Water mites of the world

HARRY SMIT

WATER MITES OF THE WORLD

with keys to the families, subfamilies, genera and subgenera (Acari: Hydrachnidia)

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Subfamily Stygomomoniinae Motaş & Tanasachi, 1946 713
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INTRODUCTION

In 1974 Dave Cook published his monumental 'Water mite genera and subgenera '. For more than four decades this has been the essential work for acaralogists working on water mites, especially those studying the world fauna. As stated by Cook (1974), there was no satisfying classification at that time from a phylogenetic point of view. This is still the situation today. Although some recent papers have been published to clarify the higher classification (Cook et al. 2000, Pešić et al. 2013, I.M. Smith et al. 2015, Dabert et al. 2016), many families are still of supposed paraphyletic origin.

Cook (1974) listed 301 genera (including subgenera now considered a genus) and 214 subgenera (synonyms excluded). Since 1974 184 new genera and 60 new subgenera (without synonymized taxa and without *Unionicola* subgenera) have been described, which increases these numbers substantially. Since 1974 44 new subgenera of the genus *Unionicola* have been described, see the chapter on this genus. The total number of genera now tallies 485, the number of subgenera 276 (including two resurrected subgenera). Moreover, 11 new families (with one family synonymized) and 23 new subfamilies (with two subfamilies synonymized) have been described. Quite some taxa have been changed in ranking, e.g. higher in ranking from subfamily to family. The figures mentioned above do not include taxa which have changed in ranking since 1974.

The aim of this publication is to make the world fauna accessible with the help of keys. For each genus a diagnosis is given, as well as its habitat and distribution.

Our present state of knowledge

Large parts of the world are still poorly investigated, especially tropical areas in Africa, South America and SE Asia (Di Sabatino et al. 2008). When Cook (1974) published his 'Water mite genera and subgenera', the fauna of the southern hemisphere was very poorly known. This applied especially to Australia, New Zealand and the southern part of South America. The situation improved considerably with the publications of Cook (1983, 1986, 1988) dealing with New Zealand, Australia and Chile, respectively.

Today a number of freshwater habitats are still underinvestigated, e.g. springs and hyporheic habitats. According to Di Sabatino et al. (2008) more than 6,000 species of water mites were known, on July 1, 2020 the number of species tallied 7,500 (pers. com. Joel Hallan). The number of genera was highest in the Neotropical region. Di Sabatino et al. (2008) expected that the number of species will increase to more than 10,000. New genera are described almost every year, and when more research will be done in the underinvestigated biotopes and areas, it is expected that this number will increase significantly.

Molecular research

Molecular research developed greatly since 1974, but few papers deal with the higher classification of water mites. The most important is the study of Dabert et al. (2016). They support the monophyly of the Hydrachnidia including the Hydrovolzioidea. The Stygothrombioidea, however, are no part of the Hydrachnidia. Concerning the internal phylogenetic structure of the water mites, Dabert et al. (2016) showed that six traditionally defined superfamilies (Hydrovolzioidea,

Eylaoidea, Lebertioidea, Hydrachnoidea, Hygrobatoidea and Arrenuroidea) are monophyletic, but that the Hydryphantoidea are of paraphyletic origin. Within the latter superfamily, the Hydrodromidae is the only monophyletic family. Two further important changes result from Dabert et al. (2016). The family Limnesiidae are part of the Lebertioidea (and not Hygrobatoidea). Finally, the genus *Neumania* is a polyphyletic group.

It is clear that much more molecular research has to be done to unravel the higher classification of the water mites. This will take quite some time, as few acarologists are working on this. Given the high number of new taxa described since 1974, I feel that new keys for the genera and subgenera are necessary now. This will be the main goal of this book.

Methods

This book deals with adult water mites, data on larvae and (deuto)nymphs are not included (except one family known only from the deutonymphal stage). Although Stygothromboidea are included in a recent text book (Davids et al. 2007), they are not included in this study. As explained in the introduction, they do not belong to the true water mites, the Hydrachnidia. The key starts with a key to the families, and for each family a key to the subfamilies, genera and subgenera can be found. For each taxon (superfamily, family, subfamily, genus and subgenus) complete references are given. All taxa except superfamilies are given in alphabetical order, after the diagnosis of the nominate taxon. Characters given under the diagnosis of the previous taxon are not repeated. The following abbreviations are used (see also Figs. 1-2): Cx-I – first coxae; Cxgl-4 – coxoglandularia 4; dgl-1 – dorsoglandularia 1; P1-5 – palp segments 1-5, I-leg-4 – fourth segment of first leg. For an explanation of the morphological terms see p. 729. For the glandularia Wiles (1997b) is followed. When the distribution is discussed, worldwide is always without Antarctica, as no water mites have been found there (Pugh & Dartnall 1994). Unless stated otherwise, the nomenclature follows K.O. Viets (1987).

THE SYSTEM OF WATER MITES

Superfamily	Family	Subfamily	Genus	Subgenus
Hydrovolzioidea	Acherontacaridae		*Acherontacarus*	
			Bharatavolzia	*Bharatavolzia*
				Bharatavolziella
	Hydrovolziidae		*Hydrovolzia*	
			Hydrovolziella	
			Stygovolzia	
Eylaoidea	Aphevideruliciidae		*Aphevideruliх*	
	Eylaidae		*Eylais*	
			Rhyncheylais	
	Limnocharidae	Limnocharinae	*Limnochares*	*Limnochares*
				Cyclothrix
			Laterolimnochares	
		Neolimnocharinae	*Neolimnochares*	
			Archaeveliacola	
			Armaveliacola	
			Isoveliacola	
			Veliacola	
		Rhyncholimnocharinae	*Rhyncholimnochares*	*Rhyncholimnochares*
				Paralimnochares
			Austrolimnochares	
	Piersigiidae	Piersigiinae	*Piersigia*	
			Austrapiersigia	
		Stygolimnocharinae	*Stygolimnochares*	
			Parawandesia	
Hydrachnoidea	Hydrachnidae		*Hydrachna*	
Hydryphantoidea	Hydryphantidae	Hydryphantinae	*Hydryphantes*	*Hydryphantes*
				Polyhydryphantes
			Georgella	
		Ankelothyadinae	*Ankelothyas*	
		Chimerathyadinae	*Chimerathyas*	
		Cowichaniinae	*Cowichania*	
		Ctenothyadidae	*Ctenothyas*	
			Stellulathyas	
		Cyclothyadinae	*Cyclothyas*	
		Diplodontinae	*Diplodontus*	
		Eupatrellinae	*Eupatrella*	
			Protziella	
		Euthyadinae	*Albertathyas*	
			Almuerzothyas	
			Amerothyasella	
			Austrotrombella	
			Columbiathyas	
			Dacothyas	
			Deuterothyas	

Superfamily	Family	Subfamily	Genus	Subgenus
			Euthyas	
			Heterothyas	
			Ignacarus	
			Iranothyas	
			Japonothyas	
			Javathyas	
			Kazakhithyas	
			Notopanisus	
			Panisellus	
			Panisopsis	*Panisopsis*
				Marshallothyas
			Panisus	
			Parathyas	
			Parathyasella	
			Placothyas	*Placothyas*
				Octothyas
			Siskiyouthyas	
			Tadjikothyas	
			Thyasella	
			Thyasides	
			Thyopsella	
			Thyopsis	
			Thyopsoides	
			Trichothyas	*Trichothyas*
				Kashmirothyas
				Lundbladia
				Neothyas
				Plesiothyas
			Vietsia	
			Zschokkea	
		Mamersinae	*Mamersa*	
		Protziinae	*Neocalonyx*	*Neocalonyx*
				Otongacarus
				Paracalonyx
			Partnunia	
			Protzia	
		Pseudohydryphantinae	*Cyclohydryphantes*	
			Pseudohydryphantes	
		Tartarothyadinae	*Tartarothyas*	
		Wandesiinae	*Euwandesia*	
			Wandesia	*Wandesia*
				Mesowandesia
				Partnuniella
	Hydrodromidae		*Hydrodroma*	
			Oxopsis	
	Rhynchohydracaridae	Clathrosperchontinae	*Clathrosperchon*	
			Clathrosperchonella	
		Rhynchohydracarinae	*Rhynchohydracarus*	*Rhynchohydracarus*
				Coibacarus

Superfamily	Family	Subfamily	Genus	Subgenus
		Santiagocarinae	*Gledhillia*	
			Santiagocarus	
	Teratothyadidae		*Teratothyas*	*Teratothyas*
				Ascoteratothyas
			Teratothyasides	*Teratothyasides*
				Hansvietsia
				Rhynchohansvietsia
	Thermacaridae		*Thermacarus*	
	Zelandothyadidae	Australiothyadinae	*Australiothyas*	
		Zelandothyadinae	*Malgasacarus*	
			Zelandothyas	
Lebertioidea	Acucapitidae		*Acucapito*	
	Anisitsiellidae	Anisitsiellinae	*Anisitsidartia*	
			Anisitsiella	
			Anisitsiellides	
			Bandakia	
			Bitabulata	
			Fuenticola	
			Gilatonia	
			Hydrobaumia	
			Mahemamersides	
			Mamersella	*Mamersella*
				Neomamersella
			Mamersides	
			Mamersopsides	
			Mamersopsis	
			Navamamersides	
			Nilgiriopsis	
			Paddelia	
			Platymamersopsis	*Platymamersopsis*
				Lavorona
			Psammotorrenticola	
			Rutacarus	*Rutacarus*
				Eorutacarus
			Shivatonia	
			Sigthoria	
			Sigthoriella	
			Sotropalpus	
			Stygomamersopsis	
			Utaxatax	*Utaxatax*
				Rospatax
		Nilotoniinae	*Bharatonia*	
			Nilotonia	*Nilotonia*
				Bolivartonia
				Cookonia
				Dartia
				Dartonia
				Davetonia
				Gereckonia
				Guanacastonia

Superfamily	Family	Subfamily	Genus	Subgenus
				Mamersonia
				Manotonia
				Tadjikodartia
				Telotaolana
			Ranautonia	
			Zelandatonia	
	Bandakiopsidae		*Bandakiopsis*	
			Cookacarus	
			Oregonacarus	
	Lebertiidae		*Lebertia*	*Lebertia*
				Brentalebertia
				Eolebertia
				Mixolebertia
				Pilolebertia
				Septlebertia
			Paralebertia	
			Scutolebertia	
	Limnesiidae	Epallagopodinae	*Epallagopus*	
		Kawamuracarinae	*Kawamuracarus*	
		Limnesiinae	*Acantholimnesia*	
			Centrolimnesia	
			Fijilimnesia	
			Limnesia	*Limnesia*
				Allolimnesia
				Duralimnesia
				Halolimnesia
				Heterolimnesia
				Limnesiella
				Limnesiellula
				Limnesiopsides
				Limnesiopsis
				Orientilimnesia
				Paralimnesia
				Pilolimnesia
				Seppiella
			Physolimnesia	
			Pterolimnesia	
			Timmsilimnesia	
			Tubophora	
			Tubophorella	
			Xenolimnesia	
		Mixdeinae	*Mixdea*	
			Tubomixdea	
		Mixolimnesiinae	*Mixolimnesia*	
		Neomamersinae	*Arizonacarus*	
			Meramecia	*Meramecia*
				Parameramecia
				Submeramecia
			Neomamersa	
		Neotorrenticolinae	*Neotorrenticola*	

Superfamily	Family	Subfamily	Genus	Subgenus
		Nicalimnesiinae	*Nicalimnesia*	
		Protolimnesiinae	*Crenolimnesia*	
			Limnesides	
			Protolimnesia	*Protolimnesia*
				Protolimnesella
				Voldroguella
		Psammolimnesiinae	*Psammolimnesia*	
		Raptorhydracarinae	*Raptorhydracarus*	
		Rheolimnesiinae	*Guanacastacarus*	
			Rheolimnesia	
			Siboneyacarus	
		Tyrrelliinae	*Neotyrrellia*	
			Tyrrellia	*Tyrellia*
				Scutotyrrellia
	Rutripalpidae		*Rutripalpus*	
	Oxidae		*Africoxus*	*Africoxus*
				Pseudofrontipoda
			Oxus	*Oxus*
				Flabellifrontipoda
				Gnaphiscus
	Sperchontidae	Apeltosperchontinae	*Apeltosperchon*	
		Sperchontinae	*Illiesiella*	
			Notosperchonopsis	
			Sperchon	*Sperchon*
				Acadiosperchon
				Hispidosperchon
				Palpisperchon
			Sperchonopsis	*Sperchonopsis*
				Sperchonopsella
	Stygotoniidae		*Stygotonia*	
	Teutoniidae		*Limnolegeria*	
			Teutonia	*Teutonia*
				Subteutonia
	Torrenticolidae	Testudacarinae	*Debsacarus*	
			Testudacarus	
		Torrenticolinae	*Monatractides*	*Monatractides*
				Pinquicola
				Rusetriella
			Neoatractides	*Neoatractides*
				Allotorrenticola
				Heteratractides
			Pseudotorrenticola	
			Stygotorrenticola	
			Torrenticola	*Torrenticola*
				Megapalpis
Hygrobatoidea	Astacocrotonidae		*Astacocroton*	
	Aturidae	Albiinae	*Albia*	*Albia*
				Albiella
				Dentalbia
				Spinalbia

Superfamily	Family	Subfamily	Genus	Subgenus
			Parasitalbia	
		Aturinae	*Ameribrachypoda*	
			Aturides	
			Aturus	*Aturus*
			Bharatalbia	*Bharatalbia*
				Bharatalbiella
				Japonalbia
			Kongsbergia	*Kongsbergia*
				Crocokongsbergia
				Kongsbergiella
				Parakongsbergia
				Pseudokongsbergia
			Neoaturus	
			Phreatobrachypoda	
			Subalbia	
			Subaturus	
		Axonopsinae	*Adelaxonopsella*	
			Albaxona	
			Axonopsalbia	
			Axonopsella	*Axonopsella*
				Chilaxonopsella
				Coaxonopsella
				Luciaxonopsella
				Neoaxonopsella
				Paraxonopsella
				Rostaxonopsella
			Axonopsis	
			Barbaxona	
			Barbaxonella	
			Barbaxonopsalbia	
			Brachypoda	
			Brachypodopsis	*Brachypodopsis*
				Kalobrachypoda
				Navinaxonopsis
			Cubaxonopsis	
			Erebaxonopsis	
			Estellacarus	
			Hexaxonopsalbia	
			Haloaxonopsis	
			Hexaxonopsis	*Hexaxonopsis*
				Plesiobrachypoda
			Javalbia	*Javalbia*
				Javalbiopsis
				Megapes
			Javalbiella	
			Kedacarus	
			Lagoenaxonopsalbia	
			Ljania	
			Miraxona	*Miraxona*
				Miraxonella

Superfamily	Family	Subfamily	Genus	Subgenus
			Miraxonides	*Miraxonides*
				Eomiraxonides
				Miraxonidella
			Neoalbia	*Neoalbia*
				Neoalbiella
			Neoaxona	*Neoaxona*
				Lamellaxona
			Neoaxonopsalbia	*Neoaxonopsalbia*
				Golaxonopsalbia
				Lankaxonopsalbia
			Neoaxonopsis	
			Neobarbaxona	
			Neobrachypoda	
			Ocybrachypoda	
			Omanaxonopsis	
			Parabrachypoda	
			Paraxonopsis	
			Polyaxonopsella	
			Prymnopsella	
			Pseudaxonopsalbia	*Pseudaxonopsalbia*
				Motasaxona
			Siamaxonopsis	
			Sinaxonopsis	
			Stokaxonopsis	
			Stygalbiella	
			Submiraxona	*Submiraxona*
				Pentalbia
			Sumatralbia	
			Subaxonopsalbia	
			Uenaxonopsis	
			Vagabundia	
			Vicinaxonopsis	
			Villaxonopsalbia	
			Woolastookia	
		Notoaturinae	*Abelaturus*	
			Acidoturus	
			Amperaturus	*Amperaturus*
				Shebaturus
			Austraturus	
			Azugaturus	
			Barwontius	
			Bleptaturus	
			Cabellaturus	
			Canterburaturus	
			Colobaturus	
			Davidsia	
			Evidaturus	
			Hestaturus	
			Kritaturus	*Kritaturus*
				Caudaturus

Superfamily	Family	Subfamily	Genus	Subgenus
			Masabania	
			Melanaturus	
			Neotryssaturus	
			Noesaturus	
			Notoaturus	
			Notaxona	
			Omegaturus	
			Paratryssaturus	
			Piotaturus	
			Pilosaturus	
			Planaturus	
			Pseudotryssaturus	
			Schwoerbelaturus	
			Spinaturus	
			Taintaturus	
			Thryptaturus	
			Tryssaturopsis	
			Tryssaturus	
			Twarntaturus	
			Uralbia	
			Valsaturus	
			Zelandalbia	
			Zelandaturus	
			Zelandopsis	
	Feltriidae		*Feltria*	*Feltria*
				Azugofeltria
				Feltriella
				Neofeltria
	Ferradasiidae		*Ferradasia*	
	Frontipodopsidae		*Frontipodopsis*	*Frontipodopsis*
				Frontipodopsella
	Omartacaridae	Omartacarinae	*Omartacarus*	*Omartacarus*
				Omartacarellus
		Maharashtracarinae	*Maharashtracarus*	
	Hygrobatidae		*Aciculacarus*	
			Actinacarus	
			Africacarus	
			Ambiguobatella	
			Ambiguobates	
			Andesobates	
			Asiabates	
			Aspidiobatella	
			Aspidiobates	
			Aspidiobatopsis	
			Atractidella	
			Atractides	*Atractides*
				Maderomegapus
				Polymegapus
				Tympanomegapus
			Australiobatella	

Superfamily	Family	Subfamily	Genus	Subgenus
			Australiobates	*Australiobates*
				Lundbladobates
			Australorivacarus	
			Brevaturus	*Brevaturus*
				Paraspidiobates
			Caenobates	
			Caledoniabates	
			Callumobates	
			Camposea	
			Coaustraliobates	
			Cookabates	
			Corticacarus	*Corticacarus*
				Corticacarellus
				Corticarides
				Lundbladacarus
				Paracorticacarus
				Polycorticacarellus
				Tetracorticacarellus
			Crenohygrobates	
			Declinatobates	
			Decussobates	
			Diamphidaxona	*Diamphidaxona*
				Diamphidaxonella
			Dockovdia	
			Dodecabates	
			Dropursa	
			Dropursides	
			Dubiobates	
			Eocorticacarus	
			Gondwanabates	
			Groonabates	
			Homtinibates	
			Hopkinsobates	
			Hygrobatella	*Hygrobatella*
				Schwoerbelobatella
			Hygrobates	*Hygrobates*
				Hygrobatides
				Hygrotetrabates
				Hygrobatomegapus
				Inflatibates
				Lurchibates
				Monobates
				Rivobates
				Schubartella
				Thonia
			Hygrobatopsis	*Hygrobatopsis*
				Hygrobatopsella
			Hygrobatractides	
			Ioannibates	
			Iranobates	

Superfamily	Family	Subfamily	Genus	Subgenus
			Javanella	
			Kallimobates	
			Karlvietsia	
			Knysnabates	
			Kyphohygrobatella	
			Kyphohygrobates	
			Mapuchacarus	
			Megapella	*Megapella*
				Megapodellides
			Mesobatella	
			Mesobates	
			Mixobates	
			Moramangabates	
			Motasia	
			Neocorticacarus	
			Notohygrobates	
			Osornobates	
			Paraschizobates	*Paraschizobates*
				Paraustraliobates
			Plesiohygrobates	
			Polyhygrobatella	
			Procorticacarus	
			Proboscibates	
			Pseudoaustraliobates	
			Rhynchaturus	
			Rhynchaustrobates	*Rhynchaustrobates*
				Victoriabates
			Schizobates	
			Sinhaladwipabates	
			Scutobates	
			Sterkspruitia	
			Stylohygrobates	
			Subcorticacarus	
			Szalayella	
			Tasmanobates	
			Tetrabates	*Tetrabates*
				Liberiobates
			Tetrahygrobatella	
			Thoracohygrobates	
			Tobelobates	
			Vietnobates	
			Zabobates	
			Zelandobatella	
			Zelandobates	
	Lethaxonidae		*Lethaxona*	*Lethaxona*
				Eolethaxona
			Lethaxonella	
			Transitia	
	Pionidae	Foreliinae	*Forelia*	
			Madawaska	

Superfamily	Family	Subfamily	Genus	Subgenus
			Pionacercopsis	
			Pionacercus	
			Pseudofeltria	
		Huitfeldtiinae	*Gereckea*	
			Huitfeldtia	
			Larri	
		Hydrochoreutinae	*Hydrochoreutes*	
		Najadicolinae	*Najadicola*	
		Pioninae	*Nautarachna*	
			Piona	
			Schwoerbelia	
			Twinforksella	
		Schminkeinae	*Schminkea*	
		Tiphyinae	*Acercella*	
			Acercopsis	
			Australotiphys	
			Neotiphys	
			Pionides	
			Pionopsis	
			Tiphys	
	Pontarachnidae		*Litarachna*	
			Pontarachna	
	Wettinidae		*Bromeliacarus*	
			Stormaxonella	
			Tasmanaxona	
			Wettina	
			Wheenyella	
			Wheenyoides	
	Unionicolidae	Encentridophorinae	*Encentridophorus*	*Encentridophorus*
				Encentridophorellus
		Omanohydracarinae	*Omanohydracarus*	
		Pionatacinae	*Amazonella*	
			Ecpolus	
			Esekalla	
			Koenikea	*Koenikea*
				Diplokoenikea
				Jurucuia
				Koenikella
				Neumanikea
				Notomideopsis
				Parakoenikea
				Pseudokoenikea
				Sespekoenikea
			Neumania	*Neumania*
				Allolemienia
				Alloneumania
				Coneumania
				Ecpolopsis
				Lemienia
				Leptopterotrichophorus

Superfamily	Family	Subfamily	Genus	Subgenus
				Neoneumania
				Nicksatax
				Soarella
				Subneumania
				Tetraneumania
			Nyangalla	*Nyangalla*
				Ecpolopella
				Subkoenikea
			Pionatax	
			Recifella	*Recifella*
				Eorecifella
				Monokoenikea
				Recifellida
				Recifellopsis
				Vietsiella
			Schadeella	
			Tanaognathus	*Tanaognathus*
				Tanaognathella
		Pollicipalpinae	*Pollicipalpus*	*Pollicipalpus*
				Pollicipalpella
		Unionicolinae	*Unionicola*	
			Vietsatax	
Arrenuroidea	Acalyptonotidae		*Acalyptonotus*	*Acalyptonotus*
				Paenecalyptonotus
	Amoenacaridae		*Amoenacarus*	
	Arenohydracaridae		*Arenohydracarus*	
	Arrenuridae		*Allarrenurus*	
			Arrenurus	*Arrenurus*
				Arrhenuropsides
				Arrhenuropsis
				Brevicaudaturus
				Dadayella
				Dividuracarus
				Megaluracarus
				Micruracarus
				Rhinophoracarus
				Rhomborificias
				Truncaturus
			Hamappendix	
			Micruracaropsis	
			Srilankurus	
			Thoracophoracarus	*Thoracophoracarus*
				Thoracophorurus
			Xenthoracaphorus	
			Wuria	
	Athienemanniidae	Africasiinae	*Africasia*	
		Athienemanniinae	*Anamundamella*	
			Bleptomundamella	
			Chelohydracarus	
			Chelomideopsis	

Superfamily	Family	Subfamily	Genus	Subgenus
			Mundamella	
			Penemundamella	
			Platyhydracarus	
			Stygohydracarus	*Stygohydracarus*
				Vicinihydracarus
		Notomundamellinae	*Davecookia*	
			Janszoonia	
			Mellamunda	
			Notomundamella	
			Phreatohydracarus	
		Stygameracarinae	*Stygameracarus*	
	Bogatiidae	Bogatiinae	*Bogatia*	
		Horreolaninae	*Horreolanus*	
	Chappuisididae	Chappuisidinae	*Chappuisides*	
		Morimotacarinae	*Morimotacarus*	
			Yachatsia	
		Tsushimacarinae	*Tsushimacarus*	
		Uchidastygacarinae	*Uchidastygacarus*	*Uchidastygacarus*
				Imamurastygacarus
	Harpagopalpidae		*Harpagopalpus*	*Harpagopalpus*
				Harpagopalpellus
	Hungarohydracaridae	Hungarohydracarinae	*Bharatohydracarus*	
			Hungarohydracarus	
			Stygarrenurus	
		Balcanohydracarinae	*Balcanohydracarus*	
		Cubanohydracarinae	*Cubanohydracarus*	
	Kantacaridae		*Kantacarus*	
	Krendowskiidae		*Allokrendowskia*	
			Geayia	*Geayia*
				Geayella
				Geayidea
				Pirapama
			Krendowskia	*Krendowskia*
				Neokrendowskia
			Roqueella	*Roqueella*
				Pararoqueella
	Laversiidae		*Laversia*	
	Mideidae		*Eumidea*	
			Midea	
	Mideopsidae	Mideopsinae	*Djeboa*	
			Mideopsella	
			Mideopsellides	
			Mideopsides	
			Mideopsis	*Mideopsis*
				Wattleopsis
			Neoxystonotus	
			Octomideopsis	
			Penemideopsis	
			Phreatomideopsis	
			Tillia	

Superfamily	Family	Subfamily	Genus	Subgenus
			Tiramideopsis	*Tiramideopsis*
				Navamideopsis
			Xystonotus	*Xystonotus*
				Mixomideopsis
		Gretacarinae	*Gretacarus*	
		Guineaxonopsinae	*Guineaxonopsis*	
			Kuschelacarus	
		Plaumanniinae	*Plaumannia*	
	Momoniidae	Momoniinae	*Austromomonia*	
			Hesperomomonia	
			Momonia	*Momonia*
				Kondia
				Orientmomonia
				Paramomonia
				Zelandomomonia
			Momoniella	
			Momonisia	
			Neomomonia	
			Notomomonia	
			Partidomomonia	
		Cyclomomoniinae	*Cyclomomonia*	
		Momonidinae	*Momonides*	
		Stygomomoniinae	*Stygomomonia*	*Stygomomonia*
				Allomomonia
			Xenomomonia	
	Neoacaridae		*Neoacarus*	
			Volsellacarus	
	Nipponacaridae		*Nipponacarus*	
	Nudomideopsidae		*Allomideopsis*	
			Neomideopsis	
			Nudomideopsis	
			Paramideopsis	
	Cladomomoniidae		*Cladomomonia*	

SYSTEMATIC ACCOUNT

Below keys are given for families, subfamilies, genera and subgenera. For the distributional data and taxonomical changes references are given after 1956 only, for data before 1956 see K. Viets (1956b). When only one species is known, in most cases no additional references are given apart from the one listed under the genus name. The keys are based on adults, with a few exceptions of genera known in the preadult stage only.

KEY TO THE FAMILIES (AFTER COOK 1974, DAVIDS ET AL. 2007, DI SABATINO ET AL. 2010, GERECKE ET AL. 2016, I.M. SMITH & COOK 2016)

1 Cx-IV with two posterior apodemes and glandularia posterior to genital field wheel-like; marine (Figs. 4-5) Pontarachnidae (pagina 568)

- Without the above mentioned character combination 2

2 Genital field without acetabula (the latter on the coxae, nearly invisible); dorsum with transverse anterior and longitudinal plate 3

- Genital field in most cases with acetabula (Fig. 6); exceptionally acetabula very small and scattered all over the membranous integument (Fig. 7), frontal area with a monocle-like or elongate eye plate; dorsum smooth or in various ways sclerotized 4

3 Dorsum with a longitudinal plate surrounded by numerous smaller but similar platelets (Fig 8); coxae lying close to each other (Fig. 9) Acherontacaridae (pagina 47)

- Dorsum with a longitudinal plate surrounded by numerous smaller but dissimilar platelets (Fig 10); coxae clearly separated from each other by soft integument (Fig. 11) Hydrovolziidae (pagina 50)

4(2) P1 longer than P2, P3 longer than P4, the latter segment reduced in size (Fig 12); gnathosoma in ventral view narrowed at the base of the slender and pointed rostrum (Fig. 13); chelicera one-segmented Hydrachnidae (pagina 71)

- Neither P1 longer than P2 nor P3 longer than P4; gnathosoma not pointed; chelicera two-segmented 5

5 Anterior dorsum with an irregularly reticulated plate surrounding the postocularia (Fig. 14); P4 with two stout dorsodistal setae (Fig. 15) Zelandothyadidae (pagina 144)

- Anterior dorsum without such reticulate plate and P4 without stout dorsodistal setae 6

6 Gnathosoma broadly widened distally, all palp segments fused (Fig. 16) Apheviderulicidae (pagina 55)

- Gnathosoma often distally narrower than at its base, palp never with all segments fused 7

7 All coxae fused on their respective sides and slightly fused anteriorly (Fig. 17); gnathosoma with a circular fringe surrounding the mouth opening (Fig. 18); genital field with three pairs of acetabula partially or completely covered by genital flaps (Fig 19) Stygotoniidae (pagina 267)

- Without the above mentioned character combination 8

8 Mouth opening surrounded by a distinct membranous fringe (as in Fig. 18); lateral eyes on a frontal sclerite (Figs. 20-22) 9

- Membranous fringe surrounding the mouth opening indistinct or absent; lateral eyes, if present, not on a frontal sclerite 11

9 Frontal sclerite large, including two pairs of glandularia (Fig. 20) Piersigiidae (pagina 60)

- Frontal sclerite without glandularia 10

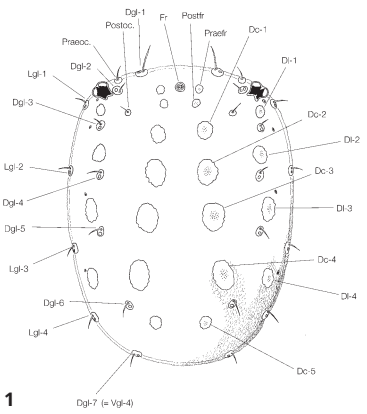
10 Frontal sclerite much longer than wide (Fig. 21) Limnocharidae (pagina 64)

- Frontal sclerite wider than long, "spectacle-shaped" (Fig. 22) Eylaidae (pagina 57)

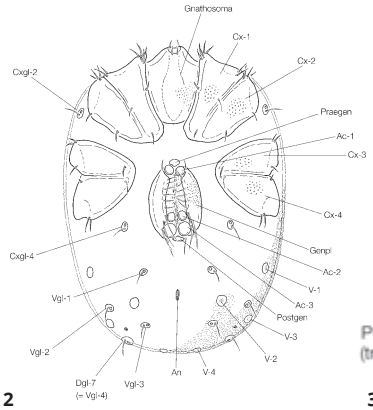
11 Palp chelate (dorsodistal projection of P4 extending beyond base of P5 (Figs. 23-24) (exception: *Neocalonyx*); gnathosoma lacking anchoral process 12

- Palp rarely chelate; when appearing chelate, then gnathosoma with anchoral process 13

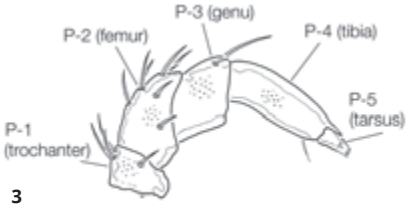
12 Pointed dorsodistal projection of P4 reaching tip level of P5 (Fig. 23); idiosoma without dorsal platelets; lateral eyes not in capsules Hydrodromidae (pagina 74)



1



2



3

1 Dorsal idiosoma terminology (after Gerecke et al. 2016)
Fr: Frontale
Dgl-1: Dorsoglandulare 1 (Antenniforme)
Dgl-2-7: Dorsoglandulare 2-7
Dgl-7: Dorsoglandulare 7 (= Vgl-4, Ventroglandulare 4)
Lgl-1-4: Lateroglandulare 1-4
Postoc: Postoculare
Preoc.: Preoculare
Dc-1-4: Dorsocentralia 1-4
Dl-1-4: Dorsolateralia 1-4

2 Ventral idiosoma terminology (after Gerecke et al. 2016)
Ac-1-3: Acetabulum 1-3
An: Excretory plate
Genpl: Genital plate
Pregen: Pregenital plate
Postgen: Postgenital plate
Cx-1-4: first to fourth coxae
Cxgl-2: Coxoglandulare 2 (Cxgl-1 and -3 not existing)
Cxgl-4: Coxoglandulare 4
Dgl-7: Dorsoglandulare 7 (= Vgl-4: Ventroglandulare 4)
Vgl-1-3: Ventroglandulare 1-3
V-1-4: Ventralia 1-4

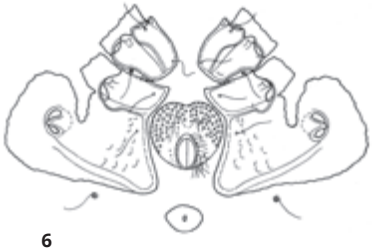
3 Terminology of the palp (after Gerecke et al. 2016)



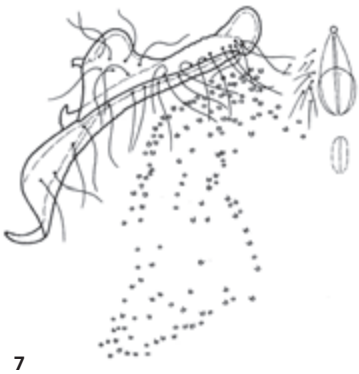
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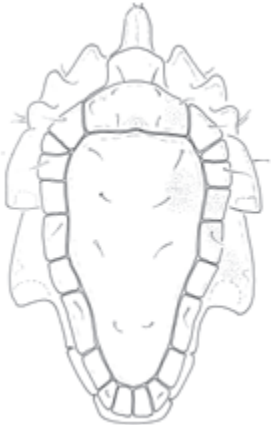
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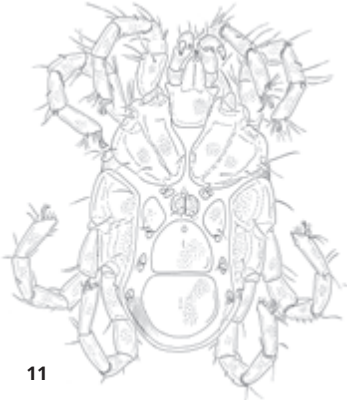
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11



12

4 *Pontarachna punctulum* Philippi, venter male (after Cook 1974)

5 *Litarachna denhami* (Lohmann), genital field male (after Cook 1974)

6 *Hydrachna kloomi* Imamura, venter male (after Cook 1974)

7 *Limnochares (Cyclothrix) crinita* Koenike, venter female (part.) (after Cook 1974)

8 *Acherontacarus nicoleiana* Valdecasas, Artheau & Boutin, dorsum male (after Davids et al. 2007)

9 *Acherontacarus nicoleiana* Valdecasas, Artheau & Boutin, venter male (after Davids et al. 2007)

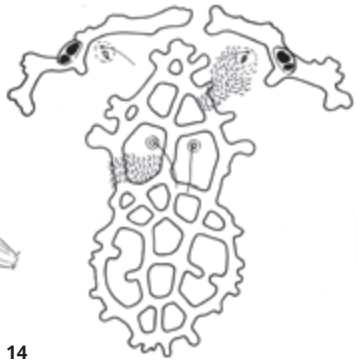
10 *Hydrovolzia placophora* (Monti), dorsum male (after Davids et al. 2007)

11 *Hydrovolzia placophora* (Monti), venter male (after Davids et al. 2007)

12 *Hydrachna cruenta* Müller, palp female (after Davids et al. 2007)



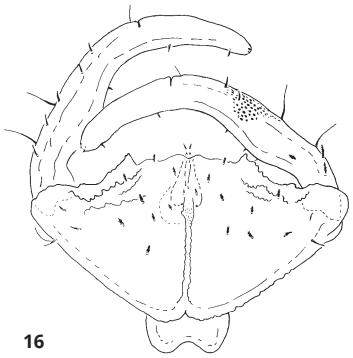
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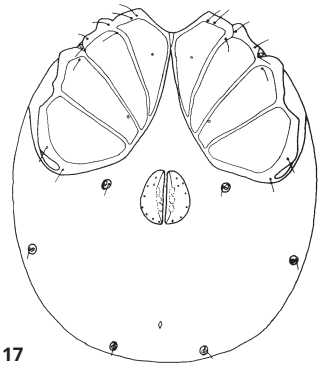
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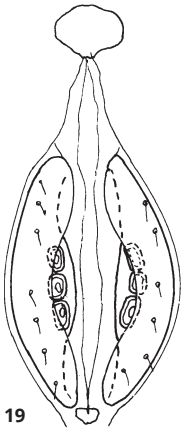
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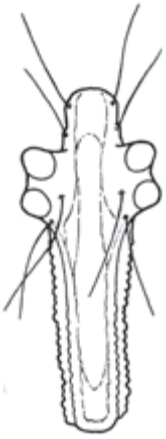
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13 *Hydrachna incisa* Halbert, gnathosoma female (after Davids et al. 2007)

14 *Zelandothyas diamphida*, frontal plate female (after Cook 1983)

15 *Zelandothyas diamphida*, palp female (after Cook 1983)

16 *Apheviderulix leptomastax* Gerecke, Smith & Cook, gnathosoma and palps deutonymph (after Gerecke et al. 1999)

17 *Stygotonia ambigua* Cook, venter male (after Cook 1992)

18 *Stygotonia ambigua* Cook, gnathosoma female (after Cook 1992)

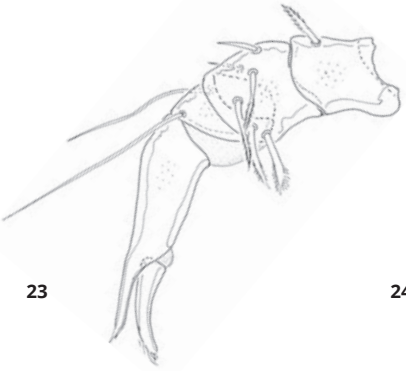
19 *Stygotonia ambigua* Cook, genital field female (after Cook 1992)

20 *Piersigia limophila* Protz, frontal sclerite female (after Cook 1974)

21 *Limnochares (Cyclothrix) crinita* Koenike, frontal sclerite female (after Cook 1974)



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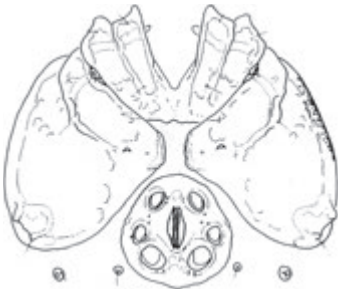
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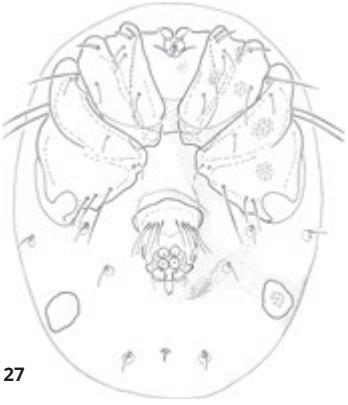
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22 *Eylais extendens* (Müller), frontal sclerite male (after Davids et al. 2007)
23 *Hydrodroma torrenticola* (Walter) palp male (after Di Sabatino et al. 2010)
24 *Diplodontus scapularis* Dugès, palp male (after Di Sabatino et al. 2010)
25 *Teutonia* (*Teutonia*) *cometes* (Koch), venter male (after Di Sabatino et al. 2010)
26 *Limnesia* (*Limnesia*) *walteri* Migot, venter male (after Gerecke et al. 2016)
27 *Rutripalpus limicola* Sokolow, venter male (after Di Sabatino et al. 2010)
28 *Rutripalpus limicola* Sokolow, palp male (after Di Sabatino et al. 2010)
29 *Monatractides madritensis* (K. Viets), dorsum male (after Di Sabatino et al. 2010)
30 *Testudacarus americanus* Marshall, dorsum female (after Cook 1974)

- Pointed dorsodistal projection of P4 not reaching tip of P5 (Fig. 24); idiosoma usually with variously developed dorsal plate(lets); lateral eyes, if present, in capsules or on plates Hydryphantidae (pagina 76)

13 Genital field with movable flaps flanking gonopore and these partially or completely covering gonopore when closed; acetabula lying free in gonopore field, not on flaps or genital plates (Fig. 25) 14

- Genital field usually without movable flaps, if flaps are present then acetabula lie on flaps rather than in the gonopore field (Fig. 26) 22

14 Cx-IV medial margins reduced to medial angles and with a pair of glandularia near these angles (Fig. 27); P4 shortened, P5 with terminally with pad-shaped claws and appearing spatulate (Fig. 28) Rutripalpidae (pagina 253)

- Cx-IV with medial margin usually well developed, if medial margins reduced then Cx-IV lacking the glandularia described above; P4 + P5 different in shape 15

15 Idiosoma integument soft; Cx-IV with a pair of glandularia or near medial margin surrounded by conspicuous membranous area or on an anteriorly directed protrusion indenting the posterior margin of Cx-III (Fig. 25) Teutoniidae (pagina 268)

- Without above mentioned character combination 16

16 Dorsal and ventral shields present; either genital field with six pairs of acetabula and dorsum with a large plate and one or two frontal platelets (Fig. 29), or genital field with three pairs of acetabula and dorsum with a large central plate surrounded by smaller platelets (Fig. 30); ventral shield with a Y-shaped suture line Torrenticolidae (pagina 270)

- Idiosoma with soft integument or various sclerotizations; if a dorsal shield is present, arrangement of dorsal sclerites different and ventral shield without Y-shaped suture line 17

17 All legs concentrated in anterior part of idiosoma and directed anteriorly (Fig. 31); coxal plate extending far onto dorsal surface Oxidae (pagina 254)

- Insertions of at least IV-legs near middle of idiosoma or further posteriorly 18

18 Coxae fused, forming a characteristic coxal shield with suture lines between Cx-II and Cx-III medially obsolete (Fig. 32) 19

- Venter with suture lines between Cx-II/III complete; if coxae fused, then without Y-shaped suture line as described above 20

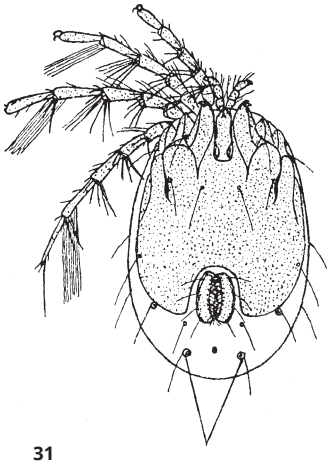
19 Suture lines between Cx-I and Cx-II forming a Y-shaped figure extending from anterior genital field to tips of Cx-I (Fig. 32); P3 not extremely elongated (Fig. 33) Lebertiidae (pagina 196)

- Suture lines between Cx-I and Cx-II not forming a Y-shaped figure (Fig. 34); P3 extremely elongated (Fig. 35) Acucapitidae (pagina 151)

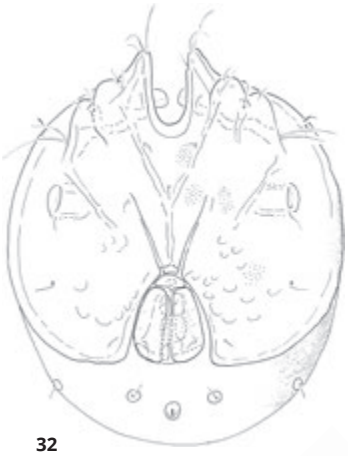
20 Lateral eyes in rounded capsules (Fig. 36); IV-L with claws; various degrees of sclerotizations may be present on venter, but never forming a complete ventral shield Sperchontidae (pagina 258)

- Lateral eyes not in capsules; IV-legs with or without claws; if claws are present, then lateral eyes located on platelets associated with ventral shield (exception: Asian genus *Bharatonia*, with the lateral eyes in well-developed capsules lying free in the integument and fourth legs with claws) 21

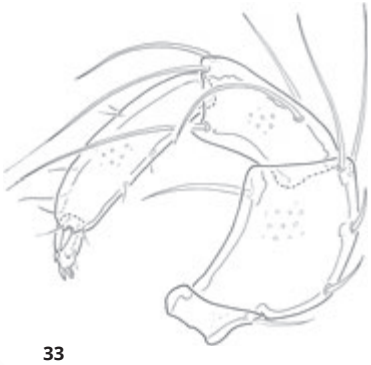
21 Cx-IV with a glandularium on the end of a finger-like extension (Fig. 37), which can be short and restricted to anteromedial part of Cx-IV or long and extending to anterolateral margins of Cx-I Bandakiopsidae (pagina 194)



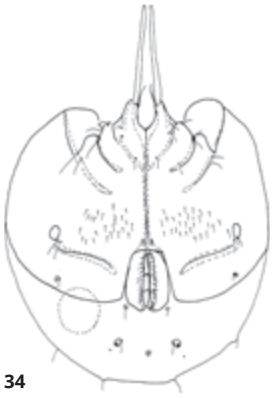
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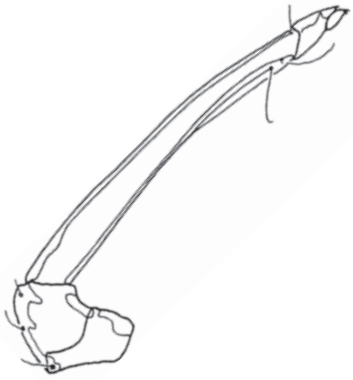
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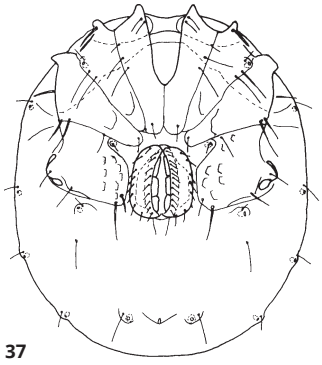
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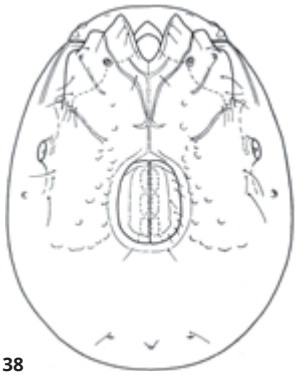
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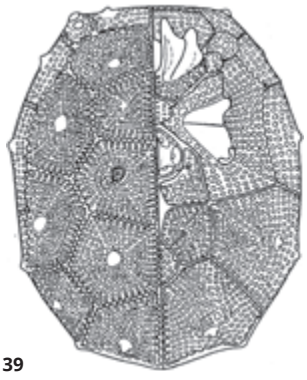
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31 *Oxus* (*Oxus*) *ovalis* (Müller), venter female (after Piersig & Lohman 1901)

32 *Lebertia* (*Mixolebertia*) *helocrenica* Gerecke, venter female (after Di Sabatino et al. 2010)

33 *Lebertia* (*Lebertia*) *sparsicapillata* Thor, palp male (after Di Sabatino et al. 2010)

34 *Acucapito naso* Wiles, venter (after Wiles 1996)

35 *Acucapito naso* Wiles, palp (after Wiles 1996)

36 *Sperchon* (*Hispidosperchon*) *clupeifer* Piersig, dorsum female (after Di Sabatino et al. 2010)

37 *Bandakiopsis fonticola* I.M. Smith, venter male (after I.M. Smith 1979)

38 *Anisitsiellides monticolus* Lundblad, venter female (after Cook 1974)

39 *Teratothyasides* (*Teratothyasides*) *lundbladi* Cook, combination of dorsum and venter female (after Cook 1974)

- Cx-IV either without glandularia or, if present, not on a finger-like extension (Fig. 38) Anisitsiellidae (pagina 152)

22(13) Dorsum and venter with a series of closely fitting reticulate platelets (Fig. 39); acetabula varying from three pairs to numerous, at least some acetabula in the membranous gonopore field Teratothyadidae (pagina 140)

- Without the above mentioned combination of characters 23

23 Genital field with 3-4 pairs of acetabula on outer margin of movable genital flaps (Fig. 40); legs and palps with numerous short, blade-like setae (Fig. 41), those of legs nearly completely covering segments Ctenothyadidae (pagina 73)

- Without the above mentioned combination of characters 24

24 Numerous acetabula on movable genital flaps (Fig. 42); dorsum with closely fitting reticulate or porose platelets (Fig. 43) Rhynchohydracaridae (pagina 134)

- Without the above mentioned combination of characters 25

25 Dorsal and ventral shields present; Cx-I with paired rows of long setae extending from tip to base; genital field with acetabula on each side in two groups, in a line on a bar-shaped sclerite flanking the gonopore, and, more numerous, in an elongated patch on posterolateral part of genital flap (Fig. 44); known from hot springs only Thermacaridae (pagina 143)

- Without the above mentioned combination of characters 26

26 Females (with membranous posteroventral area, paired genital plates and five dorsal plates): Gnathosoma with long posterior extensions separating medial margins of all coxae (Fig. 45). Males (with complete dorsal and ventral shields): Gonopore narrow and short, shifted far anteriorly, located anterior to gnathosomal base (Fig. 46). Both sexes: Cx-IV without glandularia Ferradasiidae (pagina 423)

- Without the above mentioned combination of characters 27

27 Integument soft; idiosoma somewhat elongated; all coxae lying close to each other but not fused, confined to anterior part of idiosoma; medial margins of Cx-I+II longer than medial margin of Cx-III+IV; suture line of Cx-III+IV extending at right angles to midline or slightly posteromedially (Fig. 47); genital plates with numerous acetabula on two elongate genital plates in the female but on a single elongate plate with a posterior gonopore in the male Omartacaridae (pagina 426)

- Without the above mentioned combination of characters 28

28 P2 with a ventral seta located either directly on the segment or on a socket, with some rare exceptions (Fig. 48); female acetabula, and also in many males, lying on movable genital flaps (Fig. 49); palp not uncate, claws usually absent from fourth leg Limnesiidae (pagina 204)

- P2 without a single hair-like or peg-like seta on the ventral side; rarely more than one seta may be present on the ventral side of P2; fourth legs with claws 29

29 P2 with 2-4 ventral setae, palp not uncate (Fig. 50) 30

- P2 usually without setae (Fig. 51), but when setae are present, palp uncate (Fig. 52) 31

30 Dorsal and ventral shields present; a pair of glandularia located in indentations of posterior margin of ventral shield (Fig. 53); palp five-segmented, but functionally fused into a long sickle-shaped segment with P4 much longer than P5; two or three setae present on ventral side of P2 (Fig. 50) Nipponacaridae (pagina 718)

- Dorsal and ventral shields present but without a pair of glandularia located in indentations of posterior margin of ventral shield (Fig. 54); P3 and P4 very short or fused and P1 partly fused with P2; three or four setae on medial side of P2 (Fig. 55) Bogatiidae (pagina 656)

31 Integument soft; coxae forming two groups, Cx-I and Cx–IV with short, peg-like setae (Fig. 56); male with a long petiole (Fig. 57), female with four pairs of acetabula, gonopore much longer than genital plates (Fig. 58). Known only from gill cavities of freshwater crayfish in Australia Astacocrotonidae (pagina 283)

- Without the above mentioned combination of characters 32

32 I-leg-5 much longer than I-leg-6; claw of first leg enlarged, folded backwards towards segment base to form a character grasping organ (Fig. 59) Momoniidae (pagina 700)

- I-leg-6 not forming a grasping organ 33

33 First leg with claw socket at least half as long as I-leg-6 and I-leg-6 longer than I-leg-5 (Fig. 60); idiosoma variously sclerotized but never with a bipartite dorsal shield 34

- First leg claw socket usually less than half as long as I-leg-6 (Fig. 61), when more than half as long, then either I-leg-6 shorter than I-leg-5 or dorsum with a bipartite shield 36



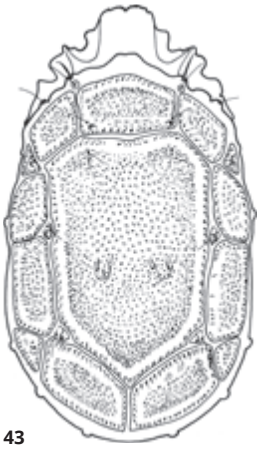
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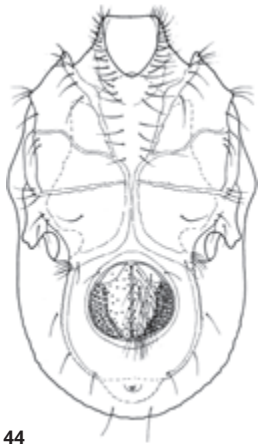
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40 *Ctenothyas verrucosa* Lundblad, venter female (after Cook 1974)

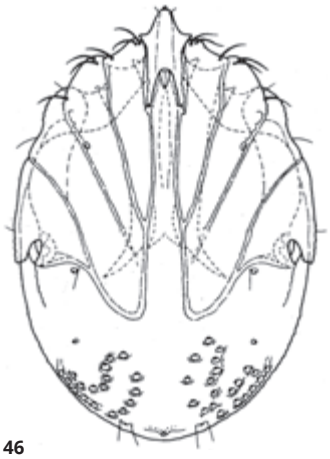
41 *Ctenothyas verrucosa* Lundblad, palp female (after Cook 1974)

42 *Rhynchohydracarus* (*Rhynchohydracarus*) *testudo* Lundblad, venter male (after Cook 1974)

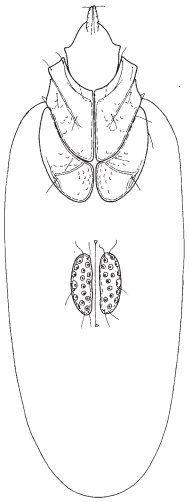
43 *Rhynchohydracarus* (*Rhynchohydracarus*) *testudo* Lundblad, dorsum male (after Cook 1974)

44 *Thermacarus nevadensis* Marshall, venter male (after Cook 1974)

45 *Ferradasia musicola* Cook, venter female (after Cook 1980)



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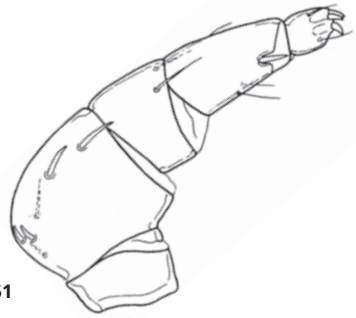
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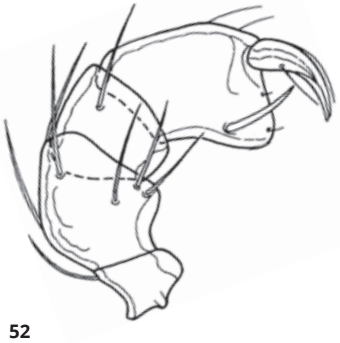
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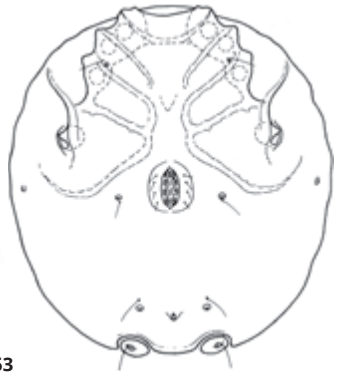
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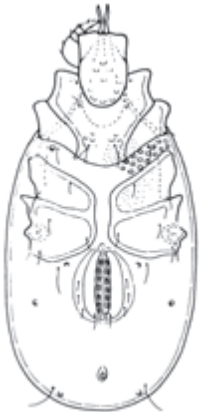
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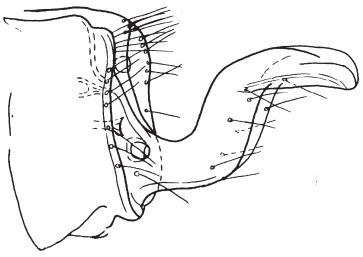
46 *Ferradasia musicola* Cook, venter male (after Cook 1980)
47 *Omartacarus* (*Omartacarus*) *elongatus* Cook, venter female (after Cook 1974)
48 *Limnesia* (*Limnesia*) *undulatoides* Davids, palp male (after Gerecke et al. 2016)
49 *Limnesia* (*Limnesia*) *lembangensis* Piersig, venter female (after Cook 1974)
50 *Nipponacarus matsumotoi* Imamura, palp male (after Cook 1974)
51 *Astacocroton molle* Haswell, palp male (after Cook 1974)
52 *Arrenurus* (*Arrenurus*) *pseudoaffinis* Piersig, palp male (after Cook 1974)
53 *Nipponacarus matsumotoi* Imamura, venter male (after Cook 1974)
54 *Bogatia maxillaris* Motaş & Tanasachi, venter male (after Cook 1974)



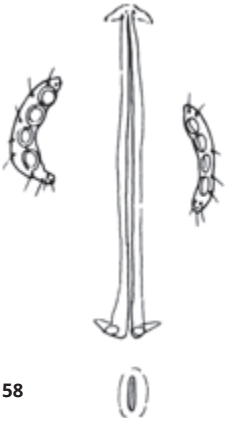
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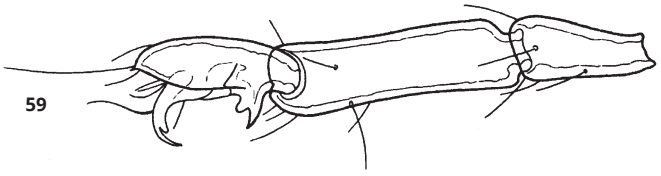
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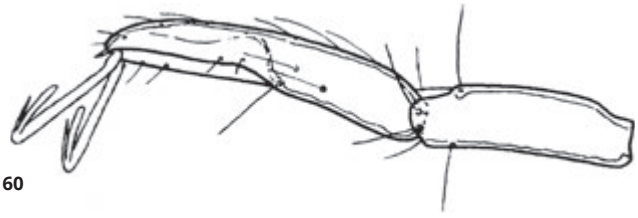
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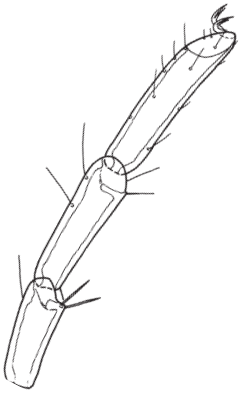
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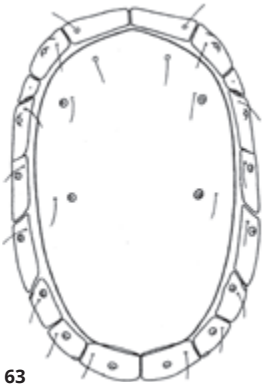
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55 *Bogatia maxillaris* Motaş & Tanasachi, dorsal view palp male (after Cook 1974)

56 *Astacocroton molle* Haswell, venter male (after Cook 1974)

57 *Astacocroton molle* Haswell, petiole male (after Cook 1974)

58 *Astacocroton molle* Haswell, genital field female (after Cook 1974)

59 *Momoniella africana* Cook, I-leg-4-6 male (after Cook 1974)

60 *Lethaxona* (*Lethaxona*) *kutapalpis* Cook, I-leg-5-6 female (after Cook 1974)

61 *Frontipodopsis* (*Frontipodopsella*) *reticulatifrons indicus* Cook, I-leg-4-6 male (after Cook 1967)

62 *Lethaxona* (*Lethaxona*) *panduvarna* Cook, venter female (after Cook 1974)

63 *Lethaxona* (*Lethaxona*) *panduvarna* Cook, dorsum female (after Cook 1974)

34 Insertions of IV-L close to midline (Fig. 62); dorsum with a central plate surrounded by a ring of 8-9 pairs of smaller platelets (Fig. 63) Lethaxonidae (pagina 541)

- Insertions of IV-L laterally (Fig. 64); dorsum without or with only 5 pairs of plaelets 35

35 Claws of I-leg-6 very long (Fig. 3080); a dorsal shield present, not surrounded by platelets Cladomomoniidae (pagina 722)

- Claws of I-leg-6 short (Fig. 2460); if a dorsal shield present (only *Stormaxonella*), the central plate surrounded by 5 pairs of platelets only (Fig. 65) Wettinidae (pagina 570)

36 Idiosoma strongly laterally compressed (Fig. 66); IV-L segments dorsoventrally expanded and laterally flattened Frontipodopsidae (pagina 424)

- Idiosoma not strongly laterally compressed, fourth leg segments normal in shape or (rarely) laterally flattened 37

37 Venter with complete ventral shield, dorsum without sclerotization. Coxae forming one group, with suture line of Cx-III/IV incomplete and medial margin of Cx-IV reduced to sharp angles; Cx-IV without glandularia (Fig. 67) Acalyptonotidae (pagina 621)

- If venter completely sclerotized, also dorsum often with a shield, at least with small sclerotizations; coxae various in shape 38

38 Dorsal and ventral shields present; acetabula scattered laterally in integument (these extremely difficult to see, Figs. 68-69) as well as in gonopore region; palp uncate, P4 greatly expanded ventrally, P5 elongate and sharply pointed (Fig. 70) Harpagopalpidae (pagina 665)

- Without the above mentioned combination of characters 39

39 Dorsal and ventral shields present; palp uncate; gnathosoma often spoon-shaped, in dorsal view enlarged (Fig. 71), in lateral view appearing pointed, with a pair of long subterminal setae (absent in Plaumanniinae, Fig. 72) Athienemanniidae (pagina 641)

- Without the above mentioned combination of characters 40

40 Dorsal and ventral shields present; median margin of Cx-IV not reaching midline; acetabula in the gonopore field (3-6 pairs in males, 4-9 pairs in females), their basal sclerites fused with genital plates on their respective sides (Fig. 73); palp uncate Neoacaridae (pagina 716)

- Median margin of Cx-IV often reaching midline, acetabula number various, often at least some of them in the ventral sclerotization; palp uncate or not 41

41 Dorsal and ventral shields present; dorsal shield with four pairs of glandularia, including a pair anterior to postocularia (Fig. 74); ventral shield variously modified, median margin of Cx-IV long, and suture line Cx-III/Cx-IV extending at right angles to midline with Cxgl-4 located at anteromedial corner of Cx-IV (Fig. 75); palp various, from slightly modified to uncate, or highly modified Chappuisididae (pagina 659)

- Without the above mentioned combination of characters 42

42 Dorsal and ventral shields present; Cxgl-2 shifted far forward on Cx-II (Fig. 76); acetabula of female lying in gonopore field (Fig. 77) or on genital plates closely flanking the gonopore (Fig. 78); palp not uncate 43

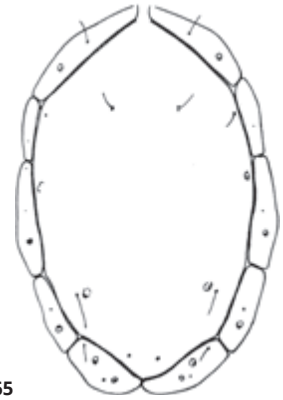
- Dorsal and ventral shields present or absent; Cxgl-2 not shifted forward on Cx-II; acetabula arrangement various; palp various 44

43 Suture lines Cx-III/IV ending far anterior to genital field; genital field of male (with a slit-shaped gonopore) not highly modified, without wing-like sclerites (Fig. 76) Nudomideopsidae (pagina 719)

- Suture lines Cx-III/IV extending to genital field (Fig. 79); male genital field with variously developed wing-like sclerites (Fig. 80) Mideidae (pagina 679)



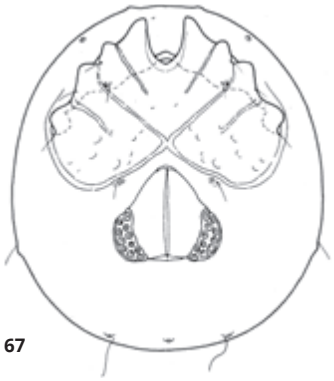
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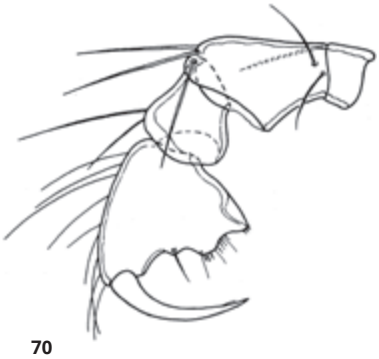
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64 *Wettina podagrica* Koch, venter male (after Gerecke et al. 2016)

65 *Stormaxonella scutulata* K.O. Viets, dorsum male (after Cook 1974)

66 *Frontipodopsis* (*Frontipodopsella*) *reticulatifrons* Szalay, dorsum male (after Gerecke et al. 2016)

67 *Acalyptonotus* (*Acalyptonotus*) *violaceus* Walter, venter female (after Cook 1974)

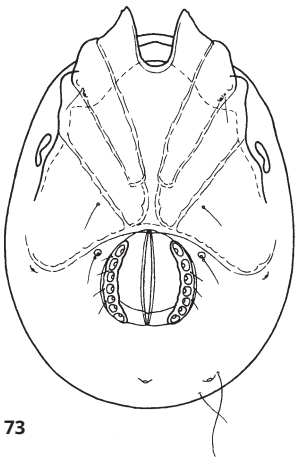
68 *Harpagopalpus* (?) *indicus* Cook, venter female (after Cook 1974)

69 *Harpagopalpus* (?) *indicus* Cook, detail genital field region female (after Cook 1974)

70 *Harpagopalpus* (?) *indicus* Cook, palp female (after Cook 1974)

71 *Mundamella germanica* K. Viets, dorsal view gnathosoma female (after Cook 1974)

72 *Plaumannia crenophila* Lundblad, lateral view gnathosoma male (after Cook 1974)



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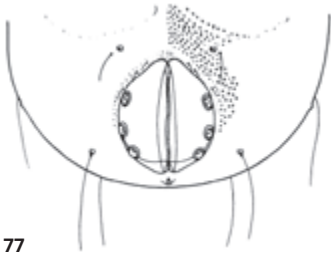
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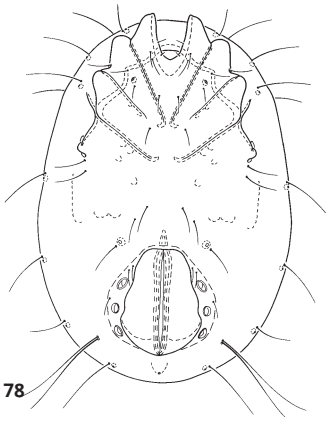
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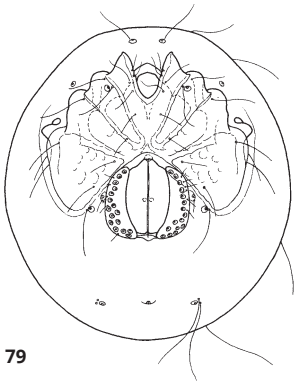
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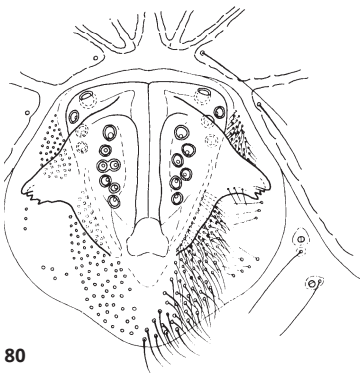
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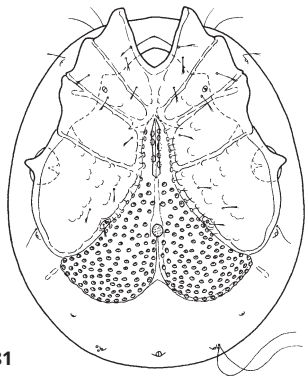
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81

73 *Neoacarus occidentalis* Cook, venter female (after Cook 1974)

74 *Chappuisides eremitus* Cook, dorsum male (after Cook 1974)

75 *Chappuisides eremitus* Cook, venter female (after Cook 1974)

76 *Nudomideopsis motasi* (Petrova), venter male (after Cook 1974)

77 *Nudomideopsis motasi* Petrova, genital field female (after Cook 1974)

78 *Allomideopsis wichitaensis* I.M. Smith, venter female (after I.M. Smith 1990b)

79 *Midea expansa* Marshall, venter female (after Cook 1974)

80 *Midea orbiculata* (Müller), genital field male (after Cook 1974)

81 *Laversia berulophila* Cook, venter male (after Cook 1974)

44(42) Dorsal and ventral shields present; Cxgl-2 located slightly anterior to suture line Cx-II/III; males (with a slit-shaped, narrow gonopore) with acetabula both on genital plates and in gonopore (Figs. 81, 82) and with genital field anteriorly extending to the level of Cx-II, females (with rounded gonopore field) with acetabula on genital plates with a concave anterolateral margin (Fig. 83); palp not uncate Laversiidae (pagina 679)

- Idiosoma sclerotization various; males: If gonopore shifted between Cx-II, then without acetabula in the gonopore field. Females: Genital plates, if extending laterally, then without concave anterolateral margin 45

45 Dorsal and ventral shields present; palp uncate either with P2 with two (near)ventral setae or P2 with a patch of setae; acetabula numerous, on genital plates in female (Fig. 84), confined to gonopore field in male (Fig. 85); palp uncate (Fig. 86) Hungarohydracaridae (pagina 667)

- Idiosoma sclerotization and genital field various; palp uncate or not, taxa with particular ventral setation of P2 have all acetabula included into the ventral sclerotization 46

46 Dorsal and ventral shields present; insertions of IV-L covered by lobed extensions of Cx-IV; genital field with three pairs of acetabula on plates fused to the ventral shield flanking gonopore field (Fig. 87); dorsal shield with six pairs of glandularia (Fig. 88) Kantacaridae (pagina 672)

- Generally with more than three pairs of acetabula; if only three pairs present, these confined to the membranous gonopore field 47

47 Dorsal and ventral shields present; posterior suture lines of Cx-IV obliterated; male (gonopore field distinctly longer than wide) with 1-2 pairs of acetabula lying in gonopore field, and further acetabula in ventral shield posterior to gonopore (Fig. 89); female (gonopore field slightly longer than wide) with all acetabula in the ventral shield (Fig. 90); P4 with slight distoventral bulge but not forming a true uncate palp (Fig. 91) Arenohydracaridae (pagina 624)

- Genital field various, but not as described above; palp uncate or not 48

48 Dorsal and ventral shield present; median margins of Cx-IV reduced to medial angles and with a pair of glandularia located at angles; acetabula located in gonopore field in both sexes (Fig. 92); insertions of IV-L covered by extensions of Cx-IV; palp uncate (Fig. 93) Krendowskiidae (pagina 672)

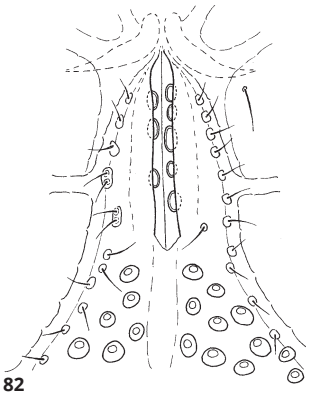
- Venter various, but Cx-IV with well developed medial margins and /or without a glandularium in this position 49

49 Dorsal and ventral shields present; male genital field located at posterior end of venter and with two pairs of acetabula in gonopore field and several pairs in the ventral shield (Fig. 94); insertions of IV-L covered by extensions of Cx-IV; IV-leg-6 greatly expanded (Figs. 95, 96); females with numerous acetabula lying on plates flanking gonopore field but are separate from ventral shield (Fig. 97); P2 and P4 with a pointed ventral extension (Fig. 98) Amoenacaridae (pagina 622)

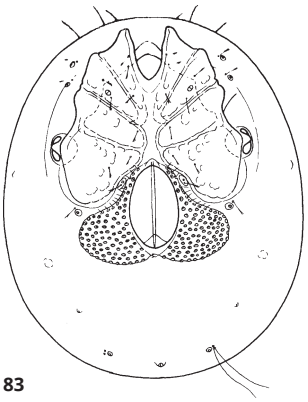
- Acetabula (three to numerous pairs) in the ventral shield surrounding gonopore field or on separate genital plates 50

50 Dorsal and ventral shield present; acetabula confined to gonopore field in both sexes (Figs. 99, 100); insertions of IV-L with either no or only very small extensions of Cx-IV Mideopsidae (pagina 681)

- Idiosoma sclerotization various; acetabula in the ventral shield or on distinct genital plates flanking gonopore 51



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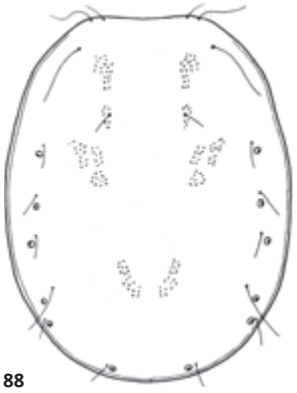
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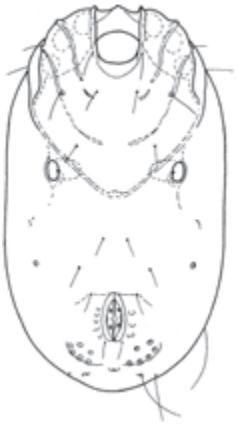
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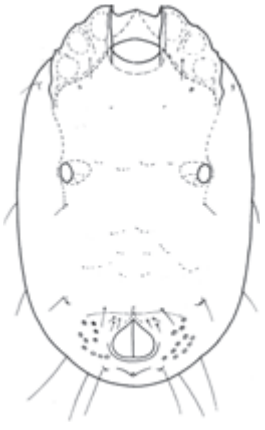
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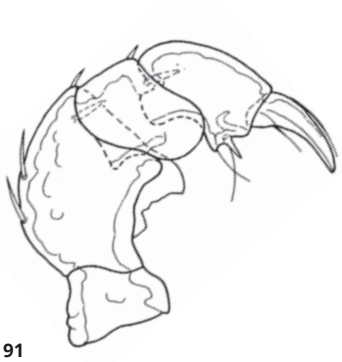


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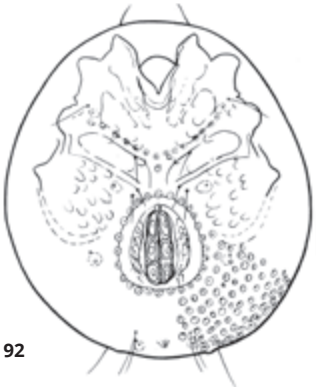


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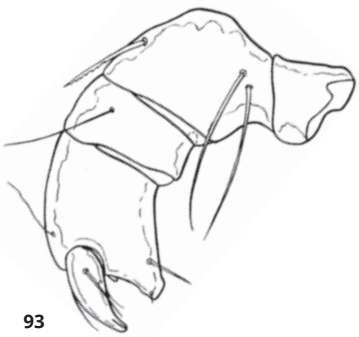
82 *Laversia berulophila* Cook, genital field male (after Cook 1974)
83 *Laversia berulophila* Cook, venter female (after Cook 1974)
84 *Bharatohydracarus phreaticus* Cook, venter female (after Cook 1974)
85 *Bharatohydracarus phreaticus* Cook, venter male (after Cook 1974)
86 *Bharatohydracarus phreaticus* Cook, palp female (after Cook 1974)
87 *Kantacarus matsumotoi* Imamura, venter female (after Cook 1974)
88 *Kantacarus matsumotoi* Imamura, dorsal shield female (after Cook 1974)
89 *Arenohydracarus minimus* Cook, venter male (after Cook 1974)
90 *Arenohydracarus minimus* Cook, venter female (after Cook 1974)



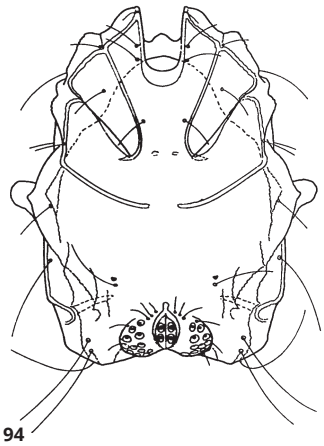
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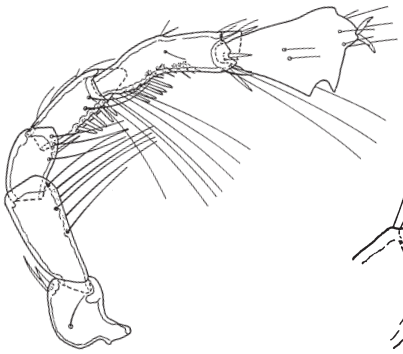
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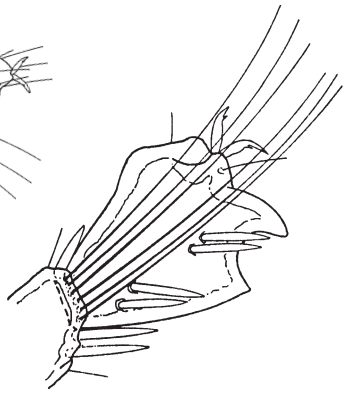
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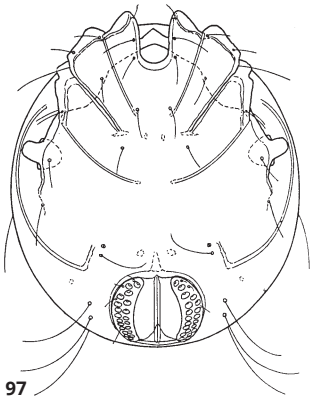
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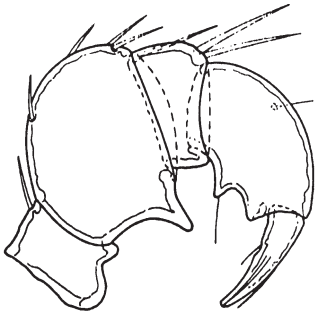
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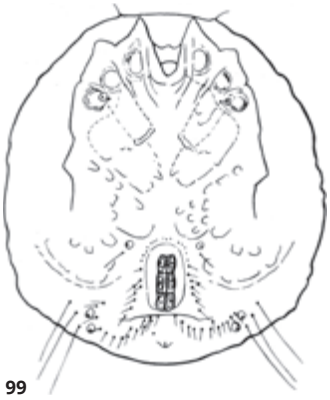
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91 *Arenohydracarus minimus* Cook, palp male (after Cook 1974)

92 *Krendowskia* (*Krendowskia*) *dorsolineata* Lundblad, venter male (after Cook 1974)

93 *Krendowskia* (*Krendowskia*) *dorsolineata* Lundblad, palp female (after Cook 1974)

94 *Amoenacarus dixiensis* I.M. Smith & Cook, venter male (after I.M. Smith & Cook 1997)

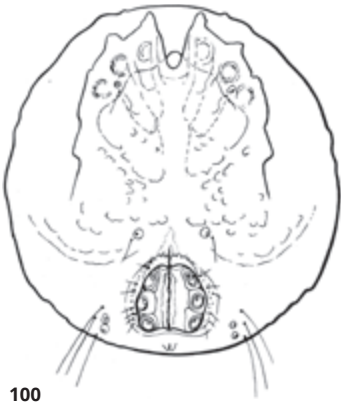
95 *Amoenacarus dixiensis* I.M. Smith & Cook, fourth leg male (after I.M. Smith & Cook 1997)

96 *Amoenacarus dixiensis* I.M. Smith & Cook, IV-leg-6 male (after I.M. Smith & Cook 1997)

97 *Amoenacarus dixiensis* I.M. Smith & Cook, venter female (after I.M. Smith & Cook 1997)

98 *Amoenacarus dixiensis* I.M. Smith & Cook, palp male (after I.M. Smith & Cook 1997)

99 *Mideopsis* (*Mideopsis*) *longidens* Lundblad, venter male (after Cook 1974)



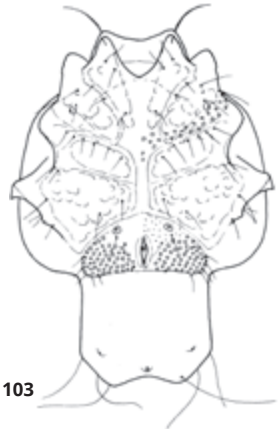
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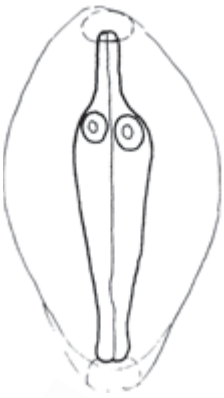
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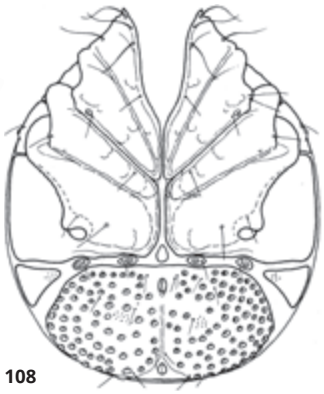
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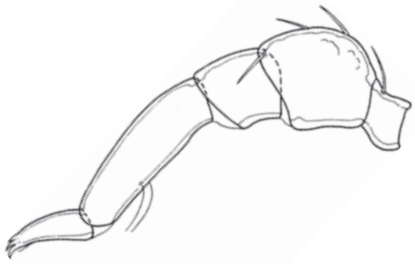


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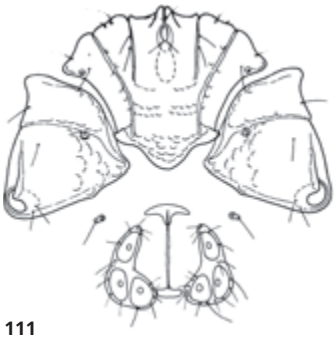
100 *Mideopsis* (*Mideopsis*) *longidens* Lundblad, venter female (after Cook 1974)
101 *Arrenurus* (*Megaluracarus*) *conicus* Piersig, venter male (after Gerecke et al. 2016)
102 *Arrenurus* (*Megaluracarus*) *conicus* Piersig, venter female (after Gerecke et al. 2016)
103 *Xenthoracaphorus chilensis* (Cook), venter male (after Cook 1988)
104 *Xenthoracaphorus chilensis* (Cook), gonopore male (after Cook 1988)
105 *Arrenurus* (*Megaluracarus*) *securiformis* Piersig, dorsum male (after Gerecke et al. 2016)
106 *Arrenurus* (*Arrenurus*) *dadayi* Cook, dorsum male (after Cook 1974)
107 *Micruracaropsis phytotelmaticola* (K. Viets), palp male (after Cook 1974)
108 *Feltria* (*Feltria*) *wyomingsensis* Cook, venter male (after Cook 1974)



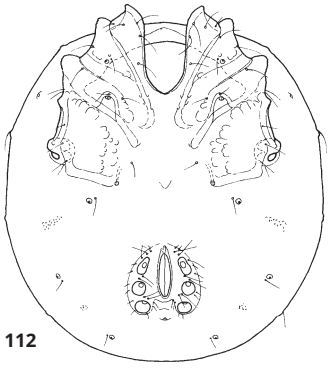
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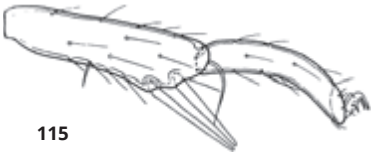
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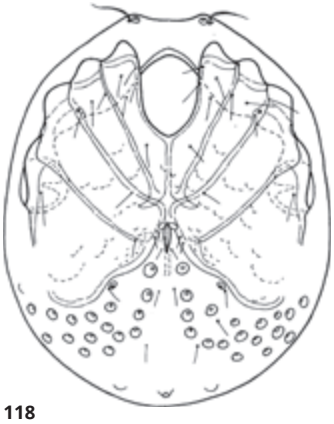
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118

109 *Feltria* (*Feltria*) *falcicorna* Cook, venter female (after Cook 1974)
110 *Feltria* (*Feltria*) *plana* Cook, palp female (after Cook 1974)
111 *Hygrobates* (*Hygrobates*) *grimshawi* Cook, venter female (after Cook 1974)
112 *Aspidiobates similis* Cook, venter male (after Cook 1986)
113 *Procorticacarus hirsutus* (K.O. Viets), dorsum male (after Cook 1986)
114 *Mixobates inermis* (Cook), I-leg-5-6 female (after Cook 1974)
115 *Atractides* (*Atractides*) *ootacamundis* Cook, I-leg-5-6 male (after Cook 1974)
116 *Nautarachna queticoensis* I.M. Smith, IV-leg-4 male (after Cook 1974)
117 *Pseudofeltria laversi* Cook, palp female (after Cook 1974)
118 *Pseudofeltria laversi* Cook, venter male (after Cook 1974)



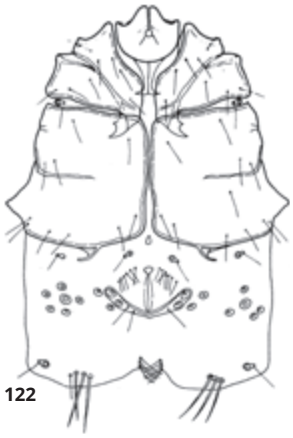
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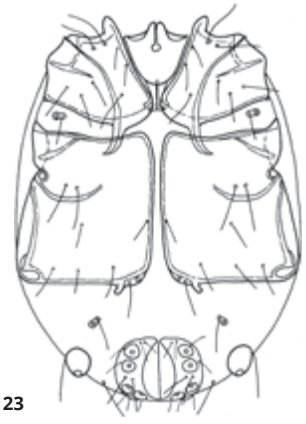
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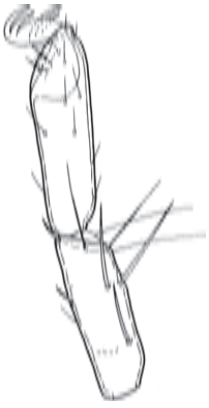
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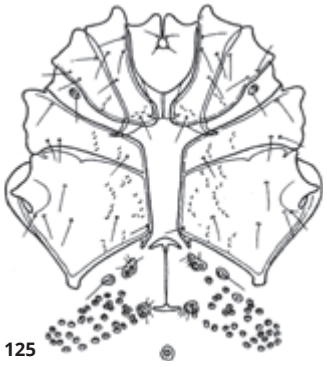
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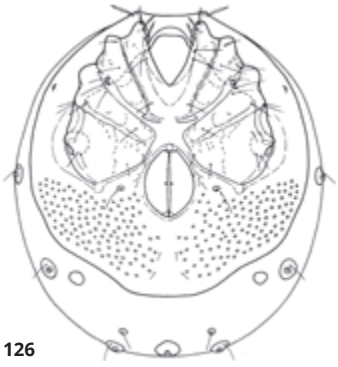
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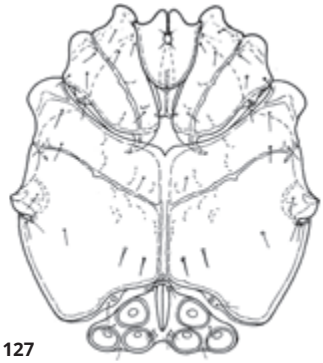
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119 *Pollicipalpus* (*Pollicipalpus*) *scutatus* K. Viets, venter male (after Cook 1974)

120 *Unionicola affinis* (Piersig), first leg male (after Cook 1974)

121 *Encentridophorus* (*Encentridophorus*) *alatus* Cook, fourth leg male (after Cook 1974)

122 *Encentridophorus* (*Encentridophorus*) *similis* Cook, venter male (after Cook 1974)

123 *Unionicola affinis* (Piersig), venter male (after Cook 1974)

124 *Forelia floridensis* Cook, I-leg-5-6 female (after Cook 1974)

125 *Piona damasiella* Cook, venter female (after Cook 1974)

126 *Nautarachna queticoensis* I.M. Smith, venter female (after Cook 1974)

127 *Pionopsis paludis* Habeeb, venter male (after Cook 1974)

51 Dorsal and ventral shields present; acetabula numerous, confined to genital plates extending laterally from gonopore and embedded in the ventral shield (Fig. 101, 102) (exception: the genus *Xenthoracaphorus* from Chile with a pair of acetabula in the gonopore field, Figs. 103, 104); female idiosoma relatively unmodified (Fig. 102), male with moderately to extremely modified posterior idiosoma, often cauda-like extended (Fig. 105) and with an unpaired terminal petiole (Fig. 106); palp uncate (exception: a *Micruracaropsis* species from a bromeliad in Surinam, Fig. 107) Arrenuridae (pagina 625)

- Idiosoma sclerotization various, with or without dorsal and ventral shields; males may have variously developed cauda like structures, but in general without development of an unpaired petiole; palp not uncate 52

52 Dorsum with sclerotizations varying from scattered platelets to a complete dorsal shield; typically, venter between Cx-IV and genital field with two pairs of glandularia in a transverse line (Figs. 108, 109); P2 lacking a peg-like seta (Fig. 110) Feltriidae (pagina 419)

- Sclerotizations of dorsum variable; venter typically without two pairs of glandularia between Cx-IV and genital field; when these glandularia are present, then P2 with a peg-like seta 53

53 A pair of glandularia present on Cx-IV (Fig. 111), occasionally extending far anteriorly on an anteriorly directed loop of suture line (Fig. 112) 54

- Glandularia absent from Cx-IV 55

54 Usually soft bodied, but a few to many dorsal or ventral platelets may be present (Fig. 113); if complete dorsal and ventral shields present, then I-leg-5 mediodistally with a characteristic fine, downturned seta (Figs. 114, 115) Hygrobatidae (pagina 429)

- Dorsal and ventral shields present, I-leg-5 without a characteristic fine, downturned seta Aturidae (in part) (pagina 283)

55(53) Dorsal and ventral shields present 56

- Dorsal and ventral shields absent, scattered platelets may be present 58

56 Genital field with numerous acetabula (> 10 pairs); either IV-leg-4 of male concave on one side with numerous peg-like setae (Fig. 116), or median surface of P4 with a peg-like seta at distal end (Fig. 117) and coxal plates lacking well-developed projections associated with insertions of IV-leg (Fig. 118) Pionidae (in part) (pagina 544)

- Number of acetabula various, from three to numerous pairs; if male fourth leg modified, not as described above 57

57 Insertions of fourth legs with large associated projections that extend laterally or only slightly posteriorly, or when projections extend decidedly posteriorly (Fig. 119), then P4 with lateral projections Unionicolidae (in part) (pagina 576)

- Openings for projections of fourth legs with either small or no associated projections, or, when large projections present they are directed or decidedly posterolaterally; P4 lacking lateral projection Aturidae (in part) (pagina 283)

58(55) Claws simple or with clawlets (Fig. 121); first leg usually with numerous grooved or fluted setae (Fig. 120); posterior margin of Cx-IV truncate or only slightly rounded, generally with a short apodeme projecting in the centre (Figs. 122, 123) Unionicolidae (in part) (pagina 576)

- Claws always with clawlets (Fig. 124); first leg without fluted or grooved setae; posterior margin of Cx-IV generally forming an obtuse or acute angle in the centre (Figs. 125-127) Pionidae (in part) (pagina 544)

SUPERFAMILY HYDROVOLZIOIDEA THOR, 1905

1905 Hydrovolziidae Thor, Zoologischer Anzeiger 28: 509.

DIAGNOSIS: Idiosoma dorsoventrally flattened. Dorsum with two unpaired central plates, a short and broad anterior plate with four setae, and a long posterior plates with four pairs of setae. Integument surrounding the central plates with 2-11 pairs of small platelets, alternately with a seta. Eye capsules, if present, lying separate. Gonopore flanked by movable flaps, no acetabula in the genital field, but these are lying on the coxae, especially near leg insertions. Genital field and excretory pore sclerite lying close to each other in the interspace between Cx-I and –II and the medial margins of Cx-III+IV. Sclerotization of the ventral shield variable, ranging from 4-8 plates to a complete ventral shield that includes the coxae. Palp five-segmented, not chelate. Gnathosoma with a well-developed rostrum, chelicera 2-segmented, not fused. Legs without swimming setae, fourth leg sometimes with sexual dimorphism.

KEY TO THE FAMILIES

1 Dorsum with five to many platelets flanking the large central plates (Figs. 128, 129) Family Acherontacaridae

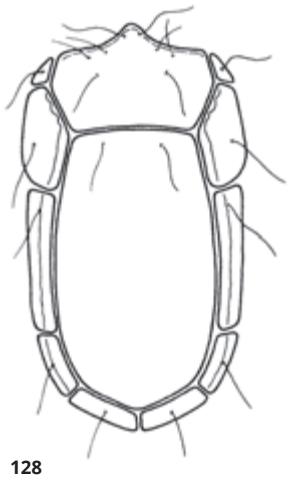
- Dorsum with 2-3 platelets flanking the large central plates (Fig. 130) Family Hydrovolziidae

Family Acherontacaridae Cook, 1967

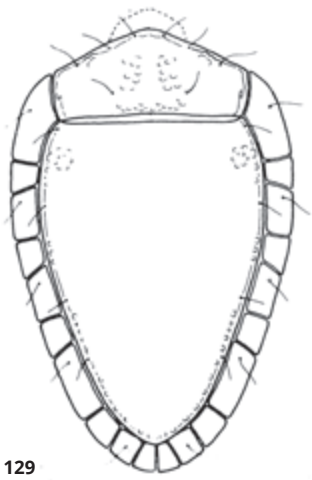
1967 Acherontacarinae Cook, Memoirs of the American Entomological Institute 9: 15.

2001 Acherontacaridae - Tuzovskij, Benfatti & Gerecke, Acarologia 41: 471.

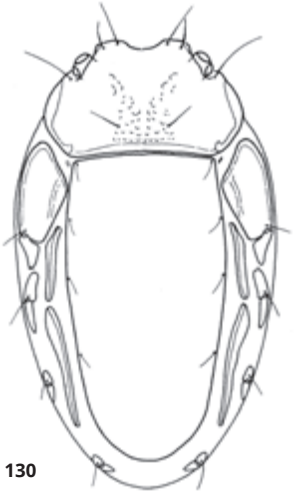
DIAGNOSIS: Dorsum with two central plates, surrounded by 5-10 plates flanking the large central plates. These plates alternately with setae and accompanying glandularia. Venter with coxae in four groups, closely adpressed to each other, forming together with the genital field a compact ventral surface. Suture lines of Cx-I/II visible only in lateral parts. Vgl-1 and Vgl-3 always without glandularia. Fourth leg with sexual dimorphism.



128



129



130

128 *Bharatavolzia pallida* Cook, dorsum female (after Cook 1974)

129 *Acherontacarus bicornis* Cook, dorsum female (after Cook 1974)

130 *Hydrovolzia marshallae* Cook, dorsal view female (after Cook 1974)

KEY TO THE GENERA

1 Dorsal shield with ten pairs of lateral platelets surrounding the large central plates (Fig. 130); several smaller platelets in the area of the genital field (Fig. 131); female genital field much longer than wide (Figs. 132, 133) Genus *Acherontacarus*

- Dorsal shield with five pairs of lateral platelets surrounding the large central plates (Fig. 128); without smaller platelets in the area of the genital field (Fig. 133); female genital field wider than long (Fig. 135) Genus *Bharatavolzia*

Genus *Acherontacarus* K. Viets, 1932

(Fig. 8-9, 129, 131-133, 136-138)

1932 *Acherontacarus* K. Viets, Zoologischer Anzeiger 100: 292.

1962 *Acherontacarellus* Lundblad, Arkiv för Zoologi Serie 2, 15: 285 - Benfatti & Gerecke (1999).

1967 *Acherontacaropsis* Cook, Memoirs of the American Entomological Institute 9: 16 – Benfatti & Gerecke (1999).

1989 *Neoacherontacarus* Bader, Bijdragen tot de Dierkunde 59: 33 - Benfatti & Gerecke (1999).

Type species: *Acherontacarus halacaroides* Viets, 1932

DIAGNOSIS: Dorsum with ten pairs of lateral platelets flanking the large central plate (Figs. 8, 129). Tiny glandularia openings present at anterior margins of lateral dorsal platelets without a seta; similarly, on the two mall platelets flanking the genital field, the median platelets with a seta and near the median margin of the more lateral platelet a tiny gland. Excretory pore platelet and three pairs of smaller platelets in the genital field area. Suture line of Cx-I/II extending posteromedially. Typically, all coxal groups separated, but Cx-I occasionally fused medially. Female genital field much longer than wide (Fig. 133). IV-leg-6 of male expanded and with enlarged setae (Fig. 137).

HABITAT: Interstitial habitats, springs and streams.

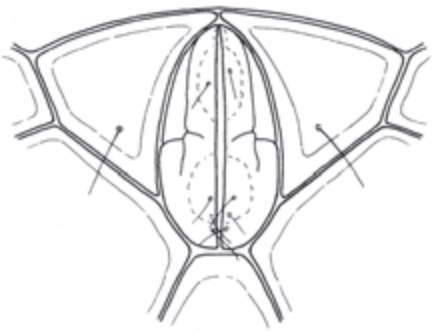
DISTRIBUTION: A dozen species known from the Mediterranean area, North Africa, the Canary Islands (Gerecke & Benfatti 2004), southern France (Valdecasas et al. 2005), Turkey (Boyaci et al. 2010) and one species known from eastern North America (I.M. Smith 2010).



131



132



133

131 *Acherontacarus bicornis* Cook, venter male (after Cook 1974)

132 *Acherontacarus bicornis* Cook, venter female (after Cook 1974)

133 *Acherontacarus halacaroides* K. Viets, genital field female (after Cook 1974)

Genus *Bharatavolzia* Cook, 1967

(Figs. 128, 134, 135, 139-141)

1967 *Bharatavolzia* Cook, Memoirs of the American Entomological Institute 9: 15.

1975 *Edsvolzia* Habeeb, Leaflets of Acadian Biology 64: 2 – new syn.

Type species: *Bharatavolzia musicola* Cook, 1967

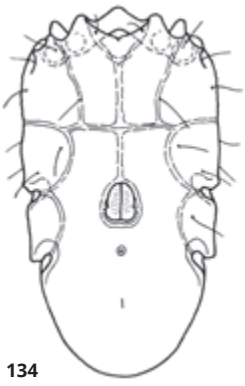
DIAGNOSIS: Dorsum with five pairs of lateral platelets flanking the two central plates, all lateral platelets with a seta (Fig. 128). Eye capsules present or absent. Coxae and genital field fused into a large ventral shield. Suture lines of Cx-I and –II directed almost posteriorly. Male genital field longer than wide (Fig. 134), female genital field wider than long (Fig. 135). Legs not exhibiting sexual dimorphism.

REMARKS: Habeeb (1975) placed the female of *B. pallida* (which he gave a new name, i.e. *E. graceffoa*) in a new genus, *Edsvolzia*, because the genital field is placed far anteriorly between Cx-I. However, in all known females of the genus *Bharatavolzia* the genital field is placed far anteriorly, and very likely this is a character of females of the genus *Bharatavolzia*. Therefore, I propose to synonymize *Edsvolzia* with *Bharatvolzia*.

KEY TO THE SUBGENERA

1 Eye capsules present; male anteromedial plate without sculpturing (Fig. 140)
Subgenus *Bharatavolzia*

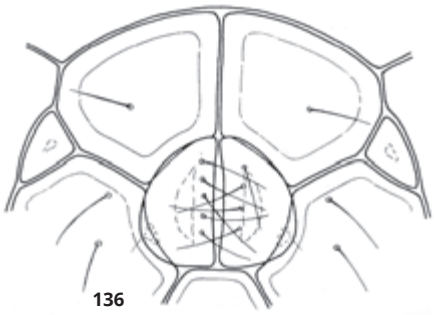
- Eye capsules absent; male anteromedial plate with sculpturing (Fig. 141)
Subgenus *Bharatavolziella*



134



135



136



137



138



139

134 *Bharatavolzia (Bharatvolziella) pallida*, venter male (after Cook 1974)

135 *Bharatavolzia (Bharatvolziella) pallida*, venter female (after Cook 1974)

136 *Acherontacarus halacaroides* K. Viets, genital field male (after Cook 1974)

137 *Acherontacarus bicornis* Cook, IV-leg-6 male (after Cook 1974)

138 *Acherontacarus bicornis* Cook, palp female (after Cook 1974)

139 *Bharatavolzia musicola*, palp male (after Cook 1974)

Subgenus *Bharatavolzia* s.s.

(Figs. 139, 140)

1967 *Bharatavolzia* Cook, Memoirs of the American Entomological Institute 9: 16.

DIAGNOSIS: Eye capsules present. Anteromedial dorsal plate without sculpturing in male (Fig. 140).

HABITAT: Springs.

DISTRIBUTION: One species known from Maharashtra State, India (Cook 1967).

Subgenus *Bharatavolziella* Cook, 1967

(Figs. 128, 134, 135, 141)

1967 *Bharatavolziella* Cook, Memoirs of the American Entomological Institute 9: 17.
Type species: *Bharatavolzia pallida* Cook, 1967

DIAGNOSIS: Eye capsules absent. Anteromedial dorsal plate with sculpturing in male (Fig. 141).

HABITAT: Interstitial habitats and streams.

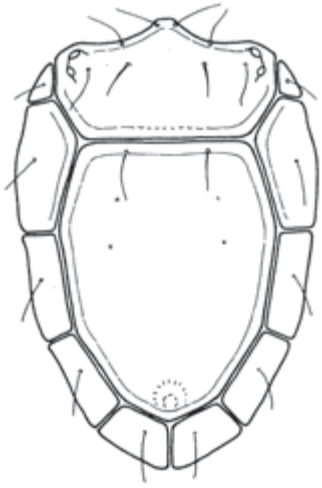
DISTRIBUTION: One species is known from Maharashtra State, India (Cook 1967), Iran (Schwoerbel & Sepasgosarian 1980) and Oman (Smit & Pešić 2010), respectively.

Family Hydrovolziidae Thor, 1905

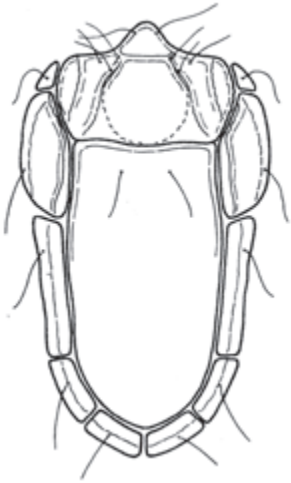
1905 Hydrovolziidae Thor, Zoologischer Anzeiger 28: 509.

1972 Polyxohalacaridae Motaş, Acarologia 13: 246 – Cook (1974).

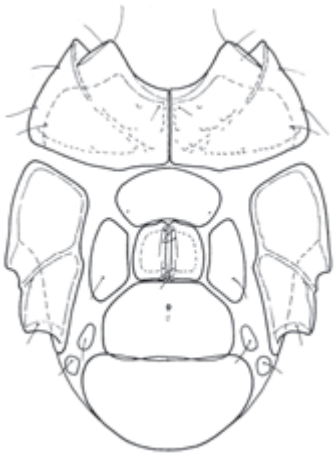
DIAGNOSIS: Dorsum with 1-2 pairs of elongate platelets laterally of central plates. Coxae in four groups, suture line between Cx-I and –II well developed. Venter with areas of soft integument between coxae and area around genital field. Vgl-1 and Vgl-3 associated with glandularia. Distal segments of IV-L with or without sexual dimorphism.



140



141



142

140 *Bharatavolzia (Bharatvolzia) musicola*, dorsum male (after Cook 1974)

141 *Bharatavolzia (Bharatvolziella) pallida* Cook, dorsum male (after Cook 1974)

142 *Stygovolzia uenoi* Imamura, venter female (after Cook 1974)

KEY TO THE GENERA

1 Ventral glandularia absent; a relatively large plate anterior to genital field (Fig. 142) Genus *Stygovolzia*

- Ventral glandularia present; without plate anterior to genital field (Fig. 143) 2

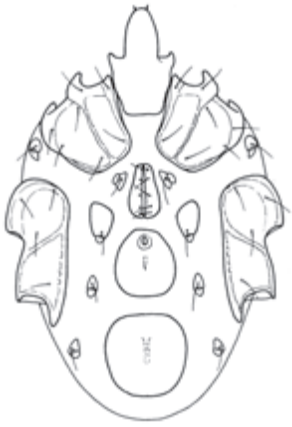
2 Lateral margins of female genital field anteriorly and posteriorly bluntly pointed (Fig. 144); fourth leg of male five-segmented and highly modified (Fig. 145) Genus *Hydrovolziella*

- Lateral margins of female genital field rounded (Fig. 143); IV-leg of male six-segmented, not modified Genus *Hydrovolzia*

Genus *Hydrovolzia* Thor, 1905

(Figs. 10-11, 130, 143, 146-149)

1905 *Polyxo* Monti, Rendiconti del Reale Istituto Lombardo di Scienze e Lettere, Milano 38: 168 (praeocc.).



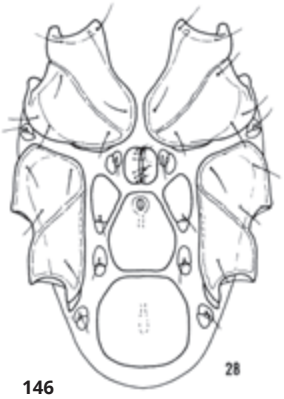
143



144



145



146



147



148

143 *Hydrovolzia marshallae* Cook, venter female (after Cook 1974)

144 *Hydrovolziella lata* (Walter), venter female (after Cook 1974)

145 *Hydrovolziella lata* (Walter), fourth leg male (after Cook 1974)

146 *Hydrovolzia marshallae* Cook, venter male (after Cook 1974)

147 *Hydrovolzia marshallae* Cook, palp male (after Cook 1974)

148 *Hydrovolzia marshallae* Cook, ventral glandularium male (after Cook 1974)

1905 *Hydrovolzia* Thor, Zoologischer Anzeiger 28: 506.

1972 *Polyxohalacarus* Motaş, Acarologia 13: 246 – Cook (1974).

Type species: *Polyxo placophora* Monti, 1905

DIAGNOSIS: Lateral eyes in capsules (Fig. 130). Genital flaps in both sexes with rounded, not angular margins (Figs. 143, 146). IV-L of male six-segmented and not exhibiting sexual dimorphism. Excretory plate longer than wide.

HABITAT: Streams, springs and seepage areas.

DISTRIBUTION: A dozen species known from the Holarctic region, and two species known from the Oriental region (Lundblad 1969)

Genus *Hydrovolziella* K. Viets, 1935

(Figs. 144, 145, 150, 151)

1935 *Hydrovolziella* K. Viets, Zoologischer Anzeiger 110: 278.

Type species: *Hydrovolzia lata* Walter, 1935

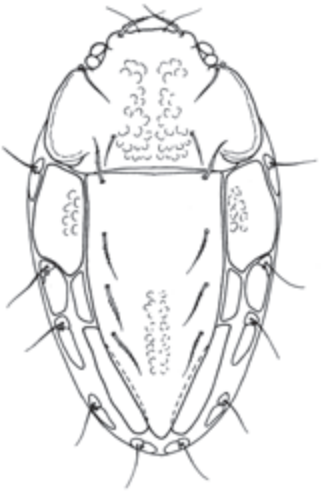
DIAGNOSIS: Lateral eyes in capsules (Fig. 150). A pair of glandularia flanking the anterior part of genital field, but these lying anterior to genital field in males (Fig. 151). Genital field of female more or less rectangular (Fig. 144). IV-L of male five-segmented, IV-leg-2 with a long proximoventral extension with a club-shaped seta, terminal segment stocky with two short, pointed ventral extensions and several small, plumose setae (Fig. 145). Excretory plate longer than wide.

HABITAT: Wet mosses near a waterfall.

DISTRIBUTION: One species known from Ivory Coast.



149



150



151

149 *Hydrovolzia marshallae* Cook, I-leg-5-6 female (after Cook 1974)

150 *Hydrovolziella lata* (Walter), dorsum male (after Cook 1974)

151 *Hydrovolziella lata* (Walter), venter male (after Cook 1974)

Genus *Stygovolzia* Imamura, 1957

(Figs. 142, 152-155)

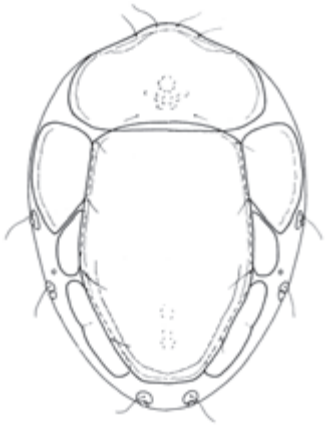
1957 *Stygovolzia* Imamura, Journal of the Faculty of Science, Hokkaido University, Series 6, Zoology 13: 49.

Type species: *Stygovolzia uenoi* Imamura, 1957

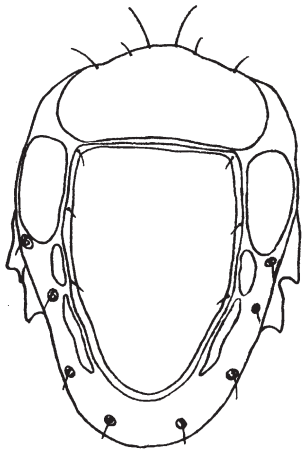
DIAGNOSIS: Eye capsules absent. Dorsum with three dorsolateral pairs of glandularia only (Figs. 150, 153). Venter without glandularia. An unpaired transverse platelet present anterior to genital field (Figs. 142, 154). Excretory pore plate distinctly wider than long.

HABITAT: Interstitial.

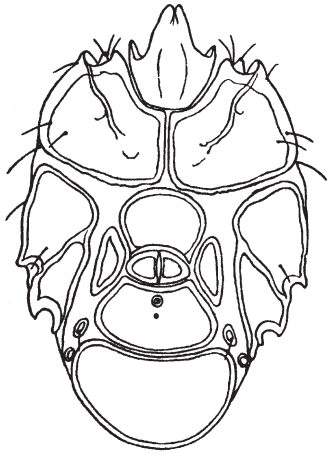
DISTRIBUTION: One species known from Japan.



152



153



154



155

152 *Stygovolzia uenoi* Imamura, dorsum female (after Cook 1974)

153 *Stygovolzia uenoi* Imamura, dorsum male (after Imamura 1957b)

154 *Stygovolzia uenoi* Imamura, venter male (after Imamura 1957b)

155 *Stygovolzia uenoi* Imamura, palp female (after Cook 1974)

SUPERFAMILY EYLAOIDEA LEACH, 1816

1816 Eylaides Leach, Transactions of the Linnean Society 11: 399.

DIAGNOSIS: Red mites with papillose membranous integument, porose plates developed or not. A frontal sclerite always present, generally well developed and including the lateral eyes in capsules, but in eyeless species reduced to a minute sclerotized bar. Coxae in four groups and usually widely separated. Acetabula minute and numerous, often stalked, or in two groups flanking the gonopore, either scattered in the area around the gonopore or distributed all over the idiosoma. Mouth opening surrounded by a frilled ring of very fine hairs, but this structure reduced in Apheviderulicidae. Palp leg-like, usually with five movable segments, in Apheviderulicidae proximal segments fused with gnathosoma, leaving fused distal segments as only movable structure, neither chelate or uncate; chelicera two-segmented. Legs six-segmented and without sexual dimorphism. Legs with strong, stout claws not retractable due to the absence of a claw furrow.

KEY TO THE FAMILIES

1 Gnathosoma unique in water mites due to partial fusing of basal palp segments with gnathosomal base (Fig. 156), dorsoventrally flattened and broadened distally with a minute, slit-shaped mouth opening, surface with numerous fine, feathered setae; movable parts of palp appearing unisegmental Family Apheviderulicidae

- Gnathosoma not flattened; round mouth opening surrounded by a fringe of fine hairs; palp typically five-segmented, but occasionally with 2-4 segments due to fusion 2

2 Frontal shield large, including lateral eye capsules and two pairs of glandularia (Fig. 157), in eye-less species frontal plate either minute, rhombic or Y-shaped; dorsal muscle attachments either large sclerotized plates or unsclerotized (Fig. 158); gonopore flanked by paired, setae-bearing platelets (Fig. 159); acetabula may be located on these plates, surrounded by these plates or lined up in the integument parallel to the gonopore Family Piersigiidae

- Frontal shield never including glandularia, lateral eyes always present and included in frontal shield (Figs. 160, 161); dorsal muscle attachments occasionally forming rod-shaped paired sclerites, usually unsclerotized; setae flanking gonopore not on plates (Fig. 162), in groups on common sockets or free in the integument; acetabula free in the integument (Fig. 163) 3

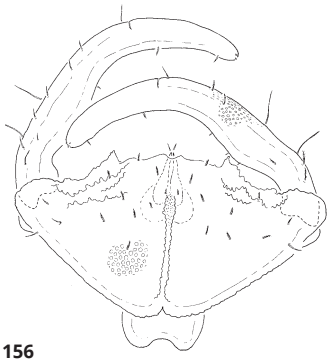
3 Frontal shield rhombic (Fig. 160); Cx-III+IV longer than wide, generally completely fused; acetabula stalked (Fig. 164) Family Limnocharidae

- Frontal shield spectacle-shaped (Fig. 161); Cx-III+IV wider than long, fused only medially (Fig. 162); acetabula not stalked Family Eylaidae

Family Apheviderulicidae Gerecke, Smith & Cook, 1999

1999 Apheviderulicidae Gerecke, Smith & Cook, Hydrobiologia 397: 134.

Diagnosis (deutonymph): Dorsum with numerous highly sculptured porose platelets separated by soft papillate integument. Frontal eye absent. Dorsum with a somewhat triangular anterior platelet with a rounded posterior margin with two pairs of setae, a single rod-shaped platelet posterior to frontal platelet and a pair of elongate platelets with one pair of glandularia flanking the frontal platelet (Fig. 165). Furthermore, dorsum with a row of six pairs of dorsocentral platelets with the glandularia located posteriorly and a row of 7-8 dorsolateral platelets. Mouth opening slit-shaped (Fig. 156) and surrounded by minute, fine feathered setae. Chelicera two segmented, its base robust



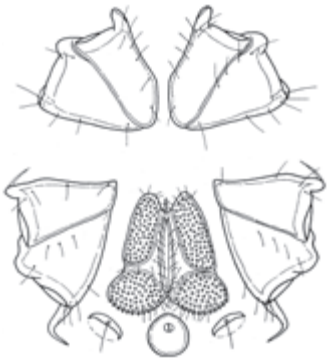
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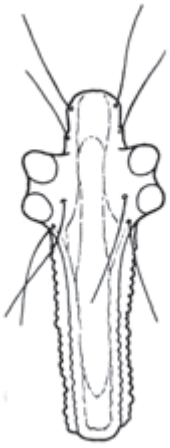
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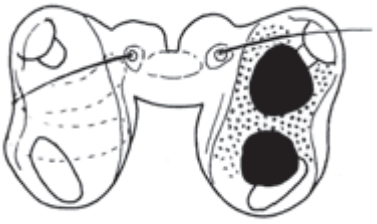
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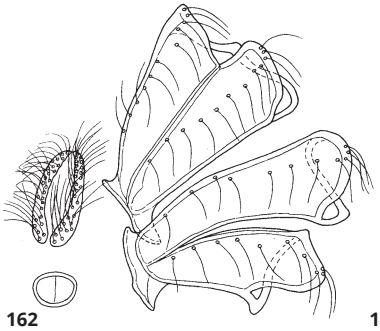
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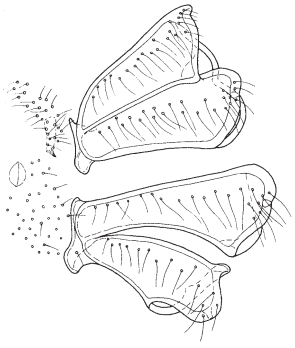
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161



162



163



164

156 *Apheviderulix leptomastax* Gerecke, Smith & Cook, gnathosoma and palps (from Gerecke et. al. 1999)
157 *Piersigia limophila* Protz, frontal shield female (after Cook 1974)
158 *Piersigia crusta* Mitchell, dorsum female (after Cook 1974)
159 *Piersigia crusta* Mitchell, venter female (after Cook 1974)
160 *Limnochares (Cyclothrix) crinita* Koenike, frontal shield female (after Cook 1974)
161 *Eylais degenerata* Koenike, frontal shield female (after Cook 1974)
162 *Eylais montana* Ribaga, venter male (part.) (after Cook 1980)
163 *Eylais multispina* Ribaga, venter deutonymph (part.) (after Cook 1980)
164 *Neolimnochares* (*Neolimnochares*) *placophorella* Cook, venter (part.) (after Cook 1966)

and broad. Venter nearly covered by coxal plates, genital field and numerous platelets. Coxae in two groups, but Cx-I and Cx-II and Cx-III and Cx-IV separated by a strip of soft integument (Fig. 166). Coxae highly sculptured laterally, with numerous short acicular setae near margins. Genital field elongate with numerous small acetabula. Excretory pore on a platelet. Gnathosomal base fused with P1-3 to form a dorsoventrally flattened structure that is nearly triangular and widest anteriorly. P4 and P5 fused into a large bowed, distally blunt segment (Fig. 156). Leg segments unmodified, I-L, II-L and III-L six-segmented, IV-L five segmented due to fusion of IV-leg-1 and -2; leg claws simple.

REMARKS: The family is known only in the deutonymphal (and larval) stage.

Genus *Aphevidérulix* Gerecke, Smith & Cook, 1999

(Figs. 16, 156, 165, 166)

1999 *Aphevidérulix* Gerecke, Smith & Cook, Hydrobiologia 397: 139.

Type species: *Aphevidérulix welwitschioides* Gerecke, Smith & Cook, 1999

DIAGNOSIS: As for family.

HABITAT: Hyporheic gravel deposits in springs and streams.

DISTRIBUTION: Known from three species from Sicily (Italy), Morocco and California (USA) (Gerecke et al. 1999).

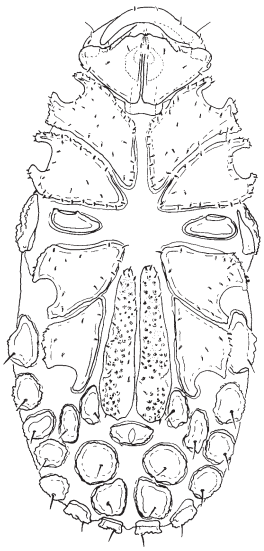
Family Eylaidae Leach, 1816

1816 Eylaides Leach, Transactions of the Linnean Society 11: 399.

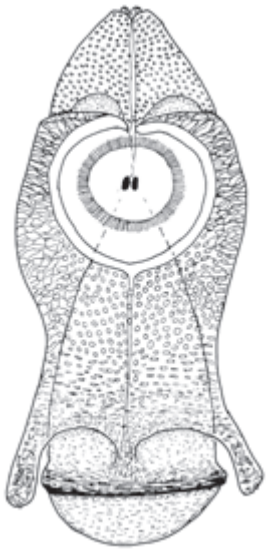
DIAGNOSIS: Red coloured mites with a soft, finely lineated integument. Dorsum without dorsal plates or platelets. Lateral eyes in two groups, each group in a capsule, these close together and usually joined medially by a sclerotized bridge, altogether forming a spectacle-like structure.



165



166



167

165 *Aphevidérulix leptomastax* Gerecke, Smith & Cook, dorsum deutonymph (after Gerecke et. al. 1999)

166 *Aphevidérulix leptomastax* Gerecke, Smith & Cook, venter deutonymph (after Gerecke et. al. 1999)

167 *Eylais extendens* (Müller), ventral view gnathosoma male (after Davids et al. 2007)

Eye bridge with a pair of setae. Gnathosoma with a large circular mouth opening containing a frilled wheel-like membrane. Pharynx usually conspicuous, except in *Rhyncheylais*. Blunt cheliceral claws projecting through mouth opening. Coxae in four groups, Cx-III and Cx-IV separated except near medial margins. Genital field lying anteriorly in integument with numerous widely scattered small acetabula. Genital field in male simple, consisting of two setae bearing sclerites. Only males in the former subgenus *Syneylais* have a well sclerotized sclerite surrounding the gonopore. Palp five-segmented, not chelate, with numerous often pectinate setae; P2 and P3 often with an extensive area of articular membrane on the ventral side. Excretory pore usually with a narrow sclerotized ring. First three pairs of legs with numerous swimming setae; leg claws simple. IV-L without swimming setae and not used when swimming.

KEY TO THE GENERA

1 Gnathosoma much longer than wide and with a prominent pharynx (Fig. 167); gnathosoma not attached to a protrusable tube Genus *Eylais*

- Gnathosoma relatively short and broad without a prominent pharynx (Fig. 168); gnathosoma attached to a protrusable tube Genus *Rhyncheylais*

Genus *Eylais* Latreille, 1796

(Figs. 22, 161-163, 167, 169)

1796 *Eylais* Latreille, Précis des Charactères Génériques des Insectes: 182.

1873 *Antonides* Alfr. Dugès, Revue des sciences naturelles, Montpellier 2: 322.

1902 *Capeulais* Thor, Annals of the South African Museum 11: 452 – K. Viets (1956b).

1907 *Eulaidopsis* Udalzow, Arbeiten Hydrobiologische Station am See Glubokoje 2: 235.

1933 *Proteylais* Szalay, Zoologischer Anzeiger 104: 330 - K.O. Viets (1987).

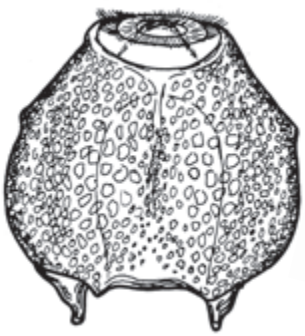
1934 *Meteyalis* Szalay, Annales Musei nationales hungarici 28: 277 - K.O. Viets (1987).

1934 *Pareylais* Szalay, Annales Musei nationales hungarici 28: 275 - K.O. Viets (1987).

1936 *Syneylais* Lundblad, Arkiv för Zoologi 29A: 3 - K.O. Viets (1987).

1968 *Spineylais* Wainstein, Trudy Instituta Biologii Vnutrennykh Vodnany 17: 96 - K.O. Viets (1987).

Type species: *Hydrachna extendens* Müller, 1776



168



169



170

168 *Rhyncheylais connexa* Lundblad, gnathosoma male (after Cook 1974)

169 *Eylais infundibulifera* Koenike, palp female (after Davids et al. 2007)

170 *Rhyncheylais connexa* Lundblad, frontal plate male (after Cook 1974)

DIAGNOSIS: Idiosoma usually oval to egg-shaped. Coxae for the most part narrow, sclerotization often forming a lattice work framed by a distinct ridge. Gnathosoma with two paired proximal apodemes in dorsal and ventral position (Fig. 167). Mouth opening ventral. P3 usually with a group of setae at ventrodistal corner (Fig. 169); P5 usually shorter than P4.

HABITAT: Permanent and temporary ponds, occasionally in lakes and in slowly running streams or pools of fast flowing streams. One species known from a hot spring.

DISTRIBUTION: Numerous species known occurring worldwide.

REMARKS: Here K.O. Viets (1987) is followed, who proposed the synonymization of the subgenera as in many cases assignment to a subgenus is not possible. *Eylais* is a very distinct genus, but the species are highly variable and therefore notoriously difficult to identify based on adult morphology. K. Viets (1956b) called the genus "eine Crux aller Hydracarinologen". Many old species descriptions are based on the very variable shape of the eye bridge and palp. Larvae are less variable and show more reliable characters for separating species. Various spellings of the genus name have been used in the past, but the only accepted spelling is the one used here.

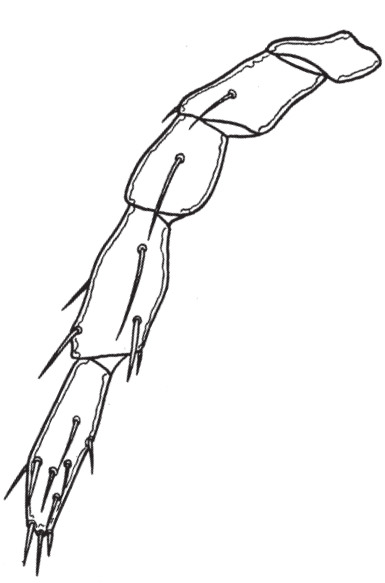
Genus *Rhyncheylais* Lundblad, 1938

(Figs. 168, 170, 171)

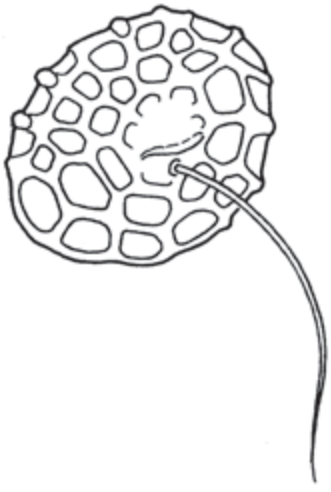
1938 *Rhyncheylais* Lundblad, Zoologischer Anzeiger 122: 7.

Type species: *Rhyncheylais connexa* Lundblad, 1938

DIAGNOSIS: Gnathosoma relatively short and broad without a prominent pharynx (Fig. 168). Mouth opening terminal. Gnathosoma attached to a protrusable tube. Eye plate without a median bridge. P5 more or less of the same length as P4 (Fig. 171).







171 **172** **173**

171 *Rhyncheylais connexa* Lundblad, palp male (after Lundblad 1941b)

172 *Stygolimnochares elongata* Cook, venter female (after Cook 1974)

173 *Stygolimnochares elongata* Cook, lateroglandularium female (after Cook 1974)

HABITAT: Ponds.

DISTRIBUTION: Known from one species from Paraguay.

Family Piersigiidae Oudemans, 1902

1902 Piersigiidae Oudemans, Tijdschrift voor Entomologie 45: 61.

DIAGNOSIS: Frontal sclerite large, including two pairs of glandularia; in eyeless species frontal sclerite reduced to a single rhombic or Y-shaped platelet with the postocularia. Dorsal muscle attachments unsclerotized or forming well sclerotized symmetrical arranged plates. Posterior margin of Cx-IV with short, pointed apodemes. Acetabula from five to numerous, lying on two paired genital plates, or lined up in the integument flanking the gonopore. Chelicera short and stout. Palp five-segmented. Legs without swimming setae, claws simple

KEY TO THE SUBFAMILIES

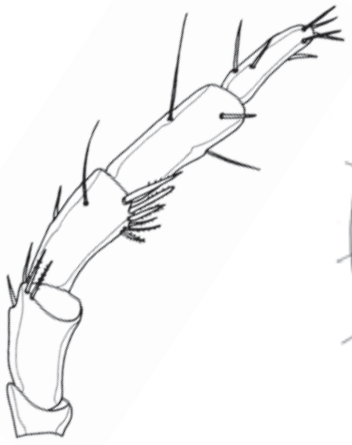
1 Idiosoma vermiform elongate (Fig. 172) with a single dorsal sclerite. Glandularia sclerites completely surrounding gland opening (Fig. 173); eyes absent.
Subfamily Stygolimnocharinae

- Idiosoma not elongate and with numerous dorsal sclerites (Fig. 158). Glandularia sclerites only partially surrounding the gland opening; eyes present, but occasionally reduced.
Subfamily Piersigiinae

Subfamily Piersigiinae Oudemans, 1902

1902 Piersigiidae Oudemans, Tijdschrift voor Entomologie 45: 61.

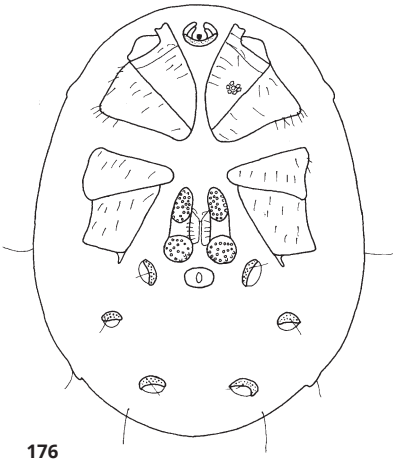
DIAGNOSIS: Frontal plate large, including lateral eyes and two pairs of glandularia. Dorsum with two to numerous symmetrically arranged plates or platelets. A single median posterior plate may be present. Gonopore flanked by two pairs of plates with numerous acetabula. P3 may be expanded laterally.



174



175



176

174 *Piersigia limophila* Protz, palp female (after Davids et al. 2007)

175 *Austrapiersigia montana* Smit, dorsum female (after Smit 1998d)

176 *Austrapiersigia montana* Smit, venter female (after Smit 1998d)

KEY TO THE GENERA

1 Dorsum with numerous symmetrically arranged plates (Fig. 157), a large posteromedial plate absent, P3 laterally not expanded (Fig. 174) Genus *Piersigia*

- Dorsum with two pairs of large plates and an unpaired large posteromedial plate (Fig. 175); P3 laterally expanded (Fig.178) Genus *Austrapiersigia*

Genus *Piersigia* Protz, 1896

(Figs. 20, 157-159, 174)

1896 *Piersigia* Protz, Zoologischer Anzeiger 19: 410.

Type species: *Piersigia limophila* Protz, 1896

DIAGNOSIS: Frontal shield large originating from fusion of several platelets, the lateral eye capsules and two pairs of glandularia (Fig. 157). Dorsum with a series of symmetrically arranged plates (Fig. 158). A clear area in the frontal shield may represent a vestigial median eye. Glandularia sclerites only partially surrounding glandularia. Lateroglandularia present or absent, when present than larger than dorsoglandularia platelets. Acetabula on minute stalks, lying in four groups on plates surrounded by a sclerotized ring (Fig. 159). P3 with several distal pectinate setae (Fig. 174).

HABITAT: Temporary and/or swampy habitats. One species possibly from an interstitial habitat.

DISTRIBUTION: Six species known from Europe, North America and Siberia (Tuzovskij 1986a).

Genus *Austrapiersigia* Smit, 1998

(Figs. 175-178)

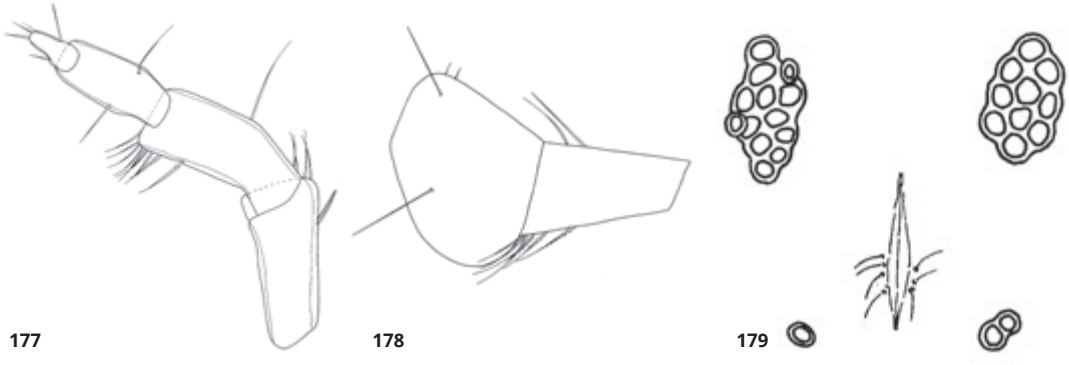
1998 *Austrapiersigia* Smit, Records of the Western Australian Museum 19: 107.

Type species: *Austrapiersigia montana* Smit, 1998

DIAGNOSIS: Frontal shield as in *Piersigia*. Dorsum with two pairs of large plates and one large posteromedial plate; laterodorsal plates absent (Fig. 175). Coxae in four groups with many small setae (Fig. 176). Genital field and palp as in *Piersigia* (Fig. 177), but P3 laterally expanded (Fig. 178). Excretory pore on a small platelet.

HABITAT: Interstitial.

DISTRIBUTION: One species known from Victoria, Australia.



177 *Austrapiersigia montana* Smit, palp female (after Smit 1998d)

178 *Austrapiersigia montana* Smit, dorsal view P2+P3 female (after Smit 1998d)

179 *Stygolimnochares elongata* Cook, genital field male (after Cook 1974)

Subfamily Stygolimnocharinae Cook, 1967

1967 Stygolimnocharinae Cook, Memoirs of the American Entomological Institute 9: 26.

DIAGNOSIS: Idiosoma vermiform elongate, dorsum with a single medial elongated or somewhat rhomboid sclerite with the postocularia. Eyes absent. Glandularia sclerites completely surrounding the glandularia. Coxae in four groups, the coxae in each group either only lightly fused, somewhat separated or completely fused. Acetabula on two pairs of genital plates or in two rows parallel to the gonopore, acetabula either stalked or not stalked.

KEY TO THE GENERA

1 Coxae in four groups, anterior and posterior group well separated (Fig. 172); acetabula on two pairs of genital plates (Fig. 179) Genus *Stygolimnochares*

- Anterior and posterior coxal groups lying close to each other (Fig. 180), acetabula in two rows parallel to gonopore Genus *Parawandesia*

Genus *Stygolimnochares* Cook, 1967

(Figs. 172, 173, 179, 181-183)

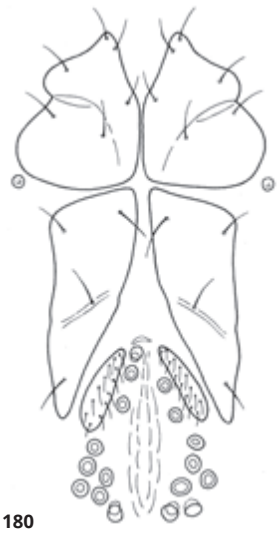
1967 *Stygolimnochares* Cook, Memoirs of the American Entomological Institute 9: 26.

Type species: *Stygolimnochares elongata* Cook, 1967

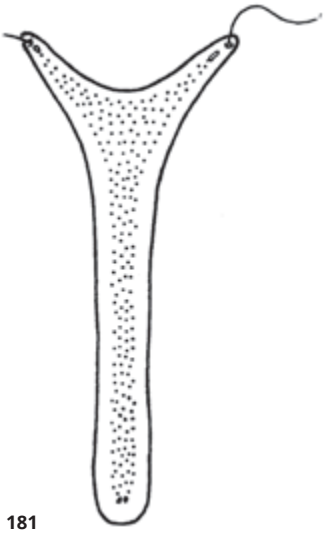
DIAGNOSIS: Dorsum with an elongated medial plate with the postocularia (Fig. 181). Coxae in four groups, the anterior groups well separated from the posterior group, coxae in each group either only lightly fused or somewhat separated (Fig. 172). Acetabula on two pairs of genital platelets, not stalked (Fig. 179).

HABITAT: Interstitial.

DISTRIBUTION: Two species known, one from Maharashtra State, India (Cook 1967) and one from eastern Australia (Cook 1986).



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180 *Parawandesia chappuisi* Angelier, venter female (after Cook 1974)

181 *Stygolimnochares elongata* Cook, frontal plate female (after Cook 1974)

182 *Stygolimnochares elongata* Cook, ventral view gnathosoma + palp female (after Cook 1974)

Genus *Parawandesia* E. Angelier, 1951

(Figs. 180, 184-187)

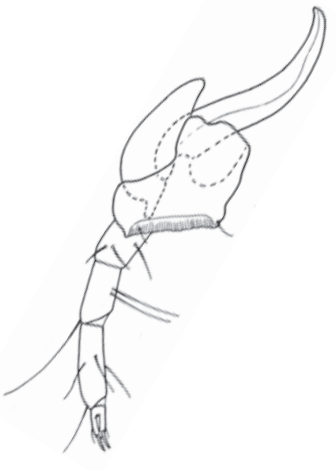
1951 *Parawandesia* E. Angelier, Bulletin du Muséum, Paris (série 2) 23: 508 – Gerecke & Cook (1995).

Type species: *Parawandesia chappuisi* E. Angelier, 1951

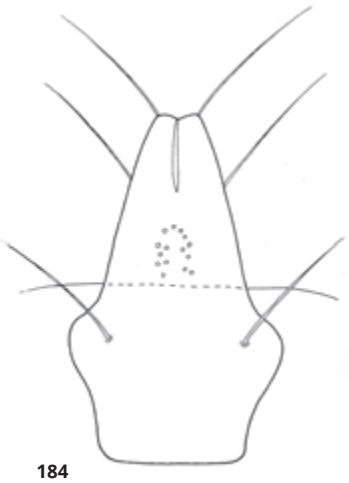
DIAGNOSIS: Dorsum with a somewhat rhomboid plate with three pairs of setae (Fig. 184), the most anterior pair distally lamellate. Coxae in four groups, anterior and posterior groups lying close to each other (Fig. 180). Cx-IV with a large, pointed apodeme. Eight or nine pairs of acetabula in two rows parallel to gonopore, stalked. Genital field anteriorly with a pair of elongate sclerites. P4 mediodistally with a large, stout seta (Fig. 187).

HABITAT: Interstitial.

DISTRIBUTION: One species known from Corsica (France) and Sardinia (Italy) (Gerecke & Cook 1995).



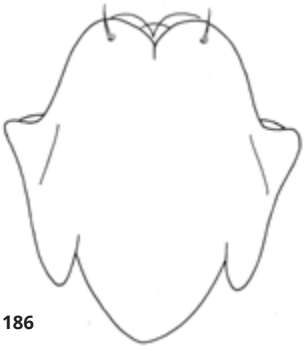
183



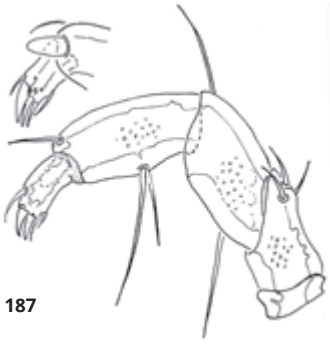
184



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183 *Stygolimnochares elongata* Cook, lateral view gnathosoma + palp female (after Cook 1974)

184 *Parawandesia chappuisi* Angelier, frontal plate female (after Cook 1974)

185 *Parawandesia chappuisi* Angelier, palp female (after Cook 1974)

186 *Parawandesia chappuisi* Angelier, gnathosoma female (after Cook 1974)

187 *Parawandesia chappuisi* Angelier, palp male

188 *Rhyncholimnochares* (*Rhyncholimnochares*) *longiscutata* Lundblad, palp female (setae not illustrated) (after Cook 1974)

Family Limnocharidae Grube, 1859

1859 Limnocharidae Grube, Archiv fur die Naturkunde Liv-, Ehst- und Kurlands 1: 434.

DIAGNOSIS: Red coloured mites with a papillate integument. Frontal sclerite with a short anterior and a long posterior extension, typically with four pairs of setae; lateral eyes in capsules, fused with frontal plate. Coxae with numerous long setae, in four groups and usually widely separated. Cx-III and Cx-IV reduced in size, much wider than long. Genital field with numerous, widely scattered and stalked acetabula. Gonopore simple, lying between the posterior coxae, usually surrounded by many setae in male and fewer in female. Gnathosoma cylindrical, ending in a large mouth opening surrounded by a frilled ring. Basal segments of chelicera long and fused medially, cheliceral claws separate. Palps relatively small, (2)3-5 segmented, P5 typically with three terminal setae. Excretory pore slightly posterior to gonopore, occasionally surrounded by a sclerotized ring. Legs without sexual dimorphism, with or without swimming setae; leg claws simple.

REMARKS: Gerecke et al. (2020) erected the subfamily Neolimnocharinae, almost solely characterized by characters of the larvae. In view of the extreme morphological diversity among these larvae, they erected, in addition to the type genus *Neolimnochares* (known at all developmental stages), four genera known from the larval instar only. Because no adult stages of the latter genera are known, it is possible that further research will prove that some species attributed to these genera are junior synonyms of species previously described from adults and attributed to *Neolimnochares* Lundblad, 1941.

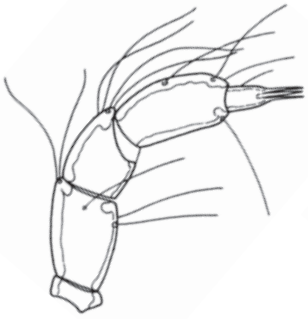
KEY TO THE SUBFAMILIES

1	Gnathosoma attached to a long protrusable tube; palp either three-segmented or appearing two-segmented (Fig. 188)	Subfamily Rhyncholimnocharinae
-	Gnathosoma not attached to a long, protrusable tube, palp four-five-segmented	2
2	Palp five-segmented (Fig. 189)	Subfamily Limnocharinae
-	Palp usually four-segmented (Fig. 190)	Subfamily Neolimnocharinae

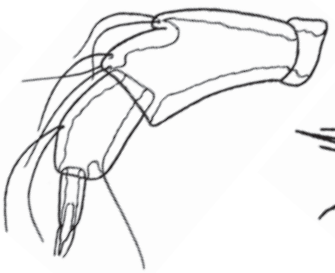
Subfamily Limnocharinae, Grube, 1859

1859 Limnocharidae Grube, Archiv fur die Naturkunde Liv-, Ehst- und Kurlands 1: 434.

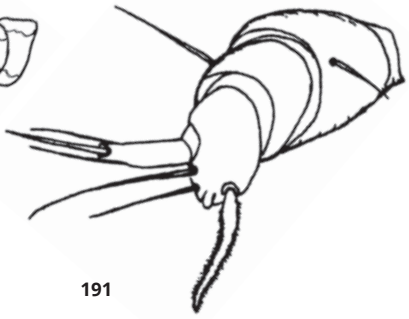
DIAGNOSIS: Dorsalia sometimes present. Gnathosoma not attached to a long protrusable tube. Palp four-five-segmented.



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189 *Limnochares (Cyclothrix) crinita* Koenike, palp male (after Cook 1974)

190 *Neolimnochares placophorella* Cook, palp female (after Cook 1974)

191 *Laterolimnochares huangshanensis* Jin, palp female (after Jin 1999)

KEY TO THE GENERA

1 P5 inserted in the middle on P4 (Fig. 191); gnathosoma wider than long (Fig. 192) Genus *Laterolimnochares*

- P5 inserted at distal end of P4 (Fig. 189); gnathosoma longer than wide Genus *Limnochares*

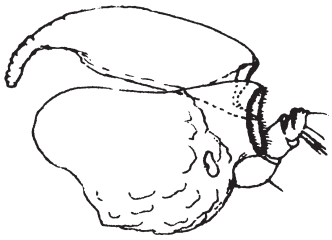
Genus *Limnochares* Latreille, 1796

(Figs. 7, 21, 160, 189, 201-203)

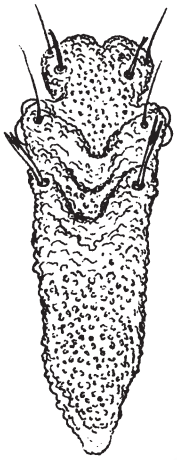
1796 *Limnochares* Latreille, Précis des Charactères Génériques des Insectes: 181.

Type species: *Acarus aquaticus* Linnaeus, 1758

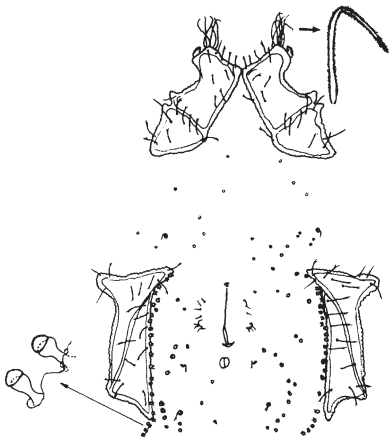
DIAGNOSIS: Palp five-segmented, with no tendency of P2 and P3 to fuse (Fig. 189). Dorsalia may be present. Legs with or without swimming setae.



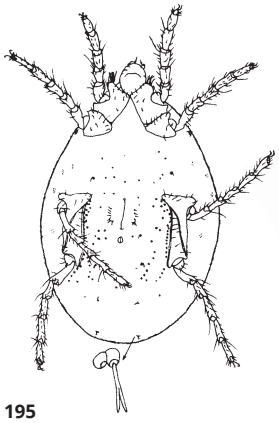
192



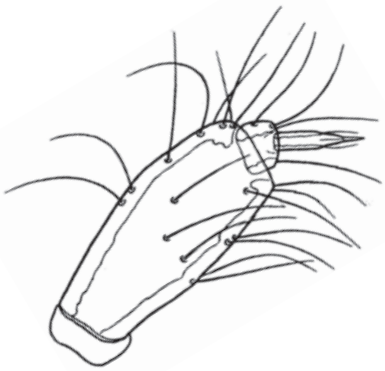
193



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192 *Laterolimnochares huangshanensis* Jin, gnathosoma + chelicera female (after Jin 1999)

193 *Laterolimnochares huangshanensis* Jin, frontal plate female (after Jin 1999)

194 *Laterolimnochares huangshanensis* Jin, detail venter female (after Jin 1999)

195 *Laterolimnochares huangshanensis* Jin, venter female (after Jin 1999)

196 *Neolimnochares africana* Cook, palp female (after Cook 1974)

197 *Neolimnochares placophorella* Cook, dorsum female (after Cook 1974)

KEY TO THE SUBGENERA

1	Legs with swimming setae	Subgenus *Cyclothrix*
-	Legs without swimming setae	Subgenus *Limnochares*

Subgenus *Limnochares* s.s.

DIAGNOSIS: Dorsalia may be present. Legs without swimming setae.

HABITAT: Permanent standing waters (also acidic), pools of streams, helocrenes, streams.

DISTRIBUTION: Almost a dozen species known from Europe (Davids et al. 2005), North America (Smith & Cook 2005), Africa (Tuzovsky & Gerecke 2009) and Borneo (Smit & Pešić 2014b).

Subgenus *Cyclothrix* Wolcott, 1905

(Figs. 7, 21, 160, 189, 201-203)

1905 *Cyclothrix* Wolcott, Transactions of the American Microscopical Society 26: 185.

1967 *Paracyclothrix* Lundblad, Arkiv för Zoologi (2) 19: 395 – Gerecke et al. (2020).

Type species: *Limnochares crinita* Koenike, 1898

DIAGNOSIS: Legs with swimming setae.

HABITAT: Permanent standing waters, streams.

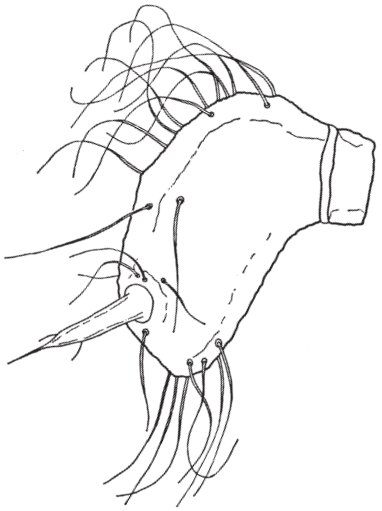
DISTRIBUTION: Several species known from Africa, India, Australia, New Zealand (Smit 1996a), North America, New Caledonia (Smit 2002a) and SE Asia (Lundblad 1967).

Genus *Laterolimnochares* Jin, 1999

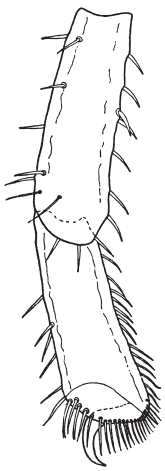
(Figs. 191-195)

1999 *Laterolimnochares* Jin. Acta Entomologica sinica 42: 311.

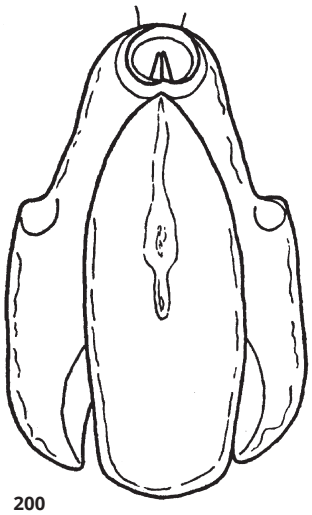
Type species: *Laterolimnochares huangshanensis* Jin, 1999



198



199



200

198 *Austrolimnochares womersleyi* (Lundblad), palp female (after Lundblad 1952a)

199 *Austrolimnochares womersleyi* (Lundblad), I-leg-5-6 female (after Lundblad 1952a)

200 *Austrolimnochares womersleyi* (Lundblad), dorsal view gnathosoma female (after Lundblad 1952a)

DIAGNOSIS: Frontal plate with short lateral extensions (Fig. 193). Dorsum without platelets. Gnathosoma wider than long (Fig. 192). Coxae and genital field as in *Limnochares*. Palp very stocky, especially P4; P5 inserted in the middle of P4, P5 with three terminal setae, one of which is stout and serrate (Fig. 191). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: One species known from Anhui Province, China.

Subfamily Neolimnocharinae Gerecke, Wohltmann, B.P. Smith & Judson, 2020

2020 Neolimnocharinae Gerecke, Wohltmann, B.P. Smith & Judson, Aquatic Insects

DIAGNOSIS: The definition of the subfamily is mainly based on larval characters. Palp four segmented, with a tendency towards fusion of P2 and P3.

REMARKS: Gerecke et al. (2020) erected the subfamily Neolimnocharinae almost solely based on larval characters. Moreover, they erected a number of genera known only in the larval stage. Therefore, these genera cannot be included in the keys and are listed below for the sake of completeness, without giving a diagnosis. All known neolimnocharine larvae are parasites of water bugs, mostly representatives of the veliid genus *Rhagovelia* Mayr.

Genus *Neolimnochares* Lundblad, 1941

(Figs. 164, 190, 196, 197, 201-203)

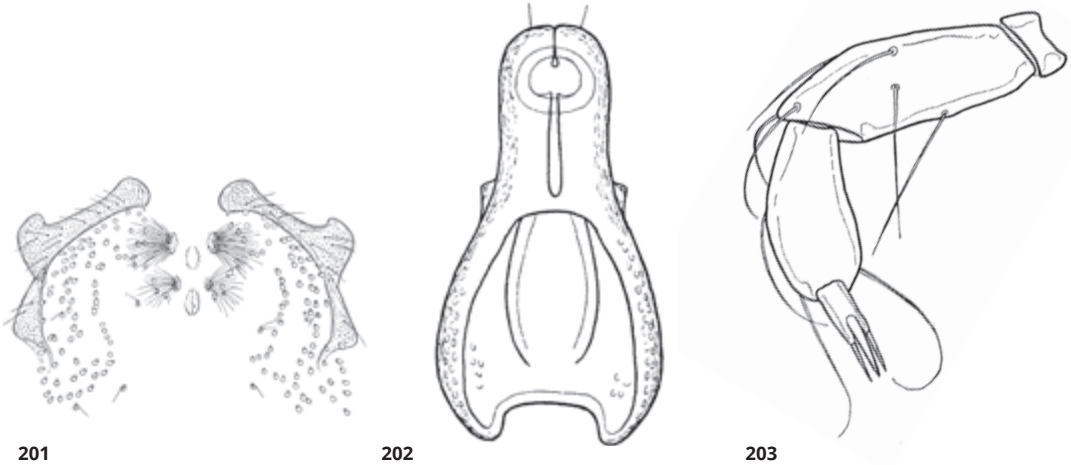
1941 *Neolimnochares* Lundblad, Kungliga Svenska Vetenskapsakademiens Handlingar (Serie 3) 19: 41.

Type species: *Neolimnochares placophora* Lundblad, 1937

DIAGNOSIS: Dorsalia may be present (Fig. 197). Palp typically five-segmented, but with a tendency for the fusion of P2 and P3 (Figs. 190, 196).

HABITAT: Streams, standing waters.

DISTRIBUTION: South and North America, Cuba (Orghidan & Georgesco 1977), Africa, Australia (Harvey 1990c).



201 **202** **203**

201 *Limnochares* (*Cyclothrix*) *tenasserimensis* Lundblad, venter male (part.) (after Lundblad 1967)

202 *Limnochares* (*Cyclothrix*) *tenasserimensis* Lundblad, gnathosoma male (part.) (after Lundblad 1967)

203 *Limnochares* (*Cyclothrix*) *tenasserimensis* Lundblad, palp male (after Lundblad 1967)

Genus *Archaeveliacola* Gerecke, Wohltmann, B.P. Smith & Judson, 2020

2020 *Archaeveliacola* Gerecke, Wohltmann, B.P. Smith & Judson, Aquatic Insects

Type species: *Archaeveliacola papuanus* Gerecke, Wohltmann, B.P. Smith & Judson, 2020

DISTRIBUTION: New Guinea, Australia.

Genus *Veliacola* Gerecke, Wohltmann, B.P. Smith & Judson, 2020

2020 *Veliacola* Gerecke, Wohltmann, B.P. Smith & Judson, Aquatic Insects

Type species: *Veliacola mirificus* Gerecke, Wohltmann, B.P. Smith & Judson, 2020

DISTRIBUTION: Madagascar, Dominican Republic.

Genus *Isoveliacola* Gerecke, Wohltmann, B.P. Smith & Judson, 2020

2020 *Isoveliacola* Gerecke, Wohltmann, B.P. Smith & Judson, Aquatic Insects

Type species: *Isoveliacola costaricensis* Gerecke, Wohltmann, B.P. Smith & Judson, 2020

DISTRIBUTION: Costa Rica, Indonesia (Borneo).

Genus *Armaveliacola* Gerecke, Wohltmann, B.P. Smith & Judson, 2020

2020 *Armaveliacola* Gerecke, Wohltmann, B.P. Smith & Judson, Aquatic Insects

Type species: *Armaveliacola rhagoveliae* Gerecke, Wohltmann, B.P. Smith & Judson, 2020

DISTRIBUTION: Madagascar and continental Africa (Cameroon, Kenya).

Subfamily Rhyncholimnocharinae Lundblad, 1936

1936 Rhyncholimnocharinae Lundblad, Zoologischer Anzeiger 116: 203.

DIAGNOSIS: Gnathosoma attached to a long protrusable tube. Palp with three to four segments, but terminal segment may be greatly reduced giving it the appearance of a two-segmented palp. Dorsalia present or absent (Tuzovskij & Gerecke 2020). Swimming setae absent.

KEY TO THE GENERA

1 Second (fusion of P2/P3) segment of palp curved dorsally (Fig. 198) Genus *Austrolimnochares*

- Second segment of palp dorsally straight (Fig. 188) Genus *Rhyncholimnochares*

Genus *Austrolimnochares* Harvey, 1998

(Figs. 198-200)

1998 *Austrolimnochares* Harvey, Records of the Western Australian Museum 19: 92.

Type species: *Paralimnochares womersleyi* Lundblad, 1952

DIAGNOSIS: Dorsum without platelets. Mouth opening dorsally (Fig. 200). Palp with four (occasionally three) segments, second segment (fusion of P2/P3) greatly enlarged and curved dorsally, separated or partly fused with P4 (Fig. 198). Excretory pore without sclerotized ring.

HABITAT: Streams.

DISTRIBUTION: One species known from eastern and south-eastern Australia.

Genus *Rhyncholimnochares* Lundblad, 1936

(Figs. 188, 204-206)

1936 *Rhyncholimnochares* Lundblad, Zoologischer Anzeiger 116: 203.

Type species: *Rhyncholimnochares lamellipalpis* Lundblad, 1936

DIAGNOSIS: Palp with three segments, but terminal segment may be greatly reduced giving it the appearance of a two-segmented palp (Fig. 188). Second segment (fusion of P2/P3) with a straight dorsal margin. Terminal segment of palp terminal or subterminal in position.

KEY TO THE SUBGENERA

1 Terminal segment of palp relatively longer than wide (Fig. 205)
Subgenus *Paralimnochares*

- Terminal segment of palp greatly reduced, knob-shaped (Fig. 204)
Subgenus *Rhyncholimnochares*

Subgenus *Rhyncholimnochares* s.s.

(Figs. 188, 204)

DIAGNOSIS: Terminal segment of palp subterminal in position on preceding segment, greatly reduced, appearing to be little more than a base for the terminal setae.

HABITAT: Streams, interstitial habitats.

DISTRIBUTION: A dozen species known from South, Central and North America.

Subgenus *Paralimnochares* Lundblad, 1937

(Figs. 205, 206)

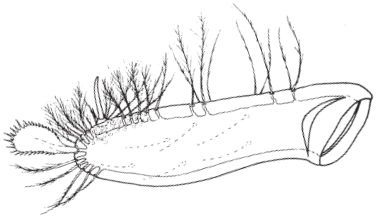
1937 *Paralimnochares* Lundblad, Zoologischer Anzeiger 118: 248.

Type species: *Rhyncholimnochares sursumhians* Lundblad, 1937

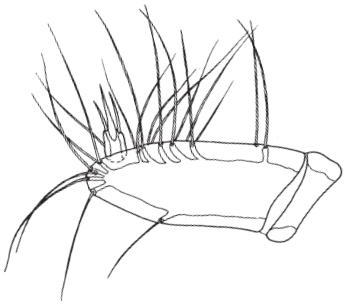
DIAGNOSIS: Terminal segment of palp of moderate size, terminal in position on preceding segment (Fig. 205).

HABITAT: Streams.

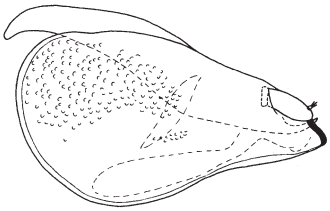
DISTRIBUTION: Three species known from South America (Brazil, Argentina) and Central America (Mexico, Cook 1980).



204



205



206

204 *Rhyncholimnochares (Rhyncholimnochares) expansiseta* Cook, palp male (after Cook 1980)

205 *Rhyncholimnochares (Paralimnochares) mexicana* Cook, palp male (after Cook 1980)

206 *Rhyncholimnochares (Paralimnochares) mexicana* Cook, gnathosoma with palp female (after Cook 1980)

SUPERFAMILY HYDRACHNOIDEA LEACH, 1816

1816 Hydrachnides Leach, Transactions of the Linnean Society 11: 399.

DIAGNOSIS: Red coloured mites, idiosoma spherical, integument papillate. Sclerotization variable, from none to an almost complete armour (Figs. 208, 209). Sclerites generally with indistinct margins, porosity very fine and dense. Lateral eyes in capsules, never included in dorsal sclerites, but occasionally embraced by frontal sclerites. Median eye present or absent. Coxae typically in four groups (Figs. 6, 207), occasionally joined by secondary sclerotization, with few setae, no setae associated with insertions of fourth legs. Cx-III+IV with concave posterior margin embracing the genital field. Cx-IV larger than Cx-III, with the leg insertions distinctly farther from the median line than Cx-I-III. Genital field with numerous small acetabula, often indented anteriorly. Male genital longer than wide, with the gonopore located posteriorly (Fig. 6). Female genital field wider than long, with the gonopore located at posterior end and not surrounded by sclerotization posteriorly; a thin, tubular ovipositor present (Fig. 207), but this mostly inverted inside the idiosoma. Gnathosoma with a long, curved, pointed rostrum. Chelicera one-segmented and stylet-like. Palp chelate, with P1 and P3 elongated; P3 usually longest segment, P4 extremely shortened, dorsally with a pointed extension flanking dorsal margin of the claw-like P5 (Fig. 12). Excretory pore on a small sclerite. Legs with numerous swimming setae, claws simple.

Family Hydrachnidae Leach, 1816

1816 Hydrachnidae Leach, Transactions of the Linnean Society 11: 399.

DIAGNOSIS: One family with the characters of the superfamily.

Genus *Hydrachna* Müller, 1776

(Figs. 6, 12, 13, 207-209)

1776 *Hydrachna* Müller, Zoologiae Danicae prodromus: 188.

1822 *Achlysia* Adouin, Bulletin des Sciences, par la Société Philomatique: 12.

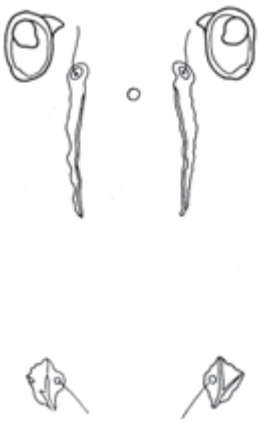
1843 *Tridachne* Raspail, Histoire naturelle de la santé et de la maladie chez les végétaux et chez les animaux en général, et en particulier chez l'homme 1: 491.



207



208



209

207 *Hydrachna mysorensis* Cook, venter female (after Cook 1974)

208 *Hydrachna kloomi* Imamura, frontal sclerite male (after Cook 1974)

209 *Hydrachna multipora* Cook, frontal sclerites female (after Cook 1974)

1893 *Bargena* Koenike, Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten 10: 47.
1916 *Anohydrachna* Thor, Revue russe d'Entomologie 16: 46.
1916 *Diplohydrachna* Thor, Revue russe d'Entomologie 16: 46.
1916 *Monohydrachna* Thor, Revue russe d'Entomologie 16: 47.
1916 *Limnohydrachna* Thor, Revue russe d'Entomologie 16: 59.
1916 *Odontohydrachna* Thor, Revue russe d'Entomologie 16: 59.
1916 *Schizohydrachna* Thor, Revue russe d'Entomologie, 16, 47.
1931 *Rhabdohydrachna* K. Viets, Zoologischer Anzeiger 93: 184.
1933 *Scutohydrachna* K. Viets, Zoologischer Anzeiger 103: 162.
1934 *Tetrahydrachna* Lundblad, Arkiv för Zoologi 28A: 25.
1950 *Chitohydrachna* Habeeb, Le Naturaliste Canadien 77: 116 – K.O. Viets (1987).
1966 *Hymenohydrachna* Wainstein, Trudy Instituta Biologii Vnutrennykh Vodnany 12: 189.
1976 *Microhydrachna* Wainstein, Trudy Instituta Biologii Vnutrennykh Vodnany 31: 140.
1976 *Piersigihydrachna* Wainstein, Trudy Instituta Biologii Vnutrennykh Vodnany 31: 141.
1976 *Thorihydrachna* Wainstein, Trudy Instituta Biologii Vnutrennykh Vodnany 31: 141.
Type species: *Hydrachna cruenta* Müller, 1776

DIAGNOSIS: As for the superfamily.

HABITAT: Standing waters, temporary as well as permanent, slow flowing streams.

DISTRIBUTION: Worldwide, many species described.

REMARKS: The subgenera erected in the past were far from a phylogenetic system, often with males and females assigned to different subgenera. Consequently, they were synonymized with the nominate subgenus by K.O. Viets (1987) and Davids et al. (2007).

SUPERFAMILY HYDRYPHANTOIDEA PIERSIG, 1896

1896 Hydryphantinae Piersig, Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig 22: 48.

Family Ctenothyadidae Lundblad, 1936

1936 Ctenothyasidae Lundblad, Entomologisk Tidskrift 57: 145.

DIAGNOSIS: Idiosoma soft and papillate, especially near Cxgl-1 these papillae are very long. Dorsum and venter without platelets. Glandularia of dorsum either free or surrounded by stellate sclerites. Lateral eyes in capsules, median eye unpigmented, the postocularia lying close to each other immediately posterior to median eye. Coxae in four groups with few to numerous setae. Genital field with 3-5 pairs of acetabula lying on the lateral margin of the genital flaps. Palp not chelate, medial margin of P2 with numerous pectinate or serrate setae, P4 with numerous stocky setae. Legs with numerous heavy setae, swimming setae absent; claws simple.

KEY TO THE GENERA

1 Genital field with three pairs of acetabula (Fig. 210); glandularia not surrounded by stellate sclerites Genus *Ctenothyas*

- Genital field with four or five pairs of acetabula (Fig. 212); glandularia surrounded by stellate sclerites (Fig. 213) Genus *Stellulathyas*

Genus *Ctenothyas* Lundblad, 1936

(Figs. 40, 41, 210, 211)

1936 *Ctenothyas* Lundblad, Entomologisk Tidskrift 57: 145.

Type species: *Ctenothyas verrucosa* Lundblad, 1936



210



211



212

210 *Ctenothyas verrucosa* Lundblad, venter female (after Cook 1974)

211 *Ctenothyas verrucosa* Lundblad, integumental papillae female (after Cook 1974)

212 *Stellulathyas magnifica* Cook & Hopkins, venter female (after Cook & Hopkins 1998)

DIAGNOSIS: Glandularia of the dorsum lying on relatively large, rounded projections. Genital field with three pairs of acetabula, lying on the lateral margin of the flaps (Fig. 210). Medial surface of P2 with numerous pectinate or serrate setae, ventral margin of P4 with a row of ventral setae and a mediodistal thickened seta (Fig. 41).

HABITAT: Hygropetric areas of streams.

DISTRIBUTION: One species known from Java.

Genus *Stellulathyas* Cook & Hopkins, 1998

(Figs. 212-215)

1998 *Stellulathyas* Cook & Hopkins, Acarologia 39: 259.

Type species: *Stellulathyas magnifica* Cook & Hopkins, 1998

DIAGNOSIS: Integument papillae either pointed or rounded (Fig. 213). Dorsum and venter with stellate sclerites surrounding the glandularia. Glandularia of dorsum with seven projections (Fig. 213), those of lateral margin and most of venter with six projections (Fig. 212). Genital field with four to five pairs of acetabula, four being the most typical number (Fig. 212). Palp and segments with numerous setae (Figs. 214-215).

HABITAT: Semi-aquatic to near-terrestrial.

DISTRIBUTION: Two species are known, one from the Subantarctic Snares Island S of New Zealand, the other from North Island, New Zealand.

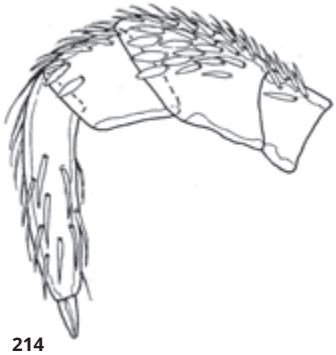
Family Hydrodromidae K. Viets, 1936

1936 Hydrodromidae K. Viets, Die Tierwelt Deutschlands 31: 140.

DIAGNOSIS: Idiosoma soft and papillate, without sclerotized dorsal or ventral platelets. Frontal eye absent. Lateral eyes not in capsules. Coxae in four groups, with many long setae along margins (Fig. 216). Genital field with numerous acetabula. Genital plates with more or less equally rounded lateral and slightly concave medial margins. A slight sexual dimorphism present in shape and setation. Palp five-segmented, P2 with pectinate mediodistal setae, P4 with a long, pointed dorsodistal extension reaching the tip of the slender and elongated P5 (Fig. 23). Legs with swimming setae (Figs. 217-218), claws without claw blade with a dorsal clawlet.



213



214



215

213 *Stellulathyas magnifica* Cook & Hopkins, dorsum female (after Cook & Hopkins 1998)

214 *Stellulathyas magnifica* Cook & Hopkins, palp female (after Cook & Hopkins 1998)

215 *Stellulathyas magnifica* Cook & Hopkins, first leg female (after Cook & Hopkins 1998)

KEY TO THE GENERA

1	Idiosoma laterally compressed	Genus *Oxopsis*
-	Idiosoma not laterally compressed, wider than high	Genus *Hydrodroma*

Genus *Hydrodroma* C.L. Koch, 1837

(Figs. 23, 216-218)

1837 *Hydrodroma* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 14: 7.

Type species: *Hydrodroma umbrata* C.L. Koch, 1837 = *Hydrodroma despiciens* (Müller, 1776)

DIAGNOSIS: As for family. Idiosoma not laterally compressed.

HABITAT: Standing waters, pools in streams, streams.

DISTRIBUTION: Worldwide, many species described. In the past, *Hydrodroma despiciens* (Müller, 1776) was considered a cosmopolitan species, but several recent studies (e.g. Pesic & Smit 2007a,b) showed that outside the Palaearctic this species does not occur.

Genus *Oxopsis* Nordenskiöld, 1905

(Not illustrated)

1905 *Oxopsis* Nordenskiöld, In: Jägerskiöld, L.A., Results of the Swedish zoological expedition to Egypt and the White Nile 2 (20A): 3.

Type species: *Oxopsis diplodontoides* Nordenskiöld, 1905

DIAGNOSIS: Idiosoma laterally compressed.

HABITAT: Standing waters.

DISTRIBUTION: Only one species known from Sudan.

REMARKS: The genus is insufficiently known. Cook (1974) suggested that the only known specimen might be damaged during mounting, resulting in the lateral compression of the idiosoma. Moreover, the illustrations of the only known species are very diagrammatic and no type specimen is available.



216



217



218

216 *Hydrodroma monticola* (Piersig), venter female (after Cook 1974)

217 *Hydrodroma monticola* (Piersig), IV-leg-4-6 male (after Cook 1974)

218 *Hydrodroma rheophila* Cook, IV-leg-4-6 female (after Cook 1974)

Family Hydryphantidae Piersig, 1896

1896 Hydryphantinae Piersig, Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig 22: 48.

DIAGNOSIS: Idiosoma soft, papillate or leathery, with various development of dorsal and ventral sclerites. Frontal eye absent or present. Lateral eyes often in capsules, but occasionally not in capsules or reduced. Coxae typically in four groups. Genital field plesiomorphotypically with movable flaps and three pairs of acetabula, but loss of genital flaps, shifting of acetabula on the flaps and polyacetabulism occurs. Palp five-segmented and chelate, but occasionally dorsodistal projection of P4 in the form of a heavy seta. Legs with or without swimming setae.

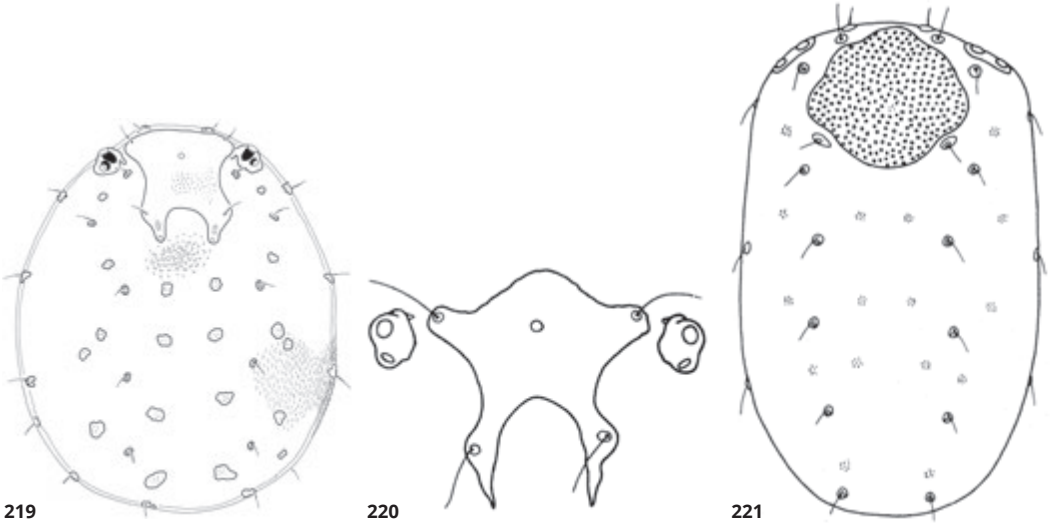
REMARKS: Several authors have discussed the phylogeny of the Hydryphantidae (e.g. Gerecke et al. 2010), and most are of the opinion the family is of paraphyletic origin. This is confirmed by a study based on molecular data (Dabert et al. 2016).

KEY TO THE SUBFAMILIES

1 Dorsum with a characteristic frontal plate including frontal eye, on anterolateral projections praefrontalia, and on posterior projections postfrontalia, posteromedial margin concave or straight (Figs. 219, 220); remaining dorsum generally smooth, in a few species muscle attachments sclerotized as small or medium-size platelets; legs in general with swimming setae (one exception: a Mediterranean species); claws simple Subfamily Hydryphantinae

- Frontal plate, if present, different in shape, without anterolateral posterior projections and posterior margin convex (Figs. 221, 222); dorsum various, from completely smooth, over equipped with numerous plates, to completely covered by a large shield; legs rarely with swimming setae, claws may be pectinate. 2

2 Dorsum covered by a complete, uniformly sclerotized dorsal shield, lateral eyes in capsules (Fig. 223); genital field located well posteriorly on the idiosoma, with slightly stalked acetabula (Figs. 224, 225); sclerotized platelets surrounding the coxal plates laterally and posteriorly Subfamily Cowichaniinae



219 *Hydryphantes* (*Hydryphantes*) *armentarius* Gerecke, dorsum (after Di Sabatino et al. 2010)

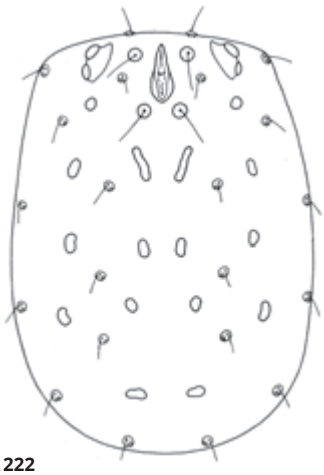
220 *Hydryphantes* (*Hydryphantes*) *flexuosus* (Koenike), frontal plate female (after Cook 1974)

221 *Vietsia scutata* (Protz), dorsum female (after Cook 1974)

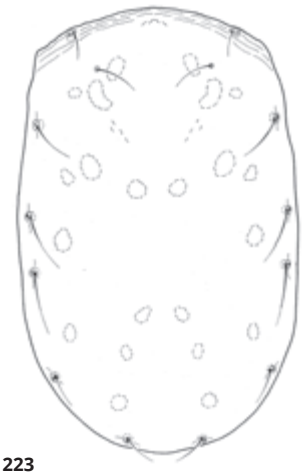
- Dorsum with or without plates, if they are fused to a dorsal shield, this is not uniformly sclerotized but with a trabecular structure, or at least one pair of small platelets remain free at its posterior margin. Genital field in general near idiosoma centre. Coxal plates may have secondary sclerotization but are not surrounded by particular platelets 3

3 Idiosoma vermiformly elongated (Fig. 226); part posterior to the genital field distinctly longer than coxal field; genital field with three pairs of acetabula, flaps reduced to rod-shaped, setae-bearing sclerites (Fig. 227); legs without swimming setae, claws simple
Subfamily Wandesiinae

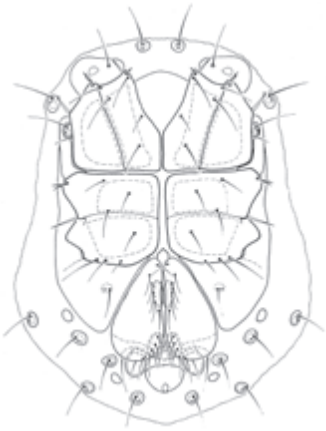
- Idiosoma not elongated; part posterior to the genital field generally shorter or only slightly longer than coxal field; genital field and legs various. 4



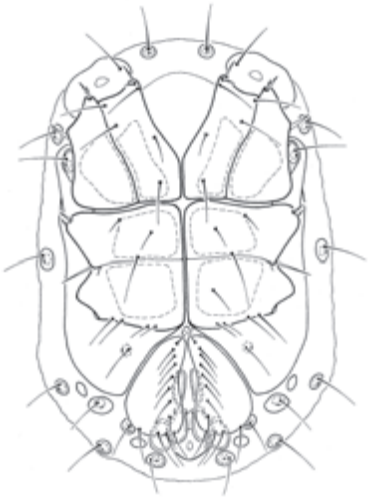
222



223



224



225



226



227

222 *Euthyas truncata* (Neuman), dorsum male (after Cook 1974)

223 *Cowichania interstitialis* I.M. Smith, dorsum female (after I.M. Smith 1983d)

224 *Cowichania interstitialis* I.M. Smith, venter female (after I.M. Smith 1983d)

225 *Cowichania interstitialis* I.M. Smith, venter male (after I.M. Smith 1983d)

226 *Wandesia* (*Wandesia*) *lychnobia* Gerecke, venter (after Di Sabatino et al. 2010)

227 *Wandesia* (*Wandesia*) *somnambula* Gerecke, genital field male (after Di Sabatino et al. 2010)

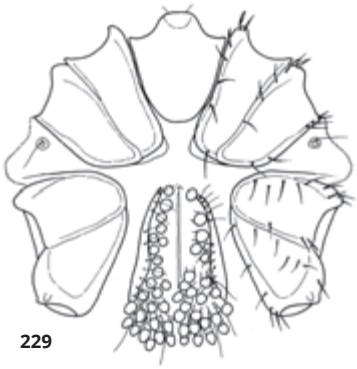
4 Idiosoma completely soft or (in some species with pectinate claws) muscle attachments sclerotized as small platelets (Fig. 228); genital field with acetabula in more than three pairs (generally very numerous, often stalked acetabula) flanked by well-developed flaps or variously shaped elongate sclerites (Fig. 229); leg claws simple (Fig. 230) or pectinate (Fig. 231), swimming setae generally absent. 5

- Idiosoma often with variously developed sclerotized plates (Fig. 232); genital field with three (Fig. 233) to numerous (Fig. 234) pairs of acetabula; species with completely smooth integument have simple claws and not more than three pairs of (rarely stalked) acetabula; legs with or without swimming setae, claws generally simple. 6

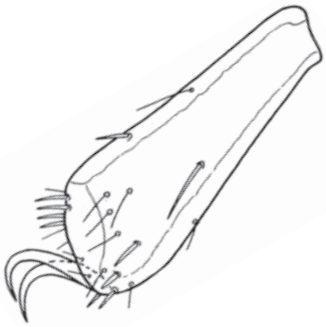
5 Genital field with two pairs of enlarged sclerites (the posterior one occasionally reduced to a small dot) located medial to acetabula (Fig. 235); the latter very numerous and small, not stalked; legs without swimming setae, claws simple. Subfamily Eupatrellinae



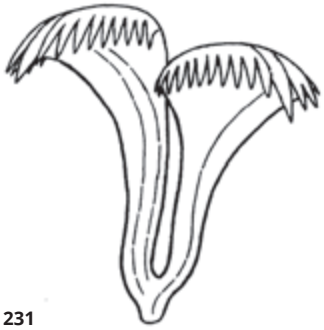
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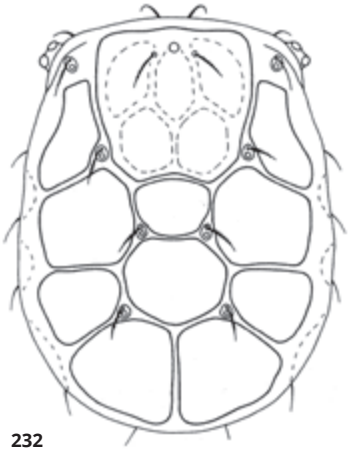
229



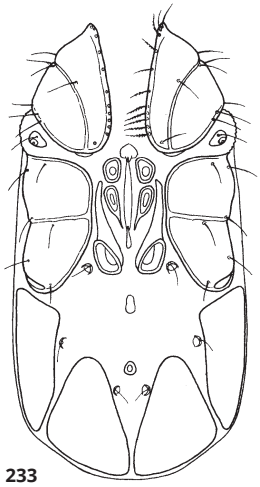
230



231



232



233

228 *Partnunia steinmanni* Walter, dorsum female (after Cook 1974)

229 *Partnunia steinmanni* Walter, venter female (after Cook 1974)

230 *Partnunia steinmanni* Walter, I-leg-6 female (after Cook 1974)

231 *Protzia gata* Cook, claws of first leg female (after Cook 1974)

232 *Javathyas cornipes* Cook, dorsum male (after Cook 1974)

233 *Trichothyas* (*Neothyas*) *hygropetrica* (Lundblad), venter male (after Cook 1974)

- Genital field with well-developed flaps (Fig. 236) or variously reduced sclerites (Fig. 237), generally located lateral to acetabula, the latter often stalked (the Neotropical genus *Neocalonyx* with one pair of elongate genital sclerites bearing stalked acetabula, Fig. 238); legs generally without swimming setae (exception: genus *Paracalonyx*, Argentina), claws often pectinate. Subfamily Protziinae

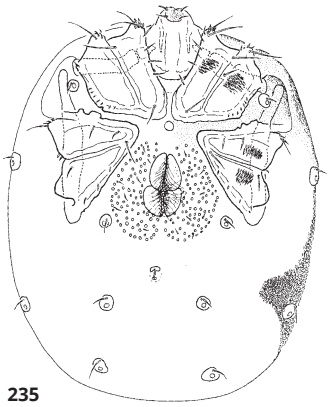
6 (4) At least one pair of acetabula (often all) in the smooth integument between gonopore and genital plates or flaps (Fig. 239) 7

- All acetabula on sclerotized plates flanking the gonopore (Fig. 240) (an exception is made by one South African *Diplodontus* species with a very high number of acetabula on genital plates, and one inconspicuous pair in the gonopore field). 10

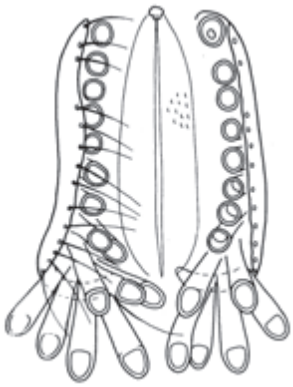
7 (6) Lateral eyes not in capsules, lying below the integument; dorsal and posteroventral idiosoma without sclerotized muscle attachments (Fig. 241); anterior coxal plate with suture line Cx-1/2 nearly parallel to idiosoma axis (Fig. 242); genital field with well-developed flaps and three pairs of large acetabula, flanking the gonopore Subfamily Tartarothyadinae



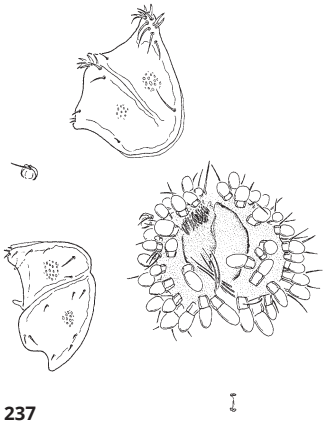
234



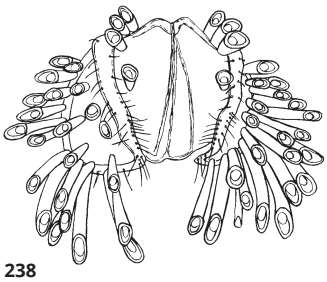
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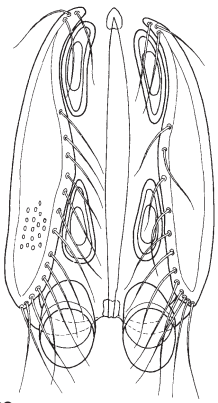
236



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238



239

234 *Heterothyas africana* Lundblad, genital field male (after Cook 1974)

235 *Eupatrella arroz* Goldschmidt & Gerecke, venter male (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

236 *Partnunia steinmanni* Walter, genital field female (after Cook 1974)

237 *Protzia patata* Goldschmidt & Gerecke, venter male (part.) (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

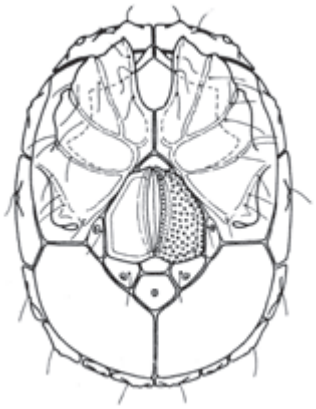
238 *Neocalonyx* (*Neocalonyx*) *pectunguis* Lundblad, genital field female (after Cook 1974)

239 *Tartarothyas romanica* Husiatinschi, genital field male (after Cook 1974)

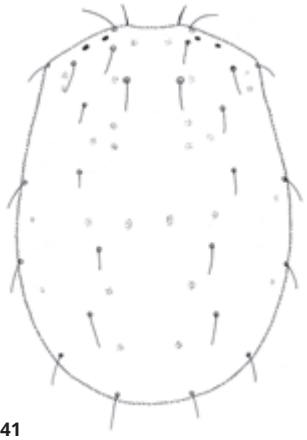
- Lateral eyes in capsules (Fig. 243); dorsal and posteroventral idiosoma completely smooth or with variously developed muscle attachment plates; anterior coxal plate with suture line Cx-1/2 generally more inclined with regard to idiosoma axis; genital field with three to numerous pairs of acetabula various in position. 8

8 Legs with swimming setae; dorsal and posteroventral idiosoma completely smooth or lateral glandularia on a garland of narrow, elongated platelets (Fig. 244); genital field with well-developed flaps and three pairs of large elongated acetabula flanking gonopore (Fig. 245) Subfamily Pseudohydryphantinae

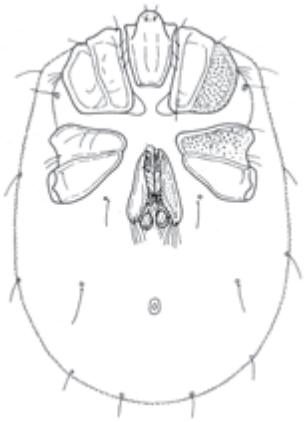
- Legs without swimming setae; dorsal and posteroventral idiosoma generally with sclerotized muscle attachments (Fig. 246), but these not arranged as a garland of longish platelets (an exception is made by the genus *Zschokkea*, with a completely smooth idiosoma surface, combined with very small, knob-shaped acetabula, Fig. 247); genital field with three to numerous pairs of acetabula various in position 9



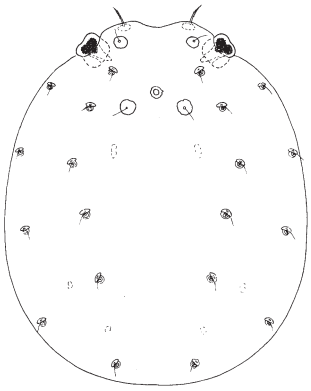
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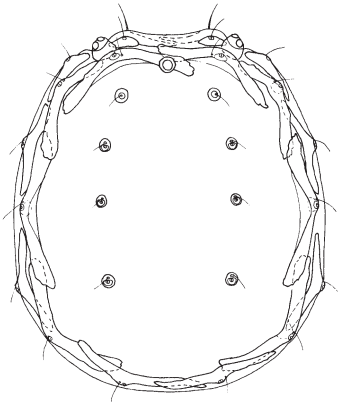
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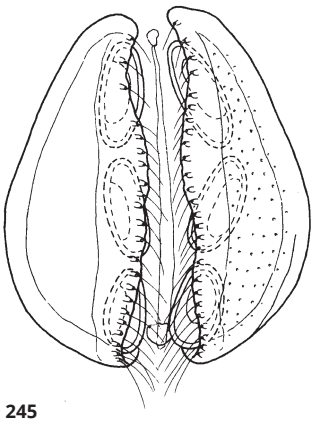
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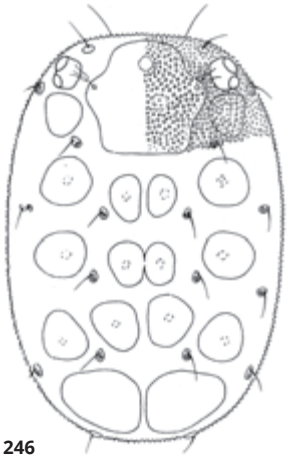
240 *Mamersa petrophila* Cook, venter female (after Cook 1974)
241 *Tartarothyas romanica* Husiatinschi, dorsum female (after Cook 1974)
242 *Tartarothyas romanica* Husiatinschi, venter female (after Cook 1974)
243 *Pseudohydryphantes crassipes* Cook, dorsum male (after Cook 1986)
244 *Cyclohydryphantes trabeculiferus* Lundblad, dorsum male (after Cook 1986)
245 *Pseudohydryphantes stylatus* Cook, genital field male (after Cook 1986)

9 Male first leg modified as a grasping appendage: I-leg-5 expanded and with a ventral row of peg-like setae, I-leg-6 may be folded back against penultimate segment (Fig. 248); dorsum with frontal plate including praeocularia, postocularia free in the integument; dorsoglandularia on enlarged platelets (Fig. 249); genital field with flaps flanking three pairs of acetabula (Fig. 250); P4 with a heavy seta (Fig. 251) (female unknown) Subfamily Ankelothyadinae

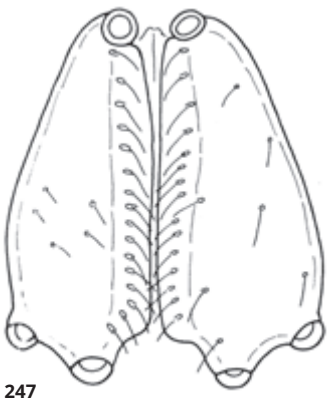
- Male first leg not modified as a grasping appendage; sclerotization of dorsum, formation of genital field and palp setation various (Figs. 232, 233, 246) Subfamily Euthyadinae

10 (6) Genital plates bearing three pairs of acetabula; distal segments of legs with 1-3 swimming setae (Fig. 252) Subfamily Chimerathyadinae

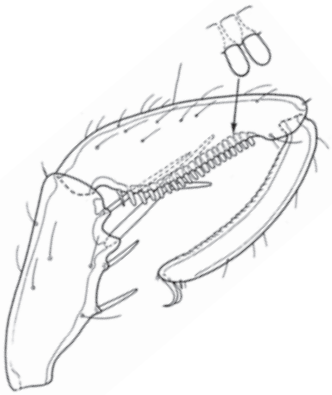
- Genital plates bearing numerous pairs of acetabula. Legs with or without swimming setae. 11



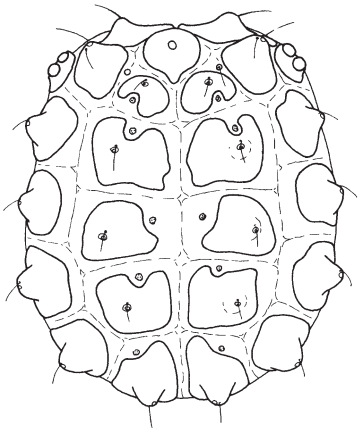
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251

246 *Deuterothyas variabilis* Lundblad, dorsum male (after Cook 1974)

247 *Zschokkea oblonga* Koenike, genital field female (after Cook 1974)

248 *Ankelothyas emydoides* Besch, I-leg-4-6 male (after Cook 1974)

249 *Ankelothyas emydoides* Besch dorsum male (after Cook 1974)

250 *Ankelothyas emydoides* Besch venter male (after Cook 1974)

251 *Ankelothyas emydoides* Besch palp male (after Cook 1974)

11 Laterodorsal glandularia on enlarged platelets with anterior and posterior finger-like extensions which are fused to form a ring around the dorsum (Figs. 253, 254); remaining integument soft, with sharp-pointed papillae; legs without swimming setae
Subfamily Cyclothyadinae

- Dorsal and posteroventral idiosoma smooth or with platelets various in shape, but never with ring of glandularia-bearing platelets around the dorsum; papillae of membranous integument areas not sharply pointed; legs with or without swimming setae. 12

12 Dorsum and posterior part of venter smooth or with very small, knob-shaped muscle attachment platelets; coxae in four groups (membranous area separating anterior and posterior coxal plates) (Fig. 255) Subfamily Diplodontinae

- Dorsum and posterior part of venter covered by densely arranged, large muscle attachment plates (frontal plate not including glandularia, regularly arranged paired glandularia plates) (Fig. 240); all coxae fused on their respective sides (Fig. 256) Subfamily Mamersinae

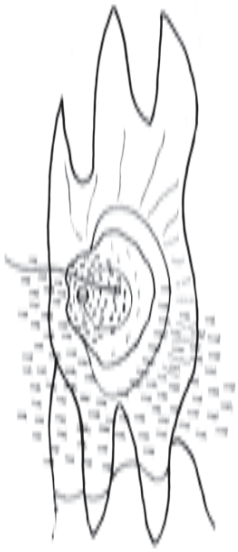
Subfamily Ankelothyadinae Besch, 1964

1964 Ankelothyadinae Besch, Beiträge zur Neotropischen Fauna 3: 94.

DIAGNOSIS: Lateral eyes in capsules, median eye on a well-developed frontal plate (Fig. 249). Glandularia and associated platelets greatly expanded. Postocularia lying free in the integument. Genital field with three pairs of acetabula which are covered by well-developed flaps (Fig. 250). Posterior acetabula on short stalks. P2 and P3 with moderately developed ventrodistal projection, P4 with a heavy seta (Fig. 251). Legs without swimming setae. Ventral margin of I-L-6 folded back against I-L-5 to form a grasping structure; I-leg-5 expanded and with a row of some 20 rounded, peg-like setae (Fig. 248). Monotypic.



252



253



254

252 *Chimerathyas cooki* Mitchell, venter adult (part.) (after Mitchell 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

253 *Cyclothyas heterospina* (Imamura), lateroglandularium platelet male (after Cook 1974)

254 *Cyclothyas heterospina* (Imamura), combination dorsum and venter male (after Cook 1974)

Genus *Ankelothyas* Besch, 1964

(Figs. 248-251)

1964 *Ankelothyas* Besch, Beiträge zur Neotropischen Fauna 3: 95.

Type species: *Ankelothyas emydoides* Besch, 1964

DIAGNOSIS: (Male only) As for subfamily.

HABITAT: Streams.

DISTRIBUTION: One species known from Chile.

Subfamily Chimerathyadinae Mitchell, 2003

2003 Chimerathyadinae Mitchell, Tribute to David R. Cook: 189.

DIAGNOSIS: Integument leathery, dorsum with two pairs of small platelets and nine pairs of glandularia (Fig. 257). Dorsal glandularia appearing as sclerotized cones with a seta at the top, gland pore a narrow slit in a circular membrane. Lateral eyes two-lensed. Genital field with three pairs of acetabula on the genital flaps. Coxae in four groups, Cx-IV with a rounded medial margin (Fig. 252). Distal segments of legs with 1-3 swimming setae. Monotypic.

Genus *Chimerathyas* Mitchell, 2003

(Figs. 252, 257-259)

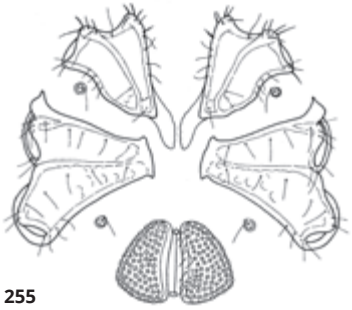
2003 *Chimerathyas* Mitchell, Tribute to David R. Cook: 189.

Type species: *Chimerathyas cooki* Mitchell, 2003

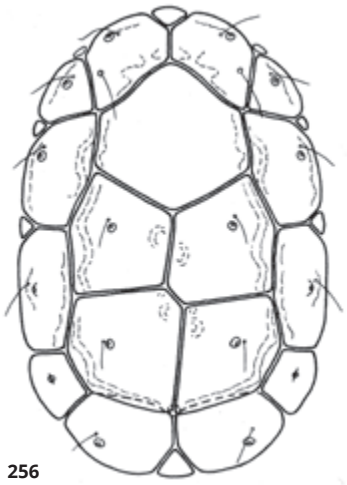
DIAGNOSIS: As for subfamily.

HABITAT: Temporary waters, e.g. vernal swamps.

DISTRIBUTION: One species known from Ohio, USA.



255



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257

255 *Diplodontus silvestrii* (Daday), venter male (after Cook 1974)

256 *Mamersa petrophila* Cook, dorsum female (after Cook 1974)

257 *Chimerathyas cooki* Mitchell, dorsum adult (part.) (after Mitchell 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

Subfamily Cowichaniinae I.M. Smith, 1983

1983 Cowichaniinae I.M. Smith, The Canadian Entomologist 115: 523.

DIAGNOSIS: Dorsum covered by an entire shield including median eye, postocularia and six pairs of laterally located glandularia (Fig. 223). Lateral eyes on plates. Coxae in four groups, surrounded laterally and posteriorly by extensive sclerotization. Genital field lying posteriorly, with well-developed genital flaps and three pairs of acetabula on short stalks (Fig. 224). Palp only slightly chelate, with P4 with a dorsodistal stout seta extending to the middle of P5 (Fig. 260). Legs without swimming setae. Monotypic.

Genus *Cowichania* I.M. Smith, 1983

(Figs. 223-225, 260)

1983 *Cowichania* I.M. Smith, The Canadian Entomologist 115: 525.

Type species: *Cowichania interstitialis* I.M. Smith, 1983

DIAGNOSIS: As given for the subfamily.

HABITAT: Springs.

DISTRIBUTION: One species known from British Columbia, Canada.

Subfamily Cyclothyadinae Lundblad, 1941

1941 Cyclothyasinae, Entomologisk Tidskrift 62: 110.

DIAGNOSIS: Lateral eyes in capsules which are incorporated in anterolateral sclerites. Median eye absent. Dorsum with large dorsal shield including postfrontale and four pairs of glandularia (Fig. 254). Laterodorsal glandularia enlarged with anterior and posterior finger-like extensions which are fused to form a ring around the dorsum (Fig. 253). Integument soft with numerous sharp-pointed papillae. Genital field with numerous acetabula on the well-developed genital flaps. P2 with anteroventral pectinate setae (Fig. 261). Legs without swimming setae, claws simple. Monotypic.

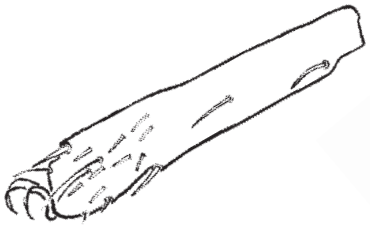
Genus *Cyclothyas* Lundblad, 1941

(Figs. 253, 254, 261)

1941 *Cyclothyas* Lundblad, Entomologisk Tidskrift 62: 111.



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259



260

258 *Chimerathyas cooki* Mitchell, gnathosoma + palp adult (part.) (after Mitchell 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

259 *Chimerathyas cooki* Mitchell, I-leg-6 adult (after Mitchell 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

260 *Cowichania interstitialis* I.M. Smith, palp male (after I.M. Smith 1983d)

1955 *Ogumacarus* Imamura, Bulletin of the Biogeographical Society of Japan, 16/19: 182 – Cook (1974).

Type species: *Cyclothyas mirabilis* Lundblad, 1941

DIAGNOSIS: As for subfamily.

HABITAT: Streams and springs.

DISTRIBUTION: Two species known, one from Burma (Lundblad 1967) and one from Japan.

Subfamily Diplodontinae K. Viets, 1936

1931 Eupatrinae K. Viets, Zoologischer Anzeiger 93: 210.

1936 Diplodontinae K. Viets, Die Tierwelt Deutschlands 31: 140.

DIAGNOSIS: Lateral eyes in capsules with well-developed apodemes. Median eye present, occasionally reduced in size, free in the integument. Dorsal and ventral muscle attachments generally unsclerotized, rarely forming small sclerotized dots. Genital field with numerous acetabula (up to 600) lying on the genital flaps (Fig. 255). An additional pair of acetabula may be present between the genital plates and the anterior part of the gonopore. Near anterior margin of P2 several stout setae (Fig. 262). Cheliceral claw long and stylet-like. Legs with or without swimming setae. Monotypic.

Genus *Diplodontus* Dugès, 1834

(Figs. 24, 255, 262)

1834 *Diplodontus* Dugès, Annales des sciences naturelles, 2, Zoologie 1: 148.

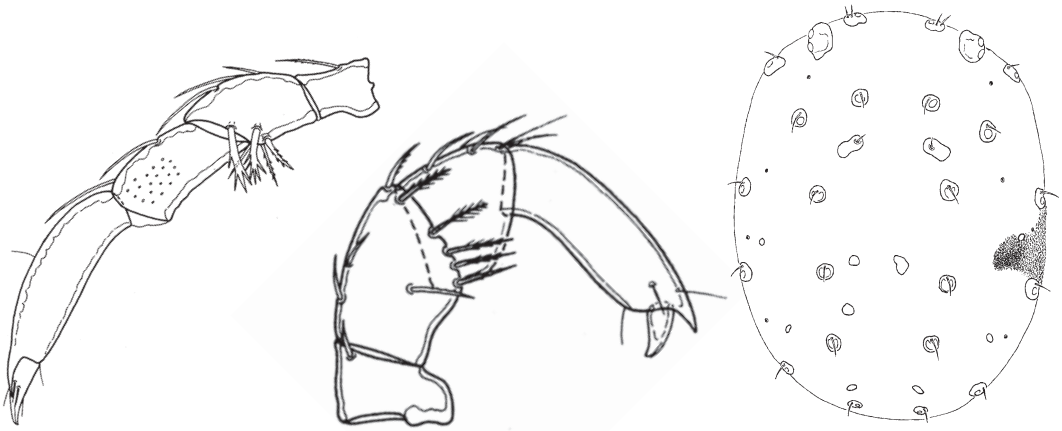
1896 *Eupatra* Koenike, Zoologischer Anzeiger 19: 357.

Type species: *Diplodontus scapularis* Dugès, 1834

DIAGNOSIS: As for subfamily.

HABITAT: Standing waters, slow running streams, springs, hygropetric habitats (Gerecke 2004a).

DISTRIBUTION: Widespread, several species known from Europe, Asia, Africa and Australia.



261 **262** **263**

261 *Cyclothyas heterospina* (Imamura), palp male (after Cook 1974)

262 *Diplodontus silvestrii* (Daday), palp male (after Cook 1974)

263 *Eupatrella arroz* Goldschmidt & Gerecke, dorsum male (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

Subfamily Eupatrellinae K. Viets, 1935

1935 Eupatrellinae K. Viets, Zoologischer Anzeiger 110: 278 – Goldschmidt & Gerecke (2003).

DIAGNOSIS: Idiosoma with dorsal and ventral platelets. Median eye absent, or lying in a frontal plate including the frontalia, glandularia and postocularia. When median eye is absent, then frontal plate is lacking. Muscle attachment plates either rounded (when a median eye is present) or rod-, bone- or star-shaped (when median eye is absent). Coxae in four groups, suture lines of coxae complete. Genital field with numerous acetabula, either discoidal or on very short stalks and surrounding a pair of genital flaps flanking the gonopore. Posterior flaps may be reduced to a pair of tiny knobs with one seta each. P4 with or without a dorsodistal projection. Legs without swimming setae, claws simple, without lateral clawlets.

KEY TO THE GENERA

1 Median eye and frontal plate absent (Fig. 263); genital field with two paired sclerites (Figs. 235, 266) Genus *Eupatrella*

- Median eye and frontal plate present (Fig. 264); genital field with one pair of sclerites (Fig. 265) Genus *Protziella*

Genus *Eupatrella* Walter, 1935

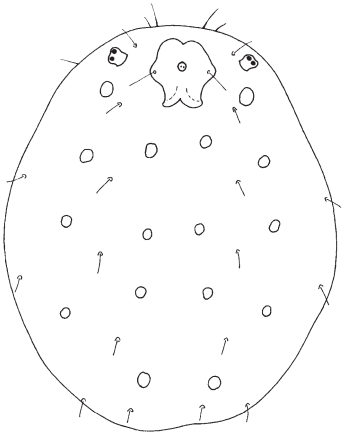
(Figs. 235, 263, 266-268)

1935 *Eupatrella* Walter, Archiv für Hydrobiologie 28: 84.

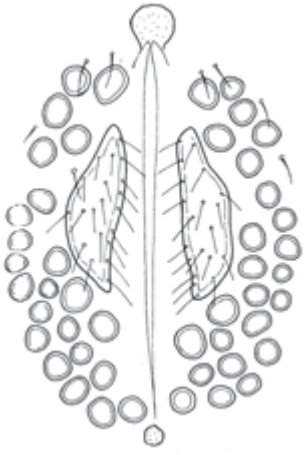
1972 *Neoprotziella* Lundblad, Entomologisk Tidskrift 93: 117 - Goldschmidt & Gerecke (2003).

Type species: *Eupatrella reticulata* Walter, 1935

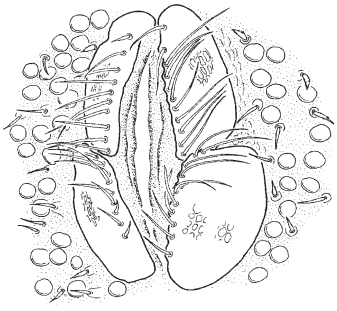
DIAGNOSIS: Median eye and frontalia absent (Fig. 263). Dorsal and ventral platelets small and rounded, or rod- or star-shaped. Coxae with an elongated reticulation, Cx-II with long anterolateral extensions. Genital field with two pairs of genital flaps with numerous long setae (Fig. 266); males with more densely-arranged and longer genital setae than the female (Fig. 266). P4 with a dorsodistal extension (Fig. 268).



264



265



266

264 *Protziella hutchinsoni* Lundblad, dorsum female (after Cook 1974)

265 *Protziella hutchinsoni* Lundblad, genital field male (after Cook 1974)

266 *Eupatrella arroz* Goldschmidt & Gerecke, genital field female (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

HABITAT: Springs and streams.

DISTRIBUTION: The genus has a disjunct distribution, with five species known from Burkina Faso, Congo (K.O. Viets & Böttger 1974a), Cameroon (Lundblad 1972), Costa Rica, Ecuador (Goldschmidt & Gerecke 2003) and Borneo (Wiles 1999).

Genus *Protziella* Lundblad, 1934

(Figs. 264, 265, 269, 270)

1934 *Protziella* Lundblad, Memoirs of the Connecticut Academy of Arts and Sciences 10: 92.

Type species: *Protziella hutchinsoni* Lundblad, 1934

DIAGNOSIS: Median eye present (Fig. 269), lying on a frontal plate together with the pre- and post-frontalia and a pair of glandularia (Fig. 264). Dorsal platelets small and rounded. All glandularia lying free in the integument. Coxae in four groups, anterolateral corners with a tuft of setae. Genital field with one pair of genital flaps (Fig. 265).

HABITAT: Springs and streams.

DISTRIBUTION: One species known from Kashmir and Afghanistan (Imamura 1966).

Subfamily Euthyadinae K. Viets, 1931

1926 Thyasinae K. Viets, Zoologischer Anzeiger 69: 190.

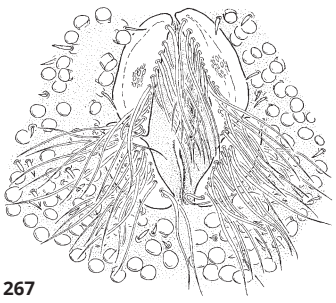
1931 Euthyadinae K. Viets, Zoologischer Anzeiger 93: 210.

1942 Zschokkeinae K. Viets, Zoologischer Anzeiger 138: 210.

2007 Thyadidae Tuzovskij, Acarina 15: 181 – Di Sabatino et al. (2010).

DIAGNOSIS: Lateral eyes in capsules or on a common eye plate. Medial eye generally present, but often not pigmented. Dorsal and posteroventral muscle attachment plates typically sclerotized, often in a characteristic pattern of large plates. However, in some taxa sclerotization reduced to a frontal plate or completely absent. Genital field typically with large flaps and three pairs of acetabula, in several taxa flaps reduced to small sclerotized strips and / or genital field with numerous acetabula. Legs without swimming setae, leg claws various.

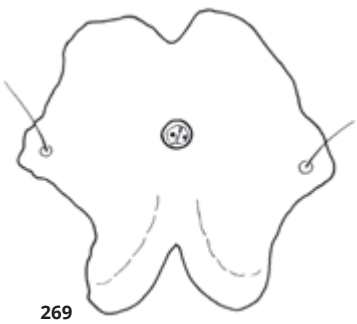
REMARKS: According to Di Sabatino et al. (2010) the subfamily is a polyphyletic assemblage of genera. Not included: *Pseudothyas* Thor, 1899 as the only known species must be considered a *species incerta* (Di Sabatino et al. 2009).



267



268



269

267 *Eupatrella arroz* Goldschmidt & Gerecke, genital field male (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

268 *Eupatrella arroz* Goldschmidt & Gerecke, gnathosoma + palp male (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

269 *Protziella hutchinsoni* Lundblad, frontal plate female (after Cook 1974)

KEY TO THE GENERA

1 Dorsum with three large medial plates (frontal plate, including pre- and postocularia, as well as dorsocentralia 1; central plate: fused dorsocentralia 2; posterior plate: fused dorsocentralia 3) (Fig. 271) 2

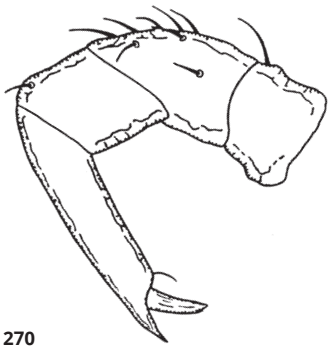
- Arrangement of dorsal plates various, not with three medial plates in series 7

2 Genital field with three pairs of acetabula (Fig. 272) 3

- Genital field with more than three pairs of acetabula (Fig. 273) 5

3 Dorsodistal extension of P4 absent, instead, a large seta is present (Fig. 274) Genus *Almuerzothyas*

- P4 with a dorsodistal extension (Fig. 275) 4



270



271



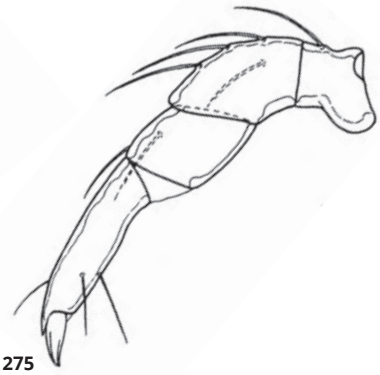
272



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275

270 *Protziella hutchinsoni* Lundblad, palp female (after Lundblad 1934)

271 *Almuerzothyas casado* Goldschmidt & Gerecke, dorsum female (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

272 *Almuerzothyas casado* Goldschmidt & Gerecke, venter female (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

273 *Dacothyas savulescui* Motaş, genital field male (after Cook 1974)

274 *Almuerzothyas casado* Goldschmidt & Gerecke, palp female (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

275 *Javathyas cornipes* Cook, palp male (after Cook 1974)

4 Male (pregenital sclerite longer than wide or reduced, Fig. 276): Cx-III lying close to each other (Fig. 277); I-leg-3 with a lateral extension (Fig. 280); female (pregenital sclerite wider than long (Fig. 278); I-leg-3 simple): genital flaps relatively wide (Fig. 279)
Genus *Javathyas*

- Male: Cx-III farther apart (Fig. 281); I-leg-3 without extension (Fig. 282); female: genital flaps relatively narrow (Fig. 283) Genus *Trichothyas* (in part)

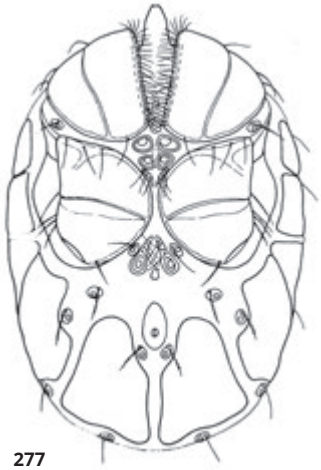
5(2) Genital field with four or five pairs of acetabula 6

- Genital field with many pairs of acetabula Genus *Heterothyas*

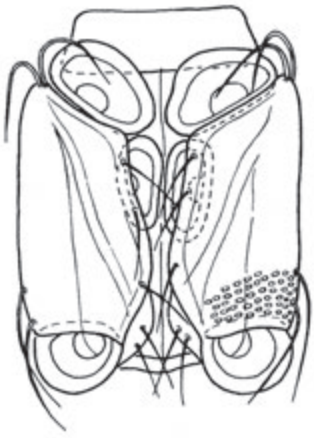
6 Males: Cx-III close to each other, dividing genital flaps into anterior and posterior pairs of platelets; I-L-3 with a strongly developed lateral extension bearing an enlarged seta; females: genital flaps relatively wide, maximum width about twice diameter of posterior acetabula
Genus *Dacothyas*



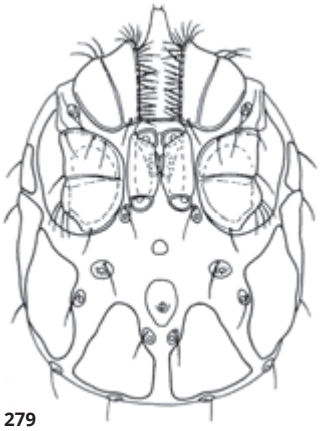
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281

276 *Javathyas cornipes* Cook, genital field male (after Cook 1974)

277 *Javathyas cornipes* Cook, venter male (after Cook 1974)

278 *Javathyas cornipes* Cook, genital field female (after Cook 1974)

279 *Javathyas cornipes* Cook, venter female (after Cook 1974)

280 *Javathyas cornipes* Cook, first leg male (after Cook 1974)

281 *Trichothyas* (*Lundbladia*) *petrophila* (Michael), venter male (after Di Sabatino et al. 2010)

- Male: Cx-III farther apart, genital flaps not divided; I-leg-3 without extension; female: genital flaps relatively narrow, maximum width corresponding to diameter of posterior acetabula Genus *Trichothyas* (in part)

7(1) Genital field with more than three pairs of acetabula (Fig. 284) 8

- Genital field with three pairs of acetabula (Fig. 285) 11

8 Without acetabula lying posterior to the genital flaps (Fig. 286); lateral eyes in capsules 9

- Several pairs of acetabula located posterior to the genital flaps (Figs. 287, 288); lateral eyes with small lenses lying on a pair of platelets 10

9 Genital field with four or five pairs of acetabula; acetabula not lying on the genital flaps (Fig. 284) Genus *Placothyas*

- Genital field with nine to 11 pairs of acetabula, all lying on the genital flaps (Fig. 289) Genus *Austrotrombella* (in part)

10(8) Posterior pair of acetabula separate from genital flaps (Fig. 290) Genus *Amerothyasella*

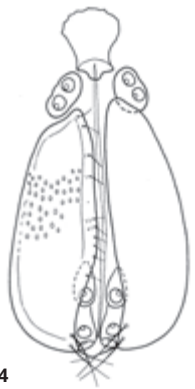
- Posterior acetabula fused to genital flaps (Fig. 288) Genus *Panisellus*



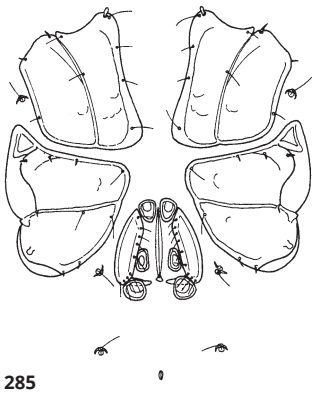
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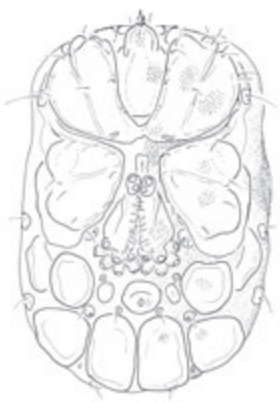


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287

282 *Trichothyas* (*Lundbladia*) *petrophila* (Michael), first leg male (after Di Sabatino et al. 2010)

283 *Trichothyas* (*Lundbladia*) *petrophila* (Michael), genital field female (after Di Sabatino et al. 2010)

284 *Placothyas octopora* (K. Viets), genital field female (after Cook 1974)

285 *Siskiyouthyas rivularis* I.M. Smith & Cook, venter male (after I.M. Smith & Cook 1998b)

286 *Austrotrombella southcotti* Smit, venter male (after Smit 2012a) Reproduced with permission from copyright holder

287 *Panisellus thienemanni* (K. Viets), venter female (after Di Sabatino et al. 2010)

11(7) On dorsum, only a large frontal plate present, no other muscle attachments 12

- Not as above 13

12 Frontal plate not including postocularia; genital flaps extending anterior to acetabula 1 (Fig. 221) Genus *Vietsia*

- Frontal plate including postocularia (Fig. 291); genital flaps not extending anterior to anterior pair of acetabula (Fig. 292) Genus *Siskiyouthyas*

13 Dorsal plates linked by subcuticular bridges (Fig. 293) 14

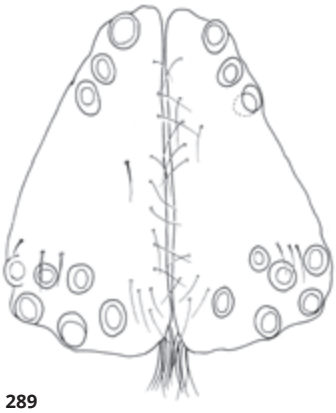
- Dorsal plates not linked by subcuticular bridges (Fig. 294) 15

14 Dorsum covered by a latticed shield, only lateral eyes surrounded by small membranous areas (Fig. 293) Genus *Thyopsis*

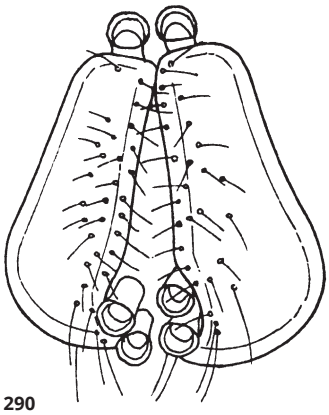
- Dorsal plates surrounded by membranous areas; dorsocentralia 3 medially fused to a rounded platelet (Fig. 295) Genus *Tadjikothyas*



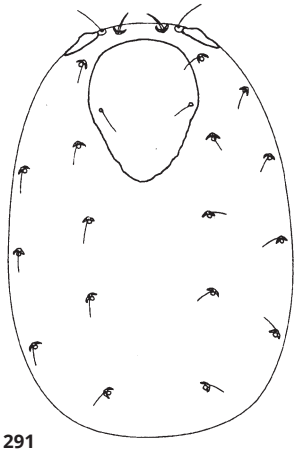
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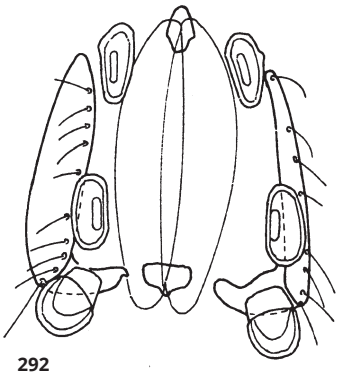
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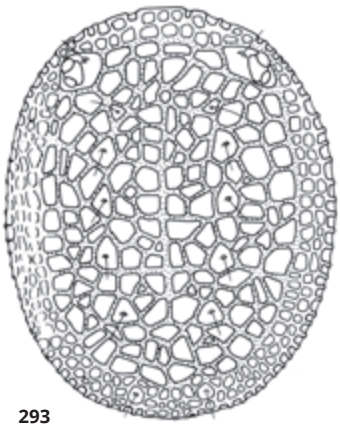
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291



292



293

288 *Panisellus thienemanni* (K. Viets), genital field male (after Cook 1974)

289 *Austrotrombella leprosa* Southcott, genital field female (after Harvey 1996a)

290 *Amerothyasella appalachiana* I.M. Smith & Cook, genital field male (after I.M. Smith & Cook 1999a)

291 *Siskiyouthyas rivularis* I.M. Smith & Cook, dorsum male (after I.M. Smith & Cook 1998b)

292 *Siskiyouthyas rivularis* I.M. Smith & Cook, genital field female (after I.M. Smith & Cook 1998b)

293 *Thyopsis cancellata* (Protz), dorsum male (after Cook 1974)

15(13) Males: Dorsum with one large plate (covering about 4/5 of the dorsal surface) (Fig. 294); female: dorsal plate covering less than 50 % of dorsum (Fig. 296); glandularia not incorporated in the dorsal plate crescent-shaped 16

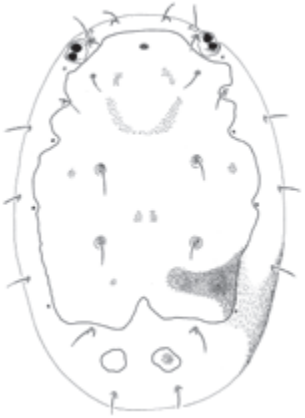
- Male and female: Dorsal plates much smaller (covering less than 50 % of surface of dorsum) (Fig. 297); glandularia not crescent-shaped 17

16 Third pair of acetabula incorporated in posteromedian margins of genital flaps (Fig. 298) Genus *Ignacarus*

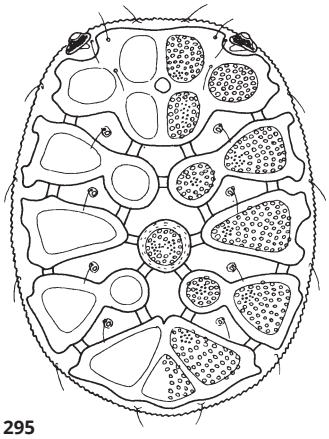
- Third pair of acetabula posterior to genital flaps (Fig. 299) Genus *Thyopsella*

17(15) All dorsocentralia, except Dc-3, fused to anterior and lateral neighbouring plates; Dc-3 fused medially into a rounded platelet, separate from other plates (Fig. 297) Genus *Japonothyas*

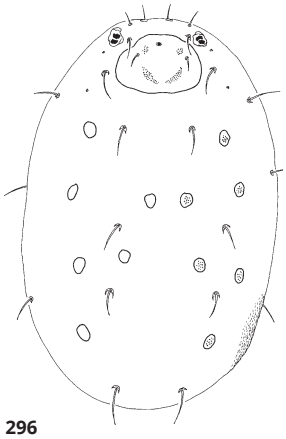
- Not all dorsocentralia fused to anterior and lateral neighbouring plates; Dc-3 separate or fused medially 18



294



295



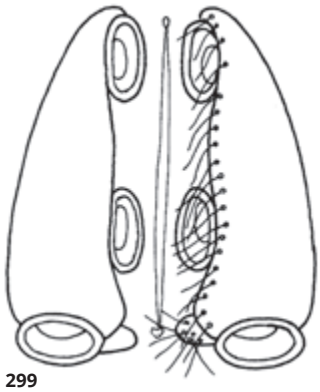
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299

294 *Ignacarus salarius* Gerecke, dorsum male (after Gerecke 1999)

295 *Tadjikothyas fibulata* (Motaş & Tanasachi), dorsum male (after Cook 1974)

296 *Ignacarus salarius* Gerecke, dorsum female (after Gerecke 1999)

297 *Japonothyas ornatus* Imamura & Mitchell, dorsum female (after Cook 1974)

298 *Ignacarus salarius* Gerecke, genital field male (after Gerecke 1999)

299 *Thyopsella dictyophora* Cook, genital field male (after Cook 1974)

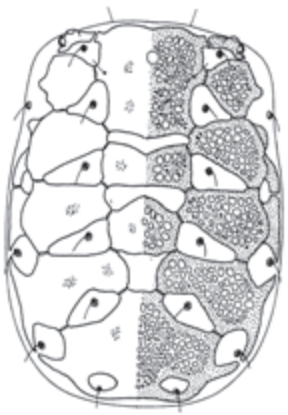
18 Dc-2 and -3 medially fused, Dc-4 and -5 fused into a large posterior plate; all other plates in touch with neighbouring plates (Fig. 300) Genus *Columbiathyas*

- Dc-2 and -3 not medially fused, Dc-4 and -5 not fused into a large posterior plate (but Dc-5 may be fused into a large posterior plate); all other plates separated from neighbouring plates 19

19 An unpaired muscle attachment between Dgl-3 (Figs. 301, 302); male gonopore field flanked by a pair of lamellar, tongue-shaped lips with a dense, distally-directed denticulation on their inner surface (Fig. 303); palp stocky (Fig. 304) Genus *Iranothyas*

- Without or with a pair of muscle attachments between Dgl-3; male gonopore various; palp various 20

20 A paired frontal plate present, postocularia not included into frontal plate (Fig. 305) Genus *Thyopsoides*

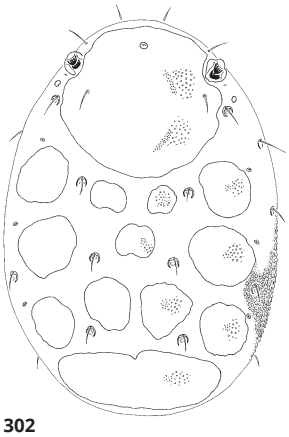


300



301

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302



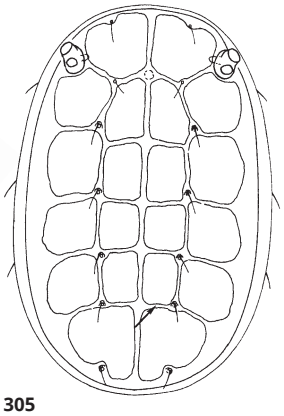
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304

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305

300 *Columbiathyas crenicola* I.M. Smith & Cook, dorsum male (after I.M. Smith & Cook 1998b)

301 *Iranothyas circularis* (Schwoerbel & Sepasgozarian), dorsum female (after Pesic et al. 2009a) Reproduced with permission from copyright holder

302 *Iranothyas marismortui* (Gerecke), dorsum female (after Gerecke 1999)

303 *Iranothyas alhajarica* Pesic, Gerecke & Smit, genital field male (after Pesic et al. 2009a) Reproduced with permission from copyright holder

304 *Iranothyas alhajarica* Pesic, Gerecke & Smit, palp male (after Pesic et al. 2009a) Reproduced with permission from copyright holder

305 *Thyopsoides plana* (Habeeb), dorsum male (after I.M. Smith & Cook 1999b)

- If a frontal plate is present, it is unpaired; if paired, postocularia included into frontal plates 21

21 Frontal plate rhomboid, including a large, pigmented median eye but no setae-bearing sclerites (Fig. 306); papillae of integument triangular or quadrangular Genus *Euthyas*

- If a frontal plate is present, it includes at least one pair of setae 22

22 On each side, anterior or anterolateral to the anterior pair of acetabula a sclerite is located with two or more setae (Fig. 307), this sclerite either separated or fused with genital flaps 23

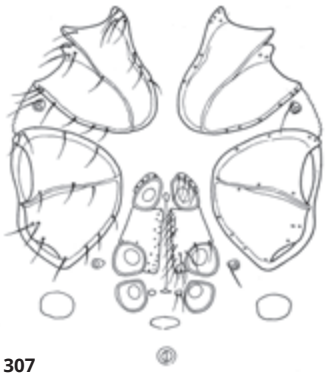
- Anterior or anterolateral to the anterior pair of acetabula no setae present (Fig. 308) 27

23 Third pair of acetabula completely separated from genital sclerites (Fig. 307) Genus *Deuterothyas*

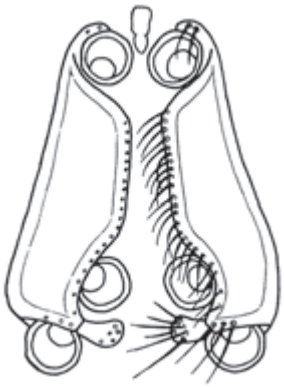
- Third pair of acetabula attached to genital sclerites (Fig. 309) 24



306



307



308



309



310



311

306 *Euthyas truncata* (Neuman), dorsum adult (after Di Sabatino et al. 2010)

307 *Deuterothyas variabilis* Lundblad, venter male (after Cook 1974)

308 *Panisus cataphractus* (Koenike), genital field female (after Cook 1974)

309 *Panisopsis* (*Panisopsis*) *pedunculata* (Koenike), genital field female (after Cook 1974)

310 *Notopanisus wetzeli* Besch, median eye male (after Cook 1974)

311 *Thyasella mandibularis* (Lundblad), palp male (after Di Sabatino et al. 2010)

24 Dorsalia reduced to little more than muscle attachment dots; median eye with two pigmented spots (Fig. 310) Genus *Notopanisus*

- Dorsalia well developed; median eye, if pigmented, with scattered pigment granules 25

25 P4 relatively short, P5 relatively long (Fig. 311); frontal plate roundish, not including postocularia (Fig. 312) 26

- P4 relatively long, P5 relatively short (Fig. 313); frontal plate longer than wide, including postocularia (Fig. 314) Genus *Panisopsis*

26 Dorsal muscle attachment plates weakly sclerotized; dorsocentralia 1 separate from frontal plate; median eye not visible (Fig. 312); genital flaps with less than 20 pairs of setae (Fig. 315) Genus *Thyasella*

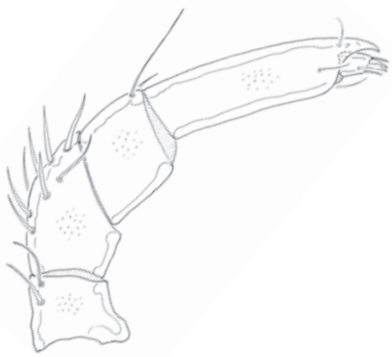
- Dorsal muscle attachment plates strongly sclerotized; dorsocentralia 1 fused with frontal plate; median eye well visible; genital flaps with more than 20 pairs of setae (Fig. 316) Genus *Parathyasella*

27(22) Dorsocentralia 5 fused medially to a large posterodorsal plate (Fig. 317) Genus *Panisus*

- Dorsocentralia 5 separate (Fig. 318) 28



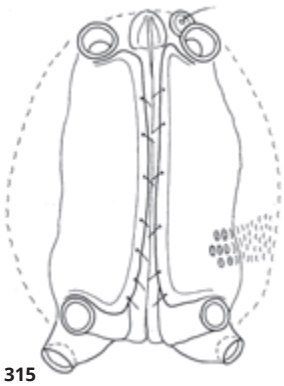
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312 *Thyasella mandibularis* (Lundblad), dorsum male (after Di Sabatino et al. 2010)

313 *Panisopsis* (*Panisopsis*) *thori* (Walter), palp adult (after Di Sabatino et al. 2010)

314 *Panisopsis* (*Panisopsis*) *curvifrons* (Walter), dorsum adult (after Di Sabatino et al. 2010)

315 *Thyasella mandibularis* (Lundblad), genital field male (after Cook 1974)

316 *Parathyasella frigida* (Lundblad), genital field male (after Di Sabatino et al. 2010)

317 *Panisus torrenticolus* Piersig, dorsum adult (after Di Sabatino et al. 2010)

28 Median eye with two pigmented spots, usually surrounded by a small frontal plate including pre- and postfrontalia (Fig. 318), but occasionally the latter separate
Genus *Thyasides*

- Median eye with or without pigment; if pigment present, it is diffuse and not concentrated in two spots; frontal plate present or absent 29

29 All acetabula fused to the genital flaps (Fig. 319) Genus *Austrotrombella* (in part)

- At least some acetabula in the membranous zone between genital flaps (Fig. 320) 30

30 Dorsal muscle insertions sclerotized (often reduced in size to small dots) (Fig. 321)
Genus *Parathyas*

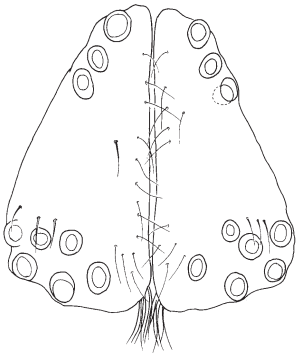
- Dorsal muscle insertions not sclerotized (occasionally visible as indistinct areas) (Fig. 322) 31

31 Leg claws not pectinate; posterior two pairs of acetabula located on the genital flaps (Fig. 323) Genus *Zschokkea*

- Leg claws pectinate (Fig. 324); acetabula either fused or separated from genital flaps 32



318



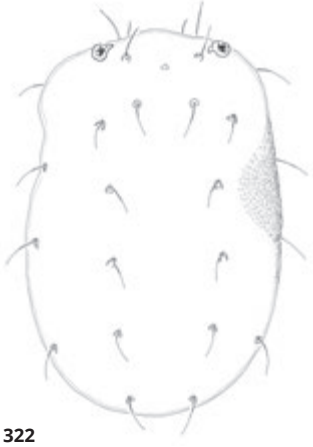
319



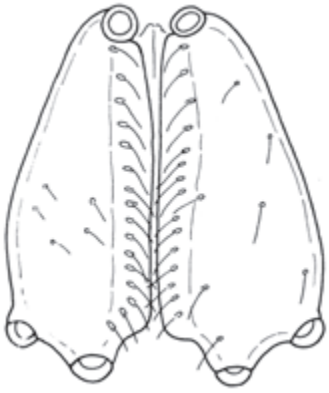
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323

318 *Thyasides dentatus* (Thor), dorsum female (after Di Sabatino et al. 2010)
319 *Austrotrombella leprosa* Southcott, genital field female (after Harvey 1996a)
320 *Parathyas inepta* (Lundblad), genital field male (after Di Sabatino et al. 2010)
321 *Parathyas barbigera* (K. Viets), dorsum male (after Di Sabatino et al. 2010)
322 *Zschokkea oblonga* Koenike, dorsum female (after Di Sabatino et al. 2010)
323 *Zschokkea oblonga* Koenike, genital field female (after Cook 1974)

32 Each leg claw with a long and a short comb; integument papillae striated (Fig. 325)
Genus *Kazakhithyas*

- Each leg claw with one comb (Fig. 326); integument papillae not striated
Genus *Albertathyas*

Genus *Albertathyas* I.M. Smith & Cook, 1998

(Figs. 326-330)

1998 *Albertathyas* I.M. Smith & Cook, International Journal of Acarology 24: 333.
Type species: *Albertathyas montana* I.M. Smith & Cook, 1998

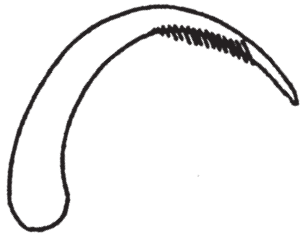
DIAGNOSIS: Dorsum lacking dorsalia and median eye (Fig. 327). Genital field with three pairs of acetabula (Fig. 328). No setae bearing sclerites anterior to first pair of acetabula (Fig. 329). Leg claws pectinate (Fig. 326).


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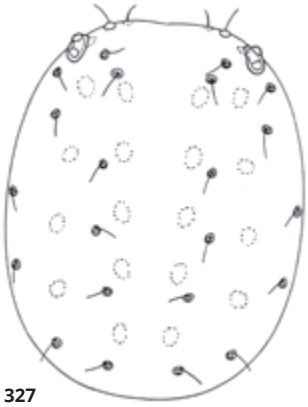
324


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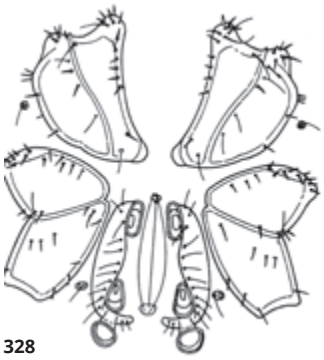
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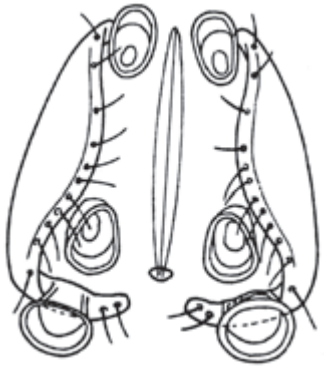
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324 *Kazakhithyas pectinatus* Smit, I-leg-4-6 male (after Smit 2016d) Reproduced with permission from copyright holder

325 *Kazakhithyas pectinatus* Smit, integument structure (after Smit 2016d) Reproduced with permission from copyright holder

326 *Albertathyas montana* I.M. Smith & Cook, claw fourth leg male (after I.M. Smith & Cook 1998b)

327 *Albertathyas montana* I.M. Smith & Cook, dorsum female (after I.M. Smith & Cook 1998b)

328 *Albertathyas montana* I.M. Smith & Cook, venter female (after I.M. Smith & Cook 1998b)

329 *Albertathyas montana* I.M. Smith & Cook, genital field male (after I.M. Smith & Cook 1998b)

HABITAT: Rocky riffles in mountain streams.

DISTRIBUTION: One species known from western North America (Alberta, Montana, Oregon, Wyoming).

Genus *Almuerzothyas* Goldschmidt & Gerecke, 2003

(Figs. 271, 272, 274, 331)

2003 *Almuerzothyas* Goldschmidt & Gerecke, Tribute to David R. Cook: 101.

Type species: *Almuerzothyas casado* Goldschmidt & Gerecke, 2003

DIAGNOSIS: Lateral eyes attached to preocular platelets. Frontal shield large, frontal eye reduced. Dc-3 and Dc-4 fused medially, sclerites with large, round pores, not closely adpressed to each other (Fig. 271). Setae of Dgl-1, Dgl-3-5 and Vgl-1-2 flattened and enlarged. Cx-I with strongly protruding, pointed anteromedial margins. No setae bearing sclerites anterior to first pair of acetabula. Genital field with three pairs of acetabula. Genital flaps large, pregenital sclerite crescent-shaped with a posteromedial projection. Base of second pair of acetabula extended posteriorly in a long, pointed tip. Third pair of acetabula attached to posteromedial tip of genital flaps (Fig. 272). Vgl-2 reduced. P1-4 relatively short and robust, dorsodistal extension of P4 a distinct seta; ventral margin of P4 with a long ventral seta (Fig. 274).

HABITAT: Mosses in streams, springs, possibly interstitial.

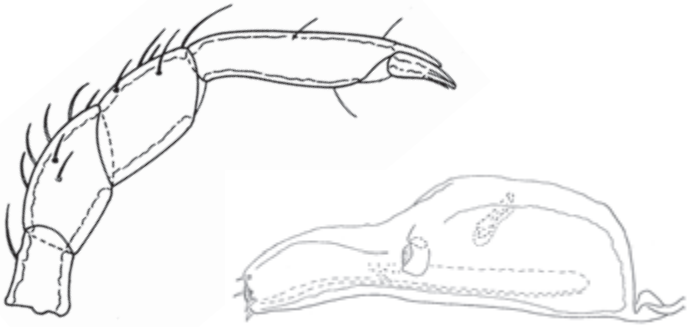
DISTRIBUTION: One species known from Costa Rica and one from Texas, USA (I.M. Smith & Cook 2009a).

Genus *Amerothyasella* I.M. Smith & Cook, 1999

(Figs. 290, 332-335)

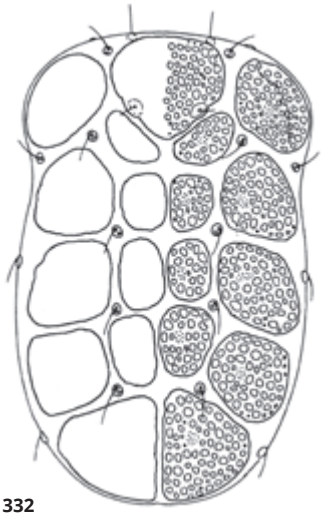
1999 *Amerothyasella* I.M. Smith & Cook, International Journal of Acarology 25: 47.

Type species: *Amerothyasella appalachiana* I.M. Smith & Cook, 1999



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331



332

330 *Albertathyas montana* I.M. Smith & Cook, palp male (after I.M. Smith & Cook 1998b)

331 *Almuerzothyas casado* Goldschmidt & Gerecke, gnathosoma female (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

332 *Amerothyasella appalachiana* I.M. Smith & Cook, dorsum male (after I.M. Smith & Cook 1999a)

DIAGNOSIS: Lateral eyes in capsules. Dorsum with a large frontal plate including postocularia; median eye absent. Dorsalia large and separated from each other (Fig. 332). Venter near posterior idiosoma margin with two pairs of large plates and more anteriorly 2-4 pairs of platelets (Fig. 333). Genital field with three pairs of acetabula in males (Fig. 290) and four pairs of acetabula in females (Fig. 334); posterior 2-3 pairs not fused with the genital flaps, the latter not extending anterior to first pair of acetabula. Palp stocky, P4 with a long dorsodistal extension (Fig. 335)

HABITAT: Interstitial.

DISTRIBUTION: Two species known from eastern North America (New Brunswick, Newfoundland, Virginia, Tennessee) and one from Khabarovsk Territory, Russian Far East (Semenchenko 2010a).

Genus *Austrotrombella* Southcott, 1991

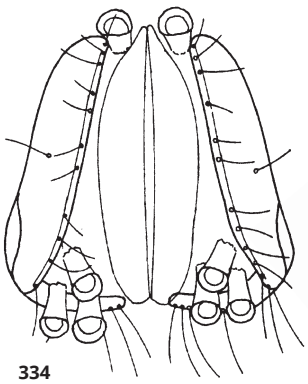
(Figs. 286, 289, 319, 336-339)

1991 *Austrotrombella* Southcott, Transactions of the Royal Society of South Australia 115: 207 - Harvey (1996a).

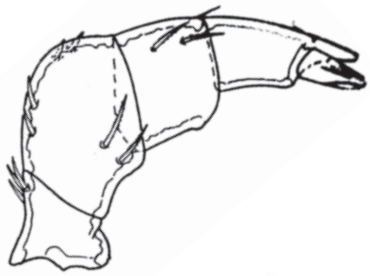
Type species: *Austrotrombella leprosa* Southcott, 1991



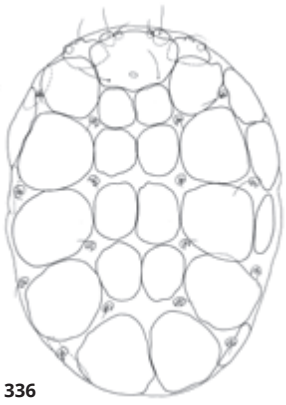
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333 *Amerothyasella appalachiana* I.M. Smith & Cook, venter male (after I.M. Smith & Cook 1999a)

334 *Amerothyasella appalachiana* I.M. Smith & Cook, genital field female (after I.M. Smith & Cook 1999a)

335 *Amerothyasella appalachiana* I.M. Smith & Cook, palp female (after I.M. Smith & Cook 1999a)

336 *Austrotrombella leprosa* Southcott, dorsum female (after Harvey 1996a)

337 *Austrotrombella leprosa* Southcott, venter female (after Harvey 1996a)

338 *Austrotrombella leprosa* Southcott, palp female (after Harvey 1996a)

DIAGNOSIS: Lateral eyes in capsules. A frontal plate present with the postocularia and the median eye (Fig. 336). Dorsum with large platelets arranged as follows: a row of separate, paired dorsocentralia 1-5, dorsocentralia 5 larger than other dorsocentralia. Dorsolateralia 1-4 larger than dorsocentralia 1-4. Moreover, four pairs of dorsal auxiliary platelets present. Sclerites of dorsoglandularia lunate. Coxal plates in four groups. Venter with two pairs of large platelets posterior to genital field (Fig. 337). Anterior to genital field a small pre-genital sclerite present, between genital field and excretory pore 1-2 smaller platelets. Genital field with 3-11 pairs of acetabula, all lying on the genital flaps; 1-3 pairs in anterior third of genital flaps, remainder 2-8 acetabula in posterior third. P2-3 with a row of dorsal setae (Fig. 338).

HABITAT: Semi-aquatic habitats in alkaline swamps and streams.

DISTRIBUTION: Two species known from South Australia (Smit 2012a).

Genus *Columbiathyas* I.M. Smith & Cook, 1998

(Figs. 300, 340-344)

1998 *Columbiathyas* I.M. Smith & Cook, International Journal of Acarology 24: 335.

Type species: *Columbiathyas crenic*ola I.M. Smith & Cook, 1998

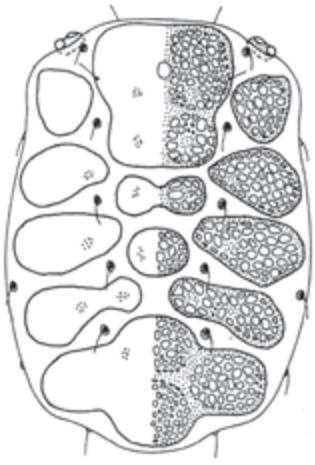
DIAGNOSIS: Frontal plate with dorsocentralia 1, dorsolateralia 1 and pre- and postfrontalia and median eye (Fig 300, 340). Dorsocentralia 2 separate or contiguous with dorsolateralia 2 and 3, often fused medially. The pair of dorsocentralia 3 always fused medially and often contiguous with dorsolateralia 3 and 4. Dorsocentralia 4 fused with dorsolateralia 4. Dorsocentralia 5 and dorsolateralia 5 fused into a single posteromedial plate. No setae bearing sclerites anterior to first pair of acetabula. Genital field with three pairs of acetabula, sclerites with setae anterior to first pair of acetabula absent (Figs. 341, 342).

HABITAT: Helocrene springs.

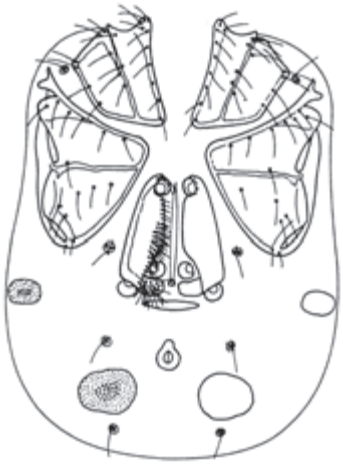
DISTRIBUTION: One species known from western North America (British Columbia, Washington, Oregon).



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341

339 *Austrotrombella leprosa* Southcott, fourth leg female (after Harvey 1996a)

340 *Columbiathyas crenicola* I.M. Smith & Cook, dorsum female (after I.M. Smith & Cook 1998b)

341 *Columbiathyas crenicola* I.M. Smith & Cook, venter male (after I.M. Smith & Cook 1998b)

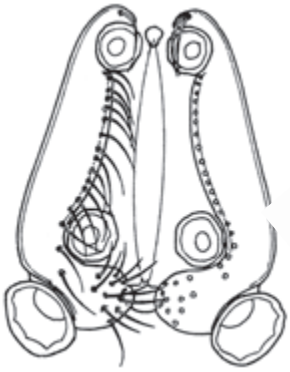
Genus *Dacothyas* Motaş, 1959

(Figs. 273, 345-348)

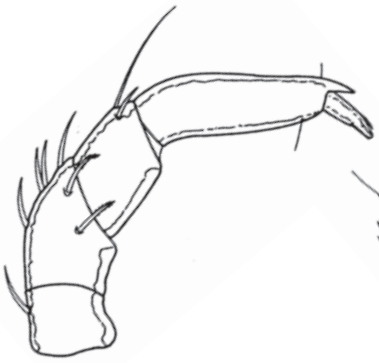
1959 *Dacothyas* Motaş, Omagiu lui Traian Săvulescu cu prilejul împlinirii a 70 de ani: 473.

Type species: *Dacothyas savulescui* Motaş, 1959

DIAGNOSIS: Dorsum with a large frontal plate, with the median eye and including postocularia (Fig. 345). Posterior to frontal plate two unpaired medial centralia. Dorsum with four pairs of large lateralia, and anterolateral to frontal plate a pair of small platelets. Coxae in four groups, medial margin of Cx-I with a fringe of setae. Genital field with four pairs of acetabula. Genital flaps of male greatly reduced (Fig. 273), subdivided into a pair of sclerites with many setae posterior to the third acetabula lying free in the integument, and a small pair of sclerites with numerous setae fused with the fourth acetabula. Cx-III and Cx-IV lying close together in male, dividing the genital field in two parts. Anterior two pairs of acetabula fused with the pre- and postgenital sclerites to form a triangular platelet. The small gonopore lies in the anterior part of this platelet. Genital flaps of female well developed (Fig. 346). P4 with two heavy setae (Fig. 347). First leg of male highly modified, I-leg-3 with a large seta (Fig. 348).



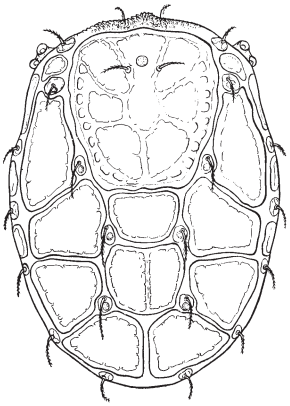
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342 *Columbiathyas crenicola* I.M. Smith & Cook, genital field female (after I.M. Smith & Cook 1998b)

343 *Columbiathyas crenicola* I.M. Smith & Cook, palp male (after I.M. Smith & Cook 1998b)

344 *Columbiathyas crenicola* I.M. Smith & Cook, fourth leg male (after I.M. Smith & Cook 1998b)

345 *Dacothyas savulescui* Motaş, dorsum female (after Motaş 1959)

346 *Dacothyas savulescui* Motaş, genital field female (after Cook 1974)

347 *Dacothyas savulescui* Motaş, palp male (after Cook 1974)

HABITAT: Helocrene springs.

DISTRIBUTION: One species known from Romania and one from Turkey (Oezkan & Bader 1988; Boyaci & Gülle 2014 (as *Trichothyas*)).

Genus *Deuterothyas* Lundblad, 1941

(Figs. 246, 307, 349, 350)

1941 *Deuterothyas* Lundblad, Entomologisk Tidskrift 62: 111.

Type species: *Deuterothyas variabilis* Lundblad, 1941

DIAGNOSIS: Dorsum with a frontal plate composed of the pigmentless median eye, the pre- and postfrontalia, dorsocentralia 1 and the postocularia (Fig. 246). All other dorsal plates large, with a tendency for dorsocentralia 3 and the enlarged dorsocentralia 5 to fuse medially. Ventralia small. Genital field with three pairs of acetabula, the third pair lying free in the integument (Fig 307, 349). Anterior to the first pair of acetabula a pair of sclerites with 2-4 setae; the large median sclerites with a fringe of setae along medial margin; between the third pair of acetabula a pair of tiny sclerites with two setae.

HABITAT: Streams

DISTRIBUTION: One species known from northern Burma.

Genus *Euthyas* Piersig, 1898

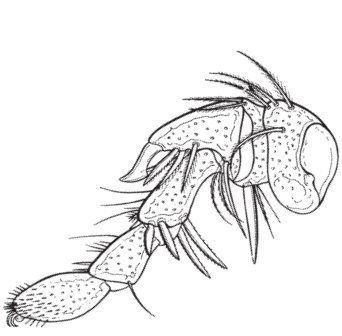
(Figs. 222, 306, 351-355)

1874 *Bradybates* Neuman, Forhandlinger ved de skandinaviske Naturforskeres 11: 409 (praeocc.).

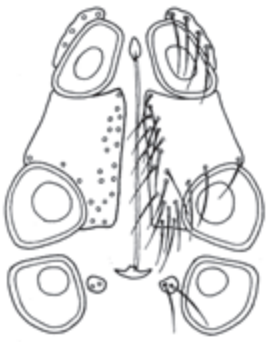
1898 *Euthyas* Piersig, Zoologischer Anzeiger 21: 575.

Type species: *Bradybates truncatus* Neuman, 1875

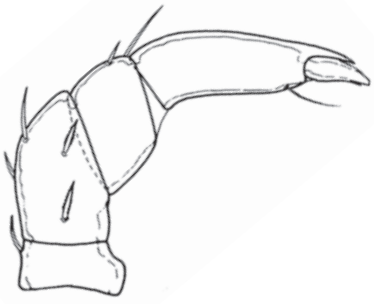
DIAGNOSIS: Lateral eyes in capsules. Papillae of integument triangular or quadrangular. Median eye with two dark spots, lying on a rhombic frontal platelet made up of the median eye sclerite and the frontalia (Fig. 306). Dorsocentralia 1+2 fused to a rod-shaped platelet on their respective sides, all other dorsalia small and rounded. Pre- and postocularia on a large basis. Coxae (Fig. 351) and legs with dense, uniform setation. Genital field with three or four pairs of acetabula, genital flaps densely covered by numerous setae all over the surface of the flaps (Fig 351, 352). Gnathosoma slender with a short (Fig. 354) to long (Fig. 355) rostrum. P4 with numerous dorsal setae.



348



349



350

348 *Dacothyas savulescui* Motaş, first leg male (after Motaş & Tanasachi 1962)

349 *Deuterothyas variabilis* Lundblad, genital field male (after Cook 1974)

350 *Deuterothyas variabilis* Lundblad, palp male (after Cook 1974)

HABITAT: Temporary and semi-aquatic standing waters, e.g. dune slacks, marshes and terrestrializing habitats; streams.

DISTRIBUTION: Holarctic, with two species known from North America (Cook 1959, 1974) and three species from Europe and North Africa (Gerecke 1996, 1999).

Genus *Heterothyas* Lundblad, 1941

(Figs. 234, 356-360)

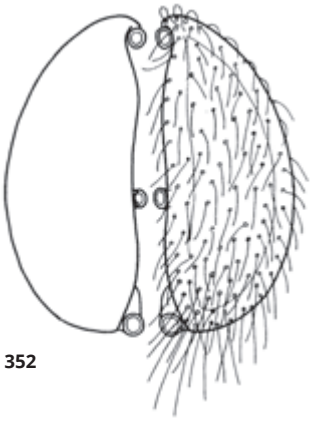
1941 *Heterothyas* Lundblad, Entomologisk Tidskrift 62: 110.

Type species: *Heterothyas africana* Lundblad, 1941

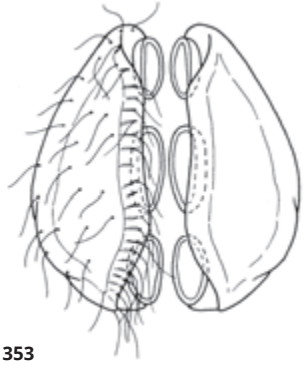
DIAGNOSIS: Dorsum with a large frontal plate including the postocularia, the pre- and postfrontalia and the dorsocentralia 1 and 2 (Fig. 356). Dorsocentralia 3 and 4 medially fused, dorsocentralia 5 not fused. Genital field with numerous acetabula (Fig. 234). Genital flaps reduced to a pair of setae-bearing sclerites located posterolaterally of second acetabular group. Gonopore short. Coxae in four groups, medial margin of Cx-I with a fringe of pectinate setae. Cx-III and Cx-IV lying medially close. Posterior to genital field a large platelet, much wider than long. I-leg-3 with two heavy setae (Fig. 360).



351



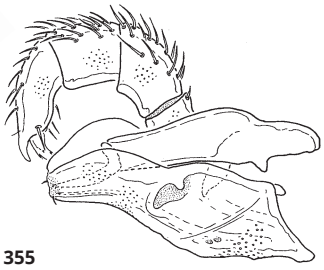
352



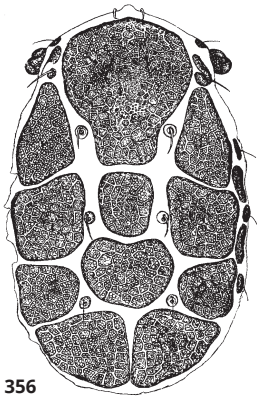
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351 *Euthyas mitchelli* Cook, venter male (after Cook 1974)

352 *Euthyas truncata* (Neuman), genital field male (after Cook 1974)

353 *Euthyas mitchelli* Cook, genital field male (after Cook 1974)

354 *Euthyas mitchelli* Cook, gnathosoma + palp (after Cook 1974)

355 *Euthyas elephantula* Gerecke, gnathosoma + palp female (after Gerecke 1996)

356 *Heterothyas africana* Lundblad, dorsum male (after Lundblad 1945)

HABITAT: Waterfalls.

DISTRIBUTION: One species known from south-eastern South Africa.

Genus *Ignacarus* Gerecke, 1999

(Figs. 294, 296, 298, 361-363)

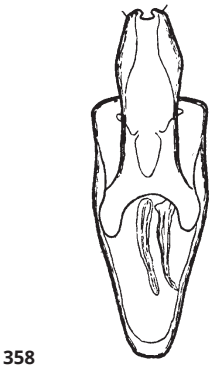
1999 *Ignacarus* Gerecke, Archiv für Hydrobiologie, Supplement 121: 126.

Type species: *Ignacarus salarius* Gerecke, 1999

DIAGNOSIS: Dorsum of male with one large plate covering ¾ of dorsum, including all laterodorsalia and dorsocentralia except dorsolateralia and dorsocentralia 5 (Fig. 294). Dorsal glandularia crescent-shaped, those of the dorsal plate surrounded by a ring of membranous integument. Female with a much smaller frontal plate, remaining dorsalia small and separate (Fig. 296). Coxae with numerous setae along margins. Genital field with three pairs of small acetabula on ring-shaped basal sclerites; first pair near anterior tip of genital flaps, second and third pair in posterior part of genital field. Second pair of acetabula free in membranous integument, third pair of acetabula included in the posteromedian margin of genital flaps. Male gonopore flanked by a multipointed, anteriorly directed sclerites extending from second pair of acetabula to the anterior tip of genital flaps (Fig. 298). Female genital field without these sclerites (Fig. 361). Legs with strong sexual dimorphism in the setation (Fig. 363).



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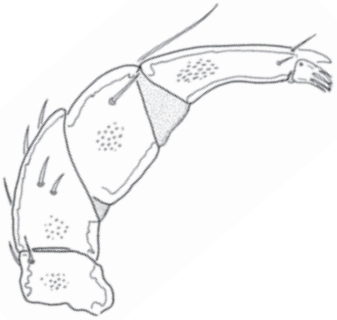
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357 *Heterothyas africana* Lundblad, venter male (after Lundblad 1945)

358 *Heterothyas africana* Lundblad, dorsal view gnathosoma male (after Lundblad 1945)

359 *Heterothyas africana* Lundblad, palp male (after Lundblad 1945)

360 *Heterothyas africana* Lundblad, first leg male (after Lundblad 1945)

361 *Ignacarus salarius* Gerecke, genital field female (after Gerecke 1999)

362 *Ignacarus salarius* Gerecke, palp male (after Gerecke 1999)

HABITAT: Inland saline standing waters.

DISTRIBUTION: Known from one species from Spain.

Genus *Iranothyas* Bader, 1984

(Figs. 301-304, 364)

1984 *Iranothyas* Bader, Entomologica Basiliensia 9: 10.

1999 *Balaneothyas* Gerecke, 1999, Archiv für Hydrobiologie, Supplement 121: 124.

Type species: *Panisopsis circularis* Schwoerbel & Sepasgozarian, 1976

DIAGNOSIS: Frontal plate including postocularia, pre- and postfrontalia, median eye, dorsocentralia 1 and often also dorsocentralia 2 and dorsolateralia 1 (Figs. 301-302, 364). Dorsocentralia 3 fused medially, remaining dorsalia separate. Glandularia sclerites crescent-shaped. Genital field with three pairs of acetabula, first and second pair in membranous integument flanking the gonopore, third pair of acetabula enclosed in the posterior part of genital flap. Genital flaps with numerous setae. Male gonopore flanked by a pair of lamellar, tongue-shaped lips with numerous denticules on the inner surface (Fig. 303). Palp stout (Fig. 304).

HABITAT: Springs.

DISTRIBUTION: Three species known from Iran (Schwoerbel & Sepasgozarian 1976), Israel, Oman (Pesic et al. 2009a), the United Arab Emirates (Smit 2014b) and Turkey (Boyaci & Gülle 2014).

Genus *Japonothyas* Imamura & Mitchell, 1967

(Figs. 297, 365, 366)

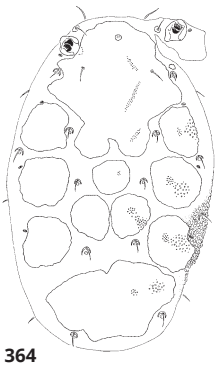
1967 *Japonothyas* Imamura & Mitchell, Annotationes Zoologicae Japonenses 40: 171.

Type species: *Japonothyas ornatus* Imamura & Mitchell, 1967

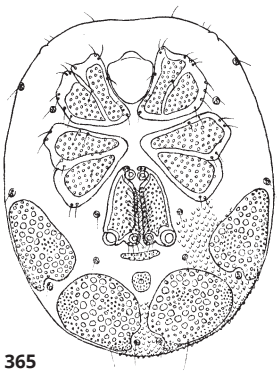
DIAGNOSIS: Frontal plate composed of pre- and postfrontalia, pre- and postocularia, dorsocentralia 1 and occasionally also dorsolateralia 1. Dorsocentralia 2 and dorsolateralia 2 fused on their respective sides. Dorsocentralia 3 fused medially into a rounded sclerite. Dorsocentralia 4 and dorsolateralia 4 fused on their respective sides. Dorsocentralia 5 fused medially (Fig. 297). Dorsalia reticulate and not joined by subcuticular bridges, glandularia lying free in the integument. Ventralia relatively large (Fig. 365). Genital field with three pairs of acetabula, first pair of acetabula near anterior tip of genital flaps, second and third pair of acetabula in a transverse line (Fig. 366). Genital flap anteriorly to first acetabula with two heavy setae.



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365

363 *Ignacarus salarius* Gerecke, fourth leg male (after Gerecke 1999)

364 *Iranothyas marismortui* (Gerecke), dorsum male (after Gerecke 1999)

365 *Japonothyas ornatus* Imamura & Mitchell, venter male (after Imamura & Mitchell 1967)

HABITAT: Springs.

DISTRIBUTION: One species known from Japan.

Genus *Javathyas* K. Viets, 1929

(Figs. 232, 275-280)

1929 *Javathyas* K. Viets, Zoologischer Anzeiger 80: 161.

1929 *Allothyas* K. Viets, Zoologischer Anzeiger 80: 163.

Type species: *Allothyas bedaliensis* K. Viets, 1929 = *Javathyas triumvirorum* K. Viets, 1929

DIAGNOSIS: Lateral eyes not in capsules but fused with preocularia platelets. Frontal plate including dorsocentralia 1 and 2, the pre- and postfrontalia and the median eye, the latter unpigmented (Fig. 232). Dorsocentralia 3 and 4 fused medially. Genital plate with three pairs of acetabula. Male: Genital flaps greatly reduced, subdivided into a small anterior setae-bearing sclerite lying free in the integument posterior to the second pair of acetabula, and a small posterior setae-bearing sclerites fused with the third pair of acetabula (Fig. 276). Cx-III and Cx-IV lying close to each other, excluding the genital field (Fig. 277). Anterior two pairs of acetabula separated from each other. Gonopore short, and lying anteriorly; postgenital sclerite located between first and second pair of acetabula. I-L of male, especially I-L-3, highly modified (Fig. 280). I-leg-3 with a dorsal extension bearing a stout setae and several smaller setae, ventral margin with a stout seta too. Female: Genital flaps well developed (Figs. 278, 279). First leg not modified.

HABITAT: Springs, small streams.

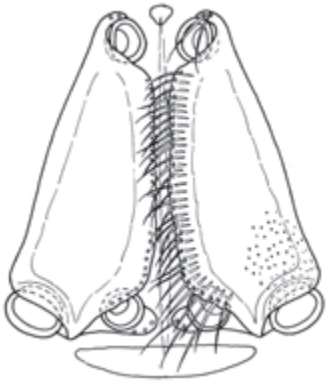
DISTRIBUTION: Two species known from Java and India (Cook 1967), one from New Caledonia (Smit 2009a) and one from Madagascar (Gerecke 2020).

Genus *Kazakhithyas* Smit, 2016

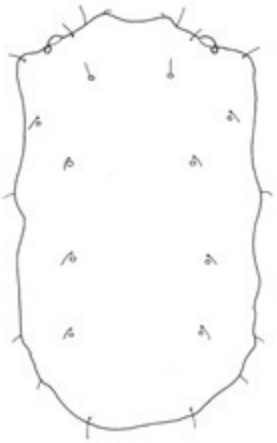
(Figs. 324, 325, 367-370)

2016 *Kazakhithyas* Smit, Zootaxa 4200: 324.

Type species: *Kazakhithyas pectinatus* Smit, 2016

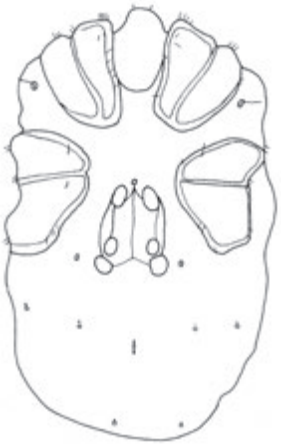


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366 *Japonothyas ornatus* Imamura & Mitchell, genital field female (after Cook 1974)

367 *Kazakhithyas pectinatus* Smit, dorsum male (after Smit 2016d) Reproduced with permission from copyright holder

368 *Kazakhithyas pectinatus* Smit, venter male (after Smit 2016d) Reproduced with permission from copyright holder

DIAGNOSIS: Papillae of integument striated at their base (Fig. 325). Lateral eyes in capsules. Dorsalia and median eye not visible (Fig. 367). Dorsal muscle attachments not sclerotized. Genital field with three pairs of acetabula, these not fused with the genital flaps (Figs. 368-369). Each leg claw with two combs, a large comb and a small comb, respectively (Fig. 324); clawlet and claw blade absent.

HABITAT: Rheohelocrenes.

DISTRIBUTION: One species known from the Tien Shan Mountains, Kazakhstan.

Genus *Notopanisus* Besch, 1964

(Figs. 310, 371-374)

1964 *Notopanisus* Besch, Beiträge zur Neotropischen Fauna 3: 92.

Type species: *Notopanisus wetzeli* Besch, 1964

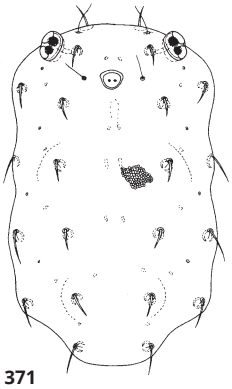
DIAGNOSIS: Lateral eyes in capsules. Median eye relatively large and with two pigmented dots (Fig. 310). Dorsalia absent (Fig. 371). Sclerites associated with glandularia either crescent-shaped or rounded. Coxae with few, often paired, short setae (Fig. 372). Genital field with three pairs of acetabula; genital flaps well developed, medial margins with numerous setae (Fig. 373). Anterior to first pair of acetabula a pair of sclerites with 4-5 setae.


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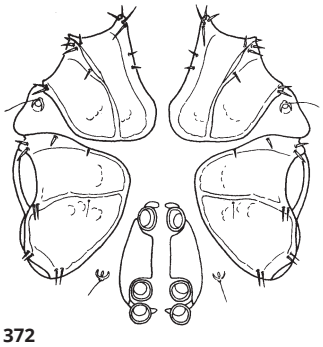
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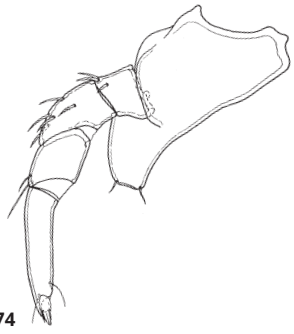
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369 *Kazakhithyas pectinatus* Smit, coxae + genital field male (after Smit 2016d) Reproduced with permission from copyright holder

370 *Kazakhithyas pectinatus* Smit, palp male (after Smit 2016d) Reproduced with permission from copyright holder

371 *Notopanisus wetzeli* Besch, dorsum female (after Cook 1980)

372 *Notopanisus wetzeli* Besch, venter male (after Cook 1974)

373 *Notopanisus wetzeli* Besch, genital field male (after Cook 1974)

374 *Notopanisus wetzeli* Besch, gnathosoma + palp female (after Cook 1980)

HABITAT: Streams, waterfalls with mosses, interstitial habitats.

DISTRIBUTION: Three species known from Chile and Argentina, Tasmania, Australia (Harvey 1988) and South Island, New Zealand (Smit 1996a).

Genus *Panisellus* K. Viets, 1925

(Figs. 287, 288, 375, 376)

1925 *Panisellus* K. Viets, Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere 50: 479.

Type species: *Panisus thienemanni* K. Viets, 1920

DIAGNOSIS: Lateral eyes separated from each other on common eye plates. Frontal shield is a fusion of the frontalia, to form a subtriangular plate; median eye not developed. All other dorsalia and posteroventral sclerites not fused but expanded to occupy most of the idiosoma surface (Fig. 375). Coxae with very weak setation, posteromedial margins of CX-I + II fused into a small bridge (Fig. 287). Genital field with one or two pairs of acetabula anterior to genital flaps, and more posteriorly 3-6 pairs of acetabula located at posterior margins of genital flaps (Fig. 288). P4 distally with two strong peg-like setae (Fig. 376).

HABITAT: Helocrenes.

DISTRIBUTION: One species known from Europe.

Genus *Panisopsis* K. Viets, 1926

(Figs. 309, 313, 314, 377-379)

1926 *Panisopsis* K. Viets, Zoologischer Anzeiger 66: 147.

1926 *Panisoides* Lundblad, Entomologisk Tidskrift 47: 208.

1954 *Acadiothyas* Habeeb, Leaflets of Acadian Biology 2: 2 – Cook (1959).

1984 *Walterothyas* Bader, Entomologica Basiliensia 9: 7 – Gerecke (1996b).

1992 *Sindacoides* Bader, Entomologica Basiliensia 15: 5 – Di Sabatino et al. (2009).

Type species: *Thyas vigilans* Piersig, 1896



375



376



377

375 *Panisellus thienemanni* (K. Viets), dorsum female (after Di Sabatino et al. 2010)

376 *Panisellus thienemanni* (K. Viets), palp female (after Di Sabatino et al. 2010)

377 *Panisopsis* (*Panisopsis*) *ezoensis* (Imamura), dorsum female (after Cook 1974)

DIAGNOSIS: Lateral eyes in capsules. Frontal plate in most species consisting of a fusion of the pre- and postfrontalia, dorsocentralia 1 and the postocularia (Fig. 378). However, in some species the pre- and postfrontalia are fused on their respective sides, but the dorsocentralia 1 and the postocularia are lying free. All kinds of intermediate between these two extremes exist. Median eye well developed, with or without pigment. Remaining dorsal plates either small or enlarged, either all lying free or dorsocentralia 3 or 5 fused medially. Genital field with three pairs of acetabula on each side lying more or less in a line. Genital flaps anteriorly embracing the first pair of acetabula; anterior to first pair of acetabula an extension of genital flaps with 2-6 setae (Figs. 309, 377). Posterior part of genital flaps narrowed and embracing the third pair of acetabula with a seta-bearing extension. Legs very stout with many strong setae.

KEY TO THE SUBGENERA

1 Median eye pigmented (though often much reduced); pre- and postfrontalia usually fused on their respective sides (Fig. 314) Subgenus *Panisopsis* s.s.

- Median eye without pigment and lying free in the integument, flanked by platelets composed of the pre-and postfrontalia, dorsocentralia 1 and usually the postocularia Subgenus *Marshallothyas*

Subgenus *Panisopsis* s.s.

(Figs. 309, 313, 314, 377, 378)

DIAGNOSIS: Median eye pigmented (though often much reduced); pre- and postfrontalia usually fused on their respective sides (Fig. 314).

HABITAT: (Hygropetric) springs, streams, peat bogs, temporary standing waters.

DISTRIBUTION: Holarctic, with several species known from Europe, North Africa, Iran (Schwoerbel & Sepasgozarian 1976), Japan (Imamura & Mitchell 1967) and North America (Cook 1959). *Panisopsis ezoensis* (Imamura, 1954) has a pair of small frontal plates (Fig. 377) and is assigned by Cook (1974) to *Panisopsis* s.s., albeit with a question mark.

Subgenus *Marshallothyas* Cook, 1953

(Fig. 379)

1953 *Marshallothyas* Cook, Proceedings of the Entomological Society of Washington 55: 305.
Type species: *Marshallothyas asopos* Cook, 1953

DIAGNOSIS: Median eye without pigment and lying free in the integument, flanked by platelets composed of the pre-and postfrontalia, dorsocentralia 1 and usually the postocularia (Fig. 379).

HABITAT: Springs and streams.

DISTRIBUTION: One species known from North America.

Genus *Panisus* Koenike, 1896

(Figs. 308, 317, 380)

1896 *Panisus* Koenike, Zoologischer Anzeiger 19: 356.

Type species: *Thyas cataphracta* Koenike, 1895

DIAGNOSIS: Lateral eyes in capsules. A well-developed median eye present, with or without pigment. Frontal plate composed of median eye, pre- and postfrontalia, dorsocentralia 1 and postocularia (Figs. 317, 380). Dorsocentralia 2-4 typically free, but these may be fused medially. Dorsolateralia 2-4 much larger than corresponding dorsocentralia. Dorsocentralia 5 very large and fused medially. All glandularia lying free. Genital field with three pairs of acetabula lying more or less in a longitudinal line (Fig. 308). Genital flaps only slightly narrowed posteriorly, typically with two pairs of strong setae anterior to the first pair of acetabula.

HABITAT: Springs and streams.

DISTRIBUTION: Holarctic, with several species in Europe, North Africa, Siberia (Tuzovskij 1976) and North America.

Genus *Parathyas* Lundblad, 1926

(Figs. 320, 321, 381)

1836 *Thyas* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 5: 18 (praeocc.).

1926 *Parathyas* Lundblad, Entomologisk Tidskrift 47: 208.

1974 *Todothyas* Cook, Memoirs of the American Entomological Institute 21: 74 – Di Sabatino et al. (2009, 2010).

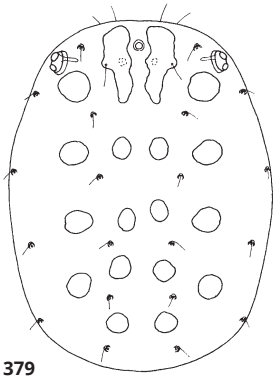
2006 *Acerbitas* Özdikmen, Munis Entomology & Zoology 1: 51 - Di Sabatino et al. (2010).

Type species: *Thyas thoracatus* Piersig, 1896

DIAGNOSIS: Lateral eyes in capsules. Median eye lacking pigment, lying free in the integument or fused with neighbouring frontalia to form a rounded or subtriangular frontal plate. Muscle attachment sclerites small (Fig. 321) to large (Fig. 381). Dorsalia never fused, except dorsocentralia 1 and 2, which are occasionally fused but always medially separated. Genital field with three pairs of acetabula, first pair of acetabula lying anterior to anterior margin of genital flap (Fig. 320). Second and third pair of acetabula lying near posterior margin of genital flaps, their basal sclerites to various degree fused to each other and to flap margin.



378



379



380

378 *Panisopsis* (*Panisopsis*) *setipes* (Viets), dorsum male (after Cook, 1974)

379 *Panisopsis* (*Marshallothyas*) *asopos* (Cook), dorsum male (after Cook 1974)

380 *Panisus condensatus* Habeeb, dorsum female (after Cook 1974)

HABITAT: Temporary standing waters, small water bodies, semi-aquatic biotopes as terrestrializing waters, springs, swamps.

DISTRIBUTION: Holarctic, with several species known from Europe, North Africa, Siberia (Tuzovskij 2000), North America (Cook 1959); one species known from Kashmir.

Genus *Parathyasella* K. Viets, 1949

(Figs. 316, 382)

1949 *Parathyasella* K. Viets, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 32: 310 – I.M. Smith & Cook (1999a).

Type species: *Thyas frigida* Lundblad, 1925

DIAGNOSIS: Lateral eyes in capsules. Frontal plate including frontalia, dorsocentralia 1 and postocularia. Dorsalia relatively small. Genital field with three pairs of acetabula, second pair not fused with genital flaps, third pair close to second pair and posterior to genital flaps (Fig. 316). Anterior margin of genital flap embracing first pair of acetabula and bearing 1-3 setae at anterior tip. P5 with a long dorsodistal projection.

HABITAT: Springs, small streams.

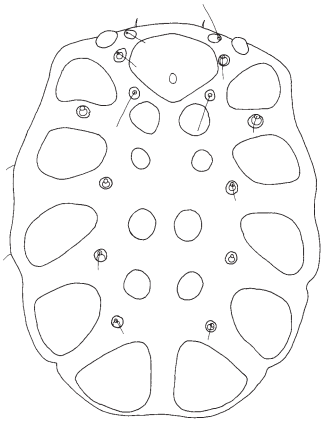
DISTRIBUTION: One species known from Sweden and two species known from western North America (I.M. Smith & Cook 1999a).

Genus *Placothyas* Lundblad, 1926

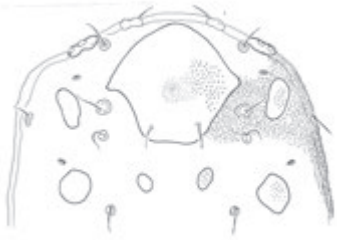
(Figs. 284, 383-387)

1926 *Placothyas* Lundblad, Entomologisk Tidskrift 47: 208.

Type species: *Thyas octopora* K. Viets, 1914



381



382



383

381 *Parathyas thoracata* (Piersig), dorsum

382 *Parathyasella frigida* (Lundblad), anterior dorsum male (after Di Sabatino et al. 2010)

383 *Placothyas* (*Placothyas*) *octopora* (K. Viets), dorsum female (after Cook 1974)

DIAGNOSIS: Lateral eyes in capsules. Frontal plate composed of the unpigmented median eye and the pre- and postfrontalia; postocularia either fused or separated from the frontal plate (Fig. 383). Remaining dorsalia expanded, dorsocentralia 3 either fused medially or separated. Genital field with 4-5 pairs of acetabula; a pair of acetabula on a common sclerite located on each side anterior to the well-developed genital flaps.

KEY TO THE SUBGENERA

1 Five pairs of acetabula (Fig. 284); postocularia fused with frontal plate (Fig. 383)
Subgenus *Placothyas*

- Four pairs of acetabula (Fig. 385); postocularia lying free in the integument (Fig. 386)
Subgenus *Octothyas*

Subgenus *Placothyas* s.s.

(Figs. 284, 383, 384)

DIAGNOSIS: Postocularia fused with the frontal plate. Dorsocentralia 3 fused medially. Genital field with five pairs of acetabula.

HABITAT: Small standing waters.

DISTRIBUTION: One species known from South Africa.

Subgenus *Octothyas* Lundblad, 1945

(Figs. 385-387)

1945 *Octothyas* Lundblad, Arkiv för Zoologi 36, A: 3.
Type species: *Octothyas hewittae* Lundblad, 1945

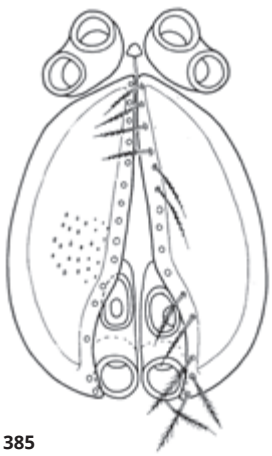
DIAGNOSIS: Postocularia lying free in the integument, all dorsalia separated (Fig. 386). Genital field with four pairs of acetabula (Fig. 385).

HABITAT: Springs.

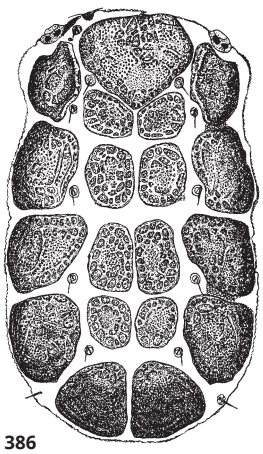
DISTRIBUTION: One species known from South Africa.



384



385



386

384 *Placothyas* (*Placothyas*) *octopora* (K. Viets), gnathosoma + palp female (after Cook 1974)

385 *Placothyas* (*Octothyas*) *hewittae* (Lundblad), genital field male (after Cook 1974)

386 *Placothyas* (*Octothyas*) *hewittae* (Lundblad), dorsum male (after Lundblad 1945)

Genus *Siskiyouthyas* I.M. Smith & Cook, 1998

(Figs. 285, 291, 292, 388, 389)

1998 *Siskiyouthyas* I.M. Smith & Cook, International Journal of Acarology 24: 337.

Type species: *Siskiyouthyas rivularis* I.M. Smith & Cook, 1998

DIAGNOSIS: Dorsum with a large frontal including postocularia, other dorsalia and medial eye absent (Fig. 291). Genital field with three pairs of acetabula, genital flaps not extending anterior to first pair of acetabula (Fig. 285). Acetabula relatively large, middle pair lying in posterior half of gonopore (Fig. 292). Palp relatively slender (Fig. 289), leg segments relatively stocky.

HABITAT: Detritus in rocky riffles of small cascading streams.

DISTRIBUTION: One species known from western North America (Oregon, California).

Genus *Tadjikothyas* Sokolow, 1948

(Figs. 295, 390, 391)

1948 *Tadjikothyas* Sokolow, Festschrift Sernow: 244.

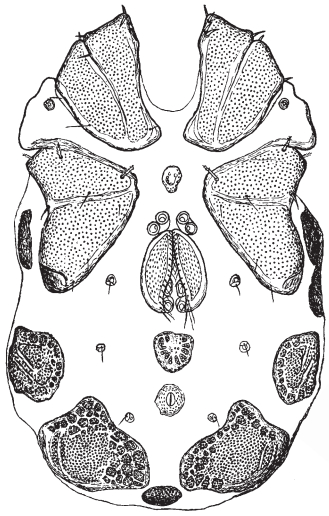
1957 *Placothyopsis* Motaş & Tanasachi, Arkiv för Zoologi (Serie 2) 11: 167.

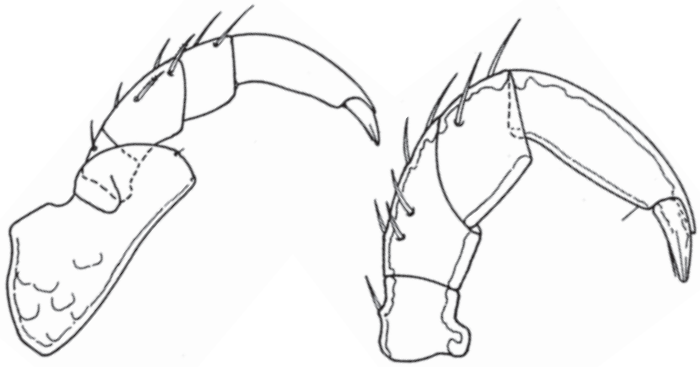
Type species: *Tadjikothyas connexa* Sokolow, 1948

DIAGNOSIS: Frontal plate including dorsolateralia 1 and dorsocentralia 1 and the pre- and postocularia; dorsocentralia 2 and dorsocentralia 4 fused with dorsolateralia 2 and 4, respectively (Fig. 295). Dorsocentralia 3 fused medially, forming a rounded central plate. Dorsocentralia 5 fused medially with a posterior non-paired platelet. The dorsalia joined by subcuticular bridges but separated by membranous areas. The dorsoglandularia in the soft integument. Genital field with three pairs of acetabula, typically with 3-4 pairs of setae anterior to first pair of acetabula (Fig. 391).

HABITAT: Springs.

DISTRIBUTION: Two species known, one from Tajikistan and Iran (Pesic et al. 2005) and one from Romania (Motaş et al. 1957).





387 **388** **389**

387 *Placothyas* (*Octothyas*) *hewittae* (Lundblad), venter male (after Lundblad 1945)

388 *Siskiyouthyas rivularis* I.M. Smith & Cook, gnathosoma + palp female (after I.M. Smith & Cook 1998b)

389 *Siskiyouthyas rivularis* I.M. Smith & Cook, palp female (after I.M. Smith & Cook 1998b)

Genus *Thyasella* K. Viets, 1926

(Figs. 311, 312, 315)

1926 *Thyasella* K. Viets, Zoologischer Anzeiger 66: 147.

Type species: *Thyas mandibularis* Lundblad, 1924

DIAGNOSIS: Lateral eyes in small capsules. Frontal plate including pre- and postfrontalia, but dorsocentralia 1 separated; median eye absent (Fig. 312). Pre- and postfrontalia on small dome-shaped projections. All idiosoma sclerites weakly developed and faintly delineated. Posteromedial margins of Cx-I + II pointed, without a projection embracing gnathosomal bay. Coxae with few but long setae. Anterior margins of genital flaps embracing first pair of acetabula, with a seta on anterior tip (Fig. 315). Second and third pair of acetabula fused, lying posteriorly to genital field, but separate from genital flaps. Palp stocky (Fig. 311)

HABITAT: Springs, interstitial and temporary habitats.

DISTRIBUTION: One species known from Europe and one species from Canada (I.M. Smith & Cook 2009a).

Genus *Thyasides* Lundblad, 1926

(Figs. 318, 392, 393)

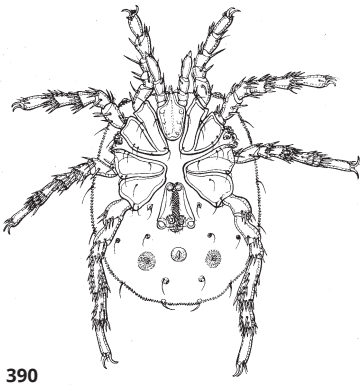
1926 *Thyasides* Lundblad, Entomologisk Tidskrift 47: 208.

Type species: *Thyas dentata* Thor, 1897

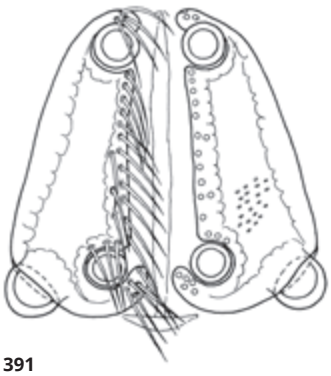
DIAGNOSIS: Lateral eyes in capsules. Frontal eye with two pigmented spots. Frontalia fused and generally attached to posterior margin of frontal eye sclerite. Occasionally, however, frontalia separated from frontal plate. This frontal shield anteriorly convex, posteriorly concave or straight between the projecting frontalia. Dorsocentralia 1 fused with dorsocentralia 2, all dorsalia small. Cx-I, occasionally also Cx-II, with strong, tooth-like medial setae. Genital field with three pairs of acetabula, second and third pair lying very close to each other; second pair typically anterolateral to third pair. Genital flaps with numerous uniform, short setae (Fig. 392). Excretory pore with a sclerotized ring with an anterior knob-shaped extension.

HABITAT: Temporary pools, bogs.

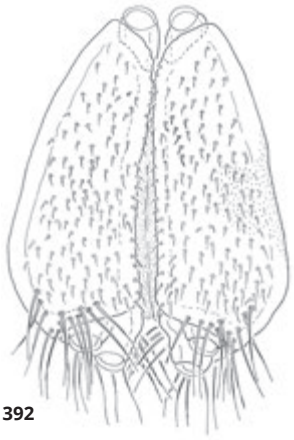
DISTRIBUTION: One species known from central and northern Europe.



390



391



392

390 *Tadjikothyas fibulata* (Motaş & Tanasachi), venter female (after Motaş et al. 1957)

391 *Tadjikothyas fibulata* (Motaş & Tanasachi), genital field female (after Cook 1974)

392 *Thyasides dentatus* (Thor), genital field female (after Di Sabatino et al. 2010)

Genus *Thyopsella* Cook, 1955

(Figs. 299, 394-397)

1955 *Thyopsella* Cook, The American Midland Naturalist 53: 412.

Type species: *Thyopsella dictyophora* Cook, 1955

DIAGNOSIS: Dorsalia incorporated into a large dorsal shield (Fig. 394), but remaining visible as individual structures as areas of larger porosity (with areas membranous in other taxa characterized by finer pores - these differences distinct in the type species but less noticeable in other species). Dorsalia proper not greatly expanded and occupying only slightly more than one-half the area of the dorsal shield (Fig. 395), arrangement similar to the pattern in *Panisus*. Median eye pigmentless and surrounded by a plate composed of the pre-and postfrontalia, dorsocentralia1 and dorsolateralia-1. Dorsocentralia-2 and dorsolateralia-2 and dorsocentralia-4 and dorsolateralia-4 appearing fused on their respective sides, occasionally also dorsocentralia-3 and dorsolateralia-3. Dorsocentralia-5 fused medially. Dorsal shield may be either reticulate or punctate. Genital field with three pairs of acetabula, with the second pair lying well anterior to the third pair (Fig. 396).

HABITAT: Springs.

DISTRIBUTION: Six species known from North America (see K.O. Viets 1987) and one from Mexico (Cook 1980).

Genus *Thyopsis* Piersig, 1899

(Figs. 293, 398-401)

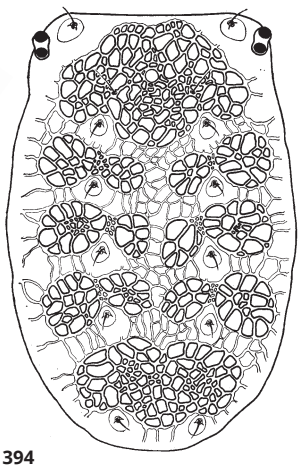
1899 *Thyopsis* Piersig, Zoologica 19: 378.

Type species: *Thyas cancellata* Protz, 1896

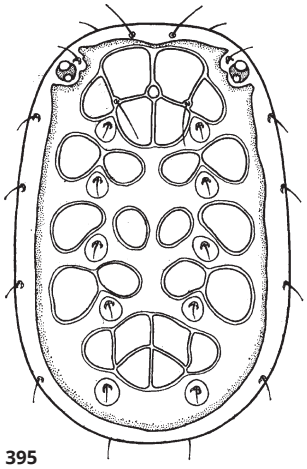
DIAGNOSIS: Lateral eyes in capsules, embraced or surrounded by extensions of the dorsal shield. All dorsalia fused into a reticulate shield (Figs. 293, 398), with only small membranous areas surrounding the glandularia. Median eye small, unpigmented. Genital field with three pairs of acetabula, second and third pair of acetabula lying in a transverse line (Fig. 399). Genital flaps equally enlarged from anterior to posterior margin (Fig. 400).



393



394



395

393 *Thyasides dentatus* (Thor), palp female (after Di Sabatino et al. 2010)

394 *Thyopsella dictyophora* Cook, dorsum male (after Cook 1955)

395 *Thyopsella occidentalis* Cook, dorsum male (after Cook 1959)

HABITAT: Springs, small streams, ponds, ditches.

DISTRIBUTION: Two species known from the Western Palaearctic (Gerecke & Schwoerbel 1992) and two from North America (Habeeb 1963a, 1975b).

Genus *Thyopsoides* I.M. Smith & Cook, 1999

(Figs. 305, 402-405)

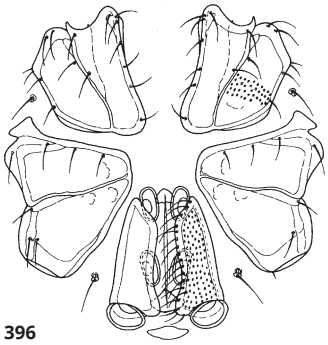
1999 *Thyopsoides* I.M. Smith & Cook, International Journal of Acarology 25: 51.

Type species: *Thyopsis plana* Habeeb, 1963

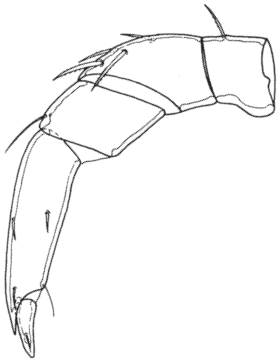
DIAGNOSIS: Lateral eyes in capsules. Dorsal shield weakly sclerotized, dorsalia faintly delineated. All dorsalia paired and not fused, except dorsocentralia 5, which are fused with the dorsolateralia 5 on their respective sides (Fig. 305). Frontal plate paired and not fused with the postocularia. Genital field with three pairs of acetabula, second pair lying anterior to third pair and not fused with flaps (Fig. 402). Anterior margin of genital flaps of males posterior to first pair of acetabula (Fig. 403), those of females with three setae anterior to first pair of acetabula and embracing first pair (Fig. 404).

HABITAT: Mosses of waterfalls.

DISTRIBUTION: One species known from California.



396



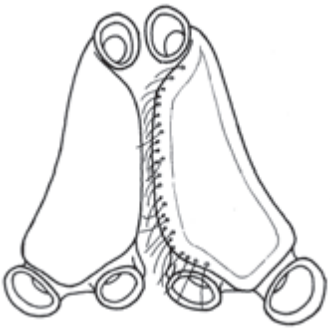
397



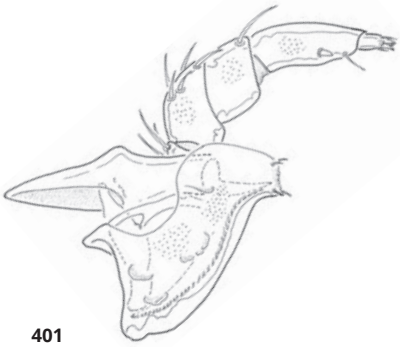
398



399



400



401

396 *Thyopsella obscura* Cook, venter female (after Cook 1980)

397 *Thyopsella obscura* Cook, palp female (after Cook 1980)

398 *Thyopsis cancellata* (Protz), dorsum young male (part.) (after Di Sabatino et al. 2010)

399 *Thyopsis cancellata* (Protz), venter male (part.) (after Di Sabatino et al. 2010)

400 *Thyopsis cancellata* (Protz), genital field male (after Cook 1974)

401 *Thyopsis cancellata* (Protz), gnathosoma + palp male (after Di Sabatino et al. 2010)

Genus *Trichothyas* K. Viets, 1926

(Figs. 233, 281, 283, 406-414)

1926 *Trichothyas* K. Viets, Zoologischer Anzeiger 69: 191.

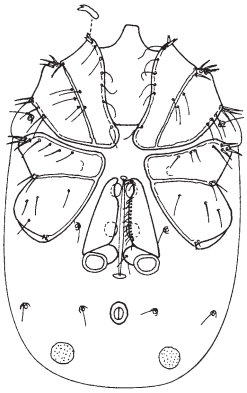
Type species: *Thyas pennata* K. Viets, 1913

DIAGNOSIS: Lateral eyes not in distinct capsules, attached to preocularia platelets. Frontal plate including the unpigmented median eye, dorsocentralia-1 and -2 and the pre- and postfrontalia. Dorsocentralia-3 and -4 fused medially. Margins of coxae with fine pennate setae, in dense rows along medial margin of Cx-I and suture lines of Cx-I/II. Genital field with 3-5 pairs of acetabula. Legs short and stout.

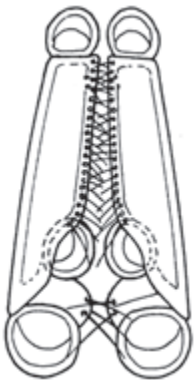
KEY TO THE SUBGENERA (PARTIALLY BASED ON MALES ONLY)

1 Genital field with three pairs of acetabula (Fig. 233) 2

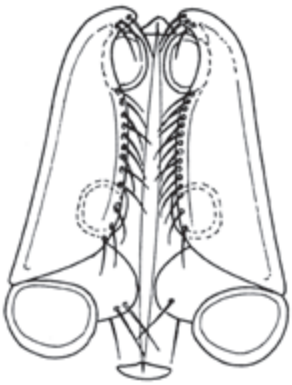
\- Genital field with more than three pairs of acetabula (Fig. 409) 4



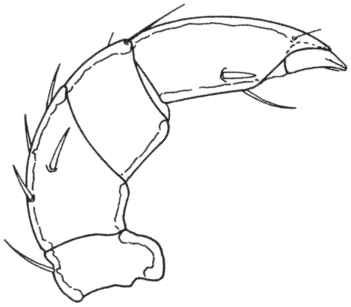
402



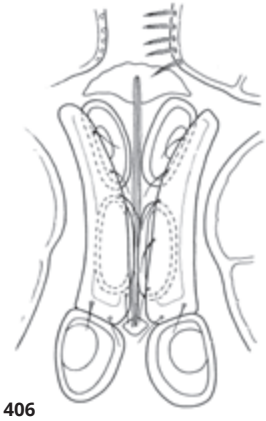
403



404



405



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407

402 *Thyopsoides plana* (Habeeb), venter female (after I.M. Smith & Cook 1999b)

403 *Thyopsoides plana* (Habeeb), genital field male (after I.M. Smith & Cook 1999b)

404 *Thyopsoides plana* (Habeeb), genital field female (after I.M. Smith & Cook 1999b)

405 *Thyopsoides plana* (Habeeb), palp male (after I.M. Smith & Cook 1999b)

406 *Trichothyas* (*Trichothyas*) *pennata* (K. Viets), genital field female (after Cook 1974)

407 *Trichothyas* (*Trichothyas*) *pennata* (K. Viets), genital field male (after Cook 1974)

2 Males: Genital flaps with median extensions which extend nearly to posterior margin of third pair of acetabula; gonopore long, extending to third pair of acetabula (Fig. 233) Subgenus *Neothyas*

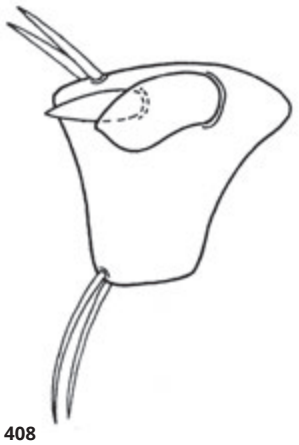
- Males: Genital flaps either extending anterior to the third pair of acetabula or just to these; gonopore relatively short, not extending to third pair of acetabula 3

3 Males: Genital flaps not touching third pair of acetabula (Fig. 407) Subgenus *Trichothyas* s.s.

- Males: Genital flaps touching third pair of acetabula (Fig. 411) Subgenus *Lundbladia*

4 All posterior acetabula in contact with the genital flaps (Fig. 409) Subgenus *Kashmirothyas*

- Some of the posterior acetabula not in contact with the genital flaps (Fig. 414) Subgenus *Plesiothyas*



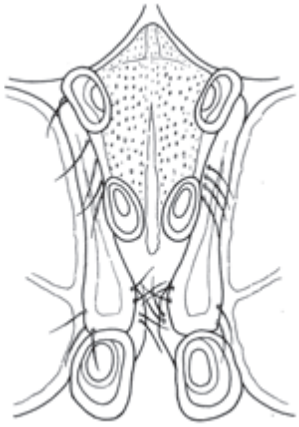
408



409



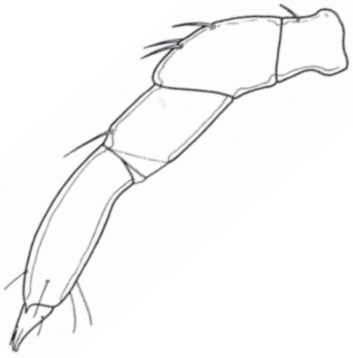
410



411



412



413

408 *Trichothyas* (*Trichothyas*) *pennata* (K. Viets), I-leg-3 male (after Cook 1974)

409 *Trichothyas* (*Kashmirothyas*) *hutchinsoni* (Lundblad), genital field male (after Cook 1974)

410 *Trichothyas* (*Kashmirothyas*) *hutchinsoni* (Lundblad), genital field female (after Cook 1974)

411 *Trichothyas* (*Lundbladia*) *musicola* (Mitchell), genital field male (after Cook 1974)

412 *Trichothyas* (*Neothyas*) *hygropetrica* (Lundblad), genital field male (after Cook 1974)

413 *Trichothyas* (*Neothyas*) *hygropetrica* (Lundblad), palp male (after Cook 1974)

Subgenus *Trichothyas* s.s.

(Figs. 406-408)

DIAGNOSIS: Genital field with three pairs of acetabula. Males: Genital flaps curved and reduced and not touching third pair of acetabula. First and second pair of acetabula close together but removed from third pair of acetabula in male (Fig. 407). Gonopore very short. Females: Genital flaps touching third pair of acetabula (Fig. 406).

HABITAT: Streams.

DISTRIBUTION: One species known from Cameroon.

Subgenus *Kashmirothyas* Lundblad, 1934

(Figs. 409, 410)

1934 *Kashmirothyas* Lundblad, Memoirs of the Connecticut Academy of Arts and Sciences 10: 102.

1942 *Octolundbladia* Vitzthum, Bronn's Klassen und Ordnungen des Tierreichs, Arachnoidea 5, 4, 5: 839.

Type species: *Octolundbladia ladakiana* Vitzthum, 1942

DIAGNOSIS: Genital field with four to five pairs of acetabula (Figs. 409, 410). Third group pf acetabula (with 2-3 acetabula) solidly fused with the genital flaps.

HABITAT: Streams, springs.

DISTRIBUTION: Three species known from Kashmir, Himalaya Mountains, Turkey (Özkan & Boyaci 1992) and Montenegro (Pešić et al. 2018a).

Subgenus *Lundbladia* K. Viets, 1929

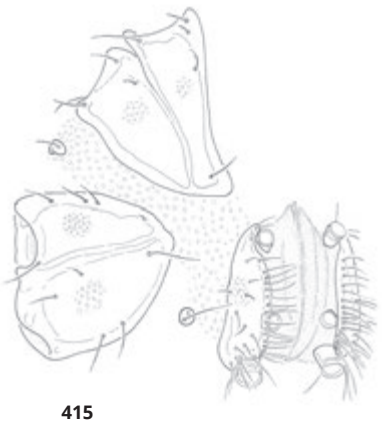
(Figs. 281-283, 411)

1929 *Lundbladia* K. Viets, Zoologischer Anzeiger 86: 49.

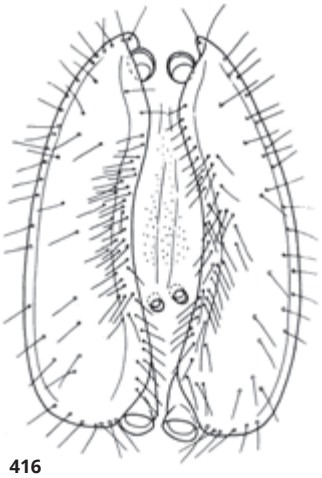
Type species: *Lundbladia feuerborni* K. Viets, 1929



414



415



416

414 *Trichothyas* (*Plesiothyas*) *multipora* (Walter), genital field female (after Cook 1974)

415 *Vietsia scutata* (Protz), venter adult (part.) (after Di Sabatino et al. 2010)

416 *Vietsia scutata* (Protz), genital field male (after Cook 1974)

DIAGNOSIS: Genital field with three pairs of acetabula (Figs. 281, 283). Genital flaps more or less straight, usually only slightly reduced in size and touching the third pair of acetabula in both sexes. Male gonopore not as short as in the nominate subgenus, extending beyond level of second pair of acetabula (Fig. 411).

HABITAT: Hygropetric and interstitial habitats, springs, cascades of streams.

DISTRIBUTION: The subgenus is widespread, with several species known from North and Central America (Goldschmidt & Gerecke 2003), Africa (Madagascar, Gerecke 2020), Asia (Iran, Pesic et al. 2005) and Europe.

Subgenus *Neothyas* Lundblad, 1941

(Figs. 233, 412, 413)

1941 *Neothyas* Lundblad, Entomologisk Tidskrift 62: 110.

Type species: *Neothyas hygropetrica* Lundblad, 1941

DIAGNOSIS: Genital field with three pairs of acetabula (Fig. 233). Males: Genital flaps only slightly reduced, and extending posteriorly almost to posterior end of third pair of acetabula (Fig. 412). Gonopore relatively long, extending to third pair of acetabula. Posterior coxae widely separated. P4 with only a short dorsodistal extension (Fig. 413).

HABITAT: Small streams with mosses.

DISTRIBUTION: Known from one species from Java, Indonesia.

Subgenus *Plesiothyas* K. Viets, 1935

(Fig. 414)

1935 *Plesiothyas* K. Viets, Zoologischer Anzeiger 110: 278.

Type species: *Trichothyas multipora* Walter, 1935

DIAGNOSIS: Genital field with three, four or five pairs of acetabula. Third group of acetabula (with 2-3 acetabula) not solidly fused with the genital flaps (Fig. 414).

HABITAT: Seepage areas associated with waterfalls.

DISTRIBUTION: One species known from Ivory Coast.

Genus *Vietsia* Lundblad, 1926

(Figs. 221, 415-417)

1926 *Vietsia* Lundblad, Entomologisk Tidskrift 47: 208.

Type species: *Thyas scutata* Protz, 1923

DIAGNOSIS: Lateral eyes not in capsules, lying on a pair of platelets at anterior idiosoma margin. Frontal plate including frontalia and the unpigmented median eye (Fig. 221). Pre- and postocularia lying free in the integument. Remaining dorsal and posteroventral idiosoma without sclerotization. Genital field with three pairs of relatively small acetabula lying in the membranous area flanking the gonopore (Figs. 415-416). Second pair of acetabula closer to third pair than to first pair. Palp stocky (Fig. 417)

HABITAT: Temporary habitats, e.g. quackfens, flooded meadows, often in semi-aquatic habitats like terrestrializing biotopes.

DISTRIBUTION: One species known from Europe.

Genus *Zschokkea* Koenike, 1892

(Figs. 247, 322, 323, 418, 419)

1892 *Zschokkea* Koenike, Zoologischer Anzeiger 15: 320.

Type species: *Zschokkea oblonga* Koenike, 1892

DIAGNOSIS: Lateral eyes in capsules. Dorsal muscle attachments unsclerotized, except for dorsocentralia 1 and 2, fused on their respective sides into very small platelets (Fig. 322). Medial eye unpigmented and lying free in the integument. Genital field with three pairs of acetabula, the second and third pair of acetabula fused with small extensions of the genital flaps (Figs. 247, 323). Palp stocky (Fig. 419).

HABITAT: Helocrene springs, small streams, moorland pools, quackfens and reedlands.

DISTRIBUTION: Four species known, one from Europe, two from Siberia (Tuzovskij 2020) and one from Ontario, Canada (I.M. Smith & Cook 2009a).

Subfamily Hydryphantinae Piersig, 1896

1896 Hydryphantinae Piersig, Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig 22: 48.

DIAGNOSIS: Lateral eyes in capsules. Genital field with three to many acetabula, genital flaps well developed. Dorsum with a frontal plate including the median eye and on anterolateral extensions the preocularia, on posterior extensions the postocularia. Dorsal muscle attachments sclerotized, rarely forming large plates. Legs usually with swimming setae, leg claws simple.

KEY TO THE GENERA

1 More than 30 pairs of acetabula, lateral margin of genital flaps indented (Fig. 420) Genus *Georgella*

- Less than 25 (Fig. 421), often only three (Fig. 422), pairs of acetabula, lateral margin of genital flaps not indented Genus *Hydryphantes*



417



418



419

417 *Vietsia scutata* (Protz), palp adult (after Di Sabatino et al. 2010)

418 *Zschokkea oblonga* Koenike, venter female (after Di Sabatino et al. 2010)

419 *Zschokkea oblonga* Koenike, palp (after Di Sabatino et al. 2010)

Genus *Georgella* Koenike, 1907

(Figs. 420, 423-425)

1907 *Georgella* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 19: 129 – Tuzovskij (2007).

Type species: *Hydrodroma helvetica* Haller, 1882

DIAGNOSIS: Genital field with more than 30 pairs of acetabula, arranged in two groups separated by an indentation in the lateral margin of the genital flap (Fig. 420). An additional pair of acetabula present in the membranous area flanking the gonopore. Acetabula disc-like, not on stalks.

HABITAT: Standing waters (ponds, swamps, ditches).

DISTRIBUTION: Several species known from the Western Palaearctic region.

REMARKS: *Georgella* was considered a full genus in the past, but most recent authors ranked it as a subgenus of *Hydryphantes.* Tuzovskij (2007), however, based on differences in the larval morphology, proposed ranking of *Georgella* as a separate genus.

Genus *Hydryphantes* C.L. Koch, 1841

(Figs. 219, 220, 421-422)

1841 *Hydryphantes* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 37: 18.

1954 *Mackerrasiella* Womersley, Studies from the Institute of Medical Research, Federation of Malaya 26: 112 – Vercammen-Grandjean (1972).

Type species: *Hydryphantes hilaris* C.L. Koch, 1841 = *Hydryphantes ruber* (De Geer, 1778)

DIAGNOSIS: Genital field with three (Fig. 422) to numerous acetabula, but not more than 25 pairs. In polyacetabulate species most acetabula on the genital flaps, one anterior pair and one posterior pair in the membranous area flanking the gonopore. Genital flaps without lateral indentations.



420



421



422

420 *Georgella helvetica* (Haller), genital field adult (after Di Sabatino et al. 2010)

421 *Hydryphantes* (*Polyhydryphantes*) *flexuosus* (Koenike), genital field adult (after Di Sabatino et al. 2010)

422 *Hydryphantes* (*Hydryphantes*) *ruber* (De Geer), genital field male (after Di Sabatino et al. 2010)

KEY TO THE SUBGENERA

1 Genital field with three pairs of acetabula (Fig. 422) Subgenus *Hydryphantes*

- Genital field with more than three pairs of acetabula (Fig. 421) Subgenus *Polyhydryphantes*

Subgenus *Hydryphantes* s.s.

(Figs. 219, 220, 422)

1985 *Hydrobaderia* Özkan, Entomologica Basiliensia 10: 19 – Di Sabatino et al. (2009).

DIAGNOSIS: Genital field with three pairs of acetabula, posterior pair stalked. Swimming setae present, but absent in one species, *H. yalvaci* Özkan, 1982.

HABITAT: Permanent and temporary standing waters, springs.

DISTRIBUTION: Widespread, but no species known from the Australasian region.

Subgenus *Polyhydryphantes* K. Viets, 1926

(Fig. 421)

1926 *Polyhydryphantes* K. Viets, Zoologischer Anzeiger 69: 191.

1927 *Octohydryphantes* Lundblad, Archiv für Hydrobiologie 18: 409 – Lundblad (1962).

1986 *Papilloporus* Walter, Archiv für Hydrobiologie 28: 85 - Cook (1986).

Type species: *Hydrodroma flexuosa* Koenike, 1885

DIAGNOSIS: Genital field with four to many pairs of acetabula, but not more than 25 pairs. Lateral margin of genital flaps not indented. Acetabula more or less stalked, in species with more numerous acetabula becoming stalks shorter. Acetabula may be papillate.

HABITAT: Permanent and temporary standing waters, some species also in brackish waters.

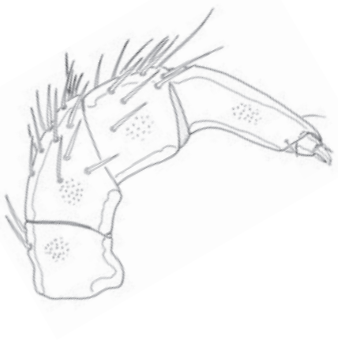
DISTRIBUTION: Worldwide, a dozen species described.



423



424



425

423 *Georgella helvetica* (Haller), venter (after Di Sabatino et al. 2010)

424 *Georgella helvetica* (Haller), frontal plate (after Di Sabatino et al. 2010)

425 *Georgella helvetica* (Haller), palp (after Di Sabatino et al. 2010)

Subfamily Mamersinae K. Viets, 1931

1931 Mamersinae K. Viets, Zoologischer Anzeiger 93: 210.

DIAGNOSIS: Lateral eyes in capsules, these fused with anterior platelets. Dorsum with large glandularia platelets which occupy most of the area (Fig. 256). One large anteromedial platelet without glandularia, median eye absent. Posterior part of venter with a pair of large plates and several smaller platelets (Fig. 240). All coxae fused on their respective sides and Cx-I lying close to each other medially. Genital flaps well developed, with numerous acetabula lying on the flaps. Shape of pregenital sclerite rhomboid in males (Fig. 427), somewhat triangular in females (Fig. 426). Legs with or without swimming setae, leg claws simple. Monotypic.

Genus *Mamersa* Koenike, 1898

(Figs. 240, 256, 426-428)

1898 *Mamersa* Koenike, Abhandlungen der Senckenberg Gesellschaft für Naturforschung 21: 372.

1969 *Armothyas* Nayar, Bulletin of Entomology 10: 47 – Bader (1980a).

Type species: *Mamersa testudinata* Koenike, 1898

DIAGNOSIS: As for subfamily.

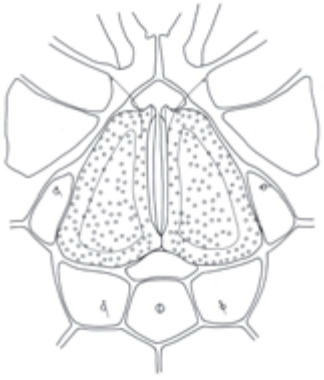
HABITAT: Ponds and slow flowing streams.

DISTRIBUTION: Several species known from the Afrotropical region (Uganda, Cook 1979, Madagasacar, Gerecke 2020), Asia (Jin & Guo 1993, Savatenalinton & Smit 2017) and Australia (Harvey 1988b).

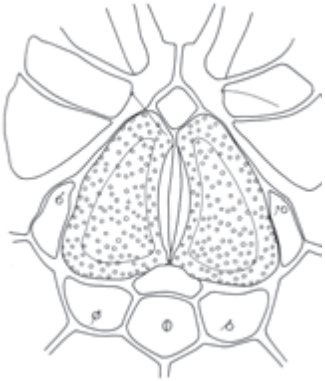
Subfamily Protziinae Koenike, 1909

1909 Protziinae Koenike, Die Süsswasserfauna Deutschlands 12: 23.

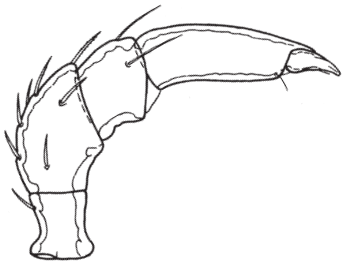
DIAGNOSIS: Lateral eyes in capsules. Median eye in a few species visible as a small ring not surrounded by sclerotization. Idiosoma typically without dorsal or ventral sclerites, but in some *Neocalonyx* very small platelets are present. Genital field typically with numerous acetabula, but in the European *Protzia octopora* Lundblad only four pairs present. Acetabula in most species


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426 *Mamersa rouxi* Walter, genital field female (after Savatenalinton & Smit 2017) Reproduced with permission from copyright holder

427 *Mamersa rouxi* Walter, genital field male (after Savatenalinton & Smit 2017) Reproduced with permission from copyright holder

428 *Mamersa petrophila* Cook, palp female (after Cook 1974)

stalked, never fused with genital flaps, the latter well developed or reduced in various degrees. Legs typically without swimming setae, but swimming setae present in *Neocalonyx* subgenus *Paracalonyx*. Leg claws simple or with lateral clawlets.

KEY TO THE GENERA

1	Setae-bearing sclerites (genital flaps or vestiges of these) placed medial to the majority of the acetabula (Fig. 238)	Genus *Neocalonyx*
-	Setae-bearing sclerites either placed lateral to the base of the majority of the genital acetabula or completely absent (Fig. 429)	2
2	Leg claws simple; genital flaps well developed (Fig. 429)	Genus *Partnunia*
-	Leg claws bearing lateral clawlets (Fig. 431), genital flaps more or less reduced (Fig. 432)	Genus *Protzia*

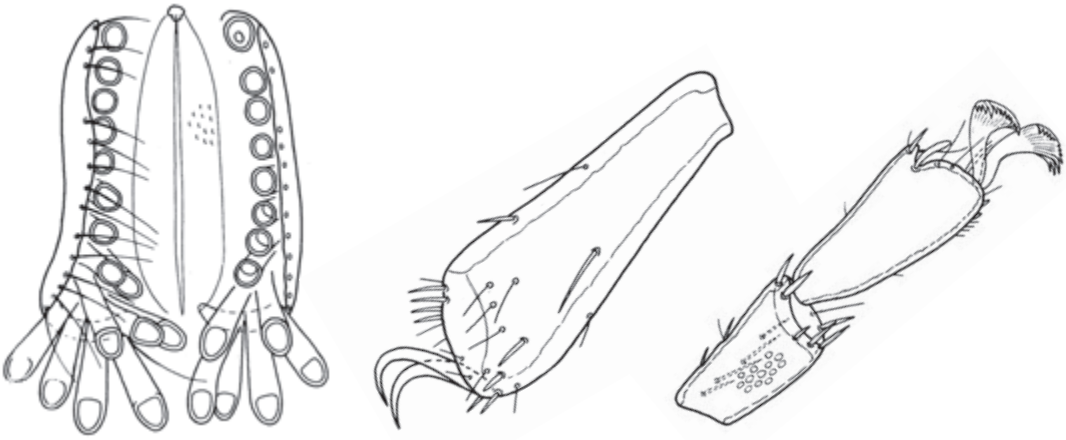
Genus *Neocalonyx* Walter, 1919

(Figs. 238, 433-441)

1919 *Neocalonyx* Walter, Revue suisse de Zoologie 27: 27.

Type species: *Neocalonyx godeti* Walter, 1919

DIAGNOSIS: Dorsum smooth or with very small dorsalia. Median eye, if present, not lying on a frontal plate. Dorsoglandularia 3-5 differing from remaining glandularia in having stiletto-like flat setae, which may be strongly plumose. Cx-I+II with or without a posteromedial projection. Genital field with numerous acetabula and typically on long stalks. Genital sclerites consisting of curved rod surrounding the majority of the acetabula, medially with numerous setae (Fig. 238). A few acetabula lying anteromedial to setae-bearing sclerites. Palp not chelate, but P4 with a heavy dorsodistal seta. Legs with or without swimming setae leg claws with or without lateral clawlets.



429 **430** **431**

429 *Partnunia steinmanni* Walter, genital field female (after Cook 1974)

430 *Partnunia steinmanni* Walter, I-leg-6 (after Cook 1974)

431 *Protzia gata* Cook, I-leg-5-6 female (after Cook 1974)

KEY TO THE SUBGENERA

1	Legs with swimming setae (Fig. 433)	Subgenus *Paracalonyx*
-	Legs without swimming setae	2
2	Setae of dorsoglandularia 3-5 only slightly plumose; Cx-I+II without posteromedial projection (Fig. 435)	Subgenus *Neocalonyx* s.s.
-	Setae of dorsoglandularia 3-5 strongly plumose; Cx-I+II with a posteromedial projection (Fig. 436)	Subgenus *Otongacarus*

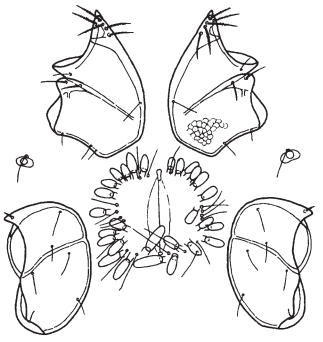
Subgenus *Neocalonyx* s.s.

(Figs. 238, 435, 437-439)

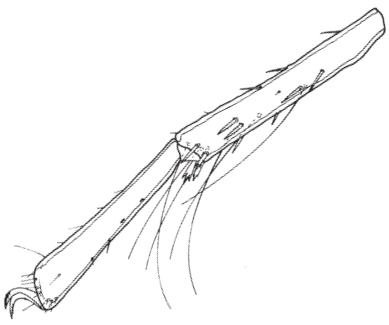
DIAGNOSIS: Median eye and small dorsalia present or absent. Laterally compressed setae of dorsoglandularia 3-5 only slightly plumose. Cx-I+II without posteromedial projection (Fig. 435). Legs without swimming setae; leg claws with (Fig. 437) or without (Fig. 438) lateral clawlets.

HABITAT: Streams, springs.

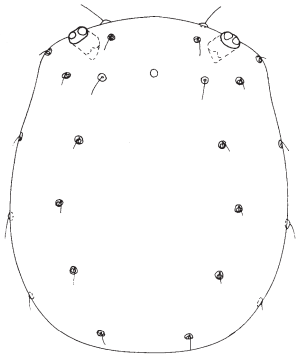
DISTRIBUTION: Several species known from Argentina, Bolivia (Rosso de Ferradás & Fernández 2007), Chile (Besch 1964, Cook 1988), Ecuador and Costa Rica (Goldschmidt & Gerecke 2003).



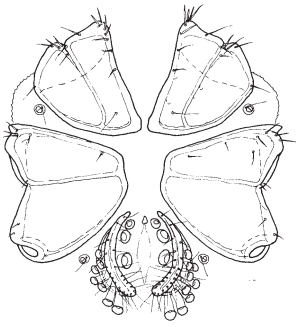
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434



435



436



437

432 *Protzia gata* Cook, venter female (after Cook 1974)

433 *Neocalonyx* (*Paracalonyx*) *longipalpis* Lundblad, IV-leg-5-6 male (after Cook 1988)

434 *Neocalonyx* (*Paracalonyx*) *longipalpis* Lundblad, dorsum male (after Cook 1988)

435 *Neocalonyx* (*Neocalonyx*) *penai* Besch, venter male (after Cook 1988)

436 *Neocalonyx* (*Otongacarus*) *pina* Goldschmidt & Gerecke, venter male (after Goldschmidt & Gerecke 2003)
Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

437 *Neocalonyx* (*Neocalonyx*) *pectunguis* Lundblad, claws female (after Cook 1974)

Subgenus *Paracalonyx* Lundblad, 1944

(Figs. 433, 434)

1944 *Paracalonyx* Lundblad, Entomologisk Tidskrift 65: 137.

Type species: *Neocalonyx longipalpis* Lundblad, 1941

DIAGNOSIS: A pigmentless median eye present (Fig. 434). Dorsalia absent or small. Second and third legs with a few swimming setae, fourth legs with many swimming setae (Fig. 433). Leg claws with lateral clawlets (Fig. 433).

HABITAT: Standing waters (lakes), streams.

DISTRIBUTION: Two species known from Argentina (Besch 1964, Rosso de Ferradás 1987) and Chile (Besch 1964, Cook 1988).

Subgenus *Otongacarus* Goldschmidt & Gerecke, 2003

(Figs. 436, 440, 441)

2003 *Otongacarus* Goldschmidt & Gerecke, Tribute to David R. Cook: 98.

Type species: *Neocalonyx pina* Goldschmidt & Gerecke, 2003

DIAGNOSIS: Lateral eye capsules reduced to small rhombic sclerites. Median eye and dorsalia absent. Setae of dorsoglandularia 3-5 slender and strongly plumose. Cx-I+II with a long posteromedial projection (Fig. 436). Legs lacking swimming setae, claws simple (Fig. 441).

HABITAT: Streams.

DISTRIBUTION: Two species known, one from Costa Rica and one from Ecuador.

Genus *Partnunia* Piersig, 1896

(Figs. 228-230, 236, 429, 442)

1896 *Partnunia* Piersig, Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig 22/23: 52.

Type species: *Thyas angusta* Koenike, 1893

DIAGNOSIS: Dorsum without dorsalia (Fig. 228). Median eye occasionally visible. Muscle attachments not sclerotized. Genital flaps well developed and porose, flanking, and posteriorly embracing, a row of stalked acetabula (Fig. 229, 236). Palp chelate (Fig. 442). Legs without swimming setae, leg claws simple (Fig. 230).

HABITAT: Springs and spring brooks.

DISTRIBUTION: Several species known from Europe, Japan (Gerecke 1993), North America and one species known from the Indian Himalaya (Panesar & Gerecke 1994).



438 *Neocalonyx* (*Neocalonyx*) *schindowskii* Besch, IV-leg-5-6 male (after Cook 1988)

439 *Neocalonyx* (*Neocalonyx*) *penai* Besch, gnathosoma + palp female (after Cook 1988)

440 *Neocalonyx* (*Otongacarus*) *pina* Goldschmidt & Gerecke, gnathosoma + palp male (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

Genus *Protzia* Piersig, 1896

(Figs. 231, 237, 430-432, 443, 444)

1896 *Protzia* Piersig, Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig 22/23: 52.

1905 *Sporadoporus* Wolcott, Studies from Zoological Laboratory. The University of Nebraska 31: 191 – K. Viets (1956b).

1907 *Calonyx* Walter, Zoologischer Anzeiger 31: 298 - Lundblad (1969).

1966 *Diplocalonyx* Imamura, Results of the Kyoto University Scientific Expedition to the Karakoram and Hindukush, 1955 8: 190 – Gerecke (1996a).

Type species: *Thyas eximia* Protz, 1896

DIAGNOSIS: Median eye rudimentary and unpigmented or absent. Idiosoma without muscle attachment plates. Genital flaps either developed as porose elongated sclerites, or as narrow, lightly sclerotized bars, or completely reduced (Figs. 201, 237). Genital field with numerous acetabula, but in *P. octopora* only four pairs of acetabula present (Fig. 444). Acetabula generally on stalks, at least the posterior ones. Palp chelate (Fig. 443). Legs without swimming setae, claws with lateral clawlets (Fig. 231).

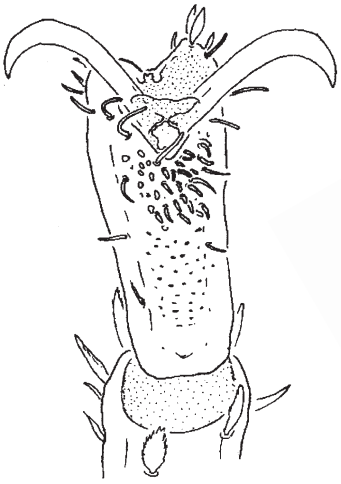
HABITAT: Streams, springs.

DISTRIBUTION: Numerous species known from the Holarctic and Oriental regions.

Subfamily Pseudohydryphantinae K. Viets, 1926

1926 Pseudohydryphantinae K. Viets, Zoologischer Anzeiger 69: 196.

DIAGNOSIS: Lateral eyes in capsules. Medial eye free in the integument. Genital field with three pairs of acetabula flanked by paired, movable flaps. Idiosoma without dorsalia, but in *Cyclohydryphantes* anterior and lateral glandularia on narrow, elongated platelets. Legs with swimming setae, claws simple.



441



442



443

441 *Neocalonyx* (*Otongacarus*) *pina* Goldschmidt & Gerecke, distal segment of fourth leg female (after Goldschmidt & Gerecke 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

442 *Partnunia steinmanni* Walter, palp adult (after Di Sabatino et al. 2010)

443 *Protzia gata* Cook, palp female (after Cook 1974)

KEY TO THE GENERA

1 Lateral glandularia lying on narrow, elongated sclerites (Fig. 244) Genus *Cyclohydryphantes*

- Without elongated glandularia platelets (Fig. 243) Genus *Pseudohydryphantes*

Genus *Cyclohydryphantes* Lundblad, 1941

(Figs. 244, 445-447)

1941 *Cyclohydryphantes* Lundblad, Entomologisk Tidskrift 62: 111.

Type species: *Cyclohydryphantes trabeculiferus* Lundblad, 1941

DIAGNOSIS: Anterior and lateral glandularia on narrow, elongated platelets (Figs. 244, 445).

HABITAT: Ponds, streams.

DISTRIBUTION: A genus endemic to Australia, with three species known (Harvey 1987, Smit 1998b).

Genus *Pseudohydryphantes* K. Viets, 1907

(Figs. 243, 245, 448-450)

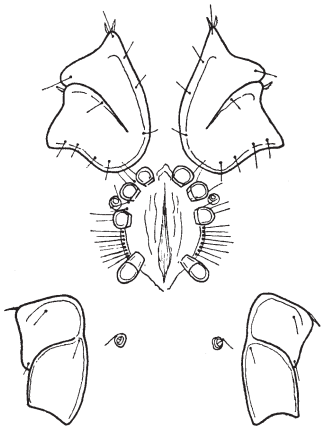
1907 *Pseudohydryphantes* K. Viets, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 19: 142.

Type species: *Pseudohydryphantes parvulus* K. Viets, 1907

DIAGNOSIS: Integument papillae rounded or with fine corona-like distal extensions. Glandularia platelets either rounded (Fig. 243) or lunate (Fig. 448), not on expanding sclerites. Legs with or without swimming setae.

HABITAT: (Temporary) standing or slowly running waters.

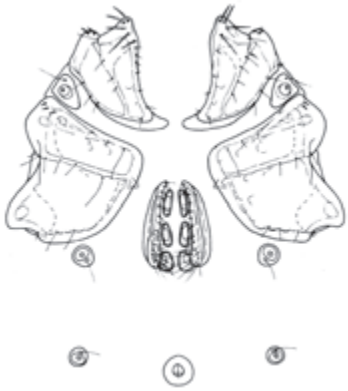
DISTRIBUTION: Several species known from the Holarctic (including Siberia, Tuzovskij 1976), and 12 species known from Australia (Cook 1986, Harvey 1987, 1988b, Smit 1998b) and one from New Zealand (Cook 1983).



444



445



446

444 *Protzia octopora* Lundblad, genital field male (after Lundblad 1956)

445 *Cyclohydryphantes trabeculiferus* Lundblad, lateral view male (after Cook 1986)

446 *Cyclohydryphantes trabeculiferus* Lundblad, venter male (after Cook 1986)

Subfamily Tartarothyadinae K. Viets, 1934

1934 Tartarothyadinae K. Viets, Zoologischer Anzeiger 105: 133.

1957 Vietsthyasinae Motaş & Tanasachi, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 35: 104.

DIAGNOSIS: Lateral eyes below the integument, with small lenses (Fig. 241). Idiosoma slightly elongated, with parallel lateral margins, muscle attachments unsclerotized. Median eye absent. Genital flaps well developed, flanking the three pairs of acetabula, anteriorly extending beyond the distal margin of the first pair of acetabula (Figs. 242, 239). Legs without swimming setae, claws simple. Monotypic.

Genus *Tartarothyas* K. Viets, 1934

(Figs. 239, 241, 242, 451)

1934 *Tartarothyas* K. Viets, Zoologischer Anzeiger 105: 133.

1957 *Vietsthyas* Motaş & Tanasachi, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 35: 104.

Type species: *Tartarothyas micrommata* K. Viets, 1934

DIAGNOSIS: As for subfamily.

HABITAT: Springs and interstitial habitats.

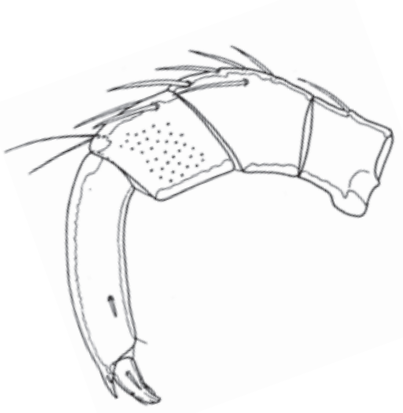
DISTRIBUTION: Several species known from the Holarctic (I.M. Smith & Cook 1999c) and one from Australia (Harvey 1987).

Subfamily Wandesiinae Schwoerbel, 1961

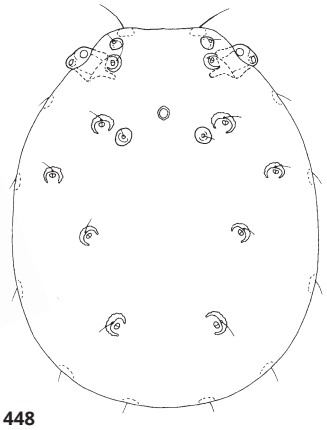
1961 Wandesiinae Schwoerbel, Archiv für Hydrobiologie, Supplement 25: 345.

1990 Wandesiidae Schwoerbel, 1961 – Tuzovskij, Nauka: 62.

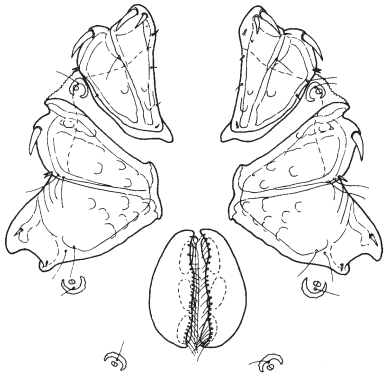
DIAGNOSIS: Eye capsules reduced in size and unpigmented or absent. Idiosoma extremely elongated, postgenital area distinctly longer than coxal field. Muscle attachments unsclerotized, except for a median postocularia-bearing sclerite present in *Euwandesia*. Genital flaps present or reduced. Genital field with three to numerous acetabula. Palp chelate or P4 with a dorsodistal seta.



447



448



449

447 *Cyclohydryphantes trabeculiferus* Lundblad, palp male (after Cook 1986)

448 *Pseudohydryphantes stylatus* Cook, dorsum male (after Cook 1986)

449 *Pseudohydryphantes stylatus* Cook, venter male (after Cook 1986)

KEY TO THE GENERA

1 Dorsum without platelets; palp either chelate (Fig. 452) or dorsodistal extension of P4 appears as a stout seta Genus *Wandesia*

- Dorsum with a median platelet with the postocularia (Fig. 453, palp not chelate, P4 with a stout dorsodistal seta (Fig. 454) Genus *Euwandesia*

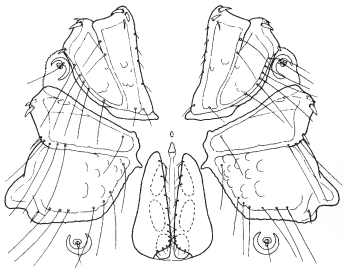
Genus *Euwandesia* André & Naudo, 1962

(Figs. 453-455, 458)

1962 *Euwandesia* André & Naudo, Acarologia 4: 596.

Type species: *Euwandesia sensitiva* André & Naudo, 1962

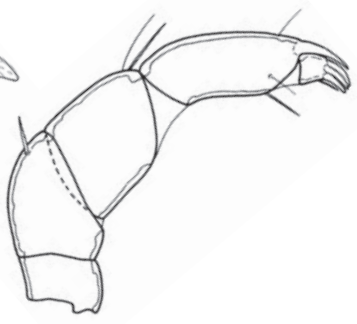
DIAGNOSIS: Dorsum with a small median sclerite with the postocularia (Fig. 453). Anterior and posterior coxal groups widely separated (Fig. 455). Genital field with three pairs of acetabula on short stalks (Fig. 458). Anterior two pairs of acetabula partially covered by weakly developed genital flaps. Palp not chelate, but P4 dorsodistally with a stout seta (Fig. 454). P5 terminally with 3-4 widely diverting stout setae. Leg claws simple.



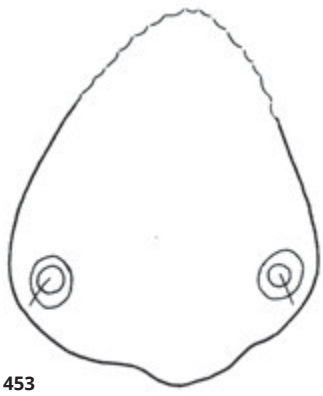
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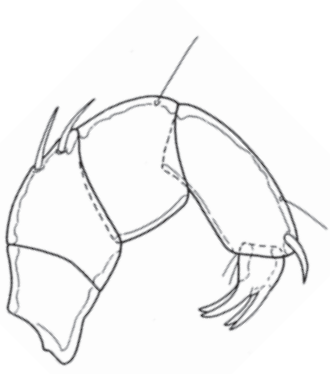
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450 *Pseudohydryphantes amatus* Cook, venter female (after Cook 1986)

451 *Tartarothyas romanica* Husiatinschi, palp female (after Cook 1974)

452 *Wandesia* (*Wandesia*) *extendens* Cook, palp female (after Cook 1974)

453 *Euwandesia vietsiella* Besch, frontal platelet female (after Cook 1974)

454 *Euwandesia vietsiella* Besch, palp female (after Cook 1974)

455 *Euwandesia sensitiva* André & Naudo, venter female (after Cook 1974)

HABITAT: Interstitial waters.

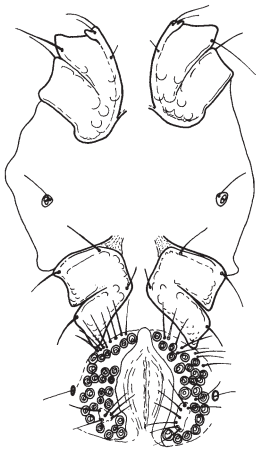
DISTRIBUTION: Two species known, one from New Zealand (Hopkins & Schminke 1970) and one from South America (Argentina and Chile, Besch 1964, Cook 1988).

Genus *Wandesia* Schechtel, 1912

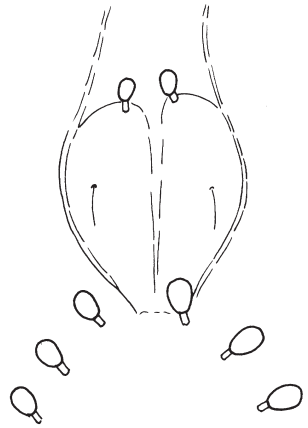
(Figs. 226, 227, 452, 456, 457, 459-465)

1912 *Wandesia* Schechtel, Bulletin International de l'Academie des Sciences de Cracovie. Classe des Sciences Mathematiques et Naturelles: 463.

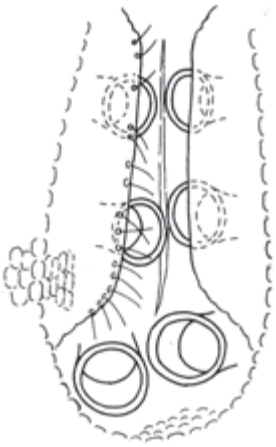
Type species: *Wandesia thori* Schechtel, 1912



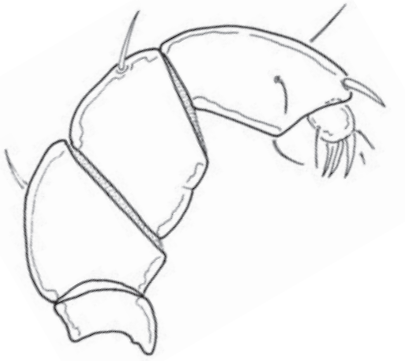
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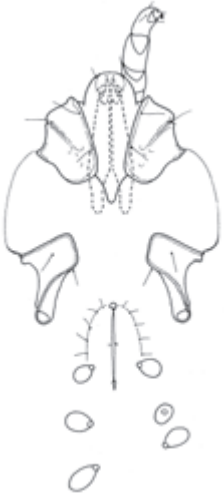
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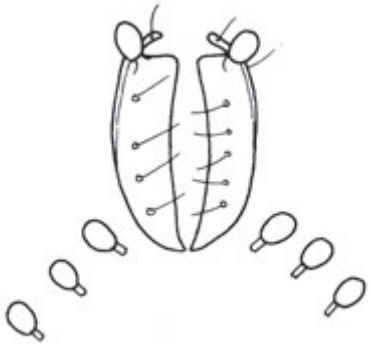
458



459



460



461

456 *Wandesia* (*Partnuniella*) *walteri* Lundblad, venter male (after Cook 1974)

457 *Wandesia* (*Mesowandesia*) *riparia* Habeeb, genital field female (after Cook 1974)

458 *Euwandesia vietsiella* Besch, genital field female (after Cook 1974)

459 *Wandesia* (*Wandesia*) *racovitzai* Gledhill, palp male (after Di Sabatino et al. 2010)

460 *Wandesia* (*Wandesia*) *extendens* Cook, venter female (after Cook 1974)

461 *Wandesia* (*Mesowandesia*) *riparia* Habeeb, genital field male (after Cook 1974)

DIAGNOSIS: Dorsum without sclerites. Genital field with three to numerous stalked or disc-shaped acetabula. Genital flaps either well developed (Fig. 462), reduced to setae-bearing sclerites or absent (Fig. 458). Suture line between Cx-I and Cx-II incomplete. Cx-IV either well developed or somewhat reduced and triangular in shape. P4 with a dorsodistal projection or with a heavy dorsodistal seta (Fig. 459). P3 without ventral setae, heavy setae at tip of P5 close together. Leg claws simple or with a small clawlet.

KEY TO THE SUBGENERA

1	Genital field with three or four pairs of acetabula (Fig. 227)	2
-	Genital field with five pairs of acetabula (Fig. 456)	Subgenus *Partnuniella*
2	Genital field with three pairs of acetabula (Fig. 227)	Subgenus *Wandesia*
-	Genital field with four pairs of acetabula (Fig. 457)	Subgenus *Mesowandesia*

Subgenus *Wandesia* s.s.

(Figs. 226, 227, 452, 459-462)

1961 *Allowandesia* Schwoerbel, Archiv für Hydrobiologie, Supplement 25: 345 – Gerecke (1999).

1958 *Pseudowandesia* Habeeb, Leaflets of Acadian Biology 17: 2 – Gerecke (2020).

DIAGNOSIS: Genital field with three pairs of stalked or disc-shaped acetabula, either without setae bearing sclerites (Fig. 458) or with relatively well-developed genital flaps in males (Fig. 462) and reduced to setae-bearing sclerites in females (Fig. 227). Cx-IV not or more or less reduced in size (Fig. 226). Dorsodistal projection of P4 often as a heavy seta (Fig. 459).

HABITAT: Interstitial waters, springs.

DISTRIBUTION: A widespread subgenus, with species known from North America, Europe (Gerecke 1991a), India (Cook 1967), Australia (Weigman & Schminke 1970, Smit 2013a), Argentina (Cook 1980), Cuba (Orghidan & Georgesco 1977) and Madagascar (Gerecke 2020).

Subgenus *Mesowandesia* André & Naudo, 1962

(Figs. 457, 461, 463)

1962 *Mesowandesia* André & Naudo, Acarologia 4: 603.

Type species: *Wandesia riparia* Habeeb, 1954

DIAGNOSIS: Genital field with four pairs of stalked acetabula, one pair located anteriorly, three pairs posterior to the gonopore. Genital field of female without setae-bearing sclerites (Fig. 457), male genital field with setae-bearing sclerites between first and second pair of acetabula (Fig. 461). Dorsodistal projection of P4 appearing as a heavy seta (Fig. 463).

HABITAT: Interstitial.

DISTRIBUTION: Known from one species from eastern North-America.

Subgenus *Partnuniella* K. Viets, 1938

(Figs. 456, 464, 465)

1938 *Partnuniella* K. Viets, Verhandlungen des Internationalen Vereins für Limnologie 8: 214.

1941 *Neowandesia* Lundblad, Kongliga Svenska vetenskaps-akademiens handlingar (s. 3) 19: 51.

Type species: *Partnuniella thermalis* K. Viets, 1938

DIAGNOSIS: Genital field with five to many pairs of disc-shaped acetabula (Fig. 456). Genital flaps reduced to setae-bearing sclerites or completely absent (Fig. 464). Cx-IV well developed. P4 with a dorsodistal projection (Fig. 465).

HABITAT: Interstitial waters, streams and thermal springs.

DISTRIBUTION: Several species known from North, Central and South America (Argentina, Besch 1964; Chile, Cook 1988, Schwoerbel 1987; Columbia, Pešić et al. 2010a) and one species from Cuba (Orghidan & Georgesco 1977).

Family Rhynchohydracaridae Lundblad, 1936

1936 Rhynchohydracaridae Lundblad, Zoologischer Anzeiger 115: 29.

1936 Clathrosperchonidae Lundblad, Zoologischer Anzeiger 115: 30 - Cook (1974).

DIAGNOSIS: Lateral eyes not in capsules, but associated with the integument or with plates; median eye absent. Dorsum and venter with more or less expanded plates. Plates with small rounded pores, or pores enlarged, resulting in radiating reticulations. Coxae in four groups or fused into a ventral shield. Genital field with a pair of genital flaps with numerous acetabula. Gnathosoma may or may not be protrusable; cheliceral claw relatively narrow and stylet-like. Palp five-segmented and not chelate, without setal tubercles, P2 with or without ventral seta. Legs without swimming setae, claws with enlarged base and clawlet. Sexual dimorphism not pronounced.

KEY TO THE SUBFAMILIES

1 Dorsum and venter with expanded plates occupying most of the area (Fig. 466); Cx-I fused medially (Fig. 467) 2

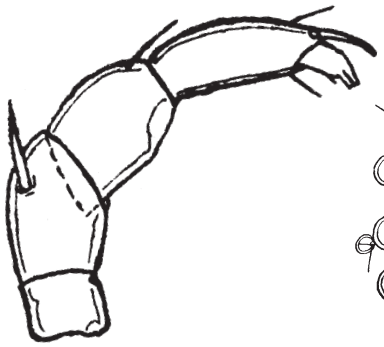
- Dorsum and venter with extended membranous area (Fig. 468), Cx-I separated medially (Fig. 469) Subfamily Clathrosperchontinae

2 Frontal plate fused with central dorsal plate (Fig. 470); plates of venter fused into a complete ventral shield (Fig. 471) Subfamily Santiagocarinae

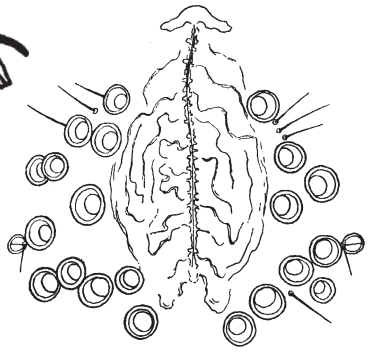
- Frontal plate separate from central dorsal plate (Fig. 468); plates of venter separate, not forming a complete ventral shield (Fig. 467) Subfamily Rhynchohydracarinae



462



463



464

462 *Wandesia* (*Wandesia*) *japonica* Imamura, genital field male (after Cook 1974)

463 *Wandesia* (*Mesowandesia*) *riparia* Habeeb, palp male (after Habeeb 1954a)

464 *Wandesia* (*Partnuniella*) *stalagmophila* Lundblad, genital field female (after Lundblad 1941b)

Subfamily Clathrosperchontinae Lundblad, 1936

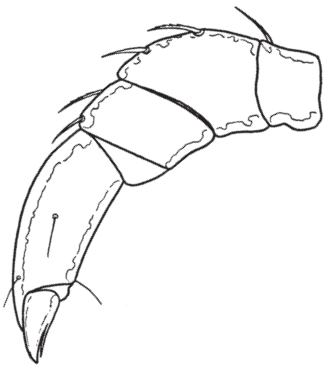
1936 Clathrosperchoninae Lundblad, Zoologischer Anzeiger 115: 30.

DIAGNOSIS: Dorsal and ventral plates well developed but not covering the entire area (Fig. 468-469); these plates with radiating reticulations in most species but lacking in *Clathrosperchonella rutae* Lundblad (Fig. 472). Postocularia associated with a pair of elongated anteromedial plates (Figs. 468, 477).

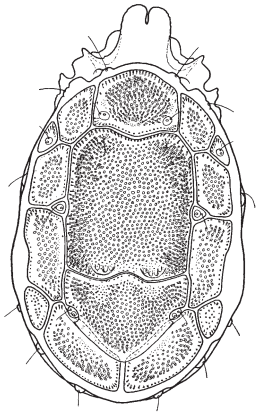
KEY TO THE GENERA

1 Gnathosoma attached to a protrusable tube (Fig. 472) Genus *Clathrosperchon*

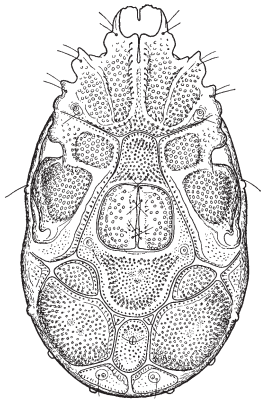
- Gnathosoma not attached to a protrusable tube (Fig. 473) Genus *Clathrosperchonella*



465



466



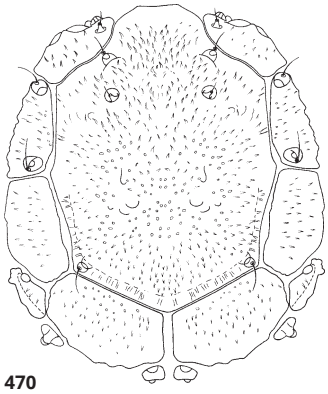
467



468



469



470

465 *Wandesia* (*Partnuniella*) *walteri* Lundblad, palp male (after Lundblad 1941b)

466 *Rhynchohydracarus dividuus* Lundblad, dorsum male (after Lundblad 1941b)

467 *Rhynchohydracarus dividuus* Lundblad, venter male (after Lundblad 1941b)

468 *Clathrosperchon ornatus* Cook, dorsum male (after Cook 1974)

469 *Clathrosperchon ornatus* Cook, venter male (after Cook 1974)

470 *Santiagocarus robustus* Valdecasas, dorsal shield male (after Valdecasas 2001)

Genus *Clathrosperchon* Lundblad, 1936

(Figs. 468, 469, 473, 475, 476)

1936 *Clathrosperchon* Lundblad, Zoologischer Anzeiger 115: 30.

Type species: *Clathrosperchon crassipalpis* Lundblad, 1936

DIAGNOSIS: Gnathosoma relatively long and attached to a protrusable tube (Fig. 472).

HABITAT: Streams and interstitial habitats.

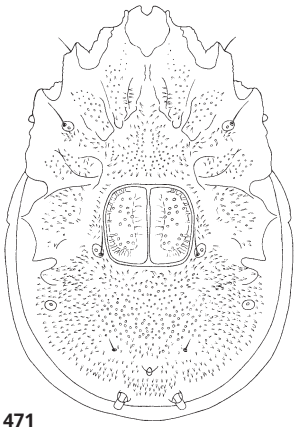
DISTRIBUTION: Several species known from North (Florida, Cook 1974), Central (Guatemala, K.O. Viets 1977a) and South America (Argentina, Cook 1980, Rosso de Ferradás 1984, 2000; Venezuela, Gruia 1988a,b).

Genus *Clathrosperchonella* Lundblad, 1937

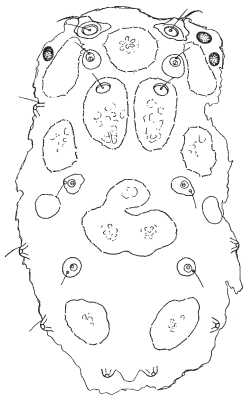
(Figs. 472-474, 477-480)

1937 *Clathrosperchonella* Lundblad, Zoologischer Anzeiger 118: 249.

Type species: *Clathrosperchonella asterifera* Lundblad, 1937



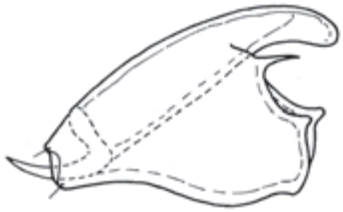
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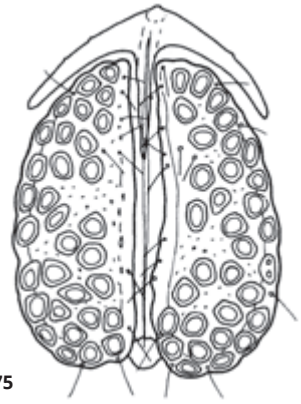
472



473



474



475



476

471 *Santiagocarus robustus* Valdecasas, venter male (after Valdecasas 2001)

472 *Clathrosperchonella rutae* Lundblad, dorsum male (after Lundblad 1941b)

473 *Clathrosperchon ornatus* Cook, gnathosoma + palp female (after Cook 1974)

474 *Clathrosperchonella asterifera* Lundblad, gnathosoma male (after Lundblad 1941b)

475 *Clathrosperchon ornatus* Cook, genital field female (after Cook 1974)

476 *Clathrosperchon ornatus* Cook, palp female (after Cook 1974)

DIAGNOSIS: Gnathosoma either relatively short or long, but not attached to a protrusable tube (Fig. 473).

HABITAT: Streams.

DISTRIBUTION: Two species known from Brazil.

Subfamily Rhynchohydracarinae Lundblad, 1936

1936 Rhynchohydracarinae Lundblad, Zoologischer Anzeiger 115: 29.

DIAGNOSIS: Dorsum and venter with expanded plates occupying most of the area. Gnathosoma attached to a protrusable tube. Cx-I fused medially. Monotypic.

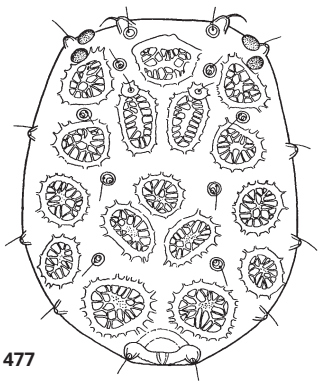
Genus *Rhynchohydracarus* Lundblad, 1936

(Figs. 42, 43, 466, 467, 485-487)

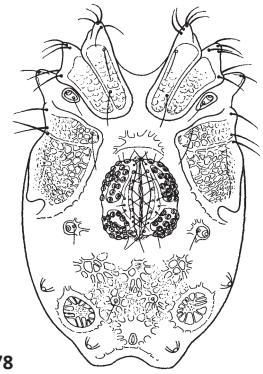
1936 *Rhynchohydracarus* Lundblad, Zoologischer Anzeiger 115: 29.

Type species: *Rhynchohydracarus testudo* Lundblad, 1936

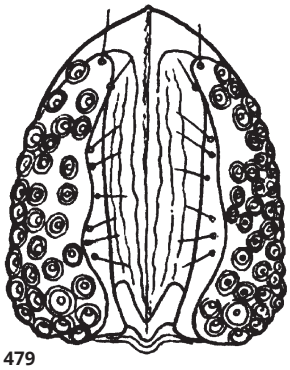
DIAGNOSIS: As for the subfamily.



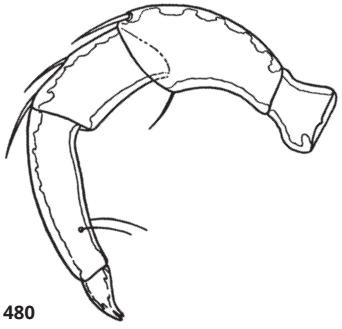
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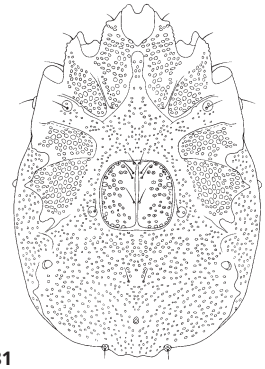
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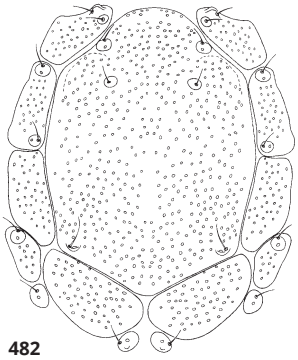
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481



482

477 *Clathrosperchonella asterifera* Lundblad, dorsum male (after Lundblad 1941b)

478 *Clathrosperchonella asterifera* Lundblad, venter male (after Lundblad 1941b)

479 *Clathrosperchonella asterifera* Lundblad, genital field female (after Lundblad 1941b)

480 *Clathrosperchonella asterifera* Lundblad, palp male (after Lundblad 1941b)

481 *Gledhillia coibensis* Valdecasas, venter male (after Valdecasas 2001)

482 *Gledhillia coibensis* Valdecasas, dorsum male (after Valdecasas 2001)

KEY TO THE SUBGENERA

1 Dorsal and ventral plates lying close to each other, leaving hardly any membranous space; dorsum with two unpaired medial plates (Figs. 466, 467)
Subgenus *Rhynchohydracarus* s.s.

- Dorsal and ventral plates not lying close to each other, leaving extended membranous space; dorsum with three unpaired medial plates (Figs. 485, 486) Subgenus *Coibacarus*

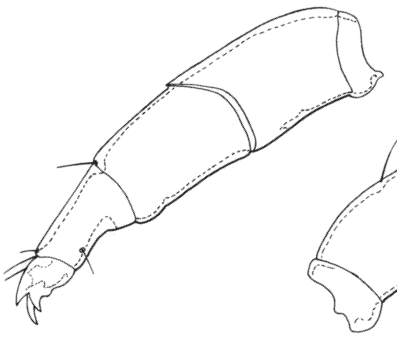
Subgenus *Rhynchohydracarus* s.s.

(Figs. 42, 43, 466, 467)

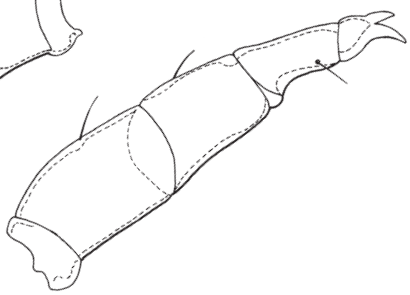
DIAGNOSIS: Dorsal and ventral plates lying close to each other, leaving hardly any membranous space; dorsum with two unpaired medial plates (Figs. 466-467).

HABITAT: Streams.

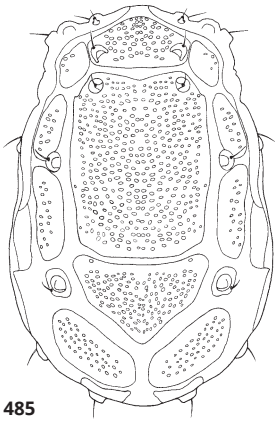
DISTRIBUTION: Two species known from South America.



483



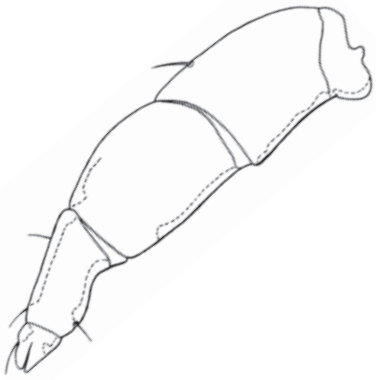
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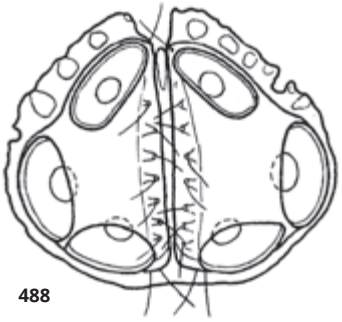
485



486



487



488

483 *Gledhillia coibensis* Valdecasas, palp male (after Valdecasas 2001)

484 *Santiagocarus robustus* Valdecasas, palp male (after Valdecasas 2001)

485 *Rhynchohydracarus* (*Coibacarus*) *carmenae* Valdecasas, dorsum female (after Valdecasas 2001)

486 *Rhynchohydracarus* (*Coibacarus*) *carmenae* Valdecasas, venter female (after Valdecasas 2001)

487 *Rhynchohydracarus* (*Coibacarus*) *carmenae* Valdecasas, palp female (after Valdecasas 2001)

488 *Teratothyasides* (*Teratothyasides*) *lundbladi* Cook, genital field female (after Cook 1974)

Subgenus *Coibacarus* Valdecasas, 2001

(Figs. 485-487)

2001 *Coibacarus* Valdecasas, Journal of Natural History 35: 1571.

Type species: *Rhynchohydracarus carmenae* Valdecasas, 2001

DIAGNOSIS: Dorsal and ventral plates not lying close to each other, leaving extended membranous space; dorsum with three unpaired medial plates (Figs. 485, 486).

HABITAT: Streams.

DISTRIBUTION: One species known from Panama.

Subfamily Santiagocarinae Valdecasas, 2001

2001 Santiagocarinae Valdecasas, Journal of Natural History 35: 1566.

DIAGNOSIS: Lateral eyes not in capsules. Dorsum with a central plate fused with an anteromedial plate, surrounded by four pairs of large plates (Fig. 470); central plate with three pairs of glandularia. Postocularia on a pair of anterolateral dorsal platelets. Gnathosoma attached to a long protrusable tube. Venter made up of a complete ventral shield (Fig. 471). Genital field with well-developed flaps bearing numerous acetabula. Legs without swimming setae.

KEY TO THE GENERA

1	Coxae in four clearly delimited groups (Fig. 481)	Genus *Gledhillia*
-	Suture lines between coxal groups obliterated (Fig. 471)	Genus *Santiagocarus*

Genus *Gledhillia* Valdecasas, 2001

(Figs. 481-483)

2001 *Gledhillia* Valdecasas, Journal of Natural History 35: 1569.

Type species: *Gledhillia coibensis* Valdecasas, 2001

DIAGNOSIS: Coxae clearly in four groups, reticulated (Fig. 481). Medial margin of Cx-IV indistinct.

HABITAT: Streams.

DISTRIBUTION: One species known from Panama.

REMARKS: *Gledhilla coibensis* is possibly a teneral specimen of *Santiagocarus robustus*. The dorsum of the two genera is identical, and the illustrations shows large idiosoma pores, which is an indication that the holotype is a teneral specimen. If so, *Gledhillia* is a synonym of *Santiagocarus*, and *G. coibensis* is a synonym of *Santiagocarus robustus*.

Genus *Santiagocarus* Valdecasas, 2001

(Figs. 470, 471, 484)

2001 *Santiagocarus* Valdecasas, Journal of Natural History 35: 1566.

Type species: *Santiagocarus robustus* Valdecasas, 2001

DIAGNOSIS: Coxae fused into a solid ventral shield, without reticulation (Fig. 471).

HABITAT: Streams.

DISTRIBUTION: One species known from Panama.

Family Teratothyadidae K. Viets, 1929

1929 Teratothyadidae K. Viets, Zoologischer Anzeiger 83: 331.

DIAGNOSIS: Lateral eyes in capsules, median eye absent. Integument papillate, dorsal and ventral plates occupying most of the area of the idiosoma. All paired plates, except lateral eye plates and a pair of anteromedial plates, surrounding glandularia (Fig. 492). Coxae in four groups. Genital field with well-developed genital flaps, with three (Fig. 88) to many (Fig. 500) pairs of acetabula which are fused with the flaps or free in the gonopore area. No pronounced sexual dimorphism. Gnathosoma may or may not be attached to a protrusable tube. Palp not chelate, five-segmented, P2 with 2-3 heavy, serrate setae (Figs. 494, 503). Legs without swimming setae, leg claws with a comb (Figs. 495, 504). Cheliceral claw very long and slender, stylet-like (Figs. 496, 502).

KEY TO THE GENERA

1 Genital field with three (Fig. 488) to many (Fig. 489) acetabula, all lying on the genital flaps — Genus *Teratothyasides*

- Genital field with three pairs of acetabula, not all of these lying on the genital flaps (Fig. 490) — Genus *Teratothyas*

Genus *Teratothyas* K. Viets, 1929

(Figs. 490-492)

1929 *Teratothyas* K. Viets, Zoologischer Anzeiger 83: 331.

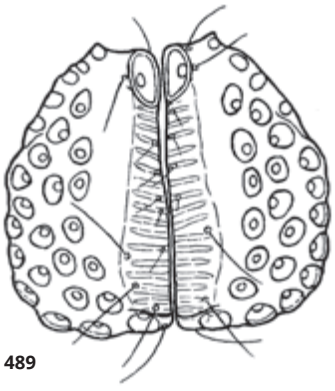
Type species: *Teratothyas reticulata* K. Viets, 1929

DIAGNOSIS: Genital field with three pairs of acetabula, first and third pair not lying on the genital flaps (Fig. 490).

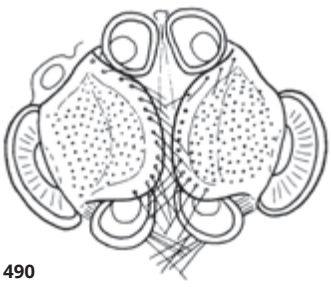
KEY TO THE SUBGENERA

1 Gnathosoma attached to a protrusable tube (Fig. 492) — Subgenus *Ascoteratothyas*

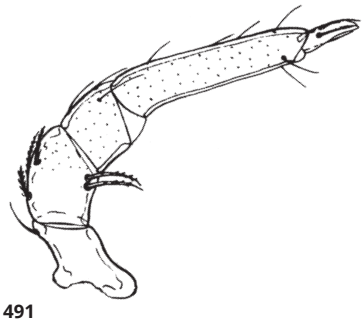
- Gnathosoma not atached to a protrusable tube — Subgenus *Teratothyas*



489



490



491

489 *Teratothyasides* (*Hansvietsia*) *sagariphorus* Cook, genital field male (after Cook 1974)

490 *Teratothyas reticulata* K. Viets, genital field female (after Cook 1974)

491 *Teratothyas reticulata* K. Viets, palp female (after K. Viets 1935)

Subgenus *Teratothyas* s.s.

(Figs. 490, 491)

DIAGNOSIS: Gnathosoma not attached to a protrusable tube.

HABITAT: Streams.

DISTRIBUTION: One species known from Sumatra and four species from Madagascar (Gerecke 2020).

Subgenus *Ascoteratothyas* Gerecke, 2020

(Fig. 492)

2020 *Ascoteratothyas* Gerecke, Zootaxa 4727: 52.
Type species: *Teratothyas levigata* Gerecke, 2020

DIAGNOSIS: Gnathosoma attached to a protrusable tube.

HABITAT: Streams.

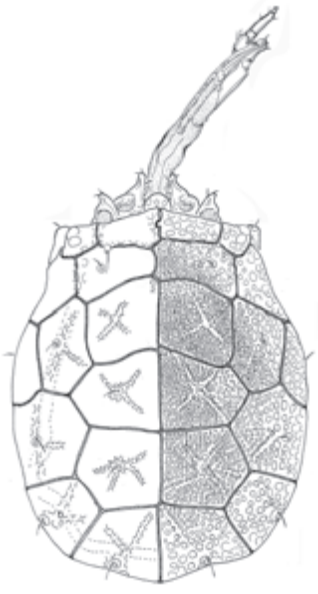
DISTRIBUTION: Three species known from Madagascar.

Genus *Teratothyasides* Lundblad, 1941

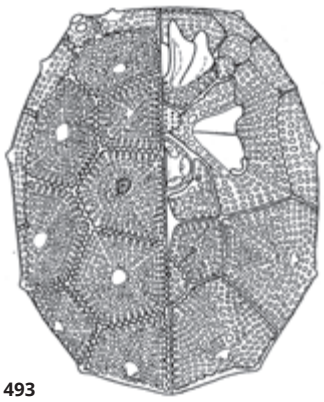
(Figs. 39, 488, 489, 493-505)

1941 *Teratothyasides* Lundblad, Entomologisk Tidskrift 62: 109.
Type species: *Teratothyasides clathratus* Lundblad, 1941

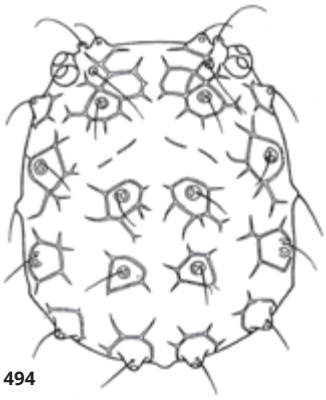
DIAGNOSIS: Genital field with three (Fig. 488) to many pairs of acetabula, all lying on the genital flaps.



492



493



494

492 *Teratothyas* (*Ascoteratothyas*) *levigata* Gerecke, dorsum female (after Gerecke 2020) Reproduced with permission from copyright holder

493 *Teratothyasides* (*Teratothyasides*) *lundbladi* Cook, combination of dorsum and venter female (after Cook 1974)

494 *Teratothyasides* (*Teratothyasides*) *lundbladi* Cook, dorsum teneral female (after Cook 1974)

KEY TO THE SUBGENERA

1	Genital field with three pairs of acetabula (Fig. 488)	Subgenus *Teratothyasides*
-	Genital field with numerous acetabula (Fig. 489)	2
2	Gnathosoma on a protrusable tube (Fig. 502)	Subgenus *Rhynchohansvietsia*
-	Gnathosoma not on a protrusable tube	Subgenus *Hansvietsia*

Subgenus *Teratothyasides* s.s.

(Figs. 39, 488, 493, 494)

DIAGNOSIS: Genital field with three pairs of acetabula (Fig. 488). Anteromedial glandularia-lacking dorsal plates either fused or separated medially.

HABITAT: Streams, swamps.

DISTRIBUTION: Three species known from Africa (Liberia, Cook 1966; Uganda; Madagascar, Gerecke 2020).

Subgenus *Hansvietsia* K. Viets, 1951

(Figs. 489, 496-498)

1951 *Hansvietsia* K. Viets, Zoologischer Anzeiger 147: 288.

Type species: *Hansvietsia sempiterna* K. Viets, 1951

DIAGNOSIS: Genital field with numerous acetabula (Fig. 489). Anteromedial glandularia-lacking dorsal plates always separated medially (Fig. 498).

HABITAT: Streams.

DISTRIBUTION: Several species known from Africa (Madagascar, Gerecke 2020).

Subgenus *Rhynchohansvietsia* K.O. Viets & Böttger, 1974

(Figs. 499-505)

1974 *Rhynchohansvietsia* K.O. Viets & Böttger, Acarologia 16: 116.

Type species: *Teratothyasides congoensis* K.O. Viets & Böttger, 1974

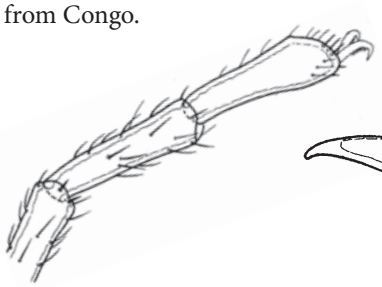
DIAGNOSIS: Genital field with numerous acetabula (Fig. 500). Gnathosoma attached to a protrusable tube (Fig. 502).

HABITAT: Streams.

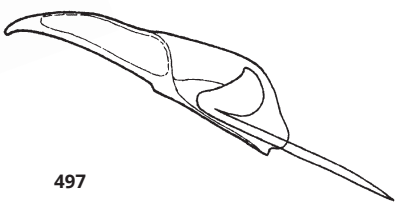
DISTRIBUTION: One species known from Congo.



495



496



497

495 *Teratothyasides* (*Hansvietsia*) *undulatus* Cook, palp female (after Cook 1974)

496 *Teratothyasides* (*Hansvietsia*) *undulatus* Cook, distal segments first leg female (after Cook 1974)

497 *Teratothyasides* (*Hansvietsia*) *sempiterna* (K. Viets), chelicera female (after Cook 1974)

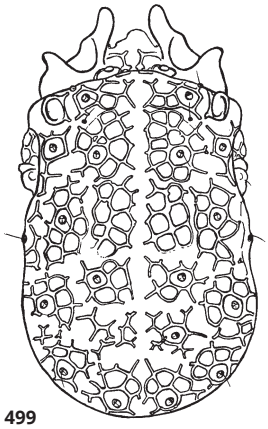
Family Thermacaridae Sokolow, 1927

1927 Thermacaridae Sokolow, Zoologischer Anzeiger 73: 20.

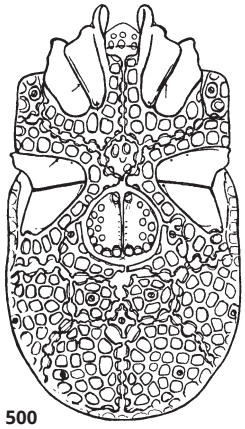
DIAGNOSIS: Lateral eyes in capsules, a median eye present. Dorsal and ventral shields present. Integument finely reticulated, sclerites with pores. A well-developed camerostome present. Glandularia absent, only associated setae present. Postocularia located slightly posterolateral to the median eye (Fig. 506). Gnathosoma relatively long with a more or less pointed rostrum (Fig. 507). Coxae close to each other and fused into a ventral shield (Fig. 44). Genital field with numerous acetabula, lying on the posterior part of the genital flaps. Moreover, two rows of acetabula lying in the membranous area lying lateral to the gonopore (Fig. 509). Genital field located posterior to Cx-IV in the male but between Cx-III/IV in the female. Females with an ovipositor (Fig. 510). Palp not chelate, P2 anteromedially with two heavy, curved, bi- or trifurcate setae (Fig. 508). I-III-legs with five segments, IV-leg with six segments. Fourth leg with a slight to extensive sexual dimorphism in males (Fig. 511). Leg claws of legs I-III with a comb, claw of fourth leg of female with a comb, claw of fourth leg of male simple. Monotypic.



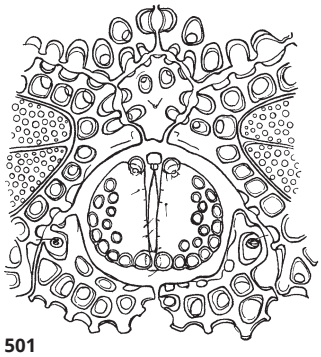
498



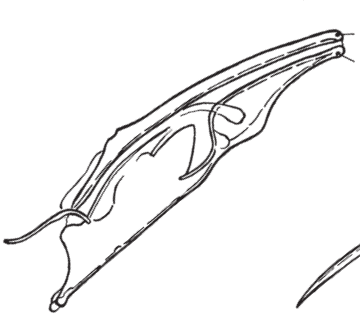
499



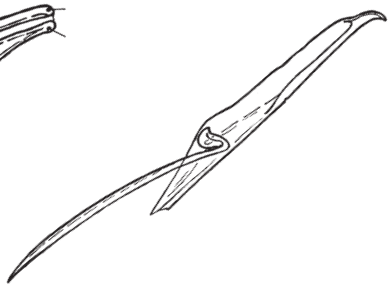
500



501



502



503

498 *Teratothyasides* (*Hansvietsia*) *undulatus* Cook, combination of dorsum and venter female (after Cook 1974)

499 *Teratothyasides* (*Rhynchohansvietsia*) *congoensis* K.O. Viets & Böttger, dorsum teneral male (after K.O. Viets & Böttger 1974a)

500 *Teratothyasides* (*Rhynchohansvietsia*) *congoensis* K.O. Viets & Böttger, venter male (after K.O. Viets & Böttger 1974a)

501 *Teratothyasides* (*Rhynchohansvietsia*) *congoensis* K.O. Viets & Böttger, genital field female (after K.O. Viets & Böttger 1974a)

502 *Teratothyasides* (*Rhynchohansvietsia*) *congoensis* K.O. Viets & Böttger, gnathosoma female (after K.O. Viets & Böttger 1974a)

503 *Teratothyasides* (*Rhynchohansvietsia*) *congoensis* K.O. Viets & Böttger, chelicera female (after K.O. Viets & Böttger 1974a)

Genus *Thermacarus* Sokolow, 1927

(Figs. 44, 506-511)

1927 *Thermacarus* Sokolow, Zoologischer Anzeiger 73: 11.
Type species: *Thermacarus thermobius* Sokolow, 1927

DIAGNOSIS: As for the family.

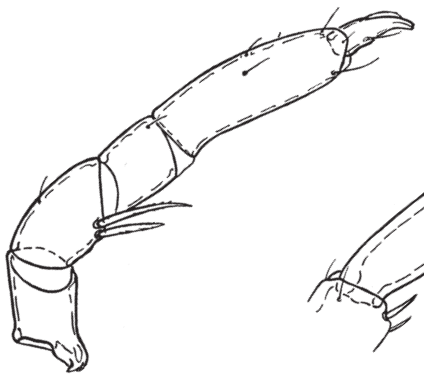
HABITAT: Thermal springs.

DISTRIBUTION: Several species known from Siberia, North (Mitchell 1963) and South America (Chile, Schwoerbel 1987; Bolivia, Martin & Schwoerbel 2002) and Kashmir.

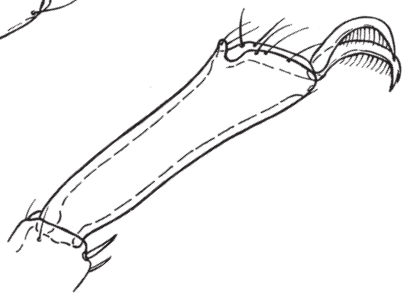
Family Zelandothyadidae Cook, 1983

1983 Zelandothyadinae Cook, Contributions of the American Entomological Institute 21: 2.

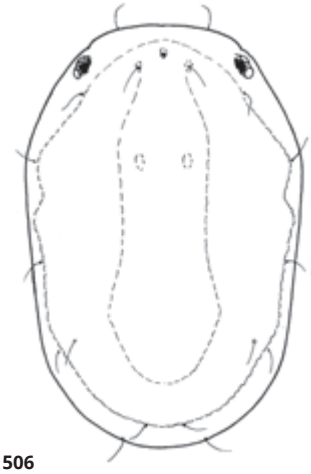
2008 Malgasacaridae Tuzovskij, Gerecke & Goldschmidt, Zoosystematica rossica 16: 163 – Gerecke et al. (2017).



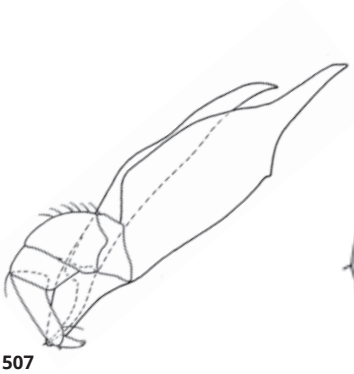
504



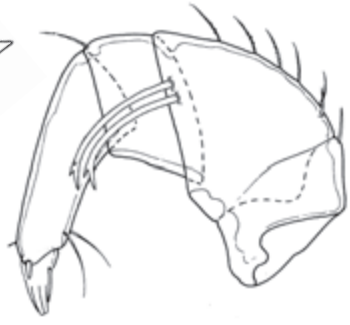
505



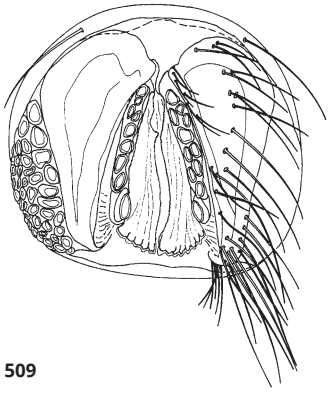
506



507



508



509

504 *Teratothyasides* (*Rhynchohansvietsia*) *congoensis* K.O. Viets & Böttger, palp female (after K.O. Viets & Böttger 1974a)

505 *Teratothyasides* (*Rhynchohansvietsia*) *congoensis* K.O. Viets & Böttger, IV-leg-6 male (after K.O. Viets & Böttger 1974a)

506 *Thermacarus nevadensis* Marshall, dorsum male (after Cook 1974)

507 *Thermacarus nevadensis* Marshall, gnathosoma + palp male (after Cook 1974)

508 *Thermacarus nevadensis* Marshall, palp male (after Cook 1974)

509 *Thermacarus andinus* Martin & Schwoerbel, genital field male (after Martin & Schwoerbel 2002)

DIAGNOSIS: Lateral eyes may or may not in capsules. Integument either with small plates made up of trabecular structures or with dorsal and ventral shields. Genital field with movable flaps covering the acetabula, the latter may be stalked. Gnathosoma attached to a protrusable tube. Mouth opening surrounded by a membranous fringe. Leg claws simple or with a comb.

KEY TO THE SUBFAMILIES

1 Idiosoma with isolated plates not fused to dorsal and ventral shields (Fig. 512), cheliceral claws long, stylet-like (Fig. 513), palp not very stocky (Fig. 514) Subfamily Zelandothyadinae

- Dorsal and ventral shields present (Fig. 515, cheliceral claws shorter, palp very stocky (Fig. 516) Subfamily Australiothyadinae

Subfamily Australiothyadinae Cook, 1986

1986 Australiothyadinae Cook, Memoirs of the American Entomological Institute 40: 12 – Harvey (1998a).

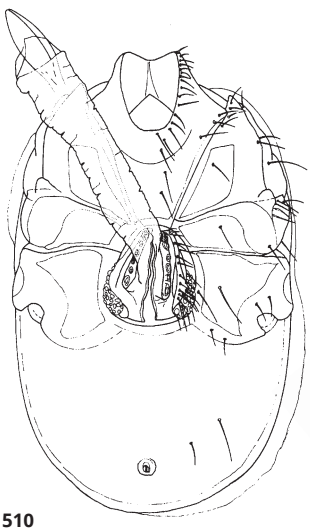
DIAGNOSIS: Lateral eyes not in capsules. Idiosoma with well-developed dorsal and ventral shields. Dorsal shield with the postocularia and four pairs of glandularia (Fig. 515, 527). Gnathosoma elongate, attached to a protrusable tube (Fig. 531). Mouth opening subterminal surrounded by a membranous ring. Coxae lying close to each other and incorporated in the ventral shield (Figs. 528, 529). Genital field with three pairs of acetabula (Figs. 530, 531). Palp segment very short, with P3 and P4 partly fused (Fig. 516). Dorsodistal part of P4 with two heavy setae. Monotypic.

Genus *Australiothyas* Cook, 1986

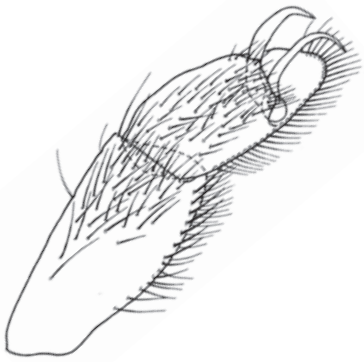
(Figs. 515, 516, 527-532)

1986 *Australiothyas* Cook, Memoirs of the American Entomological Institute 40: 12.

Type species: *Australiothyas swaini* Cook, 1986



510



511



512

510 *Thermacarus andinus* Martin & Schwoerbel, venter female (after Martin & Schwoerbel 2002)

511 *Thermacarus nevadensis* Marshall, IV-leg-5-6 male (after Cook 1974)

512 *Zelandothyas diamphida*, dorsum female (after Cook 1983)

DIAGNOSIS: As for subfamily.

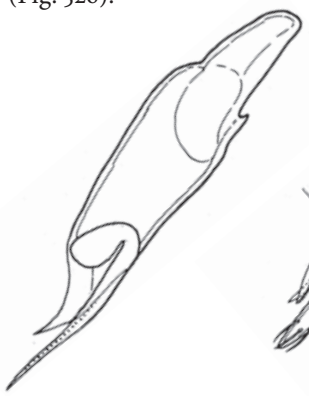
HABITAT: Interstitial habitats.

DISTRIBUTION: One species known from Tasmania.

Subfamily Zelandothyadinae Cook, 1983

1983 Zelandothyadinae Cook, Contributions of the American Entomological Institute 21: 2.

DIAGNOSIS: Lateral eyes on sclerotized trabecular bars (Figs. 517, 512). Membranous integument with papillae appearing stellate in apical view. Dorsum with a frontal plate including postocularia. Anterior part of this plate may be detached to form a separate, inverse Y-shaped sclerite. Median eye unpigmented, lying on a sclerite between the postocularia or reduced. Cx-II separated from Cx-III (Figs. 518, 522). Genital field with three to possibly many pairs of acetabula, round to oval, slightly stalked (Fig. 524). Gnathosoma attached to a protrusable tube. Basal cheliceral segments fused medially, cheliceral claws long and slender (Fig. 513). Palp neither chelate nor uncate, P4 with two heavy dorsodistal setae, P5 slender (Fig. 514). Legs without swimming setae, but with numerous hair-like setae. Leg claws with two combs, the antiaxial row shorter than the paraxial row (Fig. 526).



513



514



515



516



517



518

513 *Zelandothyas diamphida*, chelicera female (after Cook 1983)

514 *Zelandothyas diamphida*, palp female (after Cook 1983)

515 *Australiothyas swaini* Cook, dorsum male (after Cook 1986)

516 *Australiothyas swaini* Cook, palp male (after Cook 1986)

517 *Malgasacarus rarus* Tuzovskij & Gerecke, dorsum deutonymph (after Gerecke et al. 2017)

518 *Malgasacarus rarus* Tuzovskij & Gerecke, venter deutonymph (after Gerecke et al. 2017)

KEY TO THE GENERA

NB. The genus *Malgasacarus* is known in the deutonymphal stage only.

1 Frontal plate wider than long, consisting of two transverse bars, connected by three rings (Fig. 517) Genus *Malgasacarus*

- Frontal plate longer than wide, large-meshed (Fig. 512) Genus *Zelandothyas*

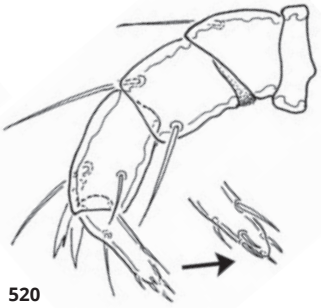
Genus *Malgasacarus* Tuzovskij, Gerecke & Goldschmidt, 2008

(Figs. 517-521)

2008 *Malgasacarus* Tuzovskij, Gerecke & Goldschmidt, Zoosystematica rossica 16: 164.
Type species: *Malgasacarus rarus* Tuzovskij, Gerecke & Goldschmidt, 2008



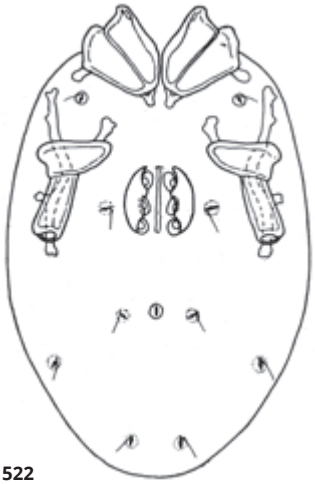
519



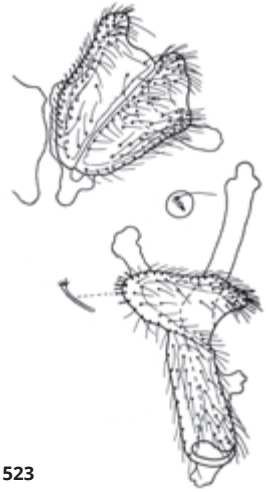
520



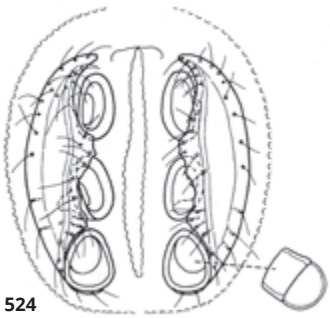
521



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524

519 *Malgasacarus rarus* Tuzovskij & Gerecke, gnathosoma + palp deutonymph (after Gerecke et al. 2017)

520 *Malgasacarus rarus* Tuzovskij & Gerecke, palp deutonymph (after Gerecke et al. 2017)

521 *Malgasacarus rarus* Tuzovskij & Gerecke, claw of third leg deutonymph (after Gerecke et al. 2017)

522 *Zelandothyas diamphida* Cook, venter female (after Cook 1983)

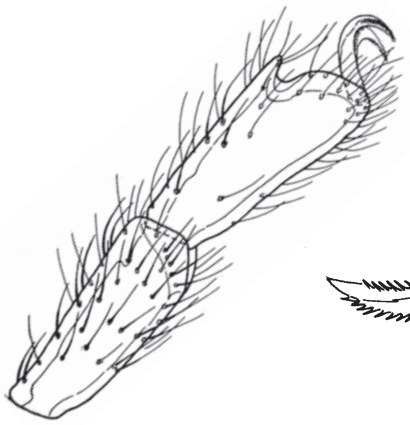
523 *Zelandothyas diamphida* Cook, right coxae female (part.) (after Cook 1983)

524 *Zelandothyas diamphida* Cook, genital field female (after Cook 1983)

DIAGNOSIS: Only known in the deutonymphal stage. Dorsum with four pairs of rod-shaped lateral platelets and three unpaired medial platelets (Fig. 517), the latter consisting of an inverse Y-shaped frontal plate consisting of two transverse bars connected by three short longitudinal bars, the median eye and the postocularia, a transverse anterodorsal plate and a rod-shaped longitudinal plate. All glandularia lying free in the soft integument not associated with platelets. Provisional genital field with three pairs of short-stalked acetabula and a pair of sclerites each with four setae (Fig. 518). P4 stocky, P5 elongate and narrow (Fig. 520).

HABITAT: Springs and streams.

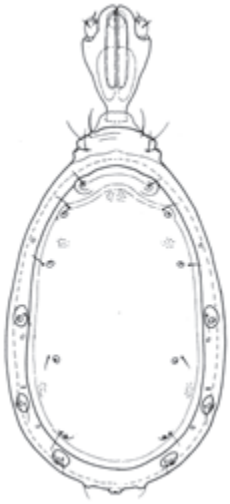
DISTRIBUTION: Known from one species collected in Madagascar.



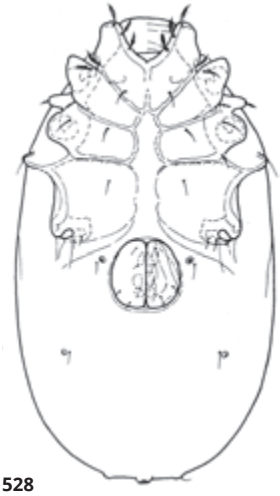
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526



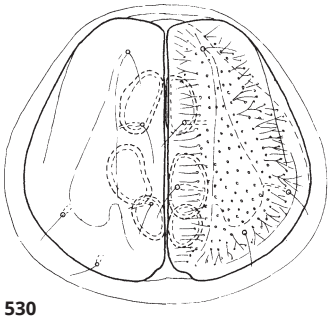
527



528



529



530

525 *Zelandothyas diamphida* Cook, I-leg-5-6 female (after Cook 1983)

526 *Zelandothyas diamphida* Cook, claws female (after Cook 1983)

527 *Australiothyas swaini* Cook, dorsum female (after Cook 1986)

528 *Australiothyas swaini* Cook, venter male (after Cook 1986)

529 *Australiothyas swaini* Cook, venter female (after Cook 1986)

530 *Australiothyas swaini* Cook, genital field male (after Cook 1986)

Genus *Zelandothyas* Cook, 1983

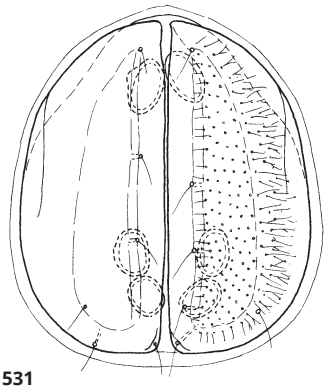
(Figs. 14, 15, 512-514, 522-526)

1983 *Zelandothyas* Cook, Contributions of the American Entomological Institute 21: 2.
Type species: *Zelandothyas diamphida* Cook, 1983

DIAGNOSIS: Frontal plate reticulate, large-meshed including the postocularia and the median eye (Fig. 14). Occasionally frontal plate completely lacking, especially in juvenile specimens. Acetabula slightly stalked (Fig. 524).

HABITAT: Streams, interstitial habitats.

DISTRIBUTION: Three species known from New Zealand (Smit 1996a, Gerecke et al. 2017).



531



532

531 *Australothyas swaini* Cook, genital field female (after Cook 1986)

532 *Australiothyas swaini* Cook, gnathosoma + palp female (after Cook 1986)

SUPERFAMILY LEBERTIOIDEA THOR, 1900

1900 Lebertiidae Thor, Nyt Magazin for Naturvidenskaberne 38 (3): 2.

DIAGNOSIS: Lateral eyes lateral in position, not on a common eye plate. Genital field with the acetabula in two parallel rows (with some rare exceptions). Genital flaps well developed, in closed position covering the gonopore and the acetabula. Palp neither chelate nor subchelate. Chelicera two-segmented.

Family Acucapitidae Wiles, 1996

1996 Acucapitidae Wiles, Quekett Journal of Microscopy 37: 692.

DIAGNOSIS: Lateral eyes in weakly developed capsules. Idiosoma soft, with a well-developed ventral shield formed by the fused coxae. Cx-I-III narrow, Cx-IV large and wide. A median suture line present from genital field to gnathosomal bay. Suture line Cx-I/II complete, all other suture lines incomplete. Cxgl-4 apically on Cx-I, the latter terminating in long membranous extensions (Fig. 34). Genital flaps completely covering the three pairs of acetabula. Palp five-segmented, P3 extremely long, P5 reduced (Fig. 35). Gnathosoma long and slender ending in a long rostrum (Fig. 534). Legs with swimming setae, claws well developed (Fig. 535). No sexual dimorphism. Monotypic.

Genus *Acucapito* Wiles, 1996

(Figs. 34, 35, 533-535)

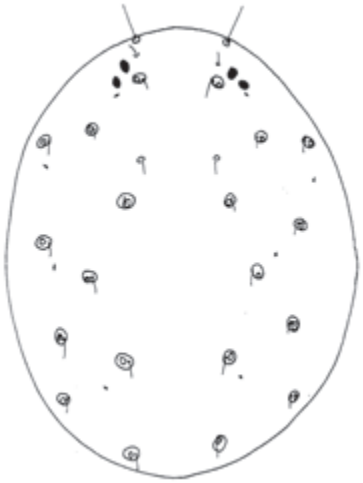
1996 *Acucapito* Wiles, Quekett Journal of Microscopy 37: 692.

Type species: *Acucapito naso* Wiles, 1996

DIAGNOSIS: As for family.

HABITAT: Streams.

DISTRIBUTION: Two species known, one from Borneo and one from Vietnam (Tuzovskij 2009).



533



534



535

533 *Acucapito naso* Wiles, dorsum adult (after Wiles 1996)

534 *Acucapito naso* Wiles, gnathosoma adult (after Wiles 1996)

535 *Acucapito naso* Wiles, fourth leg adult (swimming setae not illustrated) (after Wiles 1996)

Family Anisitsiellidae Koenike, 1910

1910 Anisitsiellidae Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 128.

1914 Mamersopsidae K. Viets, Zoologischer Anzeiger 53: 481.

1913 Drammeniinae Thor, Zoologischer Anzeiger 43: 47.

1914 Mamersopsinae K. Viets, Zoologischer Anzeiger 53: 481 – Cook (1974)

1954 Psammotorrenticolinae E. Angelier, Vie et Milieu 4: 520 – Cook (1974).

2004 Bandakiinae Panesar, Bonner zoologische Monographien 52: 51 – Gerecke et al. (2016).

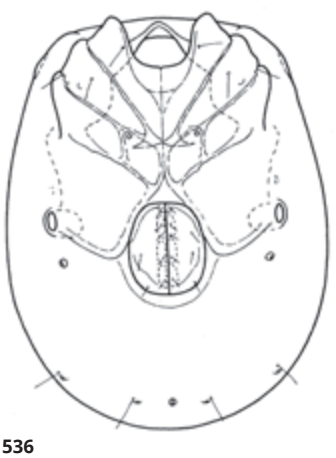
2004 Bharatoniinae Panesar, Bonner zoologische Monographien 52: 68 – Gerecke et al. (2016).

DIAGNOSIS: Lateral eyes free in or below the integument, rarely on elongated platelets (which may be fused to neighbouring plates), in capsules or reduced. Integument completely soft to completely sclerotized with dorsal and ventral shields. Coxae in four groups or fused to various degrees, occasionally integrated into a complete ventral shield. Genital field with movable flaps that may cover the gonopore completely, generally with three but in some taxa up to 20 pairs of acetabula. Palp five-segmented, P2 typically with a ventral seta. Swimming setae may be present. Fourth legs usually without claws, but claws on fourth leg present in a number of genera.

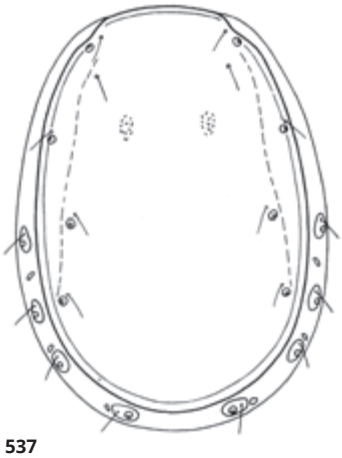
REMARKS: Bader & Sepasgozarian (1979) and Bader (1985) proposed to elevate the two subfamilies Anisitsiellinae and Nilotoniinae to family rank. Here the classification of Cook (1974) is followed, who considered these two taxa subfamilies of the Anisitsiellidae.

KEY TO THE SUBFAMILIES

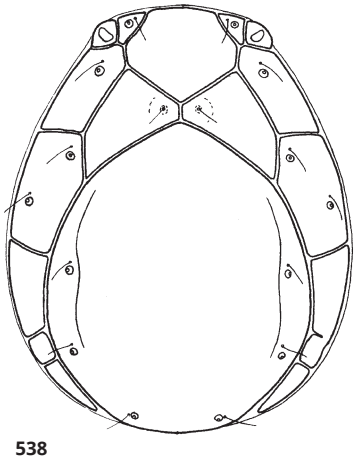
1 A well-developed ventral shield present, never divided into a larger anterior plate and a smaller, somewhat semi-circular plate posterior to the genital field (Fig. 536); dorsum with one large plate (Fig. 537) or several smaller plates occupying most of the area (Fig. 538)
Subfamily Anisitsiellinae



536



537



538

536 *Bandakia phreatica* Cook, venter male (after Cook 1974)

537 *Bandakia phreatica* Cook, dorsum male (after Cook 1974)

538 *Mamersopsis viridis* K. Viets, dorsum female (after Cook 1974)

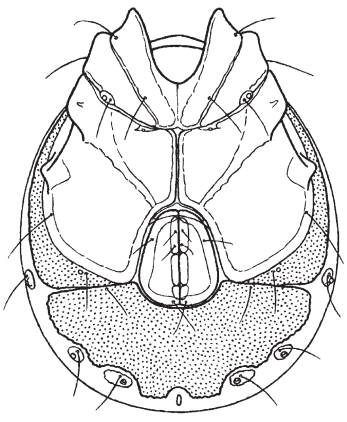
- Usually soft bodied but occasionally with extensive sclerotization (Fig. 539); heavily sclerotized species have a semi-circular, separate sclerite posterior to the genital field, or the third pair of acetabula very elongated and lying at right angle to the other two pairs (Fig. 540), or dorsum with small sclerites only (Fig. 541) Subfamily Nilotoniinae

Subfamily Anisitsiellinae Koenike, 1910

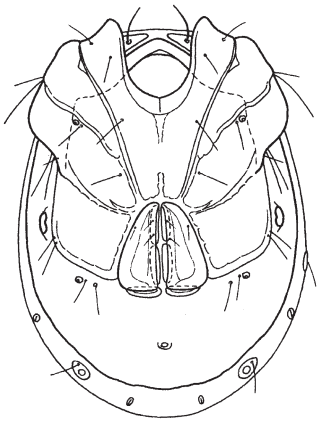
DIAGNOSIS: Well-developed dorsal and ventral shields present, usually with a single dorsal shield, but occasionally with two or more closely fitting plates. Dorsal furrow typically narrow, more extensive in genera grading towards the Nilotoniinae.

KEY TO THE GENERA

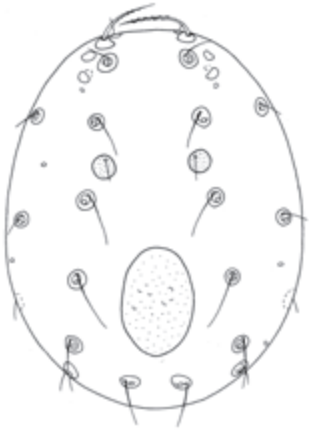
1 Fourth legs with normally developed claws (Fig. 542) 2
- Fourth leg without claws (Fig. 543) or claws very much reduced 5
2 Dorsum with a large posteromedial plate and a smaller anteromedial plate (Fig. 544) Genus *Shivatonia*
- Dorsal shield entire (Fig. 541) 3
3 Without a suture line across Cx-III; suture line Cx-III/IV incomplete, not reaching midline (Fig. 545) Genus *Sigthoriella*
- A suture line on each side extending across Cx-III immediately lateral to Cxgl-4; suture line Cx-III/IV complete, reaching midline (Fig. 536) 4
4 Cx-IV not extending posterior to genital field; insertions of fourth legs more or less opposite genital field (Fig. 536) Genus *Bandakia*
- Cx-IV extending well posterior to genital field; insertions of fourth legs located well anterior to genital field (Fig. 546) Genus *Utaxatax*



539



540



541

539 *Nilotonia* (*Nilotonia*) *testudinata* Cook, venter male (after Cook 1974)

540 *Bharatonia vietsi* Cook, venter male (after Cook 1974)

541 *Nilotonia* (*Dartonia*) *caerulea* (K. Viets), dorsum male (after Cook 1974)

5(1) Genital field with more than ten acetabula; a large gland present near middle of Cx-IV (Fig. 547) Genus *Sigthoria*

- Genital field with less than ten acetabula; without a gland near middle of Cx-IV 6

6 Dorsal shield divided into an anteromedial plate and a large posteromedial plate, flanked by smaller platelets (Fig. 548) 7

- Dorsum various, but not described as above 8

7 Gnathosoma attached to a protrusable tube; a well-developed camerostome present and extending far forward (Fig. 548) Genus *Psammotorrenticola*

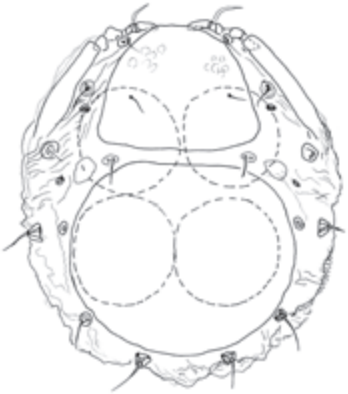
- Gnathosoma not attached to a protrusable tube; a gnathosomal bay present (Fig. 549) Genus *Stygomamersopsis*



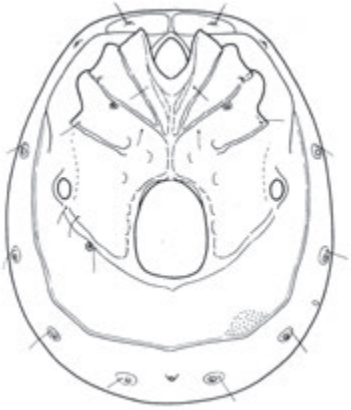
542



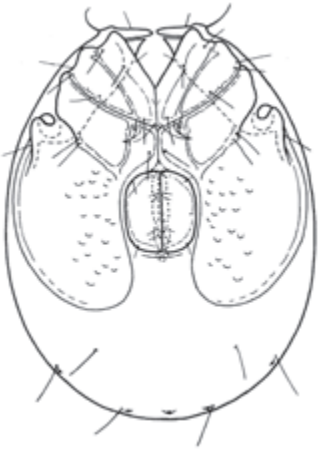
543



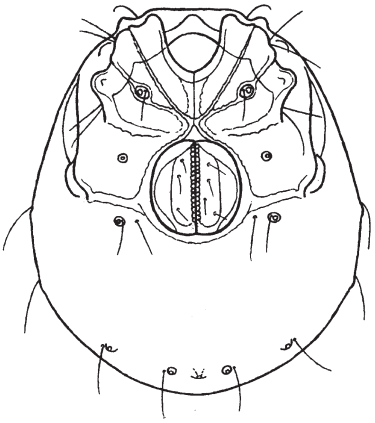
544



545



546



547

542 *Sigthoriella hygropetrica* Besch, IV-leg-6 female (?) (after Cook 1974)

543 *Nilgiriopsis imamurai* Cook, IV-leg-5-6 male (after Cook 1974)

544 *Shivatonia acetabulensis* Panesar, dorsum female (after Panesar 2004)

545 *Sigthoriella hygropetrica* Besch, venter female (?) (after Cook 1974)

546 *Utaxatax ovalis* Cook, venter male (after Cook 1974)

547 *Sigthoria nilotica* (Nordenskiöld), venter female (after Cook 1974)

8(6) Dorsum with several medium sized platelets anterior and lateral to largest plate (Fig. 538) 9

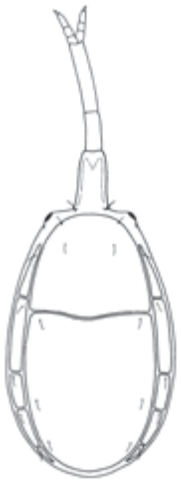
- Dorsum with a single dorsal plate flanked by very small glandularia platelets or with large anterior and posterior plates (Fig. 550) 10

9 An unpaired median platelet present at anterior end of dorsum (Fig. 538) Genus *Mamersopsis*

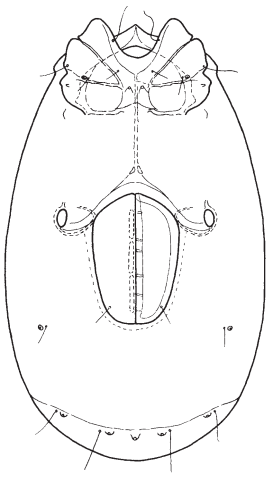
- All platelets at anterior end of dorsum paired (Fig. 551) Genus *Hydrobaumia*

10(8) Cx-IV without recognizable posterior margin (Fig. 550) Genus *Anisitsiellides*

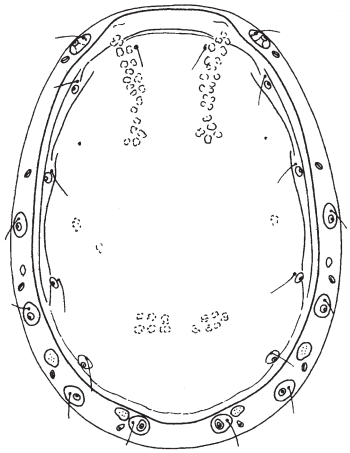
- Cx-IV with a distinct posterior margin (Fig. 553) 11



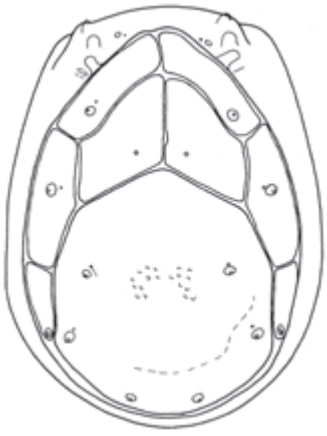
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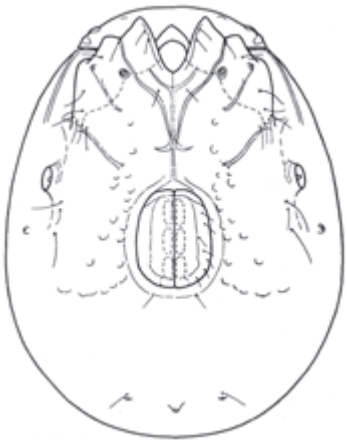
549



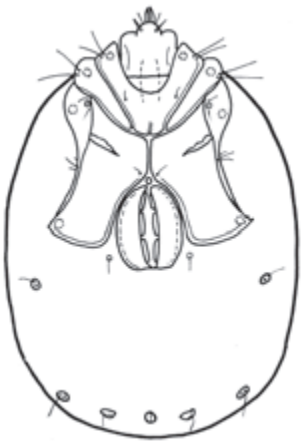
550



551



552



553

548 *Psammotorrenticola gracilis* Angelier, dorsum adult (after Cook 1974)

549 *Stygomamersopsis viedmai* Cook, venter female (after Cook 1974)

550 *Anisitsiellides lundbladi Cook* dorsum male (after Cook 1980)

551 *Hydrobaumia malacensis* Halík, dorsum male (after Cook 1974)

552 *Anisitsiellides monticolus* Lundblad, venter female (after Cook 1974)

553 *Mahemamersides boveyi* Bader, venter male (after Bader 1985)

11 Cx-III with extended lateral sclerotization connecting the insertions of III-L and IV-L; Cx-IV with very characteristic concave lateral margins (Fig. 553) Genus *Mahemamersides*

\- Cx-III without lateral sclerotization, shape of Cx-IV different (Fig. 554) 12

12 Cx-IV posteromedial suture sharp-pointed and enclosing genital field (Fig. 554) 13

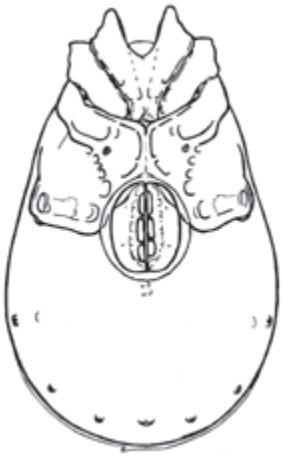
\- Cx-IV posteromedial suture rounded or bluntly-pointed (Fig. 555) 14

13 P4 expanded distally, tip of P5 with two widely-separated claws (Fig. 556) Genus *Rutacarus*

\- P4 narrowing distally, P5 with only slightly separated claws (Fig. 557) Genus *Mamersopsides*



554



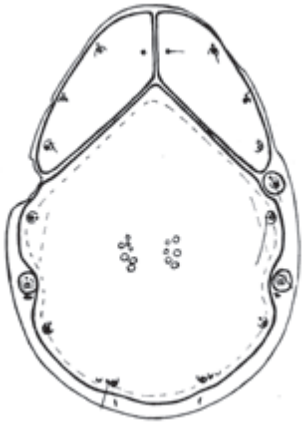
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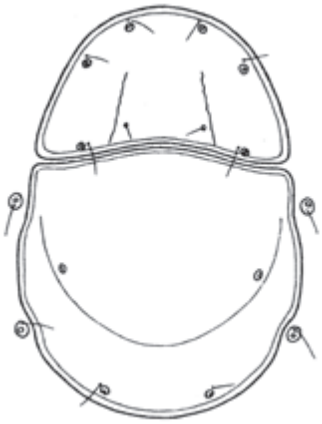
556



557



558



559

554 *Rutacarus* (*Rutacarus*) *pyriformis* Lundblad, venter male (after Cook 1974)

555 *Gilatonia triscutata* K.O. Viets & Böttger, venter male (after K.O. Viets & Böttger 1974a)

556 *Rutacarus* (*Rutacarus*) *pyriformis* Lundblad, palp male (after Cook 1974)

557 *Mamersopsides vietsi* Cook, palp female (after Cook 1974)

558 *Gilatonia triscutata* K.O. Viets & Böttger, dorsum male (after K.O. Viets & Böttger 1974a)

559 *Anisitsidartia micropalpis* Cook, dorsum female (after Cook 1974)

14(12)	Dorsal shield variously subdivided (Fig. 558)	15
-	Dorsal shield entire	18
15	Dorsum with paired anterior and unpaired posterior plates (Fig. 558)	Genus *Gilatonia*
-	All dorsal plates unpaired (Fig. 559)	16
16	Lateral margins of Cx-IV indistinct (Fig. 560); palp slender (Fig. 561)	Genus *Bitabulata*
-	Lateral margins of Cx-IV distinct (Fig. 562), palp stocky (Fig. 563)	17
17	Anterior dorsal plate tapering anteriorly (Fig. 564), Cx-IV closely flanking the genital field (Fig. 565)	Genus *Paddelia*
-	Anterior dorsal plate equally rounded anteriorly (Fig. 559); Cx-IV not closely flanking the genital field (Fig. 562)	Genus *Anisitsidartia*


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564



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560 *Bitabulata kelycoxae* Goldschmidt, venter female (after Goldschmidt 2008) Reproduced with permission from copyright holder

561 *Bitabulata kelycoxae* Goldschmidt, palp female (after Goldschmidt 2008) Reproduced with permission from copyright holder

562 *Anisitsidartia micropalpis* Cook, venter female (after Cook 1974)

563 *Anisitsidartia micropalpis* Cook, palp female (after Cook 1974)

564 *Paddelia eichhorniae* Panesar, dorsum adult (after Panesar 2004)

565 *Paddelia eichhorniae* Panesar, venter adult (after Panesar 2004)

18(14) Suture line Cx-III/IV complete, extending to genital field (Fig. 566) 19

- Suture line Cx-III/IV incomplete, not extending to genital field (Fig. 567) 21

19 Cx-III with rounded lateral projections near insertions of fourth legs; insertions of fourth legs located far forward, nearly in line with insertions of third legs (Fig. 566) Genus *Navamamersides*

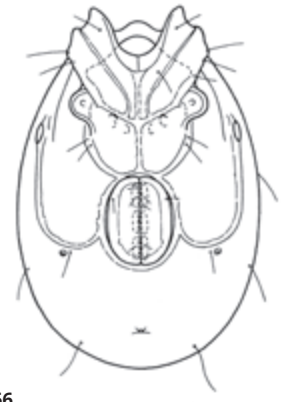
- Cx-III without rounded lateral projections; insertions of fourth legs well posterior of insertions of third legs (Fig. 568) 20

20 P2 with a large ventral comb without a ventral seta, P3 with a small ventrodistal comb (Fig. 569) Genus *Fuenticola*

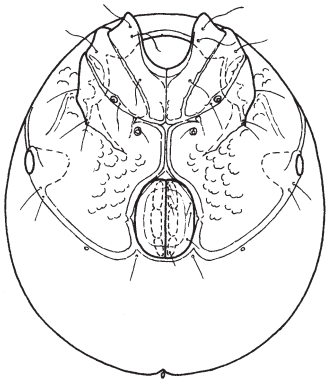
- P2 and P3 without a comb, P2 with a large ventral seta (Fig. 570) Genus *Platymamersopsis*

21(18) Cx-IV embracing a deep genital bay, closely appressed to the genital field (Fig. 567) 22

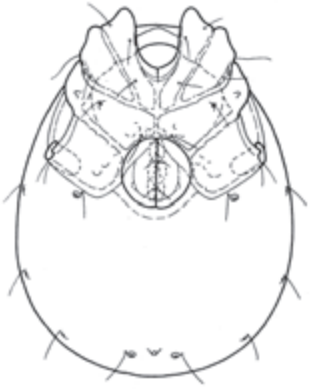
- Cx-IV flanking a relatively shallow genital bay, not closely appressed to the genital field (Fig. 571) 23



566



567



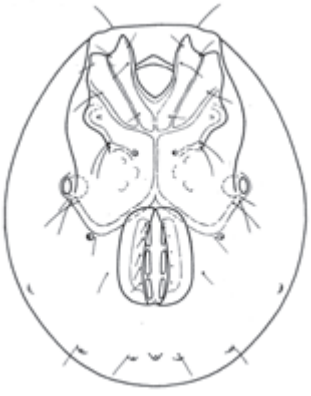
568



569



570



571

566 *Navamamersides karekari* Cook, venter female (after Cook 1974)

567 *Mamersella* (*Mamersella*) *maryellenae* Cook, venter male (after Cook 1974)

568 *Platymamersopsis mysorensis* Cook, venter male (after Cook 1974)

569 *Fuenticola sancheziana* Goldschmidt, palp male (after Goldschmidt 2004d)

570 *Platymamersopsis mysorensis* Cook, palp male (after Cook 1974)

571 *Mamersides saranganensis* K. Viets, venter female (after Cook 1974)

22 Tips of Cx-I blunt (Fig. 567); dorsal shield surrounded by numerous small glandularia platelets (Fig. 572) Genus *Mamersella*

- Tips of Cx-I pointed (Fig. 573); dorsal shield not surrounded by numerous small glandularia platelets (Fig. 574) Genus *Nilgiriopsis*

23(21) Dorsal shield with one pair of glandularia (Fig. 575); P4 distally together with P5 spoon-shaped (Fig. 576) Genus *Sotropalpus*

- Dorsal shield with more than one pair of glandularia (Fig. 577); palp of normal shape 24

24 With a well-defined ridge extending anteriorly from insertions of fourth legs (Fig. 571) Genus *Mamersides*

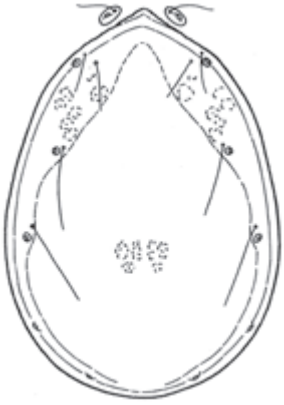
- Without a well-defined ridge extending anteriorly from insertions of fourth legs (Fig. 578) Genus *Anisitsiella*



572



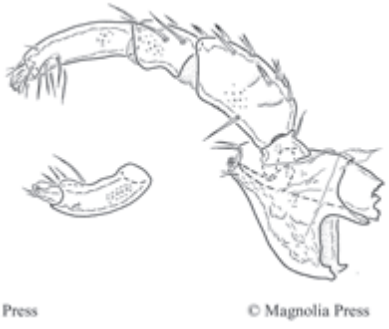
573



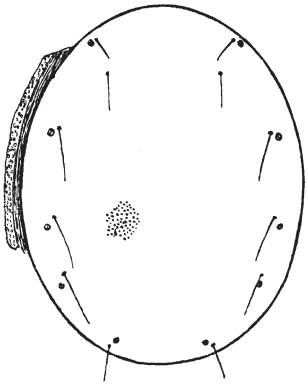
574



575



576



577

572 *Mamersella* (*Mamersella*) *maryellenae* Cook, dorsum male (after Cook 1974)

573 *Nilgiriopsis imamurai* Cook, venter male (after Cook 1974)

574 *Nilgiriopsis imamurai* Cook, dorsum male (after Cook 1974)

575 *Sotropalpus manga* Goldschmidt, dorsum male (after Goldschmidt 2008) Reproduced with permission from copyright holder

576 *Sotropalpus manga* Goldschmidt, gnathosoma + palp, below P4+5 male (after Goldschmidt 2008) Reproduced with permission from copyright holder

577 *Mamersides saranganensis* K. Viets, dorsum female (after K. Viets 1935)

Genus *Anisitsidartia* Cook, 1966

(Figs. 559, 562, 563, 579)

1966 *Anisitsidartia* Cook, Memoirs of the American Entomological Institute 6: 35.

Type species: *Anisitsidartia micropalpis* Cook, 1966

DIAGNOSIS: Lateral eyes lying below the integument between dorsal and ventral shields. Dorsal shield divided into an anterior plate with three pairs of glandularia and the postocularia, and a much larger posterior plate with two pairs of glandularia (Fig. 559). All coxae lying close to each other, incorporated in the ventral shield; suture lines of Cx-III/IV incomplete (Fig. 562). Cx-IV forming a triangular genital bay, not closely flanking the genital field. Glandularia of Cx-III either poorly developed or absent. Genital field with three pairs of acetabula. Palp very small, stocky, without ventral setae (Fig. 563). Legs without swimming setae, claws of legs-I-III without clawlet; IV-leg-6 without claws (Fig. 579).

HABITAT: Streams.

DISTRIBUTION: One species known from Liberia.

Genus *Anisitsiella* Daday, 1905

(Figs. 578, 580-582)

1905 *Anisitsiella* Daday, Mathematikai és Természettudományi Értesítö 23: 339.

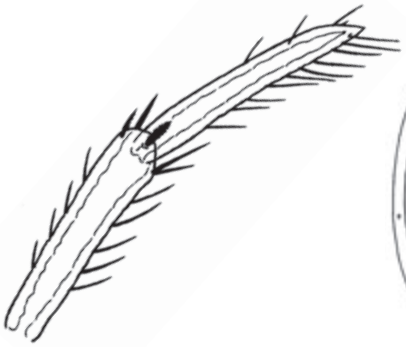
1937 *Mamersellides* Lundblad, Zoologischer Anzeiger 120: 282 – Panesar (2004).

Type species: *Anisitsiella aculeata* Daday, 1905

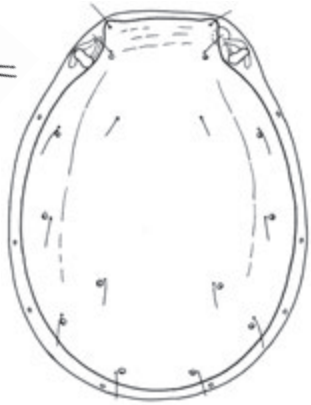
DIAGNOSIS: Lateral eyes lying in the dorsal furrow. Dorsal and ventral shields present. Dorsum with a complete dorsal plate with 6-8 pairs of glandularia and the postocularia (Fig. 580). First coxae not extending to frontal idiosoma margin. Suture line Cx-III/IV and lateral margin of Cx-IV incomplete, Cx-IV posteriorly rounded, not closely flanking the genital field. Lateral to genital field an area of articular membrane, genital field with three pairs of acetabula (Figs. 578, 581). P2 with a ventral seta, P4 ventrodistally with small setal tubercles (Fig. 582). Third and fourth legs with swimming setae, IV-leg-6 without claw.



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578 *Anisitsiella aculeata* Daday venter male (after Cook 1974)

579 *Anisitsidartia micropalpis* Cook, IV-leg-5-6 female (after Cook 1974)

580 *Anisitsiella aculeata* Daday dorsum male (after Cook 1974)

HABITAT: Lakes, swamps and slow running streams.

DISTRIBUTION: One species known from South America (Argentina, Brazil, Columbia, Paraguay) and one species from Central America (Mexico, Costa Rica) and Florida (Cramer & I.M. Smith 1993).

Genus *Anisitsiellides* Lundblad, 1941

(Figs. 38, 550, 552, 583)

1941 *Anisitsiellides* Lundblad, Entomologisk Tidskrift 62: 114.

1986 *Australiotonia* Cook, Memoirs of the American Entomological Institute 40: 22 – Harvey (1990a).

Type species: *Anisitsiellides monticolus* Lundblad, 1941

DIAGNOSIS: Lateral eyes incorporated in an anterior platelet which is separated from the ventral shield. Dorsal and ventral shields present. Dorsal shield entire, with two or four pairs of glandularia (Fig. 550). Dorsal furrow relatively wide with small glandularia platelets. Tips of Cx-I either slightly extending or not reaching beyond anterior idiosoma margin or not reaching this. Suture line Cx-III/IV incomplete. Posterior suture lines of Cx-IV not visible in ventral sclerotization (Figs. 38, 552). Genital field with three pairs of glandularia. P2 with or without ventral seta, P4 with small or large (Fig. 583) setal tubercles. Legs with swimming setae, IV-leg-6 without claw.

HABITAT: Streams, interstitial.

DISTRIBUTION: Several species known from New Zealand (Cook 1983), Australia (Cook 1986, Harvey 1990a, Smit 2007a), Chile (Cook 1988) and Argentina (Cook 1980, Smit 2002c).

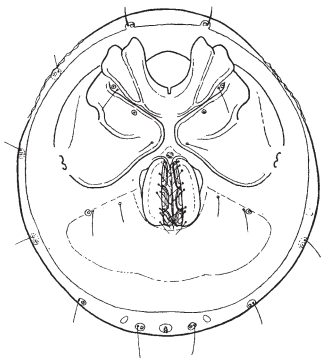
Genus *Bandakia* Thor, 1913

(Figs. 536, 537, 584-586)

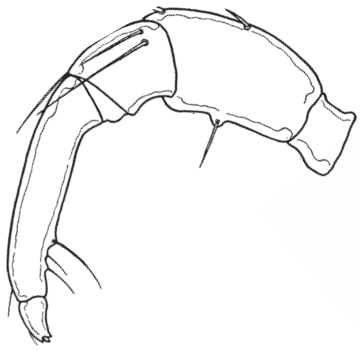
1913 *Bandakia* Thor, Zoologischer Anzeiger 43: 40.

1913 *Drammenia* Thor, Zoologischer Anzeiger 43: 43.

Type species: *Bandakia concreta* Thor, 1913



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581 *Anisitsiella aculeata* Daday venter female (after Lundblad 1941b)

582 *Anisitsiella aculeata* Daday palp female (after Lundblad 1941b)

583 *Anisitsiellides monticolus* Lundblad, palp female (after Cook 1974)

DIAGNOSIS: Lateral eyes rarely free in the integument, generally on sclerites which may be fused medially to each other or to anterior medial margin of ventral shield (Fig. 584). Dorsal and ventral shields present (Fig. 537). Cx-III with a gland laterally flanked by a suture line parallel to midline (Fig. 536). Genital field with three pairs of acetabula. Genital field extending beyond posterior suture line of Cx-IV. P2 with a ventral seta (Fig. 585). Legs stocky, without swimming setae; IV-leg-6 with a claw (Fig. 586).

HABITAT: Springs, streams, interstitial habitats.

DISTRIBUTION: Europe (Gerecke 1991a), North and Central America (Cramer & I.M. Smith 1991, Goldschmidt 2004d), India (Panesar 2004), SE-Asia (Wiles 1991).

Genus *Bitabulata* Goldschmidt, 2008

(Figs. 560, 561, 587-589)

2008 *Bitabulata* Goldschmidt, Zootaxa 1954: 76.

Type species: *Bitabulata kelycoxae* Goldschmidt, 2008

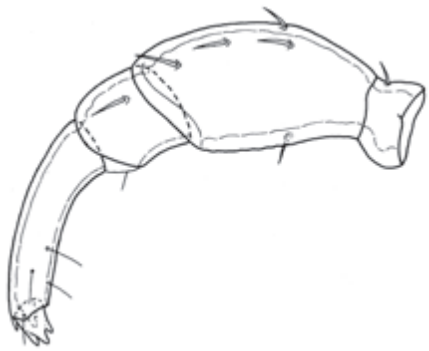
DIAGNOSIS: Lateral eyes lying under the integument. Dorsal and ventral shields present. Dorsal shield divided into a large posterior plate with two pairs of glandularia and a somewhat smaller anterior plate with only the postocularia (Fig. 587). Dorsal furrow wide, with all other dorsoglandularia and lateroglandularia on medium-sized platelets. Median suture line of Cx-I relatively long, suture line Cx-III/IV incomplete, lateral margins of Cx-IV not visible (Fig. 560). A short to long lateral ridge may be present extending anteriorly to insertions of fourth legs, or just only lateral to Cx-III. Genital bay tight. Genital field with three pairs of acetabula, extending posteriorly beyond posterior margin of Cx-IV. Gnathosoma relatively long or compact. Palp slender, especially P4; P2 with a medial seta, P4 with 2-4 ventral setae (Fig. 561). Legs without swimming setae, IV-leg-6 without claw (Fig. 589).

HABITAT: Springs and streams.

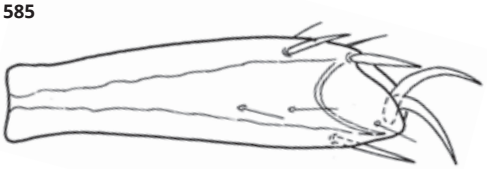
DISTRIBUTION: Three species known from Madagascar.



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584 *Bandakia anisitsipalpis* Cook, venter male (after Cook 1974)

585 *Bandakia longipalpis* Cook, palp female (after Cook 1974)

586 *Bandakia phreatica* Cook, IV-leg-6 male (after Cook 1974)

Genus *Fuenticola* Goldschmidt, 2004

(Figs. 569, 590-593)

2004 *Fuenticola* Goldschmidt, Senckenbergiana biologica 83: 118.

Type species: *Fuenticola sancheziana* Goldschmidt, 2004

DIAGNOSIS: Dorsum with a complete shield with five pairs of glandularia and the postocularia (Fig. 590). Coxae extending beyond frontal idiosoma margin; medial suture line of Cx-I very long. Suture line Cx-III/IV complete; posteromedial corners of Cx-IV bluntly pointed. Cx-IV reaching posterior margin of genital field (Fig. 591). Gnathosoma in lateral view almost rectangular (Fig. 592). Genital field with three pairs of acetabula. Palp stocky, P2 with a large ventral comb, P3 with a shorter ventrodistal comb (Fig. 569). Legs without swimming setae, IV-leg-6 with very short claws (Fig. 593).



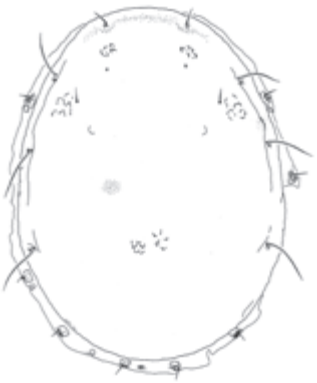
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587 *Bitabulata kelycoxae* Goldschmidt, dorsum female (after Goldschmidt 2008) Reproduced with permission from copyright holder

588 *Bitabulata kelycoxae* Goldschmidt, gnathosoma + palp female (after Goldschmidt 2008) Reproduced with permission from copyright holder

589 *Bitabulata kelycoxae* Goldschmidt, fourth leg female (after Goldschmidt 2008) Reproduced with permission from copyright holder

590 *Fuenticola sancheziana* Goldschmidt, dorsum male (after Goldschmidt 2004d)

591 *Fuenticola sancheziana* Goldschmidt, venter male (after Goldschmidt 2004d)

592 *Fuenticola sancheziana* Goldschmidt, gnathosoma + palp male (after Goldschmidt 2004d)

HABITAT: Rheocrene springs.

DISTRIBUTION: One species known from Costa Rica.

Genus *Gilatonia* K.O. Viets & Böttger, 1974

(Figs. 555, 558, 594)

1974 *Gilatonia* K.O. Viets & Böttger, Acarologia 16: 123.

Type species: *Gilatonia triscutata* K.O. Viets & Böttger, 1974

DIAGNOSIS: Dorsal shield consisting of paired anterior plates with three pairs of glandularia and the postocularia and an unpaired anteriorly pointed posterior plate with three pairs of glandularia (Fig. 558). First coxae extending beyond frontal idiosoma margin. Ventral shield with all coxae lying close to each other, suture line Cx-III/IV incomplete (Fig. 558). Palp stocky, P2 and P4 without ventral seta (Fig. 594). Legs without swimming setae, IV-leg-6 without claw.

HABITAT: Streams.

DISTRIBUTION: One species known from Congo.

Genus *Hydrobaumia* Halík, 1930

(Figs. 551, 595, 596)

1930 *Hydrobaumia* Halík, Zoologischer Anzeiger 89: 135.

Type species: *Hydrobaumia malacensis* Halík, 1930

DIAGNOSIS: Dorsal shield consisting of a posteromedial plate with three pairs of glandularia, three pairs of smaller lateral platelets each with one pair of glandularia and paired anteromedial plates with the postocularia (Fig. 551). Ventral shield with suture line Cx-III/IV incomplete, medially bowed anteriorly. Cx-IV rectangular or triangular, not closely flanking genital field (Fig. 595). Genital field with three pairs of acetabula, genital field extending beyond posterior margin of Cx-IV. P2 with a heavy ventral seta, setal tubercles of P4 small (Fig. 596). Legs with swimming setae, IV-leg-6 without claws.



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593 *Fuenticola sancheziana* Goldschmidt, fourth leg male (after Goldschmidt 2004d)

594 *Gilatonia triscutata* K.O. Viets & Böttger, palp male (after K.O. Viets & Böttger 1974a)

595 *Hydrobaumia purpurea* Smit, venter male (after Smit 2013b) Reproduced with permission from copyright holder

HABITAT: Slow running streams.

DISTRIBUTION: Two species known, one from Malaysia and one from New Guinea (Smit 2013b).

Genus *Mahemamersides* Bader, 1985

(Figs. 553, 597-600)

1985 *Mahemamersides* Bader, Mitteilungen der Schweizerischen entomologischen Gesellschaft 58: 15.

Type species: *Mahemamersides boveyi* Bader, 1985

DIAGNOSIS: Dorsal shield entire, with three pairs of glandularia and the postocularia; dorsal furrow narrow (Fig. 553). Ventral shield with suture line Cx-III/IV incomplete. Cx-III lateral margin nearly extending to posterolateral corner of Cx-IV, connecting the insertions of the third and fourth legs. Shape of Cx-IV very characteristic, with a pointed posterolateral corner, concave lateral margins and posteromedial corner rounded (Fig. 597). Cx-IV not closely flanking the genital field. Three pairs of acetabula present. P2 with a ventral seta (Fig. 599). Legs without swimming setae, IV-leg-6 without claw (Fig. 600).

HABITAT: Springs.

DISTRIBUTION: One species known from Mahé, Seychelles.

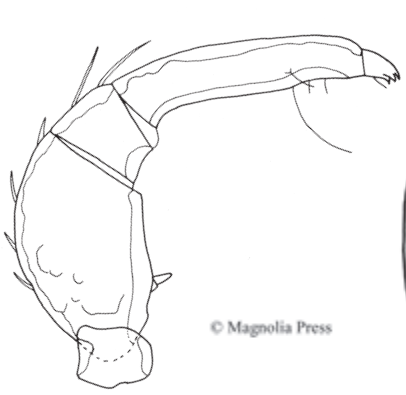
Genus *Mamersella* K. Viets, 1929

(Figs. 567, 572, 601-604)

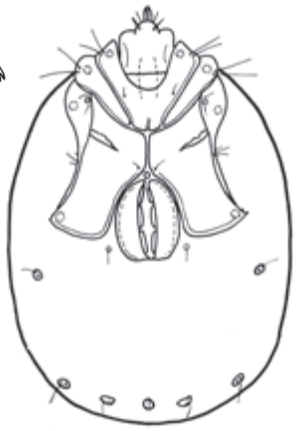
1929 *Mamersella* K. Viets, Zoologischer Anzeiger 80: 165.

Type species: *Mamersella thienemanni* K. Viets, 1929

DIAGNOSIS: Lateral eyes lying below integument, partially incorporated in ventral shield. Dorsal shield entire, with 3-5 pairs of glandularia (Fig. 572). Dorsal furrow relatively wide. Ventral shield with suture lines Cx-III/IV incomplete, posterior margin of Cx-IV rounded (Fig. 567). Genital field with three pairs of acetabula. Excretory pore free or incorporated in ventral shield. P2 with a ventral seta. Legs without swimming setae, IV-leg-6 without a claw.


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596 *Hydrobaumia purpurea* Smit, palp male (after Smit 2013b) Reproduced with permission from copyright holder

597 *Mahemamersides boveyi* Bader, venter male (after Bader 1985)

598 *Mahemamersides boveyi* Bader, gnathosoma + palp male (after Bader 1985)

REMARKS: The only species of the subgenus *Neomamersella* was transferred to the genus *Platymamersopsis* by Panesar (2004), but according to Goldschmidt (2008) this was not justified, and he retained the subgenus within the genus *Mamersella*.

KEY TO THE SUBGENERA

1 P4 with ventral setal tubercles, P5 closely appressed claws (Fig. 601) Subgenus *Mamersella*

- P4 without ventral setal tubercles; P5 with diverging claws Subgenus *Neomamersella*

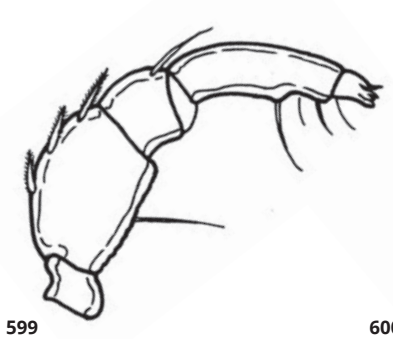
Subgenus *Mamersella* s.s.

(Figs. 567, 572, 601)

DIAGNOSIS: Glandularia of Cx-III somewhat medial, posterior to suture line Cx-II/III (Fig. 567). Setal tubercles of P4 moderately developed; claws of P5 closely appressed (Fig. 601).

HABITAT: Springs and seepage areas.

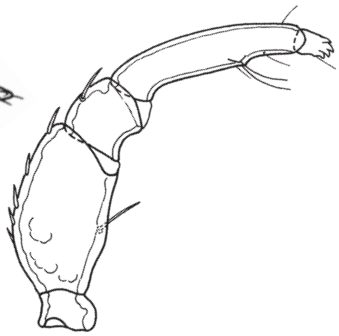
DISTRIBUTION: Several species known from India (Cook 1967), Indonesia, Australia (Harvey 1990a) and Mexico (Otero-Colina 1987). A species described from New Zealand belongs to the genus *Limnesia* (Panesar 2004).



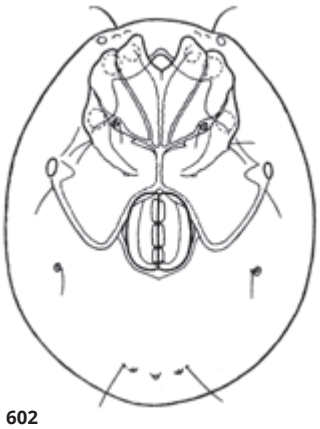
599



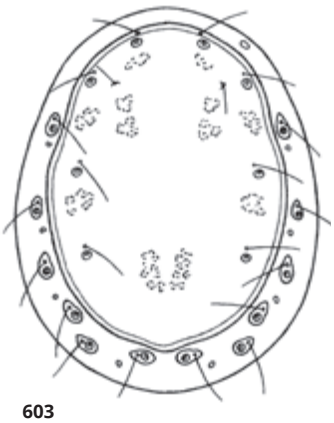
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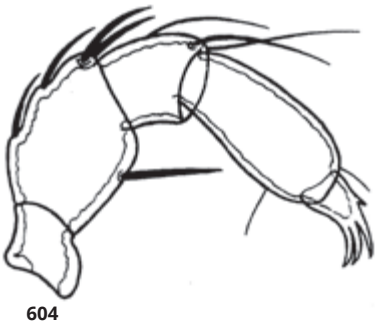
601



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599 *Mahemamersides boveyi* Bader, palp male (after Bader 1985)

600 *Mahemamersides boveyi* Bader, fourth leg male (after Bader 1985)

601 *Mamersella* (*Mamersella*) *maryellenae* Cook, palp male (after Cook 1974)

602 *Mamersella* (*Neomamersella*) *tototaensis* Cook, venter female (after Cook 1974)

603 *Mamersella* (*Neomamersella*) *tototaensis* Cook, dorsum female (after Cook 1974)

604 *Mamersella* (*Neomamersella*) *tototaensis* Cook, palp female (after Cook 1974)

Subgenus *Neomamersella* Cook, 1966

(Figs. 602-604)

1966 *Neomamersella* Cook, Memoirs of the American Entomological Institute 6: 39.

Type species: *Mamersella tototaensis* Cook, 1966

DIAGNOSIS: Glandularia of Cx-III indistinct, posterior to suture line Cx-II/III (Fig. 602). P4 without setal tubercles, claws of P5 diverging (Fig. 604).

HABITAT: Streams.

DISTRIBUTION: One species known from Liberia.

Genus *Mamersides* K. Viets, 1935

(Figs. 571, 577, 605)

1935 *Mamersides* K. Viets, Archiv für Hydrobiologie, Supplement 13: 557.

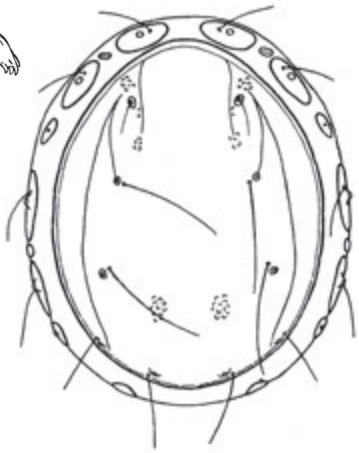
Type species: *Mamersides saranganensis* K. Viets, 1935

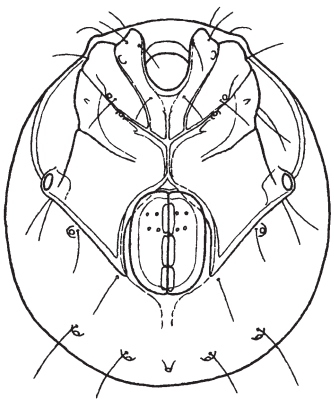
DIAGNOSIS: Lateral eyes incorporated into the ventral shield. Dorsal and ventral shields present. Dorsal shield complete, with five pairs of glandularia and the postocularia (Fig. 577). Dorsal furrow of moderate width with only small glandularia platelets. Ventral shield with most suture lines of coxae well developed, suture line Cx-III/IV incomplete. Cx-IV not closely flanking genital field, posterior margin bluntly pointed (Fig. 571). Genital field extending far posterior to Cx-IV. A ridge present extending anteriorly from insertions of fourth legs. Genital field with three pairs of acetabula. Legs without swimming setae, IV-leg-6 without claws.

HABITAT: Springs.

DISTRIBUTION: Two species known from Java.







605 **606** **607**

605 *Mamersides saranganensis* K. Viets, gnathosoma + palp female (after K. Viets 1935)

606 *Mamersopsides vietsi* Cook, dorsum female (after Cook 1974)

607 *Mamersopsides vietsi* Cook, venter female (after Cook 1974)

Genus *Mamersopsides* K. Viets, 1916

(Figs. 557, 606-610)

1916 *Mamersopsides* K. Viets, Archiv für Hydrobiologie 11: 252.

Type species: *Mamersopsides sigthori* K. Viets, 1916

DIAGNOSIS: Lateral eyes incorporated into ventral shield. Dorsal shield complete with four pairs of glandularia and the postocularia. Dorsal furrow relatively wide with large glandularia platelets (Fig. 606). Ventral shield with Cx-IV sharply pointed posteriorly and closely flanking the genital field. Suture lines of Cx-III/IV incomplete; median suture lines of Cx-III and Cx-IV well developed, longer in male (Fig. 608) than in female (Fig. 607). A well-developed curved ridge present anterior to insertions of fourth legs. Genital field with three pairs of acetabula, extending well beyond the posterior margin of Cx-IV in male but only slightly in female. P4 narrowing distally, P5 with only slightly separated claws (Fig. 557). Legs without swimming setae, IV-leg-6 without claws.

HABITAT: Streams, springs.

DISTRIBUTION: Two species known from West Africa (Cook 1966) and one species from Costa Rica (Goldschmidt 2004d).

Genus *Mamersopsis* Nordenskiöld, 1905

(Figs. 538, 609, 610)

1905 *Mamersopsis* Nordenskiöld, In: Jägerskiöld, Results of the Swedish zoological expedition to Egypt and the White Nile 2 (20A): 7.

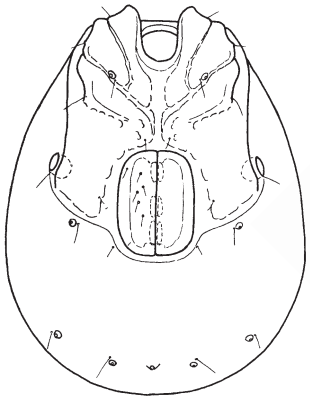
Type species: *Mamersopsis thoracica* Nordenskiöld, 1905

DIAGNOSIS: Lateral eyes with the anterior lens on ventral shield, posterior lens on a small platelet of dorsal shield. Dorsal shield consisting of a large posteromedial plate with three pairs of glandularia, paired anteromedial plates with the postocularia, an unpaired anteromedial plate and 5-6 lateral platelets (Fig. 538). Suture lines Cx-III/IV incomplete, Cx-III without glandularia (Fig. 609). Genital field with three pairs of acetabula. Palp stocky (Fig. 610). Fourth legs with swimming setae, IV-leg-6 without claws.

HABITAT: Standing waters.



608



609



610

608 *Mamersopsides vietsi* Cook, venter male (after Cook 1974)

609 *Mamersopsis viridis* K. Viets, venter female (after Cook 1974)

610 *Mamersopsis viridis* K. Viets, palp female (after K. Viets 1935)

DISTRIBUTION: Three species known from Africa (Cameroon, Sudan), Sumatra and Bangladesh (Pešić et al. 2018b).

Genus *Navamamersides* Cook, 1967

(Figs. 566, 611-613)

1967 *Navamamersides* Cook, Memoirs of the American Entomological Institute 9: 51.

Type species: *Navamamersides karekari* Cook, 1967

DIAGNOSIS: Lateral eyes incorporated into the ventral shield. Dorsal shield entire, with the postocularia and four pair of glandularia (Fig. 611). Dorsal furrow narrow and without enlarged platelets. Ventral shield with suture lines of coxae well developed. Cx-IV rounded posteriorly, separated by the genital field. Insertions of third legs on rounded projections. Suture lines of Cx-III/IV extending in posterior direction. Glandularia of Cx-III near suture line Cx-II/III (Fig. 566). Genital field with three pairs of acetabula. P2 ventrally with a short peg-like seta, P4 without well-developed setal tubercles (Fig. 612). Leg segments stocky, without swimming setae. IV-leg-6 without claws (Fig. 613).

HABITAT: Streams and seepage areas.

DISTRIBUTION: Two species known from India.

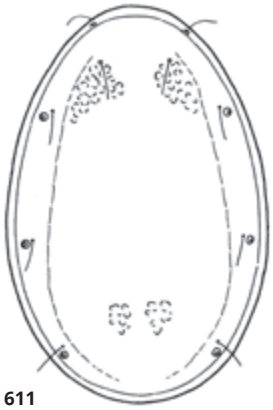
Genus *Nilgiriopsis* Cook, 1967

(Figs. 543, 573, 574, 614)

1967 *Nilgiriopsis* Cook, Memoirs of the American Entomological Institute 9: 54.

Type species: *Nilgiriopsis imamurai* Cook, 1967

DIAGNOSIS: Dorsal shield entire, with the postocularia and five pairs of glandularia. Dorsal furrow of moderate width, with anteriorly a pair of glandularia platelets (Fig. 574). Ventral shield with tips of Cx-I and Cx-II more or less pointed, suture line Cx-III/IV incomplete. Cx-IV posteriorly rounded, closely flanking the genital field (Fig. 573). A ridge extending anteromedially of insertions of fourth legs. Glandularia of Cx-III near suture line Cx-II/III. Genital field with three pairs of acetabula. Palp slender (Fig. 614). Leg segments relatively long, without swimming setae. IV-leg-6 with serrate ventral margin, claw absent (Fig. 543).



611



612



613

611 *Navamamersides karekari* Cook, dorsum female (after Cook 1974)

612 *Navamamersides karekari* Cook, palp male (after Cook 1974)

613 *Navamamersides karekari* Cook, IV-leg-4-6 male (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: One species known from India.

Genus *Paddelia* Panesar, 2004

(Figs. 564, 565, 615, 616)

2004 *Paddelia* Panesar, Bonner zoologische Monographien 52: 78.

Type species: *Paddelia eichhorniae* Panesar, 2004

DIAGNOSIS: Dorsal shield consisting of two large plates, anterior plate tapering and smaller than dorsal plate, with the postocularia and two pairs of glandularia; posterior plate with four pairs of glandularia. Dorsal furrow narrow, without glandularia. Ventral shield with Cx-I-III projecting beyond frontal idiosoma margin. Cxgl-4 on a narrow projection which extends to suture line Cx-I/II. Suture lines Cx-III/IV absent. Genital field with three pairs of acetabula. Palp stocky, P2 ventrally with a large peg-like seta (Fig. 615). Legs without swimming setae. IV-leg-6 without claw, flattened to a paddle, with a row of 3-4 setae and serrate margins (Fig. 616). Other legs with comb-bearing claws.

HABITAT: Ponds.

DISTRIBUTION: One species known from India.

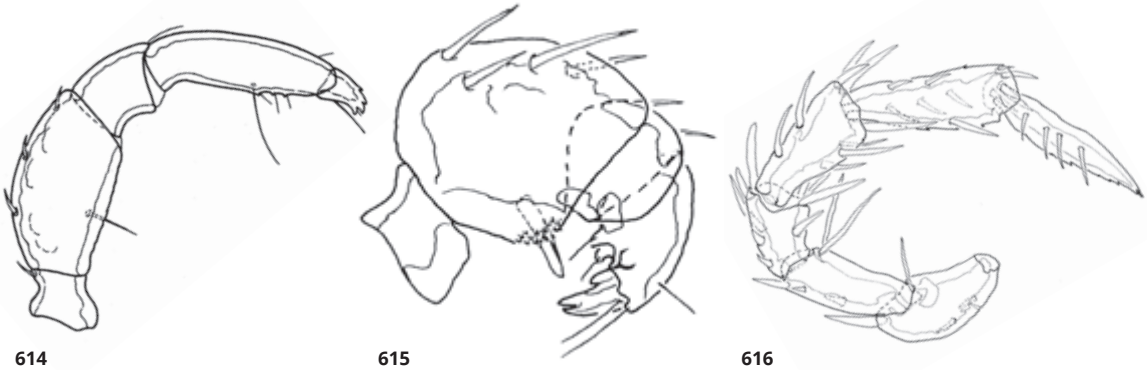
Genus *Platymamersopsis* K. Viets, 1914

(Figs. 568, 570, 617-622)

1914 *Platymamersopsis* K. Viets, Archiv für Hydrobiologie 9: 347.

Type species: *Platymamersopsis nordenskioldi* K. Viets, 1914

DIAGNOSIS: Lateral eyes fused with ventral shield. Dorsal shield complete, with the postocularia and five pairs of glandularia, all peripherally located, and a peripheral ridge (Fig. 617). Dorsal furrow narrow, without glandularia. Suture line Cx-III/IV complete or incomplete. Cx-IV more or less rectangular with lateral ridge, medially separated by the genital field (Fig. 568). Cx-III with glandularia in most species near anterior margin. Genital field with three pairs of acetabula. Gnathosoma various in shape. Palp stocky, P2 with a seta close to ventral margin (Fig. 570). Legs without swimming setae. IV-leg-6 without claw (Fig. 618), other legs with (Fig. 619) or without comb-bearing claw.



614 **615** **616**

614 *Nilgiriopsis imamurai* Cook, palp male (after Cook 1974)

615 *Paddelia eichhorniae* Panesar, palp adult (after Panesar 2004)

616 *Paddelia eichhorniae* Panesar, fourth leg adult (after Panesar 2004)

KEY TO THE SUBGENERA

1 P5 stout (Fig. 570), gnathosoma with a relatively short rostrum (Fig. 620)
Subgenus *Platymamersopsis* s.s.

- P5 elongated, gnathosoma with a laterally compressed, keel-like extended rostrum (Fig. 621)
Subgenus *Lavorona*

Subgenus *Platymamersopsis* s.s.

(Figs. 568, 570, 617-620)

DIAGNOSIS: P5 not elongated; gnathosoma of normal shape (Fig. 570). Claws of legs I-III with (Fig. 619) or without comb.

HABITAT: Streams, springs and spring brooks.

DISTRIBUTION: Several species known from India (Cook 1967), widespread in the Afrotropical region, with several species described from West Africa (Cook 1966), southern Africa (K.O. Viets 1971, 1981a), Madagascar (Goldschmidt 2008) and the Comoros (Smit et al. 2009, Pešić et al. 2018c).

Subgenus *Lavorona* Goldschmidt, 2008

(Fig. 621)

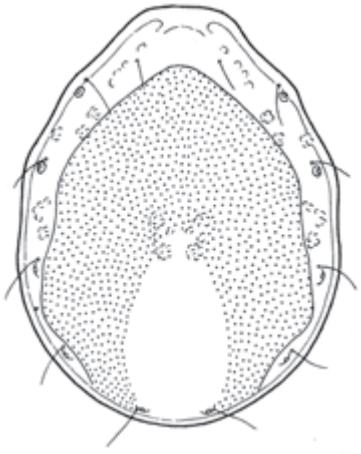
2008 *Lavorona* Goldschmidt, Zootaxa 1954: 109.

Type species: *Lavorona pinocchio* Goldschmidt, 2008

DIAGNOSIS: P5 elongated; gnathosoma with a laterally compressed, keel-like extended rostrum (Fig. 621). Claws of legs I-III with a comb.

HABITAT: Streams.

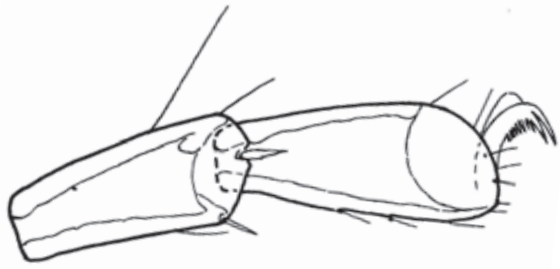
DISTRIBUTION: Two species known from Madagascar.



617



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619

617 *Platymamersopsis (Platymamersopsis) mysorensis* Cook, dorsum female (after Cook 1974)

618 *Platymamersopsis* (*Platymamersopsis*) *mysorensis* Cook, IV-leg-5-6 female (after Cook 1974)

619 *Platymamersopsis* (*Platymamersopsis*) *mysorensis* Cook, I-leg-5-6 female (after Cook 1974)

Genus *Psammotorrenticola* E. Angelier, 1951

(Figs. 548, 622, 623)

1951 *Psammotorrenticola* E. Angelier, Bulletin du Muséum, Paris (série 2) 23: 508.

Type species: *Psammotorrenticola gracilis* E. Angelier, 1951

DIAGNOSIS: Lateral eyes fused with the ventral shield. Dorsal shield divided in a large posteromedial plate and a smaller anteromedial plate flanked by five pairs of lateral platelets (Fig. 548). Anterior part of Cx-I forming a funnel-shaped camerostome. Ventral shield with Cx-I and Cx-II small and located well anterior to genital field, Cx-IV large with a median suture line (Fig. 622). All other suture lines incomplete or not visible. Insertion of fourth legs close to genital field. Excretory pore and flanking glandularia on a separate sclerite. Gnathosoma attached to a protrusable membranous tube. Palp small with reduced setation (Fig. 623). IV-leg-6 without claw.

HABITAT: Interstitial.

DISTRIBUTION: One species known from Corsica, France.

Genus *Rutacarus* Lundblad, 1937

(Figs. 554, 556, 624-626)

1937 *Rutacarus* Lundblad, Zoologischer Anzeiger 120: 283.

Type species: *Rutacarus pyriformis* Lundblad, 1937

DIAGNOSIS: Lateral eyes either incorporated into a glandularia platelet or fused with the ventral shield. Dorsal shield entire, with the postocularia and 3-4 pairs of glandularia (Fig. 624). Ventral shield with suture lines Cx-III/IV incomplete. Median margins of Cx-IV flanking the genital field, Cx-IV pointed posteromedially. Glandularia of Cx-III near anterior margin (Fig. 554). Genital field with three pairs of acetabula. Palp either of "normal" anisitsiellid-like shape, with P2 ventrally with one seta and P5 with four non-spreading setae (Fig. 626), or atypical, with P2 ventrally with two setae and P5 with two diverging claws (Fig. 556). Legs without swimming setae. IV-leg-6 without claw, claws of other legs simple.


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620 **621** **622**

620 *Platymamersopsis* (*Platymamersopsis*) *davecooki* Goldschmidt, gnathosoma + palp male (after Goldschmidt 2008) Reproduced with permission from copyright holder

621 *Platymamersopsis* (*Lavorona*) *pinocchio* Goldschmidt, gnathosoma + palp female (after Goldschmidt 2008) Reproduced with permission from copyright holder

622 *Psammotorrenticola gracilis* Angelier, venter adult (after Cook 1974)

KEY TO THE SUBGENERA

1 P2 ventrally with two setae, P5 with two diverging claws (Fig. 556) Subgenus *Rutacarus* s.s.

- P2 ventrally with one seta, P5 with four non-diverging claws (Fig. 626) Subgenus *Eorutacarus*

Subgenus *Rutacarus* s.s.

(Figs. 554, 556, 624)

DIAGNOSIS: Lateral eyes incorporated into a glandular platelet. Dorsal shield with four pairs of glandularia (Fig. 624). P2 and P4 elongated, P4 gradually widening anteriorly; P2 ventrally with two setae, P5 with two diverging claws (Fig. 556).

HABITAT: Streams.

DISTRIBUTION: One species known from Brazil.

Subgenus *Eorutacarus* Cook, 1980

(Figs. 625, 626)

1980 *Eorutacarus* Cook, Memoirs of the American Entomological Institute 31: 34.

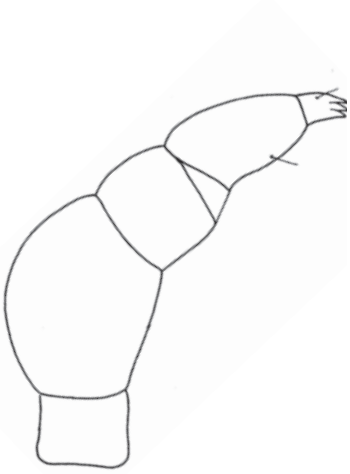
1983 *Neorutacarus* Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 22: 103 – Panesar (2004).

Type species: *Rutacarus ferradasae* Cook, 1980

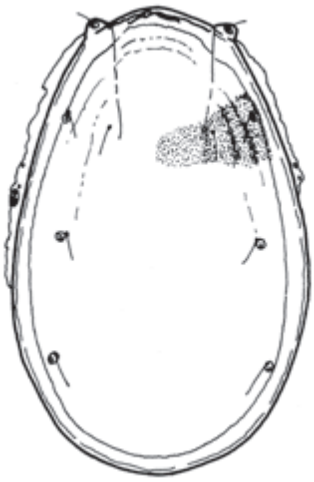
DIAGNOSIS: Lateral eyes incorporated into ventral shield. Dorsal shield with four pairs of glandularia (Fig. 625). P2 ventrally with one seta, P5 with four non-diverging claws (Fig. 626).

HABITAT: Streams, interstitial.

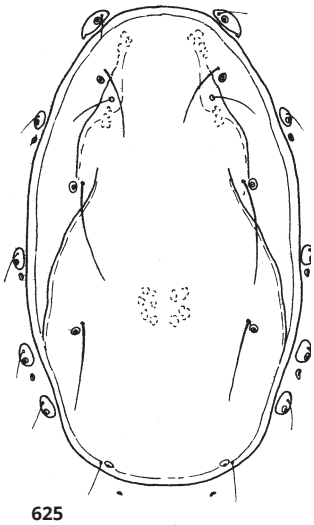
DISTRIBUTION: Five species known, one from Argentina, one from Venezuela (Orghidan & Gruia 1983a), two from Australia (Cook 1986, Harvey 1990) and one from Panama (Valdecasas 2008a).



623



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623 *Psammotorrenticola gracilis* Angelier, palp adult (after Cook 1974)

624 *Rutacarus* (*Rutacarus*) *pyriformis* Lundblad, dorsum male (after Cook 1974)

625 *Rutacarus* (*Eorutacarus*) *ferradasae* Cook, dorsum male (after Cook 1980)

Genus *Shivatonia* Panesar, 2004

(Figs. 544, 627-629)

2004 *Shivatonia* Panesar, Bonner zoologische Monographien 52: 70.

Type species: *Shivatonia acetabulensis* Panesar, 2004

DIAGNOSIS: Lateral eye lenses each on a separate platelet. Dorsal shield divided in an anterior plate with the postocularia and a larger posterior plate without glandularia. Dorsal furrow wide. Ventral shield in males complete, in females incomplete. Median margin of Cx-I + II extending to genital field, Cx-III and Cx-IV bluntly pointed medially, without median margin. Suture lines Cx-II/III and Cx-III/IV incomplete. Cx-IV not closely flanking genital field. Cxgl-4 on Cx-II (Fig. 627). Genital field with three pairs of acetabula. P2 ventrally with a peg-like seta, P4 with setal tubercles, P4 and P5 slender (Fig. 628). Legs without swimming setae. IV-leg-6 with well-developed claws without claw blade (Fig. 629), claws of other legs with claw blade.

HABITAT: Streams.

DISTRIBUTION: One species known from Darjeeling, India and one from Turkey (Boyaci 2010).

Genus *Sigthoria* Koenike, 1907

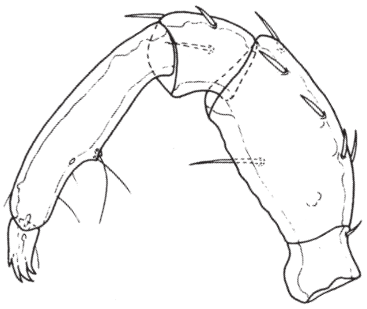
(Figs. 547, 630, 631)

1905 *Amasis* Nordenskiöld, In: Jägerskiöld, Results of the Swedish zoological expedition to Egypt and the White Nile 2 (20A): 9 (praeocc.).

1907 *Sigthoria* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 19: 127.

1969 *Pseudatractides* Nayar, Bulletin of Entomology 10: 49 – K.O. Viets (1987).

Type species: *Amasis niloticus* Nordenskiöld, 1905



626



627



628

626 *Rutacarus* (*Eorutacarus*) *ferradasae* Cook, palp male (after Cook 1980)

627 *Shivatonia acetabulensis* Panesar, venter female (part., after Panesar 2004)

628 *Shivatonia acetabulensis* Panesar, gnathosoma + palp female (after Panesar 2004)

DIAGNOSIS: Lateral eyes incorporated into ventral shield. Dorsal shield entire with sculpturing, including postocularia and five pairs of glandularia (Fig. 630). Dorsal furrow narrow. Ventral shield with a ridge extending anteriorly from insertions of fourth leg. Cx-IV more or less rectangular or posteriorly rounded, closely flanking the genital field or more separate. Cx-IV with a central glandularium (Fig. 547). Suture lines Cx-III/IV incomplete. Genital field with 15-17 pairs of acetabula. P2 ventrally with a hair-like seta on a very short tubercle (Fig. 631). Fourth legs with a few long swimming setae. IV-leg-6 without claw, claws of other legs with small clawlets.

HABITAT: Standing waters (ponds, ditches) and slow flowing streams.

DISTRIBUTION: Two species known, one species, *S. nilotica* is widespread and known from Africa, Asia and Australia, with even one record from the Netherlands (Smit & Van der Hammen 1992b). However, according to Harvey (1990a), Australian specimens differ in setation and might belong to a different species. A second species of *Sigthoria* is known from Vietnam (Tuzovsky 2014).

Genus *Sigthoriella* Besch, 1964

(Figs. 542, 545, 632, 633)

1964 *Sigthoriella* Besch, Beiträge zur Neotropischen Fauna 3: 170.

Type species: *Sigthoriella hygropetrica* Besch, 1964

DIAGNOSIS: Dorsal shield entire with six pairs of glandularia (Fig. 632), dorsal furrow relatively wide with several glandularia platelets. Suture lines Cx-III/IV incomplete. Cx-IV somewhat rectangular and closely flanking the gonopore. Glandularia of Cx-III near anterior margin (Fig. 545). Glandularia of venter well delineated and lying peripheral to a somewhat oval suture line, suggesting the former are incorporated into the ventral shield by secondary sclerotization. Exact number of acetabula unknown, probably three or four. Claws of chelicera stylet-like. P2 ventrally with a seta, P4 with well-developed setal tubercles (Fig. 633). IV-leg-6 with a pair of simple claws (Fig. 542), claws of other legs with a blunt ventral clawlet and moderately sized claw blade.

HABITAT: Mosses in seepage areas.

DISTRIBUTION: One species known from Chile.



629 **630** **631**

629 *Shivatonia acetabulensis* Panesar, IV-leg-6 female (after Panesar 2004)

630 *Sigthoria nilotica* (Nordenskiöld), dorsum female (after Cook 1974)

631 *Sigthoria nilotica* (Nordenskiöld), palp female (?) (after Cook 1974)

Genus *Sotropalpus* Goldschmidt, 2008

(Figs. 575, 576, 634-636)

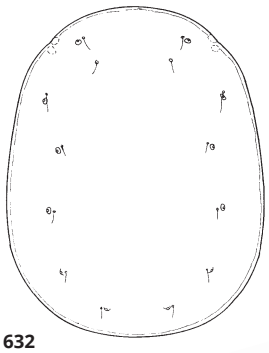
2008 *Sotropalpus* Goldschmidt, Zootaxa 1954: 69.

Type species: *Sotropalpus manga* Goldschmidt, 2008

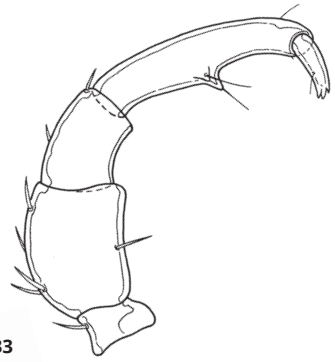
DIAGNOSIS: Lateral eyes lying free under the integument. Dorsum with a complete dorsal shield, with a pair of glandularia near anterior margin without accompanying setae and the postocularia. The wide dorsal furrow with all other dorsoglandularia and the lateroglandularia on medium-sized platelets (Fig. 575). Ventral shield with Cx-I medially fused, suture line Cx-III/IV incomplete. Genital bay narrow, diverging posteriorly (Fig. 634). Genital field with three pairs of acetabula, extending posteriorly beyond posterior margin of Cx-IV. P2 with a ventral seta, P4 distally forming together with P5 a spoon-shaped structure (Fig. 576). Legs without swimming setae, legs-I-III with heavy claws (Fig. 635), IV-leg-6 without claws but with two heavy pinnate setae (Fig. 636).

HABITAT: Spring and spring brooks.

DISTRIBUTION: One species known from Madagascar.



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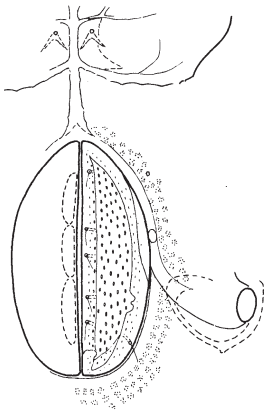
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637

632 *Sigthoriella hygropetrica* Besch, dorsum female (?) (after Cook 1988)

633 *Sigthoriella hygropetrica* Besch, palp female (?) (after Cook 1974)

634 *Sotropalpus manga* Goldschmidt, venter male (after Goldschmidt 2008) Reproduced with permission from copyright holder

635 *Sotropalpus manga* Goldschmidt, third leg male (after Goldschmidt 2008) Reproduced with permission from copyright holder

636 *Sotropalpus manga* Goldschmidt, fourth leg male (after Goldschmidt 2008) Reproduced with permission from copyright holder

637 *Stygomamersopsis viedmai* Cook, genital field male (after Cook 1974)

Genus *Stygomamersopsis* Cook, 1974

(Figs. 549, 637-641)

1974 *Stygomamersopsis* Cook, Memoirs of the American Entomological Institute 21: 119.

Type species: *Stygomamersopsis viedmai* Cook, 1974

DIAGNOSIS: Lateral eyes fused with ventral shield. Dorsal shield consisting of an anteromedial plate with the postocularia, and one pair of glandularia, and a larger posteromedial plate with 2-3 pairs of glandularia (but with four pairs of setae, so likely one or two pairs of glandularia may have disappeared), flanked by six pairs of lateral platelets three of which have glandularia (Fig. 638). Ventral shield with Cx-I-III small and located well anterior to genital field. Glandularia of Cx-III close to midline. Cx-IV large with a well-developed median suture line, posterior suture line extending to sockets of fourth legs (Fig. 549). Excretory pore and two pairs of flanking glandularia on a platelet which shows varying degrees of fusion with the remainder of ventral shield. Genital field with three pairs of acetabula. Gnathosoma not on a protrusable tube. Palp either stocky (Fig. 639) or slender (Fig. 640). Legs without swimming setae. IV-leg-6 without claw (Fig. 641).

HABITAT: Interstitial.

DISTRIBUTION: Two species known from Spain.

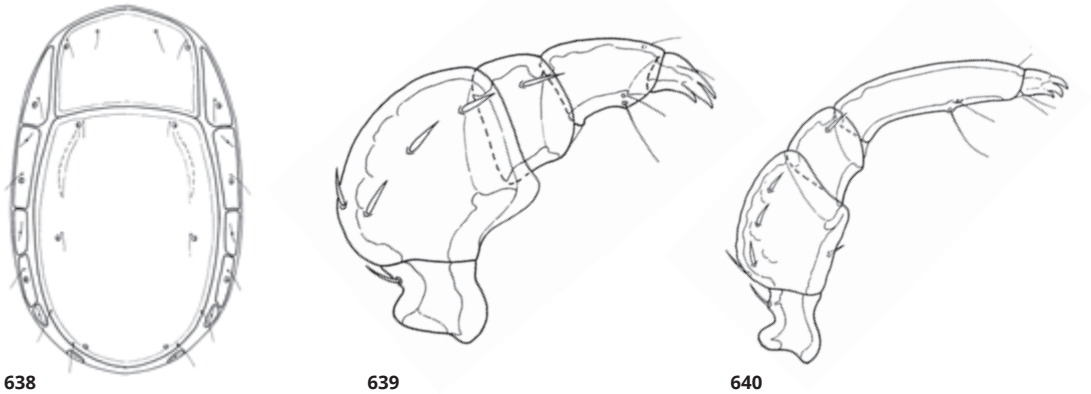
Genus *Utaxatax* Habeeb, 1964

(Figs. 546, 642-650)

1964 *Utaxatax* Habeeb, Leaflets of Acadian Biology 37: 1.

Type species: *Utaxatax californiensis* Habeeb, 1964

DIAGNOSIS: Lateral eyes either on a separate platelet which includes also preocularia and one pair of glandularia (Fig. 642), or free in dorsal furrow. Dorsal shield entire with the postocularia and 3-4 pairs of glandularia (Fig. 643). Dorsal furrow wide with 5-6 pairs of glandularia. Ventral shield with Cx-I either separated or fused medially, Cx-IV medially separated by the genital field, or completely encompassing genital field (Fig. 546). Glandularia of Cx-III lying anteromedially and flanked by a suture line parallel to idiosoma axis on Cx-III. Genital field with three pairs of acetabula. P2 ventrally with a seta, P4 slender to somewhat stocky, without pronounced setal tubercles (Fig. 644). Legs without swimming setae. IV-leg-6 with well-developed claw (Fig. 645). Claw of third leg with or without sexual dimorphism.



638 **639** **640**

638 *Stygomamersopsis viedmai* Cook, dorsum female (after Cook 1974)

639 *Stygomamersopsis viedmai* Cook, palp male (after Cook 1974)

640 *Stygomamersopsis anisitsipalpis* Cook, palp male (after Cook 1974)

KEY TO THE SUBGENERA

1 Cx-IV expanded, completely encompassing genital field (Fig. 647) Subgenus *Rospatax*

- Cx-IV less expanded, not completely encompassing genital field (Fig. 546) Subgenus *Utaxatax* s.s.

Subgenus *Utaxatax* s.s.

(Figs. 546, 642-645)

DIAGNOSIS: Lateral eyes on a platelet together with preocularia (Fig. 642). Cx-IV not completely encompassing genital field. Anterior coxae separated medially and from the posterior coxae (Fig. 546). Insertions of fourth legs not partially covered by the margins of Cx-III. Ventral margin of P2 straight (Fig. 644). Claw of leg III without sexual dimorphism.

HABITAT: Streams, interstitial.

DISTRIBUTION: Four species known from western North America and four species from the Himalaya, India (Panesar 2004).

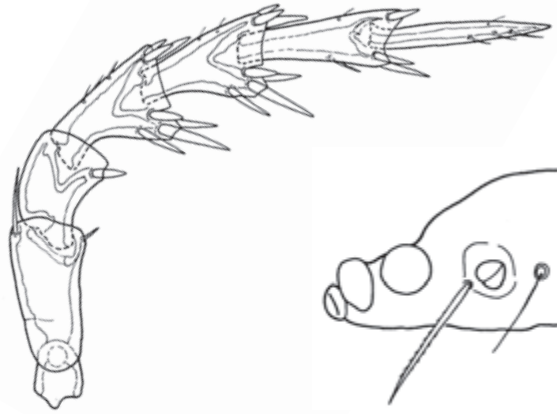
Subgenus *Rospatax* Gerecke, 1988

(Figs. 646-650)

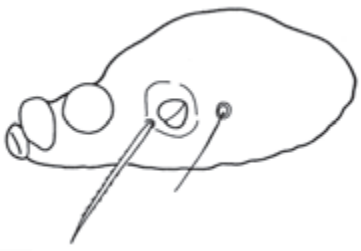
1988 *Rospatax* Gerecke, Animalia 15: 197.

Type species: *Utaxatax ventriplax* Gerecke, 1988

DIAGNOSIS: Lateral eyes free in the dorsal furrow. Cx-IV expanded and encompassing genital field (Fig. 647). Anterolateral margins of Cx-III expanded, partially covering insertions of fourth leg. Ventral margin of P2 slightly convex (Fig. 648). Third leg with in males with a robust, simple claw (Fig. 649), in females less robust and with a dorsal clawlet (Fig. 650).



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643

641 *Stygomamersopsis anisitsipalpis* Cook, fourth leg female (after Cook 1974)

642 *Utaxatax* (*Utaxatax*) *ovalis* Cook, ocular platelet female (after Cook 1974)

643 *Utaxatax* (*Utaxatax*) *ovalis* Cook, dorsum male (after Cook 1974)

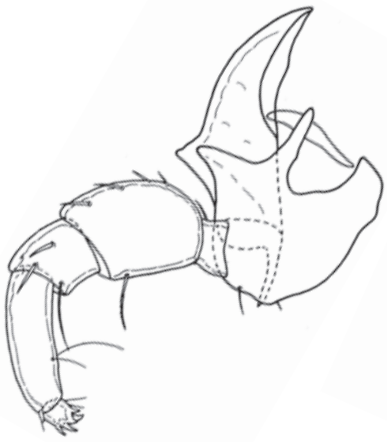
HABITAT: Springs.

DISTRIBUTION: One species known from the islands of Sardinia and Sicily (Italy) and Spain.

Subfamily Nilotoniinae K. Viets, 1929

1929 Nilotoniinae K. Viets, Zoologischer Anzeiger 86: 53.

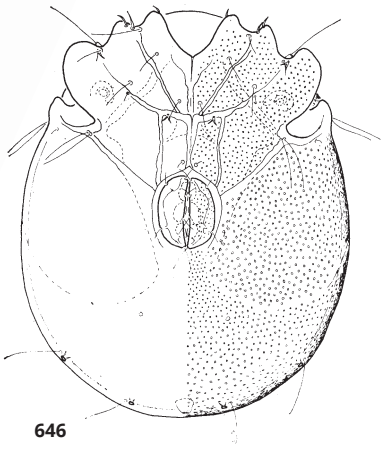
DIAGNOSIS: Typically, soft-bodied mites with small dorsalia and ventralia, but occasionally the sclerotization is more extensive and a complete dorsal shield may be present. If a dorsal shield is present, a solid ventral shield is not present in both sexes.



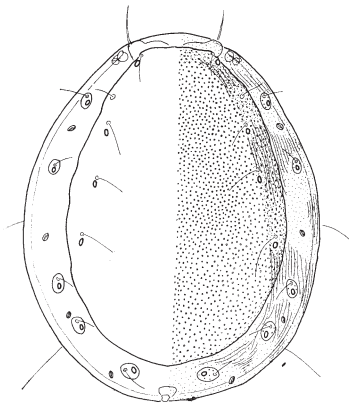
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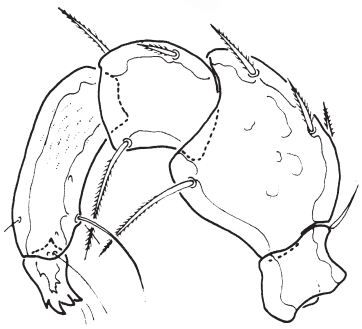
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644 *Utaxatax* (*Utaxatax*) *ovalis* Cook, gnathosoma + palp male (after Cook 1974)

645 *Utaxatax* (*Utaxatax*) *ovalis* Cook, IV-leg-6 male (after Cook 1974)

646 *Utaxatax* (*Rospatax*) *ventriplax* Gerecke, venter male (after Gerecke 1988)

647 *Utaxatax* (*Rospatax*) *ventriplax* Gerecke, dorsum male (after Gerecke 1988)

648 *Utaxatax* (*Rospatax*) *ventriplax* Gerecke, palp male (after Gerecke 1988)

649 *Utaxatax* (*Rospatax*) *ventriplax* Gerecke, third leg male (after Gerecke 1988)

KEY TO THE GENERA

1 Fourth leg with claws (Fig. 651); third acetabulum at posterior end of genital flaps, lying at right angles to median idiosoma axis (Fig. 540) Genus *Bharatonia*

- Fourth leg without claws (Fig. 652); third acetabulum arranged in the same axis as other acetabula (Fig. 653) 2

2 Cx-IV expanded, completely enclosing genital field (Fig. 654) Genus *Zelandotonia*

- Cx-IV not enclosing genital field (Fig. 653) 3

3 P4 stocky and expanded distal to the middle, with a spine-like seta at distal end; claws of P5 widely separated (Fig. 655) Genus *Ranautonia*

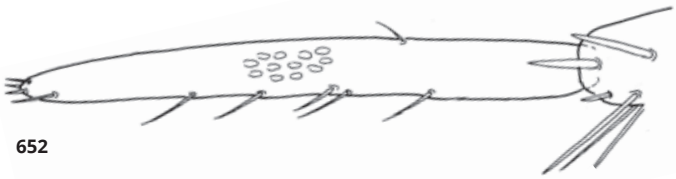
- P4 slender, if short, not expanded and without spine-like seta at distal end; claws of P5 not distinctly separated (Fig. 656) Genus *Nilotonia*



650



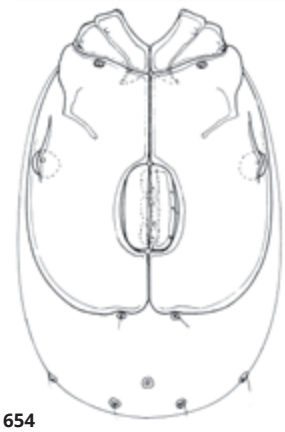
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650 *Utaxatax* (*Rospatax*) *ventriplax* Gerecke, III-leg-6 female (after Gerecke 1988)

651 *Bharatonia vietsi* Cook, IV-leg-6 male (after Cook 1974)

652 *Ranautonia dentipalpis* Viets, IV-leg-6 male (after Cook 1974)

653 *Ranautonia dentipalpis* Viets, venter male (after Cook 1974)

654 *Zelandotonia orion* Cook, venter female (after Cook 1992)

655 *Ranautonia dentipalpis* Viets, palp male (after Cook 1974)

Genus *Bharatonia* Cook, 1967

(Figs. 540, 651, 657-661)

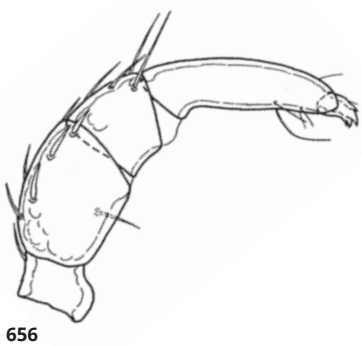
1967 *Bharatonia* Cook, Memoirs of the American Entomological Institute 9: 48.

Type species: *Bharatonia vietsi* Cook, 1967

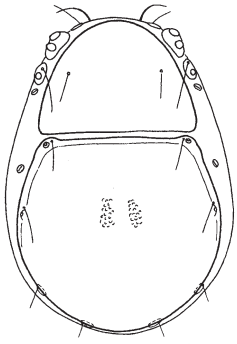
DIAGNOSIS: Lateral eyes in capsules which lie free in the integument. Dorsal shield formed by two large plates, posterior plate larger than anterior plate; anterior plate with the postocularia, posterior plate with two pairs of glandularia in the male (Fig. 657), none in the female (Fig. 658). Ventral shield present in the male (Fig. 540), absent in the female (Fig. 659). Cx-IV more or less rectangular and closely flanking the genital field. Cx-I-III expanding and projecting beyond frontal idiosoma. Cx-III with the glandularium near anterior margin, Cxgl-2 (sensu Wiles 1997b) apparently absent, Cxgl-4 with two accompanying setae (Fig. 540). Genital field with three pairs of acetabula, third pair lying at posterior end of genital flaps at right angles to the median axis of the idiosoma. P2 ventrally with a heavy seta on a small tubercle (Fig. 660), P3 ventrally expanding, P5 slender. Palp exhibiting sexual dimorphism, P4 more slender in female (Fig. 661). Legs without swimming setae. All legs with claws with dorsal and ventral clawlets (Fig. 651).

HABITAT: Seepage areas.

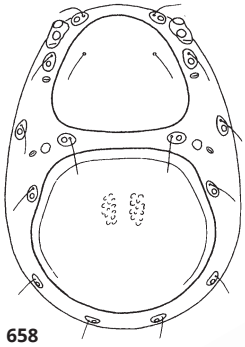
DISTRIBUTION: One species known from India.



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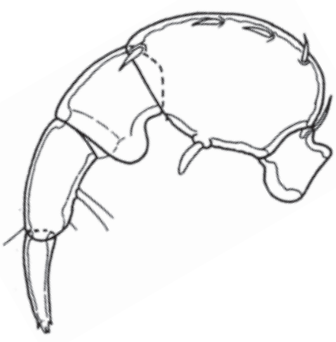
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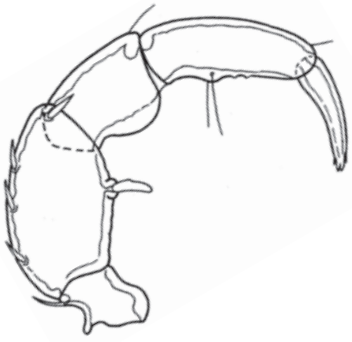
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656 *Nilotonia* (*Nilotonia*) *indica* Walter, palp male (after Cook 1974)

657 *Bharatonia vietsi* Cook, dorsum male (after Cook 1974)

658 *Bharatonia vietsi* Cook, dorsum female (after Cook 1974)

659 *Bharatonia vietsi* Cook, venter female (after Cook 1974)

660 *Bharatonia vietsi* Cook, palp male (after Cook 1974)

661 *Bharatonia vietsi* Cook, palp female (after Cook 1974)

Genus *Nilotonia* Thor, 1905

(Fig. 539, 541, 656, 662-707)

1905 *Nilotonia*, Zoologischer Anzeiger 28: 807.

1929 *Dartonia*, K. Viets, Zoologischer Anzeiger 86: 53.

1941 *Dartoniella* Lundblad, Entomologisk Tidskrift 62: 114.

1952 *Neodartia* Lundblad, Arkiv för Zoologi (Serie2) 3: 441.

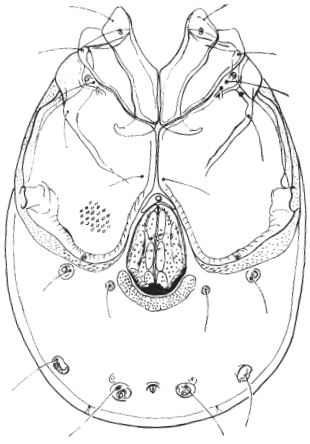
Type species: *Teutonia loricata* Nordenskiöld, 1905

DIAGNOSIS: Sclerotization of the dorsum varying from two small postocularia platelets and a small posteromedian platelet (Fig. 693) to a well-developed dorsal shield (Fig. 674). Ventral sclerotization varying from none to extensive. If dorsal sclerotization is extensive, the posteroventral sclerotization is always separated by a membranous suture from the coxae and genital field. Coxae in four groups or fused to various degree, suture line Cx-III/IV complete or incomplete. Glandularia on Cx-III various in position or absent. Genital field with 3-4 pairs of acetabula, extending between Cx-IV (Fig. 664) or located posterior to coxal field. Palp often slender, P2 with a ventral seta and often ventrally denticulate, P4 with a group of five ventral setae generally associated with pointed denticles in the distal part of segment. Legs with or without swimming setae. II-leg-5 of male may be modified (Fig. 669). Claw of IV-leg-6 reduced, small peg-seta-like remnants visible, tip of IV-leg-6 often with one or several prominent terminal setae. Claws of legs-I-III with or without ventral clawlets.

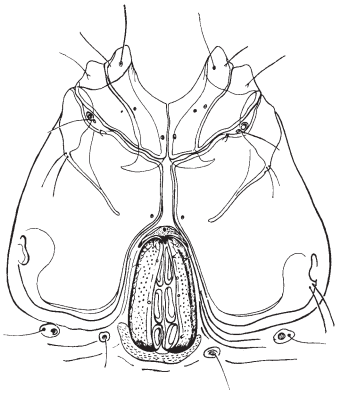
KEY TO THE SUBGENERA (PARTLY MALES ONLY)

1 Claws of legs-I-III without clawlets; genital field with sexual dimorphism male genital field tapering anteriorly (Fig. 662), female genital field with subparallel lateral margins (Fig. 663) Subgenus *Bolivartonia*

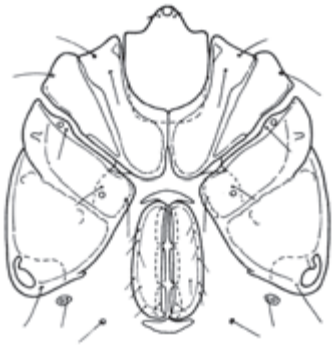
- Claws of legs-I-III with dorsal and/or ventral clawlets; genital field with only a weak sexual dimorphism (Figs. 664, 665) 2



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662 *Nilotonia* (*Bolivartonia*) *simoni* Orghidan & Gruia, venter male (after Orghidan & Gruia 1987)

663 *Nilotonia* (*Bolivartonia*) *simoni* Orghidan & Gruia, venter female (after Orghidan & Gruia 1987)

664 *Nilotonia* (*Davetonia*) *perplexa* Cook, venter female (after Cook 1974)

2 IV-leg-5 with swimming setae (Fig. 666) Subgenus *Nilotonia*

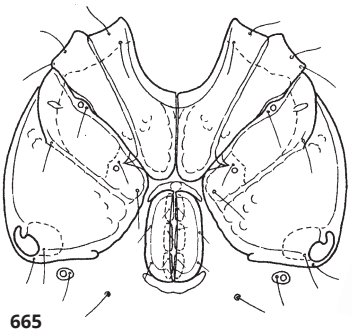
- IV-leg-5 without swimming setae (Fig. 667) 3

3 Anterior acetabula separated from second and third acetabula (Fig. 668); II-leg-5 of male modified, with the ventral margin expanding (Fig. 669) Subgenus *Dartia*

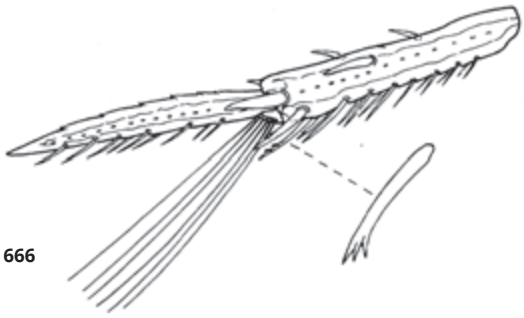
- Anterior acetabula not separated from second and third acetabula (Fig. 670); second leg of male not modified 4

4 Cxgl-4 on an anterior projection of Cx-III protruding into posterior margin of Cx-II (Fig. 671) Subgenus *Tadjikodartia*

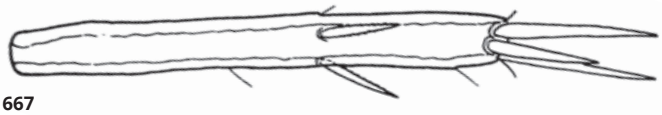
- Cxgl-4 lying on Cx-III (Fig. 664) 5



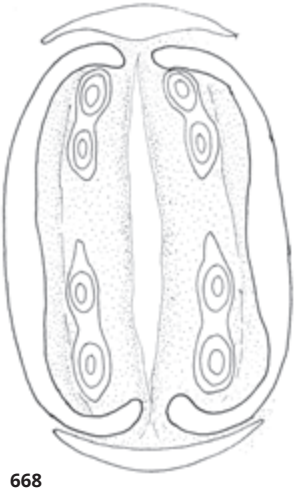
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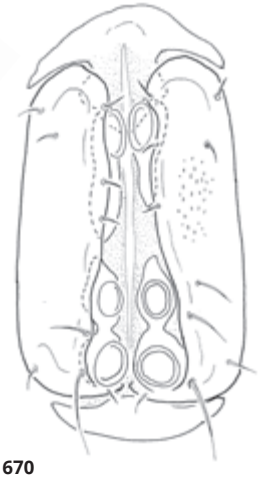
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665 *Nilotonia* (*Davetonia*) *perplexa* Cook, venter male (after Cook 1967)

666 *Nilotonia (Nilotonia) cooki* Panesar, IV-leg-5-6 male (after Cook 1974, as *N. indica)*

667 *Nilotonia* (*Davetonia*) *perplexa* Cook, IV-leg-6 female (after Cook 1974)

668 *Nilotonia* (*Dartia*) *harrisi* Soar, genital field male (after Di Sabatino et al. 2010)

669 *Nilotonia* (*Dartia*) *borneri* (Walter), II-leg-4-6 male (after Di Sabatino et al. 2010)

670 *Nilotonia* (*Dartonia*) *pyrenaica* Lundblad, genital field male (after Di Sabatino et al. 2010)

5 Dorsum with three large plates, covering most of the dorsum, consisting of a pair of anterior plates and a large posterior plate (Fig. 672) Subgenus *Telotaolana*

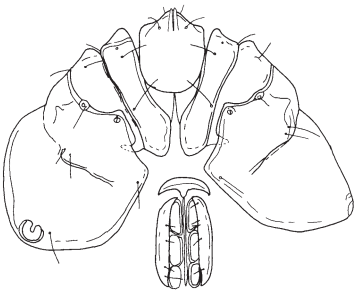
- Dorsum either with small platelets (Fig. 673) or a single large dorsal plate (Fig. 674) 6

6 IV-leg-6 with 3-4 terminal setae (Fig. 667), Cxgl-4 lying in the centre of Cx-III (Fig. 664) Subgenus *Davetonia*

- IV-leg-6 with less than three terminal setae (Fig. 675), Cxgl-4 lying near anterior margin of Cx-III (Fig. 676) 7

7 Acetabula on enlarged basal sclerites (Fig. 677) Subgenus *Gereckonia*

- Acetabula not on enlarged basal sclerites (Fig. 678)



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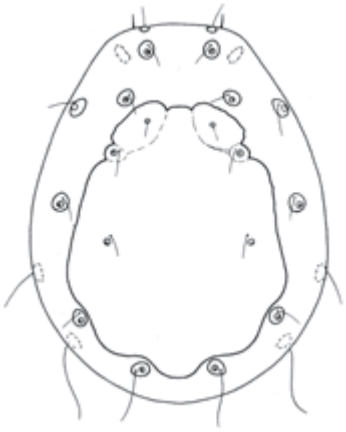


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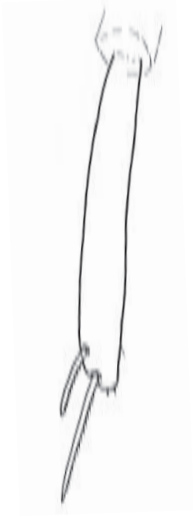
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671 *Nilotonia* (*Tadjikodartia*) *emarginata* (Sokolow), venter female (after Sokolow 1948)

672 *Nilotonia* (*Telotaolana*) *ankaratra* Goldschmidt, dorsum male (after Goldschmidt 2008) Reproduced with permission from copyright holder

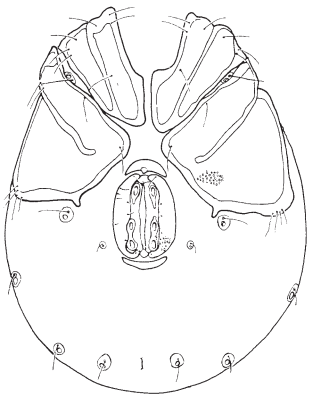
673 *Nilotonia* (*Nilotonia*) *cooki* Panesar, dorsum male (after Cook 1974 , as *N. indica* Walter)

674 *Nilotonia* (*Mamersonia*) *amazonica* (K. Viets), dorsum female (after Cook 1974)

675 *Nilotonia* (*Dartonia*) *caerulea* (Viets), IV-leg-6 male (after Cook 1974)

676 *Nilotonia* (*Dartonia*) *caerulea* (Viets), venter male (after Cook 1974)

8	Dorsum with a large plate covering most of surface (Fig. 679)	9
-	Dorsum with smaller platelets (Fig. 680); if a large plate is present, then IV-leg-6 without long (sub)terminal setae	10
9	IV-leg-3-5 with elongated thin setae (which are not swimming setae) (Fig. 681); gnathosoma not compact (Fig. 682)	Subgenus *Mamersonia*
-	IV-leg-3-5 with stout setae only (Fig. 683); gnathosoma compact (fig. 684)	Subgenus *Cookonia*
10	III-leg of male modified, III-leg-6 of male enlarged (Fig. 685)	Subgenus *Guanacastonia*
-	Third leg of male not modified	11
11	IV-leg-6 without long (sub)terminal setae (fig. 686)	Subgenus *Manotonia*
-	IV-leg-6 with 1-2 long (sub)terminal setae (fig. 675)	Subgenus *Dartonia*



677

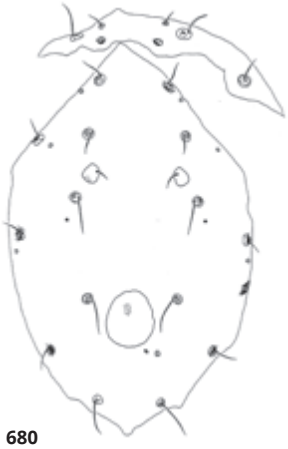


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677 *Nilotonia* (*Gereckonia*) *turcica* Özkan & Soysal, venter male (after Özkan & Soysal 1989)

678 *Nilotonia* (*Guanacastonia*) *pablito* Goldschmidt, venter female (after Goldschmidt 2004d)

679 *Nilotonia* (*Cookonia*) *anjozorobe* Goldschmidt, dorsum male (after Goldschmidt 2008) Reproduced with permission from copyright holder

680 *Nilotonia* (*Guanacastonia*) *pablito* Goldschmidt, dorsum female (after Goldschmidt 2004d)

681 *Nilotonia* (*Mamersonia*) *amazonica* (K. Viets), IV-leg-6 female (after Cook 1974)

682 *Nilotonia* (*Mamersonia*) *amazonica* (K. Viets), gnathosoma + palp female (after Cook 1974)

Subgenus *Nilotonia* s.s.

(Figs. 539, 656, 666, 673)

1967 *Tadagatonia* Cook, Memoirs of the American Entomological Institute 9: 46 – Panesar (2004).

DIAGNOSIS: Dorsum without large plates, but with a pair of anterior platelets and a single posteromedial platelet (Figs. 673). Males with a complete ventral shield (Fig. 539), ventral shield of females with a varying degree of secondary sclerotization. Genital field with three pairs of acetabula. Chelicera elongated (L/H > 8). Fourth leg with swimming setae. IV-leg-6 without (Fig. 666) or with one (sub)terminal seta.

HABITAT: Ponds.

DISTRIBUTION: Two species known from India (Panesar 2004), one from Thailand (Savatenalinton & Smit 2017) and two from Africa.

Subgenus *Bolivartonia* Orghidan & Gruia, 1983

(Figs. 662, 663, 687-691)

1983 *Bolivartonia* Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 22: 103.

Type species: *Bolivartonia simoni* Orghidan & Gruia, 1983

DIAGNOSIS: Dorsum of male with a large plate covering most of surface (Fig. 687) or as in female, with a pair of anterior platelets and a larger posteromedial platelet (Fig. 688). Genital bay narrow, Cx-IV closely flanking the genital field. Posterior and lateral margin of Cx-IV with secondary sclerotization (Fig. 662-663). Genital field with three pairs of acetabula. Genital flaps tapering anteriorly in males (Fig. 662), lateral margins in females subparallel (Fig. 663). Claws of palp close to each other (Fig. 689) or widely diverging (Fig. 691). Claws of legs-I-III simple, without clawlet. IV-leg-6 without or with a long subterminal seta (Fig. 690).

HABITAT: Hyporheic, springs.

DISTRIBUTION: One species known from Venezuela and two species known from Costa Rica (Goldschmidt 2004d).


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683 *Nilotonia* (*Cookonia*) *anjozorobe* Goldschmidt, IV-leg-2-6 female (after Goldschmidt 2008) Reproduced with permission from copyright holder

684 *Nilotonia* (*Cookonia*) *anjozorobe* Goldschmidt, gnathosoma + palp female (after Goldschmidt 2008) Reproduced with permission from copyright holder

685 *Nilotonia* (*Guanacastonia*) *pablito* Goldschmidt, III-leg-2-6 male (after Goldschmidt 2004d)

Subgenus *Cookonia* Goldschmidt, 2008

(Figs. 679, 683, 684, 692)

2008 *Cookonia* Goldschmidt, Zootaxa 1954: 48.

Type species: *Nilotonia anjozorobe* Goldschmidt, 2008

DIAGNOSIS: A large dorsal plate covering most of dorsum, with 3-5 pairs of glandularia (Fig. 679). Venter posteriorly and laterally of coxae with extensive secondary sclerotization (Fig. 692). Gnathosoma compact, short and high, nearly rectangular in lateral view (Fig. 684). Genital field with three pairs of acetabula. Legs without swimming setae, claws of legs I-III with dorsal and ventral clawlets. IV-leg-6 with two small terminal setae and one subterminal mid-sized seta (Fig. 683).

HABITAT: Streams and springs.

DISTRIBUTION: Two species known from Madagascar.

Subgenus *Dartia* Soar, 1917

(Figs. 668, 669)

1917 *Dartia* Soar, Journal of the Quekett Microscopical Club (series 2) 13: 277.

1980 *Parvadartia* Bader, Fauna of Saudi Arabia 2: 54 – Gerecke & Moreno (2008).

Type species: *Dartia harrisi* Soar, 1917

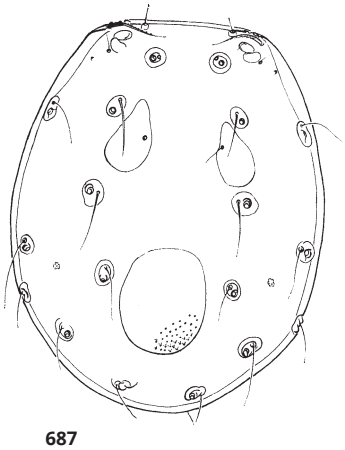
DIAGNOSIS: Dorsum with a pair of anterior platelets and a single posterior platelet. Genital field with three or four pairs of small acetabula, with the anterior and posterior group well separated (Fig. 668). Second leg of male modified, ventral margin of II-leg-5 expanding, II-leg-6 with a kink (Fig. 669). IV-leg-6 in both sexes with a long subterminal seta.

HABITAT: Springs, streams, bogs, intertidal freshwater pools.

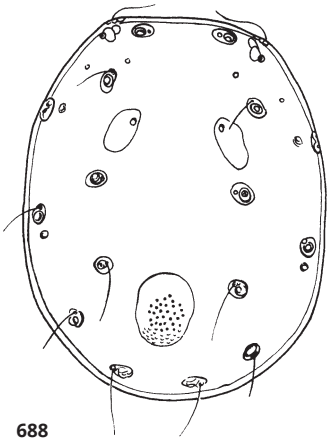
DISTRIBUTION: Several species known from Europe, Africa (South Africa, Congo), Israel (Bader 1995), Turkey (Soysal & Özkan 1989), Iran (Bader & Sepasagozarian 1980, Guo et al. 2006), China (Yi et al. 2009c), Madagascar (Goldschmidt 2008) and Oman (Smit & Pešić 2010).



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686 *Nilotonia* (*Manotonia*) *tegulata* (K. Viets), IV-leg-6 female (after Cook 1974)

687 *Nilotonia* (*Bolivartonia*) *simoni* Orghidan & Gruia, dorsum male (after Orghidan & Gruia 1987)

688 *Nilotonia* (*Bolivartonia*) *simoni* Orghidan & Gruia, dorsum female (after Orghidan & Gruia 1987)

Subgenus *Dartonia* K. Viets, 1929

(Figs. 541, 670, 675, 676, 693)

1929 *Dartonia* K. Viets, Zoologischer Anzeiger 86: 53.

1929 *Dartiella* K. Viets, Zoologischer Anzeiger 86: 53 – Pešić (2013b).

Type species: *Dartonia caerulea* K. Viets, 1929

1941 *Dartoniella* Lundblad, Entomologisk Tidskrift 62: 114.

DIAGNOSIS: Eyes present or absent. Dorsum with a pair of anterior platelets and a single posterior platelet (Fig. 541). Venter without secondary sclerotization (Fig. 676). Cx-I either fused or separated medially. Genital field with three pairs of acetabula. Genital field with anterior acetabula separated from second and third acetabula (Fig. 670). II-leg without sexual dimorphism. IV-leg-6 with 1-2 (sub)terminal setae (Fig. 675), rarely without subterminal seta.

HABITAT: Streams and springs, pools in streams, interstitial.

DISTRIBUTION: For a review see Pešić (2013b). Several species known from India (Cook 1967), Sumatra, Java (Lundblad 1971), Vietnam (Pešić 2013b), Saudi Arabia (Bader 1980b), Iran (Bader & Sepasgozarian 1980, Pešić et al. 2012c), Israel (Bader1995), Africa (including Madagascar, Goldschmidt 2008) and Europe (Gerecke 1992).

Subgenus *Davetonia* Pešić, 2013

(Figs. 664, 665, 667)

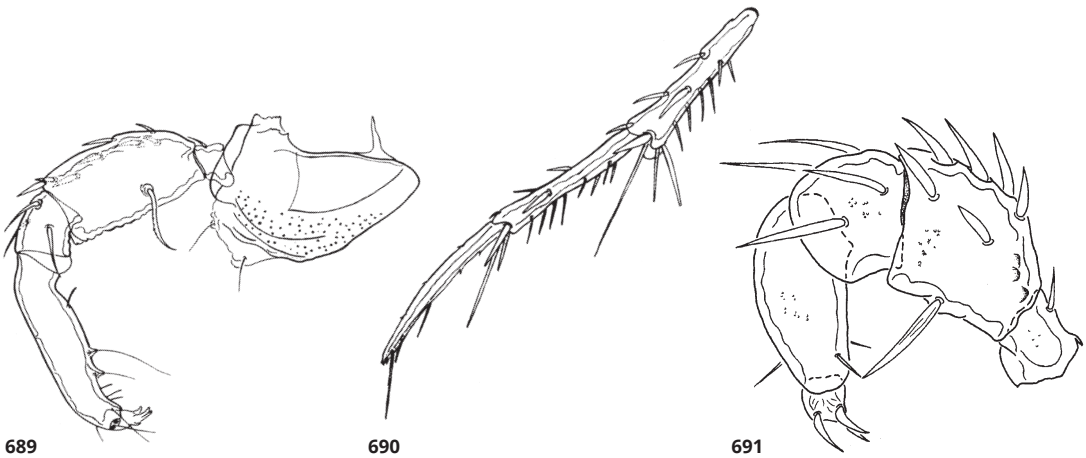
2013 *Davetonia* Pešić, Zootaxa 3710: 379.

Type species: *Nilotonia perplexa* Cook, 1967

DIAGNOSIS: Dorsum with a pair of anterior platelets and a single posterior platelet. Genital field with three pairs of acetabula. Acetabula large, anterior acetabula not separated from second and third acetabula (Figs. 664, 665). Claws of legs-I-III with heavy ventral and/or dorsal clawlets. Legs without sexual dimorphism. IV-L-6 with 3-4 terminal setae (Fig. 667).

HABITAT: Springs.

DISTRIBUTION: Two species known, one from Maharashtra State, India and one from Turkey (Oezkan & Bader 1988).



689 *Nilotonia* (*Bolivartonia*) *simoni* Orghidan & Gruia, gnathosoma + palp female (after Orghidan & Gruia 1987)

690 *Nilotonia* (*Bolivartonia*) *simoni* Orghidan & Gruia, IV-leg-4-6 male (after Orghidan & Gruia 1987)

691 *Nilotonia* (*Bolivartonia*) *curtipalpis* Goldschmidt, palp male (after Goldschmidt 2004d)

Subgenus *Gereckonia* Pešić, 2013

(Figs. 677, 694, 695)

2013 *Gereckonia* Pešić, Zootaxa 3710: 378,

Type species: *Nilotonia turcica* Özkan & Soysal, 1989

DIAGNOSIS: Dorsum with a pair of anterior platelets and a single posterior platelet (Fig. 694). Genital field with three pairs of acetabula. Acetabula small, located on enlarged basal sclerites (Fig. 677); anterior acetabula separated from second and third acetabula. II-L without sexual dimorphism. IV-L-6 with one long subterminal seta (Fig. 695).

HABITAT: Swamps fed by hot springs.

DISTRIBUTION: One species known from Turkey (Özkan & Soysal 1989).

Subgenus *Guanacastonia* Goldschmidt, 2004

(Figs. 678, 680, 685, 696)

2004 *Guanacastonia* Goldschmidt, Senckenbergiana biologica 83: 141.

Type species: *Nilotonia pablito* Goldschmidt, 2004

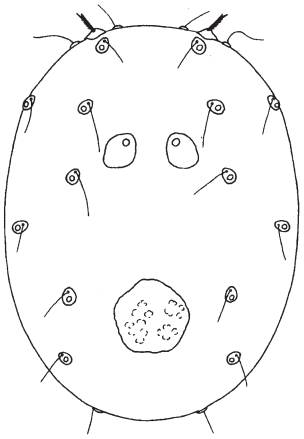
DIAGNOSIS: Dorsum with a pair of anterior platelets and a single posterior platelet (Fig. 678). Genital field with three pairs of acetabula. Acetabula large, anterior acetabula not separated from second and third acetabula (Fig. 678). Third leg with sexual dimorphism: III-leg-5 of male enlarged (Fig. 685), III-leg-5 of male ventrally with much longer setae than in female. IV-leg-6 in both sexes without terminal setae.

HABITAT: Springs.

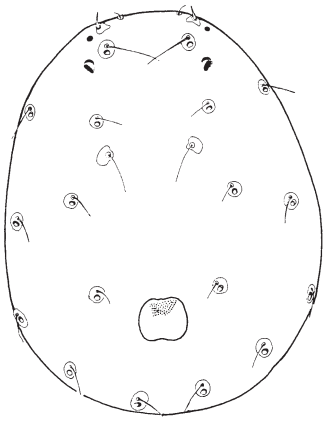
DISTRIBUTION: One species known from Costa Rica.


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692 *Nilotonia* (*Cookonia*) *anjozorobe* Goldschmidt, venter female (after Goldschmidt 2008) Reproduced with permission from copyright holder

693 *Nilotonia* (*Dartonia*) *perplexa* Cook, dorsum female (after Cook 1967)

694 *Nilotonia* (*Gereckonia*) *turcica* Özkan & Soysal, dorsum male (after Özkan & Soysal 1989)

Subgenus *Mamersonia* K. Viets, 1954

(Figs. 674, 681, 682)

1954 *Mamersonia* K. Viets, Schweizerische Zeitschrift für Hydrologie 16: 95.

Type species: *Mamersonia amazonica* K. Viets, 1954

DIAGNOSIS: Dorsum with a large plate (Fig. 674), venter with extensive secondary sclerotization. Genital field with three pairs of large acetabula, anterior acetabula not separated from second and third acetabula (Fig. 682). IV-leg-6 with two very small terminal setae, IV-leg-3-5with a thin subterminal seta (Fig. 681). Claws of legs-I-III with dorsal and ventral clawlet. Swimming setae absent.

HABITAT: Lakes, slow running streams.

DISTRIBUTION: Several species known from Brazil.

REMARKS: Three species described by Bader (1995) from Trinidad do not belong to this subgenus, but to *Anisitsiella aculeata* Daday (Smit 2019b).

Subgenus *Manotonia* Walter, 1935

(Figs. 686, 697-700)

1935 *Manotonia* Walter, Archiv für Hydrobiologie 28: 94 – Panesar (2004).

1935 *Mania* Walter, Archiv für Hydrobiologie 28: 94 (praeocc.).

Type species: *Mania muscicola* Walter, 1935

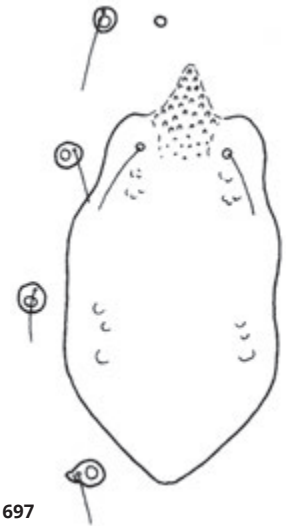
DIAGNOSIS: Dorsum with either small platelets or a single moderately developed plate with the postocularia and 0-2 two pairs of glandularia (Fig. 697). Posterior coxal groups rounded and posteriorly with secondary sclerotization (Fig. 698). Genital field located far posteriorly of Cx-IV or lying between Cx-IV. Genital field with three pairs of acetabula, anterior acetabula not separated from second and third acetabula. P4 with or without setal tubercles (Fig. 699). IV-leg-6 with two short peg-like setae, ventrally with a row of stout setae (Fig. 686). Claws of legs with dorsal clawlet (Fig. 700).



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695 *Nilotonia* (*Gereckonia*) *turcica* Özkan & Soysal, IV-leg-6 male (after Özkan & Soysal 1989)

696 *Nilotonia* (*Guanacastonia*) *pablito* Goldschmidt, palp female (after Goldschmidt 2004d)

697 *Nilotonia* (*Manotonia*) *tegulata* (K. Viets), dorsal plate female (after Cook 1974)

HABITAT: Springs, streams.

DISTRIBUTION: Several species known from Algeria, Ghana (Cook 1979), India (Panesar 2004), Iran (Pesic & Saboori 2006) and southern Europe (Gerecke 1991a).

Subgenus *Tadjikodartia* Bader, 1980

(Figs. 671, 701-703)

1980 *Tadjikodartia* Bader, Fauna of Saudi Arabia 2: 52.

Type species: *Dartia emarginata* Sokolow, 1948

DIAGNOSIS: Dorsum with small anterior platelets and a larger single posteromedial plate. Parts of Cx-III protruding over Cx-II and bearing here Cxgl-4 (Fig. 671). Genital field with three pairs of acetabula, without large interspace between anterior and posterior acetabula. Claws of legs-I-III with a comb (Fig. 702). IV-leg-6 with a heavy terminal seta (Fig. 703).

HABITAT: Streams.

DISTRIBUTION: One species known from Saudi Arabia, Tajikistan, Iran (Pesic & Saboori 2007) and India (Panesar 2004).



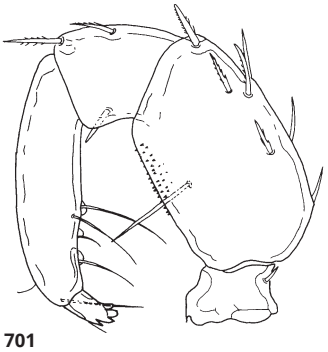
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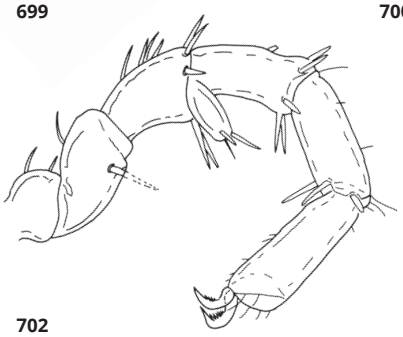
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698 *Nilotonia* (*Manotonia*) *tegulata* (K. Viets), venter female (after Cook 1974)

699 *Nilotonia* (*Manotonia*) *tegulata* (K. Viets), gnathosoma + palp adult (after Cook 1974)

700 *Nilotonia* (*Manotonia*) *tegulata* (K. Viets), claw first leg female (after Cook 1974)

701 *Nilotonia* (*Tadjikodartia*) *emarginata* (Sokolow), palp female (after Sokolow 1948)

702 *Nilotonia* (*Tadjikodartia*) *emarginata* (Sokolow), first leg female (I-leg-4 misshapen) (after Sokolow 1948)

703 *Nilotonia* (*Tadjikodartia*) *emarginata* (Sokolow), fourth leg female (after Sokolow 1948)

Subgenus *Telotaolana* Goldschmidt, 2008

(Figs. 672, 704-707)

2008 *Telotaolana* Goldschmidt, Zootaxa 1954: 27.

Type species: *Nilotonia ankaratra* Goldschmidt, 2008

DIAGNOSIS: Three large plates covering most of dorsum, consisting of a pair of large anterior plates and a larger posterior plate (Fig. 672). Number of glandularia of dorsal plates varying from 0-2 in anterior plates and 0-3 in posterior plate. Venter with extended secondary sclerotization, generally more extensive in males (Fig. 672) than in females (Fig. 704). Genital field with three pairs of acetabula. Legs without swimming setae. Claws of legs with dorsal and ventral clawlets, occasionally one of these lacking. IV-leg-6 with two small terminal setae and one mid-sized subterminal seta (Fig. 706).

HABITAT: Springs and spring brooks.

DISTRIBUTION: Confined to Madagascar, with four species known.

Genus *Ranautonia* K. Viets, 1929

(Figs. 652, 653, 655, 708)

1929 *Ranautonia* K. Viets, Zoologischer Anzeiger 83: 233.

Type species: *Ranautonia dentipalpis* K. Viets, 1929

DIAGNOSIS: Lateral eye lenses separated and lying below the integument. Dorsum with a pair of small platelets with the postocularia, and a small median platelet (Fig. 708). Coxae in four groups, Cx-I lying close together medially. Posterior coxal groups widely separated from each other by the genital field. Suture line Cx-III/IV nearly complete. Cxgl-2 lying free in the integument between Cx-II and Cx-III. No glandularia on Cx-III (Fig. 653). Venter without secondary sclerotization. Genital field with three pairs of acetabula. Well-developed pre- and postgenital sclerites present. P4 stocky with a concave anteroventral margin, with a spine-like seta at distal end; claws of P5 widely separated (Fig. 655). Legs without swimming setae, IV-leg-6 without claw (Fig. 652). Other legs with simple claws.





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704 **705** **706**

704 *Nilotonia* (*Telotaolana*) *ankaratra* Goldschmidt, dorsum female (after Goldschmidt 2008) Reproduced with permission from copyright holder

705 *Nilotonia* (*Telotaolana*) *ankaratra* Goldschmidt, venter female (after Goldschmidt 2008) Reproduced with permission from copyright holder

706 *Nilotonia* (*Telotaolana*) *ankaratra* Goldschmidt, fourth leg male (after Goldschmidt 2008) Reproduced with permission from copyright holder

HABITAT: Streams.

DISTRIBUTION: One species known from Sumatra, Indonesia.

Genus *Zelandatonia* Cook, 1992

(Figs. 654, 709-711)

1992 *Zelandatonia* Cook, Stygologia 7: 46.

Type species: *Zelandatonia orion* Cook, 1992

DIAGNOSIS: Dorsum with two pairs of small platelets, anterior pair with the postocularia (Fig. 709). All four coxal groups placed very close together but not fused. Anterior coxal group (Cx-I+II) much smaller than posterior coxal group (Cx-III+IV). Cx-IV expanded, enclosing genital field (Fig. 654). Suture lines Cx-III/IV incomplete. Glandularia of Cx-III near anterior margin. Genital field with three pairs of acetabula. Palp stocky, especially P2 and P3 (Fig. 710). IV-leg-6 without claws (Fig. 711). IV-leg-5 with several swimming setae.

HABITAT: Interstitial.

DISTRIBUTION: One species known from South Island, New Zealand.


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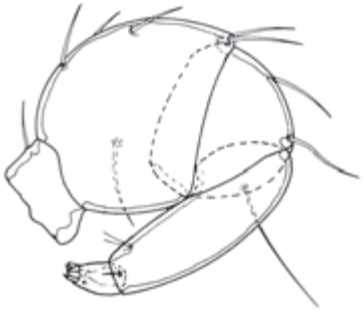
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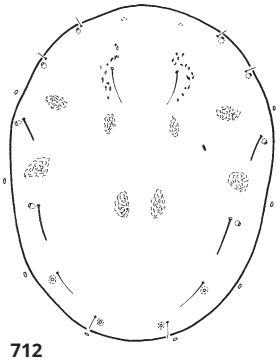
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707 *Nilotonia* (*Telotaolana*) *ankaratra* Goldschmidt, gnathosoma + palp male (after Goldschmidt 2008) Reproduced with permission from copyright holder

708 *Ranautonia dentipalpis* Viets, dorsum male (after Cook 1974)

709 *Zelandotonia orion* Cook, dorsum female (after Cook 1992)

710 *Zelandotonia orion* Cook, palp female (after Cook 1992)

711 *Zelandotonia orion* Cook, IV-leg-5-6 female (after Cook 1992)

712 *Bandakiopsis fonticola* I.M. Smith, dorsum male (after I.M. Smith 1979)

Family Bandakiopsidae Panesar, 2004

2004 Bandankiopsiidae Panesar, Bonner zoologische Monographien 52: 42.

DIAGNOSIS: Lateral eyes on platelets, together with preocular setae and a pair of glandularia; these platelets either separated or fused with ventral shield. Complete dorsal and ventral shields present. Dorsal shield with the postocularia and either 3 or 6 pairs of glandularia (Fig. 712). Dorsal furrow with four pairs of slit organs and none or 3 pairs of glandularia. Ventral shield with 4 or 5 pairs of glandularia. Cx-III medially widely separated. Posterior suture line of Cx-IV present or absent. Cxgl-4 located at the end of a long anterior extension or in an anteromedial indentation of Cx-IV. Genital field with three pairs of acetabula, with a slight sexual dimorphism, in males all acetabula at equal distance from each other, in females first and second pair of acetabula more distanced from each other than second and third pair. Legs without swimming setae. P5 long, with well-developed claws (Fig. 713), P2 with either a medial or ventrodistal seta. IV-leg-6 with well-developed claws, claws with claw blade and clawlet (Fig. 714).

REMARKS: Panesar (2004) erected the family Bandakiopsidae without establishing a type genus, obligatory under the International Code of Zoological Nomenclature. Instead, a species was chosen as type, i.e. *Bandakiopsis fonticola* I.M. Smith, 1979. Therefore, I consider *Bandakiopsis* I.M. Smith, 1979 as the type genus of the family Bandakiopsidae. The family name was written by Panesar (2004) as Bandakiopsiidae, but in Table 11 also as Bandakiopsidae. The latter name is in my opinion the most appropriate, and is used in this publication.

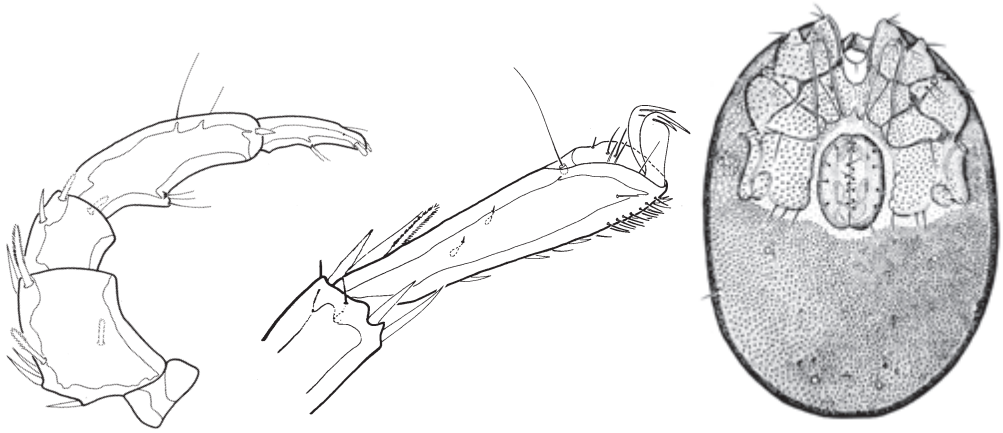
KEY TO THE GENERA

1 Cxgl-4 lying posterior to suture line of Cx-III/IV (Fig. 37); P4 ventrally with setal tubercles (Fig. 713) Genus *Bandakiopsis*

- Cxgl-4 lying on a long extension, reaching either Cx-I or Cx-III (Fig. 715); P4 without ventral setal tubercles (Fig. 716) 2

2 Cxgl-4 lying on a long extension which reaches Cx-I (Fig. 715); Cx-IV with a more or less distinct posterior suture line Genus *Cookacarus*

- Cxgl-4 lying on a long extension which reaches anterior margin of Cx-III; Cx-IV without posterior suture line (Fig. 717) Genus *Oregonacarus*



713 **714** **715**

713 *Bandakiopsis fonticola* I.M. Smith, palp male (after I.M. Smith 1979)

714 *Bandakiopsis fonticola* I.M. Smith, IV-leg-6 male (after I.M. Smith 1979)

715 *Cookacarus columbiensis* Barr, venter female (after Barr 1977)

Genus *Bandakiopsis* I.M. Smith, 1979

(Figs. 37, 712-714)

1979 *Bandakiopsis* I.M. Smith, The Canadian Entomologist 111: 547.

Type species: *Bandakiopsis fonticola* I.M. Smith, 1979

DIAGNOSIS: Dorsal plate with six pairs of glandularia (Fig. 712). Ventral shield with two pairs of posterior glandularia. Cxgl-4 lying in an indentation of the anteromedial corner of Cx-IV, posterior to suture line Cx-III/IV (Fig. 37). Posterior margin of Cx-IV straight or slightly convex, and nearly transverse. P4 ventrally with well-developed setal tubercles (Fig. 713). Claws of P5 relatively small.

HABITAT: Springs.

DISTRIBUTION: One species known from British Columbia, Canada and one species from Darjeeling State, India (Panesar 2004).

Genus *Cookacarus* Barr, 1977

(Figs. 715, 716, 718)

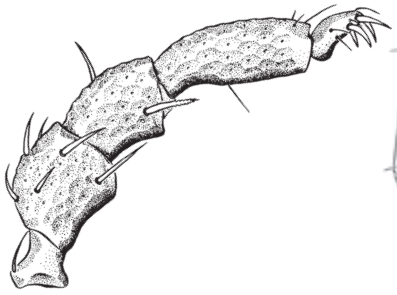
1977 *Cookacarus* Barr, Canadian Journal of Zoology 55: 877.

Type species: *Cookacarus columbiensis* Barr, 1977

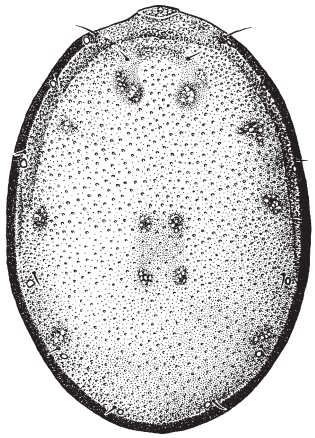
DIAGNOSIS: Dorsal plate six pairs of glandularia (Fig. 718). Ventral shield with two pairs of posterior glandularia. Posterior margin of Cx-IV posteriorly slightly convex. Cxgl-4 on a long extension which reaches Cx-I (Fig. 715). P4 ventrally without setal tubercles, claws of P5 large (Fig. 716).

HABITAT: Springs.

DISTRIBUTION: One species known from British Columbia, Canada.







716 **717** **718**

716 *Cookacarus columbiensis* Barr, palp female (after Barr 1977)

717 *Oregonacarus rivulicolus* I.M. Smith, venter male (after I.M. Smith 1989e)

718 *Cookacarus columbiensis* Barr, dorsum female (after Barr 1977)

Genus *Oregonacarus* I.M. Smith, 1989

(Figs. 717, 719, 720)

1989 *Oregonacarus* I.M. Smith, The Canadian Entomologist 121: 533.

Type species: *Oregonacarus rivulicolus* I.M. Smith, 1989

DIAGNOSIS: Dorsal plate with three pairs of glandularia (Fig. 719). Ventral shield with one pair of posterior glandularia. Posterior margin of Cx-IV obliterated. Cxgl-4 on a large extension which reaches anterior margin of Cx-III (Fig. 717). P4 ventrally without setal tubercles; claws of P5 large (Fig. 720).

HABITAT: Springs.

DISTRIBUTION: One species known from western North America (Oregon, California, USA).

Family Lebertiidae Thor, 1900

1900 Lebertiidae Thor, Nyt Magazin for Naturvidenskaberne 38 (3): 2.

DIAGNOSIS: Idiosoma oval or spherical in shape. Lateral eyes in capsules. Muscle attachments generally unsclerotized, exceptionally with small muscle attachments plates or a complete dorsal shield. Coxal shield covering the anteroventral part of idiosoma, posteriorly approaching or completely surrounding the genital field. A characteristic Y-shaped suture line, extending from anterior margin of genital bay to tips of Cx-I. Leg insertions not set far forward, insertions of IV-L not associated with extensions of coxal surface (Fig. 724). All legs with well-developed claws. Swimming setae present on II-IV-L or absent. Genital field with movable flaps and three, in exceptional cases six pairs of acetabula. Acetabula flanking the gonopore. P1 with one short dorsal seta (long in genus *Scutolebertia*), P2 with 1-2 ventrodistal setae and several short distal setae (but long in *Scutolebertia*), P3 with 4-9 setae, P4 with two fine ventral setae and a short, peg-like mediodistal seta.

KEY TO THE GENERA

1 P2 ventrally with two setae (Fig. 721); Cxgl-2 lying on an extension which reaches almost the tip of Cx-I (Fig. 722) Genus *Paralebertia*

- P2 ventrally with one seta (Fig. 723); Cxgl-2 lying between Cx-II and Cx-III (Fig. 724) 2



719 **720** **721**

719 *Oregonacarus rivulicolus* I.M. Smith, dorsum male (after I.M. Smith 1989e)

720 *Oregonacarus rivulicolus* I.M. Smith, palp male (after I.M. Smith 1989e)

721 *Paralebertia aborigenica* Tuzovskij, palp male (after Tuzovskij 2003c)

2 Dorsum with a large plate (Fig. 725), P2 with very long dorsal setae (Fig. 726) Genus *Scutolebertia*

- Dorsum without large plate, dorsal setae of P2 relatively short (Fig. 723) Genus *Lebertia*

Genus *Lebertia* Neuman, 1880

(Figs. 32, 33, 723, 724, 727-740)

1879 *Pachygaster* Lebert, Bulletin de la Société vaudoise des sciences naturelles (s. 2) 16: 371. (praeocc.)

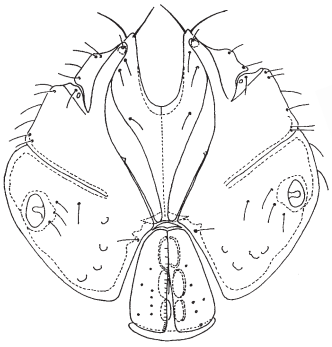
1880 *Lebertia* Neuman, Kongliga Svenska vetenskaps-akademiens handlingar (N.F.) 17: 68.

1896 *Berlesia* Piersig, Zoologica 1: 20.

1905 *Neolebertia* Thor, Zoologischer Anzeiger 28: 820.

1963 *Estelloxus* Habeeb, Leaflets of Acadian Biology 32: 1 – Gerecke (2009a).

Type species: *Pachygaster tauinsignitus* Lebert, 1879



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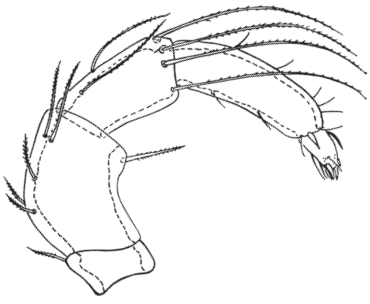
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722 *Paralebertia aborigenica* Tuzovskij, venter male (after Tuzovskij 2003c)

723 *Lebertia* (*Lebertia*) *pusilla* Koenike, palp male (after Di Sabatino et al. 2010)

724 *Lebertia* (*Lebertia*) *fimbriata* Thor, venter female (after Di Sabatino et al. 2010)

725 *Scutolebertia trinitensis* I.M. Smith, dorsum male (after I.M. Smith 1991c)

726 *Scutolebertia trinitensis* I.M. Smith, palp male (after I.M. Smith 1991c)

727 *Lebertia* (*Septlebertia*) *mamolinensis* Tuzovskij, palp male (after Tuzovskij 1982d)

DIAGNOSIS: A well-sclerotized coxal field present which more or less embraces the genital field (Fig. 724), only in exceptional cases extending to lateral margins of idiosoma or onto the lateral parts of dorsum. Dorsal and posteroventral surface membranous. Muscle attachment platelets unsclerotized. Suture lines Cx-II/III forming an acute angle at anterior margin of genital bay, interrupted at level of III-leg insertions. Suture lines Cx-III/IV originating laterally and directed medially at an obtuse angle, obliterated before reaching the genital bay (Fig. 733). Palp without ventral projections on P2-4. P1 with a short, dorsodistal seta; P2 with a strong, pennate ventrodistal seta and several dorsal setae; P3 with 5-8 long, hair-like setae on medial and dorsal surface, one seta (rarely two) of these near ventrodistal margin, two at distal margin in medial or dorsal position, and another two or three (rarely up to five) on dorsal or mediodorsal surface; P4 with two fine ventral setae and a short, peg-like mediodistal seta. Legs with or without swimming setae.

KEY TO THE SUBGENERA

1 P3 with 4-5 setae at distal margin (Fig. 727) Subgenus *Septlebertia*

\- P3 with three setae at distal margin (Fig. 723) 2

2 P3 with two ventrodistal setae, located on the medial and lateral surface; P3 totally with 6-8 setae (Fig. 728); suture lines Cx-II/III in a very acute angle (< 30°) (Fig. 729) Subgenus *Eolebertia*

\- P3 generally with one ventrodistal seta (Fig. 730), if an additional seta is present, both are located on the medial surface of the segment (Fig. 731); P3 totally with 5-6 setae, exceptionally with more than six setae; suture lines Cx-II/III more divergent (≥ 30°) Fig. 724) 3

3 Pointed tips of Cx-I bent ventrally (Fig. 732); acetabula may be divided, resulting in six acetabula (Fig. 733); palp stout (L/H P2 <1.3, P4 <2.7), gnathosoma slender and elongate Subgenus *Brentalebertia*

\- Tips of Cx-I directed anteriorly, not bent ventrally; acetabula not divided; palp more slender (L/H P2 >1.2, P4 >2.5), gnathosoma shorter and stouter (Fig. 734) 4



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728 *Lebertia* (*Eolebertia*) *elsteri* Schwoerbel, palp female (after Di Sabatino et al. 2010)

729 *Lebertia* (*Eolebertia*) *elsteri* Schwoerbel, venter male (after Di Sabatino et al. 2010)

730 *Lebertia* (*Lebertia*) *oblonga* Koenike, palp male (after Di Sabatino et al. 2010)

4 P3 with six (occasionally up to seven) setae (Fig. 735); Cx-IV may extend beyond, or embrace, posterior margin of genital field (Fig. 736) Subgenus *Mixolebertia*

- P3 with five setae (Fig. 737), exceptionally with more than five setae (in a highly variable population of *L. rufipes*); Cx-IV not extending beyond posterior margin of genital field (Fig. 724) 5

5 P4 distally narrowed, all dorsal setae lying in distal quarter of segment (Fig. 737); swimming setae numerous (Fig. 738), also on second leg Subgenus *Pilolebertia*

- P4 various in shape, always at least one dorsal seta in centre or proximal half of segment (Fig. 739); swimming setae only in a limited number of species, not on second leg Subgenus *Lebertia*

Subgenus *Lebertia* s.s.

(Figs. 33, 723, 724, 730, 734, 739)

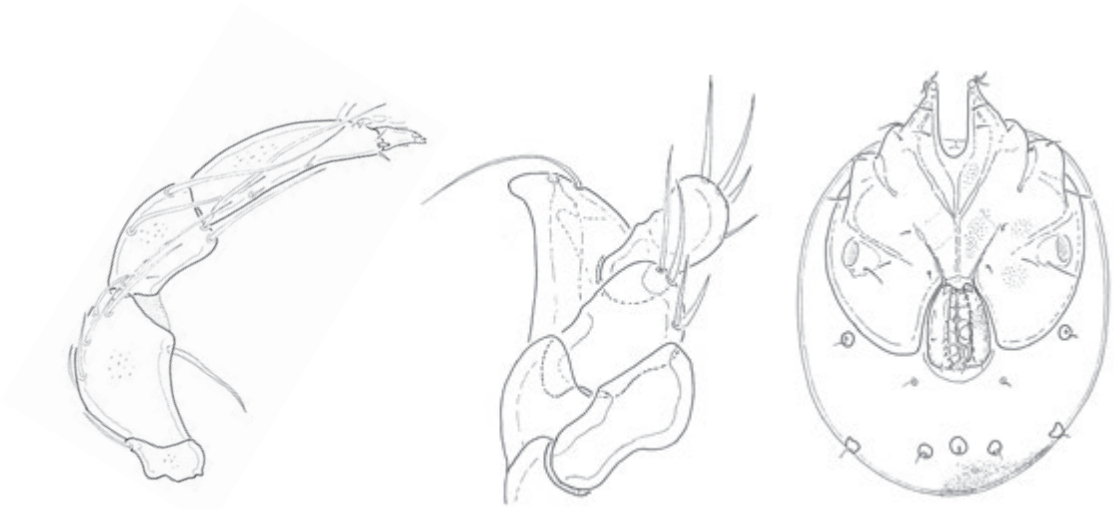
1897 *Pseudolebertia* Thor, Archiv or mathematik og Naturvidenskab 20: 19 - Gerecke (2009a).

DIAGNOSIS: Medial surface of P3 with five setae. P4 bearing fine dorsal setae in proximal and distal part of segment (Figs. 723, 730, 739). Legs with or without swimming setae, only in exceptional cases in higher numbers. Cx-IV in males rarely extending posteriorly beyond genital field, excretory pore in most species unsclerotized.

HABITAT: Springs, streams, lakes.

DISTRIBUTION: Numerous species known from the Holarctic. Furthermore, one species known from Liberia (Cook 1966), one from Mexico (Cook 1980) and several species from southern China (Wang et al. 2016a).

REMARKS: Probably a paraphyletic or polyphyletic clade (Di Sabatino et al. 2010).



731 **732** **733**

731 *Lebertia* (*Pilolebertia*) *insignis* Neuman, palp male (after Di Sabatino et al. 2010)

732 *Lebertia* (*Brentalebertia*) *minutipalpis* K. Viets, tips of anterior coxae, later view, female (after Di Sabatino et al. 2010)

733 *Lebertia* (*Brentalebertia*) *hygropetrica* Gerecke, venter female (after Di Sabatino et al. 2010)

Subgenus *Brentalebertia* Gerecke, 2008

(Figs. 732, 733, 740)

2008 *Brentalebertia* Gerecke, Fundamental and Applied Limnology, Archiv für Hydrobiologie 170: 325.

Type species: *Lebertia hygropetrica* Gerecke, 2008

DIAGNOSIS: Coxal field anteriorly narrowed, tips of Cx-I bent ventrally (Fig. 732). Gnathosoma flat and slender in lateral view (Fig. 740), palp very stout (L/H P2 1.2-1.3, P4 1.9-2.5). P3 bearing 5-6 medial setae, P4 shortened with convex dorsal and ventral margins, maximum height in centre of segment near insertion of proximoventral seta (Fig. 740). Acetabula simple or doubled (Fig. 733), but two acetabula on each side always have a basal sclerites in common (resulting in six pairs of acetabula arranged on each side of gonopore on three basal sclerites). Legs with swimming setae absent or weakly developed. Distal segments of I-leg with numerous fine ventral setae, II-III-leg-3-4 distally with numerous strong and stout sword setae. Leg claws with ventral and clawlet and claw blade. Excretory pore sclerotized or smooth.

HABITAT: Hygropetric, springs.

DISTRIBUTION: Four species known from the Western Palaearctic (Gerecke 2009a, Esen et al. 2013a).

Subgenus *Eolebertia* Gerecke, 2009

(Figs. 728, 729)

2009 *Eolebertia* Gerecke, Abhandlungen der Senckenberg Gesellschaft für Naturforschung 566: 132.

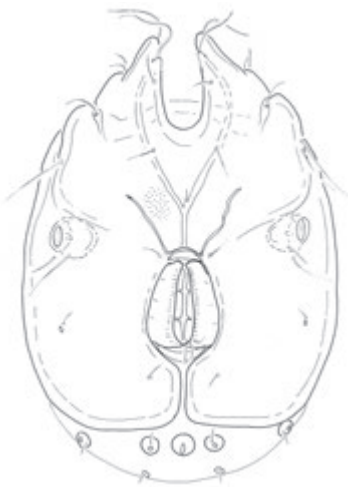
Type species: *Lebertia elsteri* Schwoerbel, 1957



734



735



736

734 *Lebertia* (*Lebertia*) *fimbriata* Thor, gnathosoma + palp male (after Di Sabatino et al. 2010)

735 *Lebertia* (*Mixolebertia*) *sefvei* Walter, palp female (after Di Sabatino et al. 2010)

736 *Lebertia* (*Mixolebertia*) *sefvei* Walter, venter male (after Di Sabatino et al. 2010)

DIAGNOSIS: Coxal field elongated and slender. Cx-I + II posteriorly forming an acute angle (< 30°) (Fig. 729). Gnathosoma and chelicera robust and stout. Posteromedial margins of Cx-IV not including ventralia 1. P2 with short and stout ventral seta, three robust dorsocentral setae and two finer and longer dorsodistal setae; P3 with 6-8 long, basally very robust setae (Fig. 728); P4 with 5-6 irregularly scattered, hair-like dorsal setae, both ventral setae in in distal half of segment, arranged close to each other, or apart and dividing the segment 2:1:1; peg-like setae well developed, long and pointed; P5 long and slender. IV-leg 4 bearing one, IV-leg-5 bearing two short, hair-like setae. Excretory pore not sclerotized.

HABITAT: Springs, interstitial.

DISTRIBUTION: Two species known from Central and Southern Europe. A species described from China (Wang et al. 2020) blurred the separation of the subgenera *Eolebertia* and *Septlebertia*. Future studies must show whether these subgenera can be maintained or not.

Subgenus *Mixolebertia* Thor, 1906

(Figs. 32, 735, 736)

1906 *Mixolebertia* Thor, Zoologischer Anzeiger 29: 769.

1906 *Hexalebertia* Thor, Zoologischer Anzeiger 31: 69 – Newell (1959).

1911 *Durolebertia* Thor, Zoologischer Anzeiger 37: 386.

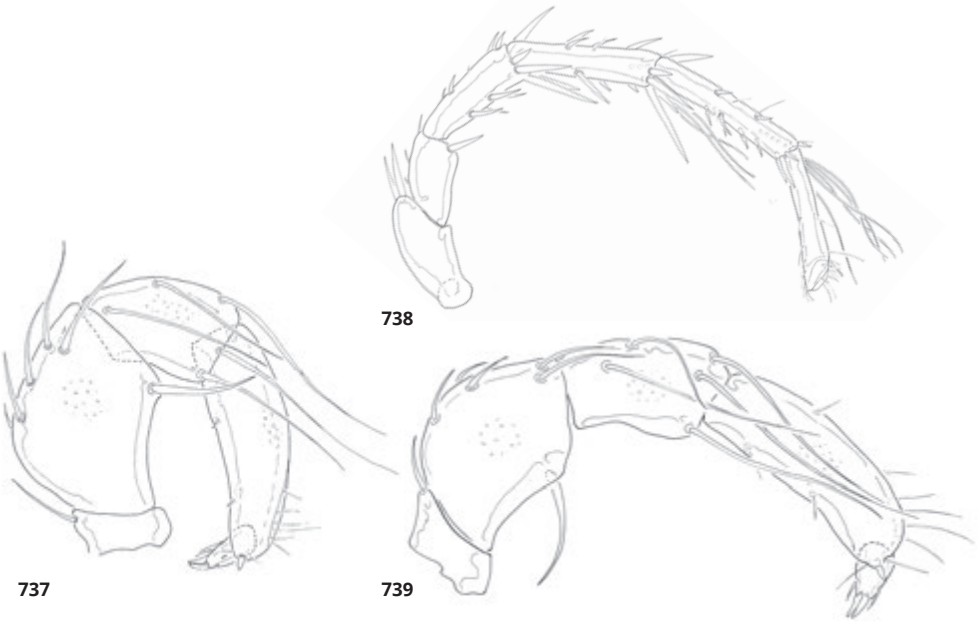
1911 *Apolebertia* Thor, Zoologischer Anzeiger 38: 423.

Type species: *Lebertia brevipora* Thor, 1899

DIAGNOSIS: Medial surface of P3 with six (occasionally up to seven) setae (Fig. 735). Legs with or (more frequently) without swimming setae.

HABITAT: Ponds, lakes, springs, streams, hygropetric.

DISTRIBUTION: Numerous species known from the Holarctic.



737 *Lebertia* (*Pilolebertia*) *porosa* Thor, palp male (after Di Sabatino et al. 2010)

738 *Lebertia* (*Pilolebertia*) *pilosa* Maglio, fourth leg male (after Di Sabatino et al. 2010)

739 *Lebertia* (*Lebertia*) *maglioi* Thor, palp male (after Di Sabatino et al. 2010)

Subgenus *Pilolebertia* Thor, 1900

(Figs. 731, 737, 738)

1900 *Pilolebertia* Thor, Nyt Magazin for Naturvidenskaberne 38 (3): 268.

1937 *Distolebertia* Husiatinschi, Zoologischer Anzeiger 118: 155.

Type species: *Lebertia insignis* Neuman, 1880

DIAGNOSIS: Integument smooth or with fine striation. Coxal field not expanding to lateral and posteroventral idiosoma. Palp generally slender. P3 bearing five medial setae, one of these in ventrodistal position; P4 distally narrowed, dorsal setae concentrated to a longitudinal pit in distal quarter of segment (Fig. 737). Legs with numerous swimming setae.

HABITAT: Lakes, pools in streams, streams, lowland rivers.

DISTRIBUTION: The most widespread subgenus. Many species are found in the Holarctic, a few species are known from South Africa (K. Viets 1956a), southern China (Jin 1994, 1997b; Guo et al. 2005; Wang et al. 2016b), Guatemala (K.O. Viets 1977a) and Costa Rica (Cook 1980).

Subgenus *Septlebertia* Imamura, 1954

(Fig. 727)

1954 *Septlebertia* Imamura, Journal of Hokkaido Gakugei University, Section B, Supplement 1: 64.

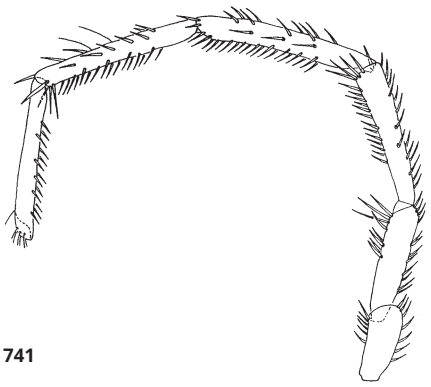
Type species: *Lebertia brunnea* Imamura, 1954 = *Lebertia imamurai* Viets, 1956

DIAGNOSIS: Integument with longish papillae. P3 with 4-5 setae at distal margin (Fig. 727). Legs without swimming setae. Excretory pore unsclerotized.

HABITAT: Springs, streams.



740



741



742

740 *Lebertia* (*Brentalebertia*) *hygropetrica* Gerecke, gnathosoma + palp female (after Di Sabatino et al. 2010)

741 *Paralebertia aborigenica* Tuzovskij, fourth leg male (after Tuzovskij 2003c)

742 *Scutolebertia trinitensis* I.M. Smith, venter male (after I.M. Smith 1991c)

DISTRIBUTION: Three species known from Japan (*L. imamurai* Viets, 1956). Afghanistan (*L. noshaqensis* Imamura, 1966) and Magadan Province, Russian Far East (*L. mamolinensis* Tuzovskij, 1982). A second species from the Russian Far East assigned to this subgenus (i.e. *L. dmitrii* Semenchenko & Tuzovskij, 2010), according to the diagnosis used in this publication belongs to *Mixolebertia*.

REMARKS: The name *Septlebertia* was introduced for a species bearing seven setae on P3. However, here the presence of 4-5 setae at the distal margin of P3 is considered diagnostic.

Genus *Paralebertia* Tuzovskij, 2003

(Figs. 721, 722, 741)

2003 *Paralebertia* Tuzovskij, Zoologiceskij Zurnal 82: 872.

Type species: *Lebertia aborigenica* Tuzovskij, 1990

DIAGNOSIS: Cxgl-2 lying on an extension which reaches almost the tip of Cx-I (Fig. 722). Median suture line of Cx-II in male very short, in female absent. P2 ventrally with 2-3 setae (Fig. 721), P3 dorsally with 3-4 stout setae, two thin setae and two mediodorsal setae, mediodistally with only one seta near anterodorsal corner; mediodistal seta of P3 lacking, anteroventral seta of P3 lacking or present. All small ventral setae of P4 lying in the distal half of segment or all three lying near centre of segment. Legs without swimming setae, but IV-leg segments with numerous short setae, especially IV-leg-3-6 (Fig. 741).

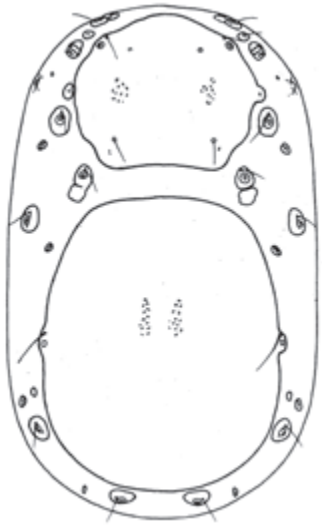
HABITAT: Mountain lakes.

DISTRIBUTION: One species known from Magadan Province, Russia.





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743 **744** **745**

743 *Scutolebertia trinitensis* I.M. Smith, venter female (part.) (after I.M. Smith 1991c)

744 *Raptorhydracarus tomasini* Pešić & Gerecke, dorsum male (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

745 *Protolimnesia* (*Protolimnesella*) *interstitialis* Cook, dorsum male (after Cook 1980)

Genus *Scutolebertia* I.M. Smith, 1991

(Figs. 725, 726, 742, 743)

1991 *Scutolebertia* I.M. Smith, The Canadian Entomologist 123: 817.

Type species: *Scutolebertia trinitensis* I.M. Smith, 1991

DIAGNOSIS: A large dorsal plate covering nearly complete dorsum, with the postocularia and four pairs of glandularia (Fig. 725). Gnathosomal bay small. Venter nearly completely covered by an extensive ventral shield incorporating coxae and genital field (Fig. 742). Genital field with three pairs of acetabula, male posteriorly with a group of long setae (Fig. 742), all setae in genital field of female short (Fig. 743). P1 dorsally with one long seta, P2 dorsally with five long setae, P3 dorsally with four long setae, ventral and mediodistal margins without setae (Fig. 726).

HABITAT: Hyporheic, streams.

DISTRIBUTION: One species known from California, USA.

Family Limnesiidae Thor, 1900

1900 Limnesiidae Thor, Nyt Magazin for Naturvidenskaberne 38: 3.

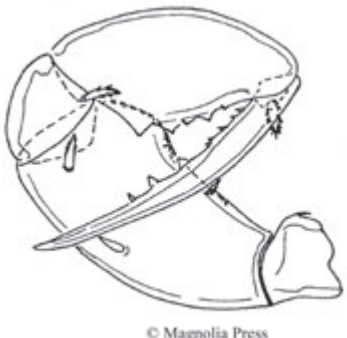
1936 Neotorrenticolidae Lundblad, Zoologischer Anzeiger 116: 204 – Cook (1974).

1953 Epallagopodidae K. Viets, Veröffentlichungen Museum Bremen, A 2: 153 – Cook (1974).

1954 Neomamersidae Lundblad, Arkiv för Zoologi (Serie 2) 5: 447.

DIAGNOSIS: Integument varying from soft without dorsalia or ventralia to species with well-developed dorsal and ventral shields. Lateral eyes not in capsules, but lying either below the integument or more rarely incorporated in the integument. Coxae in four groups or exhibiting varying degrees of fusion. Medial part on Cx-III with conspicuous glandularia (Cxgl-4, formerly called *Glandulae Limnesia*), or these glandularia shifted to a bifurcation of the suture lines between Cx-III/IV, or absent. When the medial part of the suture line Cx-III/IV is obliterated, Cxgl-4 appear to lie on Cx-III or Cx-IV. Cx-IV in most cases triangular. Genital field with three to numerous acetabula, on the movable flaps in females, generally on an unpaired, roundish immovable plate completely surrounding the gonopore in males. Palp five-segmented, P2 typically with a peg-like ventral seta, but occasionally this seta hair-like or absent. Swimming setae absent or present. IV-leg with or without claws.





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746 **747** **748**

746 *Kawamuracarus serratipalpis* Cook, palp female (after Cook 1974)

747 *Raptorhydracarus tomasini* Pešić & Gerecke, palp male (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

748 *Nicalimnesia andha* Cook, IV-leg-6 female (after Cook 1974)

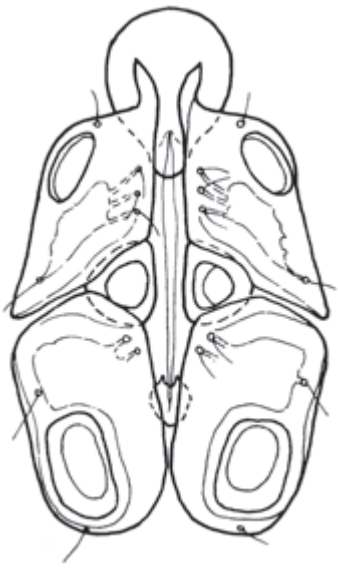
REMARKS: In the past, the family was assigned to the superfamily Hygrobatoidea. Dabert et al. (2016), however, showed, based on molecular data, that the family should be assigned to the Lebertioidea.

KEY TO THE SUBFAMILIES OF THE LIMNESIIDAE

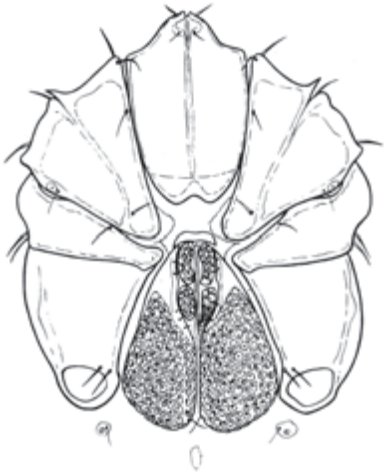
1	Genital flaps divided by a membranous transversal line into an anterior and a posterior part (Fig. 750)	2
-	Genital flaps not divided (but may be constricted laterally, Fig. 770)	4
2	Fourth legs without claws; ventral shield with small anterolateral projections on each side	Subfamily Neomamersinae
-	Fourth legs with claws; ventral shield without anterolateral projections	3
3	Dorsal and ventral shields present, ventral shield divided in an anterior plate and a much larger posterior plate; palp with large tubercles	Subfamily Nicalimnesiinae (in part)
-	Dorsum and venter may exhibit extensive sclerotization, but a complete ventral shield never developed; palp without large tubercles	Subfamily Mixolimesiinae
4(1)	P4 with large tubercles (Fig. 746)	5
-	P4 without large tubercles (Fig. 795)	6
5	Dorsal and ventral shields present	Subfamily Nicalimnesiinae (in part)
-	Dorsum may be completely covered by two large plates, but always without ventral shield	Subfamily Kawamuracarinae



749



750



751

749 *Neomamersa lundbladi paucipora* Cook, 1V-leg-6 male (after Cook 1974)

750 *Mixolimnesia pallida* Cook, genital field male (after Cook 1988)

751 *Neotorrenticola violacea* Lundblad, venter male (after Cook 1974)

6(4) Genital field with numerous acetabula, these arranged in three groups on each side: a large posterior group containing most of the acetabula, and two anteriorly located groups; these groups always distinct in male, but may be indistinct in females of some species (Fig. 751) Subfamily Neotorrenticolinae

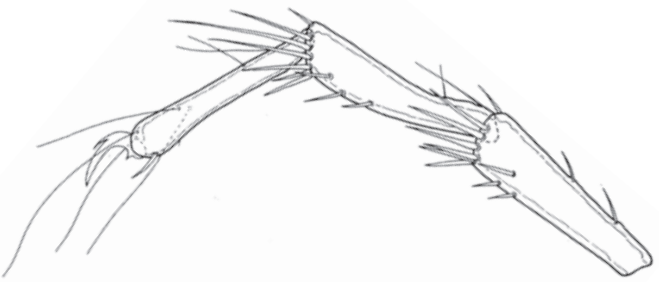
- Acetabula various in number, if more than three pairs present, these not in three distinct groups 7

7 Fourth legs bearing well-developed claws (Fig. 752) 8

- Fourth legs without well-developed claws, a long terminal seta may be present (Fig. 753) 12

8(6) P5 very long, longer than P4 (Fig. 747) Subfamily Raptorhydracarinae

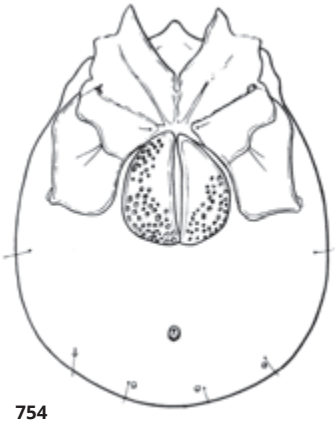
- P5 not longer than P4 9



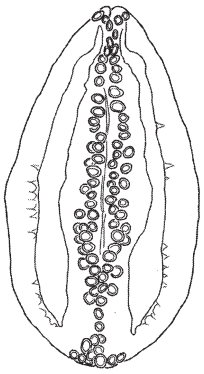
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752 *Tyrrellia* (*Scutotyrrellia*) *scutata* Cook, IV-leg-4-6 male (after Cook 1974)

753 *Limnesia* (*Limnesia*) *pinguipalpis* Cook, IV-leg-6 female (after Cook 1974)

754 *Rheolimnesia motasi* Lundblad, venter female (after Cook 1974)

755 *Rheolimnesia costarricense* Goldschmidt, genital field male (after Goldschmidt 2004c)

756 *Tyrrellia* (*Scutotyrrellia*) *scutata* Cook, dorsum female (after Cook 1974)

757 *Protolimnesia* (*Protolimnesia*) *unguiculata* Walter, venter female (after Cook 1974)

9 Idiosoma with complete dorsal and ventral shields, genital flaps movable in both sexes, acetabula numerous, lying on the genital flaps in female (Fig. 754), but in the membranous area between genital flaps in male (Fig. 755) Subfamily Rheolimnesiinae

- Not with the above mentioned characters; genital flaps of males often not movable, fused to an unpaired plate; species with dorsal and ventral shields, and genital field with numerous acetabula, have acetabula lying on the genital flaps in both sexes 10

10 Integument with rounded papillae, lateral eye lenses at surface of integument and surrounded by a sclerotized area (Fig. 756) Subfamily Tyrrelliinae

- Integument not papillate, lateral eye lenses lying below integument 11

11 Dorsal and ventral shields absent; genital field with three pairs of acetabula (Fig. 757) Subfamily Protolimnesiinae (part.)

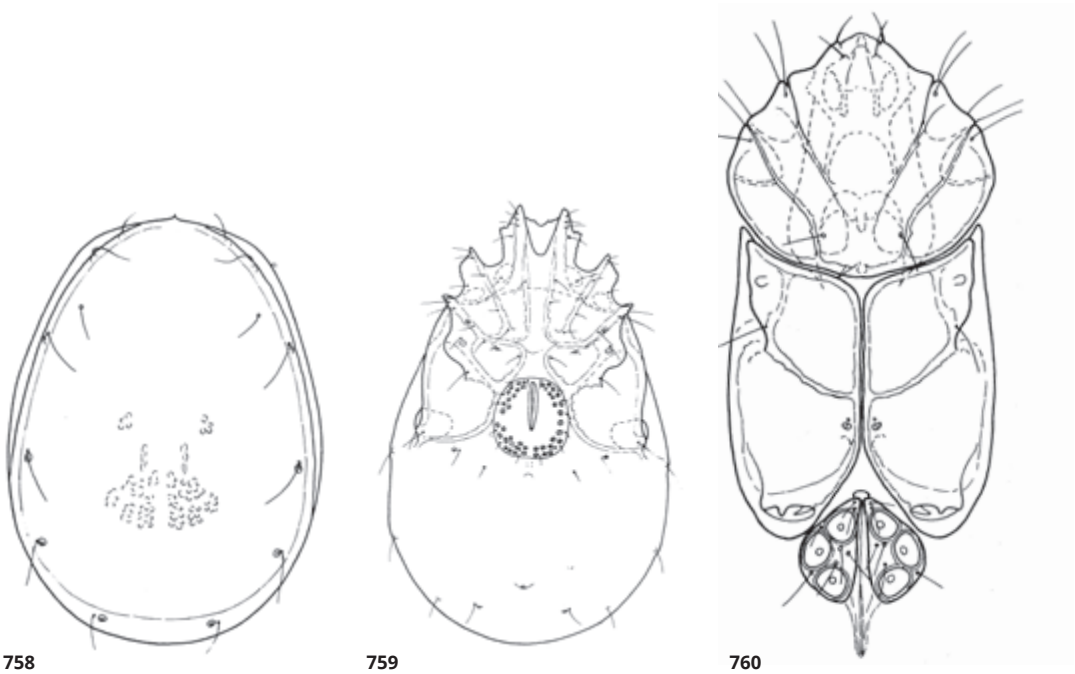
- Dorsal (Fig. 758) and ventral shields present; genital field with more than three pairs of acetabula (Fig. 759) Subfamily Mixdeinae

12(7) Gnathosoma fused with Cx-I; idiosoma elongated (Fig. 760), part posterior to genital field distinctly longer than coxal field and greatly swollen posteriorly (Fig. 761) Subfamily Psammolimnesiinae

- Gnathosoma not fused with Cx-I (Fig. 762); idiosoma of normal shape, not elongated, part posterior to genital field shorter than coxal field 13

13 P4 with a mediodistal peg-like seta (Fig. 763); gnathosoma without posterior apodemes (Fig. 763); movable genital flaps present in both sexes Subfamily Epallagopodinae

- P4 without a mediodistal peg-like seta; gnathosoma usually with posterior apodemes (Fig. 764); movable flaps usually present in females only Subfamily Limnesiinae



758 *Tubomixdea botosaneanui* (Cook), dorsum male (after Cook 1981a)

759 *Tubomixdea botosaneanui* (Cook), venter male (after Cook 1981a)

760 *Psammolimnesia mexicana* Cook, venter male (after Cook 1974)

Subfamily Epallagopodinae K. Viets, 1953

1953 Epallagopodinae K. Viets, Veröffentlichungen Museum Bremen, A 2: 153.

DIAGNOSIS: Dorsal and ventral shields present. Cxgl-4 lying near anterior margin of Cx-III. Cx-I and Cx-II medially fused, with a distinct medial suture line. Suture line between Cx-III/IV incomplete, present laterally only. Medial margins of Cx-IV reduced to angles (Fig. 765). Gnathosoma without posterior apodemes (Fig. 763); a well-developed rostrum is present. Genital field lying well posteriorly to Cx-IV, with three pairs of acetabula (Figs. 766- 767). Genital field with movable flaps in both sexes. P2 anteroventrally with a large peg-like seta. P4 with well-developed ventral setal tubercles and a short peg-like seta mediodistally, P5 relatively long (Fig. 763). Swimming setae absent, IV-leg without claws. Monotypic.

Genus *Epallagopus* K. Viets, 1953

(Figs. 763, 765-767)

1953 *Epallagopus* K. Viets, Veröffentlichungen Museum Bremen, A 2: 153.

Type species: *Epallogopus tecticoxalis* K. Viets, 1953

DIAGNOSIS: As for subfamily.

HABITAT: Springs.

DISTRIBUTION: One species known from El Salvador.

Subfamily Kawamuracarinae K. Viets, 1943

1943 Kawamuracarinae K. Viets, Archiv für Hydrobiologie 40: 15.

DIAGNOSIS: Lateral without eye pigment. Dorsum with three small platelets or two large plates (Fig. 768). When three platelets are present, the anterior pair bearing a pair of glandularia and the postocularia, the posteromedial platelet without glandularia. If two large dorsal plates are present, anterior plate with two pairs of glandularia and the postocularia, the posterior plate with two pairs of glandularia. Coxae in for groups, Cxgl-4 near anterior margin of Cx-III (Fig. 769). Venter without secondary sclerotization. Genital field with three (Fig. 770) to numerous acetabula (Fig. 769). Genital flaps with a lateral indentation between the first and second acetabula, in polyacetabulate species between the first and second group of acetabula. Medial surface of P4 with heavy setae, which may be bifurcate (Fig. 746). P5 relatively long and tapering to a point at tip. Swimming setae absent. IV-leg-6 with variously developed claws (Fig. 771), or without claws (Fig. 772). Monotypic.



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763

761 *Psammolimnesia mexicana* Cook, venter female (after Cook 1974)

762 *Limnesia* (*Limnesia*) *separata*, venter female (after Cook 1974)

763 *Epallagopus tecticoxalis* K. Viets, gnathosoma + palp female (after Cook 1974)

Genus *Kawamuracarus* Uchida, 1937

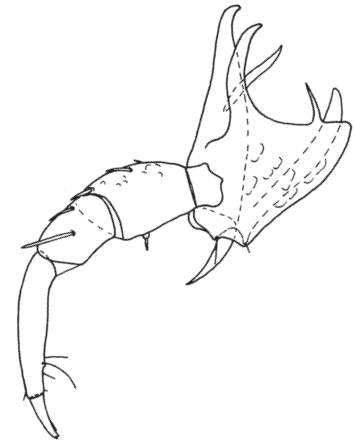
(Figs. 746, 768-772)

1937 *Kawamuracarus* Uchida, Bulletin of the Biogeographical Society of Japan 7: 22.
Type species: *Kawamuracarus elongatus* Uchida, 1937

DIAGNOSIS: As for subfamily.

HABITAT: Hyporheic.

DISTRIBUTION: Several species known from Japan, Europe, North America (I.M. Smith & Cook 2000), Mexico (Cook 1980, Cramer 1987), India (Cook 1967), Oman (Smit 2003a), Indonesia (Smit 1992a) and Ghana (Smit 2014a).



764



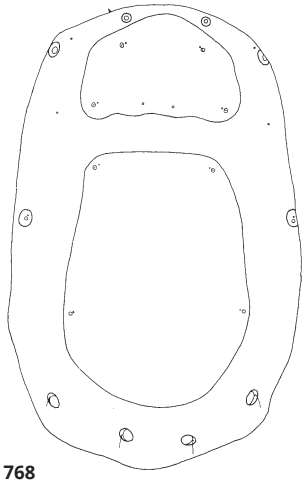
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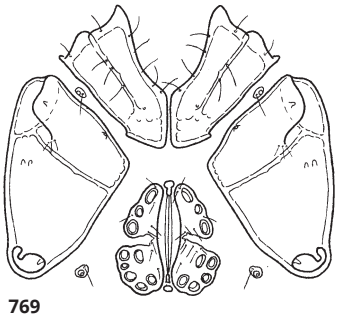
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768



769

764 *Limnesia* (*Limnesia*) *firrolda* Cook, gnathosoma + palp male (after Cook 1980)

765 *Epallagopus tecticoxalis* K. Viets, venter female (after Cook 1974)

766 *Epallagopus tecticoxalis* K. Viets, genital field female (after Cook 1974)

767 *Epallagopus tecticoxalis* K. Viets, genital field male (after Cook 1974)

768 *Kawamuracarus biscutatus* Smit, dorsum female (after Smit 2014a)

769 *Kawamuracarus polyporus* Cook, venter male (after Cook 1974)

Subfamily Limnesiinae Thor, 1900

1979 Stygolimnesiinae Imamura, Proceedings of the 4th International Congress of Acarology: 160 – Cook (1986).

DIAGNOSIS: Lateral eyes separated on each side, not in capsules. Sclerotization of idiosoma variable, from completely smooth to well-developed dorsal and ventral shields. Cxgl-4 present, usually located medially near anterior margin of Cx-III. Coxae in four groups, in three groups or fused into a coxal shield. Genital field with three to many pairs of acetabula. Gnathosoma usually with posterior apodemes. Movable genital flaps present in female, these flaps not subdivided. In males the flaps are usually fused anteriorly and posteriorly, forming a ring-like sclerite surrounding the gonopore. However, occasionally movable flaps are present in the males as well. Ventral seta of P2 variable, P4 without peg-like setae. Swimming setae present or absent. Legs occasionally with sexual dimorphism. IV-leg-6 without claws. In many genera females do not show generic characters.

KEY TO THE GENERA

1 Gnathosoma attached to a protrusable tube (Fig. 773); postocularia located far posteriorly, in case two large dorsal plates are present, the postocularia are located on the posterior plate (Fig. 774) 2

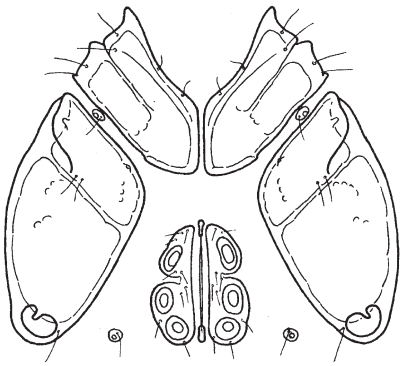
\- Gnathosoma generally not attached to a protrusable tube; postocularia located more anteriorly, in case a protrusable tube is developed and two large dorsal plates are present, the postocularia are located on the anterior plate (Fig. 775) 3

2 Dorsum with large plates (Fig. 774), venter with a ventral shield incorporating coxae and genital field Genus *Tubophorella*

\- Dorsum without large plates (Fig. 776), venter without ventral shield Genus *Tubophora*

3(1) Male III-leg-6 greatly expanded (Fig. 777), other legs not greatly expanded Genus *Physolimnesia*

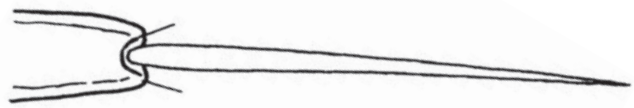
\- If III-leg-6 is somewhat expanded, then III-leg-5 is also enlarged 4



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770 *Kawamuracarus uniscutatus* Cook, venter male (after Cook 1974)

771 *Kawamuracarus polyporus* Cook, IV-leg-6 female (after Cook 1974)

772 *Kawamuracarus serratipalpis* Cook, tip of IV-leg-6 female (after Cook 1974)

4 Genital flaps of male separated medially and with pronounced anteroventral projections (Fig. 778) Genus *Pterolimnesia*

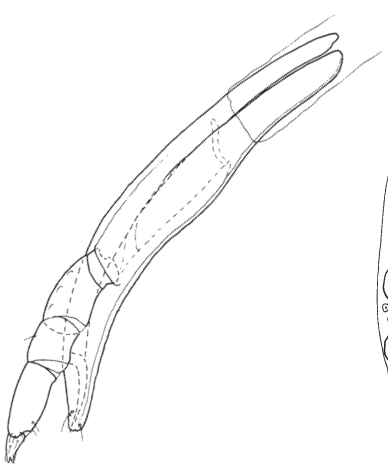
- Genital flaps of male usually fused anteriorly and posteriorly (Fig. 779); if flaps of male are separated, there are no anteroventral projections (Fig. 780) 5

5 Second leg of male modified to form a grasping organ (Fig. 781) 6

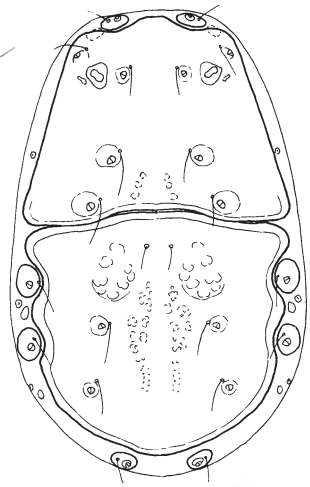
- Second leg of male not modified 7

6 In addition to second leg, also first leg changed into a grasping organ (Fig. 782); male genital field not partially covered by coxae (Fig. 783) Genus *Timmsilimnesia*

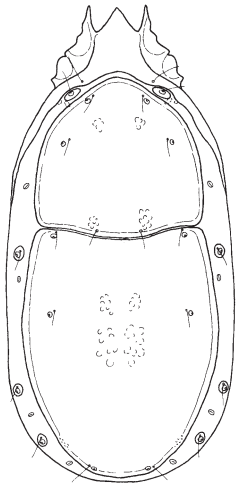
- Only second leg modified: II-leg-4 expanded, II-leg-5 with a concave ventral margin and II-leg-6 bowed (Fig. 784); genital field partially covered by the coxae (Fig. 785) Genus *Xenolimnesia*



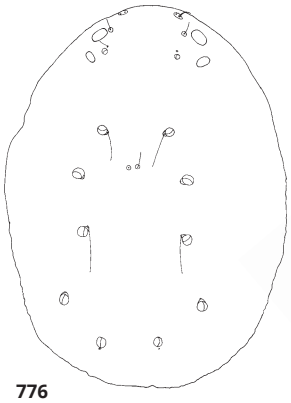
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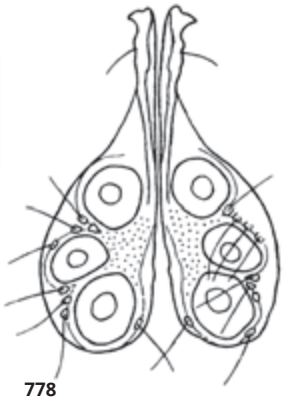
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773 *Tubophorella amoena* K.O. Viets, gnathosoma + palp female (after Cook 1986)

774 *Tubophorella amoena* K.O. Viets, dorsum male (after Cook 1986)

775 *Limnesia* (*Limnesia*) *hopa* Cook, dorsum male (after Cook 1986)

776 *Tubophora limnesioides* Walter, dorsum male

777 *Physolimnesia australis* Halík, III-leg-5-6 male (after Halík 1940)

778 *Pterolimnesia conjuncta* (Walter), genital field male (after Cook 1974)

7(5) Genital field of male posteriorly bulging, with the gonopore lying on this bulge (Fig. 786) Genus *Fijilimnesia*

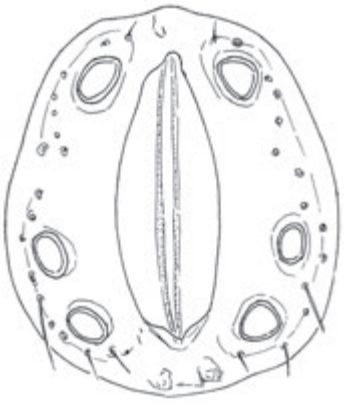
- Genital field of male posteriorly not bulging 8

8 Third leg with a pronounced sexual dimorphism, male III-leg-5 widened anteriorly, III-leg-6 stocky (Fig. 787); genital field with three pairs of acetabula Genus *Centrolimnesia*

- Third leg without pronounced sexual dimorphism; if a weak sexual dimorphism is present, genital field with more than three pairs of acetabula 9

9 IV-leg of male modified, IV-leg-1-4 elongated (Fig. 788); male genital field very large, extending far posterolaterally (Fig. 789) Genus *Acantholimnesia*

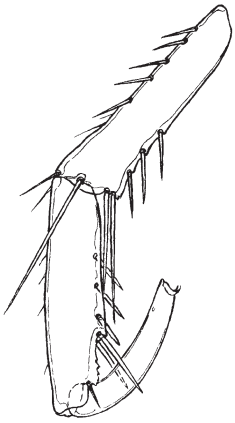
- IV-leg of male not as above; genital field of male much smaller, not extending far posterolaterally (Fig. 790) Genus *Limnesia*



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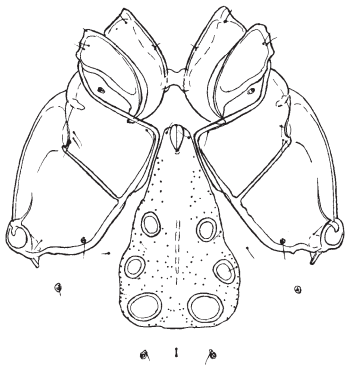
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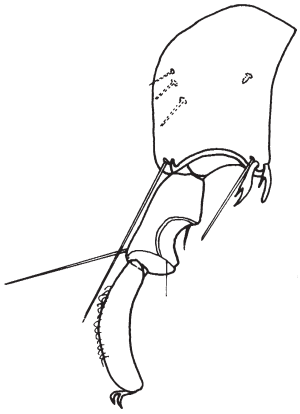
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779 *Limnesia* (*Limnesia*) *connata* Koenike, genital field male (after Gerecke et al. 2016)

780 *Limnesia* (*Limnesiopsides*) *pectungulata* K. Viets, venter male (after Cook 1974)

781 *Timmsilimnesia ingens* (K.O. Viets), II-leg-4-6 male (after K.O. Viets 1984b)

782 *Timmsilimnesia ingens* (K.O. Viets), I-leg-3-6 male (after K.O. Viets 1984b)

783 *Timmsilimnesia ingens* (K.O. Viets), venter male (after K.O. Viets 1984b)

784 *Xenolimnesia wetteni* Smit, II-leg-4-6 male (after Smit 1994)

Genus *Acantholimnesia* K. Viets, 1954

(Figs. 788, 789, 791)

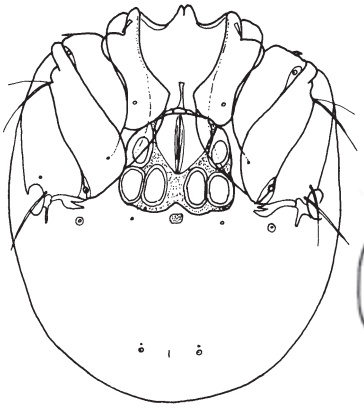
1954 *Acantholimnesia* K. Viets, Schweizerische Zeitschrift für Hydrologie 16: 122.

Type species: *Acantholimnesia millepora* K. Viets, 1954

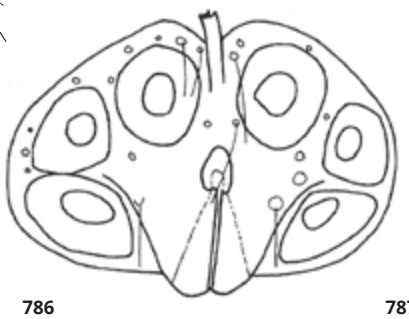
DIAGNOSIS: Idiosoma weakly sclerotized. Coxae in four groups, Cx-II not extending to midline. Genital field with numerous acetabula. Genital flaps movable in female (Fig. 791), but lightly fused anteriorly and posteriorly in male. Gonopore of male small, genital plates wing-like, extended far posterolaterally (Fig. 789). P2 ventrally with a peg-like seta on a tubercle. Swimming setae present. Male IV-leg-1-4 elongated, IV-leg-4 with several stout setae (Fig. 788). Leg claws with dorsal and ventral clawlet.

HABITAT: Flooded forests, rivers.

DISTRIBUTION: One species known, collected in the Amazon River region, Brazil.



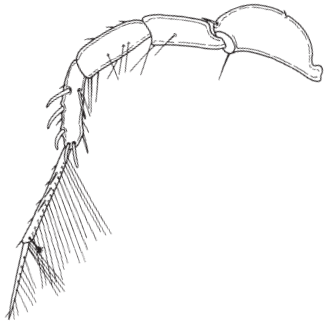
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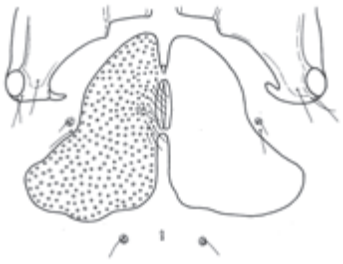
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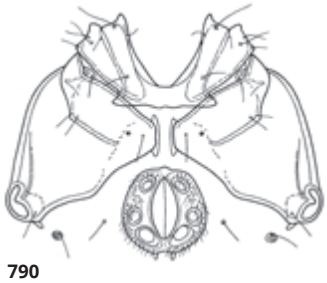
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785 *Xenolimnesia wetteni* Smit, venter male (after Smit 1994)

786 *Fijilimnesia fluviatilis* Smit, genital field male (after Smit 2003b)

787 *Centrolimnesia schubarti* K. Viets, III-leg-5-6 male (after Cook 1974)

788 *Acantholimnesia millepora* K. Viets, fourth leg male (after Cook 1974)

789 *Acantholimnesia millepora* K. Viets, genital field male (after Cook 1974)

790 *Limnesia* (*Limnesia*) *lembangensis* Piersig, venter male (after Cook 1974)

Genus *Centrolimnesia* Lundblad, 1935

(Figs. 787, 792-795)

1935 *Centrolimnesia* Lundblad, Arkiv för Zoologi 28A: 5.

Type species: *Centrolimnesia bondi* Lundblad, 1935

DIAGNOSIS: Lateral eyes strongly enlarged. Idiosoma weakly sclerotized. Coxae in four groups. Medial margin of Cx-I very long. Cx-II not extending to midline. Cxgl-4 between Cx-III and Cx-IV (Figs. 792, 793). Genital field with three pairs of acetabula (Fig. 794). Genital flaps movable in female but not in male. Anterior pair, and in some species also second pair of acetabula, in male located well anterior to the gonopore. P2 ventrally with peg-like seta, which may be lying on a small tubercle (Fig. 795). Swimming setae present. III-leg with pronounced sexual dimorphism, especially II-leg-5, to a more limited extent III-leg-6 (Fig. 787).

HABITAT: Standing waters, also planktonic, and slow flowing streams.

DISTRIBUTION: Several species known from Haiti, Brazil, Paraguay (K.O. Viets & Böttger 1986; Rosso de Ferradás & Böttger 1997), Surinam, Columbia, Ecuador (Gerecke et al. 1997), the Caribbean (Haiti), Mexico, Costa Rica (Cook 1980) and the southern USA (Florida, Louisiana, I.M. Smith & Cook 1996).

Genus *Fijilimnesia* Smit, 2003

(Figs. 786, 796-799)

2003 *Fijilimnesia* Smit, Acarologia 42: 352.

Type species: *Fijilimnesia fluviatilis* Smit, 2003

DIAGNOSIS: Idiosoma without extensive sclerotization. Coxae in four groups, suture line Cx-III/IV incomplete, not reaching midline (Fig. 796). Cxgl-4 posterior to suture line Cx-III/IV. Genital field with three pairs of acetabula, male gonopore lying on a posteriorly directed bulge (Fig. 786). P2 ventrally with a peg-like seta, either inserted more or less directly on the segment or lying on a bulge (Fig. 797). Legs with swimming setae. III-leg slightly to strongly modified, in the latter case III-leg-enlarged (Fig. 798). IV-leg-6 without claws but with a long terminal seta (Fig. 799).

HABITAT: Streams.

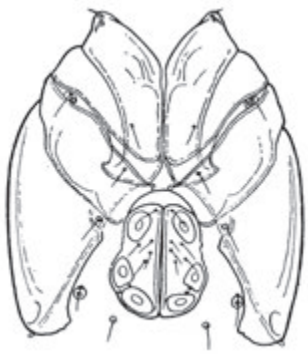
DISTRIBUTION: Two species known from Viti Levu, Fiji.



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791 *Acantholimnesia millepora* K. Viets, genital field female (after Cook 1974)

792 *Centrolimnesia schubarti* K. Viets, venter male (after Lundblad 1941b)

793 *Centrolimnesia schubarti* K. Viets, venter female (after Lundblad 1941b)

Genus *Limnesia* C.L. Koch, 1836

(Figs. 26, 48, 49, 752, 761, 763, 774, 778, 779, 790, 799-842)

1836 *Limnesia* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 2: 19.

1979 *Stygolimnesia* Imamura, Proceedings of the 4th International Congress of Acarology: 160 – Cook (1986).

Type species: *Limnesia fulgida* C.L. Koch, 1836

DIAGNOSIS: Idiosoma sclerotization variable, from completely soft to well-developed dorsal and ventral shields (Fig. 775). Gnathosoma may or may not be protrusable. Genital field with three to many acetabula. Females with movable genital flaps (Fig. 762); in males the genital flaps usually fused anteriorly and posteriorly (Fig. 779) or bowed anteriorly and posteriorly and (nearly) touching. Cxgl-4 variable in position, but usually in the vicinity of the suture line Cx-III/Cx-IV. Ventral seta of P2 variable in size, on a tubercle or not. Legs slightly modified in males or without sexual dimorphism. Swimming setae absent or present.

REMARKS: Probably a paraphyletic genus, comprising the left over after the more divergent members of the subfamily have been placed in separated genera (Cook 1974). Thirteen subgenera described, but a number of these of doubtful validity (Cook 1974).



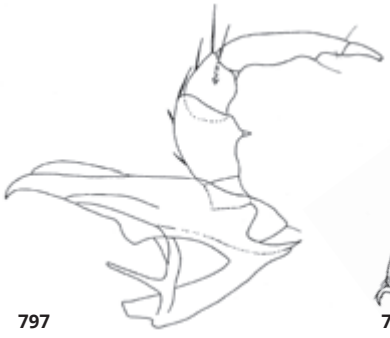
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794 *Centrolimnesia vietsi* Lundblad, genital field male (after Cook 1974)

795 *Centrolimnesia schubarti* K. Viets, palp male (after Cook 1974)

796 *Fijilimnesia fluviatilis* Smit, venter male (after Smit 2003b)

797 *Fijilimnesia fluviatilis* Smit, gnathosoma + palp male (after Smit 2003b)

798 *Fijilimnesia fluviatilis* Smit, III-leg-3-6 male (after Smit 2003b)

799 *Fijilimnesia fluviatilis* Smit, IV-leg-5-6 male (after Smit 2003b)

KEY TO THE SUBGENERA (FEMALES CANNOT BE ASSIGNED GENERALLY TO SUBGENERA)

1 Both I- and II-leg-6 of male (Figs. 800, 801) with slight sexual dimorphism, these segments tapering in male and ventrally with multiple irregular constrictions Subgenus *Halolimnesia*

\- First and second legs without sexual dimorphism, or only I-leg with a slight sexual dimorphism 2

2 Genital field with 3-4 pairs of acetabula (Fig. 802) 3

\- Genital field with more than four pairs of acetabula (Fig. 803) 8

3 Cheliceral claw long and stylet-like; gnathosoma with a long narrow rostrum (Fig. 804) Subgenus *Pilolimnesia*

\- Cheliceral claw not long and stylet-like; gnathosoma with only a short, narrow rostrum (Fig. 805) 4

4 Well-developed dorsal and ventral shields present (Fig. 806) 7

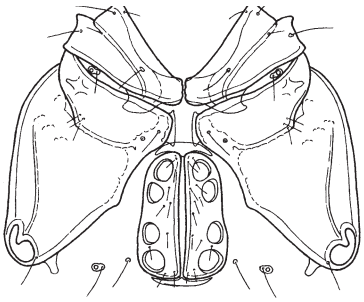
\- Sclerotization variable, but dorsal and ventral shields not present 5



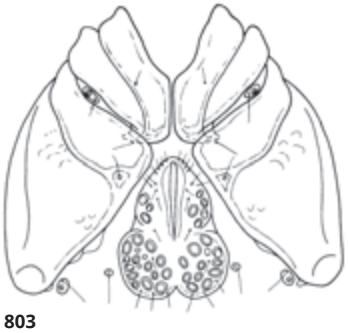
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800 *Limnesia* (*Halolimnesia*) *diversipes* Pešić, Smit & Saboori, I-leg-5-6 male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

801 *Limnesia* (*Halolimnesia*) *diversipes* Pešić, Smit & Saboori, II-leg-4-6 male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

802 *Limnesia* (*Limnesia*) *pinguipalpis* Cook, venter female (after Cook 1974)

803 *Limnesia* (*Heterolimnesia*) *tasmanica* (Lundblad), venter male (after Cook 1974)

804 *Limnesia* (*Pilolimnesia*) *rostrata* (K. Viets), gnathosoma + palp male (after Cook 1974)

805 *Limnesia* (*Limnesia*) *lembangensis* Piersig, gnathosoma + palp female (after Cook 1974)

5 Male I-leg-5 and -6 slightly enlarged (Fig. 807); genital field of male with lateral indentations (Fig. 808) Subgenus *Heterolimnesia* (in part)

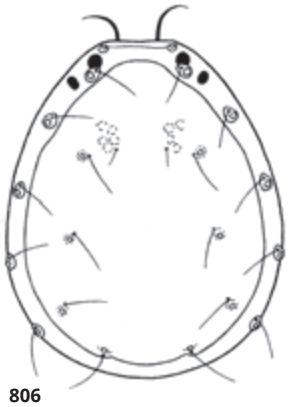
- I-leg-5 and -6 not modified; genital field of male various in shape, but lateral margins of genital field not indented 6

6 Genital field with three pairs of elongated acetabula, these with irregular margins; acetabulum 1 in a right angle with acetabula 2 and 3 in male (Fig. 809), all acetabula directed in the same way in female (Fig. 810) Subgenus *Orientilimnesia*

- Genital field with three or more pairs of acetabula, margins not irregular; arrangement of acetabula not as above (Fig. 811) Subgenus *Limnesia*

7(4) Medial margins of genital flaps with a series of pore-like setal bases (Fig. 812) Subgenus *Seppiella*

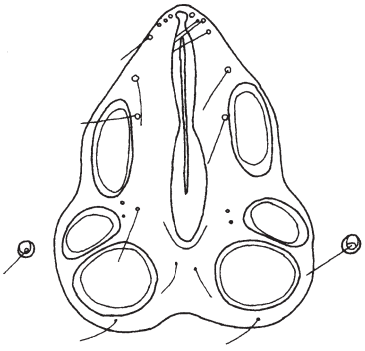
- Medial margins of genital flaps without a series of pore-like setal bases (Fig. 813) Subgenus *Duralimnesia*



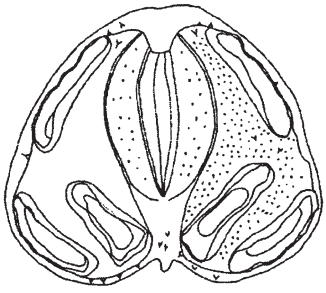
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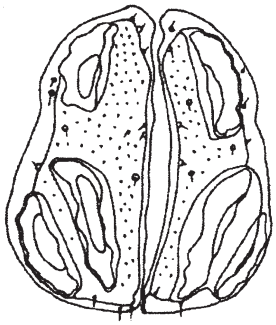
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806 *Limnesia* (*Duralimnesia*) *testudinata* Cook, dorsum male (after Cook 1974)

807 *Limnesia* (*Heterolimnesia*) *neocaledonica* Smit, I-leg-4-6 male (after Smit 2002a)

808 *Limnesia* (*Heterolimnesia*) *neocaledonica* Smit, genital field male (after Smit 2002a)

809 *Limnesia* (*Orientilimnesia*) *sinica* Yi & Jin, genital field male (after Yi et al. 2009a) Reproduced with permission from copyright holder

810 *Limnesia* (*Orientilimnesia*) *sinica* Yi & Jin, genital field female (after Yi et al. 2009a) Reproduced with permission from copyright holder

811 *Limnesia* (*Limnesia*) *lembangensis* Piersig, venter female (after Cook 1974)

8(2) I-leg-5 and -6 slightly modified; genital field of male with lateral indentations (Fig. 803) Subgenus *Heterolimnesia* (in part)

- I-leg-5 and 6 not modified; genital field of male various in shape, but lateral margins of genital field not indented 9

9 Leg claws with several ventral clawlets (Fig. 814) 10

- Leg claws with only one ventral clawlet (Fig. 815) 11

10 Genital plates of male fused anteriorly and posteriorly (Fig. 816) Subgenus *Limnesiopsis*

- Genital plates of male separated (Fig. 780) Subgenus *Limnesiopsides*

11(9) Ventral peg-like seta of P2 located on a long tubercle (Fig. 817) Subgenus *Allolimnesia*

- Ventral peg-like seta of P2 not located on a long tubercle (Fig. 818) 12

12 Cx-IV more or less four-sided; Cxgl-4 located on Cx-III, slightly anterior to posterior suture line Cx-III/IV (Fig. 819) Subgenus *Paralimnesia*

- Cx-IV more or less triangular; Cxgl-4 located medially between Cx-III and Cx-IV, but may be shifted as to appear on Cx-IV (Fig. 820) 13



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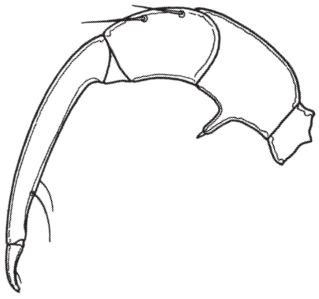
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812 *Limnesia* (*Seppiella*) *magnipora* Besch, venter male (after Cook 1974)

813 *Limnesia* (*Duralimnesia*) *testudinata* Cook, venter male (after Cook 1974)

814 *Limnesia* (*Limnesiopsis*) *anomala* Koenike, claw of third leg male (after Cook 1974)

815 *Limnesia* (*Limnesiella*) *eggletoni* Cook, claw of third leg male (after Cook 1974)

816 *Limnesia* (*Limnesiopsis*) *anomala* Koenike, venter male (after Cook 1974)

817 *Limnesia* (*Allolimnesia*) *angustipalpis* Lundblad, palp female (after Lundblad 1941b)

13 P4 comparatively short and stocky and without setal tubercles; P3 with a long seta on medial surface (Fig. 821) Subgenus *Limnesiellula*

- P4 comparatively long, usually with small setal tubercles; P3 lacking a long seta on medial surface (Fig. 822) Subgenus *Limnesiella*

Subgenus *Limnesia* s.s.

(Figs. 26, 48, 49, 753, 762, 764, 775, 779, 790, 802, 805, 811)

1957 *Rivolimnesia* Habeeb, Leaflets of Acadian Biology 16: 3 – Cook (1974).

1922 *Tetralimnesia* Thor, Nyt Magazin for Naturvidenskaberne 61: 117 – new. syn.

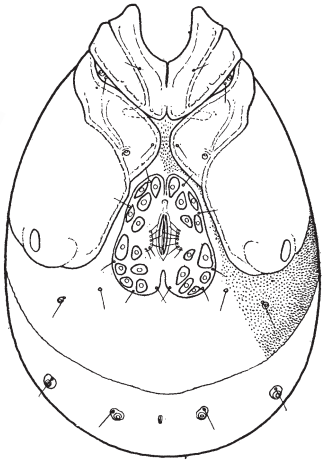
DIAGNOSIS: Sclerotization varying from none to more or less well-developed dorsal and ventral shields in male (Fig. 775). Gnathosoma lacking a long rostrum (Figs. 764, 805) and chelicera not stylet-like. Cxgl-4 in variable position, located on Cx-III (Figs. 790, 811), on Cx-IV or in a bifurcation between Cx-III and Cx-IV (Fig. 762). Genital field with three or four pairs of acetabula (Fig. 802). In males, movable genital flaps occasionally present but usually genital field fused anteriorly and posteriorly into an unmovable genital field. Palp variable. Legs with or without swimming setae, claws variable.

HABITAT: Known from all types of fresh and brackish waters, including hyporheic habitats.

DISTRIBUTION: Numerous species known worldwide.

REMARKS: Probably a para- or polyphyletic clade (Gerecke et al. 2016), including all triacetabulate species which are not characterized by modifications of mouthparts or genital field, or without dorsal and ventral shields in both sexes. The difference between species with three pairs of acetabula and with four pairs of acetabula has no taxonomical significance. Consequently, *Tetralimnesia* is synonymized with *Limnesia* s.s.







818 **819** **820**

818 *Limnesia* (*Paralimnesia*) *microdon* Lundblad, palp male (after Cook 1974)

819 *Limnesia* (*Paralimnesia*) *microdon* Lundblad, venter male (after Lundblad 1941b)

820 *Limnesia* (*Limnesiellula*) *brasiliana* (K. Viets), venter female (after Cook 1974)

Subgenus *Allolimnesia* K. Viets, 1936

(Figs. 817, 823, 824)

1936 *Allolimnesia* K. Viets, Zoologischer Anzeiger 113: 209.

Type species: *Limnesia polypora* K. Viets, 1936

DIAGNOSIS: Genital field with numerous acetabula. Gonopore of male located at anterior end of genital field (Fig. 823). Cxgl-4 located on Cx-III. No glandularia fused with the male genital field. P2 ventrally with a peg-like seta on a well-developed tubercle (Fig. 817). Legs with swimming setae, leg claws with a ventral clawlet only.

HABITAT: Standing and slowly flowing streams.

DISTRIBUTION: Four species known from South America (Brazil, Paraguay, Venezuela).

Subgenus *Duralimnesia* K. Viets, 1924

(Figs. 806, 813, 825, 826)

1924 *Duralimnesia* K. Viets, Zoologischer Anzeiger 58: 103.

Type species: *Limnesia tenuipalpis* K. Viets, 1924

DIAGNOSIS: Well-developed dorsal and ventral shields present in both sexes, dorsal shield without anterolateral projections (Fig. 806). Genital field with three pairs of acetabula. Medial margins of genital flaps without numerous pores or setal bases (Fig. 813). Legs with a few swimming setae, claws of I- and II-leg simple.

HABITAT: Streams.

DISTRIBUTION: Three species known from West-Africa (Cameroon, Liberia, Cook 1966).

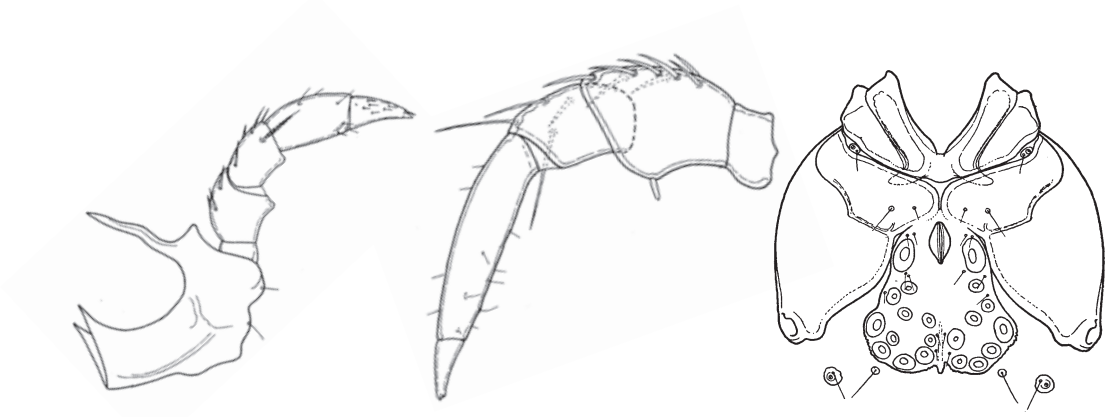
REMARKS: According to Cook (1974) the subgenus is of doubtful validity.

Subgenus *Halolimnesia* Pešić, Smit & Saboori, 2012

(Figs. 800, 801, 827-830)

2012 *Halolimnesia* Pešić, Smit & Saboori, Zootaxa 3330: 30.

Type species: *Limnesia diversipes* Pešić, Smit & Saboori, 2012



821 **822** **823**

821 *Limnesia* (*Limnesiellula*) *brasiliana* (K. Viets), gnathosoma + palp female (after Cook 1974)

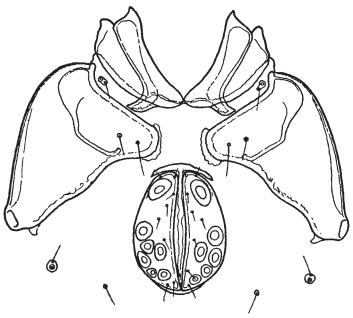
822 *Limnesia* (*Limnesiella*) *eggletoni* Cook, palp female (after Cook 1974)

823 *Limnesia* (*Allolimnesia*) *angustipalpis* Lundblad, venter male (after Lundblad 1941b)

DIAGNOSIS: Genital field with three pairs of acetabula. Male genital flaps bowed, but not touching anteriorly and posteriorly. Male I- and II-leg-6 segments tapering and ventrally with multiple irregular constrictions (Figs. 800, 801), but unmodified in female. Cxgl-4 lying in the medially in the middle of Cx-III (Fig. 827). P2 with a stout setae inserted on a ventral extension (Fig. 829). IV-leg-6 without claw but with a long terminal seta (Fig. 830). Legs with swimming setae.

HABITAT: Pools in saline inland rivers.

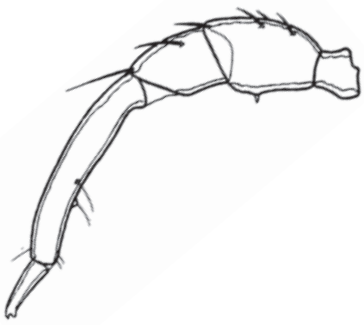
DISTRIBUTION: One species known from Iran.



824



825



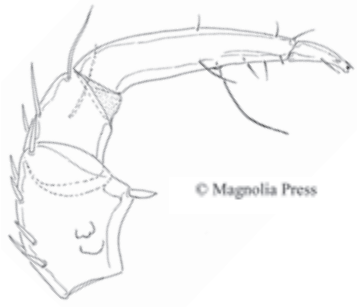
826



827



828



829

824 *Limnesia* (*Allolimnesia*) *angustipalpis* Lundblad, venter female (after Lundblad 1941b)

825 *Limnesia* (*Duralimnesia*) *testudinata* Cook, venter female (after Cook 1974)

826 *Limnesia* (*Duralimnesia*) *testudinata* Cook, palp female (after Cook 1974)

827 *Limnesia* (*Halolimnesia*) *diversipes* Pešić, Smit & Saboori, venter male (part.) (after Pešić et al. 2012c) Reproduced with permission from copyright holder

828 *Limnesia* (*Halolimnesia*) *diversipes* Pešić, Smit & Saboori, genital field female (after Pešić et al. 2012c) Reproduced with permission from copyright holder

829 *Limnesia* (*Halolimnesia*) *diversipes* Pešić, Smit & Saboori, palp female (after Pešić et al. 2012c) Reproduced with permission from copyright holder

Subgenus *Heterolimnesia* Lundblad, 1941

(Figs. 803, 807, 808, 831)

1941 *Heterolimnesia* Lundblad, Entomologisk Tidskrift 62: 115 – Smit (2002a).

Type species: *Heterolimnesia tasmanica* Lundblad, 1941

DIAGNOSIS: Idiosoma soft. Coxae in four groups, but median margins of Cx-I may be close together. Cxgl-4 located medially in a bifurcation of Cx-III and Cx-IV. Genital field with three to numerous acetabula. Genital field of male with lateral indentations (Figs. 803, 808). Gonopore of male located in anterior part of genital field. P2 ventrally with a large, proximally directed peg-like seta (Fig. 831). Male I-leg-5 and -6 slightly enlarged (Fig. 807). Legs with swimming setae.

HABITAT: Standing waters, streams.

DISTRIBUTION: Two species known, one from Australia and one from New Caledonia (Smit 2002a).

Subgenus *Limnesiella* Daday, 1905

(Figs. 815, 822, 832)

1905 *Limnesiella* Daday, Mathematikai és Természettudományi Értesítő 23: 340.

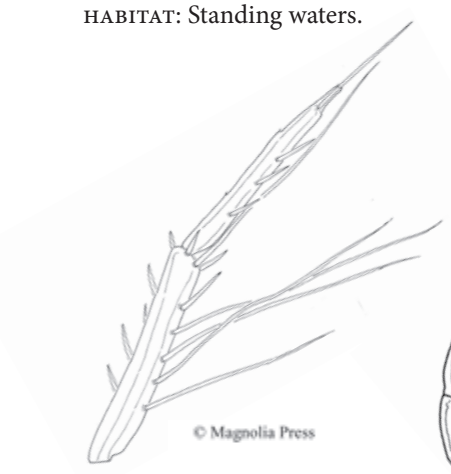
1936 *Neolimnesia* Lundblad, Zoologischer Anzeiger 116: 202.

1937 *Limnesicula* K. Viets, Zoologischer Anzeiger 117: 169.

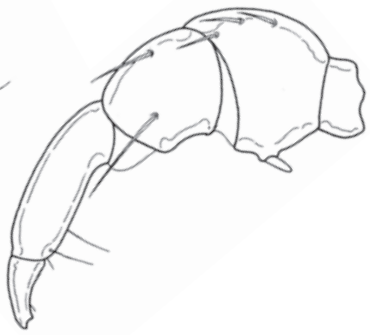
Type species: *Limnesiella pusilla* Daday, 1905

DIAGNOSIS: Sclerotization varying from none to well-developed dorsal and ventral shields. Cxgl-4 located medially, usually in a bifurcation between Cx-III and Cx-IV (Fig. 832), but occasionally shifted onto Cx-IV. Genital field with numerous acetabula; male gonopore located in the middle of genital field (Fig. 831). No glandularia fused with genital field in either sex. P2 ventrally with a well-developed seta, not lying on a tubercle; P3 without a long pectinate seta; P4 with variously developed setal tubercles (Fig. 822). Leg claws with one ventral clawlet (Fig. 815). Legs with swimming setae.

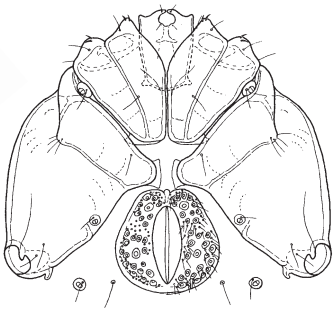
HABITAT: Standing waters.


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830



831



832

830 *Limnesia* (*Halolimnesia*) *diversipes* Pešić, Smit & Saboori, IV-leg-5-6 male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

831 *Limnesia* (*Heterolimnesia*) *tasmanica* Lundblad, palp male (after Cook 1974)

832 *Limnesia* (*Limnesiella*) *eggletoni* Cook, venter male (after Cook 1974)

DISTRIBUTION: Several species known from South America (Brazil, Uruguay, Paraguay, Surinam, Argentina) and Central America (Mexico), extending into northern USA. *Limnesia orientalis* Lundblad, 1969 from Burma is the only member of the subgenus in the Oriental region. Lundblad (1969) discussed only the affinities with the subgenus *Limnesiellula*, but males of that subgenus have Cxgl-4 fused with the genital field.

Subgenus *Limnesiellula* K. Viets, 1935

(Figs. 820, 821, 833)

1935 *Limnesiellula* K. Viets, Zoologischer Anzeiger 112: 273.

Type species: *Limnesiellula brasiliana* K. Viets, 1935

DIAGNOSIS: Idiosoma without secondary sclerotization. Cxgl-4 located in a bifurcation between Cx-III and Cx-IV (Fig. 820). Genital field with numerous acetabula. Male gonopore located in the middle of genital field, a pair of glandularia fused with male genital field or lying very close to it (Fig. 833). P2 ventrally with a minute seta placed on a short anteroventral extension; P3 with a long pectinate or smooth seta; P4 without setal tubercles (Fig. 821). Legs with swimming setae.

HABITAT: Standing waters and slow flowing streams.

DISTRIBUTION: Two species known, one from Brazil and one from Argentina (Rosso de Ferradás & Smit 1998).

Subgenus *Limnesiopsides* K. Viets, 1938

(Figs. 780, 834)

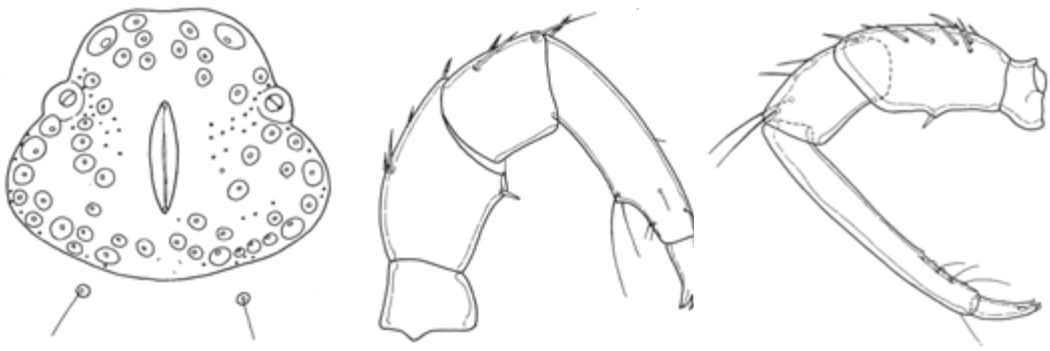
1938 *Limnesiopsides* K. Viets, Zoologischer Anzeiger 121: 131.

Type species: *Limnesia pectungulata* K. Viets, 1938

DIAGNOSIS: (Male only) Cxgl-4 relatively small, lying medially of suture line of Cx-III/IV. Genital field with numerous acetabula, many of these constricted in the middle and appearing to be dividing into two separate acetabula. Genital plates of male not fused, forming movable genital flaps (Fig. 780). P4 with a setal tubercle (Fig. 834). Legs with swimming setae, leg claws with a comb.

HABITAT: Ponds.

DISTRIBUTION: One species known from Uruguay.



833 **834** **835**

833 *Limnesia* (*Limnesiellula*) *brasiliana* (K. Viets), genital field male (after Cook 1974)

834 *Limnesia* (*Limnesiopsides*) *pectungulata* K. Viets, palp male (after Cook 1974)

835 *Limnesia* (*Limnesiopsis*) *anomala* Koenike, palp male (after Cook 1974)

Subgenus *Limnesiopsis* Piersig, 1896

(Figs. 814, 816, 835)

1896 *Limnesiopsis* Piersig, Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig 22/23: 52.

Type species: *Limnesia anomala* Koenike, 1895

DIAGNOSIS: Cxgl-4 relatively large, lying in a bifurcation of Cx-III and Cx-IV. Genital field with numerous acetabula. Genital plates of male fused anteriorly and posteriorly (Fig. 816). P4 with a series of small setal tubercles (Fig. 835). Legs with swimming setae, claws with a comb (Fig. 814).

HABITAT: Lakes and ponds.

DISTRIBUTION: One species known from North America.

Subgenus *Orientilimnesia* Yi & Jin, 2009

(Figs. 809, 810, 836-838)

2009 *Orientilimnesia* Yi & Jin, Zootaxa 2140: 28 - nov. stat.

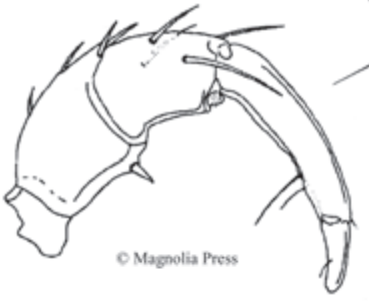
Type species: *Orientilimnesia sinica* Yi & Jin, 2009

DIAGNOSIS: Idiosoma soft. Coxae in four groups. Cxgl-4 located anteromedially on Cx-III (Fig. 836). Genital field with three pairs of acetabula. Flaps movable in female, anteriorly and posteriorly fused in male. Acetabula with irregularly shaped margin, acetabulum 1 in a right angle with acetabula 2 and 3 in male (Fig. 809), acetabula directed in the same way in female (Fig. 810). P2 ventrally with a peg-like seta, not inserted directly on a tubercle (Fig. 837). Legs with swimming setae. IV-leg-6 without claw (Fig. 838).

HABITAT: Streams, paddy fields.

DISTRIBUTION: One species known from southern China.







836 **837** **838**

836 *Limnesia* (*Orientilimnesia*) *sinica* Yi & Jin, venter female (after Yi et al. 2009a) Reproduced with permission from copyright holder

837 *Limnesia* (*Orientilimnesia*) *sinica* Yi & Jin, palp female (after Yi et al. 2009a) Reproduced with permission from copyright holder

838 *Limnesia* (*Orientilimnesia*) *sinica* Yi & Jin, IV-leg-5-6 male (after Yi et al. 2009a) Reproduced with permission from copyright holder

REMARKS: This taxon was originally described as a genus, but the differences with especially *Limnesia* s.s. are too small to warrant this. The margins of the acetabula are irregularly shaped, but this is a character found in more limnesiids, e.g. in *Protolimnesia* and *Neomamersa*. In the latter two genera we find species with both irregularly and regularly shaped acetabula. Therefore, I propose to lower it in rank to a subgenus.

Subgenus *Paralimnesia* Lundblad, 1938

(Figs. 818, 819, 839)

1938 *Paralimnesia* Lundblad, Zoologischer Anzeiger 122: 35.

Type species**:** *Limnesia microdon* Lundblad, 1938

DIAGNOSIS: (Male only) Dorsum with a large plate with two pairs of glandularia and the postocularia (Fig. 839). Venter with extensive sclerotization. Cx-IV more or less four-sided (Fig. 819). Cxgl-4 located on Cx-III. Genital field with numerous acetabula, gonopore small and located near middle of genital field. No glandularia fused with genital field. P2 ventrally with a small seta not lying on a tubercle (Fig. 818). Legs with a few swimming setae, leg claws with one ventral clawlet.

HABITAT: Streams.

DISTRIBUTION: One species known from Brazil.

Subgenus *Pilolimnesia* K. Viets, 1938

(Figs. 804, 840, 841)

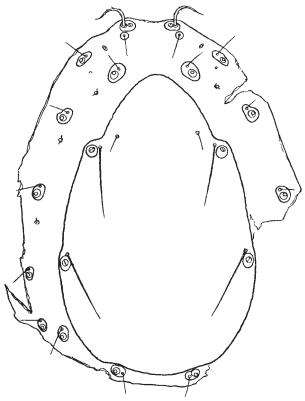
1938 *Pilolimnesia* K. Viets, Zoologischer Anzeiger 121: 21.

Type species: *Pilolimnesia rostrata* K. Viets, 1938

DIAGNOSIS: Dorsum not sclerotized, venter with extensive sclerotization (Figs. 840-841). Genital field with three pairs of acetabula. Gnathosoma with a long narrow rostrum (Fig. 804), chelicera stylet-like. Palp slender, P2 ventrally with a hair-like seta (Fig. 804). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: Two species known from Brazil.



839



840



841

839 *Limnesia* (*Paralimnesia*) *microdon* Lundblad, dorsum male (after Lundblad 1941b)

840 *Limnesia* (*Pilolimnesia*) *rostrata* Lundblad, venter female (after Cook 1974)

841 *Limnesia* (*Pilolimnesia*) *rostrata* Lundblad, venter male (after Cook 1974)

Subgenus *Seppiella* Besch, 1969

(Figs. 812, 842, 843)

1969 *Seppiella* Besch, Beiträge zur Neotropischen Fauna 6: 80.

Type species: *Limnesia magnipora* Besch, 1969

DIAGNOSIS: Dorsal and ventral shields present in both sexes. Dorsal shield with a pair of anterolateral projections (Fig. 842). Genital field with three pairs of acetabula. Medial margins of genital flaps with numerous setal bases (Fig. 812). P2 with a seta on a tubercle, P4 with small setal tubercles (Fig. 843). Legs with swimming setae. Only first leg with simple claws.

HABITAT: Streams.

DISTRIBUTION: Two species known from South America (Brazil, Surinam).

Genus *Physolimnesia* Halík, 1940

(Figs. 777, 844-847)

1940 *Centrolimnesia* (*Physolimnesia*) Halík, Zoologischer Anzeiger 131: 22.

1941 *Physolimnesia* Halík – Lundblad (1941a).

Type species: *Centrolimnesia australis* Halík, 1940

DIAGNOSIS: Idiosoma weakly sclerotized, dorsal platelets absent. Coxae in four groups, suture line of Cx-III/IV incomplete, not reaching midline (Figs. 845-846). Cxgl-4 lying near suture line Cx-III/IV or slightly anterior to it. Genital field with 3-4 pairs of acetabula. Genital flaps of female movable. P2 ventrally with a peg-like seta on a short tubercle, P4 with large setal tubercles (Fig. 847). Males with III-leg-6 enlarged (Fig. 777), IV-leg-5-6 forming a grasping organ (Fig. 844), IV-leg-6 with grooves. Legs with swimming setae, IV-leg-6 without claws.

HABITAT: Standing waters, like pools, lakes, rockholes and slow flowing streams.

DISTRIBUTION: Two species known from northern Australia (Smit 1998a).

Genus *Pterolimnesia* K. Viets, 1942

(Figs. 778, 848-853)

1942 *Limnesia* (*Pterolimnesia*) K. Viets, Zoologischer Anzeiger 138: 211.

1974 *Pterolimnesia* K. Viets – Cook (1974)

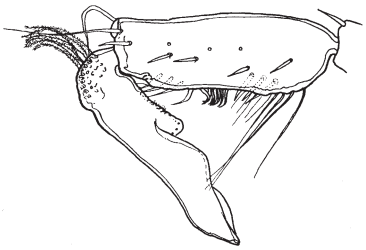
Type species: *Limnesia armata* Koenike, 1895



842



843



844

842 *Limnesia* (*Seppiella*) *magnipora* Besch, anterior part of dorsum male (after Cook 1974)

843 *Limnesia* (*Seppiella*) *magnipora* Besch, palp female (after Besch 1969)

844 *Physolimnesia australis* (Halík), IV-leg-5-6 male (after Halík 1940)

DIAGNOSIS: Idiosoma soft. Cx-II not extending to midline (Figs. 848, 850). Genital field with three pairs of acetabula. Genital flaps separated in male, with a pair of large, pointed, seta bearing projections at anterior end (Figs. 778, 849). Genital flaps of female movable. P2 ventrally with a peg-like seta on a short tubercle. Male with I-leg-5 slightly enlarged and I-leg-6 slightly bowed (Fig. 852), in females these segments less enlarged and bowed (Fig. 853). Legs with a few swimming setae.

HABITAT: Standing waters, backwater areas of streams.

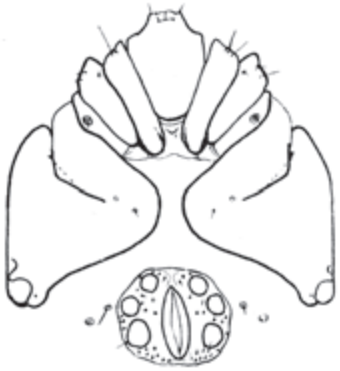
DISTRIBUTION: Two species known from Africa (Burkina Faso, Tanzania, Liberia, Cook 1966).

Genus *Timmsilimnesia* K.O. Viets, 1984

(Figs. 781-783, 854-856)

1984 *Timmsilimnesia* K.O. Viets, Archiv für Hydrobiologie 101: 422.

Type species: *Timmsilimnesia prehendens* K.O. Viets, 1984 = *Timmsilimnesia ingens* (K.O. Viets, 1975)



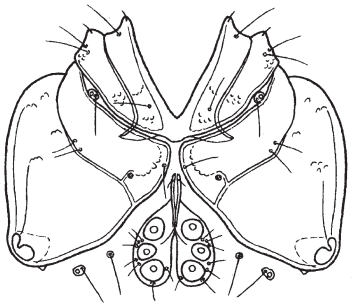
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846



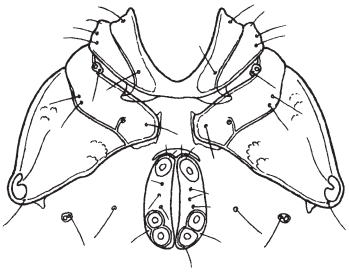
847



848



849



850

845 *Physolimnesia australis* (Halík), venter male (after Halík 1941)

846 *Physolimnesia australis* (Halík), venter female (after Halík 1941)

847 *Physolimnesia australis* (Halík), palp male (after Cook 1974)

848 *Pterolimnesia conjuncta* (Walter), venter male (after Cook 1974)

849 *Pterolimnesia conjuncta* (Walter), lateral view genital field male (after Cook 1974)

850 *Pterolimnesia conjuncta* (Walter), venter female (after Cook 1974)

DIAGNOSIS: Idiosoma soft. Cxgl-4 near posteromedial margin of Cx-IV. Genital field with three pairs of acetabula; male gonopore small, lying at anterior tip of genital field (Fig. 783). P2 with a peg-like, P4 with large setal tubercles (Fig. 854). Male with I-+II-leg-5-6 forming a sort of grasping organ (Figs. 781, 782), I-leg-5 enlarged. Female legs not modified, although sixth segment is slightly curved (Fig. 856). IV-leg without claws.

HABITAT: Standing waters like small lakes and billabongs.

DISTRIBUTION: One species known from northern Australia.

Genus *Tubophora* Walter, 1935

(Figs. 776, 857-859)

1935 *Tubophora* Walter, Archiv für Hydrobiologie 28: 92.

Type species: *Tubophora limnesioides* Walter, 1935

DIAGNOSIS: Idiosoma soft, postocularia lying far posteriorly (Fig. 776). Coxae in four groups, Cx-II extending to midline (Fig. 857). Gnathosoma long and attached to a long protrusable tube (Fig. 858). Genital field with three pairs of acetabula. Genital flaps of male fused anteriorly and posteriorly. P2 with a very short, hair-like anteroventral seta (Fig. 859). Swimming setae absent.

HABITAT: Mosses associated with a waterfall, streams.

DISTRIBUTION: Africa, two species known, one from Ivory Coast and Ghana and one from Congo (K.O. Viets & Böttger 1974b).



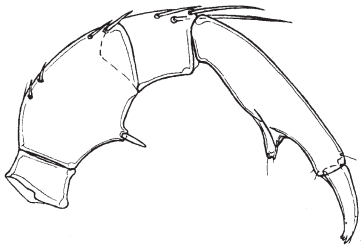
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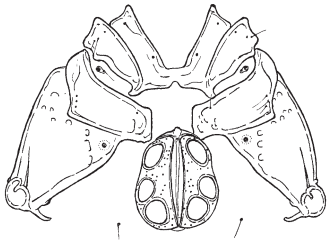
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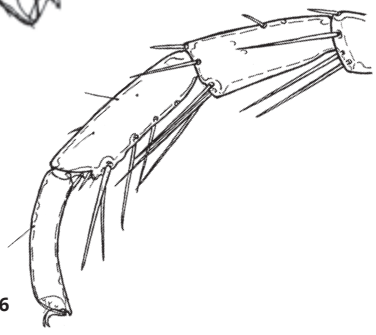
853



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851 *Pterolimnesia conjuncta* (Walter), palp male (after Cook 1974)

852 *Pterolimnesia conjuncta* (Walter), I-leg-5-6 male (after Cook 1974)

853 *Pterolimnesia conjuncta* (Walter), I-leg-5-6 female (after Cook 1974)

854 *Timmsilimnesia ingens* (K.O. Viets), palp male (after K.O. Viets 1984b)

855 *Timmsilimnesia ingens* (K.O. Viets), venter female (after K.O. Viets 1975)

856 *Timmsilimnesia ingens* (K.O. Viets), I-leg-4-6 female (after K.O. Viets 1975)

Genus *Tubophorella* K.O. Viets, 1978

(Figs. 773, 774, 860-864)

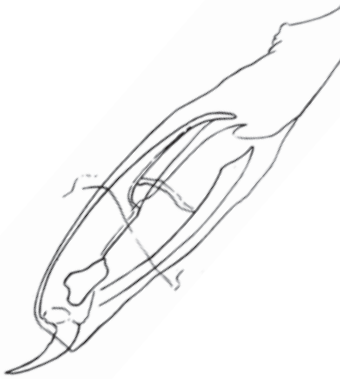
1978 *Tubophorella* K.O. Viets, Acarologia 19: 272.

Type species: *Tubophorella scutata* K.O. Viets, 1978

DIAGNOSIS: Dorsum with two large plates (Fig. 774) or with a complete dorsal shield. When two dorsal plates are present, the posterior plate is the largest. Anterior dorsal plate with 2-4 pairs of glandularia, posterior dorsal plate with postocularia and 2-4 pairs of glandularia. A well-developed camerostome present. Venter with a complete shield, incorporating coxae and genital field (Figs. 860-861). Gnathosoma elongated, on a long protrusable tube. Cxgl-4 lying between Cx-III and Cx-IV. Genital field with three to eight pairs of acetabula. P2 ventrally with (Fig. 863) or without (Fig. 773) a hair-like seta. Swimming setae absent. IV-leg-6 without claw, with (Fig. 864) or without (Fig. 862) a long terminal seta.



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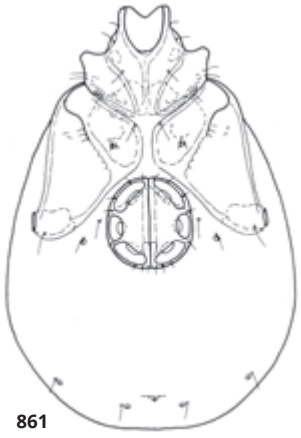
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857 *Tubophora limnesioides* Walter, venter male (after Cook 1974)

858 *Tubophora limnesioides* Walter, gnathosoma male (after Cook 1974)

859 *Tubophora limnesioides* Walter, palp male (after Cook 1974)

860 *Tubophorella amoena* K.O. Viets, venter male (after Cook 1986)

861 *Tubophorella amoena* K.O. Viets, venter female (after Cook 1986)

862 *Tubophorella amoena* K.O. Viets, IV-leg-6 female (after Cook 1986)

HABITAT: Streams.

DISTRIBUTION: The genus has a disjunct distribution, with five species known from Guatemala, Costa Rica (Cook 1980), Australia (K.O. Viets 1978a) and Argentina (Fernández 1992).

Genus *Xenolimnesia* Smit, 1994

(Figs. 784, 785, 865)

1994 *Xenolimnesia* Smit, Storkia 3: 6.

Type species: *Xenolimnesia wetteni* Smit, 1994

DIAGNOSIS: (Male only) Anterior pair of lateral eyes lying below the integument, posterior pair incorporated in the integument. Idiosoma soft. Coxae in two groups, all suture lines complete, Cx-I separated medially. Posterior margin of Cx-IV with hook-shaped apodemes. Cxgl-4 present, lying between Cx-III and Cx-IV, at level of posterior margin of genital field. Genital field with three pairs of acetabula, partly covered by the coxae (Fig. 785). Gonopore wide, located anteriorly in genital field. Genital skeleton apparently absent. Posterior to genital field a small platelet. Palp stocky, P2 ventrally with a heavy seta (Fig. 865). Legs with swimming setae. II-leg modified: II-leg-4 enlarged, II-leg-5 with a concave ventral margin and II-leg-6 bowed (Fig. 784). IV-leg-6 without claw but with a terminal seta.

HABITAT: Lakes.

DISTRIBUTION: One species known from Cameroon.

Subfamily Mixdeinae Orghidan & Gruia, 1980

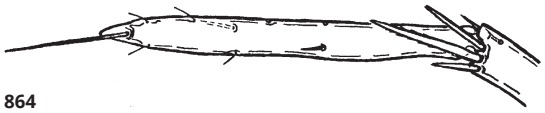
1980 Mixdeidae Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 19: 133 – Goldschmidt (2004c).

DIAGNOSIS: Dorsal and ventral shields present, dorsal shield with or without glandularia. Gnathosoma may or may not be attached to a protrusable tube. Coxae included into ventral shield, Cx-I fused medially, Cx-IV somewhat triangular, closely flanking the genital field. Cxgl-4 lying near anterior margin of Cx-III. Genital field with numerous acetabula, lying on the genital flaps, the latter movable in the female, fused in the male. P2 ventrally with or without a seta, when a seta is present it is hair-like. Legs without swimming setae, claws with dorsal and ventral clawlet. IV-leg-6 with claws.

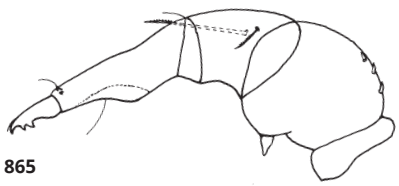
REMARKS: Originally described as a subfamily of the Mideidae. Cook (1981a) pointed on the similarities with the Limnesiidae. Goldschmidt (2004c) proposed a separate ranking as a subfamily within the Limnesiidae, which is followed here.



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863 *Tubophorella tshingandensis* K.O. Viets & Böttger, palp male (after K.O. Viets & Böttger 1984b)

864 *Tubophorella tshingandensis* K.O. Viets & Böttger, IV-leg-6 male (after K.O. Viets & Böttger 1984b)

865 *Xenolimnesia wetteni* Smit, palp male (after Smit 1994)

KEY TO THE GENERA

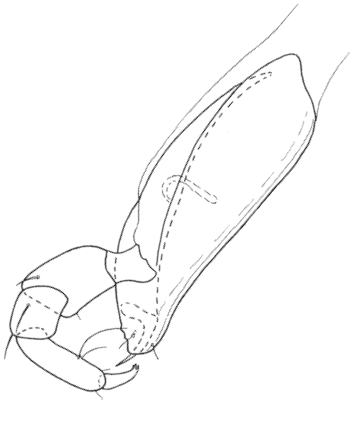
1 Gnathosoma on a protrusable tube (Fig. 866); dorsal shield with 4-5 pairs of glandularia (Fig. 867) Genus *Tubomixdea*

- Gnathosoma not on a protrusable tube; dorsal shield without glandularia (Fig. 868) Genus *Mixdea*

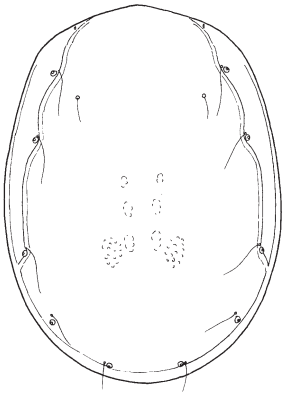
Genus *Mixdea* Orghidan & Gruia, 1980

(Figs. 868-873)

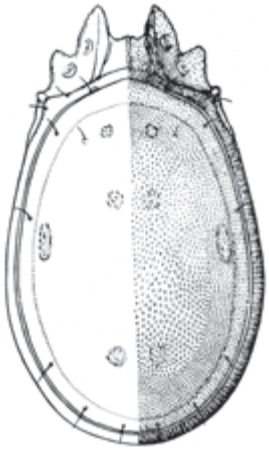
1980 *Mixdea* Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 19: 135.
Type species: *Mixdea composita* Orghidan & Gruia, 1980



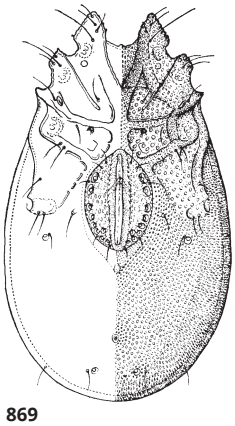
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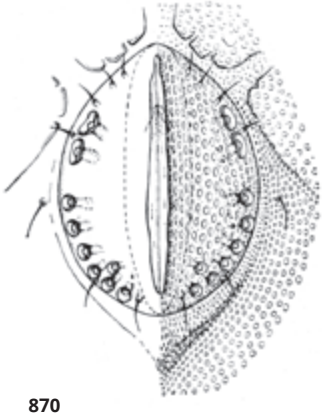
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866 *Tubomixdea voldroguea* (Cook), gnathosoma + palp male (after Cook 1981a)
867 *Tubomixdea voldroguea* (Cook), dorsum female (after Cook 1981a)
868 *Mixdea composita* Orghidan & Gruia, dorsum male (after Orghidan & Gruia 1980a)
869 *Mixdea composita* Orghidan & Gruia, venter male (after Orghidan & Gruia 1980a)
870 *Mixdea composita* Orghidan & Gruia, genital field male (after Orghidan & Gruia 1980a)
871 *Mixdea composita* Orghidan & Gruia, fourth leg male (after Orghidan & Gruia 1980a)

DIAGNOSIS: Dorsal shield with the postocularia, associated setae of dorsal glandularia present, but glandularia lacking (Fig 868). Gnathosoma not on a long, protrusable tube. Cx-IV without medial margin (Figs. 869, 872). Genital field with nine pairs of acetabula (Fig. 870). Genital field of male narrower and more angular anteriorly (Fig. 871), female genital field wider and more rounded (Fig. 872). P4 with a long ventral seta, P2 with small denticles (Fig. 873). Fourth leg with claws, with dorsal and ventral clawlets (Fig. 871).

HABITAT: Hyporheic.

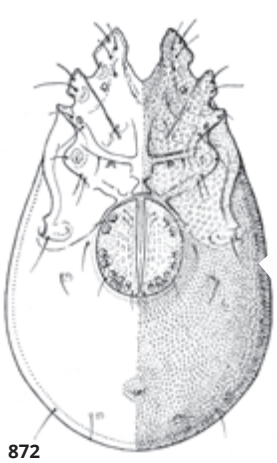
DISTRIBUTION: One species known from Cuba.

Genus *Tubomixdea* Cook, 1981

(Figs. 758, 759, 866, 867, 874-877)

1981 *Tubomixdea* Cook, Bijdragen tot de Dierkunde 51: 140 - nov. stat.

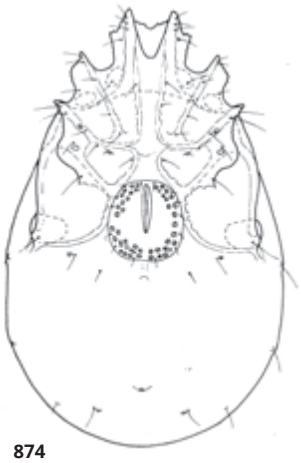
Type species: *Mixdea botosaneanui* Cook, 1981



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872 *Mixdea composita* Orghidan & Gruia, venter female (after Orghidan & Gruia 1980a)

873 *Mixdea composita* Orghidan & Gruia, palp male (after Orghidan & Gruia 1980a)

874 *Tubomixdea botosaneanui* (Cook), venter male (after Cook 1981a)

875 *Tubomixdea botosaneanui* (Cook), venter female (after Cook 1981a)

876 *Tubomixdea botosaneanui* (Cook), palp male (after Cook 1981a)

877 *Tubomixdea botosaneanui* (Cook), IV-leg-5-6 male (after Cook 1981a)

DIAGNOSIS: Dorsal shield including postocularia and five pairs of glandularia and with lateral ridges (Fig. 867). Gnathosoma attached to a long protrusable tube (Fig. 866). Genital field with more than 20 acetabula (Figs. 874, 875). Fourth leg with claws, with dorsal and ventral clawlets (Fig. 877).

HABITAT: Hyporheic.

DISTRIBUTION: Two species known from Haiti.

REMARKS: The diagnostic characters warrant the status as a separate genus.

Subfamily Mixolimnesiinae Cook, 1988

1988 Mixolimnesiinae Cook, Memoirs of the American Entomological Institute 42: 51.

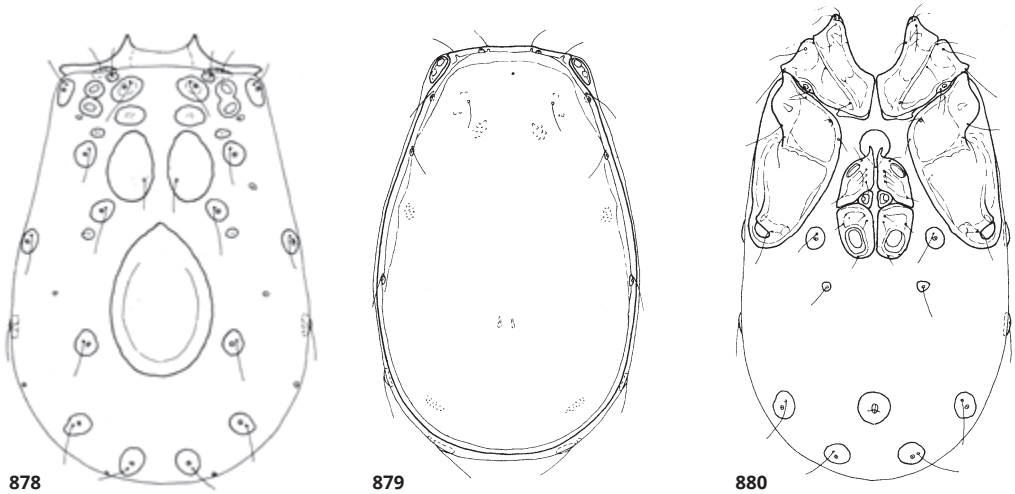
DIAGNOSIS: Integument papillate, eye lenses incorporated into the dorsal integument (or actually forming a low capsule). Dorsum and venter with a various degree of sclerotization (Figs. 878, 879, 885), never with a continuous ventral shield. Coxae separated into four groups, Cxgl-4 shifted anteriorly near anterior margin of Cx-III (Fig. 880). Genital field with either three (Fig. 750) or six pairs (Fig. 881) of acetabula. Movable genital flaps present in both sexes, on each side divided into anterior and posterior parts. In males with three pairs of acetabula, the middle acetabula are free and have an anterior projection on the anterior sclerite (Fig. 882), but the middle acetabula may be fused with the anterior sclerite (Fig. 883). In a species with six pairs of acetabula, males have the anterior sclerites with four and the posterior sclerites with two pairs of acetabula (Fig. 881), females have the anterior sclerite with two and the posterior sclerite with four pairs of acetabula. P2 with or without a fine ventral seta; P4 with small ventral setal tubercles only (Fig. 886). IV-leg bearing claws. Monotypic.

Genus *Mixolimnesia* Cook, 1988

(Figs. 750, 878-887)

1988 *Mixolimnesia* Cook, Memoirs of the American Entomological Institute 42: 52.

Type species: *Mixolimnesia pallida* Cook, 1988



878 *Mixolimnesia pallida* Cook, dorsum male (after Cook 1988)

879 *Mixolimnesia magnifica* Cook, dorsum male (after Cook 1988)

880 *Mixolimnesia pallida* Cook, venter male (after Cook 1988)

DIAGNOSIS: As for subfamily.

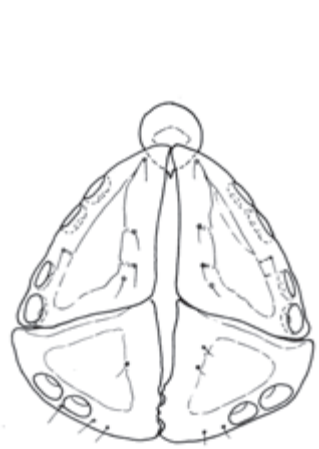
HABITAT: Hyporheic, streams.

DISTRIBUTION: Several species known from Chile.

Subfamily Neomamersinae Lundblad, 1954

1954 Neomamersinae Lundblad, Arkiv för Zoologi (Serie 2) 5: 447.

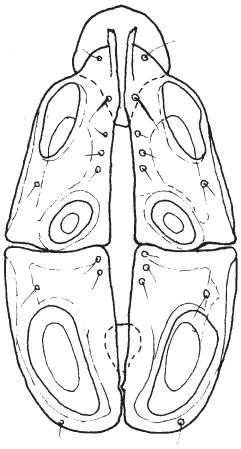
DIAGNOSIS: Dorsal and ventral shields present. Dorsal shield divided in a large anterior and a smaller posterior plate, flanked by small platelets and glandularia. Coxae fused with ventral shield. Cxgl-4 lying near anterior margin of Cx-III. Ventral shield with small anterolateral projections on each side. Genital field with three pairs of acetabula to numerous acetabula. Movable flaps present in both sexes, each flap divided into an anterior and posterior part. P2 ventrally with a small peg-like or hair-like seta, or without a seta; P4 with or without large setal tubercles, P5 stocky or very long and tapering to a pointed tip. Swimming setae absent. IV-leg-6 lacking claws, with a large (sub)terminal seta.



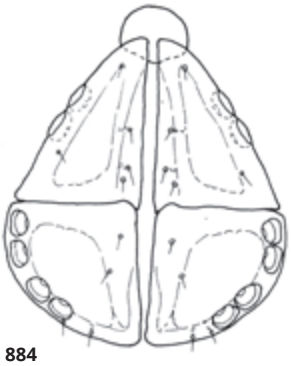
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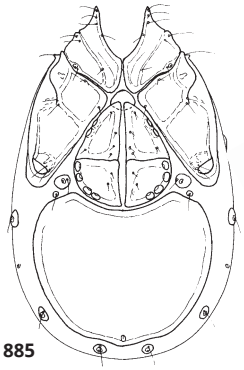
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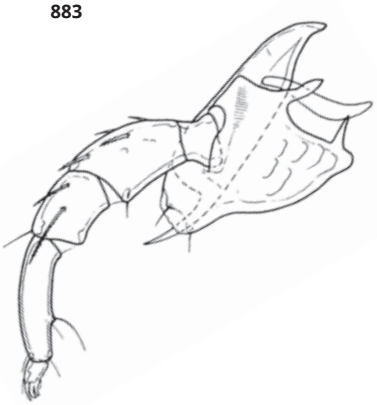
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881 *Mixolimnesia magnifica* Cook, genital field male (after Cook 1988)

882 *Mixolimnesia pallida* Cook, genital field male (after Cook 1988)

883 *Mixolimnesia ribagai* Cook, genital field male (after Cook 1988)

884 *Mixolimnesia magnifica* Cook, genital field female (after Cook 1988)

885 *Mixolimnesia magnifica* Cook, venter female (after Cook 1988)

886 *Mixolimnesia pallida* Cook, gnathosoma + palp female (after Cook 1988)

KEY TO THE GENERA

1	P4 with very long setal tubercles (Fig. 888)	Genus *Neomamersa*
-	P4 with only small or without setal tubercles (Fig. 889)	2
2	Venter posteriorly with small platelets (Fig. 890)	Genus *Meramecia*
-	Venter posteriorly without small platelets (Fig. 891)	Genus *Arizonacarus*

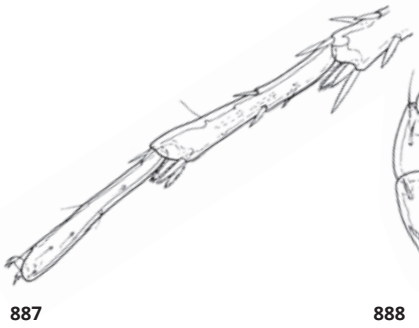
Genus *Arizonacarus* I.M. Smith & Cook, 1994

(Figs. 891-896)

1994 *Arizonacarus* I.M. Smith & Cook, The Canadian Entomologist 126: 1150.

Type species: *Arizonacarus chiricahuensis* I.M. Smith & Cook, 1994

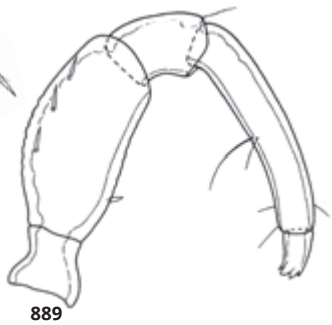
DIAGNOSIS: Anterior dorsal plate with the postocularia and three pairs of setae, glandularia absent. Posterior dorsal plate with two pairs of setae, glandularia absent (Fig. 891). Ventral shield complete (Figs. 892, 893). Genital plates with three pairs of acetabula, these constricted in their centre. All acetabula of male lying on separate sclerites (Fig. 894), posterior two pairs of acetabula in females lying on common sclerite (Fig. 895). P2 typically without ventral setae, P4 stocky, without setal tubercles, P5 with a distal curved seta (Fig. 896).



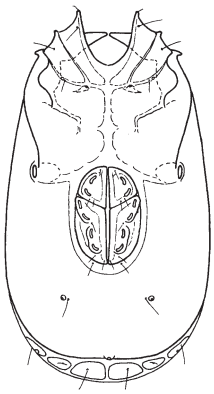
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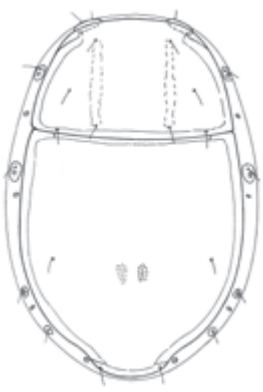
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887 *Mixolimnesia pallida* Cook, IV-leg-4-6 female (after Cook 1988)

888 *Neomamersa andalienensis* Cook, palp female (after Cook 1988)

889 *Meramecia* (*Meramecia*) *ocularis* (Cook), palp female (after Cook 1974)

890 *Meramecia* (*Meramecia*) *ocularis* (Cook), venter female (after Cook 1974)

891 *Arizonacarus chiricahuensis* I.M. Smith & Cook, dorsum female (after I.M. Smith & Cook 1994)

892 *Arizonacarus chiricahuensis* I.M. Smith & Cook, venter male (after I.M. Smith & Cook 1994)

HABITAT: Streams.

DISTRIBUTION: One species described from Arizona, USA, but according to I.M. Smith & Cook (1994) one more, still undescribed species, present in Mexico.

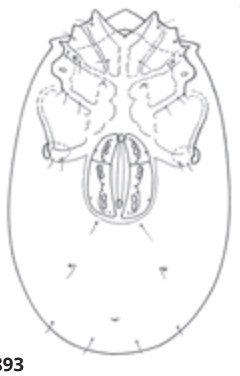
Genus *Meramecia* Cook, 1963

(Figs. 889, 890, 897-905)

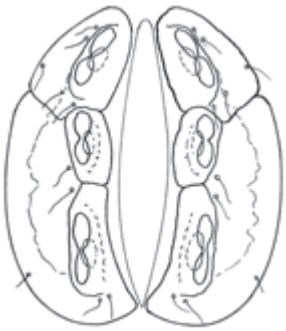
1963 *Meramecia* Cook, American Midland Naturalist 70: 304 – Cook (1974).

Type species: *Neomamersa anisitsipalpis* Cook, 1963

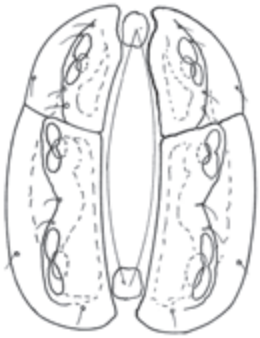
DIAGNOSIS: Anterior dorsal plate with the postocularia and 1-2 pair of setae, glandularia absent (Fig. 901). Posterior plate with 1-2 pair of setae, glandularia absent. Venter with small posterior platelets, bearing either setae or the excretory pore. Genital field with three to many pairs of acetabula arranged in polyacetabulate species in three groups on each side (Fig. 902); anterior group of acetabula on a separate sclerite, posterior two groups lying on a common plate. Acetabula crescent-shaped to rounded. P2 ventrally with a peg-like seta, setal tubercles of P4 small or absent.



893



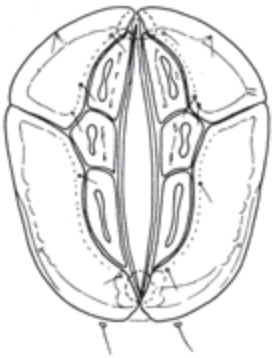
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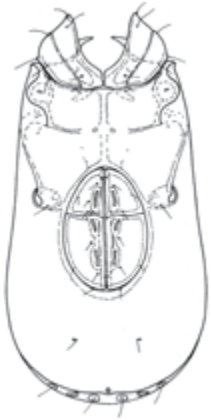
895



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893 *Arizonacarus chiricahuensis* I.M. Smith & Cook, venter female (after I.M. Smith & Cook 1994)

894 *Arizonacarus chiricahuensis* I.M. Smith & Cook, genital field male (after I.M. Smith & Cook 1994)

895 *Arizonacarus chiricahuensis* I.M. Smith & Cook, genital field female (after I.M. Smith & Cook 1994)

896 *Arizonacarus chiricahuensis* I.M. Smith & Cook, palp female (after I.M. Smith & Cook 1994)

897 *Meramecia* (*Submeramecia*) *diamphida* Cook, genital field male (after Cook 1980)

898 *Meramecia* (*Submeramecia*) *diamphida* Cook, venter female (after Cook 1980)

KEY TO THE SUBGENERA

1 Genital field with three pairs of acetabula, male acetabula separated and lying free medial to the genital flaps (Fig. 897), those of female fused with the flaps but lying close to the medial margins (Fig. 898) Subgenus *Submeramecia*

- Six or more acetabula present, male and female acetabula lying on genital flaps (Fig. 899) 2

2 Genital field with six pair of acetabula (Fig. 899) Subgenus *Meramecia* s.s.

- Genital field with more than 14 acetabula (Fig. 900) Subgenus *Parameramecia*

Subgenus *Meramecia* s.s.

(Figs. 889, 890, 899)

DIAGNOSIS: Posterior dorsal plate with one pair of glandularia setae. Platelets in dorsal furrow relatively large and occupying most of the surface of the dorsal furrow. Genital field with six pairs of acetabula, lying on the genital flaps (Fig. 890). P5 relatively slender, with slender setae (Fig. 889).

HABITAT: Hyporheic.

DISTRIBUTION: Several species described from Central America (Mexico, Cook 1980) and USA (Cook 1963e, 1969).

Subgenus *Parameramecia* I.M. Smith & Cook, 1994

(Figs. 900-903)

1994 *Parameramecia* I.M. Smith & Cook, The Canadian Entomologist 126: 1159.

Type species: *Meramecia multipora* I.M. Smith & Cook, 1994

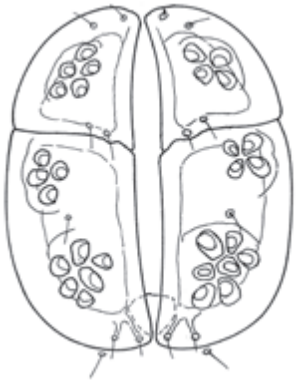
DIAGNOSIS: Posterior dorsal plate with two pairs of glandularia setae (Fig. 901). Platelets in dorsal furrow relatively small and occupying less than half of the surface of the dorsal furrow. Genital field with 14-20 pairs of acetabula lying on the genital flaps (Fig. 900). P5 stocky, with blunt setae (Fig. 903).

HABITAT: Hyporheic.

DISTRIBUTION: One species known from Arizona, USA and one from Argentina (Fernández 2001, 2002).



899



900



901

899 *Meramecia* (*Meramecia*) *ocularis* (Cook), genital field female (after Cook 1974)

900 *Meramecia* (*Parameramecia*) *multipora* I.M. Smith & Cook, genital field male (after I.M. Smith & Cook 1994)

901 *Meramecia* (*Parameramecia*) *multipora* I.M. Smith & Cook, dorsum male (after I.M. Smith & Cook 1994)

Subgenus *Submeramecia* Cook, 1980

(Figs. 897, 898, 904, 905)

1980 *Submeramecia* Cook, Memoirs of the American Entomological Institute 31: 65.

Type species: *Meramecia diamphida* Cook, 1980

DIAGNOSIS: Posterior dorsal plate with one pair of glandularia setae (Fig. 904). Platelets in dorsal furrow relatively large and occupying most of the surface of the dorsal furrow. Genital field with six pairs of acetabula, lying on the genital flaps in female (Fig. 898), but separated and lying medial to genital flaps in male (Fig. 897). P5 relatively slender, with slender setae (Fig. 905).

HABITAT: Hyporheic.

DISTRIBUTION: One species known from Argentina.

Genus *Neomamersa* Lundblad, 1954

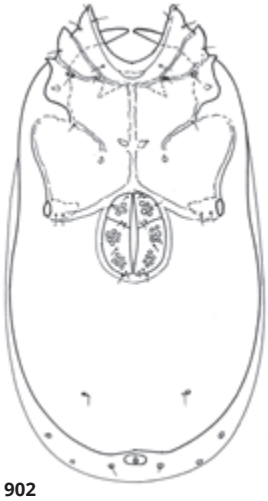
(Figs. 749, 888, 906-912)

1954 *Neomamersa* Lundblad, Arkiv för Zoologi (Serie 2) 5: 447.

Type species: *Neomamersa uncipalpis* Lundblad, 1954

DIAGNOSIS: Lateral eyes with eye pigment present or absent. Anterior dorsal plate with the postocularia and two pairs of setae, glandularia absent (Fig. 906). Posterior dorsal plate with two pairs of setae, glandularia absent. Platelets in dorsal furrow relatively small, occupying only a small part of surface. Ventral shield without small posterior platelets (Fig. 907). Genital field with six to many acetabula, in polyacetabulate species arranged in three groups (Fig. 909). Occasionally, acetabula in two groups on two pairs of sclerites (Figs. 910, 911). Anterior group of acetabula separated by a suture line from posterior two groups in female (Fig. 908), in males anterior and central group of acetabula on a common sclerite (Fig. 909). P2 ventrally with a hair-like seta, P4 ventrally with large setal tubercles, P5 long and tapering to a pointed tip, nearly as long as, or occasionally longer than P4 (Fig. 912).

HABITAT: Hyporheic.



902



903



904

902 *Meramecia* (*Parameramecia*) *multipora* I.M. Smith & Cook, venter male (after I.M. Smith & Cook 1994)

903 *Meramecia* (*Parameramecia*) *multipora* I.M. Smith & Cook, palp male (after I.M. Smith & Cook 1994)

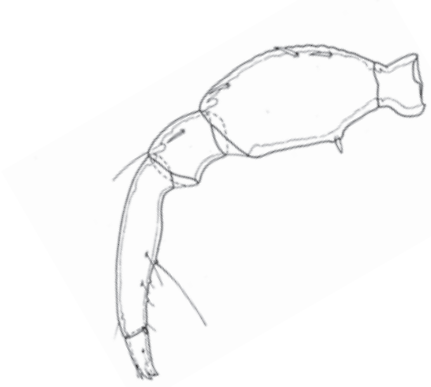
904 *Meramecia* (*Submeramecia*) *diamphida* Cook, dorsum female (after Cook 1980)

DISTRIBUTION: Several species known from Argentina, Columbia, Chile (Cook 1988), Mexico (Cramer 1987), Costa Rica (Goldschmidt 2004a), Caribbean (Haiti), Cuba (Orghidan & Gruia 1983c), Venezuela (Gruia 1988a,b) and the USA (I.M. Smith & Cook 1994).

Subfamily Neotorrenticolinae Lundblad, 1936

1936 Neotorrenticolinae Lundblad, Zoologischer Anzeiger 116: 204.

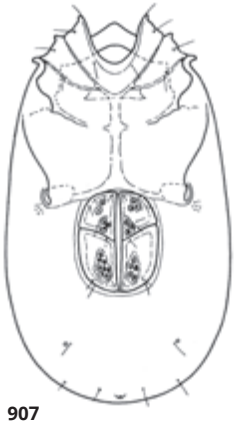
DIAGNOSIS: Lateral eyes separated on each side, lenses incorporated into the integument. Dorsum of male with a large shield, dorsum of female with a varying number of dorsalia, anteromedial platelet bearing the postocularia (Fig. 914). Coxae in four groups, Cxgl-4 absent. Genital field with numerous acetabula, more or less in three groups, especially in the male (Fig. 751). These three groups lying on the movable flaps in the female (Fig. 913); in males, only the posterior group of acetabula on the genital flaps, the two anterior groups medially to the flaps. P2 ventrally with a peg-like seta located on a well-developed ventral tubercle (Fig. 915). Swimming setae absent, IV-leg-6 with claws. Monotypic.



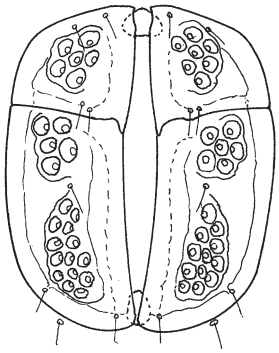
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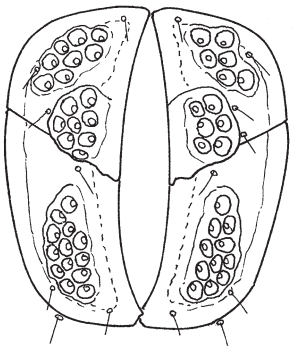
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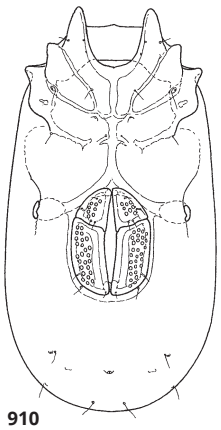
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910

905 *Meramecia* (*Submeramecia*) *diamphida* Cook, palp female (after Cook 1980)

906 *Neomamersa lundbladi paucipora* Cook, dorsum male (after Cook 1974)

907 *Neomamersa lundbladi paucipora* Cook, venter male (after Cook 1974)

908 *Neomamersa lundbladi lundbladi* Cook, genital field female (after I.M. Smith & Cook 1994)

909 *Neomamersa lundbladi lundbladi* Cook, genital field male (after I.M. Smith & Cook 1994)

910 *Neomamersa neomexicana* I.M. Smith & Cook, venter female (after I.M. Smith & Cook 1994)

Genus *Neotorrenticola* Lundblad, 1936

(Figs. 751, 913-915)

1936 *Neotorrenticola* Lundblad, Zoologischer Anzeiger 116: 204.
Type species: *Neotorrenticola violacea* Lundblad, 1936

DIAGNOSIS: As for subfamily.

HABITAT: Streams.

DISTRIBUTION: Several species known from Brazil, Paraguay, Peru, Columbia, Venezuela (Gruia 1988a,b) and Central America (Mexico, Cramer 1987).

Subfamily Nicalimnesiinae Cook, 1967

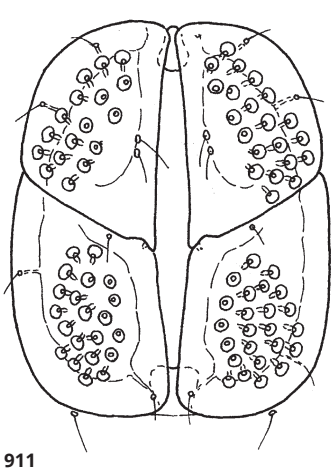
1967 Nicalimnesiinae Cook, Memoirs of the American Entomological Institute 9: 80.

DIAGNOSIS: Lateral eyes unpigmented. Dorsal shield divided into an anterior and posterior plate (Fig. 916). All coxae fused into a large ventral plate, including genital field, separated from a large posterior ventral plate (Figs. 917-918. Ventral shield with small anterolateral projections at the level of Cx-II. Cxgl-4 near anterior margin of Cx-III. Genital field with 6-7 pairs of acetabula, arranged in three groups in both sexes. Genital flaps present in female, each flap divided in an anterior sclerite with the anterior two acetabula, and the posterior sclerite bearing the posterior two groups, each with 2-3 acetabula. Males with a somewhat triangular genital plate surrounding the anteriorly located gonopore. P2 ventrally with a hair-like seta; P4 ventrally with three tubercles, the largest subdivided in three smaller tubercles; P5 longer than P4, curved and gradually tapering to a pointed tip (Fig. 919). Swimming setae absent. IV-leg-6 with a well-developed claw and a long terminal seta (Fig. 748). Monotypic.

Genus *Nicalimnesia* Cook, 1967

(Figs. 748, 916-919)

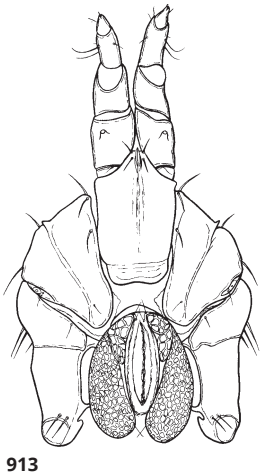
1967 *Nicalimnesia* Cook, Memoirs of the American Entomological Institute 9: 81.
Type species: *Nicalimnesia andha* Cook, 1967



911



912



913

911 *Neomamersa neomexicana* I.M. Smith & Cook, genital field male (after I.M. Smith & Cook 1994)

912 *Neomamersa lundbladi paucipora* Cook, palp male (after Cook 1974)

913 *Neotorrenticola violacea* Lundblad, venter female (after Cook 1974)

DIAGNOSIS: As for subfamily.

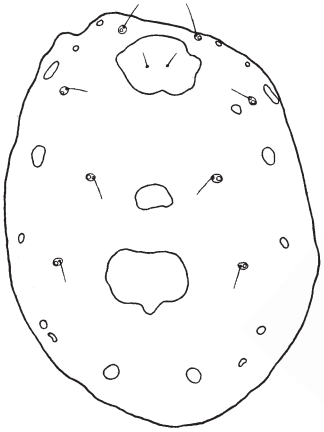
HABITAT: Hyporheic.

DISTRIBUTION: One species known from India.

Subfamily Protolimnesiinae K. Viets, 1940

1940 Protolimnesiinae K. Viets, Zoologischer Anzeiger 130: 249.

DIAGNOSIS: Lateral eyes present, lying below the integument, or absent. Integument not papillate. Degree of secondary sclerotization variable, from only small dorsalia to large dorsal plates. Cxgl-4 absent or present. Genital field with three to many acetabula. Swimming setae absent. IV-leg-6 with claws.



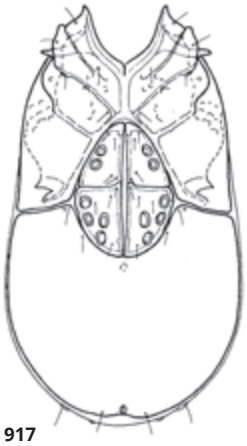
914



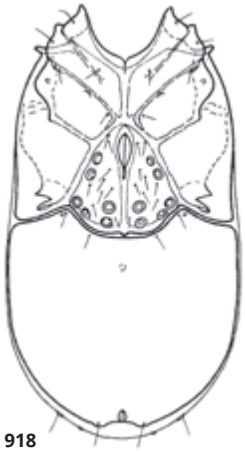
915



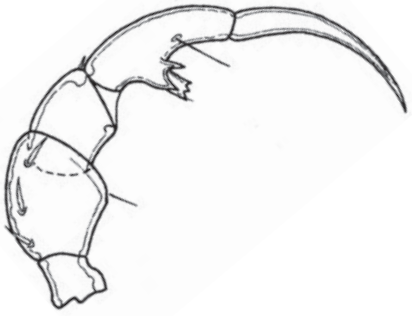
916



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914 *Neotorrenticola violacea* Lundblad, dorsum female (after Lundblad 1942a)

915 *Neotorrenticola violacea* Lundblad, palp male (after Lundblad 1942a)

916 *Nicalimnesia andha* Cook, dorsum female (after Cook 1974)

917 *Nicalimnesia andha* Cook, venter female (after Cook 1974)

918 *Nicalimnesia andha* Cook, venter male (after Cook 1974)

919 *Nicalimnesia andha* Cook, palp female (after Cook 1974)

KEY TO THE GENERA

1 IV-leg-1 more than twice as long as IV-leg-2 (Fig. 920) Genus *Limnesides*

- IV-leg-1 not more than twice as long as IV-leg-2 2

2 Genital field with a moderate sexual dimorphism (Figs. 757, 930); Cxgl-4 present Genus *Protolimnesia*

- Genital field without a sexual dimorphism; Cxgl-4 absent or reduced (Fig. 921) Genus *Crenolimnesia*

Genus *Crenolimnesia* Lundblad, 1938

(Figs. 921-923)

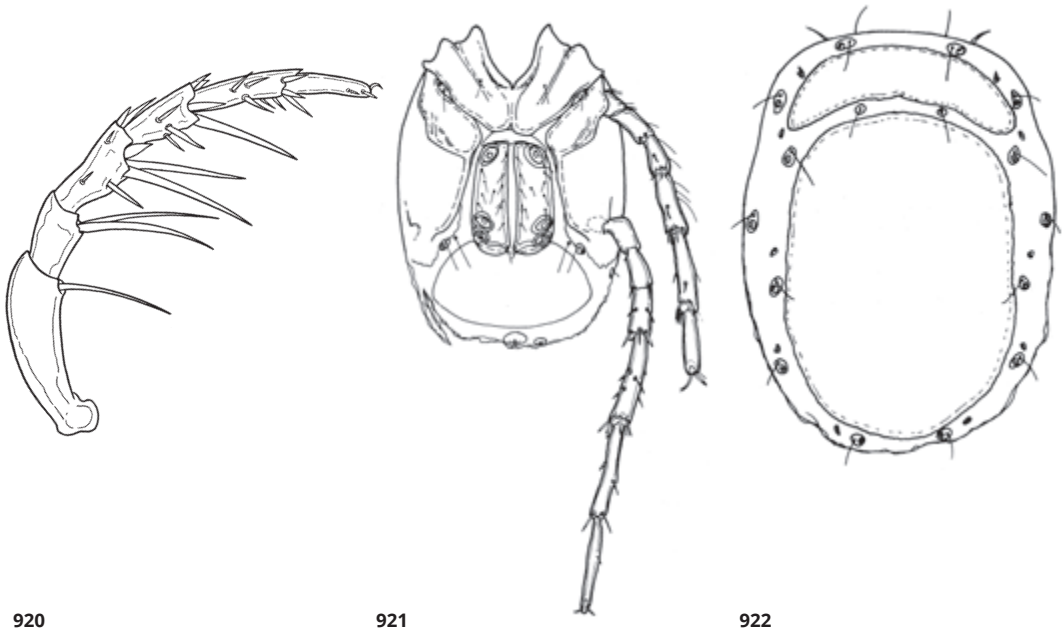
1938 *Crenolimnesia* Lundblad, Zoologischer Anzeiger 122: 36.

Type species: *Crenolimnesia placophora* Lundblad, 1938

DIAGNOSIS: Dorsum with a very large posterior plate and a much smaller anterior plate; both plates without glandularia (Fig. 922). Venter with a large plate posterior to genital field. Cx-I fused medially, Cx-IV closely flanking the genital field. Cxgl-4 reduced or absent (Fig. 921). Genital field with three pairs of acetabula. Genital flaps movable in both sexes, anterior pair of acetabula separated from posterior two pairs. P2 with an anteroventral seta (Fig. 923). Legs without swimming setae. IV-leg-1 about as long as IV-leg-2, fourth leg claws with a ventral and dorsal clawlet.

HABITAT: Springs.

DISTRIBUTION: One species known from Santa Catharina State, Brazil.



920 **921** **922**

920 *Limnesides epimeratus* Lundblad, fourth leg female (after Lundblad 1941b)

921 *Crenolimnesia placophora* Lundblad, venter female (after Cook 1974)

922 *Crenolimnesia placophora* Lundblad, dorsum female (after Cook 1974)

Genus *Limnesides* Lundblad, 1936

(Figs. 920, 924-926)

1936 *Limnesides* Lundblad, Zoologischer Anzeiger 116: 202.

Type species: *Limnesides epimeratus* Lundblad, 1936

DIAGNOSIS: (Female only) Dorsum with a large plate without glandularia. Cx-I fused medially, Cx-IV closely flanking the genital field. A suture line on Cx-IV extending anterolaterally to insertion of IV-leg. Cxgl-4 shifted to a position near Cxgl-1 (Fig. 924). Genital field with three pairs of acetabula, these elongated and constricted in the middle (Fig. 925). P2 with a relatively long anteroventral seta (Fig. 926). Swimming setae absent, but legs with long setae, especially IV-leg. IV-leg-1 much longer than IV-leg-2 (Fig. 920); IV-leg-6 with claws, these smaller than claws of other legs.

HABITAT: Streams.

DISTRIBUTION: One species known from Santa Catharina State, Brazil.

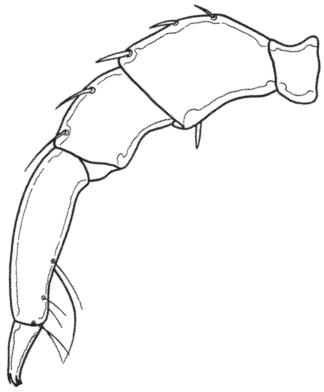
Genus *Protolimnesia* Lundblad, 1927

(Figs. 745, 757, 927-935)

1927 *Protolimnesia* Lundblad, Archiv für Hydrobiologie 18: 409.

Type species: *Limnesia unguiculata* Walter, 1919

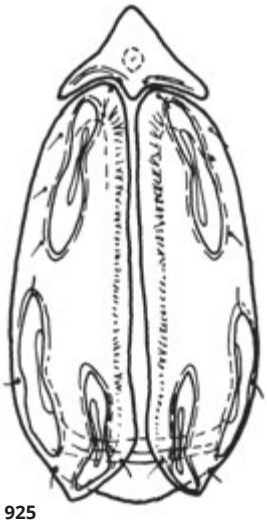
DIAGNOSIS: Lateral eyes lying under the integument or completely absent. Dorsum with variable sclerotization, from small platelets to large plates (Fig. 745), but never with a complete dorsal shield. Venter without ventral shield, but large plates may be present. Cx-I either fused or separated, Cx-IV triangular. Cxgl-4 present, lying close to anterior margin of Cx-III (Fig. 927). Genital field with three pairs of acetabula. P2 ventrally with a peg-like or hair-like seta. Legs without swimming setae. IV-leg-6 with claws and a sub-terminal seta.



923



924



925

923 *Crenolimnesia placophora* Lundblad, palp female (after Lundblad 1941b)

924 *Limnesides epimeratus* Lundblad, venter female (after Cook 1974)

925 *Limnesides epimeratus* Lundblad, genital field female (after Cook 1974)

KEY TO THE SUBGENERA

1 Dorsum with large plates, covering most of dorsum (Fig. 745); acetabula lobed (Figs. 927, 928) Subgenus *Protolimnesella*

- Dorsum with small platelets only (Fig. 930), acetabula usually not lobed (Fig. 931) 2

2 Lateral eyes lying under the integument, P5 slender (Fig. 932) Subgenus *Protolimnesia*

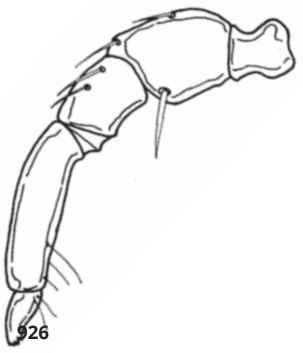
- Lateral eyes lacking, P5 very stocky (Fig. 933) Subgenus *Voldroguella*

Subgenus *Protolimnesia* s.s.

(Figs. 757, 930-932)

DIAGNOSIS: Lateral eyes lying under the integument. Dorsum with small anterior platelets and a large posterior platelet (Fig. 930). Cx-I separated medially. Acetabula usually not lobed (Fig. 931).

HABITAT: Streams.



926



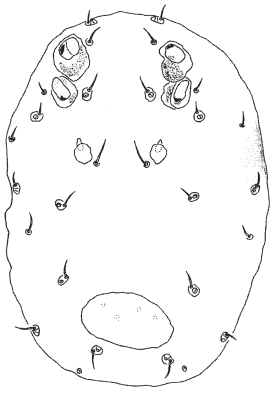
927



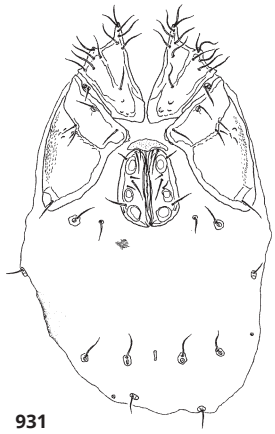
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926 *Limnesides epimeratus* Lundblad, palp female (after Cook 1974)

927 *Protolimnesia* (*Protolimnesella*) *interstitialis* Cook, venter male (after Cook 1980)

928 *Protolimnesia* (*Protolimnesella*) *interstitialis* Cook, genital field male (after Cook 1980)

929 *Protolimnesia* (*Protolimnesella*) *interstitialis* Cook, genital field female (after Cook 1980)

930 *Protolimnesia* (*Protolimnesia*) *oculata* Goldschmidt, dorsum female (after Goldschmidt 2004c)

931 *Protolimnesia* (*Protolimnesia*) *oculata* Goldschmidt, venter female (after Goldschmidt 2004c)

DISTRIBUTION: Several species known from South America (Argentina, Besch 1963, Cook 1980, Smit 2002c; Peru; Bolivia, Pešić et al. 2016), Central America (Costa Rica, Goldschmidt 2004c) and Oman (Smit & Pešić 2010).

Subgenus *Protolimnesella* Cook, 1980

(Figs. 745, 927-929, 934)

1980 *Protolimnesella* Cook, Memoirs of the American Entomological Institute 31: 73.

Type species: *Protolimnesia interstitialis* Cook, 1980

DIAGNOSIS: Lateral eyes unpigmented, lying under the integument. Dorsum with two large plates, the anterior plate bearing the postocularia (Fig. 745). Venter posteriorly either with small platelets or with one or two large plates. Cx-I fused (Fig. 927) or separated medially. Acetabula two- to four-lobed (Figs. 928-929).

HABITAT: Hyporheic.

DISTRIBUTION: South America (Argentina, Cook 1980; Ecuador), Central America (Costa Rica, Cook 1980; Mexico) and southwestern United States (Arizona, Texas, I.M. Smith & Cook 1996).

Subgenus *Voldroguella* Cook, 1981

(Figs. 933, 935)

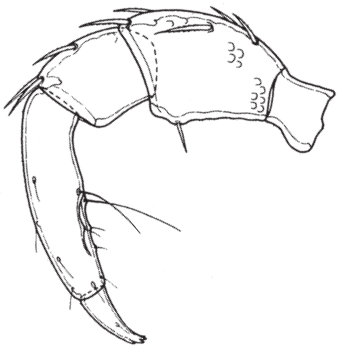
1981 *Voldroguella* Cook, Bijdragen tot de Dierkunde 51: 137.

Type species *Protolimnesia hispaniolae* Cook, 1981

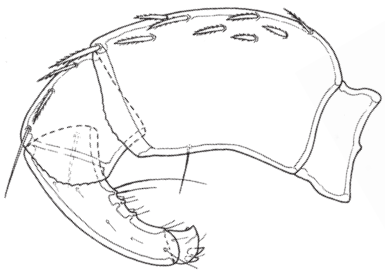
DIAGNOSIS: Lateral eyes absent. Dorsum with one pair of posteromedial muscle attachments. Venter without large plates. Cx-I separated medially. Gnathosoma without relatively long pointed posterior process (Fig. 935). P5 very stocky (Fig. 933).

HABITAT: Hyporheic.

DISTRIBUTION: One species known from Haiti.



932



933



934

932 *Protolimnesia* (*Protolimnesia*) *setifera* Cook, palp male (after Cook 1980)

933 *Protolimnesia* (*Voldroguella*) *hispaniolae* Cook, palp female (after Cook 1981a)

934 *Protolimnesia* (*Protolimnesella*) *interstitialis* Cook, palp female (after Cook 1980)

Subfamily Psammolimnesiinae Cook, 1974

1974 Psammolimnesiinae Cook, Memoirs of the American Entomological Institute 21: 177.

DIAGNOSIS: Idiosoma soft, elongated and greatly swollen posteriorly. Coxae confined to anterior quarter of venter (Fig. 761). Coxae in three groups, first coxal group fused medially and with the greatly enlarged gnathosoma (Fig. 760). Cxgl-1 not apparent; Cx-IV somewhat triangular, Cxgl-4 located on Cx-IV. Genital field extending only slightly between Cx-IV. Genital field with three pairs of acetabula. In both sexes movable genital flaps present and gonopore extending well posterior to the genital flaps (Fig. 936). P2 ventrally with a hair-like seta, P4 with small setal tubercles (Fig. 937). Legs without sexual dimorphism, swimming setae absent. IV-leg-6 without claws but with a long terminal seta (Fig. 938), claws of other legs with a dorsal clawlet. Monotypic.

Genus *Psammolimnesia* Cook, 1974

(Figs. 760, 761, 936-938)

1974 *Psammolimnesia* Cook, Memoirs of the American Entomological Institute 21: 178.

Type species: *Psammolimnesia mexicana* Cook, 1974

DIAGNOSIS: As for subfamily.

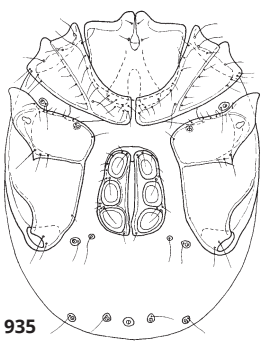
HABITAT: Hyporheic.

DISTRIBUTION: One species known from Mexico and one from Costa Rica (Cook 1980).

Subfamily Raptorhydracarinae Pešić & Gerecke, 2014

2014 Raptorhydracarinae Pešić & Gerecke, Zootaxa 3774: 375.

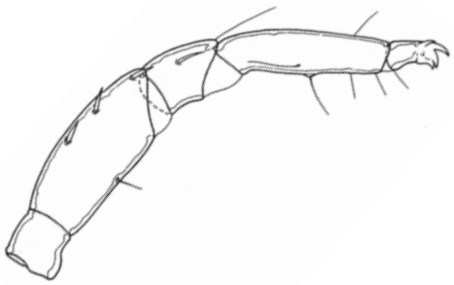
DIAGNOSIS: Lateral eyes unpigmented. Idiosoma flattened. Dorsum with two large, unpaired plates, both wider than long (Fig. 744); anterior plate with the postocularia, posterior plate without glandularia but three pairs of glandularia lying in indentations of this plate. Gnathosoma not fused to Cx-I. Coxae fused, forming a nearly circular disc (Fig. 939). All suture lines incomplete, Cx-IV posteriorly surrounding genital field. Cx-III without glandularia. Genital field with three pairs of acetabula on elongated, movable flaps. P1 without seta; P2 with a small peg-like seta in proximal half of segment; P3 with a ventrodistal serrated seta; P4 bearing 5-8 short, but stout ventral denticles and a ventrodistal serrated seta; P5 very long, longer than P4, gradually tapering to a pointed tip bearing 7-9 short denticle-like ventral setae (Fig. 747). Legs without swimming setae. I-leg-4-5 with basally thickened, very long setae (Fig. 940), IV-leg-6 with simple claws (Fig. 941). Monotypic.



935



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935 *Protolimnesia* (*Voldroguella*) *hispaniolae* Cook, venter female (after Cook 1981a)

936 *Psammolimnesia mexicana* Cook, genital field female (after Cook 1974)

937 *Psammolimnesia mexicana* Cook, palp male (after Cook 1974)

Genus *Raptorhydracarus* Pešić & Gerecke, 2014

(Figs. 744, 747, 939-941)

2014 *Raptorhydracarus* Pešić & Gerecke, Zootaxa 3774: 375.

Type species: *Raptorhydracarus tomasini* Pešić & Gerecke, 2014

DIAGNOSIS: As for subfamily.

HABITAT: Pools of percolated water in caves.

DISTRIBUTION: One species known from Vietnam.



938



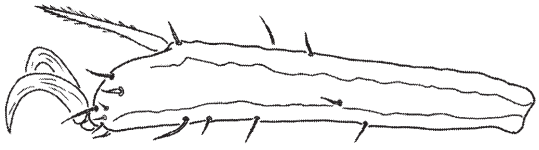
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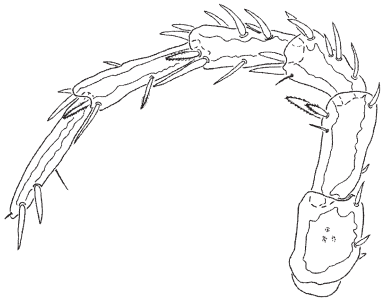
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938 *Psammolimnesia mexicana* Cook, fourth leg male (after Cook 1974)

939 *Raptorhydracarus tomasini* Pešić & Gerecke, venter male (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

940 *Raptorhydracarus tomasini* Pešić & Gerecke, first leg male (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

941 *Raptorhydracarus tomasini* Pešić & Gerecke, IV-leg-5-6 male (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

942 *Rheolimnesia costarricense* Goldschmidt, IV-leg-6 male (after Goldschmidt 2004c)

943 *Guanacastacarus mariae* Goldschmidt, fourth leg male (after Goldschmidt 2004c)

Subfamily Rheolimnesiinae Goldschmidt, 2004

2004 Rheolimnesiinae Goldschmidt, Archiv für Hydrobiologie, Supplement 151: 101.

DIAGNOSIS: Lateral eyes absent or present. Idiosoma with complete dorsal and ventral shields. Dorsal shield with a pair of lateral ridges. Cxgl-4 absent. Cx-IV medially enclosing genital field greatly, anterolaterally extending. Genital field with numerous acetabula; genital flaps movable in both sexes. Acetabula on the genital flaps in female, on gonopore field between the flaps in male. P2 anteroventrally with a peg-like seta. Swimming setae absent. IV-leg with or without claws.

KEY TO THE GENERA

1 IV-leg with claws (Fig. 942) 2

- IV-leg without claws (Fig. 943) Genus *Guanacastacarus*

2 Cx-III without medial margin, genital field not completed surrounded by Cx-IV in male (Fig. 944); males with only one pairs of genital flaps; P4 relatively slender (Fig. 945) Genus *Rheolimnesia*

- Cx-III with medial margins in female (Fig. 947), without medial margin in male (Fig. 947); male genital field completely surrounded by Cx-IV; males with two pairs of genital flaps; P4 stocky (Fig. 948) Genus *Siboneyacarus*

Genus *Guanacastacarus* Goldschmidt, 2004

(Fig. 943)

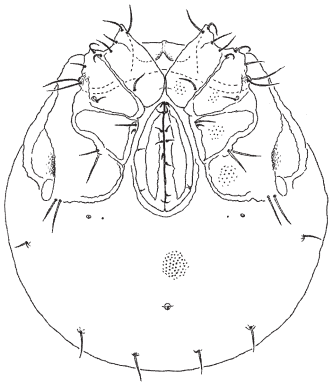
2004 *Guanacastacarus* Goldschmidt, Archiv für Hydrobiologie, Supplement 151: 113.

Type species: *Guanacastacarus mariae* Goldschmidt, 2004

DIAGNOSIS: Lateral eyes present. Cx-I fused medially. Female with 5-8 pairs of acetabula, one anterior group and two posterior groups and all acetabula lying on the genital flaps. Male with acetabula in a simple row on gonopore field between flaps. IV-leg-6 without claws (Fig. 943).

HABITAT: Springs.

DISTRIBUTION: One species known from Costa Rica.



944



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944 *Rheolimnesia costarricense* Goldschmidt, venter male (after Goldschmidt 2004c)

945 *Rheolimnesia costarricense* Goldschmidt, palp male (after Goldschmidt 2004c)

946 *Siboneyacarus sordidus* Orghidan, Gruia, Georgesco & Viña Bayés, venter female (after Orghidan et al. 1977)

Genus *Rheolimnesia* Lundblad, 1954

(Figs. 754, 755, 942, 944, 945, 949)

1954 *Rheolimnesia* Lundblad, Arkiv för Zoologi (Serie 2) 5: 487.

1995 *Rubicundula* Gerecke, Amazonia 13: 418 – Goldschmidt (2004c).

Type species: *Rheolimnesia motasi* Lundblad, 1954

DIAGNOSIS: Lateral eyes present. Dorsal shield with sharp lateral ridges, ending anteriorly in curves (Fig. 949). Cx-I of females separated (Fig. 754), Cx-I of males separated (Fig. 944) or fused in basal part. Genital field embedded partly between Cx-IV, rounded in females, elongated-oval and anteriorly pointed in males (Fig. 755). In females genital flaps bearing 40-80 acetabula in females, in males 30-50 pairs; acetabula in males arranged in more or less straight rows in the gonopore field between the flaps. All legs with claws (Fig. 942).

HABITAT: Streams, springs, spring brooks, hyporheic.

DISTRIBUTION: Four species known from South (Columbia; Venezuela; Ecuador, Gerecke 1995) and Central America (Costa Rica, Goldschmidt 2004c).

Genus *Siboneyacarus* Orghidan, Gruia, Georgesco & Viña Bayés, 1977

(Figs. 946-948, 950, 951)

1977 *Siboneyacarus* Orghidan, Gruia, Georgesco & Viña Bayés, Résultats des expéditions biospéologiques cubano-roumaines à Cuba 2: 217.

Type species: *Siboneyacarus sordidus* Orghidan, Gruia, Georgesco & Viña Bayés, 1977

DIAGNOSIS: Lateral eyes absent. Cx-I and Cx-II separated medially in both sexes, C-III with a medial margin in females (Fig. 946), not reaching midline in male (Fig. 947). Cx-IV partly encompassing genital field in female, completely enclosing genital field in male. Genital field of female large, with a lateral row of 18-19 acetabula on each flap; male genital field with 19 pairs of acetabula in gonopore field, posteriorly in several rows, and two pairs of genital flaps, both pointed anteriorly often as far as Cx-I. Palp stocky, P2 enlarged, P5 with large claws (Fig. 948). Segments of third leg of male (Fig. 950) much stocker than in female (Fig. 951), and III-leg-6 of male with a large claw.

HABITAT: Cave waters.

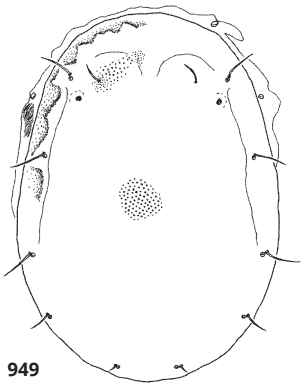
DISTRIBUTION: One species known from Cuba.



947



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947 *Siboneyacarus sordidus* Orghidan, Gruia, Georgesco & Viña Bayés, venter male (after Orghidan et al. 1977)

948 *Siboneyacarus sordidus* Orghidan, Gruia, Georgesco & Viña Bayés, palp male (after Orghidan et al. 1977)

949 *Rheolimnesia costarricense* Goldschmidt, dorsum male (after Goldschmidt 2004c)

Subfamily Tyrrelliinae Koenike, 1910

1910 Tyrrelliinae Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 125.

DIAGNOSIS: Lateral eye lenses separated and incorporated in the integument. Integument papillate. Dorsum typically with two or three medium sized plates, the pair of anterior platelets may be fused, occasionally with a complete dorsal shield in males. Venter without secondary sclerotization. Coxae in three or four groups or fused into a coxal plate; Cx-I separated medially in females, partially or completely fused in males. Cxgl-4 present or absent, if present, located near anterior margin of Cx-III. Genital field with three to many acetabula on movable flaps. In the genus *Neotyrrellia* Cx-IV laterally with additional acetabula which are easily overlooked. Palp stocky, P2 ventrally with a peg-like seta (Fig. 958), usually on a short tubercle. Legs stocky, (with one exception) without swimming setae. IV-leg-6 with claws.

KEY TO THE GENERA

1 Cxgl-4 present, Cx-IV with numerous acetabula best visible in lateral view (Fig. 956) Genus *Neotyrrellia*

- Cxgl-4 absent, Cx-IV without acetabula (Fig. 953) Genus *Tyrrellia*

Genus *Neotyrrellia* Lundblad, 1938

(Figs. 952, 955-958)

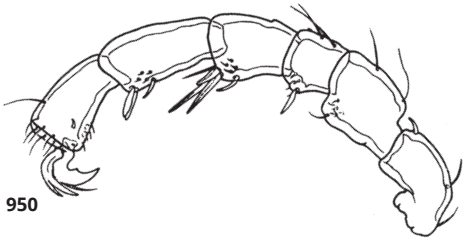
1938 *Neotyrrellia* Lundblad, Zoologischer Anzeiger 122: 9.

Type species: *Neotyrrellia petricola* Lundblad, 1938

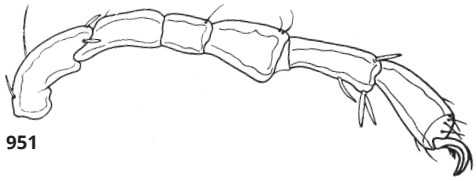
DIAGNOSIS: Dorsum with 2-3 moderately sized platelets (Fig. 955). Genital field with three (Fig. 952) to many acetabula (Fig. 956), many additional acetabula laterally on Cx-IV. Cxgl-4 present near anterior margin of Cx-III. Claws with clawlets (Fig. 957).

HABITAT: Springs, streams.

DISTRIBUTION: Several species known from South America (Brazil; Columbia; Paraguay; Argentina, Rosso de Ferradás 1990), Central America (Costa Rica, Cook 1980, Goldschmidt 2004b), the Caribbean (St Vincent) and southwestern USA (Arizona, Texas, I.M. Smith & Cook 1996). According to Goldschmidt (2004b) undescribed species are present in Chile.



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950 *Siboneyacarus sordidus* Orghidan, Gruia, Georgesco & Viña Bayés, third leg male (after Orghidan et al. 1977)

951 *Siboneyacarus sordidus* Orghidan, Gruia, Georgesco & Viña Bayés, third leg female (after Orghidan et al. 1977)

952 *Neotyrrellia triacetabulata* Goldschmidt, venter male (after Goldschmidt 2004b)

Genus *Tyrrellia* Koenike, 1895

(Figs. 752, 756, 953, 954, 959-963)

1895 *Tyrrellia* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 13: 198.

Type species: *Tyrrellia circularis* Koenike, 1895

DIAGNOSIS: Lateral eye lenses separated, lying either free in the integument, or, if a dorsal shield is present, incorporated in the dorsal shield. Dorsum with two or three moderate-sized platelets, or, in males, occasionally with a large dorsal shield (Fig. 960). Cxgl-4 absent (Fig. 953). Genital field with three (Fig. 953) to seven pairs of acetabula (Fig. 959). Claws with or without clawlets.

KEY TO THE SUBGENERA

1 Genital field with 3 pairs of acetabula (Fig. 953); without dorsal shield in both sexes (Fig. 954); without long setae on fourth leg Subgenus *Tyrrellia*

- Genital field with 6-7 pairs of acetabula (Fig. 959); male with a large dorsal shield (Fig. 960); IV-leg with long swimming setae Subgenus *Scutotyrrellia*

Subgenus *Tyrrellia* s.s.

(Figs. 953, 954)

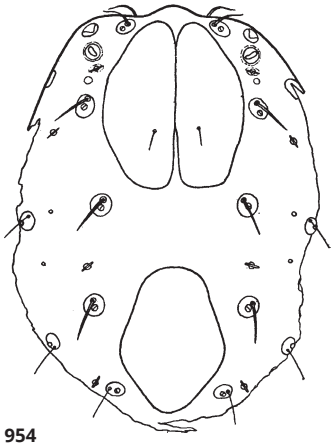
DIAGNOSIS: Dorsum with small plates in both sexes (Fig. 954). Genital field with three pairs of acetabula (Fig. 953). Cx-I and Cx-II separated in both sexes. Legs without swimming setae, claws without clawlets.

HABITAT: Springs, streams, hygropetric; occasionally in other habitats like warm volcanic water at 3200 m altitude in Chile (Cook 1988).

DISTRIBUTION: Several species known from North America (Mitchell 1958), South America (Argentina, Cook 1980; Chile, Besch 1962, Cook 1980; Brazil, K.O. Viets 1977c) and Central America (Mexico, Cook 1980).



953



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955

953 *Tyrrellia* (*Tyrrellia*) *crenophila* Lundblad, venter male (after Cook 1974)

954 *Tyrrellia* (*Tyrrellia*) *crenophila* Lundblad, dorsum male (after Lundblad 1941b)

955 *Neotyrrellia reticulata* Goldschmidt, dorsum female (after Goldschmidt 2004b)

Subgenus *Scutotyrrellia* Cook, 1974

(Figs. 752, 756, 959-963)

1974 *Scutotyrrellia* Cook, Memoirs of the American Entomological Institute 21: 161.

Type species: *Tyrrellia scutata* Cook, 1974

DIAGNOSIS: Dorsum with a complete dorsal shield in male and with small platelets in female. Genital field with 6-7 pairs of acetabula. Cx-II and Cx-III completely fused in male. Legs-II-IV with swimming setae (Fig. 961). Claws with clawlets.

HABITAT: The only known species was collected near a lake, but the exact habitat is not known.

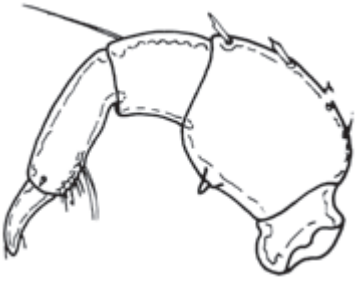
DISTRIBUTION: One species known from Florida, USA.



956



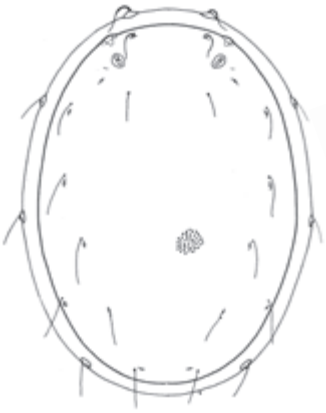
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961

956 *Neotyrrellia reticulata* Goldschmidt, venter female (after Goldschmidt 2004b)

957 *Neotyrrellia reticulata* Goldschmidt, third leg female (after Goldschmidt 2004b)

958 *Neotyrrellia petricola* Lundblad, palp male (after Cook 1974)

959 *Tyrrellia* (*Scutotyrrellia*) *scutata* Cook, venter female (after Cook 1974)

960 *Tyrrellia* (*Scutotyrrellia*) *scutata* Cook, dorsum male (after Cook 1974)

961 *Tyrrellia* (*Scutotyrrellia*) *scutata* Cook, IV-leg-4-6 male (after Cook 1974)

Family Rutripalpidae Sokolow, 1934

1934 Rutripalpidae Sokolow, Zoologischer Anzeiger 106: 325.

DIAGNOSIS: Lateral eyes with two lenses lying in a small eye capsule; median eye absent. Dorsum with five dorsocentralia, postocularia lying free in the integument (Fig. 964). Gnathosoma with an extremely short rostrum directed ventrally. Coxae in four groups, Cx-IV more or less triangular (Fig. 27). Cxgl-4 located medial to suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. Male genital field with an angled, movable penis-like tube formed by fused genital plates; in normal position, this organ embedded in a pit of membranous integument, directed posteriorly (Fig. 965), in erect position directed anteriorly (Fig. 966). Anterior part of the organ with paired, long, posteriorly directed setae. Acetabula lying on distal part of penis-tube. Acetabula-bearing area flanked by a collar diverging posteriorly and forming a pair of tips on level of third pair of acetabula. Between acetabula no gonopore is visible but a posteriorly-directed tube originating medially from third pair of acetabula. Genital field flanked by a pair of large sclerites. Female genital field flanked by a pair of genital flaps, pregenital sclerite prominent, pent- or hexangular (Fig. 967). Palp five-segmented and without ventral projections (Fig. 28). P5 and its terminal setae flattened to produce s spatulate segment, claws nail-like arranged in two groups (Fig. 968). Legs without swimming setae, all leg claws with clawlets. Monotypic.

Genus *Rutripalpus* Sokolow, 1934

(Figs. 27, 28, 964-968)

1934 *Rutripalpus* Sokolow, Zoologischer Anzeiger 106: 318.

Type species: *Rutripalpus limicola* Sokolow, 1934

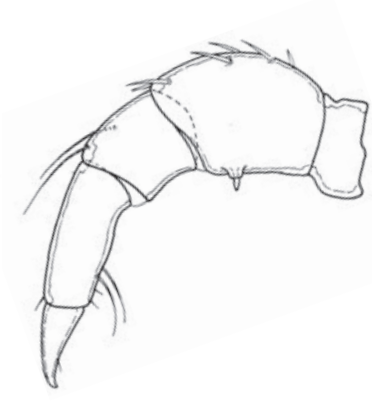
DIAGNOSIS: As for family.

HABITAT: Springs.

DISTRIBUTION: One species known from Europe (Russia, Germany, Montenegro, Gerecke & Tuzovskij 2001, the Netherlands, Wiggers pers. com.) and one from Canada (I.M. Smith 1991c).



962



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962 *Tyrrellia* (*Scutotyrrellia*) *scutata* Cook, venter male (after Cook 1974)

963 *Tyrrellia* (*Scutotyrrellia*) *scutata* Cook, palp female (after Cook 1974)

964 *Rutripalpus limicola* Sokolow, dorsum male (after Di Sabatino et al. 2010)

Family Oxidae K. Viets, 1926

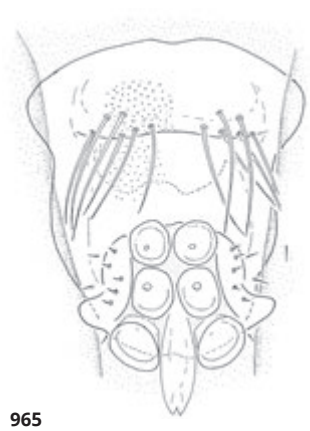
1926 Oxidae K. Viets, Zoologischer Anzeiger 69: 197.

DIAGNOSIS: Lateral eyes not in capsules, lying below the integument. Dorsalia present or absent. Coxal plates fused and in most genera greatly expanded, encompassing a large part of the idiosoma except a narrow dorsal strip. Suture lines of coxal plates generally only visible laterally, a median suture line rarely present. Cxgl-1 lying near tip of Cx-I, accompanied by a hyaline membrane and various modified setae. Palp with four (Fig. 969) or five (Fig. 970) segments, P2 and P3 without ventral projections or setae. All legs located anteriorly (Fig. 31), Legs-II-IV with swimming setae, I-III-leg with claws bearing a dorsal clawlet, claws of IV-leg reduced; IV-leg-6 bearing a long terminal seta. Genital field anteriorly embraced or surrounded by Cx-IV, genital flaps typically covering three pairs of acetabula located in the gonopore field.

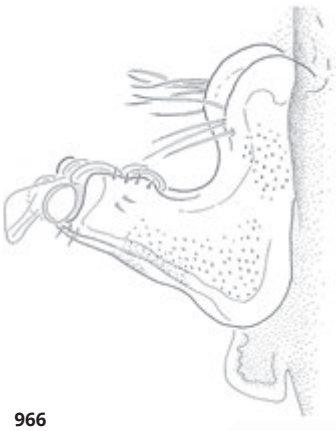
KEY TO THE GENERA

1 Palp four-segmented (Fig. 969) Genus *Africoxus*

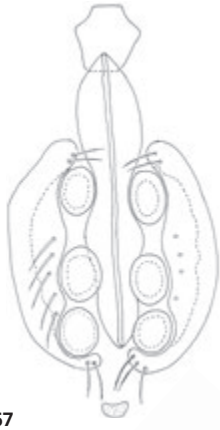
- Palp five-segmented (Fig. 970) Genus *Oxus*



965



966



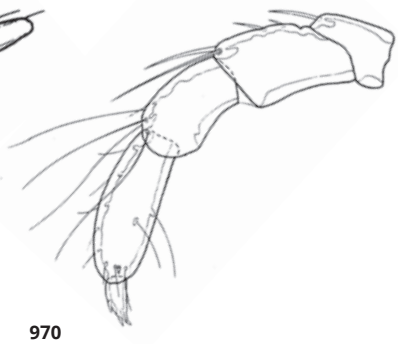
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965 *Rutripalpus limicola* Sokolow, genital field in ventral view male (after Di Sabatino et al. 2010)

966 *Rutripalpus limicola* Sokolow, genital field in lateral view male (after Di Sabatino et al. 2010)

967 *Rutripalpus limicola* Sokolow, genital field female (after Di Sabatino et al. 2010)

968 *Rutripalpus limicola* Sokolow, dorsal view P5 female (after Cook 1974)

969 *Africoxus* (*Africoxus*) *curvisetus* (K. Viets), palp female (after Cook 1974)

970 *Oxus* (*Oxus*) *extendens* Cook, palp male (after Cook 1986)

Genus *Africoxus* Cook, 1966

(Figs. 969, 971-975)

1966 *Africoxus* Cook, Memoirs of the American Entomological Institute 6: 57.

Type genus: *Oxus curvisetus* K. Viets, 1916

DIAGNOSIS: P2 and P3 fused to produce a four-segmented palp (Fig. 969). Venter without a median suture line. Cx-I with a tube of soft integument extending anteriorly. I-leg-2 with one or two stout dorsal setae which are longer than I-leg-3. No sclerites associated with the excretory pore.

KEY TO THE SUBGENERA

1 Idiosoma not laterally compressed; most of dorsum unsclerotized and without dorsalia Subgenus *Africoxus* s.s.

- Idiosoma laterally compressed, coxae extending onto dorsal side leaving only a small unsclerotized strip containing small dorsalia (Fig. 971) Subgenus *Pseudofrontipoda*

Subgenus *Africoxus* s.s.

(Figs. 969, 972, 973)

DIAGNOSIS: Idiosoma not laterally compressed. Dorsum with an extensive area of soft integument lacking dorsalia. Coxae mostly confined to ventral surface (Fig. 972). I-leg-2 with only one large dorsal seta (Fig. 973), claws with a clawlet.

HABITAT: Permanent standing waters and streams.

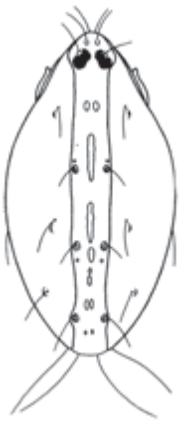
DISTRIBUTION: Three species known from Africa (Liberia, Cameroon, Congo, Kenya and Ethiopia).

Subgenus *Pseudofrontipoda* Cook, 1966

(Figs. 971, 974, 975)

1966 *Pseudofrontipoda* Cook, Memoirs of the American Entomological Institute 6: 60.

Type species: *Africoxus obesus* Cook, 1966



971



972



973

971 *Africoxus* (*Pseudofrontipoda*) *szalayi* Cook, dorsum female (after Cook 1974)

972 *Africoxus* (*Africoxus*) *curvisetus* (K. Viets), venter male (after Cook 1974)

973 *Africoxus* (*Africoxus*) *curvisetus* (K. Viets), first leg female (after Cook 1974)

DIAGNOSIS: Idiosoma laterally compressed (Fig. 971). Coxae expanded dorsally and posteriorly, occupying most of idiosoma surface (Fig. 974). Dorsum with an unsclerotized strip bearing small platelets (Fig. 971). I-leg-2 with two large setae, claws without clawlets (Fig. 975).

HABITAT: Streams.

DISTRIBUTION: Three species known from Africa (Liberia, Ethiopia).

Genus *Oxus* Kramer, 1877

(Figs. 31, 970, 976-986)

1836 *Marica* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 5: 23 (praeocc.).

1877 *Oxus* Kramer, Archiv für Naturgeschichte 43: 239.

1880 *Pseudomarica* Neuman, Kongliga Svenska vetenskaps-akademiens handlingar 17: 70.

1891 *Frontipoda* Koenike, Zoologischer Anzeiger 14: 19 – Besch (1964); Di Sabatino et al. (2009).

1901 *Pseudoxus* Thor, Archiv or mathematik og Naturvidenskab 23: 18.

Type species: *Oxus oblongus* Kramer, 1877 = *Oxus strigatus* (Müller, 1776)

DIAGNOSIS: Idiosoma laterally compressed or as wide as high. Dorsalia in the soft integument of the dorsum present or absent. Coxae may or may not extend onto the dorsal surface (Figs. 979, 984). Sexual dimorphism of the coxae may be present, e.g. in males coxae completely encompassing the genital field, in females genital field only partly encompassed by the coxae. A suture line extending anteriorly or laterally from the area of the genital field absent or present (Fig. 977). Palp five-segmented, but in one species from New Zealand P4 and P5 fused (Smit 2002b). Excretory pore with or without sclerotization. Leg claws with one to many clawlets, in the latter case forming a comb (Fig. 976).

REMARKS: Traditionally three genera were distinguished, i.e. *Oxus*, *Gnaphiscus* and *Frontipoda*. In Europe these appeared very distinct, but with the description of many species of other areas of the world, the differences became blurred. *Flabellifrontipoda* was described as a genus from the Southern Hemisphere, but lowered to the rank of subgenus of *Frontipoda* by Smit (2002b). Consequently, *Flabellifrontipoda* is now a subgenus of *Oxus*.

KEY TO THE SUBGENERA

1 Claws with a comb (Fig. 976), a median ventral suture line present (Fig. 977) Subgenus *Flabellifrontipoda*

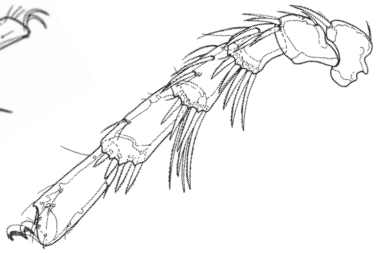
- Claws without a comb (Fig. 978), median ventral suture line usually absent (Fig. 979) 2



974



975



976

974 *Africoxus* (*Pseudofrontipoda*) *szalayi* Cook, lateral view female (after Cook 1974)

975 *Africoxus* (*Pseudofrontipoda*) *szalayi* Cook, first leg female (after Cook 1974)

976 *Oxus* (*Flabellifrontipoda*) *zadina* (Cook), first leg male (after Cook 1986)

2 Male genital field almost completely enclosed by the expanded Cx-IV (Fig. 980) (females not distinguishable at subgenus level) Subgenus *Gnaphiscus*

- Male genital field only partially surrounded by the moderately expanded coxae (Fig. 981) Subgenus *Oxus*

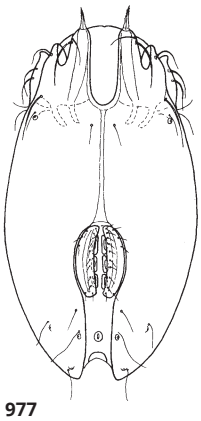
Subgenus *Oxus* s.s.

(Figs. 31, 970, 978, 979, 981-984)

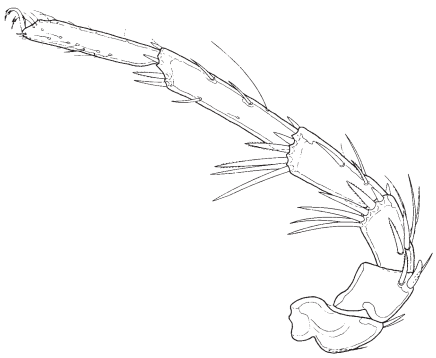
DIAGNOSIS: Idiosoma as wide as high (Fig. 982) or laterally compressed. Coxae of male typically not extending posterior to the end of genital field and never enclosing the genital field (Fig. 981). With (Fig. 983) or without (Fig. 979) suture line extending from the region of genital field to the gnathosomal bay. Coxae with a various degree of sexual dimorphism, e.g. in males coxal field covering a larger part of the venter compared to females.

HABITAT: Standing waters, streams.

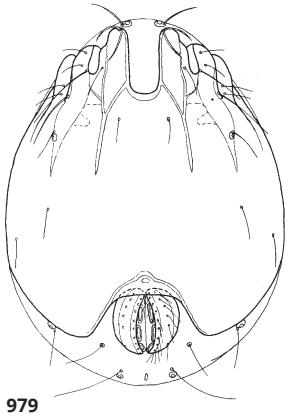
DISTRIBUTION: Numerous species known worldwide.



977



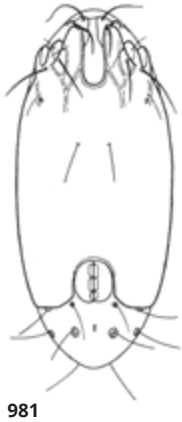
978



979



980



981



982

977 *Oxus* (*Flabellifrontipoda*) *zadina* (Cook), venter male (after Cook 1986)

978 *Oxus* (*Oxus*) *orientalis* Walter, first leg female (after Cook 1986)

979 *Oxus* (*Oxus*) *orientalis* Walter, venter female (after Cook 1986)

980 *Oxus* (*Gnaphiscus*) *setosus* (Koenike, venter male (after Cook 1974)

981 *Oxus* (*Oxus*) *maglioi* K. Viets, venter male (after Cook 1974)

982 *Oxus* (*Oxus*) *gnaphiscoides* Habeeb, lateral view male (after Cook 1974)

Subgenus *Flabellifrontipoda* Lundblad, 1947

(Figs. 976, 977, 985)

1947 *Flabellifrontipoda* Lundblad, Arkiv för Zoologi 40A: 40.

Type species: *Flabellifrontipoda pectinata* Lundblad, 1947

DIAGNOSIS: Idiosoma laterally compressed. Coxae extending onto the dorsal surface, leaving a narrow median unsclerotized strip (Fig. 985). A median ventral suture line present extending from the genital field towards the gnathosoma bay (Fig. 977). Leg claws with a comb (Fig. 976).

HABITAT: Standing waters, streams.

DISTRIBUTION: Australia (Cook 1986), New Zealand (Cook 1983), South America (Argentina, Cook 1980; Columbia; Peru; Chile, Cook 1983), Central America (Honduras, Wiles 2005).

Subgenus *Gnaphiscus* Koenike, 1898

(Figs. 980, 986)

1898 *Gnaphiscus* Koenike, Zoologischer Anzeiger 21: 267.

1913 *Gnaphoxus* Thor, Zoologischer Anzeiger 41: 166.

Type species: *Gnaphiscus setosus* Koenike, 1898

DIAGNOSIS: A very pronounced sexual dimorphism of the coxae present, those of the males enclosing the genital field except for a median strip (Fig. 980). Leg claws simple.

HABITAT: Standing waters and streams.

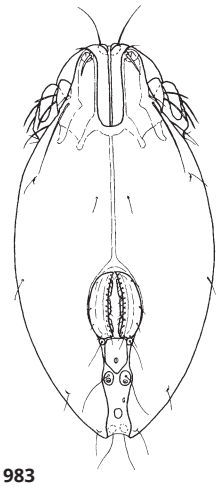
DISTRIBUTION: Four species known from Europe, Siberia and North America (Alaska).

Family Sperchontidae Thor, 1900

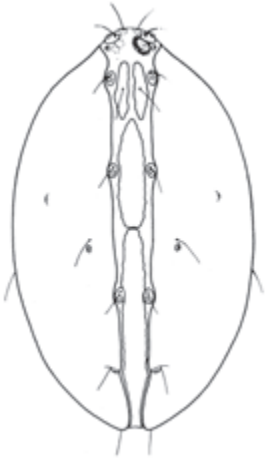
1900 Sperchontidae Thor, Nyt Magazin for Naturvidenskaberne 38 (3): 2.

1964 Sperchonopsinae Besch, Beiträge zur Neotropischen Fauna 3: 107 - Cook (1974).

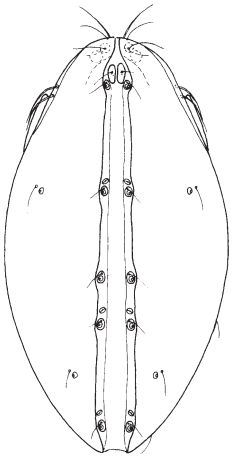
1964 Illiesiellinae Besch, Beiträge zur Neotropischen Fauna 3: 121 - Cook (1974).



983



984



985

983 *Oxus* (*Oxus*) *tasmanicus* (K.O. Viets), venter female (after Cook 1986)

984 *Oxus* (*Oxus*) *americanus* (Marshall), dorsum male (after Cook 1974)

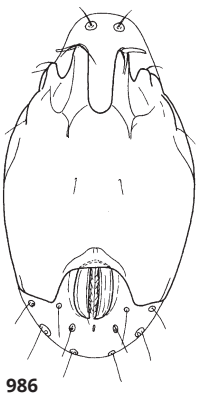
985 *Oxus* (*Flabellifrontipoda*) *pectinatus* (Lundblad), dorsum female (after Cook 1986)

DIAGNOSIS: Integument varying from papillate, areolate, granulate, lined to structureless. Lateral eyes in capsules. Dorsal and ventral plates varying from none to numerous, exhibiting various degrees of fusion till a complete dorsal shield. There may be a moderate to pronounced sexual dimorphism in number, size and fusion of dorsalia and ventralia. Median eye occasionally visible in males as a small pore in the anterior dorsal shield, in the subgenus *Acadiosperchon* in both sexes. Coxae typically in four groups, but occasionally fused on their respective sides. Genital field with three pairs of acetabula. Genital flaps present, but these may be somewhat reduced and not covering gonopore when closed. Genital field often with a slight sexual dimorphism, e.g. pregenital sclerite differing in shape between the sexes and flaps more slender and elongate in females. Palp five-segmented, P2 usually with a distoventral projection; other parts of palp variable. Legs without swimming setae. Leg claws typically with claw blade and clawlets.

KEY TO THE SUBFAMILIES

1 P3 with a large distoventral seta, P4 with a distal spine-like seta (Fig. 987); Cxgl-2 lying on Cx-II (Fig. 988) Subfamily Apeltosperchontinae

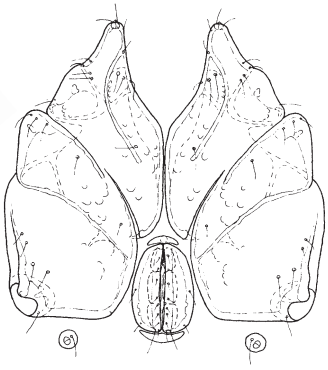
- P3 generally lacking a distoventral seta; P4 without distal seta (Fig. 989); Cxgl-2 free or secondarily fused with Cx-II (Fig. 990) Subfamily Sperchontinae



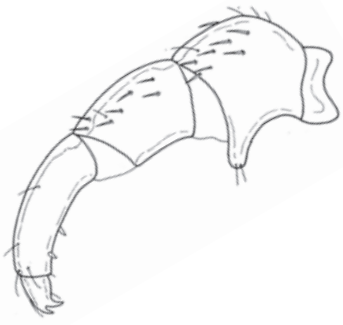
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987



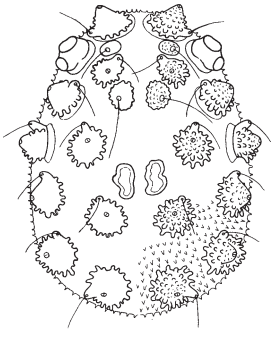
988



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990



991

986 *Oxus* (*Gnaphiscus*) *setosus* (Koenike), venter female (after Cook 1974)

987 *Apeltosperchon schmitzi* Besch, palp male (after Cook 1974)

988 *Apeltosperchon schmitzi* Besch, venter male (after Cook 1988)

989 *Sperchon* (*Hispidosperchon*) *placoderma* (Lundblad), palp male (after Cook 1974)

990 *Sperchon* (*Sperchon*) *ootacamundis* Cook, venter male (after Cook 1974)

991 *Sperchonopsis* (*Sperchonopsis*) *nova* Prasad & Cook, dorsum male (after Cook 1974)

Subfamily Sperchontinae Thor, 1900

DIAGNOSIS: Dorsalia present or absent. If Cx-I and Cx-II are touching on their respective sides, suture lines between them are complete. Suture lines Cx-I/II and Cx-III/IV on their respective sides complete (Fig. 990). Cx-I without a sclerotized line crossing from suture Cx-I/II to lateral gnathosomal bay margin. Cx-I not terminating in large seta which arises from a large setal base. P3 without a long heavy distoventral seta, P4 not terminating in a medial seta (Fig. 989).

KEY TO THE GENERA

1 Glandularia raised, with a papillate surface (Fig. 991); P4 typically or without a peg-like ventral seta (Fig. 992), a tubercle may be present Genus *Sperchonopsis*

- Glandularia various but with smooth surface (Fig. 993); P4 with (Fig. 994) or without (Fig. 995) a ventral peg-like seta 2

2 Glandularia of Cx-III shifted to the tips of Cx-I; Cxgl-2 on a long triangular sclerite joining the lateral portion of Cx-II to the medial portion of Cx-III (Fig. 996) Genus *Notosperchonopsis*

- Cx-III with or without glandularia, but not shifted to the tip of Cx-I; Cxgl-2 on a small sclerite (Fig. 997) 3



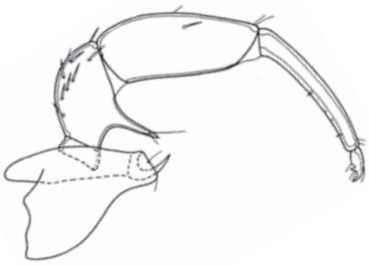
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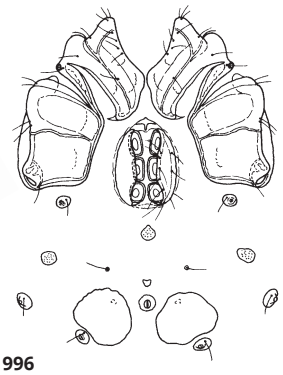
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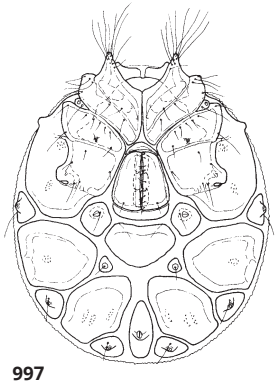
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997

992 *Sperchonopsis* (*Sperchonopsis*) *nova* Prasad & Cook, palp female (after Cook 1974)

993 *Sperchon* (*Palpisperchon*) *crassipalpis* Marshall, dorsum male (after Cook 1974)

994 *Sperchon* (*Hispidosperchon*) *denticulatus* Koenike, palp male (after Di Sabatino et al. 2010)

995 *Sperchon* (*Hispidosperchon*) *nilgiris* Cook, gnathosoma + palp female (after Cook 1974)

996 *Notosperchonopsis pauciscutata neuquenensis* Cook, venter female (after Cook 1980)

997 *Illiesiella circularis* Besch, venter female (after Cook 1988)

3	P4 lacking ventral peg-like setae (Fig. 998)	Genus *Illiesiella*
-	P4 with ventral peg-like setae (Fig. 999)	Genus *Sperchon*

Genus *Illiesiella* Besch, 1964

(Figs. 997, 998, 1000-1002)

1964 *Illiesiella* Besch, Beiträge zur Neotropischen Fauna 3: 121.

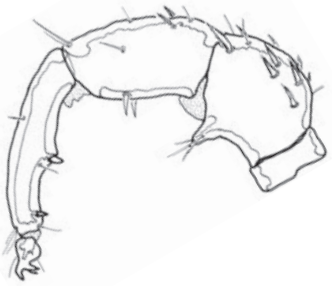
1980 *Andinosperchon* Cook, Memoirs of the American Entomological Institute 31: 29 – Cook (1988).

Type species: *Illiesiella circularis* Besch, 1964

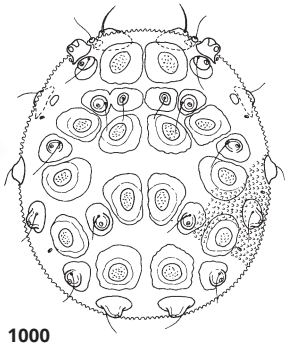
DIAGNOSIS: Lateral eye capsules fused with the ventral shield and separated from the dorsal platelets by a more or less well-developed dorsal furrow. Dorsalia and ventralia greatly expanded and occupying most of the dorsal and ventral surface, with various degrees of fusion (Figs. 1000, 1001). The glandularia may be greatly raised (Fig. 1002). Cxgl-4 on Cx-III near suture line of Cx-III/IV. Cxgl-2 on a short sclerite. P2 with a ventral projection, and also P3 and P4 may have a ventral projection; P4 lacking a ventral peg-like seta (Fig. 998).



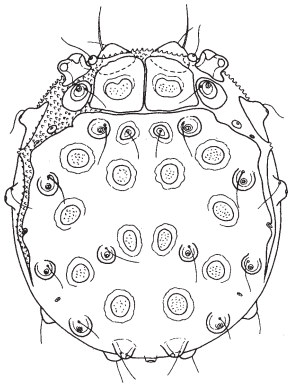
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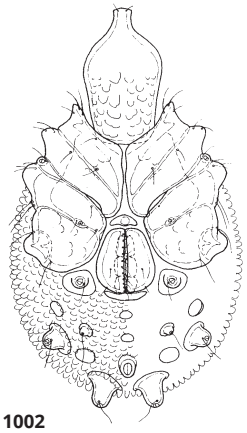
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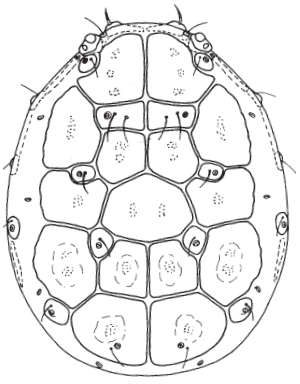
1000



1001



1002



1003

998 *Illiesiella circularis* Besch, palp female (after Cook 1988)

999 *Sperchon* (*Hispidosperchon*) *papillosus* Thor, palp male (after Di Sabatino et al. 2010)

1000 *Illiesiella ischiotricha* (Besch), dorsum female (after Cook 1980)

1001 *Illiesiella ischiotricha* (Besch), dorsum male (after Cook 1980)

1002 *Illiesiella weberi* (Besch), venter male (after Cook 1988)

1003 *Notosperchonopsis multiscutata* Besch, dorsum male (after Cook 1980)

HABITAT: Streams.

DISTRIBUTION: Several species known from South America (Argentina, Cook 1980, as *Notosperchonopis*; Chile, Besch 1964, Cook 1988).

Genus *Notosperchonopsis* Besch, 1964

(Figs. 996, 1003-1004)

1964 *Notosperchonopsis* Besch, Beiträge zur Neotropischen Fauna 3: 108.

Type species: *Sperchonopsis pauciscutata* K. Viets, 1953

DIAGNOSIS: Dorsalia numerous, often greatly expanded and exhibiting various degrees of fusion (Fig. 1003). Glandularia not raised and without papillae, either fused with the dorsalia or lying separated. Cxgl-2 on a long triangular sclerite joining the lateral portion of Cx-II to the medial portion of Cx-III (Fig. 996). Glandularia of Cx-III shifted to the tip of Cx-I. P3 lacking a peg-like seta, with or without a ventral projection; P4 without ventral peg-like seta, but a ventral projection may be present (Fig. 1004).

HABITAT: Springs, streams.

DISTRIBUTION: South America (Chile, Besch 1964, Cook 1988; Argentina, Cook 1980; Columbia; Peru).

Genus *Sperchon* Kramer, 1877

(Figs. 36, 989, 990, 993-995, 999, 1005-1016)

1877 *Sperchon* Kramer, Archiv für Naturgeschichte 43: 240.

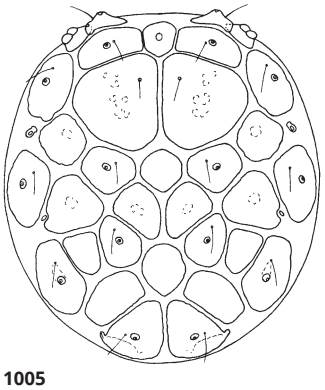
1985 *Charoelia* Bader, Revue suisse de Zoologie 92: 461 – Di Sabatino et al. (2009).

Type species: *Sperchon squamosus* Kramer, 1879

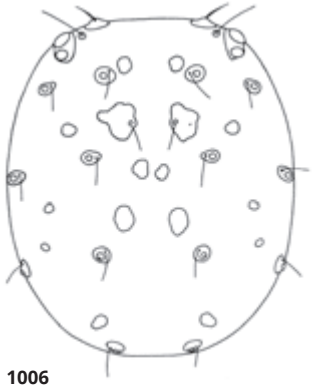
DIAGNOSIS: Dorsalia variously developed, from none to a complete dorsal shield. Glandularia usually small and not greatly raised. If glandularia are raised, their surface not papillate. Pregenital sclerite weakly developed or absent in males (Fig. 990), crescent-shaped with a anteromedial extension in females. Anterior to genital field a round sclerotized platelet present in males, absent in females. P3 with or without ventral setae; P4 typically with two ventral peg-like setae, but these setae occasionally very small or absent.



1004



1005



1006

1004 *Notosperchonopsis multiscutata* Besch, palp female (after Cook 1980)

1005 *Sperchon* (*Acadiosperchon*) *oculatus* Cook, dorsum male (after Cook 1974)

1006 *Sperchon* (*Sperchon*) *hirsutus* Cook, dorsum female (after Cook 1974)

KEY TO THE SUBGENERA

1 Anterior part of the dorsum with a pigmentless median eye (Fig. 1005) Subgenus *Acadiosperchon*

- Median eye absent (Fig. 1006) 2

2 Palp segment very short and stocky; ventral setae of P4 very heavy and interspace as wide as setae diameter (Fig. 1007) Subgenus *Palpisperchon*

- Palp segments not very stocky; peg-like setae of P4 smaller and more distanced (Fig. 995) 3

3 Integument reticulate, at least in some localized areas of the venter (Fig. 1008) Subgenus *Hispidosperchon*

- Integument rugose or papillate, nowhere reticulate (Fig. 1009) Subgenus *Sperchon*

Subgenus *Sperchon* s.s.

(Figs. 990, 1006, 1009, 1010)

1901 *Squamosperchon* Thor, Nyt Magazin for Naturvidenskaberne 23: 22.

DIAGNOSIS: Median eye absent. Integument papillate to rugose, nowhere reticulate (Fig. 1009). Dorsum with or without numerous muscle attachments (Figs. 1006). Cx-III with or without glandularia. P3 without ventral setae or denticulation; ventral peg-like setae of P4 not enlarged and not located close together (Fig. 1010).

HABITAT: Springs, streams.

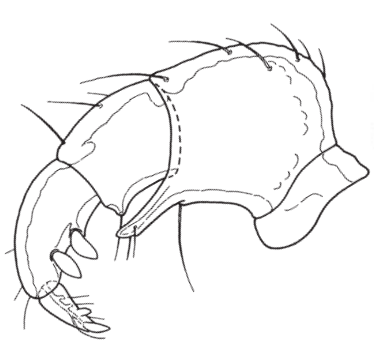
DISTRIBUTION: Numerous species known worldwide except for the Australasian region.

Subgenus *Acadiosperchon* Habeeb, 1959

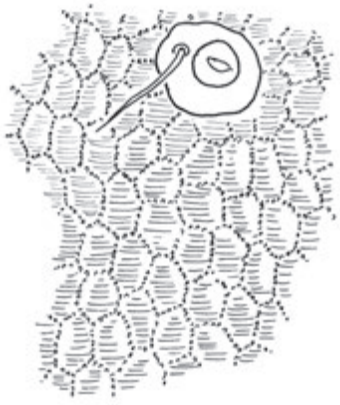
(Figs. 1005, 1011, 1012)

1959 *Acadiosperchon* Habeeb, Leaflets of Acadian Biology 20: 2.

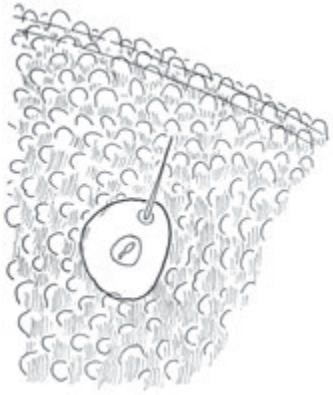
Type species: *Sperchon decorellus* Habeeb, 1955



1007



1008



1009

1007 *Sperchon* (*Palpisperchon*) *crassipalpis* Marshall, palp male (after Cook 1974)

1008 *Sperchon* (*Hispidosperchon*) *clupeifer* Piersig, integument structure (after Di Sabatino et al. 2010)

1009 *Sperchon* (*Sperchon*) *squamosus* Kramer, integument structure (after Di Sabatino et al. 2010)

DIAGNOSIS: A pigmentless median eye present (Fig. 1005). Dorsum with numerous muscle attachments, postocularia on relatively large platelets. Cx-III with or without glandularia (Fig. 1011). Ventral margin of P3 with or without a small projection but without setae; peg-like setae of P4 not greatly enlarged and not placed together (Fig. 1012).

HABITAT: Springs, streams.

DISTRIBUTION: Two species known from Canada (New Brunswick) and the USA (North Carolina, Virginia) and one species from Mexico (Otero-Colina 1987).

Subgenus *Hispidosperchon* Thor, 1901

(Figs. 36, 989, 994, 995, 999, 1008, 1013-1015)

1901 *Hispidosperchon* Thor, Nyt Magazin for Naturvidenskaberne 23: 24.

1926 *Mixosperchon* K. Viets, Zoologischer Anzeiger 69: 190 – Di Sabatino et al. (2009).

1926 *Scutosperchon* K. Viets, Zoologischer Anzeiger 69: 190 – Cook (1974).

1941 *Sperchonella* Lundblad, Entomologisk Tidskrift 62: 112 – Cook (1974).

1944 *Porosperchon* Walter**,** Internationale Revue der gesamten Hydrobiologie und Hydrographie 43: 292 – Cook (1974).

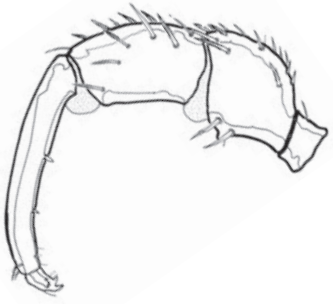
1952 *Parasperchon* Walter & Bader, Mémoires du Muséum national d'Histoire naturelle (nouvelle série), Série A, Zoologie 4: 109.

Type species: *Sperchon hispidus* Koenike, 1895

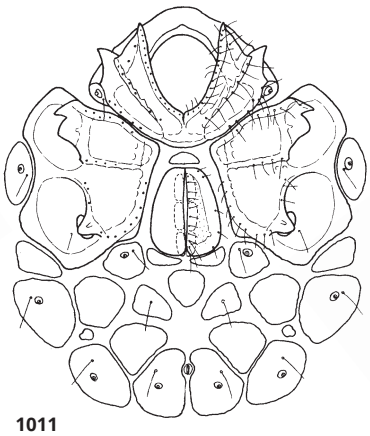
DIAGNOSIS: Median eye absent. Integument reticulate (Fig. 1008). Dorsal muscle attachments often sclerotized (Fig. 1013), forming plates that tend to fuse in males of many species, occasionally to a complete dorsal shield (Fig. 1014). Cx-III with (Fig. 1015) or without glandularia. P3 may be finely denticulate or bear setae on the ventral surface, but is without projections (Figs. 989, 994, 995).

HABITAT: Springs, streams.

DISTRIBUTION: Numerous species known worldwide except for the Australasian region.



1010



1011



1012

1010 *Sperchon* (*Sperchon*) *mutilus* Koenike, palp male (after Di Sabatino et al. 2010)

1011 *Sperchon* (*Acadiosperchon*) *oculatus* Cook, venter male (after Cook 1974)

1012 *Sperchon* (*Acadiosperchon*) *oculatus* Cook, palp male (after Cook 1974)

Subgenus *Palpisperchon* Lundblad, 1941

(Figs. 993, 1007, 1016)

1941 *Palpisperchon* Lundblad, Entomologisk Tidskrift 62: 112.

Type species: *Palpisperchon mirabilis* Lundblad, 1941

DIAGNOSIS: Median eye absent. Dorsalia and ventralia absent (Fig. 993). Glandularia raised. Cx-III without glandularia (Fig. 1016). P3 with a short ventral projection bearing a hair-like seta. P4 shortened and bearing two greatly enlarged ventral peg-like setae which are located relatively close together (Fig. 1007).

HABITAT: Streams, lakes.

DISTRIBUTION: Five species known from Burma (Lundblad 1967, 1969), the USA (Wyoming), Russia (Siberia, Scheffler 1972, Tuzovskij 1982a), Japan (Imamura 1976a) and China (Zhang & Jin 2011).

Genus *Sperchonopsis* Piersig, 1896

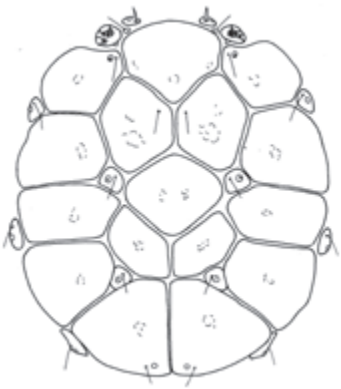
(Figs. 991, 992, 1017-1021)

1896 *Sperchonopsis* Piersig, Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig 22/23: 52.

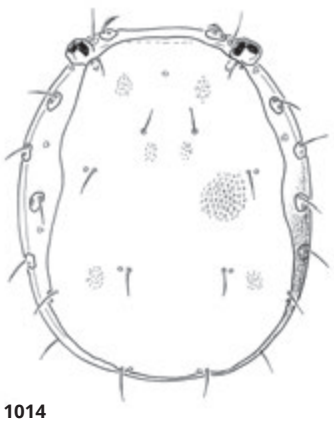
1901 *Pseudosperchon* Piersig, Tierreich 13: 169.

Type species: *Sperchon verrucosus* Protz, 1896

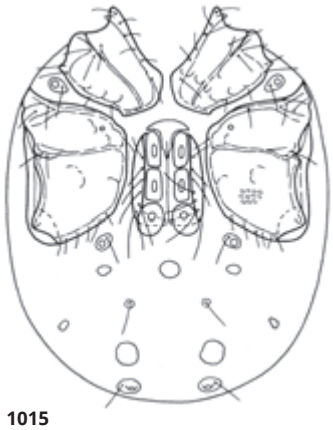
DIAGNOSIS: Dorsum smooth or with one to two platelets or three large plates. Glandularia raised and bearing well-developed papillae. Cx-III without glandularia. Genital area of male without a pregenital sclerite, but with a rounded patch anterior to genital field (Fig. 1017); females without this patch, but with a pregenital sclerite. Acetabula either elongated or rounded. P3 without a ventral projection, P4 usually without peg-like setae, a ventral tubercle present (Fig. 1020) or absent (Fig. 992).



1013



1014



1015

1013 *Sperchon* (*Hispidosperchon*) *placoderma* (Lundblad), dorsum male (after Cook 1974)

1014 *Sperchon* (*Hispidosperchon*) *clupeifer* Piersig, dorsum male (after Di Sabatino et al. 2010)

1015 *Sperchon* (*Hispidosperchon*) *nilgiris* Cook, venter male (after Cook 1974)

KEY TO THE SUBGENERA

1 Anterior two pairs of acetabula elongated, posterior pair rounded (Fig. 1017) Subgenus *Sperchonopsis* s.s.

- All three pairs of acetabula rounded (Fig. 1018) Subgenus *Sperchonopsella*

Subgenus *Sperchonopsis* s.s.

(Figs. 991, 992, 1017, 1019, 1020)

DIAGNOSIS: Dorsum smooth with one to two platelets (Fig. 991), or with three large plates (Fig. 1019). Anterior two pairs of acetabula elongated, posterior pair rounded (Fig. 1017). P4 with (Fig. 1020) or without (Fig. 992) ventral tubercle.

HABITAT: Streams.

DISTRIBUTION: About a dozen species known from the Holarctic region. From the Oriental regions one species is described (Smit & Pešić 2014b) and from the Palaearctis one species is reported (e.g. Lundblad 1969), but the former needs confirmation, preferably by molecular methods.

Subgenus *Sperchonopsella* Conroy, 1991

(Figs. 1018, 1021)

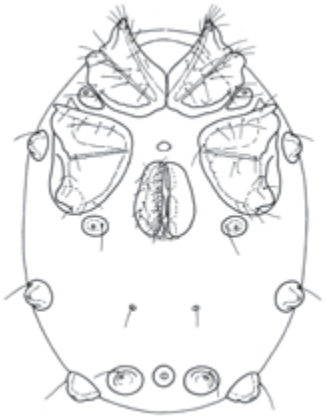
1991 *Sperchonopsella* Conroy, Acarologia 32: 30.

Type species: *Sperchonopsis whiteshellensis* Conroy, 1991

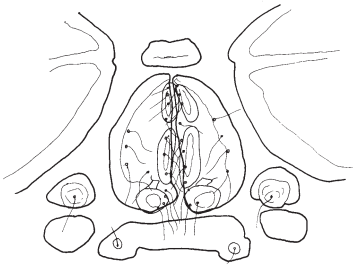
DIAGNOSIS: Dorsum with 1-2 pairs of platelets. All three pairs of acetabula rounded, posterior two pairs close to each other (Fig. 1018). P4 with a peg-like seta on a tubercle (Fig. 1021).

HABITAT: Streams.

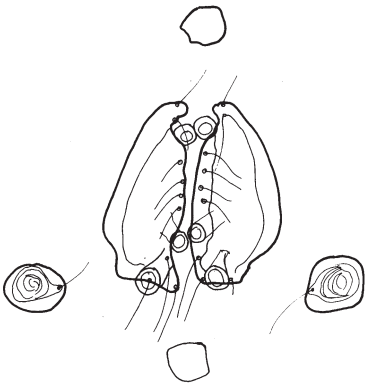
DISTRIBUTION: Two species known, one from Canada and China (Zhang & Jin 2011), and one from Japan (see Conroy 1991b).



1016



1017



1018

1016 *Sperchon* (*Palpisperchon*) *crassipalpis* Marshall, venter male (after Cook 1974)

1017 *Sperchonopsis* (*Sperchonopsis*) *anoarmata* Habeeb, genital field male (after Conroy 1991a)

1018 *Sperchonopsis* (*Sperchonopsella*) *whiteshellensis* Conroy, genital field male (after Conroy 1991b)

Subfamily Apeltosperchontinae Cook, 1974

1974 Apeltosperchontinae Cook, Memoirs of the American Entomological Institute 21: 108.

DIAGNOSIS: Lateral eye lenses fused with the integument to form very low eye capsules. Dorsalia and ventralia absent. Coxae more or less fused on their respective sides, suture lines between all coxae incomplete. Suture lines between Cx-I and Cx-II bifurcate, with medial branch terminating at gnathosomal bay posterior to tip of Cx-I. Tips of Cx-I with a pair of glandularia. Cx-II with short posterior apodemes (Fig. 988). In the species from New Zealand a sclerotized strip extending from anterior margin of Cx-III to lateral margins of Cx-II (Fig. 1022). Suture line between Cx-III and Cx-IV extending posteromedially. P2 with a heavy seta arising from a long ventral projection; P3 with a heavy distoventral seta; P4 lacking either projections or peg-like seta, P4 terminating in a medially placed heavy seta (Fig. 987). Monotypic.

Genus *Apeltosperchon* Besch, 1964

(Figs. 987, 988, 1022)

1964 *Apeltosperchon* Besch, Beiträge zur Neotropischen Fauna 3: 119.

Type species: *Apeltosperchon schmitzi* Besch, 1964

DIAGNOSIS: As for subfamily.

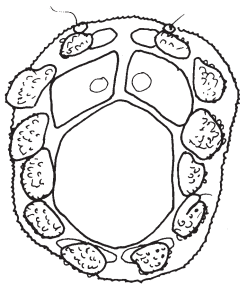
HABITAT: Streams.

DISTRIBUTION: Only two species known, one from Chile (Cook 1988) and one from New Zealand (Cook 1983).

Family Stygotoniidae Cook, 1992

1992 Stygotoniidae Cook, Stygologia 7: 44.

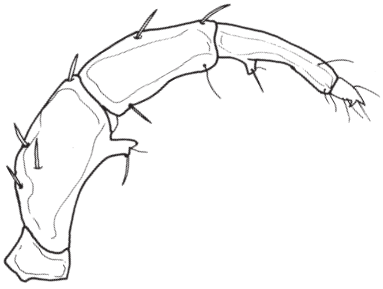
DIAGNOSIS: Integument soft, papillate. Muscle attachments not sclerotized. Gnathosoma with a large circular fringe surrounding mouth opening (Fig. 18). All coxae fused on their respective sides, Cx-I lightly fused medially (Fig. 17). Coxae bearing a few small setae, gnathosomal bay shallow. Genital field with three pairs of acetabula in gonopore field (Fig. 1024). Genital flaps present that partially or completely cover the acetabula when closed (Fig. 19). Palp five-segmented, simple, with a reduced setation and segments without ventral projections (Fig. 18). Legs without swimming setae. Legs with a reduced setation and lacking sexual dimorphism. Leg claws simple without claw blade, which can be folded back against the concave distal end of the sixth segments (Fig. 1025). Monotypic.



1019



1020



1021

1019 *Sperchonopsis* (*Sperchonopsis*) *iansmithi* Conroy, dorsum male (after Conroy 1991a)

1020 *Sperchonopsis* (*Sperchonopsis*) *verrucosa* (Protz), gnathosoma, chelicera + palp female (after Di Sabatino et al. 2010)

1021 *Sperchonopsis* (*Sperchonopsella*) *whiteshellensis* Conroy, palp female (after Conroy 1991b)

Genus *Stygotonia* Cook, 1992

(Figs. 17-19, 1023-1025)

1992 *Stygotonia* Cook, Stygologia 7: 44.
Type species: *Stygotonia ambigua* Cook, 1992

DIAGNOSIS: As for family.

HABITAT: Deep wells.

DISTRIBUTION: One species known from South Island, New Zealand.

Family Teutoniidae Koenike, 1910

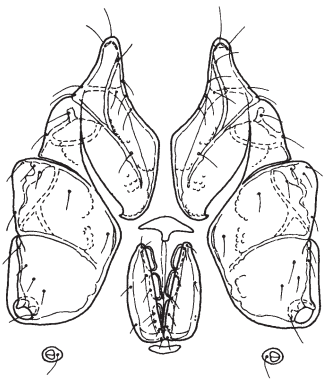
1910 Teutoniidae Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 144.

DIAGNOSIS: Lateral eyes not encapsulated bur lying free under the integument. Integument soft without plates or platelets. Gnathosoma with a short rostrum. Coxae in three or four groups, Cx-IV large, subrectangular. A pair of glandularia partly or completely surrounded by Cx-IV, or on anterior extension deeply indenting the posterior margin of Cx-III. Genital field with three pairs of acetabula in the gonopore field and well-developed genital flaps, located in a bay formed by Cx-IV. P2 with one ventral seta, P4 with a single ventral peg-like seta. Legs with swimming setae, leg-I-III claws with ventral clawlet and claw blade, claws of leg-IV reduced to small, seta-like structures.

KEY TO THE GENERA

1 Glandularia of Cx-IV located anteromedially, partly or completely surrounded by a membranous area within the coxal plate (Figs. 25, 1028); P2 with a ventrodistal projection, ventral seta away from ventral margin and relatively short; P4 ventrally with a very small, blunt peg-like seta (Fig. 1026) Genus *Teutonia*

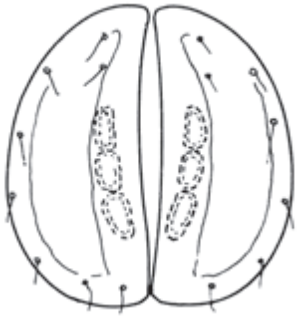
- Glandularia of Cx-IV placed on an anterior protrusion indenting posterior margin of Cx-III (Fig. 1029); P2 with a long ventral seta but without projection, P4 without peg-like seta (Fig. 1030) Genus *Limnolegeria*



1022



1023



1024

1022 *Apeltosperchon zelandicus* Cook, venter female (after Cook 1983)

1023 *Stygotonia ambigua* Cook, dorsum female (after Cook 1992)

1024 *Stygotonia ambigua* Cook, genital field male (after Cook 1992)

Genus *Limnolegeria* Motaş, 1928

(Figs. 1029-1031)

1928 *Limnolegeria* Motaş, Comptes rendus de l'Académie des Sciences, Paris 186: 176 - Gerecke (1988a).

Type species: *Limnolegeria longiseta* Motaş, 1928

DIAGNOSIS: Glandularia with very long, slender setae. Cx-I + Cx-II fused to a compact anterior coxal plate with rounded medioposterior margin and short posterior apodemes, Cxgl-2 fused to this plate. A pair of glandularia on an anterior protrusion of Cx-IV deeply indenting posterior margin of Cx-III (Fig. 1029). Lateral to this protrusion, a finger-shaped posteriorly directed apodeme at suture of Cx-III/IV. Genital sclerites well-developed, pregenital sclerite smaller than postgenital sclerite (Fig. 1031). P1-4 thick and short, P2 without a ventrodistal projection, ventral seta long. P4 ventrodistally and dorsally with numerous fine setae, but without a peg-like setae, P5 with two strong, but weakly curved claws (Fig. 1030). Legs with flattened swimming setae.

HABITAT: Karst-lakes, most records from pools of shaded low-order streams.

DISTRIBUTION: One species known from Europe.

Genus *Teutonia* Koenike, 1889

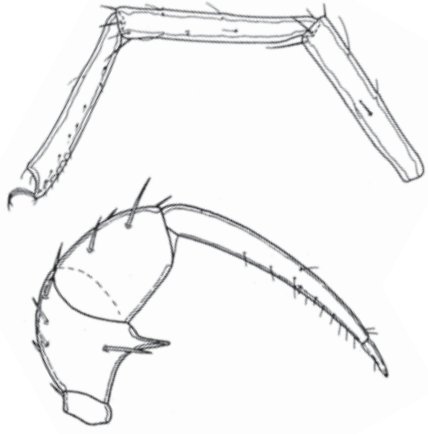
(Figs. 25, 1026-1028)

1889 *Teutonia* Koenike, Zoologischer Anzeiger 12: 104.

1897 *Pseudolimnesia* Thor, Nyt Magazin for Naturvidenskaberne 19: 21.

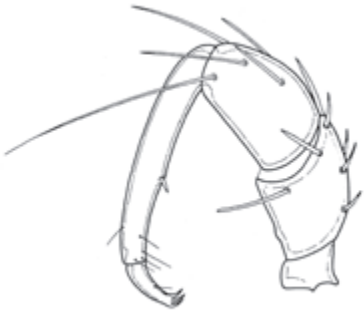
Type species: *Hygrobates cometes* C.L. Koch, 1837

DIAGNOSIS: Glandularia with fine, short setae. Cx-I + II separated medially or fused by a weak bridge, posterior apodemes strongly developed with laterally bent tips. Cxgl-2 free in the membranous interspace between Cx-II and Cx-III. A pair of glandularia located medially on Cx-IV, partly (Fig. 1028) to completely (Fig. 25) surrounded by coxal plate. Genital flaps with a few fine setae on the flap surface and numerous densely-arranged medial setae, in females in one row, in males posteriorly extending to multiple rows. Pregenital sclerite in females distinctly larger, in males smaller, than postgenital sclerite. Palp slender, especially P4 and P5. P2 with a ventral seta away from ventral margin, P4 with a small peg-like ventral seta and numerous fine, hair-like setae. P5 with stout, hook-like claws.



1025

1026



1027

1025 *Stygotonia ambigua* Cook, IV-leg-4-6 female (after Cook 1992)

1026 *Teutonia* (*Teutonia*) *cometes* (Koch), palp male (after Cook 1974)

1027 *Teutonia* (*Subteutonia*) *setifera* Habeeb, palp male (after Cook 1974)

KEY TO THE SUBGENERA

1	P2 with a well-developed ventral projection (Fig. 1026)	Subgenus *Teutonia*
-	P2 without a ventral projection (Fig. 1027)	Subgenus *Subteutonia*

Subgenus *Teutonia* s.s.

(Figs. 25, 1026, 1028)

DIAGNOSIS: P2 with a very distinct ventral projection, setae of P3 relatively short (Fig. 1026).

HABITAT: Lakes, pools of streams.

DISTRIBUTION: Several species known from the Palaearctic and Nearctic regions.

Subgenus *Subteutonia* Habeeb, 1958

(Fig. 1027)

1958 *Subteutonia* Habeeb, Leaflets of Acadian Biology 18: 1.
Type species: *Teutonia setifera* Habeeb, 1958

DIAGNOSIS: P2 without a well-developed ventral projection, setae of P3 relatively long (Fig. 1027).

HABITAT: Springs, ponds.

DISTRIBUTION: Three species known from North America, China (Guo & Jin 2005b) and Russia (Tuzovskij & Semenchenko 2009).

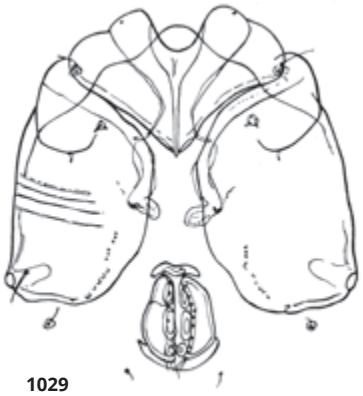
Family Torrenticolidae Piersig, 1902

1902 Atractideidae Thor, Zoologischer Anzeiger 25: 408.

1902 Torrenticolidae Piersig, Zoologische Centralblad 53: 849.



1028



1029



1030

1028 *Teutonia* (*Teutonia*) *subalpina* Thor, venter female (after Di Sabatino et al. 2010)

1029 *Limnolegeria longiseta* Motaş, venter female (after Cook 1974)

1030 *Limnolegeria longiseta* Motaş, palp male (after Cook 1974)

DIAGNOSIS: Dorsal and ventral shields present, separated by a narrow dorsal furrow. Dorsum typically with a large plate and smaller anterior (and occasionally lateral) platelets, but several ways of fusion of these smaller plates with each other or with the large plate can be found. Gnathosoma with a rostrum of variable length. Coxae included into the ventral shield. Typically, Y-shaped suture line extending anteriorly and terminating at the tip of Cx-I, but this suture line sometimes obliterated, and is completely absent in *Stygotorrenticola*. Suture line between Cx-II and Cx-III indistinctly present or absent, suture line between Cx-III and Cx-IV distinct. Secondary sclerotization added posteriorly and laterally during adult life, demarcation between the two areas of sclerotization indicated by a semi-circular line posterior to Cx-IV and near posterior end of large dorsal plate. Genital field with 3-6 pairs of acetabula; genital flaps present. Palp either four- or five-segmented, variable in shape and setation. Legs usually without swimming setae. Fourth legs terminating in a well-developed claw.

REMARKS: There are several classifications of the Torrenticolidae, here Wiles (1997a) is followed.

KEY TO THE SUBFAMILIES

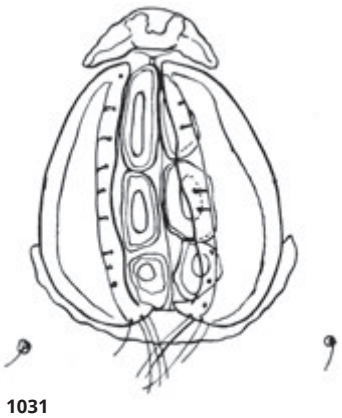
1 Dorsal shield with numerous platelets completely surrounding the large plate (Fig. 30); genital field with three pairs of acetabula; Cx-IV lacking glandularia (Fig. 1032) Subfamily Testudacarinae

\- Dorsal shield with two pairs (or less) of smaller platelets confined to the anterior portion of the dorsum (Figs. 1033-1035); genital field with six pairs of glandularia; Cx-IV with glandularia (Fig. 1036) Subfamily Torrenticolinae

Subfamily Testudacarinae Cook, 1974

1974 Testudacarinae Cook, Memoirs of the American Entomological Institute 21: 145.

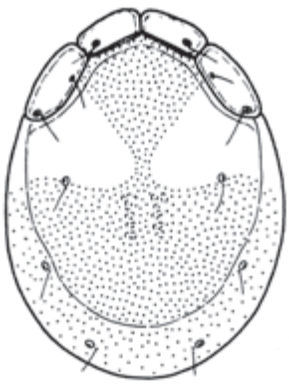
DIAGNOSIS: Dorsum with an anterior medial plate and many additional paired platelets completely surrounding the large plate (Fig. 30). Tips of Cx-I may have an anterior projection. Suture line between Cx-II and Cx-III slightly developed both laterally and medially. Cx-III and Cx-IV without glandularia. Insertions of fourth legs ventrally covered by rounded projections. A ridge present on each side extending anteriorly from area of insertion of fourth legs (Fig. 1032). Genital field with three pairs of acetabula. Palp four- (Fig. 1038) or five-segmented (Fig. 1037).



1031



1032



1033

1031 *Limnolegeria longiseta* Motaş, genital field male (after Cook 1974)

1032 *Testudacarus americanus* Marshall, venter female (after Cook 1974)

1033 *Torrenticola* (*Torrenticola*) *tetraporella* Cook, dorsum female (Cook 1974)

KEY TO THE GENERA

1 Palp five-segmented (Fig. 1037), anterior tips of Cx-I without projection (Fig. 1032)
Genus *Testudacarus*

- Palp four segmented (Fig. 1038), anterior tips of Cx-I with projection (Fig. 1040)
Genus *Debsacarus*

Genus *Debsacarus* Habeeb, 1974

(Figs. 1038-1040)

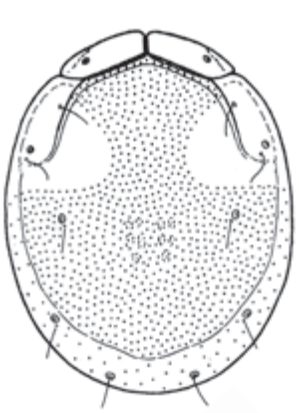
1974 *Debsacarus* Habeeb, Leaflets of Acadian Biology 61: 1.

Type species: *Testudacarus oribatoides* Habeeb, 1961

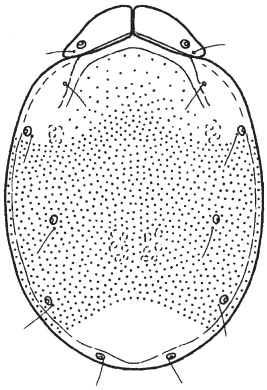
DIAGNOSIS: Anterior tips of Cx-I with projections. Gnathosoma elongated (Fig. 1038). Palp four-segmented.

HABITAT: Streams.

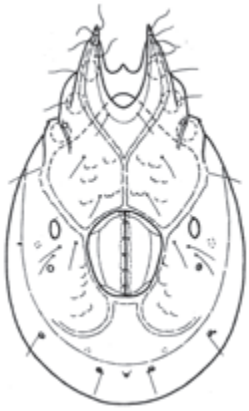
DISTRIBUTION: One species known from California, USA (O'Neill et al. 2016).



1034



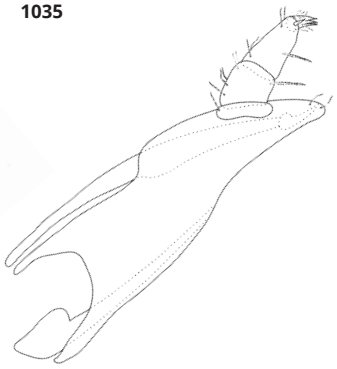
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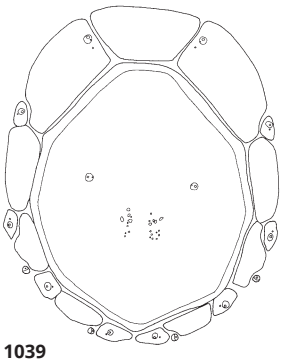
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1034 *Torrenticola* (*Torrenticola*) *microdentifera* Cook, dorsum female (Cook 1974)

1035 *Torrenticola* (*Torrenticola*) *indica* Cook, dorsum male (after Cook 1974)

1036 *Torrenticola* (*Torrenticola*) *indica* Cook, venter female (after Cook 1974)

1037 *Testudacarus americanus* Marshall, palp male (Cook 1974)

1038 *Debsacarus oribatoides* (Habeeb), gnathosoma + palp (after O'Neill et al. 2016)

1039 *Debsacarus oribatoides* (Habeeb), dorsum male

Genus *Testudacarus* Walter, 1928

(Figs. 30, 1032, 1037, 1041)

1928 *Testudacarus* Walter, Records of the Indian Museum 30: 75.

Type species: *Testudacarus tripeltatus* Walter, 1928

DIAGNOSIS: Anterior tips of Cx-I without projection. Gnathosoma usually rounded, gnathosoma bay wide (Fig. 1041). Palp five segmented (Fig. 1037).

HABITAT: Streams, interstitial

DISTRIBUTION: Many species known from North America (O'Neill et al. 2016) and one record from Mexico (Cramer 1992a). Furthermore, a few species are known from Asia (India; China, Guo & Jin 2005a; Japan, Imamura 1976a; Bhutan, Pesic & Smit 2007c).

Subfamily Torrenticolinae Piersig, 1902

1941 Neoatractidinae Lundblad, Zoologiska bidrag från Uppsala 20: 364 – Wiles (1997a).

DIAGNOSIS: Dorsal shield without lateral platelets. Suture line between coxae II and III obliterated medially. Near anterior margin of Cx-III a gland may be present. Insertions of fourth legs not covered by projections. No ridge extending anteriorly from the insertions of the fourth legs. Genital field with six pairs of acetabula. Palp four- or five-segmented.

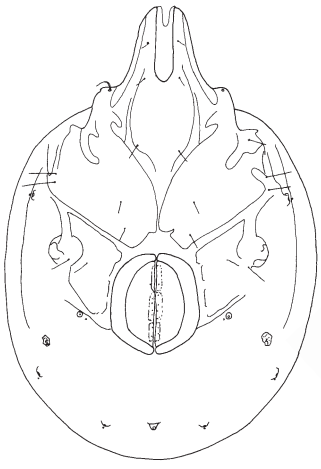
KEY TO THE GENERA

1 Gnathosoma very long and narrow, attached to a protrusable tube, gnathosomal bay shallow (Fig. 1042) Genus *Pseudotorrenticola*

\- Gnathosoma not attached to a protrusable tube, gnathosomal bay usually deep (Fig. 1043) 2

2 Medial suture line Cx-II/III absent (Fig. 1044), P2 and P3 each with a stout peg-like seta (Fig. 1045) Genus *Stygotorrenticola*

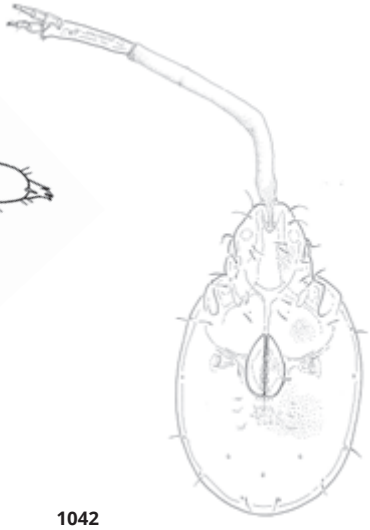
\- Medial suture line Cx-II/III present (Fig. 1043), P2 and P3 without a peg-like seta (Fig. 1046) 3



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1041



1042

1040 *Debsacarus oribatoides* (Habeeb), venter male

1041 *Testudacarus americanus* Marshall, gnathosoma + palp male (after Cook 1974)

1042 *Pseudotorrenticola rhynchota* Walter, venter male (after Di Sabatino et al. 2010)

3 Gnathosoma with long posterior apodemes, rostrum very short or very long and not set off from the rest of gnathosoma, palp compact, P2 and P3 lacking tubercles on ventral side (Fig. 1046) Genus *Monatractides*

- Gnathosoma with short posterior apodemes, rostrum usually well developed, clearly set off from the rest of gnathosoma (Fig. 1047), palp slender (Fig. 1048) 4

4 Palp four- or five-segmented, P4 short, not more than twice as long as high, P5 with broad, blunt terminal setae (Fig. 1048) Genus *Neoatractides*

- Palp five-segmented, P4 long, more than three times as long as high; P5 with slender terminal setae (Fig. 1049) Genus *Torrenticola*

Genus *Torrenticola* Piersig, 1896

(Figs. 1033-1036, 1047, 1049-1052)

1837 *Atractides* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 11: 10 (in part).

1896 *Torrenticola* Piersig, Zoologischer Anzeiger 19: 438.



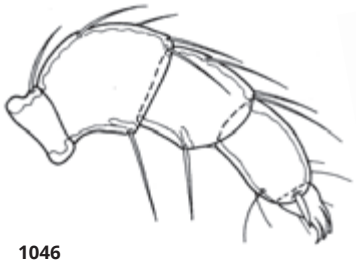
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1043 *Monatractides* (*Rusetriella*) *madritensis* (K. Viets), venter male (after Di Sabatino et al. 2010)

1044 *Stygotorrenticola coniseta* Pešić & Gerecke, venter female (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

1045 *Stygotorrenticola coniseta* Pešić & Gerecke, palp male (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

1046 *Monatractides* (*Rusetriella*) *pinapalpis* (Cook), palp female (after Cook 1974)

1047 *Torrenticola* (*Torrenticola*) *ungeri* (Szalay), gnathosoma + palp male (after Di Sabatino et al. 2010)

1048 *Neoatractides* (*Neoatractides*) *inachus* Lundblad, palp female (after Cook 1974)

1897 *Rusetria* Thor, Nyt Magazin for Naturvidenskaberne 20: 20.

Type species: *Atractides anomalus* C.L. Koch, 1837

DIAGNOSIS: Gnathosoma not attached to a protrusable tube, with short posterior apodemes (Fig. 1047). Cx-III without glandularia (Fig. 1036). Palp slender, P2 and P3 usually with setae bearing ventrodistal extensions.

KEY TO THE SUBGENERA

1 Rostrum various in shape but its tip never curved dorsally; chelicera not extremely elongated, with relatively stout, strongly curved claws (Fig. 1050) Subgenus *Torrenticola*

- Rostrum extremely elongated, its tip curved dorsally; chelicera long and thin, with slender, stylet-like claws (Fig. 1051) Subgenus *Megapalpis*

Subgenus *Torrenticola* s.s.

(Figs. 1033-1036, 1047, 1049, 1050)

DIAGNOSIS: Dorsum typically with a large plate and 2-4 smaller platelets (Fig. 1033), but various ways of fusion of the platelets with each other and with the large plate can be found (Fig. 1034-1035). Gnathosoma with basal part (proximal to palp insertion) not extremely elongated; rostrum well developed and distinctly set off from gnathosomal base (Fig. 1047). Chelicera with stout claws. P2 and P4 not strongly differing in dimensions (Fig. 1049).

HABITAT: Streams, interstitial, rarely in lakes.

DISTRIBUTION: Many species known worldwide except for Australasia and the southern part of South America.

Subgenus *Megapalpis* Halbert, 1944

(Figs. 1051, 1052)

1944 *Megapalpis* Halbert, Proceedings of the Royal Irish Academy, Section B, Biological, Geological, and Chemical Science 50: 72 – Gerecke & Di Sabatino (1996).

Type species: *Atractides tenuirostris* K. Viets, 1936

DIAGNOSIS: Gnathosoma very long and bent dorsally. Chelicera long and thin, with slender, slightly curved claws (Fig. 1051). P2 and P4 very slender, generally P2 longer than P4; P2 and P3 without distoventral extensions.



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1049 *Torrenticola* (*Torrenticola*) *motasi* Cook, palp male (after Cook 1974)

1050 *Torrenticola* (*Torrenticola*) *limula* Gerecke & Di Sabatino, gnathosoma, palp + chelicera male (after Di Sabatino et al. 2010)

1051 *Torrenticola* (*Megapalpis*) *fagei* (E. Angelier), gnathosoma + palp male (after Di Sabatino et al. 2010)

HABITAT: Interstitial, streams.

DISTRIBUTION: Several species known from Europe (Valdecasas 2005), Israel (K.O. Viets 1981b, Bader 1988, Di Sabatino et al. 2003), Asia (Iran, Bader 1988, Pesic et al. 2004, Pešić et al. 2006a, Pešić et al. 2008, Pešić et al. 2012c; Turkey, Pesic et al. 2006a; Oman, Smit & Pešić 2010; Vietnam, Pešić & Gerecke 2014) and South-Africa.

Genus *Monatractides* K. Viets, 1926

(Figs. 29, 1043, 1046, 1053-1062)

1926 *Monatractides* K. Viets, Zoologischer Anzeiger 69: 192.

1944 *Micropalpis* Halbert, Proceedings of the Royal Irish Academy, Section B, Biological, Geological, and Chemical Science 50: 72 (praeocc.).

1947 *Brevatractides* Szalay, Annales historico-naturales Musei nationalis hungarici 40: 294.

1956 *Micropalpiger* K. Viets, Tierwelt Deutschlands 21: 236.

1988 *Synaptia* Bader, Revue suisse de Zoologie 1: 91.

2014 *Vietsclio* Pešić & Smit, Zootaxa 3820: 71 – new syn.

Type species: *Atractides uniscutatus* K. Viets, 1925

DIAGNOSIS: Dorsum typically with two pairs of free anterior platelets and one large plate. Gnathosomal bay narrow. Gnathosoma with long posterior apodemes (Fig. 1055); rostrum short, in ventral view strongly narrowed. Cx-III without glandularia. Palp stout, P2 and P3 usually with ventral setae, but without tubercles. Legs with or without swimming setae.

REMARKS: As *Monatractides* s.s. and *Vietsclio* have the same type species, *Vietsclio* becomes an objective junior homonym.

KEY TO THE SUBGENERA

1 Legs II-IV with swimming setae (Fig. 1053) Subgenus *Monatractides* s.s.

- Legs without swimming setae 2





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1052 **1053** **1054**

1052 *Torrenticola* (*Megapalpis*) *thori* (Halbert), venter male (after Di Sabatino et al. 2010)

1053 *Monatractides* (*Monatractides*) *uniscutatus* (K. Viets), fourth leg male (after Pešić & Smit 2014) Reproduced with permission from copyright holder

1054 *Monatractides* (*Rusetriella*) *lusitanicus* (Lundblad), gnathosoma + palp male (after Di Sabatino et al. 1992)

2 Gnathosoma laterally compressed, not elongated posterior to palp insertion, rostrum short; P1 and P2 subquadratic, P2 bearing a ventral seta (Fig. 1054) Subgenus *Rusetriella*

- Gnathosoma cylindrical, extremely elongated posterior to palp insertion, rostrum long and bent ventrally (Fig. 1055); P1 shortened, P2 subtriangular and without ventral setae (Fig. 1056) Subgenus *Pinquicola*

Subgenus *Monatractides* s.s.

(Figs. 1053, 1057, 1058)

DIAGNOSIS: Anterior and lateral platelets fused with the large dorsal plate forming an undivided dorsal shield (Fig. 1057). Legs II-IV with swimming setae (Fig. 1053).

HABITAT: Streams, lakes.

DISTRIBUTION: One species known from Cameroon and Ghana (Pešić & Smit 2014) and one from New Jersey, USA (Habeeb 1955).

REMARKS: The type species of *Monatractides* is characterized by the presence of swimming setae (Pešić & Smit 2014). Therefore, all *Monatractides* species not belonging to the nominate subgenus and the subgenus *Pinquicola* must be assigned to the subgenus *Rusetriella*.

Subgenus *Pinquicola* Di Sabatino & Gerecke, 1996

(Figs. 1055, 1056, 1059, 1060)

1996 *Pinquicola* Di Sabatino & Gerecke, Aquatic Insects 18: 186.

Type species: *Monatractides adoratus* Di Sabatino & Gerecke, 1996

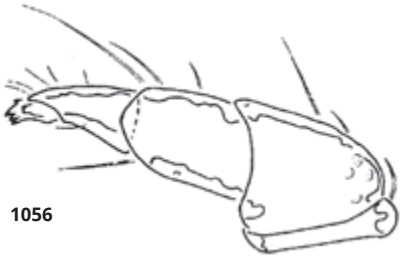
DIAGNOSIS: Gnathosoma cylindrical, extremely elongated posterior to palp insertion, rostrum long and bent ventrally (Fig. 1055); P1 shortened, P2 subtriangular and without ventral setae (Fig. 1056). Legs without swimming setae.

HABITAT: Springs, interstitial.

DISTRIBUTION: One species known from the Mediterranean islands of Corsica (France), Sardinia (Italy) and Karpathos (Greece) (Gerecke & Di Sabatino 1996).



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1055 *Monatractides* (*Pinquicola*) *adoratus* Di Sabatino & Gerecke, gnathosoma + palp male (after Di Sabatino & Gerecke 1996)

1056 *Monatractides* (*Pinquicola*) *adoratus* Di Sabatino & Gerecke, palp male (after Di Sabatino & Gerecke 1996)

1057 *Monatractides* (*Monatractides*) *uniscutatus* (K. Viets), dorsum male (after Pešić & Smit 2014) Reproduced with permission from copyright holder

Subgenus *Rusetriella* K. Viets, 1931

(Figs. 29, 1043, 1046, 1054, 1061, 1062)

1931 *Rusetriella* K. Viets, Zoologischer Anzeiger 93: 221.

Type species: *Atractides acutiscutatus* K. Viets, 1913

DIAGNOSIS: Gnathosoma laterally compressed, not elongated posterior to palp insertions, rostrum short (Fig. 1054). P1 and P2 subquadratic, P2 with a ventral seta (Fig. 1046). Occasionally palp with thickened setae (Fig. 1061) or spreading of setae near distal end of P5 (Fig. 1062). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: Numerous species known worldwide.

REMARKS: With *Vietsclio* synonymized with *Monatractides* s.s., all but two species previously assigned to the subgenus *Monatractides* must be placed in a different subgenus. The first available name is *Rusetriella*.

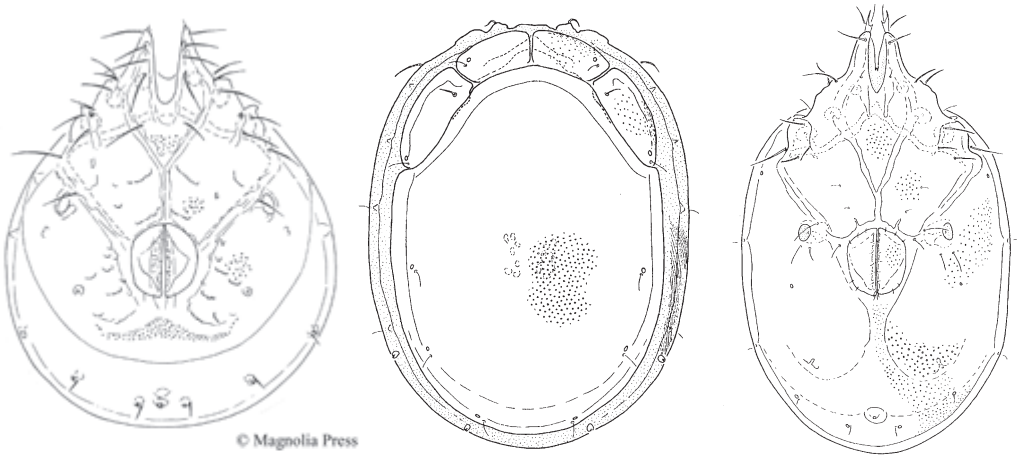
Genus *Neoatractides* Lundblad, 1941

(Fig. 1048, 1063-1075)

1941 *Neoatractides* Lundblad, Entomologisk Tidskrift 62: 97.

Type species: *Neoatractides inachus* Lundblad, 1941

DIAGNOSIS: Dorsum with a variable number of platelets due to fusion with each other and with the large plate. Gnathosomal bay wide and shallow. Suture lines Cx-II/Cx-III obliterated medially. Cxgl-4 various in position but never apical on Cx-I. Openings for fourth legs without condyles, without ridge extending anteriorly from area of insertions of fourth legs. Genital field with six pairs of acetabula. Palp four- to five-segmented, P1 high at base, tapering distally. P5 with short, thick, blunt apical setae (Fig. 1048).


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1058 **1059** **1060**

1058 *Monatractides* (*Monatractides*) *uniscutatus* (K. Viets), venter male (after Pešić & Smit 2014) Reproduced with permission from copyright holder

1059 *Monatractides* (*Pinquicola*) *adoratus* Di Sabatino & Gerecke, dorsum female (after Di Sabatino & Gerecke 1996)

1060 *Monatractides* (*Pinquicola*) *adoratus* Di Sabatino & Gerecke, venter male (after Di Sabatino & Gerecke 1996)

KEY TO THE SUBGENERA

1	Palp four segmented, P2 longer than total length of other segments combined (Fig. 1048)	Subgenus *Neoatractides* s.s.
-	Palp five-segmented (Fig. 1063)	2
2	Cx-III with a pair of glandularia (Fig. 1064)	Subgenus *Allotorrenticola*
-	Cx-III without a pair of glandularia (Fig. 1065)	Subgenus *Heteratractides*

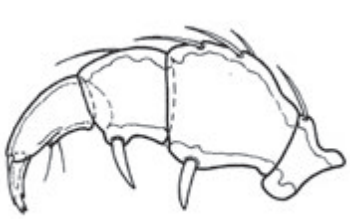
Subgenus *Neoatractides* s.s.

(Figs. 1048, 1066-1070)

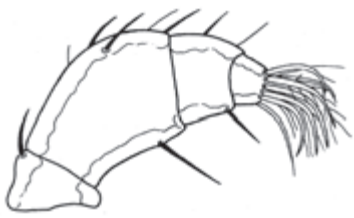
DIAGNOSIS: Cx-III with or without glandularia (Fig. 1067). Gnathosoma small, rostrum short, conical with conspicuous oral papillae (Fig. 1069). Ejaculatory complex of male protrusable (Fig. 1068), with tip bifurcate (Fig. 1070). Palp four-segmented, small and not extended far beyond the rostrum. P2 longer than total length of other segments combined (Fig. 1048).

HABITAT: Streams.

DISTRIBUTION: Several species known from the New World (Mexico, Cramer 1992a, Cramer & Cook 2000, Otero-Colina 1987; Costa Rica, Cook 1980; Guatemala, K.O. Viets 1977a; Colombia; Argentina, Rosso de Ferradás 1990). Unidentified species have been reported from the USA (Cook 1980).



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1061 *Monatractides* (*Rusetriella*) *apratima* Cook, palp female (after Cook 1974)

1062 *Monatractides* (*Rusetriella*) *cristata* (K. Viets), palp female (after Cook 1974)

1063 *Neoatractides* (*Allotorrenticola*) *suvarna* (Cook), palp female (after Cook 1974)

1064 *Neoatractides* (*Allotorrenticola*) *suvarna* (Cook), venter female (after Cook 1974)

1065 *Neoatractides* (*Heteratractides*) *serratirostris* (Lundblad), venter male (after Cook 1974)

1066 *Neoatractides* (*Neoatractides*) *inachus* Lundblad, dorsum female (after Cook 1974)

Subgenus *Allotorrenticola* Cook, 1967

(Figs. 1063, 1064, 1071, 1072)

1967 *Allotorrenticola* Cook, Memoirs of the American Entomological Institute 9: 78.

Type species: *Torrenticola suvarna* Cook, 1967

DIAGNOSIS: Gnathosoma with short posterodorsal projections, rostrum much narrower than rest of gnathosoma when viewed dorsally or ventrally. Chelicera much longer than gnathosoma and with a greatly enlarged claw. Cx-III with a pair of glandularia (Fig. 1064). Palp five-segmented (Fig. 1063), but with ventral fusion of P1 and P2 in *N. abnormipalpis* (Lundblad) (Fig. 1072). P4 shortened.

HABITAT: Streams.

DISTRIBUTION: Several species known from Asia (India, Cook 1967; Burma, Lundblad 1967, 1969; Malaysia, Wiles 1991; Borneo, Wiles 1999, Pešić & Smit 2014; Thailand, Pesic & Smit 2009a), Africa (Ghana, Pešić & Smit 2014) and Iran (Pešić et al. 2012).



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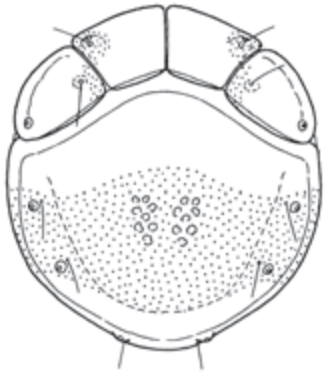
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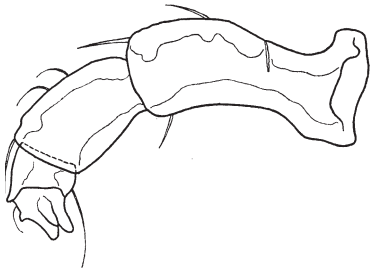
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1067 *Neoatractides* (*Neoatractides*) *inachus* Lundblad, venter female (after Cook 1974)

1068 *Neoatractides* (*Neoatractides*) *inachus* Lundblad, lateral view male (after Cook 1974)

1069 *Neoatractides* (*Neoatractides*) *formosus* Lundblad, gnathosoma + palp female (after Cook 1974)

1070 *Neoatractides* (*Neoatractides*) *formosus* Lundblad, tip of ejaculatory complex male (after Cook 1974)

1071 *Neoatractides* (*Allotorrenticola*) *suvarna* (Cook), dorsum female (after Cook 1974)

1072 *Neoatractides* (*Allotorrenticola*) *abnormipalpis* (Lundblad), palp male (after Lundblad 1967)

Subgenus *Heteratractides* Lundblad, 1941

(Figs. 1065, 1073-1075)

1941 *Heteratractides* Lundblad, Entomologisk Tidskrift 62: 98.

Type species: *Heteratractides serratirostris* Lundblad, 1941

DIAGNOSIS: Gnathosoma without long posterodorsal projections. Rostrum somewhat wider than rest of gnathosoma when viewed dorsally or ventrally, in lateral view flattened and appearing somewhat serrate (Fig. 1074). Cx-III without glandularia (Fig. 1075). Distal segments of palp relatively short (Fig. 1075).

HABITAT: Streams.

DISTRIBUTION: One species known from Columbia, two species from Malaysia (Wiles 1991, Pešić & Smit 2014) and one from China (Gu et al. 2018).

Genus *Pseudotorrenticola* Walter, 1906

(Figs. 1042, 1066-1069)

1906 *Pseudotorrenticola* Walter, Zoologischer Anzeiger 30: 573.

1954 *Pseudotorrenticolella* Lundblad, Zoologischer Anzeiger 153: 155 - K.O. Viets (1977b).

Type species: *Pseudotorrenticola rhynchota* Walter, 1906

DIAGNOSIS: Dorsum with an undivided dorsal plate or with two pairs of anterior platelets (Fig. 1076), the posterior pair may be fused with the large dorsal plate (Fig. 1079). Gnathosoma long and slender, attached to a protrusable tube, gnathosomal bay shallow (Fig. 1042). Cx-I medially fused to form a funnel-like camerostome (Fig. 1077). Palp stocky (Fig. 1078).

HABITAT: Streams, interstitial.

DISTRIBUTION: Several species known from Europe, Asia (Thailand, Wiles 1997a, Pesic & Smit 2009a; Borneo, Wiles 1997a, Pešić & Smit 2014; Malaysia, Wiles 1997a), North and Central America (Arizona, USA, I.M. Smith 1991c; Mexico, Cramer & Cook 2000; Guatemala, K.O. Viets 1977b; Honduras, Wiles 2005) and Africa (Liberia, Cook 1966; South Africa, K.O. Viets 1981a).



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1073 *Neoatractides* (*Heteratractides*) *serratirostris* (Lundblad), dorsum male (after Cook 1974)

1074 *Neoatractides* (*Heteratractides*) *serratirostris* (Lundblad), gnathosoma + palp female (after Cook 1974)

1075 *Neoatractides* (*Heteratractides*) *serratirostris* (Lundblad), palp male (after Cook 1974)

Genus *Stygotorrenticola* Pešić & Gerecke, 2014

(Figs. 1044, 1045, 1080, 1081)

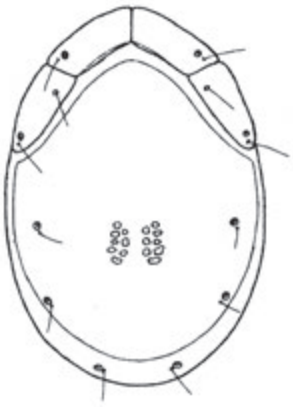
2014 *Stygotorrenticola* Pešić & Gerecke, Zootaxa 3774: 371.

Type species: *Stygotorrenticola coniseta* Pešić & Gerecke, 2014

DIAGNOSIS: Lateral eyes absent. Anterolateral platelets fused to the large dorsal plate, anteroventral platelets fused to each other to form a narrow platelet (Fig. 1080). Gnathosoma with a short rostrum, in lateral view not distinctly set off from base (Fig. 1081). Suture lines Cx-I/II complete, not meeting in the medial line, but separately ending at anterior genital field margin (Fig. 1044). Suture line Cx-II/III developed only laterally, suture lines of Cx-IV not visible. P2 with stout, pointed peg-like seta on a pointed, anteriorly directed distoventral projection. P3 with a similar seta on a pointed projection in the centre of segment. P4 slender, ventral margin with five setae (Fig. 1045).

HABITAT: Cave waters.

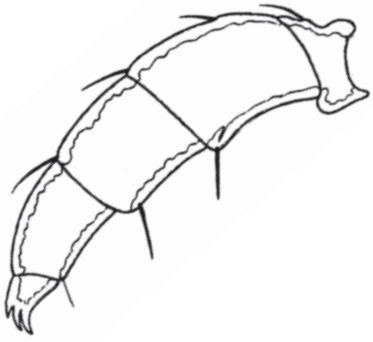
DISTRIBUTION: One species known from Vietnam.



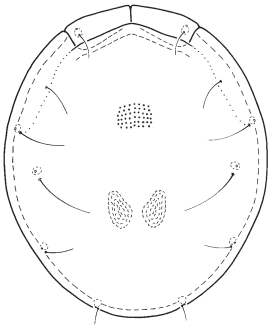
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1077



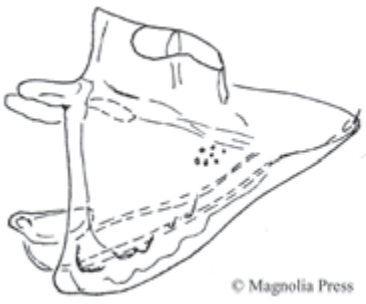
1078



1079



1080



1081

1076 *Pseudotorrenticola mitchelli* Cook, dorsum female (after Cook 1974)

1077 *Pseudotorrenticola mitchelli* Cook, venter female (after Cook 1974)

1078 *Pseudotorrenticola mitchelli* Cook, palp female (after Cook 1974)

1079 *Pseudotorrenticola chiricahua* I.M. Smith, dorsum male (after I.M. Smith1991c)

1080 *Stygotorrenticola coniseta* Pešić & Gerecke, dorsum male (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

1081 *Stygotorrenticola coniseta* Pešić & Gerecke, gnathosoma male (after Pešić & Gerecke 2014) Reproduced with permission from copyright holder

SUPERFAMILY HYGROBATOIDEA C.L. KOCH, 1842

1842 Hygrobatides C.L. Koch, Übersicht des Arachnidensystems 3(1): 7.

DIAGNOSIS: Lateral eyes free below integument or on separate platelets. Idiosoma ranging from soft with the dorsum bearing only glandularia platelets to heavily sclerotized. Gnathosoma lacking elaborate camerostome. Chelicera 2-segmented, medially separate. Coxal plates variously fused, with Cx-II-III on each side at least fused medially. Cx-III with insertions of legs III located near midlength of idiosoma and laterally directed. Acetabula usually present (except for the marine Pontarachnidae and *Haloaxonopsis*, a monotypic aturid genus from Iran), on plates flanking the gonopore. Without movable flaps that can cover the gonopore. Palp neither chelate nor uncate. Legs with five movable segments.

Family Astacocrotonidae Thor, 1927

1927 Astacocrotonidae Thor, Zoologischer Anzeiger 72: 155.

DIAGNOSIS: Lateral eyes lying beneath the integument. Idiosoma soft, dorsalia and dorsoglandularia apparently absent. Gnathosoma separated from the coxae and without an anchoral process, pharynx evident. Coxae fused into a single group on their respective sides. Cx-I with one pair, Cx-IV with two pairs of heavy, peg-like setae (Fig. 56). Cx-IV with a pair of glandularia. Posterior margin of Cx-IV rounded in female but with a small projection in male. Female genital field with four pairs of acetabula, located on narrow genital plates (Fig. 58); gonopore approximately three times length of genital plates. Male genital field with two pairs of acetabula, and a petiole which is somewhat S-shaped in lateral view (Fig. 57). Palp five-segmented, with a heavy seta distomedially on P4, P5 with four claws (Fig. 51). Legs without swimming setae. Monotypic.

Genus *Astacocroton* Haswell, 1922

(Figs. 51, 56-58)

1922 *Astacocroton* Haswell, Proceedings of the Linnean Society of New South Wales 47: 329.
Type species: *Astacocroton molle* Haswell, 1922

DIAGNOSIS: As for family.

HABITAT: Apparently parasitic, known only from the gill chambers of the fresh water decapod crustacean *Euastacus hirsutus* (McCulloch, 1917).

DISTRIBUTION: One species known from Australia.

Family Aturidae Thor, 1900

1900 Brachypodidae Thor, Nyt Magazin for Naturvidenskaberne 38: 4 (praeocc.).

1900 Aturidae Thor, Nyt Magazin for Naturvidenskaberne 38: 4.

1929 Axonopsidae K. Viets, Zoologischer Anzeiger 80: 169.

1929 Ljanidae Thor, Nyt Magazin for Naturvidenskaberne 67: 162.

DIAGNOSIS: Lateral eyes not in capsules, lying beneath the integument. Idiosoma flattened dorsoventrally, typically with dorsal and ventral shields. Dorsal shield entire or composed of two to many closely fitting platelets. Gnathosoma with or without anchoral process, either separated from, or fused with, ventral shield. Coxae making part of the ventral shield. Cx-IV may or may not have a pair of glandularia. Genital field with three to numerous pairs of acetabula lying on plates flanking the gonopore, these plates free or fused to the ventral shield. The genus *Haloaxonopsis*,

occurring in inland saline streams in Iran, with so-called wheel-like acetabula (see Cook 1996), which are found also in the marine Pontarachnidae. Palp five-segmented, P4 typically with a medial peg-like seta. Legs with or without swimming setae, often exhibiting sexual dimorphism. Leg claws simple or with a clawlet, sickle-shaped.

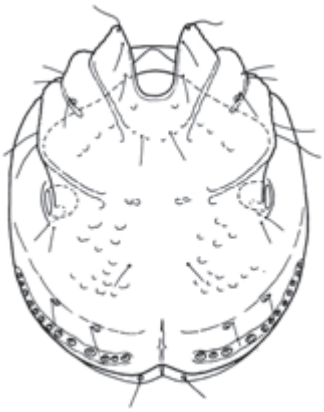
KEY TO THE SUBFAMILIES

1 Acetabula numerous (eight or more pairs), anterior coxae projecting well beyond the frontal margin of the idiosoma (Fig. 1082) 2

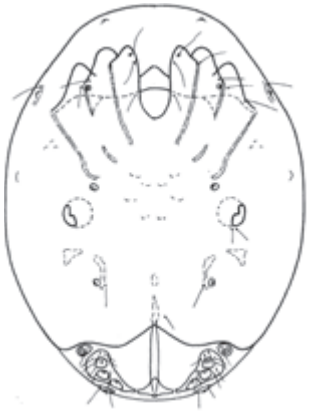
- Usually three or four pairs of acetabula (Fig. 1083); if acetabula are numerous (eight or more pairs), anterior coxae extend slightly or not at all beyond frontal margin of idiosoma (Fig. 1084) 3

2 Dorsal shield entire (Fig. 1085) Subfamily Aturinae

- Dorsal shield composed of several closely fitting platelets (Fig. 1086) Subfamily Notoaturinae



1082



1083



1084



1085



1086



1087

1082 *Aturus hiatosomus* Cook, venter female (after Cook 1974)

1083 *Hexaxonopsalbia lautieni* (Motaş), venter female (after Cook 1974)

1084 *Albia* (*Albiella*) *suvarna* Cook, venter male (after Cook 1974)

1085 *Aturus hiatosomus* Cook, dorsum male (after Cook 1974)

1086 *Barwontius inflatipalpis* K.O. Viets, dorsum female (after Cook 1986)

1087 *Neoaxona* (*Neoaxona*) *oblonga* Lundblad, venter female (after Cook 1974)

3 Acetabula numerous, at least ten pairs; insertions of fourth legs without well-developed associated projections (Fig. 1084) Subfamily Albiinae

- Usually only three or four pairs of acetabula; if ten or more pairs present, either insertions of fourth legs with well-developed associated projections (Fig. 1087), dorsum with three large plates (Fig. 1088) or two pairs of glandularia between insertions of fourth legs and genital field (Fig. 1089) Subfamily Axonopsinae

Subfamily Albiinae K. Viets, 1925

1925 Albiinae K. Viets, Archiv für Hydrobiologie 16: 225.

DIAGNOSIS: Dorsal shield entire. Tips of Cx-I not extending beyond frontal idiosoma margin. Cx-IV with more or less distinct medial, posterior and lateral suture lines. Insertions of fourth legs without associated projections. Genital field with numerous (eight or more) pairs of acetabula, on plates lying separate from ventral shield in females, fused to ventral shield in males. Palp with ventral projection. Legs with or without swimming setae, without sexual dimorphism.

KEY TO THE GENERA

1 Gnathosomal bay much deeper than wide (Fig. 1090); gravid females with the eggs inside the idiosoma; adults free living Genus *Albia*

- Gnathosomal bay wider than deep (Fig. 1091); gravid females with a large posterior extension of soft integument containing the eggs (Fig. 1092); adults (at least females, males unknown) parasitic on mayfly nymphs Genus *Parasitalbia*

Genus *Albia* Thon, 1899

(Figs. 1084, 1090, 1093-1101)

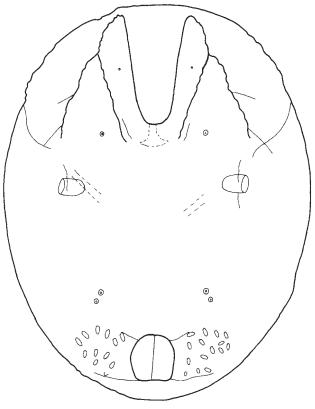
1899 *Albia* Thon, Zoologischer Anzeiger 22: 100.

Type species: *Albia stationis* Thon, 1899

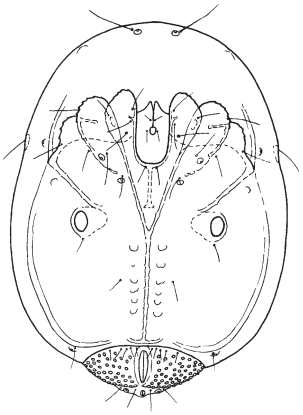
DIAGNOSIS: Gnathosomal bay much longer than wide (Fig. 1090). Insertion of fourth legs without noticeable associates projections. P4 much longer than P3. Adults free living.



1088



1089



1090

1088 *Sinaxonopsis siamicus* Smit, dorsum female (after Smit 2016a)

1089 *Siamaxonopsis ypsilon* Smit, venter female (after Smit 2016a)

1090 *Albia* (*Albia*) *stationis* Thon, venter male (after Cook 1974)

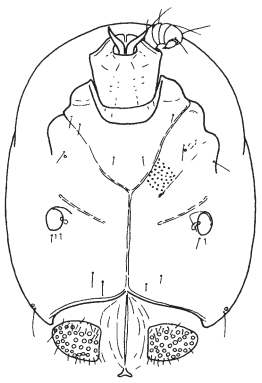
KEY TO THE SUBGENERA

1	Coxae with greatly thickened setae (Fig. 1093)	Subgenus *Spinalbia*
-	Coxae with hair-like setae only (Fig. 1094)	2
2	P2 with greatly enlarged medial setae (Fig. 1095)	Subgenus *Dentalbia*
-	P2 without greatly enlarged medial setae (Fig. 1096)	3
3	Cgl-4 located on Cx-III, close to suture line Cx-II/III (Fig. 1090)	Subgenus *Albia*
-	Cxgl-4 posterior to suture line Cx-III/IV (Fig. 1097) or on an anterior bowing of suture line Cx-III/IV (Fig. 1098)	Subgenus *Albiella*

Subgenus *Albia* s.s.

(Figs. 1090, 1099)

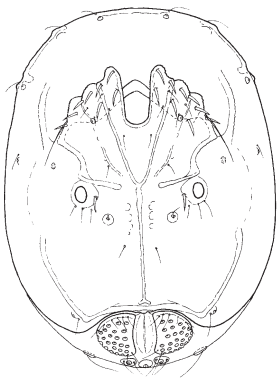
DIAGNOSIS: Cxgl-4 shifted far forward and lying on Cx-III. Suture line Cx-III/IV developed only laterally, not reaching midline (Fig. 1090). Male genital field extending to posterior end of ventral shield. Without greatly enlarged setae on coxae or medial surface of P2 (Fig. 1099).



1091



1092



1093



1094



1095



1096

1091 *Parasitalbia sumatrensis* K. Viets, venter female (after Cook 1974)

1092 *Parasitalbia sumatrensis* K. Viets, venter gravid female (after Cook 1974)

1093 *Albia* (*Spinalbia*) *rectifrons* K. Viets, venter female (after Cook 1986)

1094 *Albia* (*Dentalbia*) *phreatica* Cook, venter female (after Cook 1974)

1095 *Albia* (*Dentalbia*) *phreatica* Cook, palp female (after Cook 1974)

1096 *Albia* (*Albiella*) *suvarna* Cook, palp male (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: Two species known, one widespread in the Palaearctic (including a subspecies), and one in eastern USA.

Subgenus *Albiella* Lundblad, 1971

(Figs. 1084, 1096-1098)

1971 *Albiella*, Lundblad, Arkiv för Zoologi (Serie 2) 23: 343.

1974 *Anchistalbia* Cook, Memoirs of the American Entomological Institute 21: 351- Cook (1986).

Type species: *Albiella nesiotes* Lundblad, 1971

DIAGNOSIS: Glandularia of Cx-IV posterior to suture line Cx-III/IV (Fig. 1097) or shifted anteriorly to a bowing of the suture line Cx-III/IV (Fig. 1098). Suture lines Cx-III/IV complete (Figs. 1084, 1097) or obliterated lateral to the fourth leg insertions Fig. 1098). Male genital field extending posterior to posterior end of ventral shield. Without greatly enlarged setae on coxae or on medial surface of P2 (Fig. 1096).

HABITAT: Streams, standing waters.

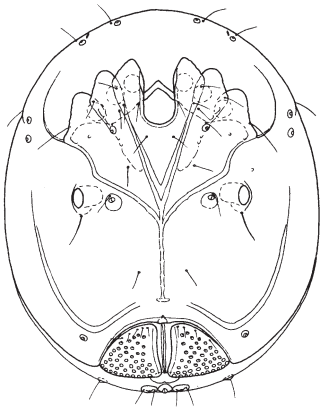
DISTRIBUTION: Widespread, known from Asia (India, Cook 1967; Indonesia, Lundblad 1971, Wiles 1992, Smit 1996b; Malaysia, Wiles 1992, Borneo, Smit & Pešić 2014; South Korea, Pešić 2014), Australasia (Australia, Cook 1986, Smit 2012c; New Guinea, Wiles 1992, Smit 2013b), Africa (Liberia, Cook 1966; Cameroon; South-Africa, K.O. Viets 1962a, 1981a), North America (Habeeb 1966), Central America (Mexico, Cook 1980; Costa Rica, Cook 1980) and South America (Brazil, Paraguay). Moreover, there is an odd record from the Netherlands (Smit & Van der Hammen 1992a).

Subgenus *Dentalbia* Cook, 1974

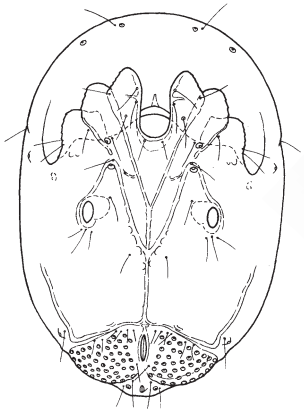
(Figs. 1094, 1095)

1974 *Dentalbia* Cook, Memoirs of the American Entomological Institute 21: 352.

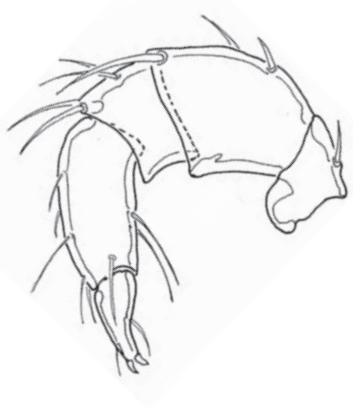
Type species: *Albia phreatica* Cook, 1967



1097



1098



1099

1097 *Albia* (*Albiella*) *iantha* Cook, venter female (after Cook 1980)

1098 *Albia* (*Albiella*) *nesiotes* (Lundblad), venter male (after Cook 1974)

1099 *Albia* (*Albia*) *stationis* Thon, palp male (after Gerecke et al. 2016)

DIAGNOSIS: Cxgl-4 well posterior to the insertions of the fourth legs. Suture lines Cx-III/IV greatly reduced or absent (Fig. 1094). Cx-III with a pair of glandularia. Male genital field may or may not extend to posterior end of ventral shield. Coxal setae not enlarged. Distomedial portion of P2 bearing one, two or three greatly enlarged setae (Fig. 1095).

HABITAT: Streams, interstitial.

DISTRIBUTION: Five species known from Asia (India, Cook 1967; Indonesia, Lundblad 1971; Iran, Pešić et al. 2012c).

Subgenus *Spinalbia* Cook, 1974

(Figs. 1093, 1100, 1101)

1974 *Spinalbia* Cook, Memoirs of the American Entomological Institute 21: 352.

Type species: *Albia inflatipalpis* Cook, 1966

DIAGNOSIS: Glandularia of Cx-IV variable in position but located always posterior to the insertions of the fourth coxae (Fig. 1093). Suture lines Cx-III/IV incomplete. Male genital field not extending to posterior end of ventral shield (Fig. 1100). Heavy setae present on the coxae, but no greatly enlarged setae on medial surface of P2 (Fig. 1101).

HABITAT: Streams.

DISTRIBUTION: Two species known from West-Africa (Cook 1966), one species from Japan (Imamura 1965) and one widespread species in Asia (Lundblad 1969, Savatenalinton & Smit 2017) and Australia (Cook 1986, Smit 2012c).

Genus *Parasitalbia* K. Viets, 1935

(Figs. 1091, 1092, 1102, 1103)

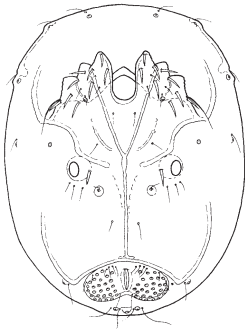
1935 *Parasitalbia* K. Viets, Archiv für Hydrobiologie, Supplement 13: 698.

Type species: *Parasitalbia sumatrensis* K. Viets, 1935

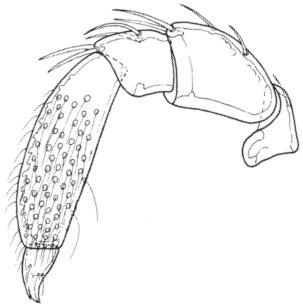
DIAGNOSIS: (Female only) Gnathosomal bay shallow (Fig. 1091), mouth opening with a fringe of setae (Fig. 1103). P4 short, slightly shorter than P3 (Fig. 1102).

HABITAT: Adult females are parasitic on the nymphal *Languidipes corporaali* (Lestage, 1922) (Ephemeroptera, Polymitarcyidae).

DISTRIBUTION: One species known from a lake in Sumatra, Indonesia.



1100



1101



1102

1100 *Albia* (*Spinalbia*) *rectifrons* K. Viets, venter male (after Cook 1986)

1101 *Albia* (*Spinalbia*) *rectifrons* K. Viets, palp male (after Cook 1986)

1102 *Parasitalbia sumatrensis* K. Viets, palp female (after Cook 1974)

Subfamily Axonopsinae K. Viets, 1929

1929 Axonopsinae K. Viets, Zoologischer Anzeiger 80: 169.

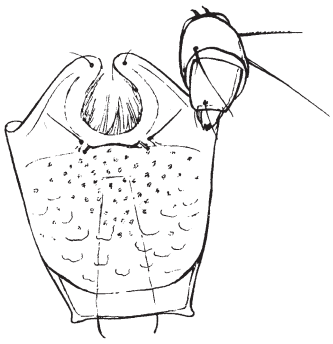
1964 Axonopsellinae Besch, Beiträge zur Neotropischen Fauna 3: 165 – Cook (1974).

DIAGNOSIS: Idiosoma typically flattened and with dorsal and ventral shields. Dorsal shield usually entire but occasionally composed of two to many closely fitting platelets. Genital field with three to many pairs of acetabula. If more than eight pairs of acetabula are present, the anterior coxae do not project beyond the anterior idiosoma margin and the genital plates are fused with the ventral shield in both sexes. Margins of genital plates usually indistinct or obliterated in taxa with numerous acetabula.

KEY TO THE GENERA

1 Well-developed posteriorly or posterolaterally directed projections associated with the insertions of the fourth legs, which may be sharp-pointed (Fig. 1104) or blunt (Fig. 1105) 2

\- Usually without projections associated with the insertions of the fourth legs (Fig. 1106); if smaller or moderately sized projections are present, there are no ridges on each side extending anteriorly from the projections (The males of *Axonopsalbia* have a slight development of such a ridge (Fig. 1107), but belong in his couplet) 18



1103



1104



1105



1106



1107



1108

1103 *Parasitalbia sumatrensis* K. Viets, gnathosoma female (after K. Viets 1935)

1104 *Barbaxona barbata* K. Viets, venter male (after Cook 1974)

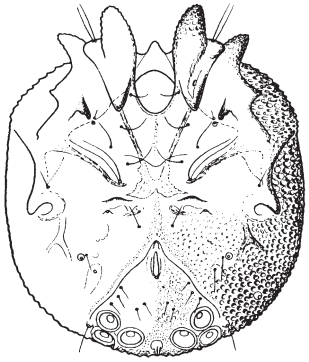
1105 *Axonopsella* (*Paraxonopsella*) *filunguis* Lundblad, venter male (after Cook 1974)

1106 *Pseudaxonopsalbia* (*Motasaxona*) *plana* Cook, venter female (after Cook 1974)

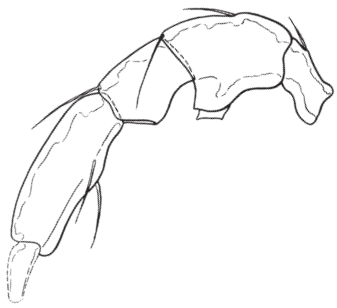
1107 *Axonopsalbia ornata* Cook, venter male (after Cook 1974)

1108 *Neobarbaxona liberiensis* (Cook), venter female (after Cook 1974)

2	Ventral pair of setae on gnathosoma greatly thickened (Fig. 1104)	3
-	Ventral pair of setae on gnathosoma not greatly thickened, usually hair-like	4
3	Ventral shield divided into an anterior part and a larger posterior part (Fig. 1108) Genus *Neobarbaxona*	
-	Ventral shield entire Genus *Barbaxona*	
4(2)	Genital field with three pairs of acetabula (Fig. 1109); P2 with a well-developed distoventral projection (Fig. 1110) Genus *Neoaxonopsis*	
-	Genital field with four or more pairs of acetabula (Fig. 1111); P2 with a small or no ventral projection (Fig. 1112)	5
5	Tips of Cx-I with somewhat recurved hook-like processes (Fig. 1111); genital field with numerous acetabula; males with a heavy seta on the ventral side of P3 (Fig. 1112) Genus *Neoaxona*	
-	Tips of Cx-I not terminating in recurved, hook-like processes (Fig. 1113); genital field various, with four to many acetabula; P3 lacking a heavy ventral seta on P3 (Fig. 1114)	6
6	Tips of Cx-I sharply pointed (Fig. 1113)	7
-	Tips of Cx-I and Cx-II rounded or only bluntly-pointed (Fig. 1115)	8



1109



1110



1111



1112



1113



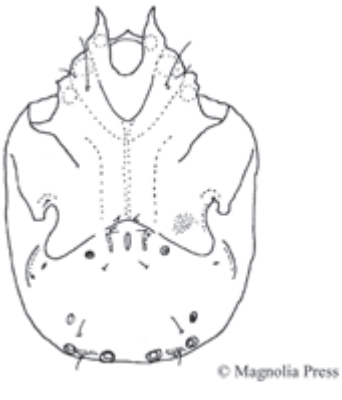
1114

1109 *Neoaxonopsis odontogaster* Lundblad, venter male (after Lundblad 1943)
1110 *Neoaxonopsis odontogaster* Lundblad, palp female (after Cook 1974)
1111 *Neoaxona* (*Neoaxona*) *oblonga* Lundblad, venter female (after Cook 1974)
1112 *Neoaxona* (*Neoaxona*) *oblonga* Lundblad, palp male (after Cook 1974)
1113 *Adelaxonopsella pallida* Cook, venter female (after Cook 1974)
1114 *Adelaxonopsella pallida* Cook, palp female (after Cook 1974)

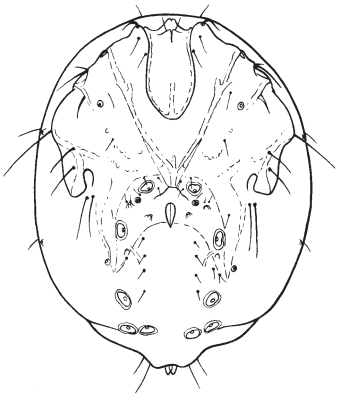
7	Tips of Cx-I and Cx-II pointed; posterior margin of Cx-IV obsolete (only female known) (Fig. 1113)	Genus *Adelaxonopsella*
-	Only tips of Cx-I pointed, posterior margin of Cx-IV distinct (only male known)(Fig. 1116)	Genus *Vagabundia*
8(6)	Gonopore completely surrounded by sclerotization (Males)	9
-	Gonopore at least posteriorly surrounded by membranous integument (Females)	13
9	Posterior suture lines of Cx-IV extending anteriorly as a U-shaped loop on each side with a gland located at anterior end of loop (Fig. 1115)	10
-	Posterior suture lines of Cx-IV more or less straight or not evident (Fig. 1117)	12
10	Genital field with four pairs of acetabula (Fig. 1115)	11
-	Genital field with more than four pairs of acetabula (Fig. 1118)	Genus *Miraxona*
11	Projections associated with openings of fourth legs pointed (Fig. 1115); IV-leg-4 with a long anteroventral projection with or without a blunt seta (Fig. 1316); second leg not modified	Genus *Miraxonides*



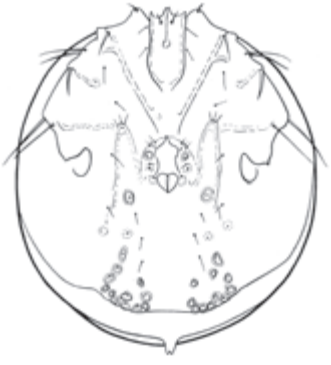
1115



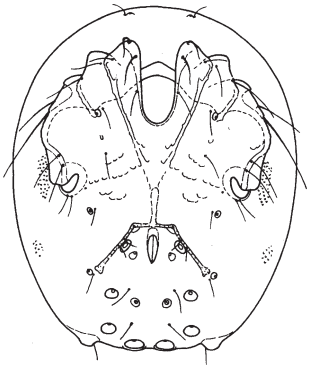
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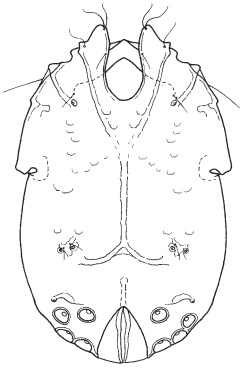
1117



1118



1119



1120

1115 *Miraxonides* (*Miraxonides*) *alatus* Lundblad, venter male (after Cook 1974)

1116 *Vagabundia sci* Valdecasas, venter male (after Valdecasas 2008b) Reproduced with permission from copyright holder

1117 *Submiraxona* (*Pentalbia*) *walteri* (Lundblad), venter male (after Cook 1974)

1118 *Miraxona (Miraxona) clavipes* Lundblad, venter male (after Cook 1974)

1119 *Axonopsella* (*Neoaxonopsella*) *argentinensis* Cook, venter male (after Cook 1980)

1120 *Stygalbiella affinis* Cook, venter female (after Cook 1974)

- Projections associated with openings of fourth legs truncated (Fig. 1389); IV-leg-4 with a short anteroventral projection with 1-2 paddle-shaped setae (Figs. 1392, 1393); second leg modified (Fig. 1391) Genus *Stygalbiella*

12(9) Genital field with four pairs of acetabula; posterior suture lines of Cx-IV evident (Fig. 1119) Genus *Axonopsella*

- Genital field with five to numerous pairs of acetabula; posterior suture line of Cx-IV indistinct (Fig. 1117) Genus *Submiraxona*

13(8) Coxae extending well beyond frontal idiosoma margin (Fig. 1120) 14

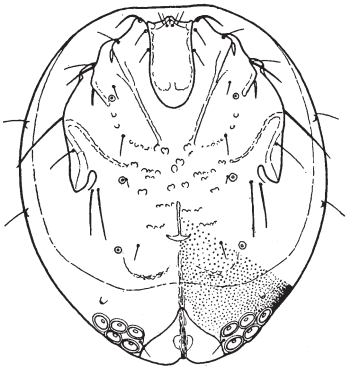
- Coxae not extending beyond frontal idiosoma margin, or only very slightly (Fig. 1121) 15

14 Genital field with four pairs of acetabula; median suture line of Cx-IV well developed (Fig. 1120) Genus *Stygalbiella*

- Genital field with six or eight pairs of acetabula; median suture lines of Cx-IV obliterated (Fig. 1122) Genus *Neoalbia*

15(13) A pair of relatively large glandularia tubercles present posterolaterally on dorsal shield (Fig. 1123) 16

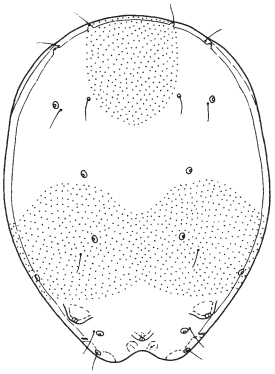
- No glandularia tubercles present posterolaterally on dorsal shield (Fig. 1124) 17



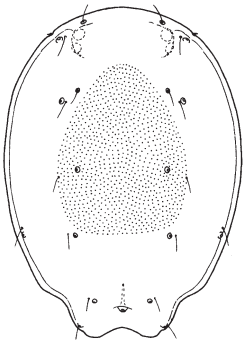
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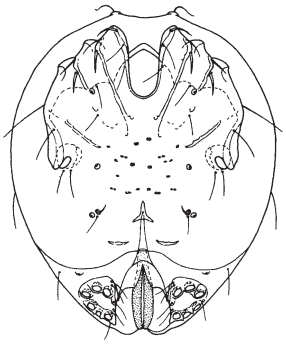
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1121 *Submiraxona* (*Pentalbia*) *walteri* (Lundblad), venter female (after Lundblad 1943)

1122 *Neoalbia* (*Neoalbia*) *violacea* Lundblad, venter female (after Cook 1974)

1123 *Submiraxona* (*Submiraxona*) *lundbladi* Cook, dorsum female (after Cook 1980)

1124 *Miraxonides* (*Miraxonidella*) *karlvietsi* Cook, dorsum female (after Cook 1980)

1125 *Miraxona* (*Miraxona*) *mexicana* Cook, venter female (after Cook 1980)

1126 *Polyaxonopsella dentifera* Lundblad, venter female (after Cook 1974)

16 Genital field with five pairs of acetabula (Fig. 1121) Genus *Submiraxona* (in part)

- Genital field with more than five pairs of acetabula (Fig. 1125) Genus *Miraxona* (in part)

17(15) Genital field with four pairs of acetabula Genera *Miraxonides* and *Axonopsella*

- Genital field with seven pairs of acetabula (Fig. 1126) Genus *Polyaxonopsella*

18(1) Proximal segments of legs, especially IV-leg-2 and -3, greatly expanded and compressed (Fig. 1127) Genus *Khedacarus*

- Proximal segments of legs not greatly expanded and compressed (Fig. 1128); if segments of fourth legs somewhat expanded and compressed, second and third segments are not the largest 19

19 A continuous suture line surrounding the Cx-IV laterally, posteriorly and medially, with a characteristic indentation near a glandular opening posteromedially from the insertions of the fourth leg (Fig. 1129) Genus *Ljania*

- Suture lines surrounding Cx-IV at least with local interruptions, in most cases without visible posteromedial margin, never with a characteristic mediocaudal indentation 20

20 A well-developed ridge present on each side of the idiosoma, usually extending from, or slightly medial to, insertions of fourth legs to anterolateral sides of idiosoma (Fig. 1130); in *Erebaxonopsis* these ridges beginning well anterior to insertions of fourth legs 21

- Without a ridge on each side extending from area of fourth legs to anterolateral sides of idiosoma (Fig. 1131) 38

21 Genital field with three pairs of wheel-like acetabula; inhabitant of inland saline streams (Figs. 1130, 1132) Genus *Haloaxonopsis*

- Acetabula of normal shape 22

22 Genital field with more than eight pairs of acetabula (Fig. 1133) 23

- Genital field with three or four pairs of acetabula (Fig. 1134) 25

23 Dorsal shield composed of two large anterior plates and a large posteromedial plate (Fig. 1135) Genus *Sinaxonopsis*

- Dorsal shield entire (Fig. 1136) 24



1127



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1128



1129

1127 *Kedacarus platypes* Cook, fourth leg male (after Cook 1974)

1128 *Haloaxonopsis salina* Pešić, Smit & Saboori, fourth leg male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

1129 *Ljania michiganensis* Cook, venter female (after Cook 1974)

24 Between insertions of fourth legs two pairs of glandularia (Fig. 1089)
Genus *Siamaxonopsis*

- Between insertions of fourth legs one pair of glandularia (Fig. 1137)
Genus *Omanaxonopsis*

25(22) Females (genital field with gonopore not completely surrounded by sclerotization) with genital plates separated from the ventral shield and typically with a small medial platelet bearing the excretory pore at posterior end of dorsal shield (Figs. 1138, 1139); males (genital field with gonopore completely surrounded by sclerotization) usually with a distinct pointed or somewhat rounded projection on ventral side of P2 (Fig. 1140); if this projection is absent from ventral side of P2, a separate platelet bearing the excretory pore is present at posterior end of dorsal shield in both male and female (*Brachypoda*-like species) 26

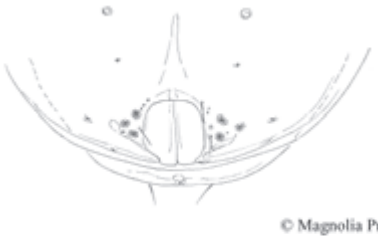
- Females with genital plates fused with ventral shield (Figs. 1134, 1141); males (and females) without a spine-like projection on ventral side of P2 (Fig. 1142) and without separate platelet at posterior end of dorsal shield with the excretory pore (*Axonopsis*-like species) 32


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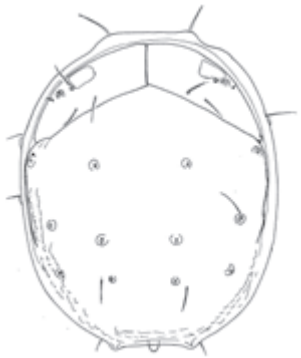
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1130 *Haloaxonopsis salina* Pešić, Smit & Saboori, venter male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

1131 *Stokaxonopsis besselingi* (Cook), venter female (after Cook 1974)

1132 *Haloaxonopsis salina* Pešić, Smit & Saboori, genital field female (after Pešić et al. 2012c) Reproduced with permission from copyright holder

1133 *Sinaxonopsis laosensis* Pešić & Smit, venter male (after Pešić & Smit 2016)

1134 *Axonopsis indica* Cook, venter female (after Cook 1974)

1135 *Sinaxonopsis laosensis* Pešić & Smit, dorsum male (after Pešić & Smit 2016)

26 A projection absent from the ventral side of P2; ventral side of P4 without a heavy seta (Fig. 1143) Genus *Woolastookia*

- A ventral projection of P2 present, usually well-developed but occasionally small; P4 with a heavy seta (Fig. 1140) 27

27 Leg segments very stocky, IV-leg-6 shorter than IV-leg-5 (Fig. 1144); P3 with a ventral extension, which may be hyaline (Fig. 1145) Genus *Cubaxonopsis*

- Leg segments less stocky (Fig. 1146), P3 without a ventral extension (Fig. 1140) 28

28 Genital field with four pairs of acetabula, suture lines Cx-III/Cx-IV well developed (Fig. 1147); males without extensive modifications of the fourth legs Genus *Neobrachypoda*

- Genital field with three or four pairs of acetabula; if four pairs of acetabula are present, suture lines Cx-III/Cx-IV indistinct; males with extensive modifications of the fourth leg (Figs. 1146, 1148) 29

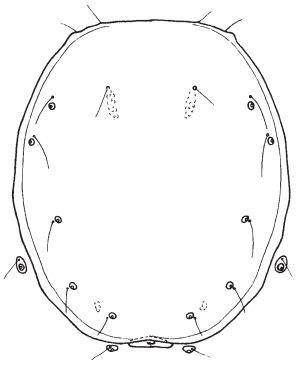
29 Ridges on each side of ventral shield extending well posterior to insertions of fourth legs (Fig. 1149); males (and occasionally females) with IV-leg-6 greatly expanded distally (Fig. 1148) Genus *Estellacarus*



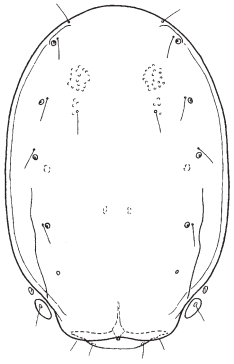
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1136 *Siamaxonopsis ypsilon* Smit, venter female (after Smit 2016a)

1137 *Omanaxonopsis arabica* Smit & Pešić, venter female (after Smit & Pešić 2010)

1138 *Neobrachypoda ekmani* (Walter), dorsum female (after Cook 1974)

1139 *Woolastookia pilositarsa* (Habeeb), dorsum female (after Cook 1974)

1140 *Neobrachypoda ekmani* (Walter), palp male (after Cook 1974)

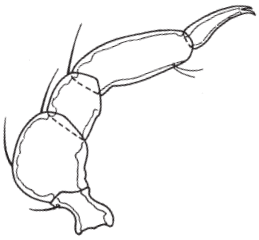
1141 *Brachypodopsis* (*Navinaxonopsis*) *abnormipes* Cook, venter female (after Cook 1974)

- Ridges on each side of ventral shield posteriorly ending at level of insertions of the fourth legs (Fig. 1150); IV-leg-5 and -6 exhibiting sexual dimorphism but IV-leg-6 not greatly expanded at distal end (Fig. 1151) 30

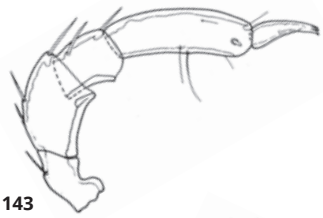
30 A well-developed ridge extending anterolaterally from male genital field (Fig. 1150); excretory pore of female on dorsal shield (Fig. 1152) Genus *Brachypoda*

- No ridge extending anterolaterally from male genital field (Fig. 1153); excretory pore of female on separate platelet posterior to dorsal shield (Fig. 1154) or on dorsal shield 31

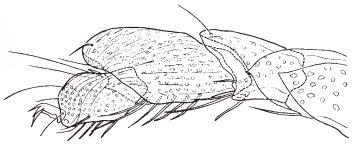
(Females not always distinguishable at genus level from here on)



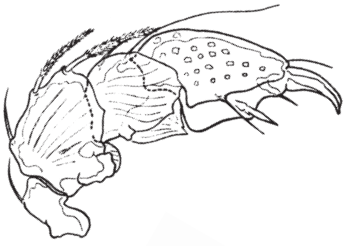
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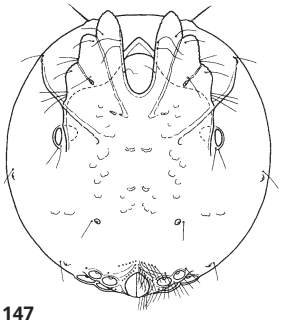
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1142 *Axonopsis keralensis* Cook, palp male (after Cook 1967)

1143 *Woolastookia pilositarsa* (Habeeb), palp female (after Cook 1974)

1144 *Cubaxonopsis robustipalpis* (Orghidan, Gruia & Iavorschi), IV-leg-4-6 male (after Orghidan et al. 1981)

1145 *Cubaxonopsis robustipalpis* (Orghidan, Gruia & Iavorschi), palp male (after Orghidan et al. 1981)

1146 *Ocybrachypoda oakcreekensis* (Habeeb), IV-leg-4-6 male (after Cook 1974)

1147 *Neobrachypoda ekmani* (Walter), venter male (after Cook 1974)

1148 *Estellacarus unguitarsus* (Habeeb), IV-leg-5-6 male (after Cook 1974)

1149 *Estellacarus unguitarsus* (Habeeb), venter male (after Cook 1974)

1150 *Brachypoda versicolor* (Müller), venter male (after Cook 1974)

31 Genital field of male close to posterior margin of idiosoma; no patch of long setae lateral to genital field (Fig. 1153) Genus *Parabrachypoda*

- Genital field of male distanced from posterior margin of posterior idiosoma margin; a patch of long setae lateral to genital field (Fig. 1155) Genus *Ocybrachypoda*

32(25) Genital field with two pairs of acetabula (Fig. 1156) Genus *Uenaxonopsis*

- Genital field with three or more pairs of acetabula (Fig. 1157) 33

33 Ridge on each side of ventral shield beginning well anterior to the insertions of the fourth legs (Fig. 1157); segments of fourth legs expanded and flattened; IV-leg-3 noticeably smaller and is greatly expanded at distal end (Fig. 1158) Genus *Erebaxonopsis*

- Ridge on each side of ventral shield beginning near the insertions of the fourth legs (Fig. 1159); segments of fourth legs not expanded and flattened; IV-leg-3 not noticeably smaller and not greatly expanded at distal end (Fig. 1160) 34

34 Tips of Cx-I and Cx-II drawn out into recurved hooks (Fig. 1272) Genus *Hexaxonopsis*

- Tips of Cx-I and Cx-II not hook-like (Fig. 1161) 35



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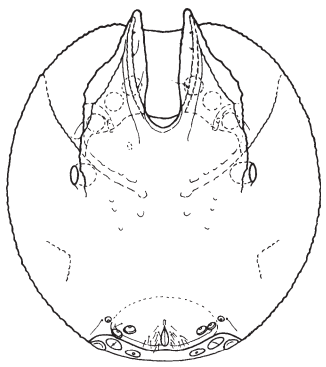
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1151 *Brachypoda versicolor* (Müller), IV-leg-4-6 male (after Gerecke et al. 2016)

1152 *Brachypoda versicolor* (Müller), dorsum female (after Gerecke et al. 2016)

1153 *Parabrachypoda modesta* (Koenike), venter male (after Gerecke et al. 2016)

1154 *Ocybrachypoda celeripes* (K. Viets), posterior part dorsum female (after Gerecke et al. 2016)

1155 *Ocybrachypoda celeripes* (K. Viets), venter male (after Gerecke et al. 2016)

1156 *Uenaxonopsis nazensis* Imamura, venter male (after Cook 1974)

35 Dorsal furrow with two pairs of glandularia platelets (Fig. 1162); both setae on ventral side of P4 small (Fig. 1163) Genus *Axonopsis*

- Dorsal furrow without glandularia platelets (Fig. 1164); at least one of the wo ventral setae of P4 stout (Fig. 1165) 36

36 Posterior gnathosomal apodemes very long (Fig. 1166); P5 approximately as long as P4 (Fig. 1167) Genus *Vicinaxonopsis*

- Posterior gnathosomal apodemes not very long; P5 much shorter than P4 37

37 Usually two glandularia present on each side between insertions of fourth legs and genital field; no cauda development in males (Fig. 1168) Genus *Brachypodopsis*

- One gland present on each side between insertions of fourth legs and genital field; males with a more or less distinct cauda development (Fig. 1169) Genus *Paraxonopsis*

38(20) P4 greatly expanded ventrally and bearing one heavy setae (Fig. 1170); glandularia absent from area around insertions of fourth legs (Fig. 1171) Genus *Stokaxonopsis*



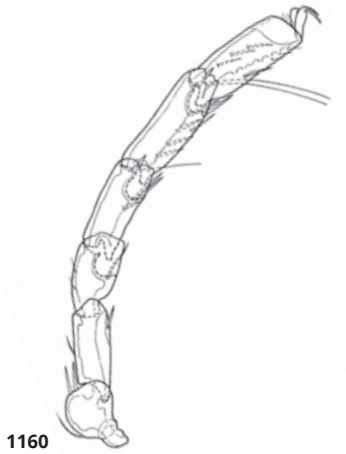
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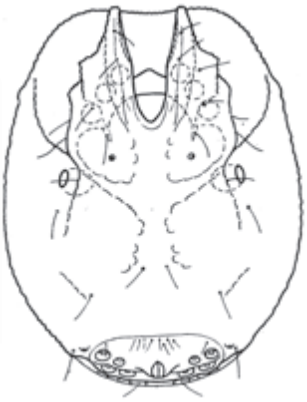
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1157 *Erebaxonopsis nearctica* Cook, venter female (after Cook 1974)

1158 *Erebaxonopsis nearctica* Cook, fourth leg male (after Cook 1974)

1159 *Hexaxonopsis* (*Hexaxonopsis*) *bharatensis* Cook, venter male (after Cook 1974)

1160 *Axonopsis phreaticola* Cook, fourth leg male (after Cook 1974)

1161 *Axonopsis indica* Cook, venter male (after Cook 1974)

1162 *Axonopsis lundbladi* Cook, posterior part dorsal furrow female (after Cook 1974)

- P4 not greatly expanded, without heavy setae (Fig. 1172); a pair of glandularia present in the vicinity of the insertions of the fourth legs, these usually medial or anterior to insertions; also, a pair of glandularia often present between insertions of fourth legs and genital field (Fig. 1173) 39

39 An anterior platelet anterior to Cx-I separated by a narrow strip of thin integument from remainder of ventral shield (Fig. 1173) 40

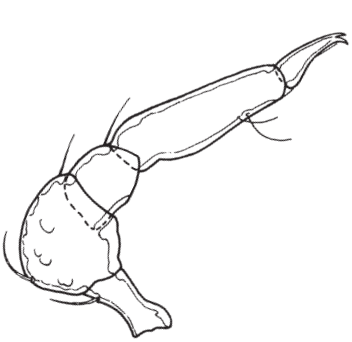
- Ventral shield entire, no separate anterior platelet present (Fig. 1174) 42

40 Genital field with three pairs of acetabula, flanked laterally by halfmoon-shaped sclerotized zones (Fig. 1173) Genus *Prymnopsella*

- Genital field with four or more pairs of acetabula, not flanked laterally by sclerotized zones (Fig. 1175) 41

41 Anterior platelet of ventral shield narrow and bearing a pair of setae; genital field with four pairs of glandularia (Fig. 1175) Genus *Sumatralbia*

- Anterior platelet of ventral shield wide and lacking setae; genital field with 4-7 pairs of acetabula (Fig. 1176) Genus *Subaxonopsalbia*



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1163 *Axonopsis indica* Cook, palp female (after Cook 1974)

1164 *Vicinaxonopsis californica* (Cook), dorsum female (after Cook 1974)

1165 *Brachypodopsis* (*Navinaxonopsis*) *abnormipes* (Cook), palp female (after Cook 1974)

1166 *Vicinaxonopsis californica* (Cook), gnathosoma + palp female (after Cook 1974)

1167 *Vicinaxonopsis californica* (Cook), palp male (after Cook 1974)

1168 *Brachypodopsis* (*Brachypodopsis*) *acuminata* (K. Viets), venter female (after Cook 1974)

42(39) Gonopore completely surrounded by sclerotization; genital field usually fused with ventral shield but rarely separated (Males) 43

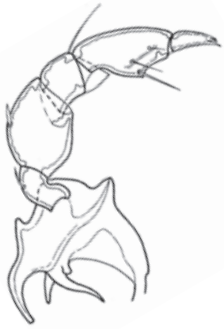
- Gonopore not completely surrounded by sclerotization; genital plates separated from the ventral shield (Females) 52

43 Genital field with four pairs of acetabula (Fig. 1177) 44

- Genital field with three pairs of acetabula (Fig. 1178) 46



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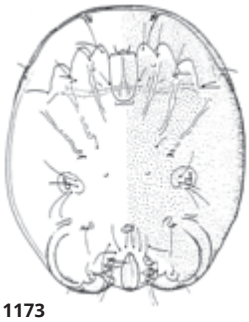
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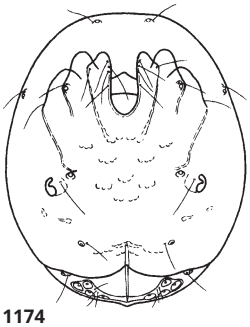
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1169 *Paraxonopsis vivarna* (Cook), venter male (after Cook 1974)

1170 *Stokaxonopsis besselingi* (Cook), gnathosoma + palp male (after Cook 1974)

1171 *Stokaxonopsis besselingi* (Cook), venter male (after Cook 1974)

1172 *Prymnopsella bucculata* Gerecke, palp male (after Gerecke 1991b)

1173 *Prymnopsella bucculata* Gerecke, venter male (after Gerecke 1991b)

1174 *Axonopsalbia vietsi* Cook, venter female (after Cook 1974)

1175 *Sumatralbia rugosa* (K. Viets), venter male (after Cook 1974)

1176 *Subaxonopsalbia pectinifera* Cook, venter male (after Cook 1974)

1177 *Pseudaxonopsalbia* (*Pseudaxonopsalbia*) *acanthophora* (Cook), venter male (after Cook 1974)

44 IV-leg-4 without a heavy terminal seta (Fig. 1179) Genus *Axonopsalbia*

- IV-leg-4 with a heavy terminal seta (Fig 1180) 45

45 Anterior to cauda with (Fig. 1181) or without a transverse ridge (Fig. 1182); acetabula not lying in a line (Fig. 1177) Genus *Pseudaxonopsalbia*

- Anterior to cauda two transverse ridges (Fig. 1183); acetabula lying in a line (Fig. 1184) Genus *Villaxonopsalbia*

46(43) IV-leg-5 greatly expanded, IV-leg-4 bearing numerous heavy dorsal setae (Fig. 1185) Genus *Neoaxonopsalbia*

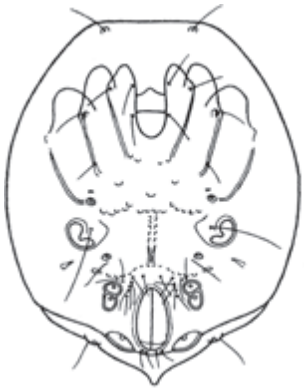
- Segments of fourth legs not expanded (Fig. 1186) 47

47 Cx-I extending to, or well beyond, frontal margin of idiosoma (Fig. 1187) Genus *Albaxona*

- Cx-I not extending to frontal margin of idiosoma (Fig. 1188) 48

48 Acetabula extending far laterally from the gonopore (Fig. 1189); dorsum with a posteromedial cavity flanked by numerous setae (Fig. 1190) Genus *Barbaxonella*

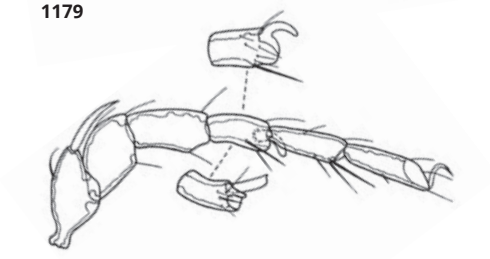
- Acetabula more or less flanking the gonopore; dorsum without a posteromedial cavity (Fig. 1188) 49



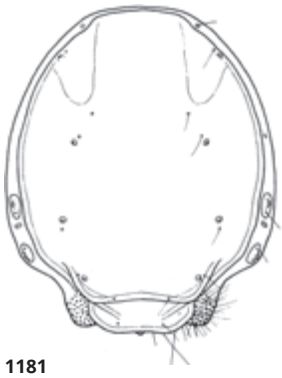
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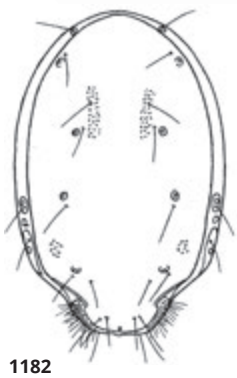
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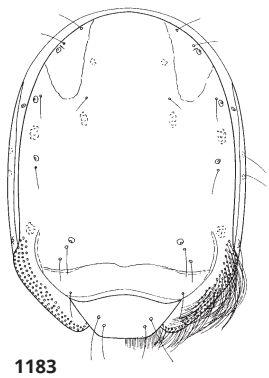
1180



1181



1182



1183

1178 *Neoaxonopsalbia* (*Neoaxonopsalbia*) *longiseta* Cook, venter male (after Cook 1974)

1179 *Axonopsalbia vietsi* Cook, fourth leg male (after Cook 1974)

1180 *Pseudaxonopsalbia* (*Pseudaxonopsalbia*) *acanthophora* (Cook), fourth leg male (after Cook 1974)

1181 *Pseudaxonopsalbia* (*Motasaxona*) *plana* (Cook), dorsum male (after Cook 1974)

1182 *Pseudaxonopsalbia* (*Pseudaxonopsalbia*) *acanthophora* (Cook), dorsum male (after Cook 1974)

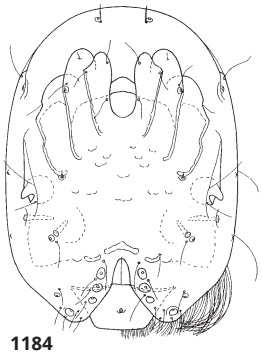
1183 *Villaxonopsalbia sudafricana* Cook, dorsum male (after Cook 1999)

49 Posterior part of dorsum without cauda development (Fig. 1191) Genus *Javalbia*

- Posterior part of dorsum with a moderate to strong cauda development (Fig. 1192) 50

50 Cauda dorsally without numerous small setae (Fig. 1192) Genus *Hexaxonopsalbia*

- Cauda dorsally with numerous small setae (Fig. 1193) 51



1184

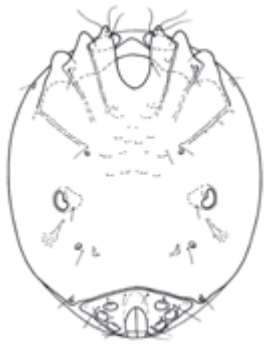


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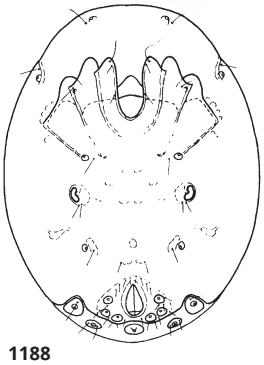


1186

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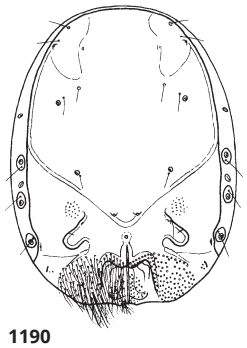
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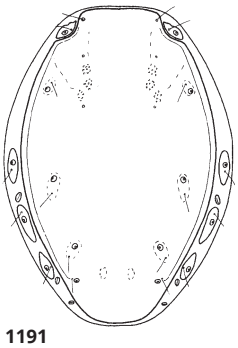
1188



1189



1190



1191



1192

1184 *Villaxonopsalbia sudafricana* Cook, venter male (after Cook 1999)

1185 *Neoaxonopsalbia* (*Neoaxonopsalbia*) *longiseta* Cook, fourth leg male (after Cook 1974)

1186 *Lagoenaxonopsalbia comorosensis* Pešić & Smit, fourth leg male (after Pešić & Smit 2018b) Reproduced with permission from copyright holder

1187 *Albaxona nearctica* Cook, venter male (after Cook 1974)

1188 *Javalbia* (*Javalbia*) *bella* Cook, venter male (after Cook 1974)

1189 *Barbaxonella iberica* Cook, venter male (after Cook 1974)

1190 *Barbaxonella iberica* Cook, dorsum male (after Cook 1974)

1191 *Javalbia* (*Javalbia*) *bella* Cook, dorsum male (after Cook 1974

1192 *Hexaxonopsalbia lautieni* (Motaş), dorsum male (after Cook 1974)

51 Cauda tapering posteriorly (Fig. 1193) Genus *Barbaxonopsalbia*

- Cauda strongly narrowed at base (Fig. 1194) Genus *Lagoenaxonopsalbia*

From here on females not always distinguishable

52(42) Claws of P5 bifid (Fig. 1195); tips of Cx-II and Cx-III more or less sharp-pointed (Fig. 1196) Genus *Javalbiella*

- Claws of P5 rarely bifid; tips of Cx-II and Cx-III more or less rounded (Fig. 1197) 53

53 Cx-I extending to or beyond frontal idiosoma margin (Fig. 1197) Genus *Albaxona*

- Cx-I not extending to frontal idiosoma margin (Fig. 1198) 54

54 Excretory pore platelet, genital plates and postgenital sclerite fused (Fig. 1198) Genus *Villaxonopsalbia*

- Genital plates and postgenital sclerite not fused with excretory pore (Fig. 1199) 55

55 Projections associated with insertions of fourth legs pointed (Fig. 1106) Subgenus *Pseudaxonopsalbia* (*Motasaxona*)

- Projections associated with insertions of fourth legs not pointed

Females of the following genera at present not separable: *Axonopsalbia*, *Barbaxonella*, *Hexaxonopsalbia*, *Javalbia*, *Lagoenaxonopsalbia*, *Neoaxonopsalbia*, *Pseudaxonopsalbia* s.s..



1193



1194



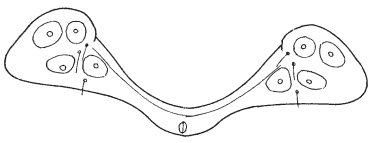
1195



1196



1197



1198

1193 *Barbaxonopsalbia pilosa* Wiles, dorsum male (after Wiles 1991)

1194 *Lagoenaxonopsalbia comorosensis* Pešić & Smit, dorsum male (after Pešić & Smit 2018b) Reproduced with permission from copyright holder

1195 *Javalbiella suehnensis* Cook, palp female (after Cook 1974)

1196 *Javalbiella suehnensis* Cook, venter female (after Cook 1974)

1197 *Albaxona stoka* Cook, venter female (after Cook 1974)

1198 *Villaxonopsalbia sudafricana* Cook, genital field female (after Cook 1999)

Genus *Adelaxonopsella* Cook, 1974

(Figs. 1113, 1114, 1200, 1201)

1974 *Adelaxonopsella* Cook, Memoirs of the American Entomological Institute 21: 329.

Type species: *Adelaxonopsella pallida* Cook, 1974

DIAGNOSIS: (Female only) Dorsal and ventral shields fused posteriorly (Fig. 1200). Gnathosoma with a short-pointed rostrum, dorsal pair of gnathosomal setae thickened, ventral pair hair-like (Fig. 1201). Tips of Cx-I sharp-pointed, those of Cx-III somewhat recurved (Fig. 1113). Insertions of fourth legs partially covered by rounded ventral projections. None of the setae of the dorsal and ventral shields thickened. Suture lines Cx-I/Cx-II long and meeting in the midline. Other coxal suture lines incomplete. Genital field with four pairs of acetabula, arranged in an arc. Genital plates fused with ventral shield without a suture line. The terminally located gonopore relatively long and narrow. P4 with a ventral tubercle, one of the two setae associated with this tubercle somewhat thickened (Fig. 1114). Legs without swimming setae.

HABITAT: Interstitial.

DISTRIBUTION: One species known from Veracruz State, Mexico.

Genus *Albaxona* Szalay, 1944

(Figs. 1187, 1197, 1202, 1203)

1944 *Albaxona* Szalay, Fragmenta Faunistica Hungarica 7: 36.

1948 *Vietsaxona* Motaş & Tanasachi, Annales Scientifiques de l'Université de Jassy 31: 148 – Cook (1974), Pešić & Gerecke (2003).

Type species: *Albaxona minuta* Szalay, 1944

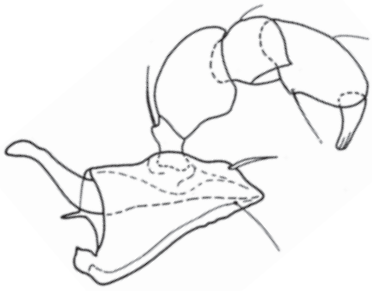
DIAGNOSIS: Dorsal and ventral shield completely separated (Fig. 1202). Glandularia in dorsal furrow relatively small. Genital field with three pairs of acetabula. Excretory pore either free or fused with the dorsal shield. Legs without sexual dimorphism. Male: Coxae extending beyond frontal idiosoma margin (Fig. 1187). Idiosoma posteriorly unmodified, without cauda development. Gonopore relatively large, genital field either separate or fused with the ventral shield. Female: Coxae typically extending beyond frontal idiosoma margin (Fig. 1197), but occasionally not reaching frontal idiosoma margin. Postgenital sclerite may be free, fused with the dorsal shield or fused with the genital plates. Glandularia associated with the genital field either free or fused with the genital plates.


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1199



1200



1201

1199 *Lagoenaxonopsalbia comorosensis* Pešić & Smit, genital field female (after Pešić & Smit 2018b) Reproduced with permission from copyright holder

1200 *Adelaxonopsella pallida* Cook, dorsum female (after Cook 1974)

1201 *Adelaxonopsella pallida* Cook, gnathosoma + palp female (after Cook 1974)

DISTRIBUTION: Streams, interstitial.

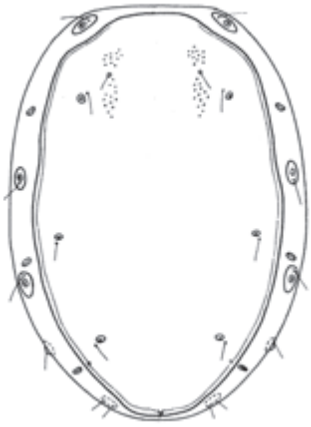
DISTRIBUTION: Widespread, several species known from the Palaearctis (Japan, Imamura 1970), including Siberia (Tuzovskij 2011), Oriental region (India, Cook 1967, Pesic & Ranga Reddy 2009; South Korea, Kim & Chung 1996; Sri Lanka, Gledhill & Wiles 1997; Vietnam, Tuzovskij 2013a; Thailand, Smit 2016a), Afrotropical region (Liberia, Cook 1966; Ghana, Smit 2016b) and Nearctic region (Virginia, USA, Cook 1974).

Genus *Axonopsalbia* K. Viets, 1914

(Figs. 1107, 1174, 1179, 1204-1207)

1914 *Axonopsalbia* K. Viets, Archiv für Hydrobiologie 9: 196.

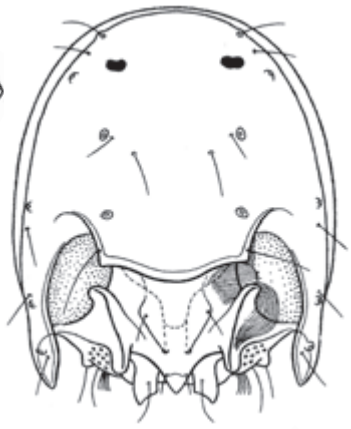
Type species: *Axonopsalbia curvisetifera* K. Viets, 1914



1202



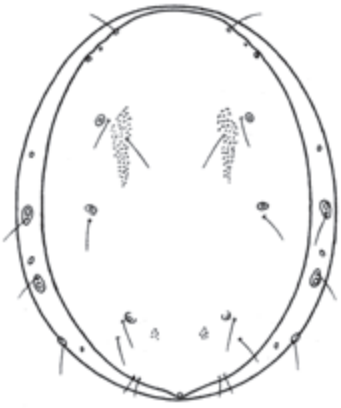
1203



1204



1205



1206



1207

1202 *Albaxona nearctica* Cook, dorsum male (after Cook 1974)

1203 *Albaxona nearctica* Cook, palp male (after Cook 1974)

1204 *Axonopsalbia vietsi* Cook, dorsum male (after Cook 1974)

1205 *Axonopsalbia vietsi* Cook, first leg female (after Cook 1974)

1206 *Axonopsalbia vietsi* Cook, dorsum female (after Cook 1974)

1207 *Axonopsalbia curvisetifera* K. Viets, palp female (after Cook 1974)

DIAGNOSIS: Coxae not extending to frontal idiosoma margin. Suture lines Cx-III/IV not extending to glandularia located (antero)medial to the insertions of fourth legs. Genital field with four pairs of acetabula. Male: Dorsal and ventral shields fused posteriorly (Fig. 1204). Idiosoma posteriorly highly modified. Glandularia of the dorsal furrow small. A ridge present on each side extending anteriorly and posteriorly from insertions of fourth legs (Fig. 1107). Insertions of fourth legs not visible in ventral view. Genital plates fused with ventral shield and without a suture line. IV-leg-5 somewhat swollen distally and one of the claws not pointed (Fig. 1179). None of the leg setae greatly thickened. Female: Projections associated with openings of fourth legs of moderate size and somewhat rounded. Anterior portion of ventral shield without separate platelet (Fig. 1174). Genital field fused with the postgenital sclerite. IV-leg-5 not swollen, claws normal (Fig. 1205). Excretory pore located at extreme posterior end of dorsal shield (Fig. 1206).

HABITAT: Streams.

DISTRIBUTION: Three species are known from West-Africa (Cameroon; Liberia, Cook 1966) and one from Europe. From Guatemala (K.O. Viets 1978b) and Sulawesi, Indonesia (Wiles 1989) two species have been described based on the female sex only. As the generic assignment is based on the male, it is not clear to which genus or genera these two species belong.

Genus *Axonopsella* Lundblad, 1930

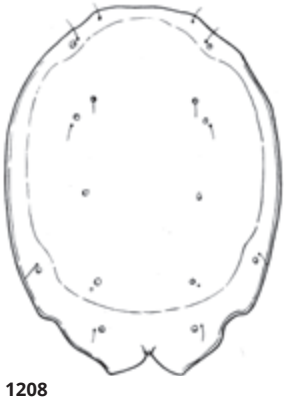
(Figs. 1105, 1119, 1208-1231)

1930 *Axonopsella* Lundblad, Zoologiska bidrag från Uppsala 13: 54.

1981 *Humboldtaxonopsella* Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 20: 63 – new syn.

Type species: *Axonopsella spinigera* Lundblad, 1930

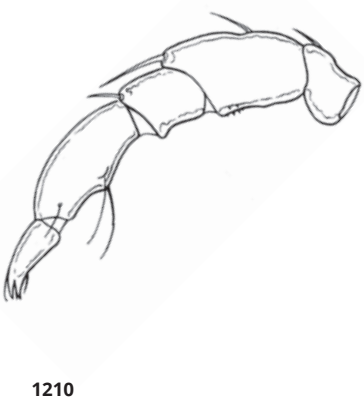
DIAGNOSIS: Female dorsal shield without enlarged glandularia tubercles. Coxae not extending beyond frontal idiosoma margin. A (nearly) separate antenniform platelet may be present at the anterior end of the ventral shield (Fig. 1231). Posterior suture lines of Cx-IV not extending anteriorly as a pair of U-shaped loops which terminate in a pair of glandularia. Cx-IV with (Fig. 1231) or without enlarged glandularia. Medial coxal suture lines relatively long. Genital field with four pairs of acetabula, enlarged glandularia tubercles flanking the genital field may or may not be present. IV-leg-4 of subgenera with the males known with an anteroventral extension with 1-3 stout setae. Legs with swimming setae.



1208



1209



1210

1208 *Axonopsella* (*Axonopsella*) *plaumanni* Lundblad, dorsum female (after Cook 1974)

1209 *Axonopsella* (*Axonopsella*) *plaumanni* Lundblad, venter female (after Cook 1974)

1210 *Axonopsella* (*Axonopsella*) *plaumanni* Lundblad, palp female (after Cook 1974)

REMARKS: The original description was based on a female, but only males of *Axonopsella* show the subgeneric characters. Several subgenera have been described, and it is possible that when the male of the type species is known, one of these subgenera must be synonymized with the nominate subgenus.

The genus has undergone an extensive speciation in Australia, but the Australian species have not yet been assigned to a subgenus. Two subgenera are based on females only. One of these, *Humboldtaxonopsella* Orghidan & Gruia, is based on incomplete suture lines of Cx-I/II, a character not suitable for delineating subgenera in *Axonopsella*. In Australian *Axonopsella* species this character is found in several species, and they clearly belong to the same subgenus as species with complete suture lines. *Humboldtaxonopsella* is therefore synonymized with the nominate taxon. *Axonopsella* s.s. serves as a dumping ground for species known from the female only or for species without a subgeneric assignment (Cook 1974). For these reasons this subgenus is not included in the key to the subgenera. The habitat and distribution of species not assigned to a subgenus is given below.

HABITAT: Streams, interstitial.

DISTRIBUTION: Several species described from South (Venezuela, Orghidan & Gruia 1981) and Central America (Guatemala, K.O. Viets 1978c; Costa Rica, Cook 1980). Moreover, many species known from Australia (Cook 1986, Smit 1996c, 2018), and a few are known from New Guinea (Wiles 1997c, Smit 1996b, 2013b). For the distribution of the subgenera see below.

KEY TO THE SUBGENERA

1 Rostrum very long (Fig. 1211); genital field females fused with Cx-IV (Fig. 1212) Subgenus *Rostaxonopsella*

\- Rostrum not very long; genital field female not fused with Cx-IV (Fig. 1209) 2

(From here on males only)

2 Suture lines surrounding male genital complete (Fig. 1213) Subgenus *Coaxonopsella*

\- Suture lines surrounding male genital field lacking or incomplete (Fig. 1214) 2

2 II-leg-6 with an extremely long claw (Fig. 1215) Subgenus *Paraxonopsella*

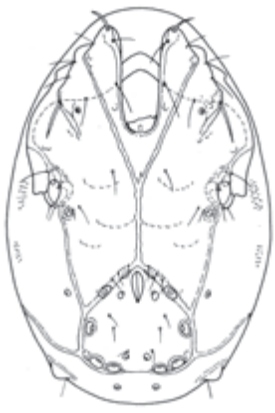
\- Claw of II-leg-6 not extremely long (Fig. 1216) 3



1211



1212



1213

1211 *Axonopsella* (*Rostaxonopsella*) *nana* Orghidan & Gruia, gnathosoma + palp female (after Orghidan & Gruia 1987)

1212 *Axonopsella* (*Rostaxonopsella*) *nana* Orghidan & Gruia, venter female (after Orghidan & Gruia 1987)

1213 *Axonopsella* (*Coaxonopsella*) *jujuyensis* Cook, venter male (after Cook 1980)

3 II-leg-6 very short (Figs. 1217, 1218) Subgenus *Luciaxonopsella*

- II-leg-6 not very short

4 Males with two very short, thickened setae at the tip of the ventral extension of IV-leg-4 (Fig. 1219) Subgenus *Chilaxonopsella*

- Males with one thickened setae at the tip of the ventral extension of IV-leg-4 (Fig. 1228) Subgenus *Neoaxonopsella*

Subgenus *Axonopsella* s.s.

(Figs. 1208-1210)

DIAGNOSIS: (Female only) Idiosoma broad-oval. Coxae not projecting beyond the frontal idiosoma margin. Cx-IV without enlarged glandularia. No ridge present on each side extending from the genital field to the openings for the fourth legs (Fig. 1209). Second leg not modified. IV-leg-4 without a large seta on an anteroventral extension.

HABITAT: Streams.

DISTRIBUTION: See above.

REMARKS: A subgenus which serves as a dumping ground for females with no males known.



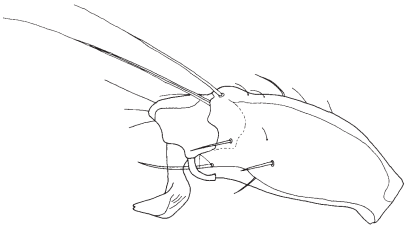
1214



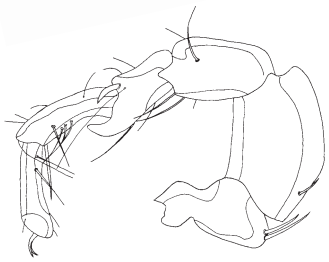
1215



1216



1217



1218



1219

1214 *Axonopsella* (*Chilaxonopsella*) *chilensis* Cook, venter male (after Cook 1988)

1215 *Axonopsella* (*Paraxonopsella*) *filunguis* Lundblad, second leg male (after Cook 1974)

1216 *Axonopsella* (*Neoaxonopsella*) *trifida* Lundblad, II-leg-5-6 male (after Cook 1974)

1217 *Axonopsella* (*Luciaxonopsella*) *misionum* Rosso de Ferradás, II-leg-5-6 male

1218 *Axonopsella* (*Luciaxonopsella*) *misionum* Rosso de Ferradás, IV-leg male

1219 *Axonopsella* (*Chilaxonopsella*) *chilensis* Cook, fourth leg male (after Cook 1988)

Subgenus *Chilaxonopsella* Cook, 1988

(Figs. 1214, 1219, 1220)

1988 *Chilaxonopsella* Cook, Memoirs of the American Entomological Institute 42: 162.
Type species: *Axonopsella chilensis* Cook, 1988

DIAGNOSIS: Idiosoma broad-oval. Dorsal shield fused posteriorly with the ventral shield. No ridge present on each side extending from the genital field to the openings for the fourth legs (Fig. 1214). Male: Glandularia of Cx-IV of normal size. II-leg-6 with a large claw with a small ventral clawlet (Fig. 1220). IV-leg-4 with two very short, thickened setae at the tip of an anteroventral extension (Fig. 1219).

HABITAT: Streams.

DISTRIBUTION: Four species known from Chile (Cook 1988).

Subgenus *Coaxonopsella* Cook, 1980

(Figs. 1213, 1221-1225)

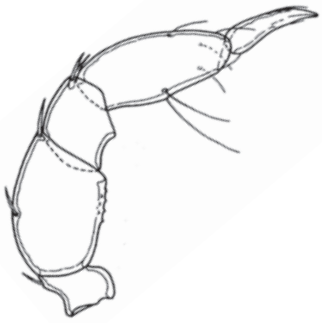
1980 *Coaxonopsella* Cook, Memoirs of the American Entomological Institute 31: 266.
Type species: *Coaxonopsella jujuyensis* Cook, 1980



1220



1221



1222



1223



1224



1225

1220 *Axonopsella* (*Chilaxonopsella*) *chilensis* Cook, II-leg-4-6 male (after Cook 1988)
1221 *Axonopsella* (*Coaxonopsella*) *jujuyensis* Cook, dorsum male (after Cook 1980)
1222 *Axonopsella* (*Coaxonopsella*) *jujuyensis* Cook, palp male (after Cook 1980)
1223 *Axonopsella* (*Coaxonopsella*) *jujuyensis* Cook, fourth leg male (after Cook 1980)
1224 *Axonopsella* (*Coaxonopsella*) *jujuyensis* Cook, IV-leg-4 male (after Cook 1980)
1225 *Axonopsella* (*Coaxonopsella*) *jujuyensis* Cook, II-leg-5-6 male (after Cook 1980)

DIAGNOSIS: (Male only) Idiosoma relatively long and oval (Fig. 1221). Dorsal shield fused posteriorly with the ventral shield. Glandularia of Cx-IV large. A ridge present on each side extending from the genital field to the openings for the fourth legs. Suture lines of genital field complete (Fig. 1213). IV-leg-4 with a large curved seta on an anteroventral extension (Figs. 1223-1224). Claw of second leg not very much enlarged, with a ventral clawlet Fig. 1225).

HABITAT: Streams.

DISTRIBUTION: One species known from Jujuy Province, Argentina.

Subgenus *Luciaxonopsella* Rosso de Ferradás, 1995

(Figs. 1217, 1218, 1226)

1995 *Luciaxonopsella* Rosso de Ferradás, Studies on Neotropical Fauna and Environment 30: 133.

Type species: *Axonopsella misionum* Rosso de Ferradás, 1995

DIAGNOSIS: (Male only) Dorsal furrow complete. No ridge present on each side extending from the genital field to the openings for the fourth legs (Fig. 1226). Glandularia of Cx-IV of normal size. P2 with a number of small denticles. II-leg-5 and -6 modified, II-leg-6 very short with a large dorsal seta (Figs. 1217). IV-leg-4 very short, with a curved anteroventral extension, and more dorsally a curved seta (Fig. 1218).

HABITAT: Streams.

DISTRIBUTION: One species known from Misiones Province, Argentina.

REMARKS: The illustrations of Rosso de Ferradás (1995) are incorrect. Examination of the holotype revealed that the large curved seta of IV-leg-4 is of "normal" shape, without three short and stout setae.

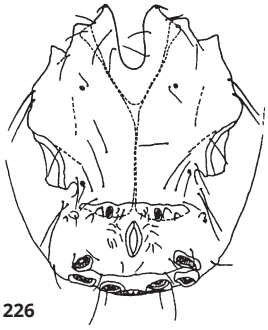
Subgenus *Neoaxonopsella* Lundblad, 1937

(Figs. 1119, 1216, 1227, 1228)

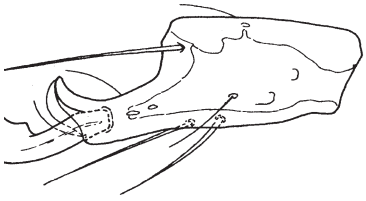
1937 *Neoaxonopsella* Lundblad, Zoologischer Anzeiger 118: 259.

Type species: *Axonopsella trifida* Lundblad, 1937

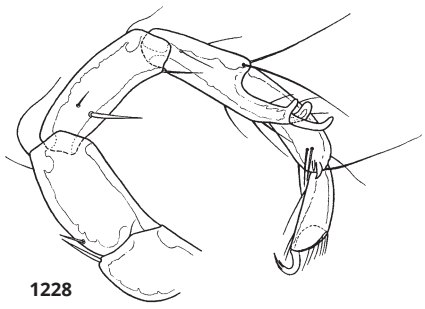
DIAGNOSIS: Idiosoma broad-oval. Dorsal furrow complete. No ridge present on each side extending from the genital field to the openings for the fourth legs (Fig. 1119). Glandularia of Cx-IV of normal size. Male: II-leg-6 occasionally noticeably expanded, claws of II-leg-6 slightly enlarged (Fig. 1216). Claws of IV-leg-6 pointed and slightly elongated, but not as long as in *Paraxonopsella*; IV-leg-4 with a large, curved seta on an anteroventral extension (Figs. 1227, 1228). Female: Second leg not modified.



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1226 *Axonopsella* (*Luciaxonopsella*) *misionum* Rosso de Ferradás, venter male (after Rosso de Ferradás 1995)

1227 *Axonopsella* (*Neoaxonopsella*) *agentinensis* Cook, IV-leg-4 male (after Cook 1980)

1228 *Axonopsella* (*Neoaxonopsella*) *trifida* Lundblad, fourth leg male (after Lundblad 1943)

HABITAT: Streams, interstitial.

DISTRIBUTION: Several species known from South America (Brazil; Argentina, Cook 1980, Rosso de Ferradás 1995; Venezuela, Orghidan & Gruia 1981), Central America (Mexico, Cook 1980) and Cuba (Orghidan & Gruia 1981).

Subgenus *Paraxonopsella* Lundblad, 1937

(Figs. 1105, 1215, 1229, 1230)

1937 *Paraxonopsella* Lundblad, Zoologischer Anzeiger 118: 258.

Type species: *Axonopsella filunguis* Lundblad, 1937

DIAGNOSIS: Idiosoma broad-oval. Dorsal furrow complete. No ridge present on each side extending from the genital field to the openings for the fourth legs (Fig. 1105). Male: Second leg exhibiting a pronounced sexual dimorphism, claws of II-leg-6 may be extremely long (Fig. 1215), in other species much less enlarged (Fig 1229). IV-leg-4 with a large seta on an anteroventral extension (Fig. 1230). Female: Legs not modified.

HABITAT: Streams.

DISTRIBUTION: Three species known from southern Brazil and Argentina (Rosso de Ferradás 1995).

Subgenus *Rostaxonopsella* Orghidan & Gruia, 1987

(Figs. 1211, 1212)

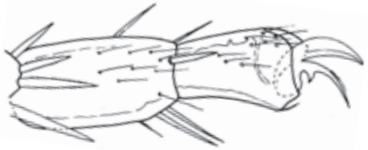
1987 *Rostaxonopsella* Orghidan & Gruia, Fauna hipogea y hemiedáfica de Venezuela y de otros paises de América del Sur 1: 127.

Type species: *Axonopsella nana* Orghidan & Gruia, 1987

DIAGNOSIS: (Female only) Idiosoma somewhat elongated broad-oval. Dorsal shield with six pairs of glandularia, fused anteriorly with ventral shield. Gnathosoma with a very long rostrum (Fig. 1211). No ridge present on each side extending from the genital field to the openings for the fourth legs. Posterior margin of Cx-IV rounded and incomplete. Genital field fused with Cx-IV (Fig. 1212).

HABITAT: Interstitial.

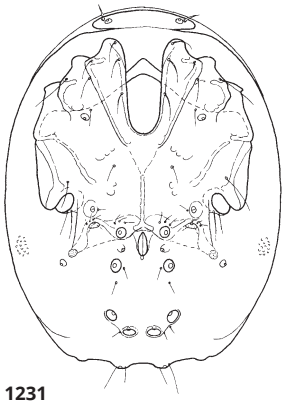
DISTRIBUTION: One species known from Venezuela.



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1229 *Axonopsella* (*Paraxonopsella*) *hamata* Lundblad, II-leg-5-6 male (after Cook 1974)

1230 *Axonopsella* (*Paraxonopsella*) *filunguis* Lundblad, fourth leg male (after Cook 1974)

1231 *Axonopsella* (?) *diamphida* Cook, venter male (after Cook 1986)

Genus *Axonopsis* Piersig, 1893

(Figs. 1134, 1142, 1160-1163)

1893 *Axonopsis* Piersig, Zoologischer Anzeiger 16: 310.

1963 *Pseudaxonopsis* Cook, American Midland Naturalist 70: 121 - Cook (1967).

Type species: *Axonopsis bicolor* Piersig, 1893 = *A. complanata* (Müller, 1776)

DIAGNOSIS: Dorsal and ventral shields fused anteriorly. Dorsal shield with 3-4 pairs of glandularia, the most posterior ones flanking the excretory pore. Dorsal furrow with two pairs of glandularia (Fig. 1162). Male idiosoma without cauda development. A ridge on each side of the ventral shield extending anterolaterally from the region of insertion of the fourth legs (Figs. 1134, 1161). No glandularia present between insertions of fourth legs and the genital field. Genital field with four pairs of acetabula. Female gonopore unsclerotized posteriorly, male gonopore completely surrounded by sclerotization. Segments of fourth legs not greatly expanded and flattened, IV-leg-3 only slightly smaller than other segments (Fig. 1160). P2 and P4 without ventral projections (Figs. 1142, 1163). Excretory pore on dorsal shield or free in the membranous integument, not on a separate platelet at posterior end of dorsal shield.

HABITAT: Standing waters (lakes), streams, interstitial.

DISTRIBUTION: Several species known from the Holarctic region (Eurasia; North America, Cook 1963a), the Oriental region (India, Cook 1967; Indonesia, SE Iran, Pešić et al 2012c; Borneo, Smit & Pešić 2014b), Japan (Imamura 1958, Tuzovskij 2003a) and West-Africa (Liberia, Cook 1966; Ghana, Smit 2016b).

Genus *Barbaxona* K. Viets, 1924

(Figs. 1104, 1232)

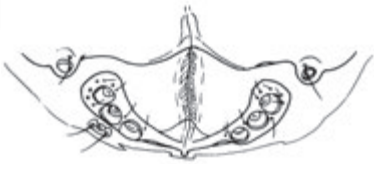
1924 *Barbaxona* K. Viets, Zoologischer Anzeiger 58: 105.

Type species: *Barbaxona barbata* K. Viets, 1924

DIAGNOSIS: Posterior pair of setae on gnathosoma greatly enlarged. Tips of Cx-I drawn out into recurved hooks (Fig. 1104). Cx-IV with large pointed processes which partially cover the insertions of the fourth legs. Anterior portion of ventral shield entire. Genital field with three pairs of acetabula. Males: With a ridge on each side in males extending posteromedially from insertions of fourth legs, several long setae associated with this ridge. Acetabula located on a small cauda flanking the subterminal gonopore. Fourth leg of male exhibiting sexual dimorphism, IV-leg-4 with two enlarged setae (Fig. 1232). Females: Genital plates fused with ventral shield without suture lines.



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1232 *Barbaxona barbata* K. Viets, IV-leg-4-6 male (after Cook 1974)

1233 *Barbaxonella angulata* Cook, genital field female (after Cook 1974)

1234 *Barbaxonella iberica* Cook, palp male (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: One species known from Cameroon.

Genus *Barbaxonella* Lundblad, 1954

(Figs. 1189, 1190, 1233, 1234)

1954 *Barbaxonella* Lundblad, Zoologischer Anzeiger 153: 158.

Type species: *Barbaxonella ovalis* Lundblad, 1954

DIAGNOSIS: Coxae not extending to frontal idiosoma margin. Genital field with three pairs of acetabula. Males: Dorsal and ventral shields may be fused posteriorly in male. Dorsum with a posteromedial depression surrounded by numerous setae (Fig. 1190). Genital plates fused with the ventral shield without suture lines (Fig. 1189). Gonopore terminal, acetabula more or less extending laterally from gonopore. Numerous setae associated with the genital field. Legs without sexual dimorphism. Females: Dorsal furrow complete with three small pairs of glandularia. Genital plates fused with postgenital sclerite (Fig. 1233). Glandularia typically associated with the genital field fused with the ventral shield. Excretory pore platelet fused with the postgenital sclerite. II-leg-1 with a greatly enlarged dorsal seta.

HABITAT: Streams, interstitial.

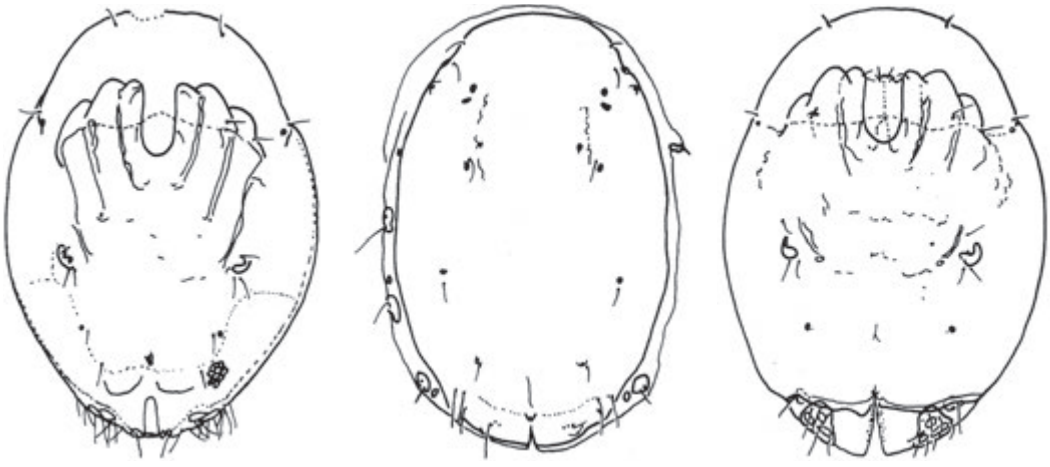
DISTRIBUTION: Five species known from Europe (England, Gledhill 1964; Spain, Cook 1974; Sicily, Italy, Gerecke & Meyer 1989; Corsica, Sardinia, Gerecke 1994; Poland, Biesiadka 1997; Estonia, Smit et al. 2010) and Asia Minor (Esen et al. 2011, Boyaci et al. 2012). Moreover, an undescribed species reported from Morocco (Pešić & Gerecke 2003) and Oman (Smit & Pešić 2010).

Genus *Barbaxonopsalbia* Wiles, 1991

(Figs. 1193, 1235-1241)

1991 *Barbaxonopsalbia* Wiles, Acarologia 32: 53.

Type species: *Barbaxonopsalbia pilosa* Wiles, 1991



1235 **1236** **1237**

1235 *Barbaxonopsalbia pilosa* Wiles, venter male (after Wiles 1991)

1236 *Barbaxonopsalbia pilosa* Wiles, dorsum female (after Wiles 1991)

1237 *Barbaxonopsalbia pilosa* Wiles, venter female (after Wiles 1991)

DIAGNOSIS: Dorsal furrow with three pairs of glandularia platelets (Fig. 1236). Excretory pore subterminal on dorsal plate. Anterior end of ventral shield entire. No glandularia associated with Cx-IV (Figs. 1235, 1237). Genital field with three pairs of acetabula (Fig. 1238). Legs without sexual dimorphism; IV-leg-5 with one swimming seta (Fig. 1241), other legs without swimming setae. Male: Idiosoma with a pronounced sexual dimorphism, with a short, truncated cauda, dorsally with many small setae (Fig. 1193). Genital plates fused to ventral shield, with conspicuous suture lines (Fig. 1235). Female: Idiosoma ovally-shaped. Cxgl-4 and genital field lying free posterior to ventral shield (Fig. 1237).

HABITAT: Streams.

DISTRIBUTION: One species known from Malaysia.

Genus *Brachypoda* Lebert, 1879

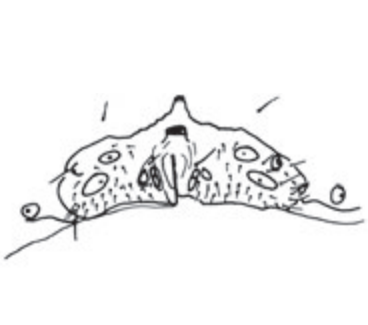
(Figs. 1150-1152, 1242, 1243)

1875 *Axona* Kramer, Archiv für Naturgeschichte 41: 310 (praeocc.).

1879 *Brachypoda* Lebert, Bulletin de la Société vaudoise des sciences naturelles (2. 2) 16: 374.

2004 *Eubrachypoda* Tuzovskij, Biologiya Vnutrennikh Vod 1: 12 – I.M. Smith et al. (2015).

Type species: *Brachypoda paradoxa* Lebert, 1879 = *B. versicolor* (Müller, 1776)



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1238 *Barbaxonopsalbia pilosa* Wiles, terminal ventral view genital field male (after Wiles 1991)

1239 *Barbaxonopsalbia pilosa* Wiles, gnathosoma female (after Wiles 1991)

1240 *Barbaxonopsalbia pilosa* Wiles, palp male (after Wiles 1991)

1241 *Barbaxonopsalbia pilosa* Wiles, fourth leg female (after Wiles 1991)

1242 *Brachypoda versicolor* (Müller), genital field female (after Gerecke et al. 2016)

1243 *Brachypoda versicolor* (Müller), palp male (after Gerecke et al. 2016)

DIAGNOSIS: Ventral shield with a pronounced ridge extending anterolaterally from region of insertion of fourth legs (Fig. 1150). No ridge extending posteriorly from region of insertion of fourth legs. Genital field with three pairs of acetabula. P2 with a variously developed ventral projection, P4 with a heavy seta associated with a ventral tubercle (Fig. 1243). Males: Genital field of male well anterior to posterior margin of ventral shield. IV-leg-4 with a patch of spatulate distoventral setae and a distal projection that extends well beyond level of insertion of IV-leg-5 (Fig. 1151). IV-leg-6 with a highly modified claw. Female: Genital plates separated from ventral shield, located near posterior margin (Fig 1242). Excretory pore located near posterior margin of dorsal shield, flanked by a pair of glandularia.

HABITAT: Standing waters (lakes, ponds, ditches), streams.

DISTRIBUTION: Several species known from the Holarctic region (South Korea, Kim & Chung 1996; Japan, Tuzovskij 2004; Siberia, Pešić & Semenchenko 2014).

Genus *Brachypodopsis* Piersig, 1903

(Figs. 1141, 1165, 1168, 1244-1252)

1903 *Brachypodopsis* Piersig, Berichte des Annaberg-Buchholzer Vereins für Naturkunde 11: 41 – I.M. Smith et al. (2015).

Type species: *Brachypodopsis gracilis* Piersig, 1903

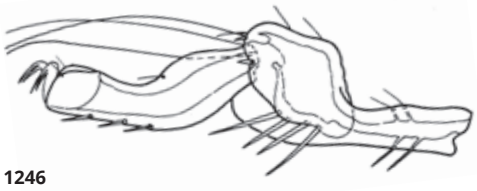
DIAGNOSIS: Dorsal and ventral shield separate or lightly fused anteriorly, no caudal development posteriorly. Dorsal furrow lacking glandularia (Fig. 1247). Dorsal shield bearing 4-6 pairs of glandularia none of which flank the excretory pore. Gnathosomal apodemes moderately long. Ventral shield with a ridge on each side extending from insertions of fourth legs to anterolateral margin of ventral shield (Fig. 1168). Legs with or without swimming setae, and may exhibit sexual dimorphism, but basal segments of fourth leg not greatly expanded or flattened. Between insertions of fourth legs and genital field usually two pairs (Fig. 1168), rarely one pair of glandularia (Figs. 1249-1250). Genital field with 3-4 pairs of acetabula, fused to ventral shield without visible suture lines. P4 with a stout ventral seta (Fig. 1251), normally on a tubercle; P5 much shorter than P4.


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1244



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1244 *Brachypodopsis* (*Brachypodopsis*) *interstitialis* Pešić, Smit & Saboori, fourth leg male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

1245 *Brachypodopsis* (*Kalobrachypoda*) *rhopalopoda* (K. Viets), IV-leg-5-6 male (after Cook 1974)

1246 *Brachypodopsis* (*Navinaxonopsis*) *abnormipes* Cook, IV-leg-5-6 male (after Cook 1974)

KEY TO THE SUBGENERA (FEMALES NOT DISTINGUISHABLE AT SUBGENUS LEVEL)

1 Male fourth unmodified (Fig. 1244) Subgenus *Brachypodopsis* s.s.

- Male fourth leg modified, IV-leg-6 either greatly expanded (Fig. 1245) or curved (Fig. 1246) 2

2 Male IV-leg-5 unmodified, IV-leg-6 greatly expanded and with thick setae (Fig. 1245) Subgenus *Kalobrachypoda*

- IV-leg-5 slender proximally, but expanded distally, IV-leg-6 curved and with slender setae (Fig. 1246) Subgenus *Navinaxonopsis*

Subgenus *Brachypodopsis* s.s.

(Figs. 1168, 1244, 1247, 1248)

DIAGNOSIS: Fourth leg of males unmodified (Fig. 1244).

HABITAT: Streams, interstitial, standing waters (lakes).

DISTRIBUTION: Many species known from the Holarctic, Neotropical and Oriental regions.

Subgenus *Kalobrachypoda* K. Viets, 1929

(Figs. 1245, 1249-1251)

1929 *Kalobrachypoda* K. Viets, Zoologischer Anzeiger 80: 167 - I.M. Smith et al. (2015).
Type species: *Kalobrachypoda rhopalopoda* K. Viets, 1929

DIAGNOSIS: Male IV-leg-5 unmodified, IV-leg-6 greatly expanded and with thick setae (Fig. 1245).

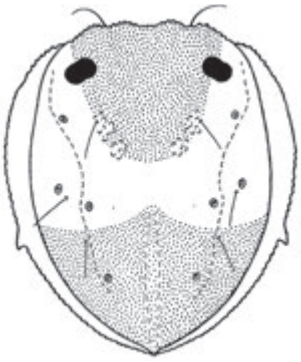
HABITAT: Standing waters, streams.

DISTRIBUTION: One species known from Sumatra and Java, Indonesia.

Subgenus *Navinaxonopsis* Cook, 1967

(Figs. 1141, 1165, 1246, 1252)

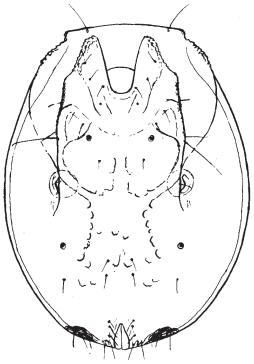
1967 *Navinaxonopsis* Cook, Memoirs of the American Entomological Institute 9: 156 - I.M. Smith et al. (2015).
Type species: *Axonopsis abnormipes* Cook, 1967



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1247 *Brachypodopsis* (*Brachypodopsis*) *koenikei* (K. Viets), dorsum male (after Cook 1974)

1248 *Brachypodopsis* (*Brachypodopsis*) *koenikei* (K. Viets), genital field male (after Cook 1974)

1249 *Brachypodopsis* (*Kalobrachypoda*) *rhopalopoda* (K. Viets), venter male (after K. Viets 1935)

DIAGNOSIS: IV-leg-5 slender proximally, but expanded distally, IV-leg-6 curved (Fig. 1246).

HABITAT: Streams.

DISTRIBUTION: Three species known from India (Cook 1967), Sulawesi (Indonesia, Wiles 1989), Iran (Pesic 2004) and Turkey (Esen et al. 2011). A species of this subgenus reported from Cuba (Orghidan et al. 1981) does not belong to this subgenus (Pesic 2004).

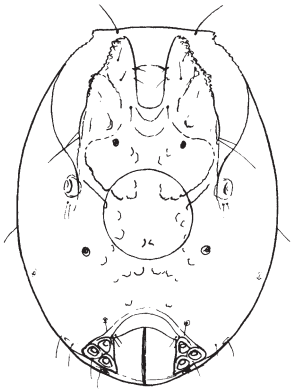
Genus *Cubaxonopsis* Orghidan, Gruia & Iavorschi, 1981

(Figs. 1144, 1145, 1253-1255)

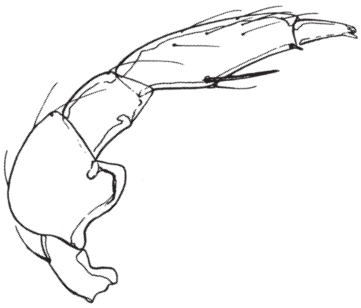
1981 *Cubaxonopsis* Orghidan, Gruia & Iavorschi, Travaux de l'Institut de Spéologie "Emile Racovitza" 20: 29 - I.M. Smith et al. (2015).

2015 *Cubanaxonopsis* Orghidan & Gruia (laps.) - I.M. Smith et al. (2015).

Type species: *Axonopsis robustipalpis* Orghidan, Gruia & Iavorschi, 1981



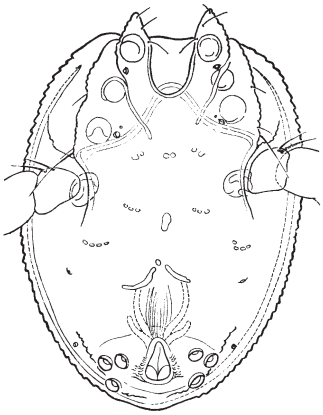
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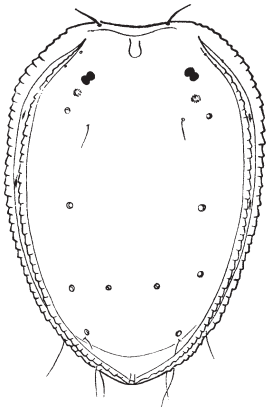
1251



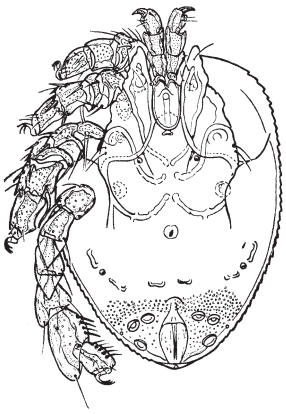
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1250 *Brachypodopsis* (*Kalobrachypoda*) *rhopalopoda* (K. Viets), venter female (after K. Viets 1935)

1251 *Brachypodopsis* (*Kalobrachypoda*) *rhopalopoda* (K. Viets), palp male (after K. Viets 1935)

1252 *Brachypodopsis* (*Navinaxonopsis*) *abnormipes* Cook, venter male (after Cook 1974)

1253 *Cubaxonopsis robustipalpis* (Orghidan, Gruia & Iavorschi), venter male (after Orghidan et al. 1981)

1254 *Cubaxonopsis robustipalpis* (Orghidan, Gruia & Iavorschi), dorsum male (after Orghidan et al. 1981)

1255 *Cubaxonopsis robustipalpis* (Orghidan, Gruia & Iavorschi), venter female (after Orghidan et al. 1981)

DIAGNOSIS: Dorsal and ventral shield fused anteriorly. No cauda development in male, dorsal shield with five pairs of glandularia some of which are without associated setae (Fig. 1254). Dorsal furrow lacking glandularia. Excretory pore near posterior margin of dorsal shield, not flanked by glandularia. Gnathosoma apodemes moderately long. Ventral shield with a short ridge extending from vestigial suture line Cx-III/IV to anterolateral margin of ventral shield (Figs. 1253, 1255). Cx-I extending beyond frontal idiosoma margin. Between insertions of fourth legs and genital field one pair of glandularia. Genital field with three pairs of acetabula, suture lines of genital field barely visible. P2, P3 and P4 greatly expanded and bearing ventral flanges; P4 with a thickened ventral seta and two slender setae (Fig. 1145). Legs with segments greatly flattened and expanded, distal segments with thickened setae, I- and IV-leg-6 stocky (Fig. 1144).

HABITAT: Interstitial.

DISTRIBUTION: Three species known from Cuba.

Genus *Erebaxonopsis* Motaş & Tanasachi, 1947

(Figs. 1157, 1158, 1256-1258)

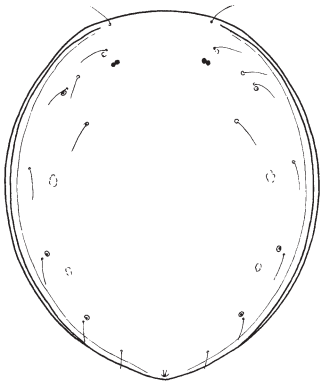
1947 *Erebaxonopsis* Motaş & Tanasachi, Bulletin de la Section Scientifique de l'Académie Roumaine 29: 507.

Type species: *Erebaxonopsis brevipes* Motaş & Tanasachi, 1947

DIAGNOSIS: Dorsal and ventral shield separated anteriorly, males without cauda. Dorsal furrow lacking glandularia. Dorsal shield with seven pairs of glandularia, some of these without associated setae (Fig. 1256); one pair of glandularia flanking the posteriorly located excretory pore. Gnathosoma apodemes moderately long. Ventral shield with a curved ridge starting well anterior to insertion of fourth leg. Genital field with four pairs of acetabula, two pairs lying more laterally; suture lines of genital field obliterated. No glandularia between insertions of fourth legs and genital field (Fig. 1257-1258). Ventral setae of P4 not enlarged and not associated with tubercles. Fourth leg segments flattened, IV-leg-3 smaller than other segments.

HABITAT: Interstitial, streams.

DISTRIBUTION: Five species known from Europe, Japan (Imamura 1958, 1961), western North America (Cook 1974) and Borneo, Malaysia (Smit & Pešić 2014b).



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1256 *Erebaxonopsis nearctica* Cook, dorsum male (after Cook 1974)

1257 *Erebaxonopsis brevipes* Motaş & Tanasachi, venter male (after Gerecke et al. 2016)

1258 *Erebaxonopsis nearctica* Cook, venter female (after Cook 1974)

Genus *Estellacarus* Habeeb, 1954

(Figs. 1148, 1149, 1259-1262)

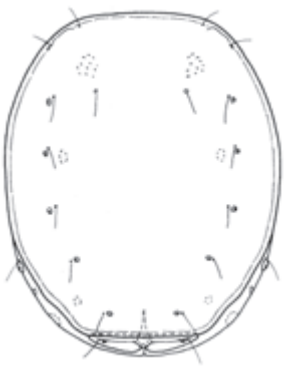
1954 *Estellacarus* Habeeb, Leaflets of Acadian Biology 2: 12.

Type species: *Brachypoda unguitarsa* Habeeb, 1953

DIAGNOSIS: Dorsal and ventral shields present, dorsum with a small platelet at posterior end of dorsal shield bearing the excretory pore and a pair of glandularia (Fig. 1259). Ventral shield with a ridge extending anterolaterally from insertions of fourth legs to anterolateral margin of ventral shield, and a short ridge posteriorly of insertions of fourth legs. Between insertions of fourth leg and genital field one pair of glandularia (Fig. 1260). Genital field with three pairs of acetabula, genital field of male located near posterior idiosoma margin (Fig. 1149). P2 with a well-developed ventral projection with a thick seta (Fig. 1262). IV-leg-4 of male (and occasionally of female) greatly expanded and with enlarged claws (Fig. 1148). Excretory pore on a small platelet posterior to dorsal shield.

HABITAT: Streams.

DISTRIBUTION: One species known from North America.



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1259 *Estellacarus unguitarsus* (Habeeb), dorsum female (after Cook 1974)

1260 *Estellacarus unguitarsus* (Habeeb), venter female (after Cook 1974)

1261 *Estellacarus unguitarsus* (Habeeb), gnathosoma + palp male (after Cook 1974)

1262 *Estellacarus unguitarsus* (Habeeb), palp male (after Cook 1974)

1263 *Hexaxonopsalbia lautieni* (Motaş), dorsum male (after Cook 1974)

1264 *Hexaxonopsalbia lautieni* (Motaş), venter male (after Cook 1974)

Genus *Hexaxonopsalbia* Motaş, 1928

(Figs. 1083, 1192, 1263-1265)

1928 *Hexaxonopsalbia* Motaş, Travaux du laboratoire Hydrobiologie et de Pisciculture de l'Université de Grenoble 20: 203.

Type species: *Axonopsalbia lautieni* Motaş, 1928

DIAGNOSIS: Dorsal furrow with three pairs of small glandularia platelets (Fig. 1192). Tips of Cx-I not extending to frontal idiosoma margin. Cx-IV with two pairs of glandularia, one located anterior and one posterior to insertions of fourth legs. Genital field with three pairs of acetabula. P4 ventrally not expanded, without stout setae (Fig. 1265). Legs without sexual dimorphism. Male: Dorsal and ventral shields narrowed posteriorly to form a short cauda (Fig. 1263). Ventral shield with posterolateral corners slightly extending beyond base of cauda. Genital field setose; gonopore subterminal in position, flanked by genital plates which are fused to ventral shield without visible suture lines (Fig. 1264). Female: Dorsal furrow complete, posterior idiosoma not modified. Genital plates and glandularia flanking the genital field free in the posteroventral integument (Fig. 1083). Excretory pore fused with postgenital sclerite.

HABITAT: Lakes, pools in streams.

DISTRIBUTION: One species known from southern France and Spain.

Genus *Haloaxonopsis* Pešić, Smit & Saboori, 2012

(Figs. 1128, 1130, 1132, 1266-1269)

2012 *Haloaxonopsis* Pešić, Smit & Saboori, Zootaxa 3330: 54.

Type species: *Haloaxonopsis salina* Pešić, Smit & Saboori, 2012

DIAGNOSIS: Dorsal and ventral shields broadly fused anteriorly, idiosoma without a cauda. Dorsal furrow without glandularia. Dorsal shield with seven pairs of glandularia, one pair flanking the excretory pore (Fig. 1266). Gnathosomal apodemes moderately long. Ventral shield with a ridge extending anterolaterally from insertions of fourth legs to anterolateral margin. Between fourth legs insertion and genital field two pairs of glandularia (Figs. 1130, 1267). Genital field with three pairs of so-called wheel-like acetabula (Fig. 1132, see Cook 1996). P4 slender, with two slender setae on a prominent ventral projections (Fig. 1268). Legs with swimming setae (Fig. 1269).



1265



1266

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1265 *Hexaxonopsalbia lautieni* (Motaş), palp male (after Gerecke et al. 2016)

1266 *Haloaxonopsis salina* Pešić, Smit & Saboori, dorsum male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

1267 *Haloaxonopsis salina* Pešić, Smit & Saboori, venter female (after Pešić et al. 2012c) Reproduced with permission from copyright holder

HABITAT: Inland saline streams.

DISTRIBUTION: One species known from SE Iran.

Genus *Hexaxonopsis* K. Viets, 1926

(Figs. 1159, 1270-1275)

1926 *Hexaxonopsis* K. Viets, Zoologischer Anzeiger 69: 195 - I.M. Smith et al. (2015).

Type species: *Brachypoda violacea* K. Viets, 1911

DIAGNOSIS: Dorsal and ventral shield separated or lightly fused anteriorly, males without a cauda development. Dorsal furrow lacking glandularia. Dorsal shield with six pair of glandularia none of which flank the excretory pore, with (Fig. 1270) or without (Fig. 1271) paired rows of spinose projections anterolaterally. Gnathosomal apodemes moderately long. A ridge extending anterolaterally from insertions of fourth legs to anterolateral margin of ventral shield. Cx-I and Cx-II with recurved, pointed, hook-like projections (Figs. 1159, 1272). Cx-IV with two, rarely three pairs of glandularia, between insertions of fourth legs and genital field. Genital field with three pairs of acetabula. Suture lines between genital field and ventral shield clearly delineated. P4 slender with a long, stout seta usually on a tubercle (Fig. 1275). Legs with or without swimming setae.


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1268 *Haloaxonopsis salina* Pešić, Smit & Saboori, palp male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

1269 *Haloaxonopsis salina* Pešić, Smit & Saboori, fourth leg male (after Pešić et al. 2012c) Reproduced with permission from copyright holder

1270 *Hexaxonopsis* (*Hexaxonopsis*) *rucira* Cook, dorsum female (after Cook 1974)

1271 *Hexaxonopsis* (*Hexaxonopsis*) *bharatensis* Cook, dorsum female (after Cook 1974)

1272 *Hexaxonopsis* (*Hexaxonopsis*) *bharatensis* Cook, venter female (after Cook 1974)

1273 *Hexaxonopsis* (*Plesiobrachypoda*) *claviger* (Walter), IV-leg-4-6 male (after Cook 1974)

KEY TO THE SUBGENERA (FEMALES NOT DISTINGUISHABLE AT SUBGENUS LEVEL)

1 Fourth legs of males not modified — Subgenus *Hexaxonopsis* s.s.

- IV-leg-5 of male expanded and bearing numerous thickened setae (Fig. 1273) — Subgenus *Plesiobrachypoda*

Subgenus *Hexaxonopsis* s.s.

(Figs. 1159, 1270-1272)

DIAGNOSIS: Male fourth leg not modified.

HABITAT: Streams, standing waters.

DISTRIBUTION: Many species described from the Oriental, Afrotropical and Nearctic regions. A few species known from Europe, China and Japan.

Subgenus *Plesiobrachypoda* K. Viets, 1942

(Figs. 1273-1275) hier alleen 1274, 1275

1942 *Plesiobrachypoda* K. Viets, Zoologischer Anzeiger 138: 212 – I.M. Smith et al. (2015).

Type species: *Axonopsis claviger* Walter, 1922

DIAGNOSIS: (Male only) In one species only Cx-I with recurved hook-like projections (Fig. 1274). P2 with (Fig. 1275) or without a large anteroventrral extension. IV-leg-5 of male expanded and bearing numerous thickened setae (Fig. 1273).

HABITAT: Streams.

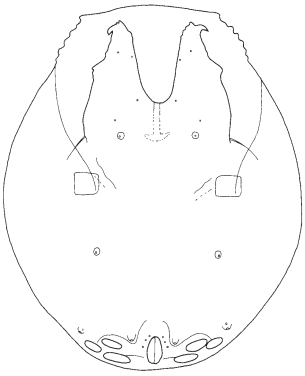
DISTRIBUTION: Three species known from Sudan and Namibia (Smit 2017a), India (Pešić & Ranga Reddy 2009) and Thailand (Smit 2016a).

Genus *Javalbia* K. Viets, 1935

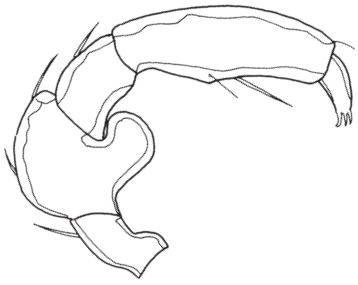
(Figs. 1188, 1191, 1276-1288)

1935 *Javalbia* K. Viets, Archiv für Hydrobiologie, Supplement 13: 674.

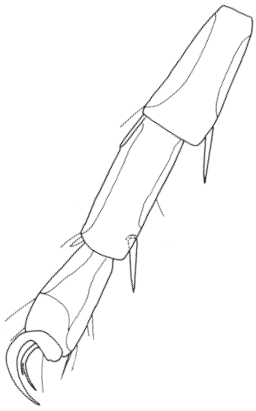
1974 *Iberaxonopsalbia* Cook, Memoirs of the American Entomological Institute 21: 317 – Gerecke (1991).



1274



1275



1276

1274 *Hexaxonopsis* (*Plesiobrachypoda*) *monouncata* Smit, venter male (after Smit 2016a)

1275 *Hexaxonopsis* (*Plesiobrachypoda*) *monouncata* Smit, palp male (after Smit 2016a)

1276 *Javalbia* (*Megapes*) *uncinata* Smit & Pešić, IV-leg-4-6 male (after Smit & Pešić 2014b)

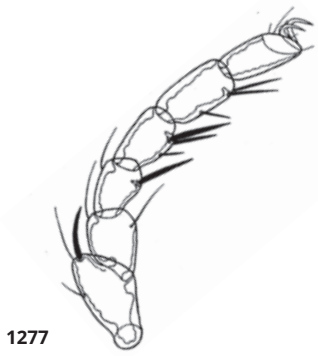
1974 *Javalbicula* K.O. Viets & Böttger, Acarologia 16: 296 – Smit (2016a).

Type species: *Javalbia elliptica* K. Viets, 1935

DIAGNOSIS: Dorsal and ventral shields completely separated, no cauda development in males. Dorsal furrow with small to long glandularia platelets with several glandularia (Figs. 1191, 1278) and occasionally fused to dorsal shield. Coxae not extending to frontal idiosoma margin, suture lines of Cx-IV obliterated (Figs. 1188, 1280). Anterior end of ventral shield without separate platelet. Genital field with three or four pairs of acetabula, in males fused with ventral shield (Fig. 1188), in females separated (Fig. 1280). Gonopore of male ranging in size from relatively small to relatively large. Suture lines of genital plates indistinct or absent. Excretory pore on a small platelet, either posterior to genital field or fused with the dorsal shield. Legs with or without a pronounced sexual dimorphism. (In the subgenus *Megapes* male fourth leg very stout, the female of this subgenus is unknown).

KEY TO THE SUBGENERA

1	Fourth leg of males very strong, with asymmetrical claws (female undescribed)(Fig. 1276)	Subgenus *Megapes*
-	Fourth leg of males not modified (Fig. 1277)	2
2	Excretory pore platelet fused with dorsal shield (Fig. 1278)	Subgenus *Javalbiopsis*
-	Excretory pore platelet posterior to genital field, free (Fig. 1279)	Subgenus *Javalbia*



1277



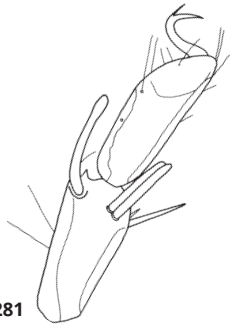
1278



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1280



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1277 *Javalbia* (*Javalbiopsis*) *africana* Cook, fourth leg male (after Cook 1974)

1278 *Javalbia* (*Javalbiopsis*) *africana* Cook, dorsum male (after Cook 1974)

1279 *Javalbia* (*Javalbia*) *antama* Cook, dorsum male (after Cook 1974)

1280 *Javalbia* (*Javalbia*) *antama* Cook, venter female (after Cook 1974)

1281 *Javalbia* (*Javalbia*) *lineata* Smit, IV-leg-5-6 male (after Smit 2016a)

1282 *Javalbia* (*Javalbia*) *bella* Cook, genital field male (after Cook 1974)

Subgenus *Javalbia* s.s.

(Figs. 1188, 1191, 1279-1284)

DIAGNOSIS: Glandularia platelets in dorsal furrow either small or large. Excretory pore lying on a small platelet posterior to genital field. Legs usually without sexual dimorphism, but in *J. lineata* Smit, 2016 from Malaysia IV-leg-4 of male with a large, curved seta (Fig. 1281).

HABITAT: Streams.

DISTRIBUTION: Several species known from SE-Asia (India, Cook 1967; Malaysia, Wiles 1991, Smit 2016a; Borneo, Smit & Pešić, 2014b; Thailand, Smit 2016a; Vietnam, Pešić & Smit 2016), one from Congo (K.O. Viets & Böttger 1974b), one from West-Africa (Ghana, Smit 2016b), one from Turkey (Esen et al. 2011) and two species from Europe (Spain, Cook 1974; Sicily, Italy, Gerecke 1991a; Corsica, France, Gerecke & Di Sabatino 2013).

Subgenus *Javalbiopsis* Cook, 1967

(Figs. 1277, 1278)

1967 *Javalbiopsis* Cook, Memoirs of the American Entomological Institute 9: 143.

Type species: *Javalbia africana* Cook, 1966

DIAGNOSIS: Glandularia platelets in dorsal furrow either small or large. Excretory pore fused with the dorsal shield in both sexes (Fig. 1278). Postgenital sclerite fused with dorsal shield in the female.

HABITAT: Streams.

DISTRIBUTION: Several species known from SE Asia (Borneo. Smit & Pešić 2014b; Thailand, Smit 2016a), Iran (Pešić et al. 2012c) and two species from the Afrotropical region (Liberia, Cook 1966; Ghana, Smit 2016b).

Subgenus *Megapes* Smit & Pešić, 2014

(Fig. 1276, 1286-1288)

2014 *Megapes* Smit & Pešić, Zootaxa 3876: 47.

Type species: *Javalbia uncinata* Smit & Pešić, 2014

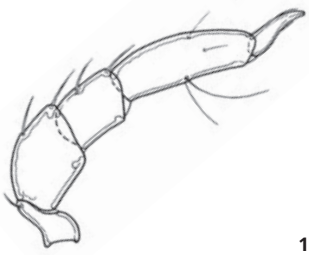
DIAGNOSIS: Male with very strong fourth legs with asymmetrical claws, one very stout, the other slender (Fig. 1276). Dorsal margins of II-leg-4 (Fig. 1286) and III-leg-4-5 with numerous small setae. Excretory pore fused with dorsal shield (Fig. 1287).

HABITAT: Streams.

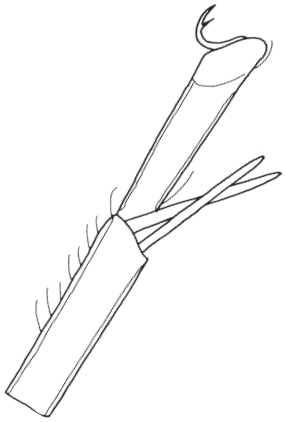
DISTRIBUTION: One species known from Borneo, Malaysia.



1283



1284



1286

1283 *Javalbia* (*Javalbia*) *bella* Cook, genital field female (after Cook 1974)

1284 *Javalbia* (*Javalbia*) *bella* Cook, palp female (after Cook 1974)

1286 *Javalbia* (*Megapes*) *uncinata* Smit & Pešić, II-leg-4-6 male (after Smit & Pešić 2014b)

Genus *Javalbiella* Cook, 1966

(Figs. 1195, 1196, 1289, 1290)

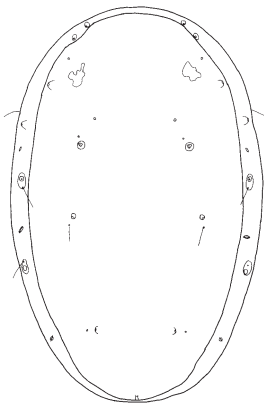
1966 *Javalbiella* Cook, Memoirs of the American Entomological Institute 6: 182.

Type species: *Javalbiella suehnensis* Cook, 1966

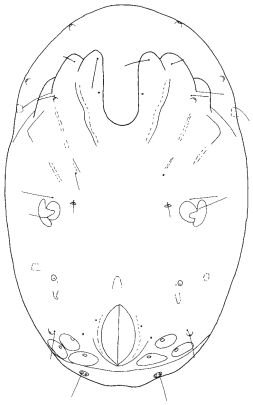
DIAGNOSIS: (Male unknown) Dorsal furrow with somewhat enlarged glandularia platelets (Fig. 1289). Coxae extending beyond frontal idiosoma margin, tips of Cx-I bluntly pointed, tips of Cx-II and Cx-III more or less sharp-pointed (Fig. 1196). Postgenital sclerite and excretory pore fused with dorsal shield. Genital field with three pairs of acetabula. Palp relatively stocky, tip of P5 bifid (Fig. 1195). Proximal segments of first leg without long ventral setae, I-leg-4 and -5 have somewhat thickened distoventral setae (Fig. 1290).

HABITAT: Streams.

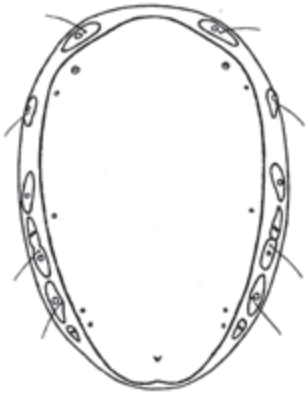
DISTRIBUTION: One species known from Liberia.



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1289



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1292

1287 *Javalbia* (*Megapes*) *uncinata* Smit & Pešić, dorsum male (after Smit & Pešić 2014b)

1288 *Javalbia* (*Megapes*) *uncinata* Smit & Pešić, venter male (after Smit & Pešić 2014b)

1289 *Javalbiella suehnensis* Cook, dorsum female (after Cook 1974)

1290 *Javalbiella suehnensis* Cook, first leg female (after Cook 1974)

1291 *Kedacarus platypes* Cook, gnathosoma + palp male (after Cook 1974)

1292 *Kedacarus platypes* Cook, venter male (after Cook 1974)

Genus *Khedacarus* Cook, 1967

(Figs. 1127, 1291-1294)

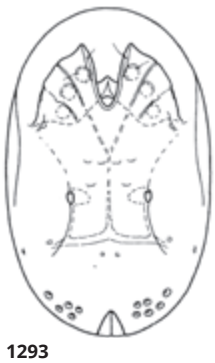
1967 *Khedacarus* Cook, Memoirs of the American Entomological Institute 9: 151.

Type species: *Khedacarus platypes* Cook, 1967

DIAGNOSIS: Lateral eyes absent. Dorsal shield entire bearing the excretory pore. Anterior end of gnathosoma widened and flattened (Fig. 1291). Medial suture line of Cx-IV well developed, posterior suture line of Cx-IV distinct. A ridge on both sides extending anteriorly and posteriorly from insertions of fourth legs. Insertions of fourth legs relatively close together. Genital field fused with ventral shield without suture lines, with 5-7 pairs of acetabula. Male gonopore subterminal (Fig. 1292), female gonopore terminal (Fig. 1293). P2 with a sharp-pointed ventral projection. P2 with a large, pointed ventral extension, P4 without heavy setae (Fig. 1291). Legs without swimming setae. Leg segments short and expanded and laterally compressed, especially fourth legs (Fig. 1294). IV-leg-2 of male with prominent dorsal setae which arise from large setal bases (Fig. 1127).

HABITAT: Interstitial.

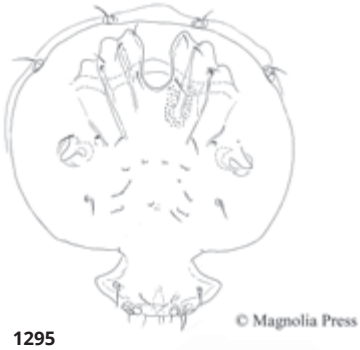
DISTRIBUTION: One species known from Maharashtra State, India.



1293



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1293 *Kedacarus platypes* Cook, venter female (after Cook 1974)

1294 *Kedacarus platypes* Cook, fourth leg female (after Cook 1974)

1295 *Lagoenaxonopsalbia comorosensis* Pešić & Smit, venter male (after Pešić & Smit 2018b) Reproduced with permission from copyright holder

1296 *Lagoenaxonopsalbia comorosensis* Pešić & Smit, genital field male (after Pešić & Smit 2018b) Reproduced with permission from copyright holder

1297 *Lagoenaxonopsalbia comorosensis* Pešić & Smit, venter female (after Pešić & Smit 2018b) Reproduced with permission from copyright holder

1298 *Lagoenaxonopsalbia comorosensis* Pešić & Smit, gnathosoma + palp male (after Pešić & Smit 2018b) Reproduced with permission from copyright holder

Genus *Lagoenaxonopsalbia* Pešić & Smit, 2018

(Figs. 1186, 1194, 1199, 1295-1298)

2018 *Lagoenaxonopsalbia* Pešić & Smit, Zootaxa 4483: 339.

Type species: *Lagoenaxonopsalbia comorosensis* Pešić & Smit, 2018

DIAGNOSIS: Dorsal and ventral shields fused posteriorly; lateroglandularia fused with dorsal shield. No glandularia in the dorsal furrow. Posterior end of male dorsal shield modified, forming a well-developed axe-shaped cauda (Fig. 1194). Tips of Cx-I not extending to frontal idiosoma margin. Two pairs of glandular platelets located near the anterior margin of ventral shield. Cx-IV with two pairs of glandularia, one located immediately medial, the other posterior to IV-L-insertions. Projections associated with IV-L-insertions relatively long and bluntly pointed. No ridge present anterolaterally from insertions of fourth legs (Figs. 1295, 1297). Genital field with three pairs of acetabula (Figs. 1199, 1296). Excretory pore of male on a separate plate lying on the caudal portion of the dorsal shield, more elevated in the centre, almost circular in lateral view, with paired groups of long setae flanking the excretory pore and paired glandularia associated with humps. Female excretory pore lying at extreme end of dorsal shield. Genital plates and postgenital sclerite of female fused with the dorsal shield; a pair of glandularia near the anterior margins of the acetabula-bearing genital plates fused to the ventral shield.

HABITAT: Streams.

DISTRIBUTION: One species known from Mayotte (Comoros).

Genus *Ljania* Thor, 1898

(Figs. 1129, 1299-1302)

1898 *Ljania* Thor, Nyt Magazin for Naturvidenskaberne 20: 3.

Type species: *Ljania bipapillata* Thor, 1898



1299 **1300** **1301**

1299 *Ljania michiganensis* Cook, dorsum female (after Cook 1974)

1300 *Ljania michiganensis* Cook, venter male (after Cook 1974)

1301 *Ljania michiganensis* Cook, palp male (after Cook 1974)

DIAGNOSIS: Idiosoma with complete dorsal and ventral shields. Dorsal furrow with one pair of glandularia located in an indentation of the dorsal shield (Fig. 1299). Ventral shield with a ridge extending anterolaterally from insertions of fourth leg, the latter not associated with projections. Posterior suture lines of Cx-IV well developed, posteromedially characteristically indented at the level of a pair of glandularia. Genital field with three pairs of acetabula, genital plates lying separate in females (Fig. 1129), but fused to ventral shield in males (Fig. 1300). Palp without projections or stout ventral setae (Fig. 1301). Legs without swimming setae and without sexual dimorphism. First leg (Fig. 1302) distinctly longer than second leg. Excretory pore on a separate platelet posterior to genital field.

HABITAT: Streams, springs.

DISTRIBUTION: Several species known from the Holarctic (Siberia, Tuzovskij 2012a) and Oriental regions (South Korea, Kim & Chung 1996; Borneo, Smit & Pešić 2014b).

Genus *Miraxona* Lundblad, 1936

(Figs. 1118, 1125, 1303-1310)

1936 *Miraxona* Lundblad, Zoologischer Anzeiger 115: 38.

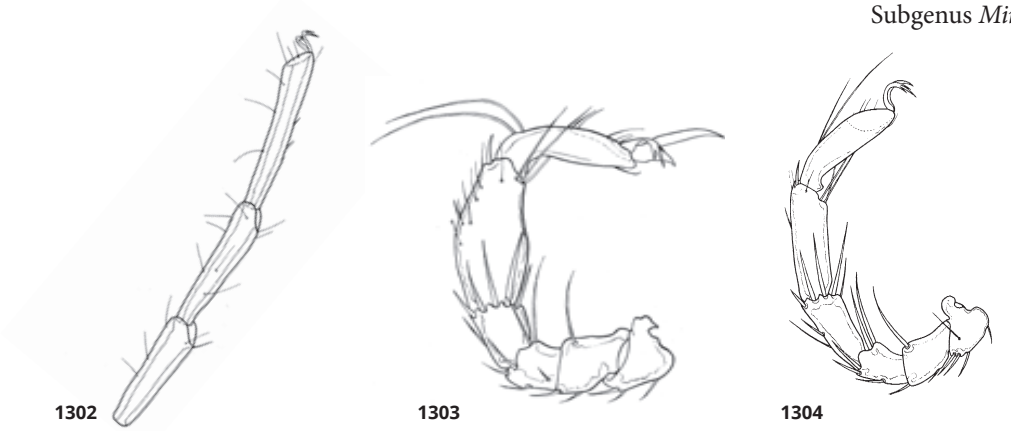
Type species: *Miraxona clavipes* Lundblad, 1936

DIAGNOSIS: Dorsal shield with a pair of posteriorly located glandularia tubercles (Fig. 1305). Genital field with five or more pairs of acetabula. Male: Gnathosoma either lightly fused posteriorly or lying free. Posterior suture lines of Cx-IV extending anteriorly as far as a pair of U-shaped loops which terminate in a pair of glandularia (Figs. 1118, 1306, 1310). Gonopore lying in the middle of venter and with a genital pit located slightly anterior to the gonopore. Second leg with (Fig. 1303) or without (Fig. 1304) sexual dimorphism. IV-leg-4 with an anteroventral extension with a large seta (Fig. 1309). Female: Cx-I may or may not (Fig. 1125) extend slightly beyond frontal idiosoma margin. A distinct concavity may or may not be present lying posteriorly to excretory pore, the latter fused with the dorsal shield.

KEY TO THE SUBGENERA (FEMALES NOT DISTINGUISHABLE AT SUBGENUS LEVEL)

1 Second leg of male with a pronounced sexual dimorphism (Fig. 1303) Subgenus *Miraxona*

\- Second leg of male without a pronounced sexual dimorphism (Fig. 1304) Subgenus *Miraxonella*



1302 **1303** **1304**

1302 *Ljania michiganensis* Cook, I-leg-4-6 male (after Cook 1974)

1303 *Miraxona* (*Miraxona*) *clavipes* Lundblad, second leg male (after Cook 1974)

1304 *Miraxona* (*Miraxonella*) *complicata* Lundblad, second leg male (after Lundblad 1943)

Subgenus *Miraxona* s.s.

(Figs. 1118, 1125, 1303, 1305-1309)

DIAGNOSIS: Distal segments and claws of second leg exhibiting a pronounced sexual dimorphism: II-leg-5 enlarged, II-leg-6 either long and slightly bowed or very short, with two long dorsal setae; claw of II-leg-6 very large (Figs. 1303, 1308).

HABITAT: Streams.

DISTRIBUTION: One species known from Brazil and two species known from Mexico (Cook 1980).

Subgenus *Miraxonella* Lundblad, 1936

(Figs. 1304, 1310)

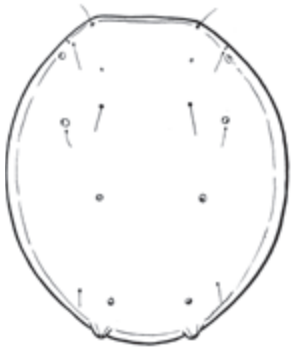
1936 *Miraxonella* Lundblad, Zoologischer Anzeiger 115: 39.

Type species: *Miraxona complicata* Lundblad, 1936

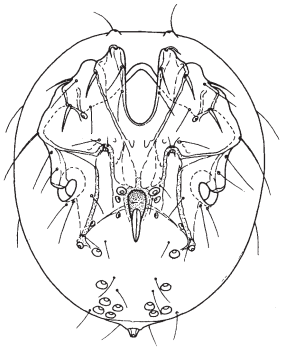
DIAGNOSIS: Second leg of male without sexual dimorphism (Fig. 1304).

HABITAT: Streams.

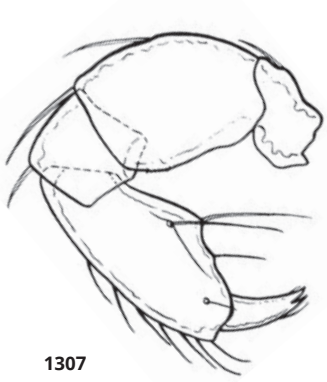
DISTRIBUTION: One species known from Brazil.



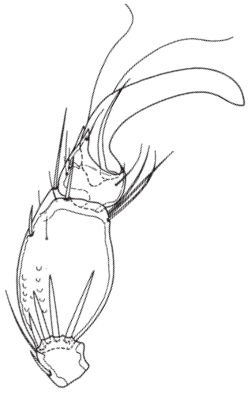
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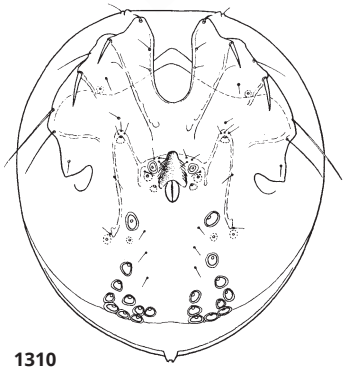
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1305 *Miraxona* (*Miraxona*) *clavipes* Lundblad, dorsum male (after Cook 1974)

1306 *Miraxona* (*Miraxona*) *mexicana* Cook, venter male (after Cook 1980)

1307 *Miraxona* (*Miraxona*) *clavipes* Lundblad, palp male (after Cook 1974)

1308 *Miraxona* (*Miraxona*) *expansipes* Cook, II-leg-4-6 male (after Cook 1980)

1309 *Miraxona* (*Miraxona*) *clavipes* Lundblad, fourth leg male (after Cook 1974)

1310 *Miraxona* (*Miraxonella*) *complicata* Lundblad, venter male (after Lundblad 1943)

Genus *Miraxonides* Lundblad, 1938

(Figs. 1115, 1124, 1311-1321)

1938 *Miraxonides* Lundblad, Zoologischer Anzeiger 122: 42.

Type species: *Miraxonides alatus* Lundblad, 1938

DIAGNOSIS: Dorsal shield with 6-7 pairs of glandularia (Fig. 1318). Coxae not extending to frontal idiosoma margin. Genital field with four pairs of acetabula. Males: Posterior suture lines of Cx-IV with (Fig. 1313) or without (Fig. 1311) an anteriorly extending pair of U-shaped loops which terminate in a pair of glandularia. Genital field without a deep pit, lying near posterior margin of ventral shield. IV-leg-4 with an anteroventral projection with (Fig. 1315) or without (Fig. 1316) a blunt seta. Females: Dorsal shield without enlarged glandularia tubercles. Posterior suture lines of Cx-IV not extending anteriorly as a pair of U-shaped loops. Projections associated with insertions of fourth legs rounded (Fig. 1314) or sharply pointed (Fig. 1317). Legs with swimming setae.



1311



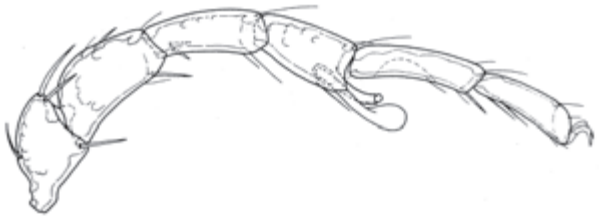
1312



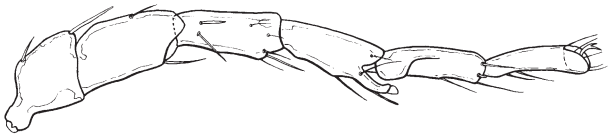
1313



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1311 *Miraxonides* (*Eomiraxonides*) *primitivus* Cook, venter male (after Cook 1988)

1312 *Miraxonides* (*Eomiraxonides*) *primitivus* Cook, venter female (after Cook 1988)

1313 *Miraxonides* (*Miraxonidella*) *karlvietsi* Cook, venter male (after Cook 1980)

1314 *Miraxonides* (*Miraxonidella*) *karlvietsi* Cook, venter female (after Cook 1980)

1315 *Miraxonides* (*Miraxonidella*) *karlvietsi* Cook, fourth leg male (after Cook 1980)

1316 *Miraxonides* (*Miraxonides*) *alatus* Lundblad, fourth leg male (after Cook 1974)

KEY TO THE SUBGENERA

1 Males without U-shaped loops of the posterior margin of Cx-IV (Fig. 1311); females with sharp pointed projections associated with insertions of fourth legs (Fig. 1312)
Subgenus *Eomiraxonides*

- Males with U-shaped loops of the posterior margin of Cx-IV Fig. 1313); females with rounded or pointed projections associated with insertions of fourth legs (Fig. 1314) 2

2 Male with a greatly enlarged seta on ventral margin of IV-leg-4 (Fig. 1315); female with narrow, somewhat rounded projections associated with insertions of fourth legs (Fig. 1314)
Subgenus *Miraxonidella*

- Male without a greatly enlarged seta on ventral side of IV-leg-4 (Fig.1316); female with pointed projections associated with insertions of fourth legs (Fig. 1317)
Subgenus *Miraxonides* s.s.

Subgenus *Miraxonides* s.s.

(Figs. 1115, 1316-1319)

DIAGNOSIS: Males with U-shaped loops of the posterior margin of Cx-IV (Fig. 1115). IV-leg-4 without large ventral seta (Fig. 1316). Females with pointed projections associated with insertions of fourth legs (Fig. 1317).

HABITAT: Standing waters (ponds), streams.

DISTRIBUTION: One species known from Brazil.

Subgenus *Eomiraxonides* Cook, 1988

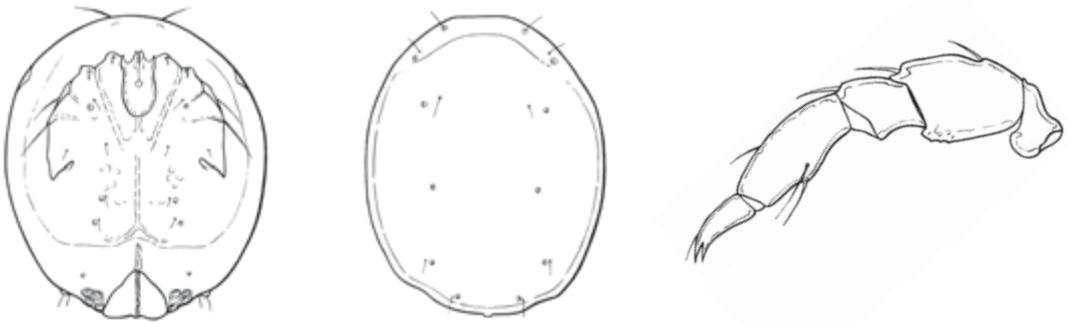
(Figs. 1311, 1312, 1320, 1321)

1988 *Eomiraxonides* Cook, Memoirs of the American Entomological Institute 42: 168.
Type species: *Miraxonides primitivus* Cook, 1988

DIAGNOSIS: Males without U-shaped loops of the posterior margin of Cx-IV (Fig. 1311). IV-leg-4 with large ventral seta (Fig. 1321). Females with pointed projections associated with insertions of fourth legs (Fig. 1312).

HABITAT: Streams.

DISTRIBUTION: One species known from Chile.



1317 **1318** **1319**

1317 *Miraxonides* (*Miraxonides*) *alatus* Lundblad, venter female (after Cook 1974)

1318 *Miraxonides* (*Miraxonides*) *alatus* Lundblad, dorsum male (after Cook 1974)

1319 *Miraxonides* (*Miraxonides*) *alatus* Lundblad, palp male (after Cook 1974)

Subgenus *Miraxonidella* Cook, 1980

(Figs. 1124, 1313-1315)

1980 *Miraxonidella* Cook, Memoirs of the American Entomological Institute 31: 267.

Type species: *Miraxonides karlvietsi* Cook, 1980

DIAGNOSIS: Males with U-shaped loops of the posterior margin of Cx-IV (Fig. 1313). IV-leg-4 with a large ventral seta (Fig. 1315). Females with rounded projections associated with insertions of fourth legs (Fig. 1314).

HABITAT: Streams.

DISTRIBUTION: Two species known, one from Argentina (Cook 1980) and one from Mexico (Cook 1980).

Genus *Neoalbia* Lundblad, 1936

(Figs. 1122, 1322-1325)

1936 *Neoalbia* Lundblad, Zoologischer Anzeiger 116: 23.

Type species: *Neoalbia violacea* Lundblad, 1936

DIAGNOSIS: (Female only) Dorsal shield with a pair of enlarged glandularia on posterolateral portion (Fig. 1323). Coxae extending well beyond frontal idiosoma margin. Medial coxal suture lines indistinct or absent. Genital field with six (Fig. 1122) or eight (Fig. 1322) pairs of acetabula.



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1320 *Miraxonides* (*Eomiraxonides*) *primitivus* Cook, palp female (after Cook 1988)

1321 *Miraxonides* (*Eomiraxonides*) *primitivus* Cook, IV-leg-4-5 male (after Cook 1988)

1322 *Neoalbia* (*Neoalbiella*) *octopora* K. Viets, venter female (after Cook 1974)

1323 *Neoalbia* (*Neoalbia*) *violacea* Lundblad, dorsum female (after Cook 1974)

1324 *Neoalbia* (*Neoalbia*) *violacea* Lundblad, palp female (after Cook 1974)

1325 *Neoalbia* (*Neoalbiella*) *octopora* K. Viets, dorsum female (after Cook 1974)

KEY TO THE SUBGENERA

1 Genital field with six pairs of acetabula; glandularia of Cx-IV located posteromedial to the insertions of fourth legs (Fig. 1122) Subgenus *Neoalbia*

- Genital field with eight pairs of acetabula; glandularia of Cx-IV slightly anteromedial to the insertions of fourth legs (Fig. 1322) Subgenus *Neoalbiella*

Subgenus *Neoalbia* s.s.

(Figs. 1122, 1323, 1324)

DIAGNOSIS: (Female only) Genital field with six pairs of acetabula; glandularia of Cx-IV located posteromedial to the insertions of fourth legs (Fig. 1122).

HABITAT: Streams

DISTRIBUTION: One species known from Brazil.

Subgenus *Neoalbiella* K. Viets, 1954

(Figs. 1322, 1325)

1954 *Neoalbiella* K. Viets, Schweizerische Zeitschrift für Hydrologie 16: 145.

Type species: *Neoalbia octopora* K. Viets, 1954

DIAGNOSIS: (Female only) Genital field with eight pairs of acetabula; glandularia of Cx-IV slightly anteromedial to the insertions of fourth legs. Coxal setae heavier than in the nominate subspecies (Fig. 1322).

HABITAT: Streams.

DISTRIBUTION: Two species known from the Amazon region of Brazil (K. Viets 1959a).

Genus *Neoaxona* Lundblad, 1936

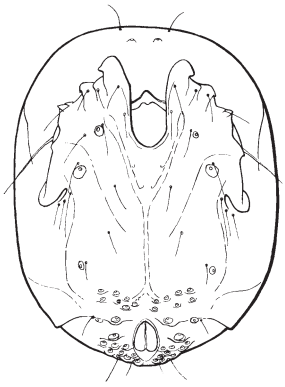
(Figs. 1087, 1111, 1112, 1326-1334)

1936 *Neoaxona* Lundblad, Zoologischer Anzeiger 115: 40.

Type species: *Neoaxona oblonga* Lundblad, 1936



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1326 *Neoaxona* (*Lamellaxona*) *abnormipes* Lundblad, second leg male (after Cook 1974)

1327 *Neoaxona* (*Lamellaxona*) *abnormipes* Lundblad, venter male (after Cook 1974)

1328 *Neoaxona* (*Neoaxona*) *oblonga* Lundblad, venter male (after Cook 1974)

DIAGNOSIS: Dorsal and ventral shield completely separated in both sexes; dorsal shield with a series of longitudinal ridges (Fig. 1331). Excretory pore platelet fused with dorsal shield. Tips of Cx-I drawn out into recurved, pointed processes. Cx-IV with large pointed, or somewhat rounded projections covering the insertions of the fourth legs (Figs. 1087, 1327, 1332). Genital field with numerous acetabula, these flanking, or extending anteriorly, to gonopore. Genital plates fused with ventral shield without visible suture lines. Genital field terminal or subterminal. P3 with a heavy ventral seta in males (Figs. 1112, 1333), but not in females (Figs. 1329, 1334). Second (Fig. 1326) or fourth leg (Fig. 1330) exhibiting sexual dimorphism.

KEY TO THE SUBGENERA

1 II-leg-6 greatly expanded (Fig. 1326); projections associated with insertions of fourth legs more or less rounded in both sexes (Fig. 1327) Subgenus *Lamellaxona*

- II-leg-6 not greatly expanded; projections associated with insertions of fourth legs more or less pointed in both sexes (Fig. 1328) Subgenus *Neoaxona* s.s.

Subgenus *Neoaxona* s.s.

(Figs. 1087, 1111, 1112, 1328-1330)

DIAGNOSIS: II-leg-6 of male not greatly enlarged, male IV-leg-6 slightly enlarged and shortened (Fig. 1330). Heavy seta of P3 of male not on a projection (Fig. 1112). Projections associated with insertions of fourth legs more or less pointed in both sexes (Figs. 1111, 1328).

HABITAT: Streams.

DISTRIBUTION: Three species known from South America (Brazil, Surinam, Paraguay).

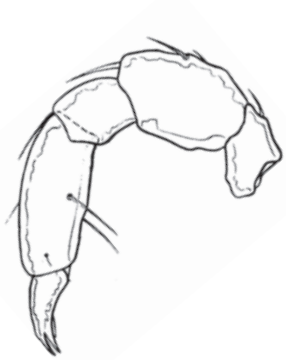
Subgenus *Lamellaxona* Lundblad, 1937

(Figs. 1326, 1327, 1331-1334)

1937 *Lamellaxona* Lundblad, Zoologischer Anzeiger 118: 261.

Type species: *Neoaxona abnormipes* Lundblad, 1937

DIAGNOSIS: II-leg-6 of male greatly enlarged (Fig. 1326), male IV-leg-6 leg relatively unmodified. Heavy seta of P3 of male on a large tubercle (Fig. 1333). Projections associated with openings of fourth legs more or less rounded in both sexes (Figs. 1327, 1332).



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1329 *Neoaxona* (*Neoaxona*) *oblonga* Lundblad, palp female (after Cook 1974)

1330 *Neoaxona* (*Neoaxona*) *oblonga* Lundblad, IV-leg-5-6 male (after Cook 1974)

1331 *Neoaxona* (*Lamellaxona*) *abnormipes* Lundblad, dorsum female (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: One species known from southern Brazil, and one species from Mexico possibly belonging to this subgenus (Cook 1980).

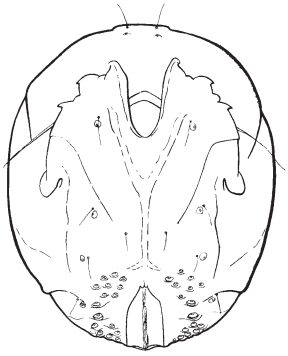
Genus *Neoaxonopsalbia* Cook, 1966

(Figs. 1178, 1185, 1335-1343)

1966 *Neoaxonopsalbia* Cook, Memoirs of the American Entomological Institute 6: 186.

Type species: *Neoaxonopsalbia mitchelli* Cook, 1966

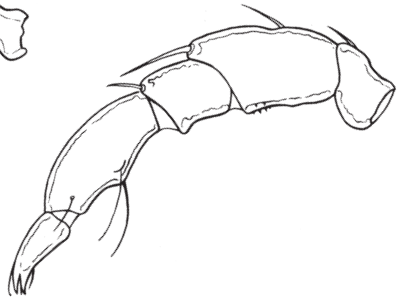
DIAGNOSIS: Dorsal and ventral shields separated. Posterior end of dorsum may be pointed (Fig. 1339, 1342), but no distinct cauda development. Coxae not extending to frontal idiosoma margin. Anterior end of ventral shield entire. Genital field with three pairs of acetabula. Excretory pore lying near posterior end of dorsal shield. Male: Gonopore relatively large and subterminal (Fig. 1337). Dorsal margin of IV-leg-4 with numerous long setae, IV-leg-5 greatly enlarged (Figs. 1185, 1335, 1336). Female: Posterior end of dorsal shield either concave or convex. Genital plates separated or fused with the postgenital sclerite, the latter lying free in the integument (Fig. 1340).



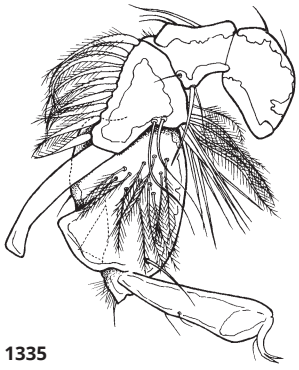
1332



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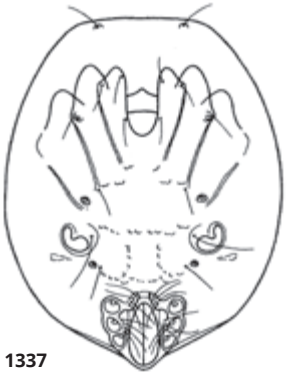
1334



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1332 *Neoaxona* (*Lamellaxona*) *abnormipes* Lundblad, venter female (after Cook 1974)

1333 *Neoaxona* (*Lamellaxona*) *abnormipes* Lundblad, palp male (after Cook 1974)

1334 *Neoaxona* (*Lamellaxona*) *plaumanni* Lundblad, palp female (after Cook 1974)

1335 *Neoaxonopsalbia* (*Lankaxonopsalbia*) *judithae* Gledhill, IV-leg-2-6 male (after Gledhill 1982)

1336 *Neoaxonopsalbia* (*Golaxonopsalbia*) *crassiseta* Cook, fourth leg male (after Cook 1974)

1337 *Neoaxonopsalbia* (*Golaxonopsalbia*) *crassiseta* Cook, venter male (after Cook 1974)

KEY TO THE SUBGENERA (FEMALES NOT DISTINGUISHABLE AT SUBGENUS LEVEL)

1 IV-leg-4 with 1-2 long curved setae on a dorsodistal extension (Fig. 1335) Subgenus *Lankaxonopsalbia*

- IV-leg-4 without long curved setae (Fig. 1336) 2

2 First two pairs of acetabula widely separated from posterior pair, acetabula not on raised genital plates (Fig. 1178) Subgenus *Neoaxonopsalbia*

- First two pairs of acetabula not separated from posterior pair, acetabula on raised genital plates (Fig. 1337) Subgenus *Golaxonopsalbia*

Subgenus *Neoaxonopsalbia* s.s.

(Figs. 1178, 1185, 1338-1342)

DIAGNOSIS: Males: Genital plates of male fused with ventral shield without visible suture lines, or with very indistinct suture lines. First two pairs of acetabula widely separated from posterior pair in males (Fig. 1178). Acetabula not on raised genital plates. Setae on dorsal side of IV-leg-4 either whip-like or blade-like. Dorso-ventral height of IV-leg-5 equal to or greater than the dorsal length (Fig. 1185).

HABITAT: Streams.

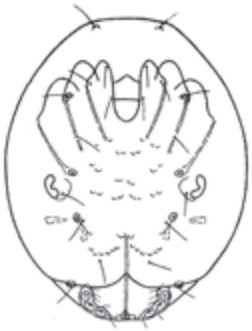
DISTRIBUTION: Three species known from Liberia (Cook 1966).



1338



1339



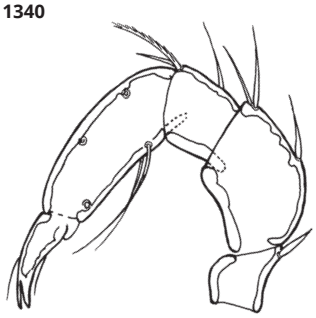
1340



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1338 *Neoaxonopsalbia* (*Neoaxonopsalbia*) *mitchelli* Cook, dorsum female (after Cook 1974)

1339 *Neoaxonopsalbia* (*Neoaxonopsalbia*) *expansa* Cook, dorsum female (after Cook 1974)

1340 *Neoaxonopsalbia* (*Neoaxonopsalbia*) *mitchelli* Cook, venter female (after Cook 1974)

1341 *Neoaxonopsalbia* (*Neoaxonopsalbia*) *longiseta* Cook, palp male (after Cook 1966)

1342 *Neoaxonopsalbia* (*Neoaxonopsalbia*) *longiseta* Cook, dorsum male (after Cook 1966)

1343 *Neoaxonopsalbia* (*Lankaxonopsalbia*) *judithae* Gledhill, palp male (after Gledhill 1982)

Subgenus *Golaxonopsalbia* Cook, 1966

(Figs. 1336, 1337)

1966 *Golaxonopsalbia* Cook, Memoirs of the American Entomological Institute 6: 190.

Type species: *Golaxonopsalbia crassiseta* Cook, 1966

DIAGNOSIS: Males: Genital plates of male fused with ventral shield with pronounced suture lines. Anterior two pairs of acetabula not separated from posterior pair (Fig. 1337). Acetabula on raised genital plates. Setae on dorsal side of IV-leg-4 blade-like (Fig. 1336).

HABITAT: Streams.

DISTRIBUTION: Two species known from Liberia, and one species from South Africa (Cook 1999).

Subgenus *Lankaxonopsalbia* Gledhill, 1982

(Figs. 1335, 1343)

1982 *Lankaxonopsalbia* Gledhill, Archiv für Hydrobiologie 94: 126.

Type species: *Neoaxonopsalbia judithae* Gledhill, 1982

DIAGNOSIS: Males: Genital plates of male fused with ventral shield with indistinct or distinct suture lines. Anterior two pairs of acetabula only slightly separated from posterior pair. Acetabula not on raised genital plates. Dorsodistal extension of IV-leg-4 bearing one or two long modified setae (Fig. 1335).

HABITAT: Streams.

DISTRIBUTION: Two species known, one from Sri Lanka (Gledhill & Wiles 1997) and one from South Africa (Cook 1999).

Genus *Neoaxonopsis* Lundblad, 1938

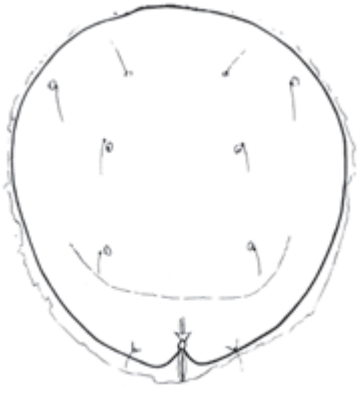
(Figs. 1109, 1110, 1344-1348)

1938 *Neoaxonopsis* Lundblad, Zoologischer Anzeiger 122: 38.

Type species: *Neoaxonopsis odontogaster* Lundblad, 1938



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1344 *Neoaxonopsis odontogaster* Lundblad, venter female (after Cook 1974)

1345 *Neoaxonopsis odontogaster* Lundblad, dorsum female (after Cook 1974)

1346 *Neoaxonopsis odontogaster* Lundblad, palp male (after Cook 1974)

DIAGNOSIS: Dorsal and ventral shields completely separated, dorsal shield without enlarged glandularia tubercles (Fig. 1345). Tips of Cx-I blunt and Cx-II pointed, both extending beyond frontal idiosoma margin. Cx-I of male with posteriorly-directed, bluntly-pointed projections. Cx-IV with moderate-sized bluntly-pointed projections which partially cover the openings of the fourth legs. A ridge present on each side extending anterolaterally from these projections of Cx-IV. Medial suture line of Cx-IV more or less obliterated (Fig. 1109). Genital field with three pairs of acetabula. Genital plates fused with the ventral shield in both sexes. Suture line of genital plates well-developed in male (Fig. 1109) but obliterated in female (Fig. 1344). Male gonopore small and located at anterior end of genital field, gonopore of female terminal in position and comparatively very wide. P2 with a well-developed ventral projection. P4 with a slightly developed ventral tubercle and two thickened associated setae (Figs. 1110, 1346). Male legs exhibiting a slight sexual dimorphism: II-leg-4 with a group of setae on medial side and II-leg-5 anteroventrally with a row of stout setae (Fig. 1347); IV-leg-4 with a row of slender setae and two stout setae on ventral margin, IV-leg-5 medially with a group of slender setae (Fig. 1348). Legs without true swimming setae, but a large number of thin setae are part of the sexual dimorphism of the male legs.

HABITAT: Streams.

DISTRIBUTION: One species known from southern Brazil.

Genus *Neobarbaxona* Cook, 1966

(Figs. 1108, 1349-1353)

1966 *Neobarbaxona* Cook, Memoirs of the American Entomological Institute 6: 192 – Cook (1974).

Type species: *Barbaxona liberiensis* Cook, 1966

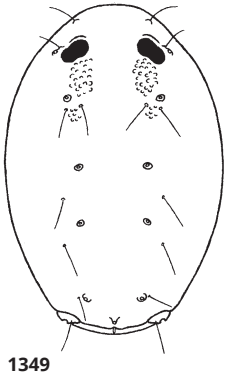
DIAGNOSIS: Dorsal and ventral shield fused posteriorly in male, no cauda development (Fig. 1350). Gnathosoma with enlarged posterior setae. Tips of Cx-I drawn out into recurved, hook-like projections (Fig. 1108). Cx-IV with sharp-pointed projections which partially cover the insertions of the fourth legs. Anterior portion of ventral shield with a separate semi-circular sclerite. A ridge on each side in male extending posteromedially from insertions of fourth legs; no setae associated with these ridges (Fig. 1351). Genital field with three pairs of acetabula. Genital plates fused with ventral shield without a visible suture line. Acetabula in female close to gonopore, but in male two pairs are lying lateral to gonopore and one pair has shifted dorsally and flanks the excretory pore. P2 ventrally with denticles (Fig. 1352). Male IV-leg-6 shortened and with two enlarged claws (Fig. 1353).



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1347 *Neoaxonopsis odontogaster* Lundblad, II-leg-3-6 male (after Lundblad 1943)

1348 *Neoaxonopsis odontogaster* Lundblad, IV-leg-4-6 male (after Lundblad 1943)

1349 *Neobarbaxona liberiensis* Cook, dorsum female (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: Two species known from West-Africa (Liberia, Cameroon).

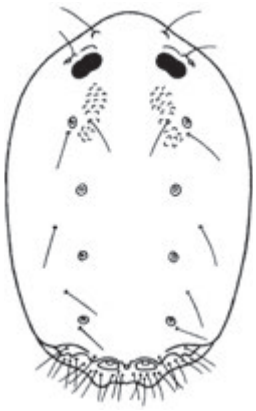
Genus *Neobrachypoda* Koenike, 1914

(Figs. 1138, 1140, 1147, 1354)

1914 *Neobrachypoda* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 22: 245.

Type species: *Axonopsis ekmani* Walter, 1911

DIAGNOSIS: Dorsal and ventral shields separated. Excretory pore on a very small separate platelet posterior to dorsal shield, flanking glandularia lying separate (Fig. 1138). Ventral shield on each side with a well-developed curved ridge extending anteriorly of insertions of fourth legs (Figs. 1147, 1354). Genital field with four pairs of acetabula on plates, which are separate in females but fused to ventral shield in males. Legs without sexual dimorphism. P2 with a pointed ventral projection, P4 with a heavy seta inserting on an obtuse triangular projection (Fig. 1140).



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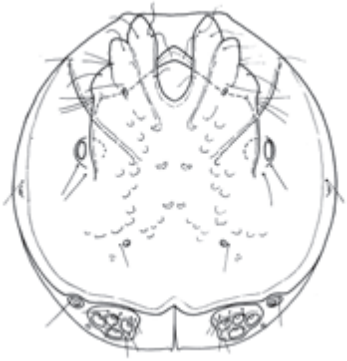
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1350 *Neobarbaxona liberiensis* Cook, dorsum male (after Cook 1974)

1351 *Neobarbaxona liberiensis* Cook, venter male (after Cook 1974)

1352 *Neobarbaxona liberiensis* Cook, palp female (after Cook 1974)

1353 *Neobarbaxona liberiensis* Cook, fourth leg male (after Cook 1974)

1354 *Neobrachypoda ekmani* (Walter), venter female (after Cook 1974)

1355 *Ocybrachypoda oakcreekensis* (Habeeb), venter female (after Cook 1974)

HABITAT: Standing waters of the upper montane and subalpine zones, preferably in deeper layers of large lakes.

DISTRIBUTION: One species known, with a circumpolar Holarctic distribution.

Genus *Ocybrachypoda* Cook, 1974

(Figs. 1146, 1154, 1155, 1355)

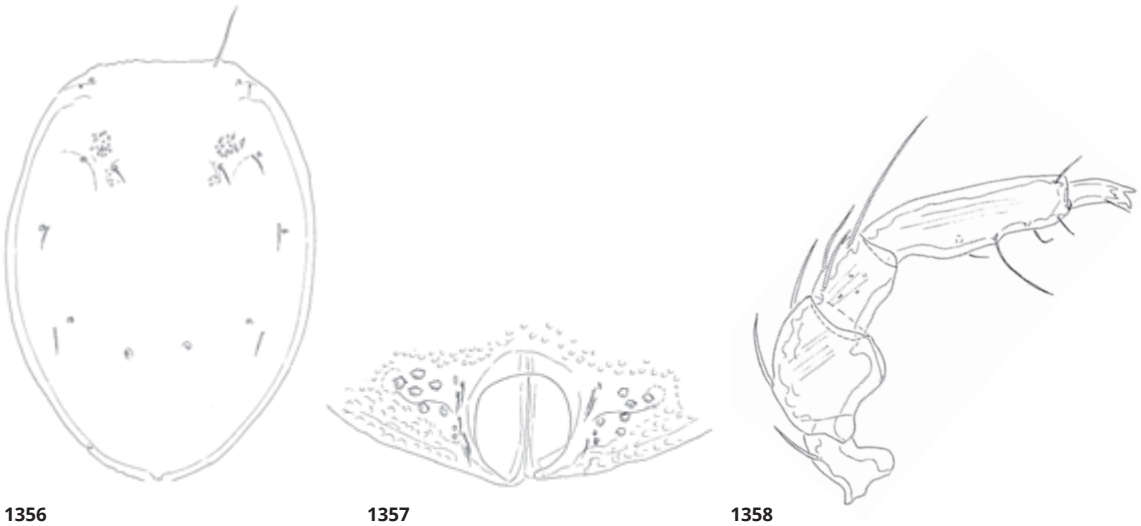
1974 *Ocybrachypoda* Cook, Memoirs of the American Entomological Institute 21: 340 – I.M. Smith et al. (2015).

Type species: *Brachypoda acuticaudata* Habeeb, 1953

DIAGNOSIS: Dorsal shield separate from ventral shield. Excretory pore on posterior edge of dorsal shield or on a small platelet posterior to dorsal shield. Fourth leg without associated ventral projections. Ventral shield with a curved ridge extending anterolaterally from insertions of fourth legs; no ridge extending posteriorly (Figs. 1155, 1355). Genital field with three pairs of acetabula. P2 with a long and pointed distoventral projection (Fig. 1155). Males: Dorsal shield without enlarged glandular setae and without a transverse ridge. Posterior margins of Cx-IV forming a transverse, laterally indistinct suture anterior to genital field. Genital field set off from posterior margin, acetabula in a transverse line or in a triangular arrangement. No ridge extending anterolaterally from genital field. A group of long setae lateral to the genital area (Fig. 1155). IV-leg-4 with a group of spatulate distoventral setae, but without a distal projection. IV-leg-5 slightly bowed, on posterior surface with a line of long setae. IV-leg-6 expanded, with strong modified claws (Fig. 1146). Females: Excretory pore separate from, or fused to, dorsal shield. Fourth legs unmodified.

HABITAT: Streams.

DISTRIBUTION: One species known from Europe, several species known from North America (Cook 1975, 1981b, Habeeb 1961), one from South Korea (Pešić & Semenchenko 2014) and one from Siberia (Pešić & Semenchenko 2014).



1356 **1357** **1358**

1356 *Omanaxonopsis arabica* Smit & Pešić, dorsum female (after Smit & Pešić 2010)

1357 *Omanaxonopsis arabica* Smit & Pešić, genital field female (after Smit & Pešić 2010)

1358 *Omanaxonopsis arabica* Smit & Pešić, palp female (after Smit & Pešić 2010)

Genus *Omanaxonopsis* Smit & Pešić, 2010

(Figs. 1137, 1356-1359)

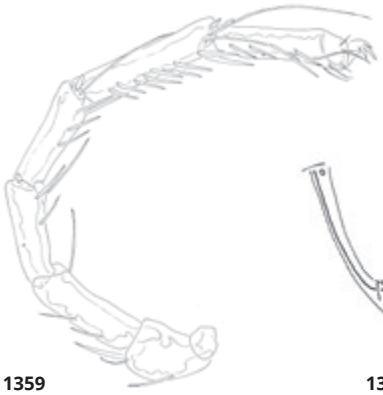
2010 *Omanaxonopsis* Smit & Pešić, Acarologia 50: 186.

Type species: *Omanaxonopsis arabica* Smit & Pešić, 2010

DIAGNOSIS: (Female only) Dorsal and ventral shield fused anteriorly; dorsal shield with four pairs of glandularia (Fig. 1356). Ventral shield without a ridge extending anterolaterally from insertions of fourth legs. Lateral margins of ventral shield with an irregular truncate projection on each side, located considerably posterior to insertions of fourth legs. Between the insertions of the fourth legs and the genital field one pair of glandularia. Genital field with 5-6 pairs of acetabula (Fig. 1137). Genital plates fused with ventral shield. P2 with an expanded distoventral margin (Fig. 1358). Leg claws with dorsal and ventral clawlets (Fig. 1359).

HABITAT: Springs.

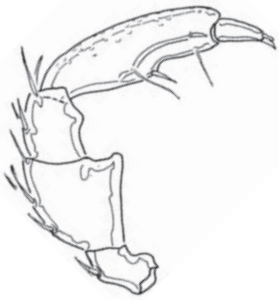
DISTRIBUTION: One species known from Oman.



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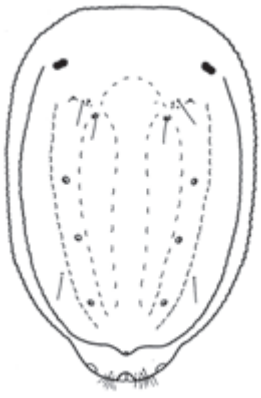
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1359 *Omanaxonopsis arabica* Smit & Pešić, fourth leg female (after Smit & Pešić 2010)

1360 *Parabrachypoda montii* (Maglio), genital field female (after Gerecke et al. 2016)

1361 *Parabrachypoda modesta* (Koenike), palp male (after Gerecke et al. 2016)

1362 *Parabrachypoda modesta* (Koenike), palp female (after Gerecke et al. 2016)

1363 *Parabrachypoda modesta* (Koenike), IV-leg-4-6 male (after Gerecke et al. 2016)

1364 *Paraxonopsis panduvarna* (Cook), dorsum male (after Cook 1974)

Genus *Parabrachypoda* K. Viets, 1929

(Figs. 1153, 1360-1363)

1926 *Brachypodella* K. Viets, Zoologischer Anzeiger 69: 195 (praeocc.).

1929 *Parabrachypoda* K. Viets, Zoologischer Anzeiger 69: 195 – I.M. Smith et al. (2015).

1937 *Hemibrachypoda* K. Viets, Zoologischer Anzeiger 120: 301 – I.M. Smith et al. (2015).

Type species: *Brachypoda montii* Maglio, 1924

DIAGNOSIS: Dorsal shield separate from ventral shield. A curved ridge anterolaterally from insertions of fourth legs, the latter without associated ventral projections (Fig. 1153). Genital field with 3-4 pairs of acetabula. P2 with a variously developed ventral projection. P4 with a heavy seta associated to a tubercle (Figs. 1361, 1362). Males: Dorsal shield without enlarged glandular setae and without a transversal ridge. Excretory pore at posterior margin of dorsal shield, flanked by a pair of glandularia. Posterior margin of Cx-IV anterior to genital field forming a transverse, laterally indistinct suture line. Genital field near posterior margin of ventral shield, acetabula in a triangular configuration; no group of long setae immediately lateral to genital field. IV-leg-4 with a strong distal projection bearing three relatively short, strong setae. IV-leg-5 slightly bowed, on posterior surface with a row of long setae. IV-leg-6 distally expanded, with highly modified claws (Fig. 1363). Females: Excretory platelet not fused to dorsal shield, fourth leg not modified.

HABITAT: Standing waters, streams.

DISTRIBUTION: Several species known from the Western Palaearctis (Italy, Di Sabatino & Cicolani 1990; Turkey, Esen et al. 2013c).

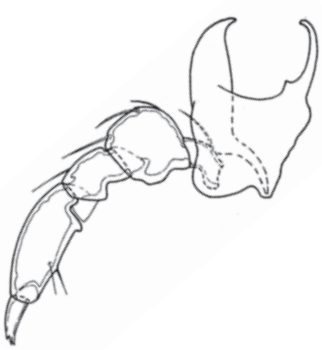
Genus *Paraxonopsis* Motaş & Tanasachi, 1947

(Figs. 1169, 1364-1367)

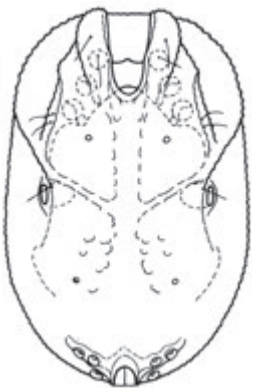
1947 *Paraxonopsis* Motaş & Tanasachi, Notatationes Biologicae, Bucharest 5: 39 - I.M. Smith et al. 2015).

Type species: *Axonopsis vietsi* Motaş & Tanasachi, 1947

DIAGNOSIS: Dorsal and ventral shield broadly fused at anterior margin, at posterior margin a cauda that bears the genital field and is more strongly developed in males. Dorsal shield with four pairs of glandularia, none of these flanking the excretory pore (Fig. 1364). Dorsal furrow without



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1365 *Paraxonopsis panduvarna* Cook, gnathosoma + palp male (after Cook 1974)

1366 *Paraxonopsis panduvarna* Cook, venter female (after Cook 1974)

1367 *Paraxonopsis separata* Smit, venter male (after Smit 2016a)

glandularia. Gnathosomal apodemes moderately long (Fig. 1365). Cx-I and Cx-II rather large, without hook-like projections. A curved ridge extending anterolaterally from insertions of fourth legs. Between insertions of fourth legs and genital field one pair of glandularia (Figs. 1169, 1366). Genital field with 3-4 pairs of acetabula, with indistinct suture lines, occasionally widely separated (Fig. 1367). Ventral margin of P4 with a slender seta and a stout seta (Fig. 1365), usually on a tubercle.

HABITAT: Streams.

DISTRIBUTION: Several species known from Europe (Italy, Gerecke & Di Sabatino 2013), the Afrotropical (Liberia, Cook 1966; Ghana, Smit 2016b), Oriental (India, Cook 1967; Oman, Smit & Pešić 2010; Malaysia, Smit 2016a; Borneo, Smit & Pešić 2014b) and Nearctic regions (North America, Cook 1974).

Genus *Polyaxonopsella* Lundblad, 1943

(Figs. 1126, 1368-1371)

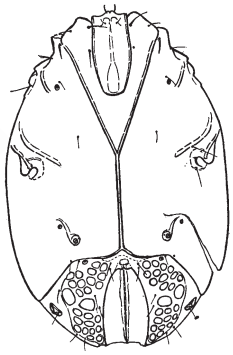
1943 *Polyaxonopsella* Lundblad, Kongliga Svenska vetenskaps-akademiens handlingar, (s. 3) 20: 75.
Type species: *Polyaxonopsella dentifera* Lundblad, 1943



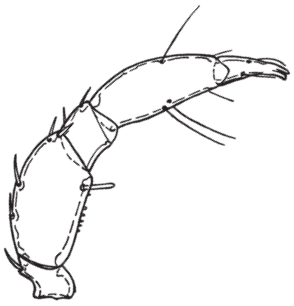
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1368 *Polyaxonopsella dentifera* Lundblad, dorsum female (after Cook 1974)
1369 *Polyaxonopsella dentifera* Lundblad, palp female (after Cook 1974)
1370 *Polyaxonopsella anomala* K.O. Viets, venter female (after K.O. Viets 1978c)
1371 *Polyaxonopsella anomala* K.O. Viets, palp female (after K.O. Viets 1978c)
1372 *Prymnopsella bucculata* Gerecke, dorsum male (after Gerecke 1991b)
1373 *Prymnopsella bucculata* Gerecke, venter female (after Gerecke 1991b)

DIAGNOSIS: (Female only) Dorsal and ventral shield separated. Dorsal shield without enlarged glandularia tubercles, posteriorly truncated (Fig. 1368). Dorsal furrow without glandularia. Excretory pore platelet fused to dorsal shield or located posterior to dorsal shield. Ventral shield with a Y-shaped median suture line (Fig. 1126). Coxae may or may not extend to frontal idiosoma margin. Genital field fused with ventral shield, with numerous acetabula (Fig. 1370). P2 anteroventrally with small denticles, and occasionally a stout setae present (Fig. 1371). P4 stocky without tubercles (Fig. 1369). Legs with a few swimming setae.

HABITAT: Streams, interstitial.

DISTRIBUTION: Four species known from Paraguay, Columbia, Guatemala (K.O. Viets 1978c) and Venezuela (Orghidan & Gruia 1981).

Genus *Prymnopsella* Gerecke, 1991

(Figs. 1172, 1173, 1372-1375)

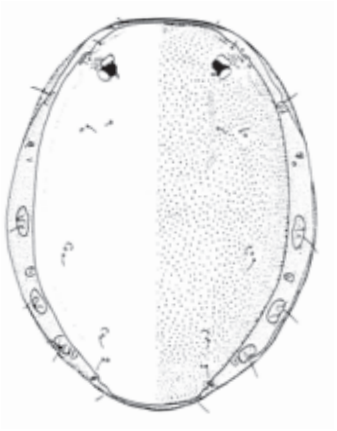
1991 *Prymnopsella* Gerecke, Aquatic Insects 13: 107.

Type species: *Prymnopsella bucculata* Gerecke, 1991

DIAGNOSIS: Dorsal and ventral shield separated. No ridge extending anterolaterally from insertions of fourth legs (Figs. 1173, 1373). Anterior coxae not extending to frontal idiosoma margin. Genital field with three pairs of acetabula. P4 slender, without tubercles (Fig. 1172). Male: Idiosoma posteriorly truncated, posterior margin indented (Fig. 1372). Excretory pore lying posterior to dorsal shield. Lateral to genital field two halfmoon-shaped ridges. Acetabula lying in a straight, longitudinal line. Female: Posterior idiosoma margin rounded (Fig. 1374). Excretory pore platelet fused with genital plates and postgenital sclerite (Fig. 1375).

HABITAT: Streams.

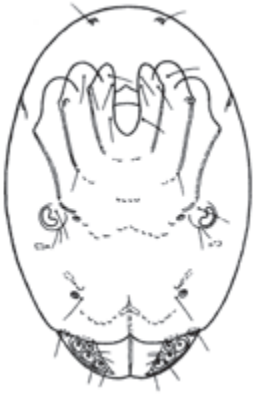
DISTRIBUTION: One species known from Sardinia, Italy and Corsica, France (Gerecke 1994).



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1374 *Prymnopsella bucculata* Gerecke, dorsum female (after Gerecke 1991b)

1375 *Prymnopsella bucculata* Gerecke, genital field female (after Gerecke 1991b)

1376 *Pseudaxonopsalbia* (*Pseudaxonopsalbia*) *acanthophora* (Cook), venter female (after Cook 1974)

Genus *Pseudaxonopsalbia* K. Viets, 1942

(Figs. 1106, 1177, 1180-1182, 1376-1381)

1942 *Pseudaxonopsalbia* K. Viets, Zoologischer Anzeiger 138: 211.

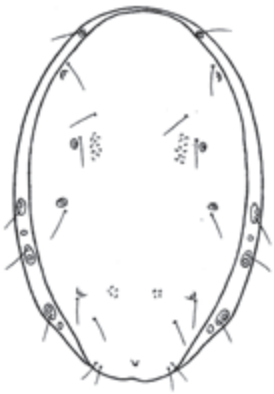
1966 *Coaxonopsalbia* Cook, Memoirs of the American Entomological Institute 6: 178 – Cook (1974).

Type species: *Axonopsalbia separata* K. Viets, 1942

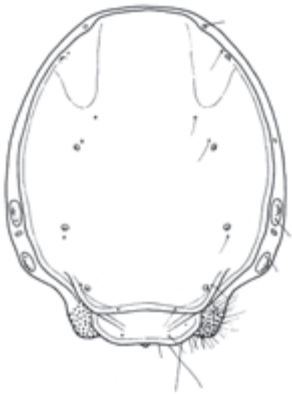
DIAGNOSIS: Dorsal and ventral shield fused posteriorly, excretory pore lying terminally on dorsal shield. Dorsal furrow with small glandularia (Figs. 1181, 1182). Coxae not extending to frontal idiosoma margin. Anterior portion of ventral shield entire. II-leg-1 and IV-leg-1 each with a greatly enlarged seta. Male: Dorsal and ventral shield posteriorly narrowed and forming a short cauda. Posterolateral part of ventral shield with numerous setae (Fig. 1177). Genital field with four pairs of acetabula, genital plates fused with ventral shield without visible suture lines. Gonopore lying terminal. Legs without swimming setae. Male IV-leg-4 with a terminal stout seta (Figs. 1180, 1377). Female: Postgenital sclerite fused either with dorsal shield (Figs. 1182, 1378) or fused with the genital plates.



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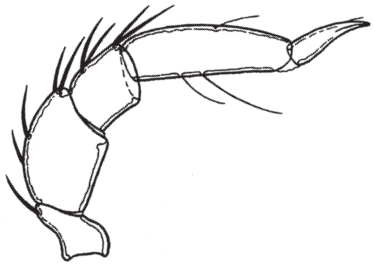
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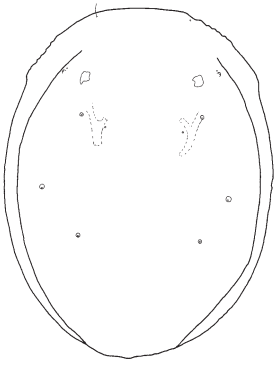
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1377 *Pseudaxonopsalbia* (*Motasaxona*) *plana* (Cook), fourth leg male (after Cook 1974)

1378 *Pseudaxonopsalbia* (*Pseudaxonopsalbia*) *acanthophora* (Cook), dorsum female (after Cook 1974)

1379 *Pseudaxonopsalbia* (*Motasaxona*) *plana* (Cook), dorsum male (after Cook 1974)

1380 *Pseudaxonopsalbia* (*Motasaxona*) *plana* (Cook), opening for fourth leg female (after Cook 1974)

1381 *Pseudaxonopsalbia* (*Pseudaxonopsalbia*) *acanthophora* (Cook), palp female (after Cook 1966)

1382 *Siamaxonopsis ypsilon* Smit, dorsum female (after Smit 2016a)

KEY TO THE SUBGENERA

1 Posterior end of dorsal shield lacking a ridge which distinctly sets off the cauda from the anterior part of the idiosoma (Fig. 1182); heavy setae on male IV-leg-4 not bifid (Fig. 1180) Subgenus *Pseudaxonopsalbia*

- Posterior end of dorsal shield with a ridge which distinctly sets off the cauda from the anterior part of the idiosoma (Fig. 1181); heavy setae on male IV-leg-4 bifid (Fig. 1377) Subgenus *Motasaxona*

Subgenus *Pseudaxonopsalbia* s.s.

(Figs. 1177, 1180, 1182, 1376, 1378, 1381)

DIAGNOSIS: Insertions of fourth legs with small associated projections (Fig. 1177). Male: Posterior end of dorsal shield not distinctly set off from the anterior part of the idiosoma by a ridge (Fig. 1182). Excretory pore located at posterior end of dorsal shield. Heavy setae on IV-leg-4 not bifid (Fig. 1180). Female: Genital plates separate (Fig. 1376). Postgenital sclerite fused with dorsal shield.

HABITAT: Streams.

DISTRIBUTION: Four species known from the Afrotropical region (Liberia, Cook 1966; Ivory Coast; Cameroon).

Subgenus *Motasaxona* Cook, 1974

(Figs. 1106, 1181, 1377, 1379, 1380)

1974 *Motasaxona* Cook, Memoirs of the American Entomological Institute 21: 311.

Type species: *Coaxonopsalbia plana* Cook, 1966

DIAGNOSIS: Insertions of fourth legs associated with moderately long, more or less pointed projections (Fig. 1106, 1380). Male: Posterior end of dorsal shield with a ridge which distinctly sets off the cauda from the anterior part of the idiosoma (Fig. 1379). Excretory pore located at posterior end of idiosoma. Heavy setae on IV-leg-4 bifid (Fig. 1377). Female: Genital plates fused with the postgenital sclerite (Fig. 1106).

HABITAT: Streams, lakes.

DISTRIBUTION: One species known from the Afrotropical region (Cameroon; Ethiopia, Motas & Tanasachi 1967; South Africa, Cook 1999).

Genus *Siamaxonopsis* Smit, 2016

(Figs. 1089, 1136, 1382-1384)

2016 *Siamaxonopsis* Smit, Acarologia 56: 360.

Type species: *Siamaxonopsis ypsilon* Smit, 2016

DIAGNOSIS: (Female only) Dorsal and ventral shields fused anteriorly. Dorsal shield with four pairs of acetabula, the most posterior pair flanking the excretory pore (Fig. 1382). Anterior coxae not extending to frontal idiosoma margin, without hook-like projections. A ridge extending anterolaterally from insertions of fourth legs, starting anteriorly of insertions of fourth legs (Figs. 1136). Between insertions of fourth legs and genital field two pairs of glandularia. Genital field with numerous acetabula (Fig. 1383). P2 with a short, nose-shaped extension (Fig. 1384). P4 slightly expanded ventrally. Legs with swimming setae. Leg claws with ventral clawlets.

HABITAT: Streams.

DISTRIBUTION: One species known from Thailand.

Genus *Sinaxonopsis* Yi & Jin, 2012

(Figs. 1088, 1133, 1135, 1385, 1386)

2012 *Sinaxonopsis* Yi & Jin, International Journal of Acarology 38: 402.

Type species: *Sinaxonopsis unicucrus* Yi & Jin, 2012

DIAGNOSIS: Dorsum with a large posteromedial plate and a pair of anteromedial plates (Figs. 1088, 1135). Posteromedial dorsal plate with 5-6 pairs of glandularia, anteromedial plates with 1-2 pairs of glandularia. Coxae fused into a single group, suture lines incomplete. Anterior coxae not extending to frontal idiosoma margin. Cx-IV extending far posteriorly (Fig. 1133). Genital field located in a triangular genital bay, with numerous acetabula extending far laterally; genital bay of female shallow. Palp slender, P2 and P4 without ventral extensions (Fig. 1385). Legs with swimming setae. Third and fourth leg of male with various modified setae (Fig. 1386).

HABITAT: Streams.

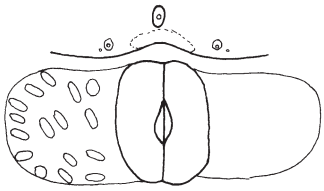
DISTRIBUTION: Three species known from Anhui Province, China, Thailand (Smit 2016a) and Laos (Pešić & Smit 2016).

Genus *Stokaxonopsis* Cook, 1967

(Figs. 1131, 1170, 1171, 1387)

1967 *Stokaxonopsis* Cook, Memoirs of the American Entomological Institute 9: 157.

Type species: *Axonopsis besselingi* Cook, 1967



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1383 *Siamaxonopsis ypsilon* Smit, genital field female (after Smit 2016a)

1384 *Siamaxonopsis ypsilon* Smit, palp female (after Smit 2016a)

1385 *Sinaxonopsis laosensis* Pešić & Smit, palp male (after Pešić & Smit 2016)

DIAGNOSIS: Dorsal and ventral shields separated. Ventral shield without a ridge extending anterolaterally from insertions of fourth legs. Anterior coxae extending beyond frontal idiosoma margin (Figs. 1131, 1171). Suture line between Cx-III and Cx-IV obliterated except for an area anterior to insertions of fourth legs, the latter relatively close together and without projections. Apparently no glandularia present between insertions of fourth legs and genital field. Genital field with three pairs of acetabula. Genital plates fused with ventral shield without visible suture lines in both sexes. Gonopore terminal in both sexes. P2 with or without anteroventral extension, P4 with thickened seta associated with a ventral tubercle (Fig. 1170). IV-leg-1 greatly enlarged.

HABITAT: Interstitial.

DISTRIBUTION: Two species known, one from India and one from Japan.

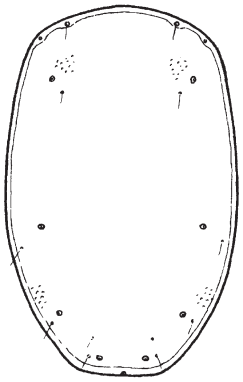
Genus *Stygalbiella* Cook, 1974

(Figs. 1120, 1388-1393)

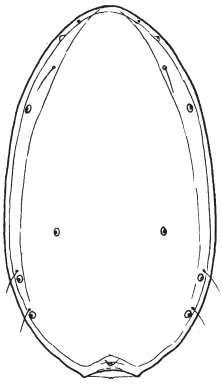
1974 *Stygalbiella* Cook, Memoirs of the American Entomological Institute 21: 328.
Type species: *Stygalbiella arizonica* Cook, 1974



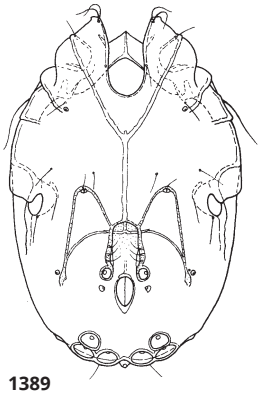
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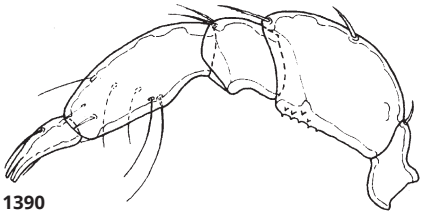
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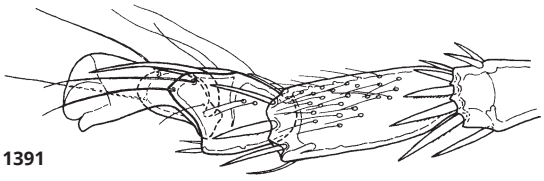
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1386 *Sinaxonopsis laosensis* Pešić & Smit, fourth leg male (after Pešić & Smit 2016)
1387 *Stokaxonopsis besselingi* (Cook), dorsum male (after Cook 1974)
1388 *Stygalbiella affinis* Cook, dorsum female (after Cook 1974)
1389 *Stygalbiella tucumanensis* Cook, venter male (after Cook 1980)
1390 *Stygalbiella tucumanensis* Cook, palp female (after Cook 1980)
1391 *Stygalbiella tucumanensis* Cook, II-leg-4-6 male (after Cook 1980)

DIAGNOSIS: Dorsal shield of females without enlarged glandularia tubercles (Fig. 1388), with or without prominent ridges and with or without a posterior indentation. Anterior coxae slightly extending beyond frontal idiosoma margin. Medial suture line of male coxae relatively long. Cx-II of female with prominent, anterior lobes, either pointed (Fig. 1120), rounded or inconspicuous. Posterior suture line of Cx-IV looping anteriorly in males, with a glandularium in tip of loop (Fig. 1389). Genital field with four pairs of acetabula, in males one pair lying anterolateral to the gonopore, the other three pairs near posterior idiosoma margin; in females the acetabula lateral to gonopore, genital field either distinctly set off or suture lines obliterated. P2 with (Fig. 1390) or without small denticles. II-leg-6 of males expanded, with claw greatly enlarged and highly modified (Fig. 1391). Male IV-leg-4 with a distoventral projection bearing 1-2 paddle-shaped setae (Figs. 1392, 1393).

HABITAT: Interstitial.

DISTRIBUTION: Several species known from North America (Cook 1974, 1981b, I.M. Smith & Cook 1998a), Central America (Guatemala, K.O. Viets 1978c; Mexico, Cramer 1992b) and South America (Argentina, Cook 1980).

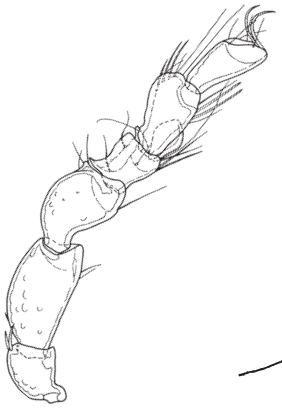
Genus *Submiraxona* Lundblad, 1937

(Figs. 1117, 1121, 1123, 1394-1401)

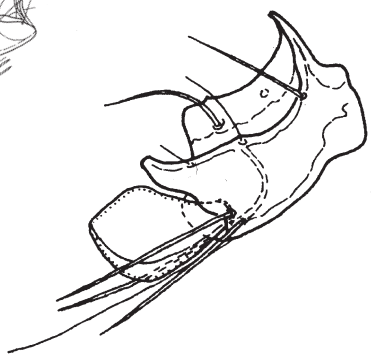
1937 *Submiraxona* Lundblad, Zoologischer Anzeiger 118: 260,

Type species: *Submiraxona crassipes* Lundblad, 1937

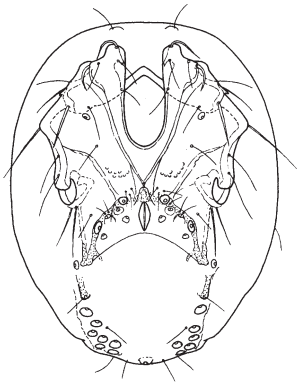
DIAGNOSIS: Dorsal shield posterolaterally with enlarged glandularia tubercles (Figs. 1123, 1395, 1399). Coxae not or only slightly extending to frontal idiosoma margin. Posterior margin of Cx-IV without U-shaped loops, more or less obliterated (Figs. 1123, 1394). Medial coxal suture line more or less obliterated in male. Projections associated with insertions of the fourth legs rounded or truncate. Genital field with five to numerous pairs of acetabula; no enlarged glandularia tubercles flanking the female genital field (Figs. 1121, 1396). Male genital field with two pairs of acetabula far distanced from the more posteriorly located acetabula, and four pairs of glandularia of three different types: Two pairs lacking setae, one pair with associated setae. Associated with the genital field is a deep apodeme which separates Cx-IV from the genital field. Legs with swimming setae. Male IV-leg-4 with an anteroventral extension with a large seta (Figs. 1398, 1401).



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1392 *Stygalbiella tucumanensis* Cook, fourth leg male (after Cook 1980)

1393 *Stygalbiella tucumanensis* Cook, IV-leg-4 male (after Cook 1980)

1394 *Submiraxona* (*Submiraxona*) *bella* Cook, venter male (after Cook 1980)

KEY TO THE SUBGENERA

1 Genital field with five pairs of acetabula (Fig. 1121) Subgenus *Pentalbia*

- Genital field with more than five pairs of acetabula (Fig. 1123) Subgenus *Submiraxona* s.s.

Subgenus *Submiraxona* s.s.

(Figs. 1123, 1394-1398)

DIAGNOSIS: Genital field with ten or more pairs of acetabula (Fig. 1394, 1396).

HABITAT: Streams.

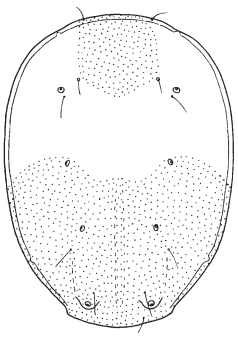
DISTRIBUTION: Several species known from Brazil, Mexico (Cook 1980), North America (Habeeb 1963b, Cook 1981b) and possibly Costa Rica (Cook 1980).

Subgenus *Pentalbia* Lundblad, 1937

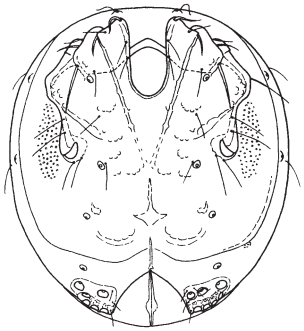
(Figs. 1117, 1121, 1399-1401)

1937 *Pentalbia* Lundblad, Zoologischer Anzeiger 120: 291.

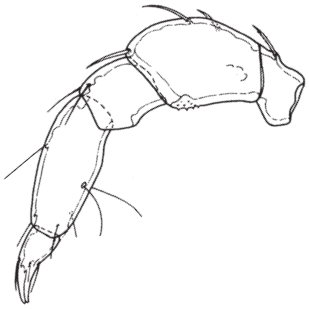
Type species: *Neoalbia walteri* Lundblad, 1937



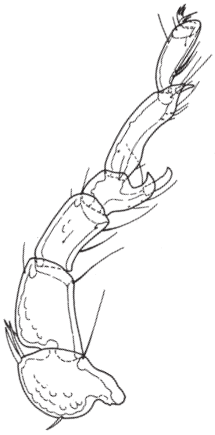
1395



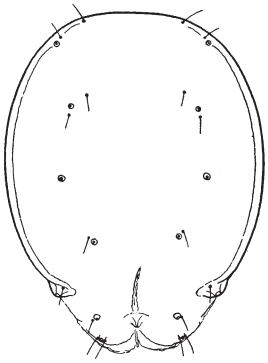
1396



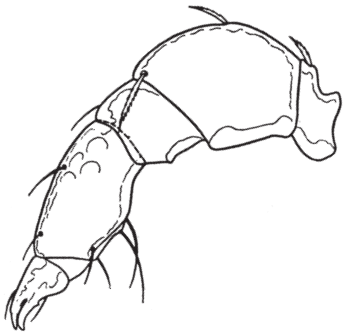
1397



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1400

1395 *Submiraxona* (*Submiraxona*) *bella* Cook, dorsum male (after Cook 1980)

1396 *Submiraxona* (*Submiraxona*) *bella* Cook, venter female (after Cook 1980)

1397 *Submiraxona* (*Submiraxona*) *lundbladi* Cook, palp female (after Cook 1980)

1398 *Submiraxona* (*Submiraxona*) *bella* Cook, fourth leg male (after Cook 1980)

1399 *Submiraxona* (*Pentalbia*) *walteri* (Lundblad), dorsum female (after Lundblad 1943)

1400 *Submiraxona* (*Pentalbia*) *walteri* (Lundblad), palp male (after Lundblad 1943)

DIAGNOSIS: Genital field with five pairs of acetabula (Figs. 1117, 1121).

HABITAT: Streams.

DISTRIBUTION: One species known from southern Brazil.

Genus *Sumatralbia* K. Viets, 1929

(Figs. 1175, 1402-1404)

1929 *Sumatralbia* K. Viets, Zoologischer Anzeiger 83: 239.

Type species: *Axonopsalbia ru*gosa K. Viets, 1929

DIAGNOSIS: Dorsal and ventral shields separated. Anterior end of ventral shield with a separate plate (Fig. 1175). Posterior end of male dorsal shield laterally with a pair of elevated bars flanking corresponding grooves (Fig. 1402). Coxae not extending to frontal idiosoma margin. No ridge extending anterolaterally from insertions of fourth legs. Male: Genital field with four pairs of acetabula, these more or less equidistant from gonopore. Genital field with numerous small setae. Genital plates with indistinct suture lines. Legs without sexual dimorphism. Female: Genital plates fused with the postgenital sclerite (Fig. 1404). Excretory pore platelet located posterior to dorsal shield (Fig. 1403).

HABITAT: Springs, streams.

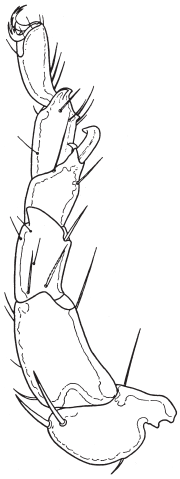
DISTRIBUTION: One species known from Sumatra and Java, Indonesia.

Genus *Subaxonopsalbia* Cook, 1966

(Figs. 1176, 1405-1410)

1966 *Subaxonopsalbia* Cook, Memoirs of the American Entomological Institute 6: 184.

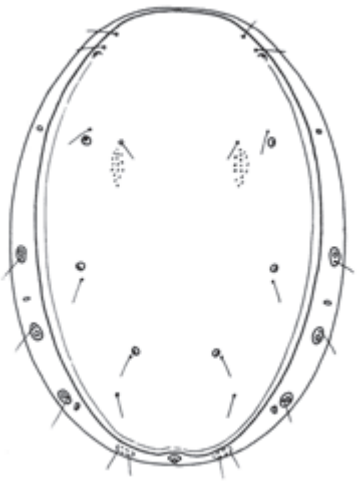
Type species: *Subaxonopsalbia pectinifera* Cook, 1966



1401



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1401 *Submiraxona* (*Pentalbia*) *walteri* (Lundblad), fourth leg male (after Lundblad 1943)

1402 *Sumatralbia rugosa* (K. Viets), dorsum male (after Cook 1974)

1403 *Sumatralbia rugosa* (K. Viets), dorsum female (after Cook 1974)

DIAGNOSIS: Dorsal and ventral shields separated. Coxae not extending to frontal idiosoma margin. Anterior end of ventral shield with a separate, semi-circular plate. No ridge extending anterolaterally from insertions of fourth legs. Genital field with 4-7 pairs of acetabula. Male: Posterior end of dorsal shield more or less pointed (Fig. 1405). Genital field distinctly set off from ventral shield. Gonopore wider than long (Fig. 1176). Excretory pore platelet free in the integument posterior to the genital field. Male IV-leg-1 with numerous dorsal setae, IV-leg-3 terminating in a heavy curved seta (Fig. 1410). Female: Genital plates separated from the postgenital sclerite (Fig. 1407). Excretory pore lying free in the integument posterior to genital field (Fig. 1406). Fourth leg not modified.

HABITAT: Streams.

DISTRIBUTION: One species known from Liberia.

Genus *Uenaxonopsis* Imamura, 1961

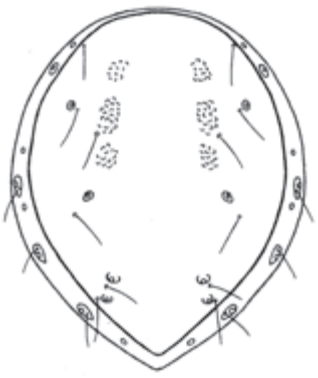
(Figs. 1156, 1411-1413)

1961 *Uenaxonopsis* Imamura, Acarologia 3: 55.

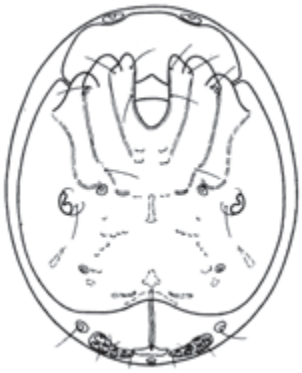
Type species: *Uenaxonopsis nazensis* Imamura, 1961



1404



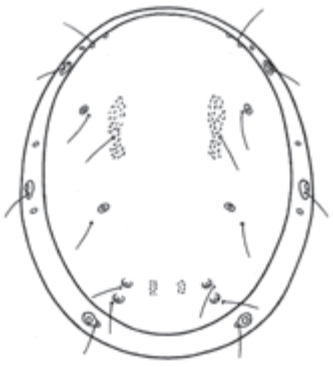
1405



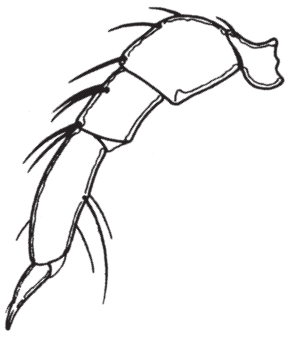
1406



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1404 *Sumatralbia rugosa* (K. Viets), genital field female (after Cook 1974)

1405 *Subaxonopsalbia pectinifera* Cook, dorsum male (after Cook 1974)

1406 *Subaxonopsalbia pectinifera* Cook, venter female (after Cook 1974)

1407 *Subaxonopsalbia pectinifera* Cook, genital field female (part.) (after Cook 1974)

1408 *Subaxonopsalbia pectinifera* Cook, dorsum female (after Cook 1974)

1409 *Subaxonopsalbia pectinifera* Cook, palp female (after Cook 1966)

DIAGNOSIS: (Male only) Lateral eyes absent. Dorsal and ventral shield broadly fused anteriorly. Dorsal shield with two pairs of glandularia, one of these at extreme posterior end; no cauda development (Fig. 1411). One pair of slit-like glandularia in dorsal furrow. Gnathosomal apodemes relatively short. Anterior coxae without hook-like projections. Genital field with two pairs of acetabula (Fig. 1412). Suture lines of genital field moderately distinct. Three pairs of small platelets located in the articular membrane posterior to the genital field (Fig. 1156). P4 without heavy setae or ventral tubercles., P5 much shorter than P4 (Fig. 1413). Legs without sexual dimorphism.

HABITAT: Interstitial.

DISTRIBUTION: One species known from Japan.

Genus *Vagabundia* Valdecasas, 2008

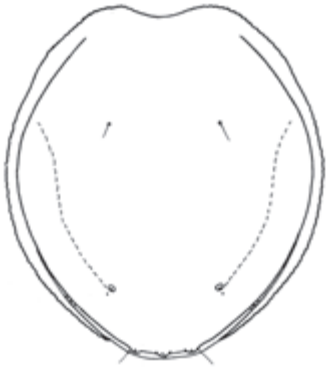
(Figs. 1116, 1414-1417)

2008 *Vagabundia* Valdecasas, Zootaxa 1820: 43.

Type species: *Vagabundia sci* Valdecasas, 2008



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1414



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1415

1410 *Subaxonopsalbia pectinifera* Cook, fourth leg male (after Cook 1974)

1411 *Uenaxonopsis nazensis* Imamura, dorsum male (after Cook 1974)

1412 *Uenaxonopsis nazensis* Imamura, genital field male (after Cook 1974)

1413 *Uenaxonopsis nazensis* Imamura, palp male (after Cook 1974)

1414 *Vagabundia sci* Valdecasas, palp male (after Valdecasas 2008b) Reproduced with permission from copyright holder

1415 *Vagabundia sci* Valdecasas, II-leg-2-6 male (after Valdecasas 2008b) Reproduced with permission from copyright holder

DIAGNOSIS: (Male only) Dorsal and ventral shields separate. Gnathosoma separated from the coxae, with a long pointed rostrum (Fig. 1417). Anterior coxae extending well beyond the frontal idiosoma margin, tips of Cx-I pointed. Male with a distinct median suture line. Cx-IV with distinct posterior suture lines. Projections of Cx-IV partially covering insertions of fourth legs. Close to these projections two pairs of glandularia. A ridge extending anterolaterally from insertions of fourth legs (Fig. 1116). Gonopore distanced from posterior idiosoma margin. Genital field with four pairs of acetabula, three pairs near posterior margin of ventral shield, one pair posterolaterally of gonopore, far distanced from posterior margin of ventral shield. Suture lines of genital field indistinct. Male second and fourth legs modified: II-leg-5 enlarged and expanded ventrally, II-leg-6 elongated; claw without clawlets (Fig. 1415). IV-leg-3 with a stout, somewhat curved anterodorsal seta, IV-leg-4 stocky, with a large, curved anteroventral seta (Fig. 1416).

HABITAT: Streams.

DISTRIBUTION: One species known from Panama.

Genus *Vicinaxonopsis* Cook, 1974

(Figs. 1164, 1166, 1167, 1418, 1419)

1974 *Vicinaxonopsis* Cook, Memoirs of the American Entomological Institute 21: 335 – I.M. Smith et al. (2015).

Type species: *Axonopsis californica* Cook, 1974

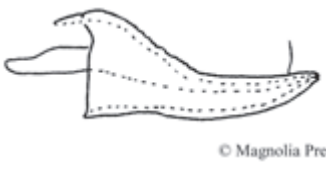
DIAGNOSIS: Dorsal and ventral shield broadly fused anteriorly; no cauda development. Dorsal furrow without glandularia (Fig. 1164). Dorsal shield with five pairs of glandularia none of which flank the excretory pore. Gnathosomal apodemes extremely long, extending posteriorly to midlength of ventral shield (Fig. 1166). A ridge extending anterolaterally from insertions of fourth legs to anteroventral margin (Fig. 1419). Anterior coxae lacking hook-like projections. Between insertions of fourth legs and genital field two pairs of glandularia. Genital field with three pairs of acetabula. Suture lines of genital field obliterated (Fig. 1418). P4 moderately long and stout, bearing two moderate thick setae. P5 extremely long and tapered distally (Fig. 1167). Legs without sexual dimorphism.

HABITAT: Streams, interstitial.

DISTRIBUTION: Several species described from the Palaearctic (Bulgaria, Petrova 1976; Italy, Pešić & Gerecke 2003; Iran, Pesic et al. 2006c, Pesic et al. 2009b), Nearctic (North America, Cook 1974; Cuba, Orghidan et al. 1981) and Oriental regions (Sulawesi, Indonesia, Wiles 1989; Borneo, Smit & Pešić 2014b, Thailand, Smit 2016a).


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1416 *Vagabundia sci* Valdecasas, IV-leg-2-6 male (after Valdecasas 2008b) Reproduced with permission from copyright holder

1417 *Vagabundia sci* Valdecasas, gnathosoma male (after Valdecasas 2008b) Reproduced with permission from copyright holder

1418 *Vicinaxonopsis californica* (Cook), genital field male (after Cook 1974)

Genus *Villaxonopsalbia* Cook, 1999

(Figs. 1183, 1184, 1198, 1420-1423)

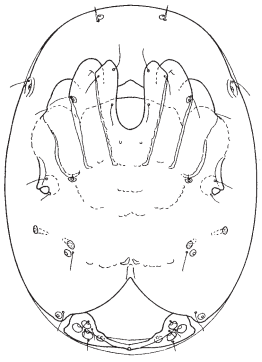
1999 *Villaxonopsalbia* Cook, International Journal of Acarology 25: 325.

Type species: *Villaxonopsalbia sudafricana* Cook, 1999

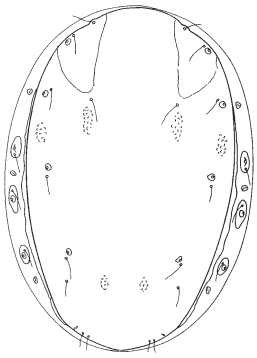
DIAGNOSIS: Anterior coxae not extending to frontal idiosoma margin. Genital field with four pairs of acetabula. Male: Dorsal and ventral shields fused posteriorly. Posterior end of dorsal shield with two transverse ridges anterior to a short cauda (Fig. 1183). Posterolateral margins of idiosoma with numerous long setae, largely confined to dorsal surface. Gonopore small, lying at anterior end of an inverted Y-shaped genital bay. Acetabula lying in a curved row along medial margins of genital bay. Excretory pore lying on ventral side of cauda (Fig. 1184). Fourth leg with proportionally long segments. Male IV-leg-6 longest, slightly curved with a short, expanded proximally placed seta. Distal ends of IV-leg-4 and -5 each with a single thickened seta (Fig. 1423). Female: Projections associated with insertions of fourth legs relatively large and extending nearly laterally. Genital plates and postgenital sclerite fused into a unit which also bears the excretory pore (Fig. 1198). Glandularia laterally of genital field fused with ventral shield (Fig. 1420).



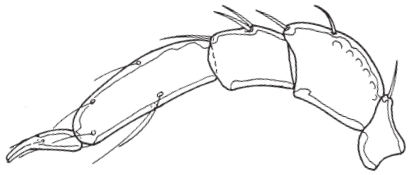
1419



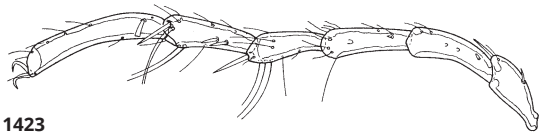
1420



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1423



1424

1419 *Vicinaxonopsis californica* (Cook), venter female (after Cook 1974)

1420 *Villaxonopsalbia sudafricana* Cook, venter female (after Cook 1999)

1421 *Villaxonopsalbia sudafricana* Cook, dorsum female (after Cook 1999)

1422 *Villaxonopsalbia sudafricana* Cook, palp female (after Cook 1999)

1423 *Villaxonopsalbia sudafricana* Cook, fourth leg male (after Cook 1999)

1424 *Woolastookia pilositarsa* (Habeeb), venter male (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: One species known from South Africa.

Genus *Woolastookia* Habeeb, 1954

(Figs. 1139, 1143, 1424-1426)

1954 *Woolastookia* Habeeb, Leaflets of Acadian Biology 2: 14.

1974 *Herbsacarus* Habeeb, Leaflets of Acadian Biology 61: 1 – K.O. Viets (1987).

Type species: *Brachypoda pilositarsa* Habeeb, 1953

DIAGNOSIS: Dorsal and ventral shields separate. Excretory pore on a small platelet at posterior margin of dorsal shield including flanking glandularia (Fig. 1139). A ridge extending anterolaterally from insertions of fourth legs to anteroventral margin. Coxal suture lines medially indistinct. Insertions of fourth legs without associated projections. Genital field with three pairs of acetabula, in female separate (Fig. 1425), in males on a triangular plate which is fused to ventral shield (Fig. 1424). Male genital field located near posterior margin of ventral shield. Excretory pore on a small platelet posterior to dorsal shield. P2 lacking a distoventral projection, P4 lacking a thick seta (Fig. 1143). Distal segments of fourth legs of male (Fig. 1426) heavier compared to female.

HABITAT: Streams.

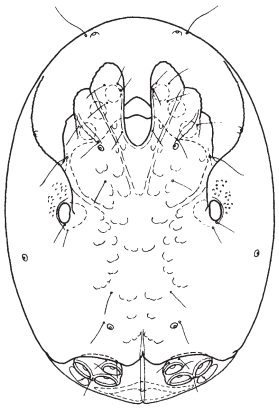
DISTRIBUTION: Several species described from Europe (Italy, Gerecke 2014b; Bosnia and Hercegovina, Greece, Pešić et al. 2010b), Russian Far East, Semenchenko 2010b; South Korea, Kim & Chung 1996, Pešić 2014; China, Yi & Jin 2012a), Nearctic (North America, Habeeb 1964), Oriental (Burma, Lundblad 1969) and Neotropical regions (Guatemala, K.O. Viets 1978c) .

Subfamily Aturinae Thor, 1900

1900 Aturinae Thor, Nyt Magazin for Naturvidenskaberne 38: 4.

1984 Japonaxonopsinae Imamura, Human Science: 55 - I.M. Smith (1991a).

DIAGNOSIS: Dorsal shield entire, not divided into several platelets. Tips of Cx-I projecting well beyond frontal idiosoma margin. Genital field with eight or more pairs of acetabula arranged along the posterolateral idiosoma margin.



1425



1426



1427

1425 *Woolastookia pilositarsa* (Habeeb), venter female (after Cook 1974)

1426 *Woolastookia pilositarsa* (Habeeb), IV-leg-4-6 male (after Cook 1974)

1427 *Subalbia longipalpis* Cook, dorsum female (after Cook 1974)

KEY TO THE GENERA

1 Dorsal shield with seven pairs of glandularia, six of these grouped more or less together (Fig. 1427) 2

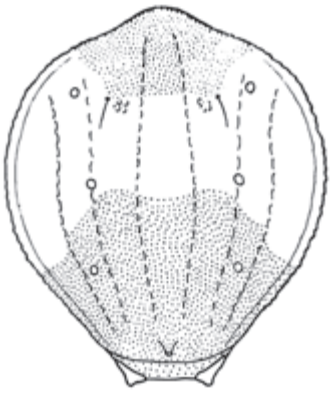
- Glandularia of dorsal shield various, but not as described above (Figs. 1428, 1429) 3

2 Glandularia group of dorsal shield near centre (Fig. 1427); palp segments extremely long and slender (Fig. 1430) Genus *Subalbia*

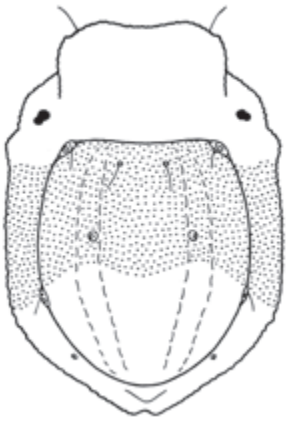
- Glandularia group of dorsal shield near posterior end (Fig. 1431); palp segments not extremely long and slender (Fig. 1432) Genus *Aturides*

3 Palp segments very long and slender; P2 with a proximoventrally directed projection (Fig. 1433) Genus *Bharatalbia*

- Palp segments short or long, if long, P2 without a proximoventrally directed projection (Fig. 1434) 4



1428



1429



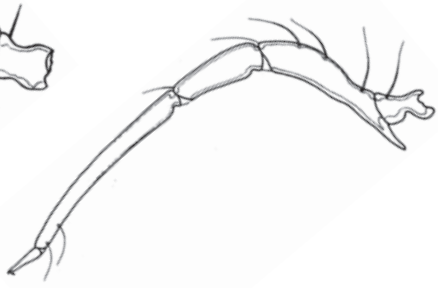
1430



1431



1432



1433

1428 *Subaturus expansus* Cook, dorsum female (after Cook 1974)

1429 *Bharatalbia* (*Bharatalbia*) *sucirapalpis* Cook, dorsum male (after Cook 1974)

1430 *Subalbia longipalpis* Cook, palp female (after Cook 1974)

1431 *Aturides dentatus* (Lundblad), dorsum male (after Cook 1974)

1432 *Aturides dentatus* (Lundblad), palp male (after Cook 1974)

1433 *Bharatalbia* (*Bharatalbiella*) *talinapalpis* Cook, palp male (after Cook 1974)

4 Three pairs of glandularia located between the genital field and Cx-III (Fig. 1435); II-leg-5 of male greatly expanded ventrally (Fig. 1436) Genus *Subaturus*

- Two pairs (or less) of glandularia located between the genital field and Cx-III (Fig. 1437); males without the sexual dimorphism described above 5

5 Dorsal shield with three pairs of glandularia 6

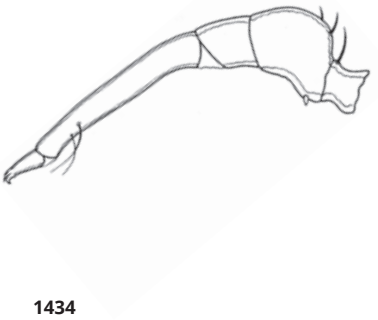
- Dorsal shield with more than three pairs of glandularia 7

6 Dorsal shield with two pairs of well-defined ridges, punctate or reticulate with rough, scaly edges (Fig. 1438) Genus *Ameribrachypoda*

- Dorsal shield with one pair of ridges, finely punctate with smooth edges (Fig. 1439) Genus *Phreatobrachypoda*

7 Dorsal and ventral shield fused anteriorly (Fig. 1440) Genus *Neoaturus*

- Dorsal and ventral shield separated anteriorly (Fig. 1441) 8



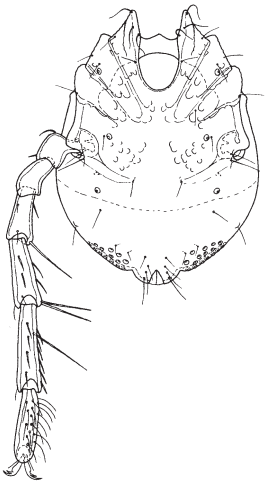
1434



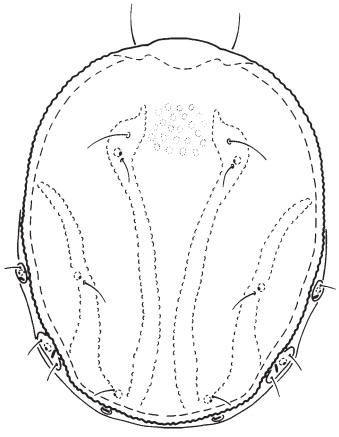
1435



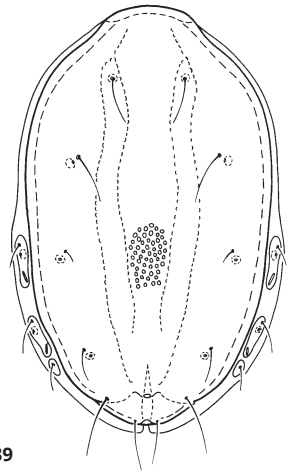
1436



1437



1438



1439

1434 *Kongsbergia* (*Pseudokongsbergia*) *loffa* Cook, palp female (after Cook 1974)

1435 *Subaturus expansus* Cook, venter male (after Cook 1974)

1436 *Subaturus expansus* Cook, II-leg-5-6 male (after Cook 1974)

1437 *Neoaturus projectus* Lundblad, venter with fourth leg male (after Cook 1980)

1438 *Ameribrachypoda robusta* (Cook), dorsum male (after I.M. Smith 1991a)

1439 *Phreatobrachypoda multipora* Cook, dorsum female (after I.M. Smith 1991a)

8 No projections associated with insertions of fourth legs (Fig. 1442); male IV-leg-5 lacking strongly thickened setae (Fig. 1443); ventral margin of P2 with (one or several) projections only in distal part (Fig. 1444) Genus *Aturus*

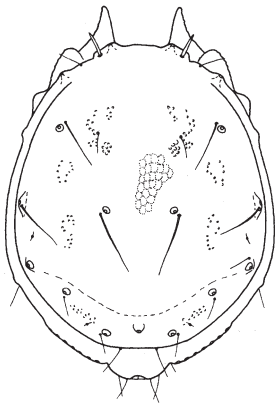
- Posteriorly directed projections covering insertions of fourth legs (Fig. 1445); male IV-leg-5 generally with strongly thickened setae (Fig. 1446); ventral margin of P2 with projections generally in proximal part (Fig. 1447) Genus *Kongsbergia*

Genus *Ameribrachypoda* I.M. Smith, 1991

(Figs. 1438, 1448-1453)

1991 *Ameribrachypoda* I.M. Smith, The Canadian Entomologist 123: 478 - I.M. Smith et al. (2015).

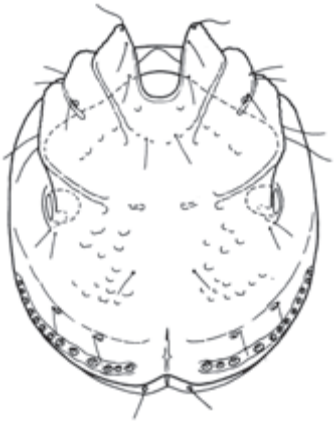
Type species: *Phreatobrachypoda robusta* Cook, 1974



1440



1441



1442



1443



1444



1445

1440 *Neoaturus projectus* Lundblad, dorsum male (after Cook 1980)

1441 *Aturus hiatosomus* Cook. dorsum male (after Cook 1974)

1442 *Aturus hiatosomus* Cook. venter female (after Cook 1974)

1443 *Aturus deceptor* Habeeb. venter male (after Cook 1974)

1444 *Aturus hiatosomus* Cook. palp female (after Cook 1974)

1445 *Kongsbergia* (*Pseudokongsbergia*) *loffa* Cook, venter male (after Cook 1974)

DIAGNOSIS: Idiosoma broadly elliptical in shape in females or elongate elliptical (Fig. 1449). Idiosoma sclerites with surfaces coarsely punctate or reticulate and with rough, scaly edges. Dorsal shield with three pairs of glandularia and two pairs of well-defined ridges (Fig. 1438). Genital field of male and excretory pore on a posterodorsal plate (Fig. 1453), or into ventral shield (Fig. 1448). Genital field of female with genital plates closely adpressed to, or fused with ventral shield with suture lines clearly visible (Fig. 1450). Fourth legs of males nearly straight, segments not greatly expanded (Fig. 1452).

HABITAT: Interstitial.

DISTRIBUTION: Two species known from western North America (Habeeb 1975c, I.M. Smith 1991a).

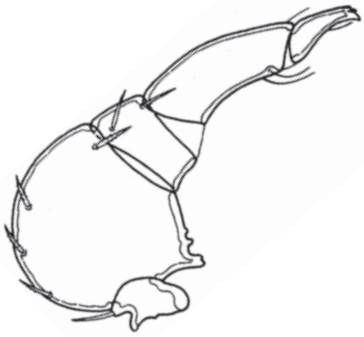
Genus *Aturides* Lundblad, 1937

(Figs. 1431, 1432, 1454, 1455)

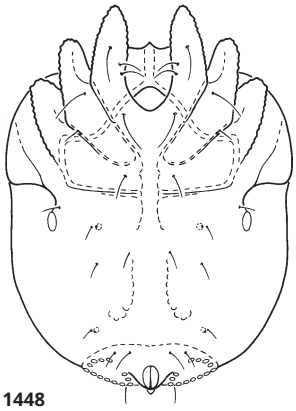
1937 *Aturides* Lundblad, Zoologischer Anzeiger 118: 261.
Type species: *Aturus dentatus* Lundblad, 1936



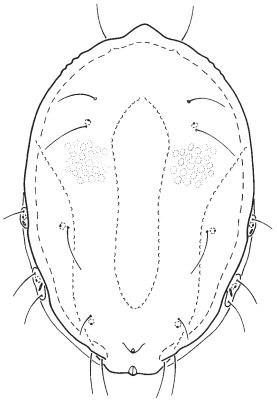
1446



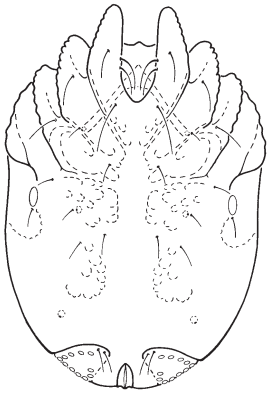
1447



1448



1449



1450



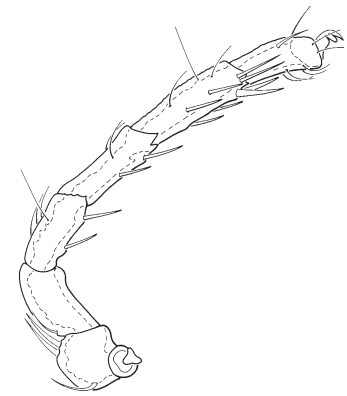
1451

1446 *Kongsbergia* (*Kongsbergia*) *parvatiya* Cook, IV-leg-4-6 male (after Cook 1974)
1447 *Kongsbergia* (*Kongsbergia*) *rucira* Cook, palp male (after Cook 1974)
1448 *Ameribrachypoda robusta* (Cook), venter male (after I.M. Smith 1991a)
1449 *Ameribrachypoda robusta* (Cook), dorsum female (after I.M. Smith 1991a)
1450 *Ameribrachypoda robusta* (Cook), venter female (after I.M. Smith 1991a)
1451 *Ameribrachypoda robusta* (Cook), palp male (after I.M. Smith 1991a)

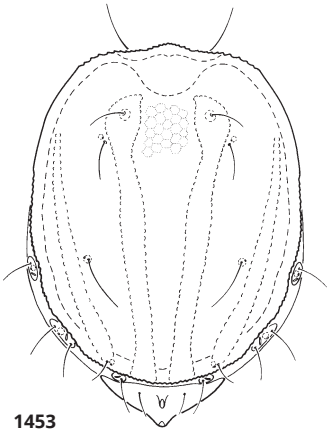
DIAGNOSIS: Dorsal and ventral shields completely separated. Dorsal shield bearing the postocularia, excretory pore and seven pairs of glandularia, six pairs of which are concentrated in the posterior half of dorsal shield (Fig. 1431). Dorsal furrow with three pairs of glandularia. Anterior coxae projecting beyond frontal idiosoma margin; projections of Cx-IV partially covering the openings for insertions of the fourth legs. Posterior suture line of Cx-IV obliterated, but a pair of glandularia apparently ling on Cx-IV (Figs. 1454, 1455). Genital field with numerous acetabula, these extending laterally from gonopore in two or three rows. Suture lines of genital plates lightly indicated in male but obliterated in female. Both male and female gonopore terminal. Setae-bearing projections extending posteriorly from the gonopore region of male. Palp segments slightly elongated but without ventral projections (Fig. 1432). Legs without swimming setae, no sexual dimorphism in leg morphology.

HABITAT: Streams.

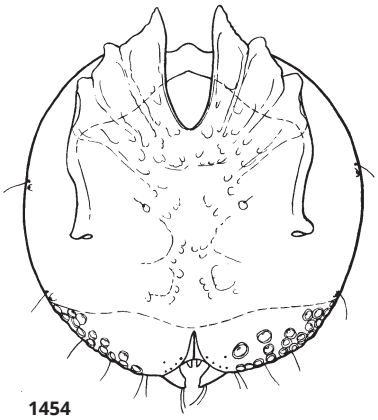
DISTRIBUTION: One species known from Brazil and one from Costa Rica (Cook 1980).



1452



1453



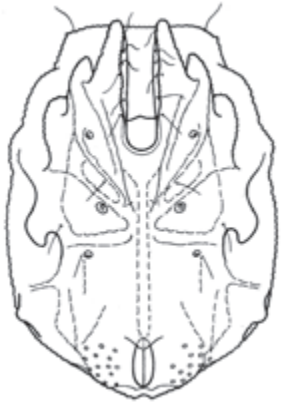
1454



1455



1456



1457

1452 *Ameribrachypoda robusta* (Cook), fourth leg male (after I.M. Smith 1991a)

1453 *Ameribrachypoda acuta* (Habeeb), dorsum male (after I.M. Smith 1991a)

1454 *Aturides dentatus* (Lundblad), venter male (after Cook 1974)

1455 *Aturides dentatus* (Lundblad), venter female (after Cook 1974)

1456 *Aturus spatulifer* Piersig, dorsum male (after Gerecke et al. 2016)

1457 *Bharatalbia* (*Bharatalbia*) *sucirapalpis* Cook, venter male (after Cook 1974)

Genus *Aturus* Kramer, 1875

(Figs. 1082, 1085, 1441-1444, 1456)

1875 *Aturus* Kramer, Archiv für Naturgeschichte 41: 309.

1930 *Crinaturus* Thor, Zoologischer Anzeiger 88: 187.

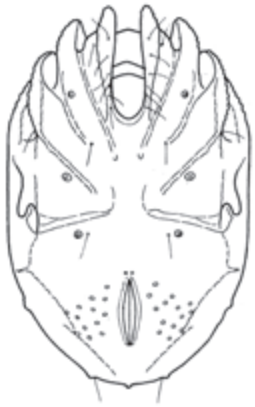
1975 *Zidenaturus* Habeeb, Leaflets of Acadian Biology 64: 3 – K.O. Viets (1987).

Type species: *Aturus scaber* Kramer, 1875

DIAGNOSIS: Dorsal shield in male generally fused posteriorly to ventral shield, in female separate from ventral shield. Dorsal furrow with 4-5 pairs of glandularia. Dorsal shield with the postocularia, four pairs of glandularia and excretory pore (Figs. 1085, 1441, 1456). Tips of Cx-I slightly extending beyond frontal idiosoma margin. Cx-IV without glandularia, no projections associated with insertions of fourth legs (Figs. 1082, 1442, 1443). Genital plates with numerous acetabula in one or two rows; genital plates slender, often extending all over posterolateral idiosoma margin. In males, genital area often with a deep median cleft and posterior idiosoma



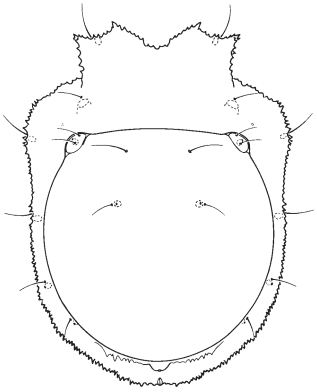
1458



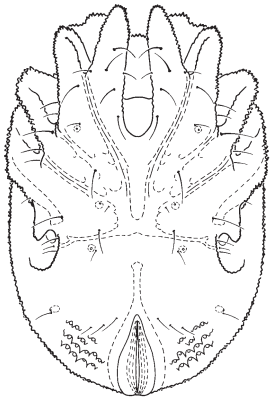
1459



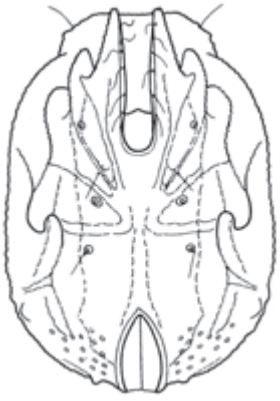
1460



1461



1462



1463

1458 *Bharatalbia* (*Bharatalbiella*) *talinapalpis* Cook, dorsum male (after Cook 1974)

1459 *Bharatalbia* (*Bharatalbiella*) *talinapalpis* Cook, venter male (after Cook 1974)

1460 *Bharatalbia* (*Bharatalbiella*) *talinapalpis* Cook, III-leg-5-6 male (after Cook 1974)

1461 *Bharatalbia* (*Japonalbia*) *cooki* I.M. Smith, dorsum female (after I.M. Smith 1991a)

1462 *Bharatalbia* (*Japonalbia*) *cooki* I.M. Smith, venter female (after I.M. Smith 1991a)

1463 *Bharatalbia* (*Bharatalbia*) *sucirapalpis* Cook, venter female (after Cook 1974)

bearing variously modified setae (Fig. 1443, 1456). Palp segments shortened, P2 with or without a short distoventral projection (Fig. 1444). Legs without swimming setae. Male IV-leg-4-5, occasionally also third leg, with variously developed sexual dimorphism in shape and setation (Fig. 1443).

HABITAT: Streams, interstitial.

DISTRIBUTION: Worldwide, many species known, but not occurring in the Australasian region. Most species are known from the Holarctic region.

Genus *Bharatalbia* Cook, 1967

(Figs. 1429, 1433, 1457-1464)

1967 *Bharatalbia* Cook, Memoirs of the American Entomological Institute 9: 179.

Type species: *Bharatalbia sucirapalpis* Cook, 1967

DIAGNOSIS: Dorsal shield bearing the postocularia and one pair of glandularia (Fig. 1429). Three pairs of additional glandularia lying either in the dorsal furrow (Figs. 1429, 1461) or fused with the ventral shield near the dorsal furrow (Fig. 1458). Anterior coxae projecting beyond frontal idiosoma, gnathosomal bay deep. Projections of Cx-IV covering the insertions of fourth legs. A ridge present on each side extending anterolaterally from the projections of Cx-IV (Fig. 1458). Posterior suture line of Cx-IV distinct, Cx-IV with a pair of glandularia. Genital field with numerous acetabula, these extending only a short distance lateral to the gonopore in several rows. Suture lines of genital plates obliterated in both sexes. Male gonopore ventral (Fig. 1462) or subterminal (Fig. 1457), female gonopore terminal (Fig. 1463). Palp segments very long and slender; proximal end of P2 with a proximally-directed projection (Fig. 1433). Legs may (Fig. 1460) or may not exhibit a slight sexual dimorphism. Legs without swimming setae.

KEY TO THE SUBGENERA

1 Dorsal furrow with 1-2 pairs of glandularia (Fig. 1429); anterior portion of ventral shield projecting (Fig. 1457); legs without sexual dimorphism 2

\- Dorsal furrow without glandularia (Fig. 1458); anterior portion of ventral shield not projecting (Fig. 1459); male III-leg-5 slightly expanded and with a distally-directed seta (Fig. 1460) Subgenus *Bharatalbiella*

2 Dorsal furrow with two pairs of glandularia (Fig. 1429); male genital field subterminal (Fig. 1457) Subgenus *Bharatalbia* s.s.

\- Dorsal furrow with one pair of glandularia (Fig. 1461); male genital field ventral (Fig. 1462) Subgenus *Japonalbia*

Subgenus *Bharatalbia* s.s.

(Figs. 1429, 1457 , 1463)

DIAGNOSIS: Dorsal furrow with two pairs of glandularia (Fig. 1429). Anterior portion of ventral shield projecting (Fig. 1463). Male genital field subterminal (Fig. 1457). Legs without sexual dimorphism.

HABITAT: Streams.

DISTRIBUTION: One species known from southern India.

Subgenus *Bharatalbiella* Cook, 1967

(Figs. 1433, 1458-1460)

1967 *Bharatalbiella* Cook, Memoirs of the American Entomological Institute 9: 181.

Type species: *Bharatalbia talinapalpis* Cook, 1966

DIAGNOSIS: Dorsal furrow without glandularia (Fig. 1458). Anterior portion of ventral shield not projecting (Fig. 1459). Male genital field ventral. III-leg-5 of male expanded and bearing a anteriorly directed seta (Fig. 1460).

HABITAT: Interstitial.

DISTRIBUTION: One species known from India.

Subgenus *Japonalbia* Imamura, 1977

(Figs. 1461, 1462, 1464)

1977 *Japonalbia* Imamura, Proceedings of the Japanese Society of Systematic Zoology 13: 46.

Type species: *Bharatalbia ibarakiensis* Imamura, 1977

DIAGNOSIS: Dorsal shield reticulate (Fig. 1464), dorsal furrow with one pair of glandularia (Fig. 1461). Anterior portion of ventral shield projecting (Fig. 1462). Male genital field located ventrally. Legs of males with or without sexual dimorphism.

HABITAT: Interstitial.

DISTRIBUTION: Four species known from Japan, one from Malaysia (Wiles 1991) and two species known from western North America (I.M. Smith 1991a).

Genus *Kongsbergia* Thor, 1899

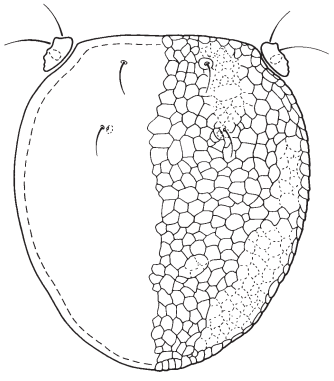
(Figs. 1434, 1445-1447, 1465-1490)

1899 *Kongsbergia* Thor, Foreløbig Meddelelse, Kristiania: 1.

1901 *Hjartdalia* Thor, Zoologischer Anzeiger 24: 673.

1901 *Aturellus* Piersig, Zoologischer Anzeiger 25: 18.

Type species: *Kongsbergia materna* Thor, 1899



1464



1465



1466

1464 *Bharatalbia* (*Japonalbia*) *cooki* I.M. Smith, dorsum male (after I.M. Smith 1991a)

1465 *Kongsbergia* (*Crocokongsbergia*) *cooki* Orghidan & Gruia, venter male (after Orghidan & Gruia 1983b)

1466 *Kongsbergia* (*Crocokongsbergia*) *cooki* Orghidan & Gruia, tip of Cx-I male (after Orghidan & Gruia 1983b)

DIAGNOSIS: Dorsal furrow without glandularia, complete in both sexes, facing laterally. Dorsal shield bearing postocularia, nine pairs of glandularia and generally the excretory pore (Fig. 1469). Tips of Cx-I slightly extending beyond frontal idiosoma margin. Suture lines of coxae visible only in their lateral parts, but a longitudinal suture line medially separating Cx-II-IV occasionally evident. Cx-IV without glandularia, a pair of prominent projections of the coxal surface partially covering insertions of fourth legs. Genital field fused to ventral shield, with numerous acetabula, extending over the posterolateral idiosoma margin, rarely in one, more frequently in 2-3 rows (Figs. 1472, 1474). Gonopore generally terminal or on a slightly protruding projection. Palp various in shape, typically with sexual dimorphism (stockier in males than in females). P2 always higher than other segments and frequently bearing ventral projections, these often located in the centre or proximal part of segment (Figs. 1447, 1475). Legs without swimming setae, leg claws with dorsal and ventral clawlet and a weakly developed claw blade. Fourth leg of male, occasionally also other legs, showing sexual dimorphism in shape and setation (Figs. 1472, 1476); IV-leg-5 with one or two strongly enlarged setae.

KEY TO THE SUBGENERA (MALES ONLY)

1 Cx-I of male with pointed, hook-like extension (Figs. 1465, 1466) Subgenus *Crocokongsbergia*

\- Cx-I without such hook-like extensions 2

2 I-leg-5 of male expanded and bearing a very heavy ventral seta (Fig. 1467) 3

\- I-leg-5 of male with only moderately thickened ventral setae or none 4

3 I-leg-4 of male with a long, thickened distoventral seta which is much longer than the seta of the ventral side of I-leg-5 (Fig. 1467) Subgenus *Parakongsbergia*

\- I-leg-4 of male with distoventral seta much shorter than the seta on the ventral side of I-leg-5 (Fig. 1468) Subgenus *Pseudokongsbergia*

4 Excretory pore of male not visible in ventral view; male without a cauda; no ridge present on each side near lateral margins of dorsal shield (Fig. 1469) Subgenus *Kongsbergia* s.s.

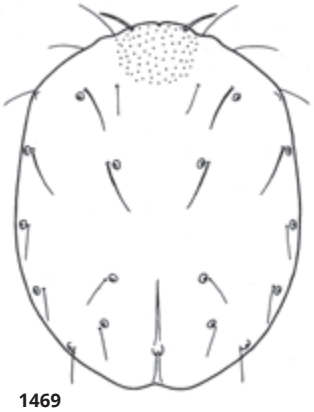
\- Excretory pore of male lying between gonopore and tip of cauda and may be seen in ventral view (Fig. 1470); male with a distinct cauda; a distinct ridge present on each side near lateral margins of dorsal shield (Fig. 1471) Subgenus *Kongsbergiella*



1467



1468



1469

1467 *Kongsbergia* (*Parakongsbergia*) *hansvietsi* K. Viets, I-leg-5 male (after Cook 1974)

1468 *Kongsbergia* (*Pseudokongsbergia*) *baderi* Cook, I-leg-4-6 male (after Cook 1974)

1469 *Kongsbergia* (*Kongsbergia*) *variabilis* Cook, dorsal shield female (after Cook 1974)

Subgenus *Kongsbergia* s.s.

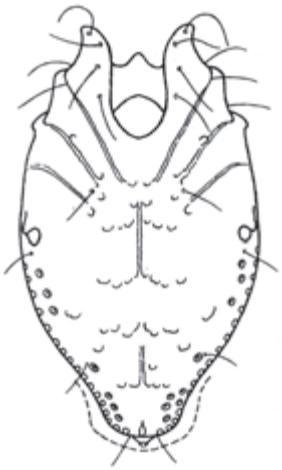
(Figs. 1446, 1447, 1469, 1472-1476)

1954 *Neokongsbergia* Lundblad, Arkiv för Zoologi (Serie 2) 5: 565 – Cook (1974).

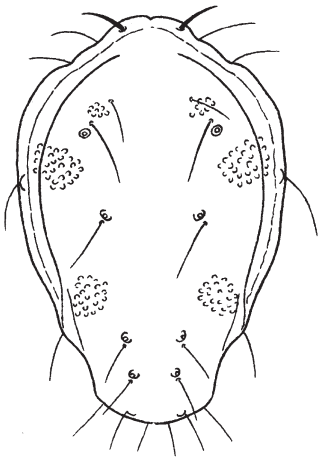
DIAGNOSIS: Dorsal shield often indented anteromedially; excretory pore lying on the dorsal shield in both sexes (Fig. 1469). Male without cauda. Neither I-leg-5 nor II-leg-5 with a large, heavy, curved seta ventrally.

HABITAT: Streams, interstitial.

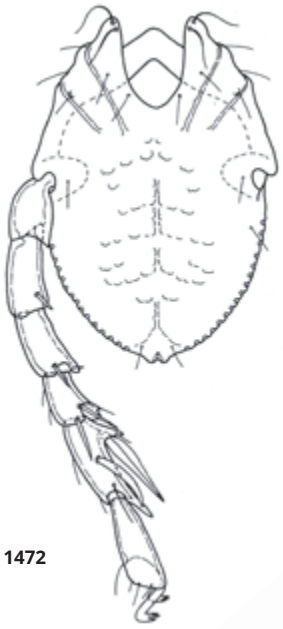
DISTRIBUTION: Worldwide, but not known from the Australasian region. Most species are known from the Holarctic regions.



1470



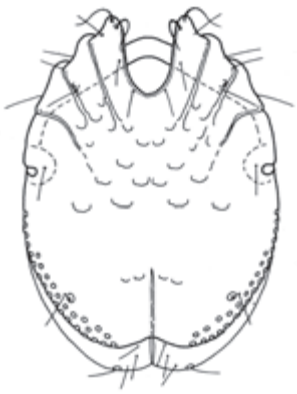
1471



1472



1473



1474



1475

1470 *Kongsbergia* (*Kongsbergiella*) *caudata* Cook, venter male (after Cook 1974)

1471 *Kongsbergia* (*Kongsbergiella*) *caudata* Cook, dorsum male (after Cook 1974)

1472 *Kongsbergia* (*Kongsbergia*) *parvatiya* Cook, venter with fourth leg male (after Cook 1974)

1473 *Kongsbergia* (*Kongsbergia*) *rucira* Cook, dorsal shield male (after Cook 1974)

1474 *Kongsbergia* (*Kongsbergia*) *variabilis* Cook, venter female (after Cook 1974)

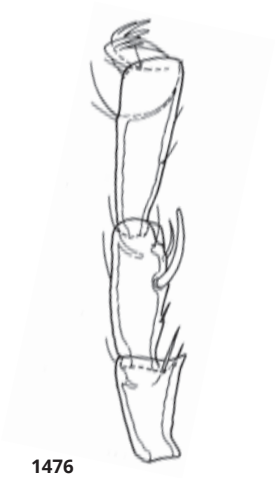
1475 *Kongsbergia* (*Kongsbergia*) *variabilis* Cook, palp female (after Cook 1974)

Subgenus *Crocokongsbergia* Orghidan & Gruia, 1980

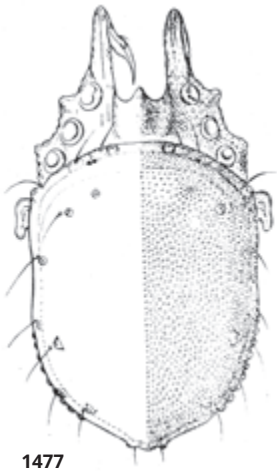
(Figs. 1465, 1466, 1477-1481)

1980 *Crocokongsbergia* Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 19: 143.

Type species: *Kongsbergia cooki* Orghidan & Gruia, 1980



1476



1477



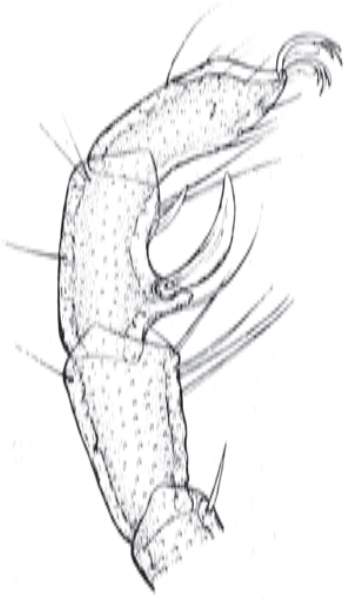
1478



1479



1480



1481

1476 *Kongsbergia* (*Kongsbergia*) *variabilis* Cook, IV-leg-4-6 male (after Cook 1974)

1477 *Kongsbergia* (*Crocokongsbergia*) *cooki* Orghidan & Gruia, dorsum male (after Orghidan & Gruia 1983b)

1478 *Kongsbergia* (*Crocokongsbergia*) *cooki* Orghidan & Gruia, dorsum female (after Orghidan & Gruia 1983b)

1479 *Kongsbergia* (*Crocokongsbergia*) *cooki* Orghidan & Gruia, venter female (after Orghidan & Gruia 1983b)

1480 *Kongsbergia* (*Crocokongsbergia*) *cooki* Orghidan & Gruia, palp male (after Orghidan & Gruia 1983b)

1481 *Kongsbergia* (*Crocokongsbergia*) *cooki* Orghidan & Gruia, IV-leg-4-6 male (after Orghidan & Gruia 1983b)

DIAGNOSIS: Cx-I of male with a pointed, hook-like extension, and with a short subapical projection (Figs. 1465-1466). In female Cx-I far projecting, without the hook-like extensions (Fig. 1479). Palp very long, especially P4 (Fig. 1480). Male IV-leg-5 ventrally with one large and one smaller heavy seta (Fig 1481).

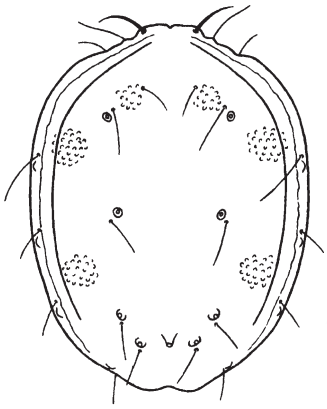
HABITAT: Streams.

DISTRIBUTION: Two species known from Cuba.

Subgenus *Kongsbergiella* Cook, 1966

(Figs. 1470, 1471, 1482-1486)

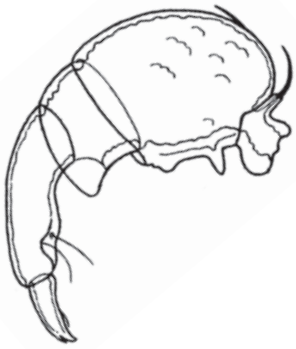
1966 *Kongsbergiella* Cook, Memoirs of the American Entomological Institute 6: 228.
Type species: *Kongsbergia caudata* Cook, 1966



1482



1483



1484



1485



1486



1487

1482 *Kongsbergia* (*Kongsbergiella*) *caudata* Cook, dorsum female (after Cook 1974)
1483 *Kongsbergia* (*Kongsbergiella*) *caudata* Cook, palp female (after Cook 1974)
1484 *Kongsbergia* (*Kongsbergiella*) *caudata* Cook, palp male (after Cook 1974)
1485 *Kongsbergia* (*Kongsbergiella*) *caudata* Cook, IV-leg-1 male (after Cook 1974)
1486 *Kongsbergia* (*Kongsbergiella*) *caudata* Cook, IV-leg-5-6 male (after Cook 1974)
1487 *Kongsbergia* (*Parakongsbergia*) *hansvietsi* K. Viets, dorsum male (after K. Viets 1949)

DIAGNOSIS: Male with a short cauda. A distinct ridge present on each side of the dorsal shield (Fig. 1471). Excretory pore located on a tubercle which lies free in the integument immediately posterior to the gonopore in male (Fig. 1471), but lying on the dorsal shield in the female. Palp of male stocky (Fig. 1484), palp of female more slender (Fig. 1483). IV-leg-1 of male with a long distal extension (Fig. 1485).

HABITAT: Streams.

DISTRIBUTION: One species known from Africa (Liberia). Cook (1974) reported the subgenus from Zimbabwe, without any details.

Subgenus *Parakongsbergia* K. Viets, 1949

(Figs. 1467, 1487-1489)

1949 *Parakongsbergia*, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 32: 328.

Type species: *Kongsbergia hansvietsi* K. Viets, 1949

DIAGNOSIS: (Male only) No cauda, excretory ore lying on the dorsal shield (Fig. 1487). Palp relatively slender (Fig. 1489). I-leg-5 (but not II-leg-5) with a heavy, curved ventral seta (Fig. 1467). I-leg-4 with a very long seta.

HABITAT: Interstitial.

DISTRIBUTION: One species known from North Macedonia.

Subgenus *Pseudokongsbergia* Walter, 1935

(Fig. 1434, 1445, 1468, 1490)

1935 *Pseudokongsbergia* Walter, Archiv für Hydrobiologie 28: 124.

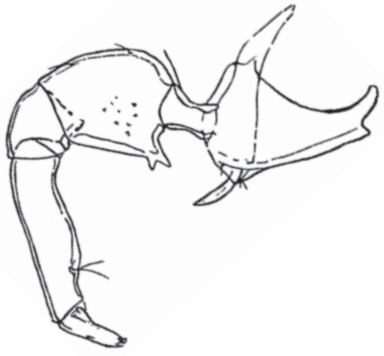
Type species: *Pseudokongsbergia longipalpis* Walter, 1935

DIAGNOSIS: Male without cauda development. Dorsal shield with a small anteromedial projection (Fig. 1490); excretory pore lying on the dorsal shield in both sexes. I-leg-5 (Fig. 1468) and II-leg-5 each with a large heavy, usually curved ventral seta in both sexes. Palp segments long in both sexes.

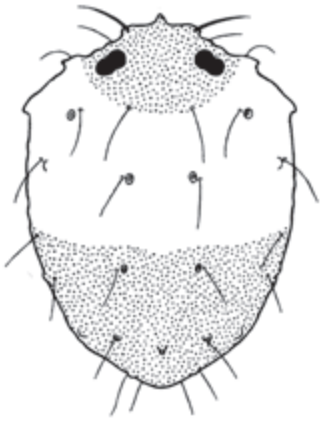
HABITAT: Streams.



1488



1489



1490

1488 *Kongsbergia* (*Parakongsbergia*) *hansvietsi* K. Viets, venter male (after K. Viets 1949)

1489 *Kongsbergia* (*Parakongsbergia*) *hansvietsi* K. Viets, gnathosoma + palp male (after K. Viets 1949)

1490 *Kongsbergia* (*Pseudokongsbergia*) *loffa* Cook, dorsal shield male (after Cook 1974)

DISTRIBUTION: Five species known from East and West Africa (Cook 1966).

REMARKS: The subgenus was erected by Walter (1935) based on a deutonymph. Cook (1966) tentatively assigned a number of species from Liberia to the subgenus, based on I-leg-5 and II-leg-5 both having a curved, stout seta.

Genus *Neoaturus* Lundblad, 1941

(Figs. 1437, 1440, 1491-1493)

1941 *Neoaturus* Lundblad, Entomologisk Tidskrift 62: 124.

Type species: *Aturus projectus* Lundblad, 1936

DIAGNOSIS: Dorsal shield fused anteriorly with ventral shield and bearing the postocularia, excretory pore and six pairs of widely scattered glandularia (Fig. 1440). Anterior coxae projecting beyond frontal idiosoma margin. Cx-IV with a pair of glandularia and extensions partially covering insertions of fourth legs (Fig. 1437). Posterior suture lines of Cx-IV lightly indicated. Genital field with numerous acetabula, these extending laterally from gonopore in several rows. Suture lines of genital field lightly indicated or obliterated. Gonopore terminal in both sexes. Gonopore of male may be located on a small projection. Female gonopore with a large articular membrane (Fig. 1491). Palp segments of moderate length and without ventral projections (Fig. 1492). Legs without swimming setae, without a pronounced sexual dimorphism of the legs, but IV-leg-5 and -6 of male with numerous slightly thickened setae (Fig. 1493).

HABITAT: Streams.

DISTRIBUTION: Several species known from South America (Brazil, Surinam, Columbia, Argentina) and Central America (Mexico, Cook 1980; Costa Rica, Cook 1980).

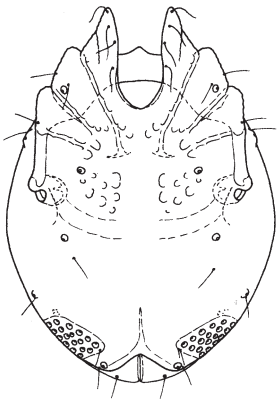
Genus *Phreatobrachypoda* Cook, 1963

(Figs. 1439, 1494-1498)

1963 *Phreatobrachypoda* Cook, American Midland Naturalist 70: 122.

1984 *Japonaxonopsis* Imamura, Human Science 1: 55 - I.M. Smith (1991a).

Type species: *Phreatobrachypoda multipora* Cook, 1963



1491



1492



1493

1491 *Neoaturus projectus* Lundblad, venter female (after Cook 1980)

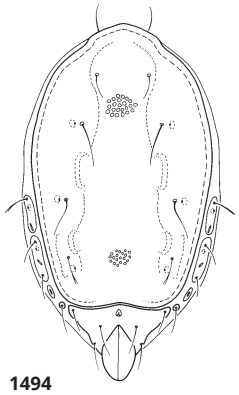
1492 *Neoaturus projectus* Lundblad, palp male (after Cook 1980)

1493 *Neoaturus projectus* Lundblad, IV-leg-5-6 male (after Cook 1980)

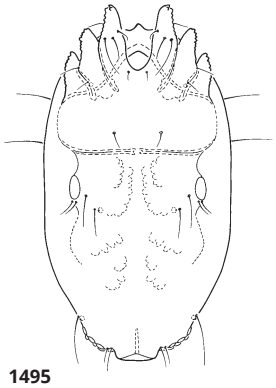
DIAGNOSIS: Lateral eyes reduced in size. Idiosoma elongate-elliptical or broad-elliptical in shape. In most species dorsal shield separated from ventral shield. Dorsal shield with one pair of well-defined ridges. Male dorsal shield bearing the postocularia and three pairs of glandularia (Fig. 1494). Female dorsal shield bearing the postocularia, excretory pore and three pairs of glandularia (Fig. 1439). Dorsal furrow with two pairs of lateroglandularia platelets and two pairs of setal platelets. Tips of Cx-I-III elongated and projecting beyond frontal idiosoma margin; Cx-IV with a pair of glandularia. A short ridge present on each side extending anterolaterally from insertion of fourth legs (Figs. 1495, 1496). Insertions of fourth legs with small or no associated projections. Genital field with ten to 15 pairs of acetabula. Genital field of male and excretory pore incorporated into a platelet posterior to dorsal shield (Fig. 1494), separated from ventral shield in the female. Male P4 slender, female P4 more stocky with a large ventral extensions. Palp without projections on P2; P4 with or without a setal tubercle (Fig. 1497). Legs without swimming setae. Fourth leg of male strongly bowed and with segments stocky and greatly expanded; distal segments variously modified and bearing rows of stout setae (Fig. 1498).

HABITAT: Interstitial.

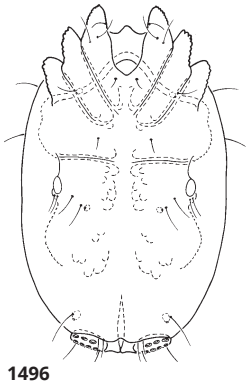
DISTRIBUTION: On species known from Japan and several species from the United States (Cook 1963a, 1974, I.M. Smith 1991a, I.M. Smith & Cook 2010).



1494



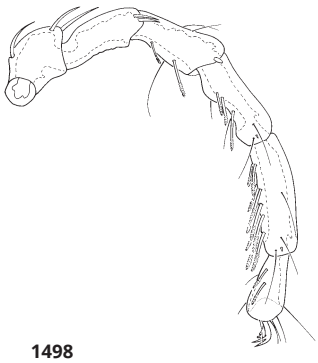
1495



1496



1497



1498



1499

1494 *Phreatobrachypoda multipora* Cook, dorsum male (after I.M. Smith 1991a)

1495 *Phreatobrachypoda multipora* Cook, venter male (after I.M. Smith 1991a)

1496 *Phreatobrachypoda multipora* Cook, venter female (after I.M. Smith 1991a)

1497 *Phreatobrachypoda multipora* Cook, palp male (after I.M. Smith 1991a)

1498 *Phreatobrachypoda multipora* Cook, fourth leg male (after I.M. Smith 1991a)

1499 *Subalbia longipalpis* Cook, venter male (after Cook 1974)

Genus *Subalbia* K. Viets, 1914

(Figs. 1427, 1430, 1499-1501)

1914 *Subalbia* K. Viets, Archiv für Hydrobiologie 9: 193 – Cook (1966).

Type species: *Subalbia proceripalpis* K. Viets, 1914

DIAGNOSIS: Dorsal shield bearing the postocularia, excretory pore and six pairs of glandularia, typically grouped near the middle and a pair at extreme posterior end (Fig. 1427). A pair of glandularia tubercles flanking the dorsal shield posterolaterally. Anterior coxae projecting beyond frontal idiosoma margin, gnathosomal bay deep. Projections of Cx-IV partially covering the insertions of fourth legs. A ridge on each side extending anterolaterally from region of insertions of fourth legs. Two pairs of glandularia located between genital field and the suture line between Cx-III and Cx-IV (Figs. 1499, 1500). Genital field with numerous acetabula, extending laterally along the sides of ventral shield in two or three rows. Suture lines of genital field distinct. Gonopore of male subterminal and relatively large, gonopore of female subterminal and relatively small. Palp segments very long, P2 not noticeably higher than other segments and without ventral projections (Fig. 1430). Legs without swimming setae, male II-leg-5 or III-leg-5 (Fig. 1501) with stout setae.

HABITAT: Streams.

DISTRIBUTION: Six species known from West Africa (Liberia, Cook 1966; Mali; Cameroon; Ghana, Smit 2016b).

Genus *Subaturus* K. Viets, 1916

(Figs. 1428, 1435, 1436, 1502-1504)

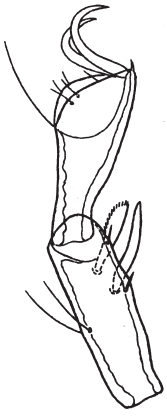
1916 *Subaturus* K. Viets, Archiv für Hydrobiologie 11: 335.

Type species: *Aturus sulcatus* K. Viets, 1916

DIAGNOSIS: Dorsal shield apparently with three pairs of glandularia arranged in two rows in central part, a pair of glandularia tubercles attached to extreme posterior end, the postocularia, excretory pore and three longitudinal ridges (Fig. 1428). Anterior coxae projecting beyond frontal idiosoma margin, gnathosomal bay relatively deep. Projections of Cx-IV partially covering the insertions of fourth legs. A ridge on each side extending anterolaterally from region of insertions of fourth legs. Three pairs of glandularia located between genital field and suture line of Cx-III/Cx-IV (Figs. 1435,



1500



1501



1502

1500 *Subalbia longipalpis* Cook, venter female (after Cook 1974)

1501 *Subalbia longipalpis* Cook, III-leg-5-6 male (after Cook 1966)

1502 *Subaturus expansus* Cook, venter female (after Cook 1974)

1502). Genital field with numerous acetabula, extending along margins of ventral shield in one or two rows. Suture line of genital plates distinct in female but obliterated in male. Gonopore relatively large, in male subterminal, in female terminal. Palp segments stocky and without ventral projections in both sexes (Fig. 1503). Legs without swimming setae. Claws of male first leg slightly to greatly enlarged (Fig. 1504), male II-leg-5 expanded ventrally with an anteriorly directed seta (Fig. 1436).

HABITAT: Streams.

DISTRIBUTION: Four species known from West Africa (Liberia, Cook 1966; Cameroon; Ghana, Smit 2016b).

Subfamily Notoaturinae Besch, 1964

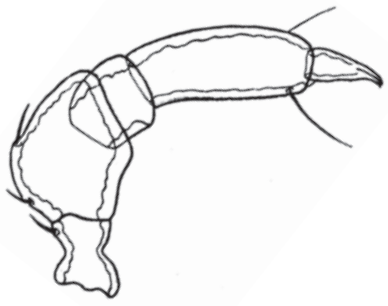
1964 Notoaturinae Besch, Beiträge zur Neotropischen Fauna 3: 158.

1977 Zelandopsinae Imamura, Journal of the Speleological Society of Japan 2: 9 - new syn.

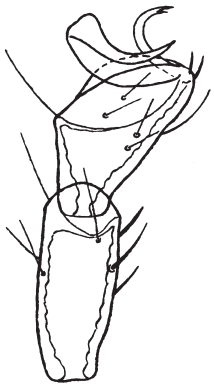
DIAGNOSIS: Idiosoma flattened with dorsal and ventral shields. Dorsal composed of two large plates, anteromedial plate single or paired with the postocularia, posteromedial plate always unpaired, laterally with 2-3 platelets, occasionally more. A free pair of dorsal glandularia may be present between lateral platelets and posteromedial plate, occasionally these free glandularia between anteromedial plate(s) and posteromedial plate. The anterodorsal portion of the ventral shield may be produced into a well-developed hood-like structure. Cx-I extending beyond frontal idiosoma margin. Acetabula varying from four pairs to numerous, lying either on the ventral shield or on genital plates. Palp may be with sexual dimorphism. Fourth legs in many genera with sexual dimorphism, occasionally also first leg.

DISTRIBUTION: The subfamily has a typical Gondwanan distribution, with genera known form Australia, New Zealand, South Africa and Chile. One genus is known from eastern Africa. Remarkably, no members of the subfamily have been found in New Guinea and New Caledonia. When Cook (1974) published his "Water mite genera and subgenera", only seven genera were known (two ranked as subgenus, one in a different subfamily). Up to date 38 genera are now known, which means a considerable increase of our knowledge of this Austral subfamily.

REMARKS: Imamura (1977a) erected the subfamily Zelandopsinae for the genus *Zelandopsis*. However, *Zelandopsis* is a typical notoaturine water mite genus, and the erection of a new subfamily is therefore not necessary.



1503



1504



1505

1503 *Subaturus expansus* Cook, palp female (after Cook 1974)

1504 *Subaturus expansus* Cook, I-leg-5-6 male (after Cook 1974)

1505 *Notaxona ochiepus* Besch, venter female (after Cook 1988)

KEY TO THE GENERA

1 Four pairs of acetabula (Figs. 1505, 1506); more than four pairs of laterodorsal platelets Genus *Notaxona*

- Five to numerous pairs of acetabula; less than four pairs of laterodorsal platelets 2

2 Four pairs of laterodorsal glandularia platelets (Fig. 1508) Genus *Colobaturus*

- Two to three pairs of laterodorsal glandularia platelets 3

3 Three pairs of laterodorsal glandularia platelets (Fig. 1509) 4

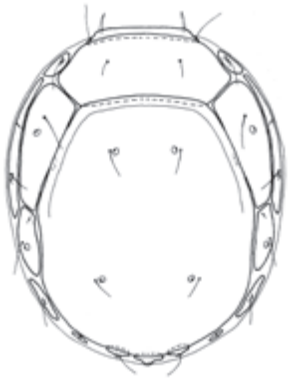
- Two pairs of laterodorsal glandularia platelets (Fig. 1510), but posterolateral platelet may be partially fused with posteromedial plate (Fig. 1685) 6

4 Postocularia lying close to anterior margin of anteromedial dorsal plate; posteromedial dorsal plate without glandularia (Fig. 1509) Genus *Valsaturus*

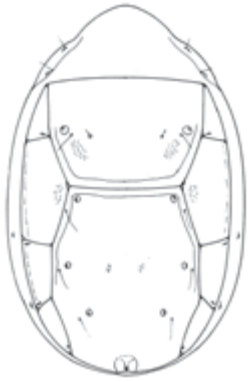
- Postocularia lying more near the centre of anteromedial plate; posteromedial dorsal plate with a pair of glandularia (Fig. 1511) 5



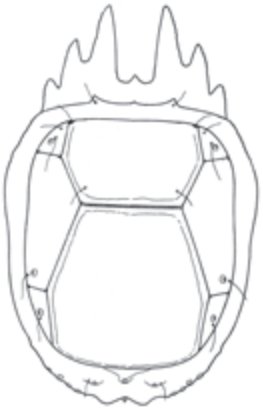
1506



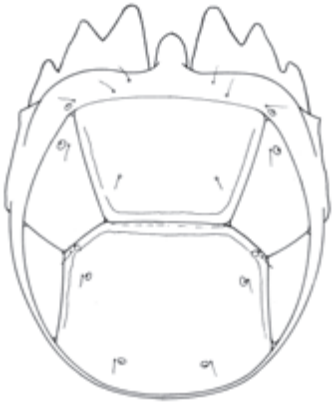
1507



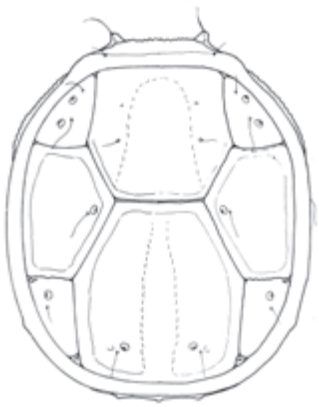
1508



1509



1510



1511

1506 *Notaxona ochiepus* Besch, genital field male (after Cook 1988)

1507 *Notaxona ochiepus* Besch, dorsum female (after Cook 1988)

1508 *Colobaturus diamphidus* Cook, dorsum female (after Cook 1991)

1509 *Valsaturus longipalpis* Cook, dorsum male (after Cook 1998)

1510 *Hestaturus ovalis* Cook, dorsum male (after Cook 1991)

1511 *Amperaturus* (*Amperaturus*) *rensburgi* Cook, dorsum male (after Cook 1998)

5 Anterolateral dorsal glandularia platelet with two pairs of glandularia (Fig. 1511); acetabula confined to gonopore area (Fig. 1512) Genus *Amperaturus*

- Anterolateral dorsal glandularia platelet with one pair of glandularia (Fig. 1513); acetabula extending laterally to lateral margins of idiosoma (Fig. 1514) Genus *Masabania*

6(3) Anteromedial plate unpaired (Fig. 1510) 7

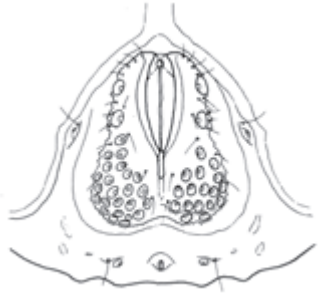
- Anteromedial plates paired (Fig. 1515) 31

7 Between laterodorsal platelets and posteromedial plate no "free" glandularia, all dorsoglandularia lying on a plate (Fig. 1510) 8

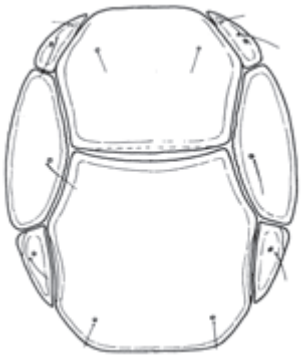
- "Free" glandularia present (Fig. 1516) 19

8 Posteromedial dorsal plate with three pairs of glandularia (Fig. 1510), posterior pair may be difficult to see in dorsal view 9

- Posteromedial dorsal plate with two pairs of glandularia (occasionally glandularia absent but associated setae still present) (Fig. 1517) 12



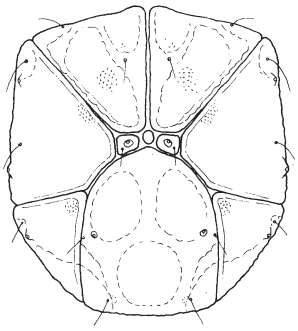
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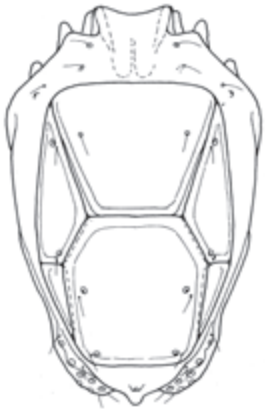
1514



1515



1516



1517

1512 *Amperaturus* (*Amperaturus*) *rensburgi* Cook, genital field male (after Cook 1998)

1513 *Masabania plumosa* Walter & Bader, dorsum female (after Cook 1974)

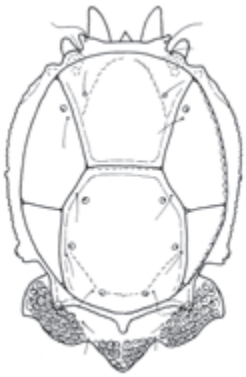
1514 *Masabania plumosa* Walter & Bader, venter male (after Cook 1974)

1515 *Notoaturus leptoglyphus* Besch, dorsum female (after Cook 1988)

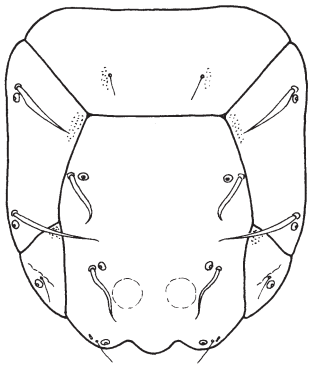
1516 *Taintaturus hopkinsi* Cook, dorsum male (after Cook 1983)

1517 *Planaturus setipalpis* Cook, dorsum male (after Cook 1983)

9	With a small hood-like structure (Fig. 1510)	Genus *Hestaturus*
-	Without hood-like structure (Fig. 1518)	10
10	Posterolateral plates with a pair of glandularia (Fig. 1519); dorsum of male with enlarged setae	11
-	Posterolateral plates without a pair of glandularia (Fig. 1518); dorsum of male without enlarged setae	Genus *Tryssaturopsis*
11	Males with enlarged setae on dorsal posteromedial plate only (Fig. 1528), Cx-IV of females without a distinct medial margin (Fig. 1684)	Genus *Spinaturus*
-	Males with enlarged setae on dorsal anterolateral platelets and posteromedial plate (Fig. 1519), Cx-IV in females with a distinct medial margin (Fig. 1590)	Genus *Noesaturus* (in part)
12(8)	IV-leg-2 in both sexes longer than other segments of the leg; IV-leg-3 very small, partially covered by IV-leg-2 (Fig. 1520)	13
-	IV-leg-2 not longer than other segments of the leg; IV-leg-3 more typical (Fig. 1521)	14



1518



1519



1520



1521



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1522



1523

1518 *Tryssaturopsis novus* (Hopkins), dorsum male (after Cook 1983)

1519 *Noesaturus expansipes* Cook, dorsum male (after Cook 1988)

1520 *Planaturus setipalpis* Cook, fourth leg male (after Cook 1983)

1521 *Kritaturus* (*Caudaturus*) *tenonus* Cook, fourth leg male (after Cook 1983)

1522 *Canterburaturus minutus* Pesic & Smit, dorsum female (after Pesic et al. 2010c) Reproduced with permission from copyright holder

1523 *Kritaturus* (*Kritaturus*) *gennadus* Cook, dorsum male (after Cook 1983)

13 Posterolateral dorsal platelets with a pair of glandularia (Fig. 1522) Genus *Canterburaturus*

- Posterolateral dorsal platelets without glandularia (Fig. 1517) Genus *Planaturus*

14(12) Anterolateral dorsal platelet with two pairs of glandularia (Fig. 1523) 15

- Anterolateral dorsal platelet with one pair of glandularia (Fig. 1524) 16

15 Dorsal shield small, covering a small part of the dorsum only; anteromedial dorsal plate much larger than posteromedial dorsal plate (Fig. 1525) Genus *Acidoturus*

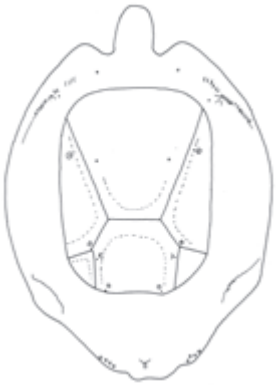
- Dorsal shield covering nearly complete dorsum; anteromedial dorsal plate not much larger than posteromedial dorsal plate (Fig. 1526) Genus *Kritaturus*

16(14) Posterolateral dorsal platelet with a pair of glandularia (Fig. 1524) 17

- Posterolateral platelet without glandularia but glandularia seta may be present (Fig. 1530) 18



1524



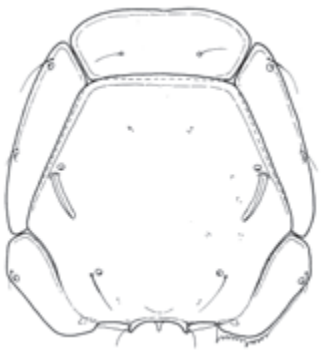
1525



1526



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1528



1529

1524 *Zelandalbia imamurai* Cook, dorsum female (after Cook 1983)

1525 *Acidoturus parviscutatus* Smit, dorsum female (after Smit 2019a)

1526 *Kritaturus* (*Caudaturus*) *tenonus* Cook, dorsum male (after Cook 1983)

1527 *Spinaturus ctenophorus* Cook, palp male (after Cook 1986)

1528 *Spinaturus ctenophorus* Cook, dorsum male (after Cook 1986)

1529 *Kritaturus* (*Kritaturus*) *gennadus* Cook, palp female (after Cook 1983)

17 Legs very stocky (Fig. 1531); a ridge posteriorly from openings of fourth legs (Fig. 1532) Genus *Zelandalbia*

- Legs not very stocky (Fig. 1533); no ridge posteriorly from openings of fourth legs (Fig. 1534) Genus *Schwoerbelaturus*

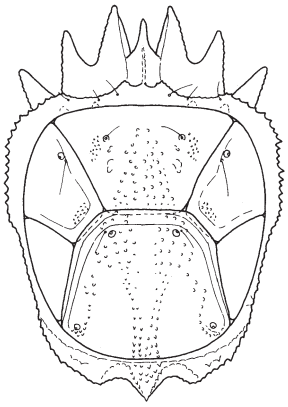
18(16) Palp very long, P2 with fine, pointed ventral setae (Fig. 1535); posterolateral platelet without glandularia, but glandularia setae present (Fig. 1536) Genus *Uralbia*

- Palp not very long, P2 without ventral setae (Fig. 1537); posterolateral platelet without glandularia (Fig. 1530) Genus *Evidaturus* (in part)

19(7) IV-L-2 longer than other segments of the leg (Fig. 1538) 20

- IV-L-2 not longer than other segments of the leg (Fig. 1539) 23

20 Anteromedial plate only slightly more than one-fourth as long as posteromedial plate (Fig. 1540); male gonopore lying far anteriorly (Fig. 1541) Genus *Zelandopsis*



1530



1531



1532



1533



1534



1535

1530 *Evidaturus scopticus* Cook, dorsum male (after Cook 1983)

1531 *Zelandalbia imamurai* Cook, fourth leg female (after Cook 1983)

1532 *Zelandalbia imamurai* Cook, venter female (after Cook 1983)

1533 *Schwoerbelaturus aturoides* (Schwoerbel), IV-leg-4-6 male (after Smit 2019a)

1534 *Schwoerbelaturus aturoides* (Schwoerbel), venter male (after Smit 2019a)

1535 *Uralbia projecta* Hopkins, gnathosoma + palp female (after Cook 1983)

- Anteromedial plate more than half as long as posteromedial plate (Fig. 1542), male gonopore lying near posterior idiosoma margin (Figs. 1543, 1547) 21

21 Without a hood-like structure (Fig. 1542); palp segments relatively long (Fig. 1544) Genus *Omegaturus*

- With a hood-like structure (Fig. 1545); palp segments normal in shape (Fig. 1546) 22

22 Gnathosoma attached to a protrusable tube; projections associated with fourth legs very large and pointed (Fig. 1547) Genus *Abelaturus*

- Gnathosoma not attached to a protrusable tube; projections associated with fourth legs much smaller (Fig. 1548) Genus *Taintaturus*

23(19) Anterodorsal part of ventral shield tapering to a well-developed medial point (Fig. 1549); excretory pore lying ventrally (Fig. 1550) Genus *Paratryssaturus*

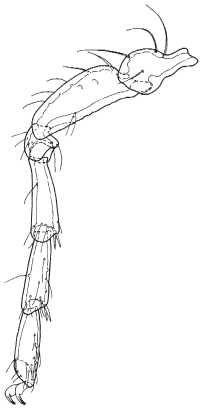
- Anterodorsal part of ventral shield more or less truncate or indented (Fig. 1551); if anterodorsal part of ventral shield is medially slightly pointed (Fig. 1552), than excretory pore is terminal or dorsal 24



1536



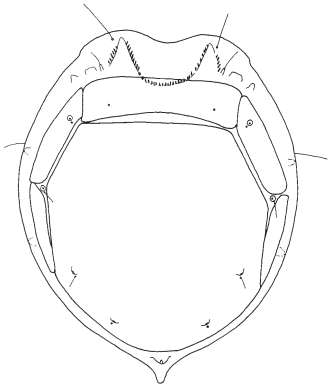
1537



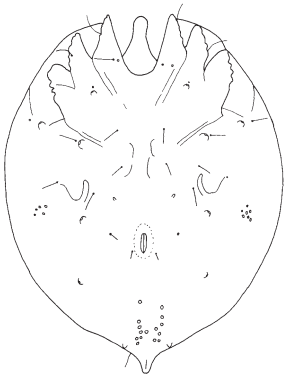
1538



1539



1540



1541

1536 *Uralbia projecta* Hopkins, dorsum male (after Cook 1983)

1537 *Evidaturus exilis* Cook, palp female (after Cook 1983)

1538 *Omegaturus longipalpis* Cook, fourth leg male (after Cook 1983)

1539 *Paratryssaturus minutus* (Hopkins), fourth leg male (after Cook 1983)

1540 *Zelandopsis morimotoi* Imamura, dorsum male (after Smit 2019a)

1541 *Zelandopsis morimotoi* Imamura, venter male (after Smit 2019a)

24 Postocularia and all four pairs of glandularia of dorsum on tubercles (Fig. 1551); posterior suture lines of fourth coxae extending decidedly posteromedially (Fig. 1553) Genus *Pilosaturus*

- Postocularia and all four pairs of glandularia of dorsum not on tubercles (Fig. 1554); posterior suture lines of fourth coxae more or less at right angles to idiosoma axis or slightly anteromedially (Fig. 1555) 25

25 IV-leg-1 shorter or as long as IV-leg-2 (Fig. 1556) 26

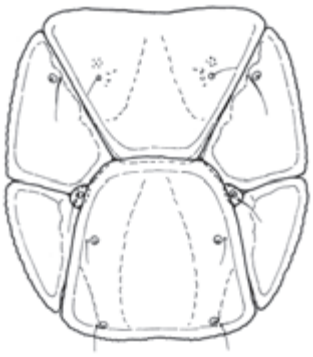
- IV-leg-1 longer than IV-leg-2 (Fig. 1557) 28

26 Male IV-L-5 enlarged with a large anterodorsal extension (Fig. 1556) Genus *Piotaturus*

- Male IV-leg-5-leg without an anterodorsal extension (Fig. 1558) 27

27 P2 ventrally with pointed setae (Fig. 1559); IV-leg-1 as long as IV-leg-2 (Fig. 1560); idiosoma anteriorly wider than posteriorly (Fig. 1561) Genus *Zelandaturus*

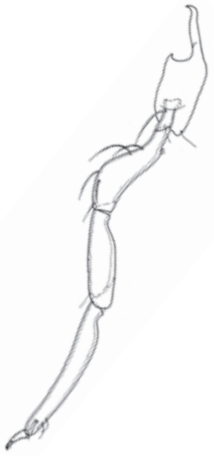
P2 without ventral setae (Fig. 1562); IV-leg-1 much shorter than IV-leg-2 (Fig. 1558); idiosoma anteriorly as wide as posteriorly (Fig. 1563) Genus *Bleptaturus*



1542



1543



1544



1545



1546



1547

1542 *Omegaturus longipalpis* Cook, dorsum male (after Cook 1983)

1543 *Omegaturus longipalpis* Cook, venter male (after Cook 1983)

1544 *Omegaturus longipalpis* Cook, gnathosoma + palp female (after Cook 1983)

1545 *Abelaturus cornophorus* Cook, dorsum female (after Cook 1983)

1546 *Abelaturus cornophorus* Cook, palp female (after Cook 1983)

1547 *Abelaturus cornophorus* Cook, venter male (after Cook 1983)

28(25) Cxgl-4 near suture line Cx-III/IV (Fig. 1564); IV-L of males not modified (Fig. 1565) 29

- Cxgl-4 near middle of Cx-IV (Fig. 1566); IV-L modified, with either IV-leg-4 lengthened and IV-leg-5 enlarged (Fig. 1567), or fourth leg segments with several stout setae (Fig. 1568) 30

29 Glandularia of posteromedial dorsal plate only in posterior half (Fig. 1569) Genus *Pseudotryssaturus*

- Glandularia of posteromedial dorsal plate also in anterior half (Fig. 1570) Genus *Evidaturus* (in part)

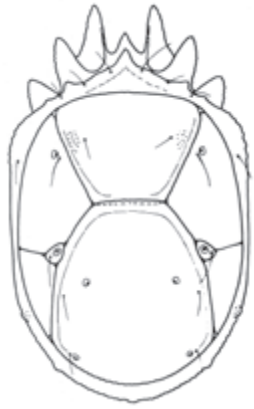
(maybe an aberrant specimen, with only at one side a free glandularium)

30(28) Dorsal shield as wide, or nearly as wide, as long, surface not reticulate; males with a distinct cauda (Fig. 1571) Genus *Neotryssaturus*

- Dorsal shield much longer than wide, surface reticulate; males without a distinct cauda (Fig. 1572) Genus *Tryssaturus*



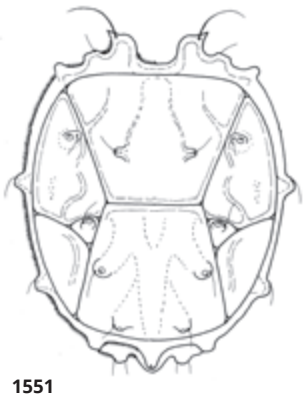
1548



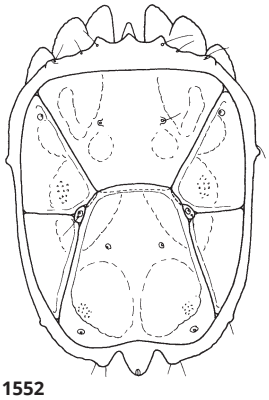
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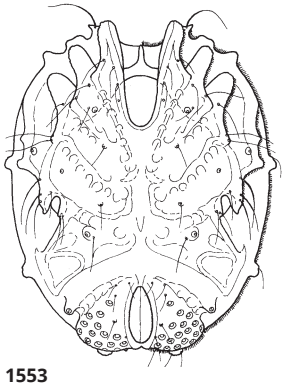
1550



1551



1552



1553

1548 *Taintaturus hopkinsi* Cook, venter male (after Cook 1983)
1549 *Paratryssaturus minutus* (Hopkins), dorsum male (after Cook 1983)
1550 *Paratryssaturus minutus* (Hopkins), venter male (after Cook 1983)
1551 *Pilosaturus villosus* (Hopkins), dorsum male (after Cook 1983)
1552 *Piotaturus bovalus* Cook, dorsum female (after Cook 1983)
1553 *Pilosaturus villosus* (Hopkins), venter female (after Cook 1983)

31(6) Dorsum besides the paired anteromedial plates and the unpaired posteromedial plate, with one central unpaired platelet and four paired lateral platelets (Fig. 1573) Genus *Thryptaturus*

\- Dorsum with two paired lateral platelets 32

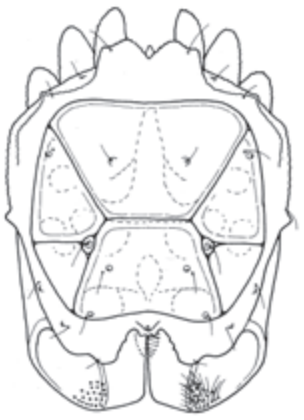
32 "Free" glandularia present between anteromedial plates and posteromedial plate (the two glandularia platelets may be fused, Fig. 1574) Genus *Notoaturus*

\- No "free" glandularia present (Fig. 1575) 33

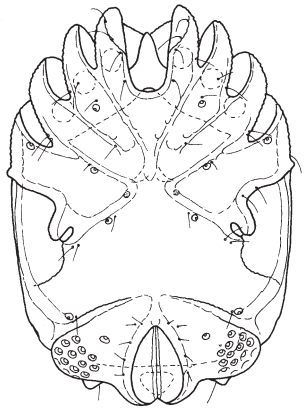
(from here on females cannot always be assigned to a genus)

33 Male I-leg-6 enlarged forming a large sheath (Fig. 1576); palp very long, P2 ventrally with spine-like setae (Fig. 1577) Genus *Davidsia*

\- First leg not modified (Fig. 1578), P2 without spine-like setae (Fig. 1579) 34



1554



1555



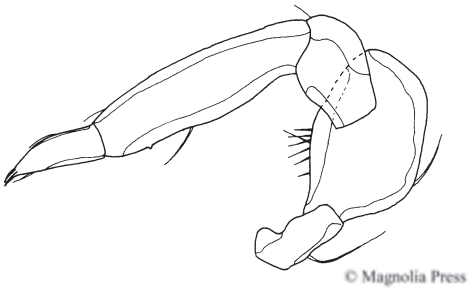
1556



1557



1558



1559

1554 *Piotaturus alvecaudatus* Cook, dorsum male (after Cook 1983)

1555 *Piotaturus alvecaudatus* Cook, venter female (after Cook 1983)

1556 *Piotaturus alvecaudatus* Cook, fourth leg male (after Cook 1983)

1557 *Pseudotryssaturus dapsilus* Cook, fourth leg male (after Cook 1983)

1558 *Bleptaturus magnipalpis* Cook, fourth leg male (after Cook 1991)

1559 *Zelandaturus magnipes* Smit, palp male (after Smit 2015c) Reproduced with permission from copyright holder

34 Posterior margin of Cx-IV directed decidedly posteromedially (Fig. 1580); P4 of male with a flap-like extension of the medial surface (Fig. 1581), P4 of female with a mediodistal pointed extension (Fig. 1579) Genus *Barwontius*

- Posterior margin of Cx-IV directed transverse or nearly so (Fig. 1582); P4 various in shape 35

35 Cx-III and Cx-IV with longitudinal ridges (Fig. 1582); ventral setae of P4 located medially on ventral margin (Fig. 1583) Genus *Twarntaturus*

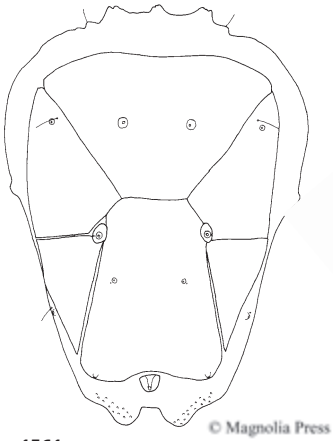
- Cx-III and Cx-IV generally without longitudinal ridges (Fig. 1584); if coxae with ridges, then ventral setae of P4 located subdistally on ventral margin (Fig. 1585) 36

36 P2 anteroventrally with a single stout projection (Fig. 1586) Genus *Azugaturus*

- P2 ventrally or anteroventrally with several denticles (Fig. 1587) 37


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1560


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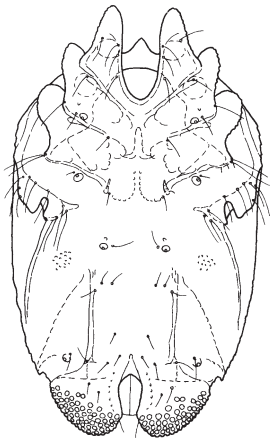
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1565

1560 *Zelandaturus magnipes* Smit, fourth leg male (after Smit 2015c) Reproduced with permission from copyright holder

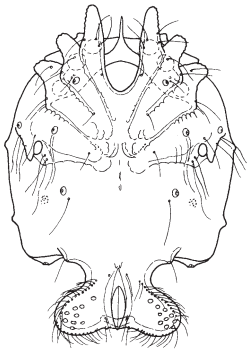
1561 *Zelandaturus magnipes* Smit, dorsum male (after Smit 2015c) Reproduced with permission from copyright holder

1562 *Bleptaturus magnipalpis* Cook, palp male (after Cook 1991)

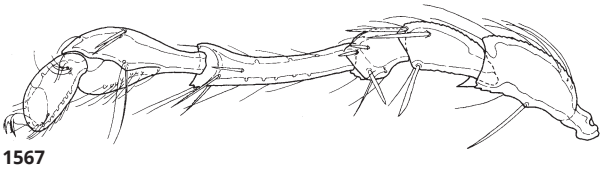
1563 *Bleptaturus magnipalpis* Cook, dorsum male (after Cook 1991)

1564 *Pseudotryssaturus indentatus* (Hopkins), venter male (after Cook 1983)

1565 *Evidaturus exilis* Cook, fourth leg male (after Cook 1983)



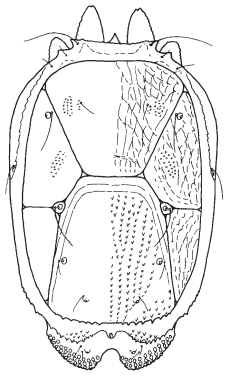
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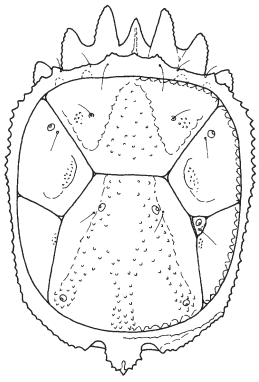
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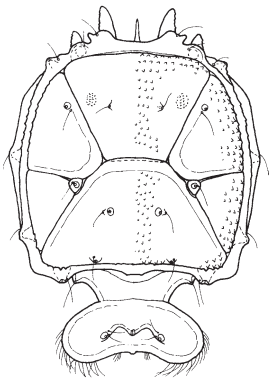
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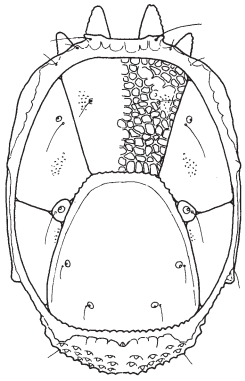
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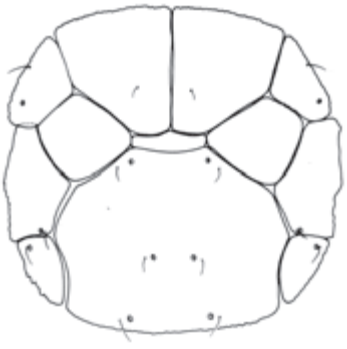
1570



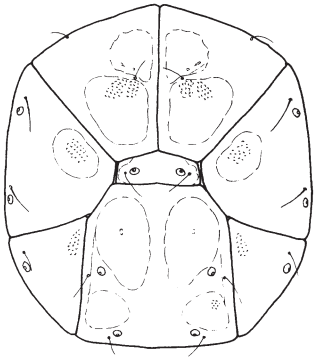
1571



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1566 *Neotryssaturus inusitatus* (Hopkins), venter male (after Cook 1983)
1567 *Neotryssaturus inusitatus* (Hopkins), fourth leg male (after Cook 1983)
1568 *Tryssaturus spinipes* Hopkins, fourth leg male (after Cook 1983)
1569 *Pseudotryssaturus indentatus* (Hopkins), dorsum male (after Cook 1983)
1570 *Evidaturus exilis* Cook, dorsum female (after Cook 1983)
1571 *Neotryssaturus inusitatus* (Hopkins), dorsum male (after Cook 1983)
1572 *Tryssaturus spinipes* Hopkins, dorsum male (after Cook 1983)
1573 *Thryptaturus boultoni* Harvey, dorsum male (after Harvey 1998b)
1574 *Notoaturus arrenuripalpis* Cook, dorsum male (after Cook 1988)

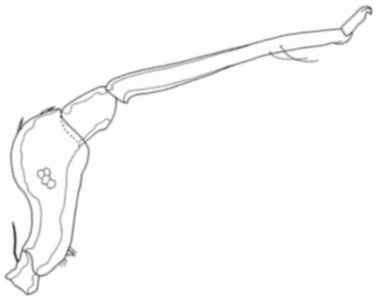
37 Ventral setae of P4 located near the middle of segment (Fig. 1587) 38
- Ventral setae of P4 located in the anterior half of segment (Fig. 1575) 39



1575



1576



1577



1578



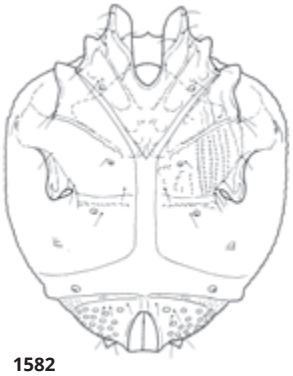
1579



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1583

1575 *Davidsia aurita* Smit, dorsum male (after Smit 2007a)
1576 *Davidsia aurita* Smit, I-leg-3-6 male (after Smit 2007a)
1577 *Davidsia aurita* Smit, palp male (after Smit 2007a)
1578 *Barwontius inflatipalpis* K.O. Viets, I-leg-4-6 male (after Cook 1986)
1579 *Barwontius inflatipalpis* K.O. Viets, gnathosoma + palp female (after Cook 1986)
1580 *Barwontius inflatipalpis* K.O. Viets, venter male (after Cook 1986)
1581 *Barwontius inflatipalpis* K.O. Viets, palp male (after Cook 1986)
1582 *Twarntaturus australicus* Cook, venter female (after Cook 1986)
1583 *Twarntaturus australicus* Cook, palp female (after Cook 1986)

38 Genital plates of female separated (Fig. 1588); male genital field triangular in shape, with paired concavities anterior to gonopore (Fig. 1589) Genus *Melanaturus*

- Genital plates of female fused (Fig. 1590); male genital field not triangular in shape, no paired concavities anterior to gonopore (Fig. 1591) Genus *Noesaturus* (in part)

39(37) Male genital field triangular in shape (Fig. 1592) Genus *Cabellaturus*

- Male genital field not triangular in shape (Fig. 1593) Genus *Austraturus*

Genus *Abelaturus* Cook, 1983

(Figs. 1545-1547, 1595, 1596)

1983 *Abelaturus* Cook, Contributions of the American Entomological Institute 21: 61.
Type species: *Abelaturus cornophorus* Cook, 1983



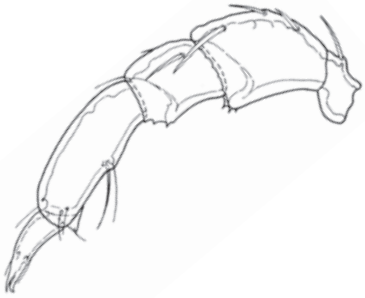
1584



1585



1586



1587



1588



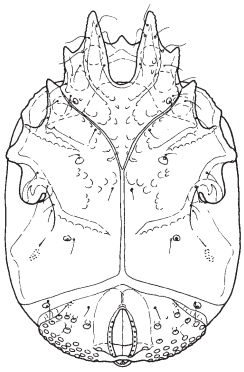
1589

1584 *Azugaturus distinctus* Cook, venter female (after Cook 1986)
1585 *Austraturus uncicoxalis* Cook, gnathosoma + palp female (after Cook 1986)
1586 *Azugaturus distinctus* Cook, palp female (after Cook 1986)
1587 *Melanaturus concavus* Cook, palp female (after Cook 1986)
1588 *Melanaturus concavus* Cook, venter female (after Cook 1986)
1589 *Melanaturus concavus* Cook, venter male (after Cook 1986)

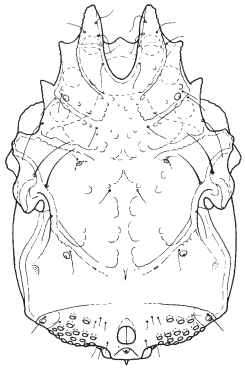
DIAGNOSIS: Lateral eye pigment reduced. Dorsum with an unpaired anteromedial plate, the posteromedial plate with two pairs of glandularia and two pairs of lateral platelets. Anterolateral dorsal platelet with a pair of glandularia, posterolateral platelet without glandularia. A free pair of glandularia present between lateral platelets and posteromedial plate, but occasionally one the these glandularia fused with posterolateral platelet. Dorsal plates and platelets reticulate. Anterodorsal part of ventral shield with a hood-like structure which extends beyond anterior tip of Cx-I (Fig. 1545). Projections associated with insertions of fourth legs very large and pointed (Figs. 1547, 1595). Gnathosoma much longer than high, without anchoral process, attached to a tube to form somewhat protrusable mouthparts. P2 without ventral extension (Fig. 1546). Legs without swimming setae. Leg segments laterally compressed. IV-L-2 longer than other segments of leg in both sexes and covering partially IV-leg-3 (Fig. 1596).

HABITAT: Interstitial and deep interstitial waters.

DISTRIBUTION: Three species known from North and South Island, New Zealand (Cook 1991, Pesic et al. 2010c).



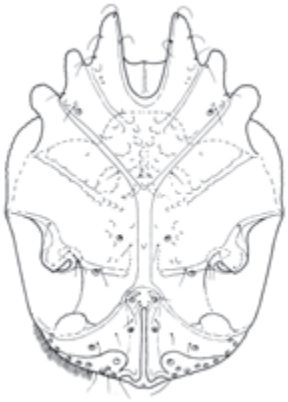
1590



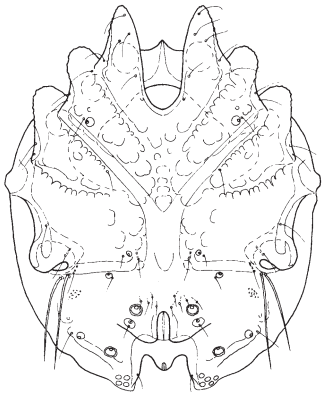
1591



1592



1593



1594



1595

1590 *Noesaturus otendus* Cook, venter female (after Cook 1988)

1591 *Noesaturus otendus* Cook, venter male (after Cook 1988)

1592 *Cabellaturus triangularis* Cook, venter male (after Cook 1986)

1593 *Austraturus vietsi* Cook, venter male (after Cook 1986)

1594 *Austraturus coomensis* Imamura, venter male (after Cook 1986)

1595 *Abelaturus cornophorus* Cook, venter female (after Cook 1983)

Genus *Acidoturus* Smit, 2019

(Figs. 1525, 1597-1599)

2019 *Acidoturus* Smit, Acarologia 59: 365.

Type species: *Acidoturus parviscutatus* Smit, 2019

DIAGNOSIS: (Female only) Integument smooth. Dorsal shield small, covering only half of the dorsum, consisting of unpaired anteromedial and posteromedial plates and two pairs of lateral platelets. Anteromedial plate with a pair of postocularia, much larger than posteromedial plate, the latter with two pair of glandularia. Anterolateral platelets each with two pairs of glandularia, posterolateral platelets without glandularia. No "free" glandularia on the dorsal shield (Fig. 1525). Anterodorsal portion of ventral shield protruding into a rounded hood. All coxae pointed. Projections associated with insertion of fourth legs very large (Fig. 1597). A pair of glandularia medially to insertions of fourth legs. Gonopore terminal in position, genital plates somewhat bulging and extending onto dorsum. Palp rather stocky, especially P4 (Fig. 1598). IV-leg-2 much larger than other segments, suture line separating IV-leg-2 from IV-leg-3 obliterated (Fig. 1599).

HABITAT: Interstitial.

DISTRIBUTION: One species known from South Island, New Zealand.



1596



1597



1598



1599



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1600



1601

1596 *Abelaturus cornophorus* Cook, fourth leg female (after Cook 1983)

1597 *Acidoturus parviscutatus* Smit, venter female (after Smit 2019a)

1598 *Acidoturus parviscutatus* Smit, gnathosoma + palp female (after Smit 2019a)

1599 *Acidoturus parviscutatus* Smit, fourth leg female (after Smit 2019a)

1600 *Amperaturus* (*Shebaturus*) *globulipes* Smit, IV-leg-3-6 male (after Smit 2017a) Reproduced with permission from copyright holder

1601 *Amperaturus* (*Amperaturus*) *rensburgi* Cook, IV-leg-3-6 male (after Cook 1998)

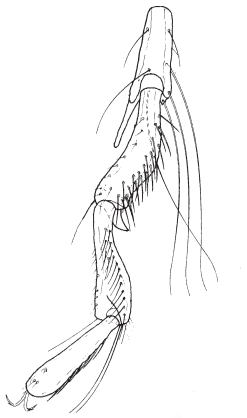
Genus *Amperaturus* Cook, 1998

(Figs. 1511, 1512, 1600-1605)

1998 *Amperaturus* Cook, Acarologia 39: 336.

Type species: *Amperaturus rensburgi* Cook, 1998

DIAGNOSIS: Dorsum with an unpaired anteromedial plate, and posteromedial plate with one pair of glandularia. Three pairs of laterodorsal platelets present, the anterolateral platelet with two pairs of glandularia, the other two each with one pair of glandularia. No free glandularia present (Fig. 1511). Preocularia lying on the anterodorsal part of ventral shield. Ventral shield may have short posterolateral projections. Insertions of fourth legs covered by associated projections. Cx-IV with a centrally located pair of glandularia (Figs. 1603, 1604). Medial margins of Cx-IV moderately to well developed. Genital field with five to numerous pairs of acetabula lying on distinct plates (Fig. 1512). P2 may have a few ventral denticles (Fig. 1605). IV-L with or without pronounced sexual dimorphism (Figs. 1601, 1602). Legs with swimming setae.



1602



1603



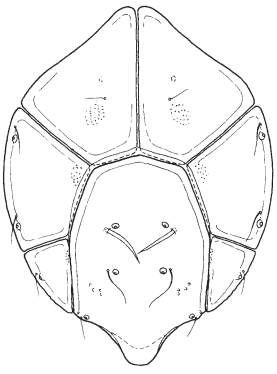
1604



1605



1606



1607

1602 *Amperaturus* (*Amperaturus*) *abelus* Cook, IV-leg-3-6 male (after Cook 1998)

1603 *Amperaturus* (*Amperaturus*) *rensburgi* Cook, venter male (after Cook 1998)

1604 *Amperaturus* (*Amperaturus*) *rensburgi* Cook, venter female (after Cook 1998)

1605 *Amperaturus* (*Amperaturus*) *rensburgi* Cook, palp female (after Cook 1998)

1606 *Austraturus vietsi* Cook, dorsum male (after Cook 1986)

1607 *Austraturus projectus* Cook, dorsum male (after Cook 1986)

KEY TO THE SUBGENERA

1 IV-leg-5 of male globular in shape (Fig. 1600) Subgenus *Shebaturus*

- IV-leg-5 of male elongated (Fig. 1601) Subgenus *Amperaturus* s.s.

Subgenus *Amperaturus* s.s.

(Figs. 1511, 1512, 1601-1605)

DIAGNOSIS: Legs with or without pronounced sexual dimorphism. In the former case male IV-leg-3 may have a distal projection (Fig. 1602), IV-leg-4 may be curved (Fig. 1601).

HABITAT: Streams.

DISTRIBUTION: Four species known from South Africa (Cook 1998, Smit 2017a).

Subgenus *Shebaturus* Smit, 2017

(Fig. 1600)

2017 *Shebaturus* Smit, Zootaxa 4273: 292.

Type species: *Amperaturus globulipes* Smit, 2017

DIAGNOSIS: (Male only) Legs with a pronounced sexual dimorphism, IV-leg-5 of male globular (Fig. 1600).

HABITAT: Streams.

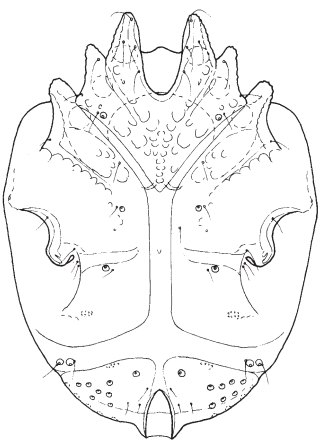
DISTRIBUTION: Known from one species from eastern South Africa.

Genus *Austraturus* K.O. Viets, 1978

(Figs. 1585, 1593, 1594, 1606-1611)

1978 *Austraturus* K.O. Viets, Australian Journal of Marine and Freshwater Research 29: 87.

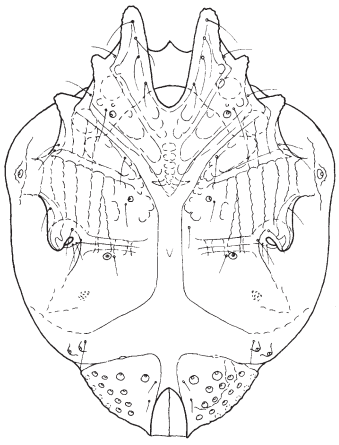
Type species: *Austraturus tumidipalpis* K.O. Viets, 1978



1608



1609



1610

1608 *Austraturus vietsi* Cook, venter female (after Cook 1986)

1609 *Austraturus vietsi* Cook, genital field male (after Cook 1986)

1610 *Austraturus uncicoxalis* Cook, venter female (after Cook 1986)

DIAGNOSIS: Dorsum with paired anteromedial plates and a posteromedial plate with three pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with two pairs of glandularia, posterolateral pair with one pair of glandularia. Free glandularia absent (Fig. 1606). Dorsum of male often with thickened setae (Fig. 1607). Coxae occasionally with longitudinal ridges (Fig. 1610). Gonopore of male very long, slit-like; a pair of glandularia flanking its anterior part (Fig. 1609). Genital field with numerous acetabula; male genital field region exhibiting various degree of sexual dimorphism of the ventral shield (Figs. 1593, 1594). Females with two pairs of glandularia, close to each other anterolateral to gonopore (Figs. 1608, 1610). P2 ventrally with rather large denticles, P4 without setal tubercles, the ventral setae placed distally (Fig. 1585). IV-L-4 and -5 of male with modified setae and stockier than in female (Fig. 1611).

HABITAT: Streams, a few species known from interstitial habitats.

DISTRIBUTION: A dozen species known from Australia (Cook 1986, Smit 1996c, 2007a, 2010a, 2018a).

Genus *Azugaturus* Cook, 1986

(Figs. 1584, 1586, 1612-1615)

1986 *Azugaturus* Cook, Memoirs of the American Entomological Institute 40: 264.

Type species: *Azugaturus distinctus* Cook, 1986

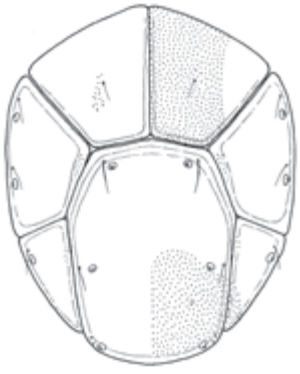
DIAGNOSIS: Dorsum with paired anteromedial plates and a posteromedial plate with three pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with two pairs of glandularia, posterolateral pair with one pair of glandularia. Free glandularia absent (Fig. 1612). Posterior part of ventral shield without sexual dimorphism. Glandularia of Cx-IV well posteriorly of the anterior suture lines (Fig. 1584). Male genital field triangular in shape with the gonopore placed at anterior end (Fig. 1613), in most species flanked by a pair of lateral lamellae (Fig. 1614). Two pairs of glandularia located on genital field (Fig. 1615). P2 with a distinct anteroventral projection in both sexes, in some species also P3 with a ventral projection. P4 broad, ventrally concave with two setae on either side of the concavity (Fig. 1586). IV-leg-6 somewhat stockier in male than in the female. Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: Five species known from eastern and northern Australia (Cook 1986, Smit 2010a).



1611



1612



1613

1611 *Austraturus vietsi* Cook, fourth leg male (after Cook 1986)

1612 *Azugaturus distinctus* Cook, dorsum female (after Cook 1986)

1613 *Azugaturus distinctus* Cook, venter male (after Cook 1986)

Genus *Barwontius* K.O. Viets, 1978

(Figs. 1086, 1578-1581, 1616, 1617)

1978 *Barwontius* K.O. Viets, Entomologica Scandinavica 9: 276.

Type species: *Barwontius inflatipalpis* K.O. Viets, 1978

DIAGNOSIS: Dorsum with paired anteromedial plates and a posteromedial plate with three pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with two pairs of glandularia, posterolateral pair with one pair of glandularia. Free glandularia absent (Fig. 1086). Posterior part of ventral shield without sexual dimorphism. Posterior suture lines of Cx-IV extending posteromedially (Fig. 1616). Coxae generally without parallel ridges, but in two species these ridges are present (Fig. 1617). Projections associated with insertions of IV-L rounded. Male gonopore small, lying near anterior end of genital field (Fig. 1580); female gonopore large and located terminally. Two pairs of glandularia located on their respective sides somewhat anterior to the lateral part of the genital plates. One pair of acetabula larger than the others and set apart at anterior part of genital field. P4 of male with the distodorsal part extending well beyond the insertion of P5; male P4 with a flap-like extension of the medial surface (Fig. 1581). Palp of female not modified as in male, but with a pointed mediodistal extension (Fig. 1579). IV-L without a pronounced sexual dimorphism.

HABITAT: Streams.

DISTRIBUTION: Many species known from eastern and south-eastern Australia (Cook 1986, Smit 2007a, 2010a).

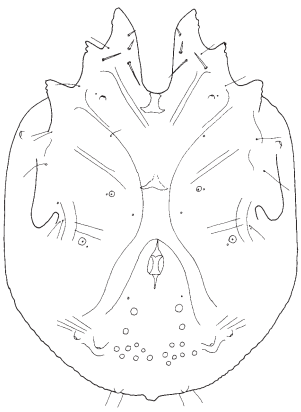
Genus *Bleptaturus* Cook, 1991

(Figs. 1558, 1562-1563, 1618, 1619)

1991 *Bleptaturus* Cook, Stygologia 6: 249.

Type species: *Bleptaturus magnipalpis* Cook, 1991

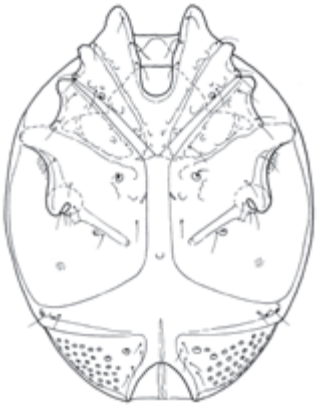
DIAGNOSIS: (Male only) Dorsum with unpaired antero- and posteromedial plates and two pairs of lateral platelets. Anterolateral platelets with one pair of glandularia, posterolateral platelets without glandularia, posteromedial plate with one pair of glandularia. Anterodorsal part of



1614



1615



1616

1614 *Azugaturus gregoryensis* Smit, venter male (after Smit 2010a)

1615 *Azugaturus distinctus* Cook, genital field male (after Cook 1986)

1616 *Barwontius inflatipalpis* K.O. Viets, venter female (after Cook 1986)

ventral shield without a hood-like structure. A pair of free, very small glandularia present between lateral platelets and posteromedial plate (Fig. 1563). Anterior three pairs of coxae small and confined to central area of ventral shield, suture lines of coxae incomplete. Ventral shield with a very large lateral part extending dorsally where the legs are inserted. Cxgl-1 not visible in ventral view, located on the lateral extensions of the ventral shield. Insertions of fourth legs located far laterally (Fig. 1618). Exact number of acetabula not known, but probably few. Male gonopore lying subterminally. Palp large, P4 expanded dorsoventrally (Fig. 1562). Excretory pore located dorsally. Distal segments of first leg enlarged, one of the claws elongated (Fig. 1619). Fourth legs of normal shape, IV-leg-1 shorter than IV-leg-2 (Fig. 1558). Legs without swimming setae.

HABITAT: Deep interstitial waters.

DISTRIBUTION: One species known from South Island, New Zealand.

Genus *Cabellaturus* Cook, 1986

(Figs. 1592, 1620-1621)

1986 *Cabellaturus* Cook, Memoirs of the American Entomological Institute 40: 261.
Type species: *Cabellaturus triangularis* Cook, 1986



1617



1618



1619



1620



1621



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1622

1617 *Barwontius striatus* Smit, venter male (after Smit 2010a)

1618 *Bleptaturus magnipalpis* Cook, venter male (after Cook 1991)

1619 *Bleptaturus magnipalpis* Cook, first leg male (after Cook 1991)

1620 *Cabellaturus triangularis* Cook, dorsum female (after Cook 1986)

1621 *Cabellaturus triangularis* Cook, palp female (after Cook 1986)

1622 *Canterburaturus minutus* Pesic & Smit, anterodorsal portion of ventral shield female (after Pesic et al. 2010c)
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DIAGNOSIS: Dorsum with paired anteromedial plates and a posteromedial plate with three pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with two pairs of glandularia, posterolateral pair with one pair of glandularia. Free glandularia absent (Fig. 1620). Posterior part of ventral shield without sexual dimorphism. Glandularia of Cx-IV closer to anterior than to posterior suture lines. Genital field with numerous acetabula. Male genital field triangular, the small gonopore located at anterior end, with one or two pairs of glandularia located near lateral margin (Fig. 1592). P2 with pointed denticles, some of these very large; P4 long, without setal tubercles, longest setae of segment located near distal end (Fig. 1621). Legs without swimming setae. Fourth leg not exhibiting a strong sexual dimorphism.

HABITAT: Streams.

DISTRIBUTION: Two species are known from eastern Australia (Cook 1986, Smit 2010a).

Genus *Canterburaturus* Pesic, Smit & Datry, 2010

(Figs. 1522, 1622-1626)

2010 *Canterburaturus* Pesic & Smit, Zootaxa 2355: 19.

Type species: *Canterburaturus minutus* Pesic & Smit, 2010

DIAGNOSIS: Dorsum with unpaired antero- and posteromedial plates and two pairs of lateral platelets. Antero- and posterolateral platelets with one pair of glandularia, posteromedial plate with two pairs of glandularia (Fig. 1522). Anterodorsal part of ventral shield with a hood-like structure (Fig. 1622). Free glandularia absent. Suture lines of coxae indistinct. Projections associated with insertions of fourth legs large and truncated. A pair of glandularia located immediately medial to insertions of fourth legs (Figs. 1623, 1624). Genital field with numerous acetabula. P2 ventrally either smooth or with small denticles (Fig. 1625. Legs without swimming setae. IV-leg-2 longer than other segments of leg (Fig. 1626).

HABITAT: Interstitial.

DISTRIBUTION: Three species known from South Island, New Zealand (Pesic et al. 2010c).



1623



1624



1625

1623 *Canterburaturus minutus* Pesic & Smit, venter female (after Pesic et al. 2010c) Reproduced with permission from copyright holder

1624 *Canterburaturus minutus* Pesic & Smit, venter male (after Pesic et al. 2010c) Reproduced with permission from copyright holder

1625 *Canterburaturus minutus* Pesic & Smit, palp female (after Pesic et al. 2010c) Reproduced with permission from copyright holder

Genus *Colobaturus* Cook, 1991

(Figs. 1508, 1627-1630)

1991 *Colobaturus* Cook, Stygologia 6: 251.

Type species: *Colobaturus diamphida* Cook, 1991

DIAGNOSIS: Dorsum with one unpaired anteromedial plate bearing the postocularia and one pair of glandularia, posteromedial plate with three pairs of glandularia and the excretory pore; four pairs of lateral platelets present, none of which have glandularia (Fig. 1508). Anterodorsal part of ventral shield with a large rounded hood-like structure. Suture lines of coxae distinct and well separated from each other on their respective sides. Projections associated with fourth legs small and continuing as a ridge on each side extending anterolaterally to margins of idiosoma. Along these ridges a shallow concavity beginning somewhat anterior to insertions of fourth legs and extending nearly to posterior end. IV-leg-3-6 lie in this concavity when flexed. Posterior suture line of Cx-IV distinct and with a pair of glandularia nearly touching them. Gonopore terminal, with few acetabula at extreme posterior margin. Palp with P2 somewhat expanded and without ventral projection, P4 ventrally with a pair of long setae, P5 longer than P4 and tapering to a point (Fig. 1629). No sexual dimorphism in legs (Fig. 1630). Legs without swimming setae.

HABITAT: Shallow and deep interstitial.

DISTRIBUTION: Two species are known from South Island, New Zealand (Cook 1991, Pesic et al. 2010c).

Genus *Davidsia* Smit, 2007

(Figs. 1575-1577, 1631, 1632)

2007 *Davidsia* Smit, Records of the Australian Museum 59: 108.

Type species: *Davidsia aurita* Smit, 2007


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1626



1627



1628

1626 *Canterburaturus minutus* Pesic & Smit, fourth leg female (after Pesic et al. 2010c) Reproduced with permission from copyright holder

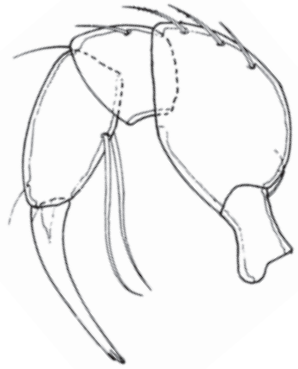
1627 *Colobaturus diamphida* Cook, venter female (after Cook 1991)

1628 *Colobaturus diamphida* Cook, genital field male (after Cook 1991)

DIAGNOSIS: (Male only) Dorsum with paired anteromedial plates, an unpaired posterolateral plate and two pairs of lateral plates. Anterolateral plates with two pairs of glandularia, posterolateral plates with one pair of glandularia, posteromedial plate with three pairs of glandularia (Fig. 1575). Cx-I long and pointed, extending well beyond frontal idiosoma margin. Suture lines of coxae incomplete. Posterior margin of Cx-IV indistinct, posteriorly to this suture line a pair of glandularia (Fig. 1631). Fourth coxae with a pair of small humps. Genital field with five pairs of acetabula not lying on genital plates, gonopore well distanced from posterior idiosoma margin. Palp very long, especially P4; P2 ventrally with pointed setae (Fig. 1577). I-L-6 forming an ear-shaped sheath with a long dorsal claw with a blunt ventral extension, and a long ventral clawlet; I-leg-5 enlarged, with convex dorsal and ventral margins (Fig. 1576). IV-L not modified (Fig. 1632). Swimming setae absent, but IV-L with numerous, stiff long setae.

HABITAT: Interstitial.

DISTRIBUTION: Known from one species from Queensland, Australia.



1629



1630



1631



1632



1633



1634

1629 *Colobaturus diamphida* Cook, palp female (after Cook 1991)

1630 *Colobaturus diamphida* Cook, fourth leg female (after Cook 1991)

1631 *Davidsia aurita* Smit, venter male (after Smit 2007a)

1632 *Davidsia aurita* Smit, IV-leg-4-6 male (after Smit 2007a)

1633 *Evidaturus exilis* Cook, venter male (after Cook 1983)

1634 *Evidaturus exilis* Cook, venter female (after Cook 1983)

Genus *Evidaturus* Cook, 1983

(Figs. 1530, 1537, 1565, 1570, 1633, 1634)

1983 *Evidaturus* Cook, Contributions of the American Entomological Institute 21: 85.

Type species: *Evidaturus exilis* Cook, 1983

DIAGNOSIS: Dorsum with unpaired antero- and posteromedial plates and two pairs of lateral platelets. Anterolateral platelets with one pair of glandularia, posterolateral platelets without glandularia, posteromedial plate with two pairs of glandularia (Fig. 1530). Free glandularia absent, in one specimen a free glandularium found on one side (Fig. 1570). Anterodorsal part of ventral shield without a hood-like structure. A tripartite ridge present near posterior end of posteromedial plate; this ridge looping around the posterior glandularia and ending posteriorly near midline. Cx-I-III projecting anteriorly. Posterior margins of Cx-IV extending anteromedially. Glandularia of Cx-IV located near suture line Cx-III/IV. Projections associated with insertions of fourth legs well developed and truncate (Figs. 1633, 1634). Excretory pore on a large tubercle. P2 without denticles, P4 bulging ventrally, P5 long and narrow (Fig. 1537). Legs without swimming setae (Fig. 1565).

HABITAT: Interstitial.

DISTRIBUTION: Two species known from North and South Island, New Zealand (Cook 1983, Smit 2017b).

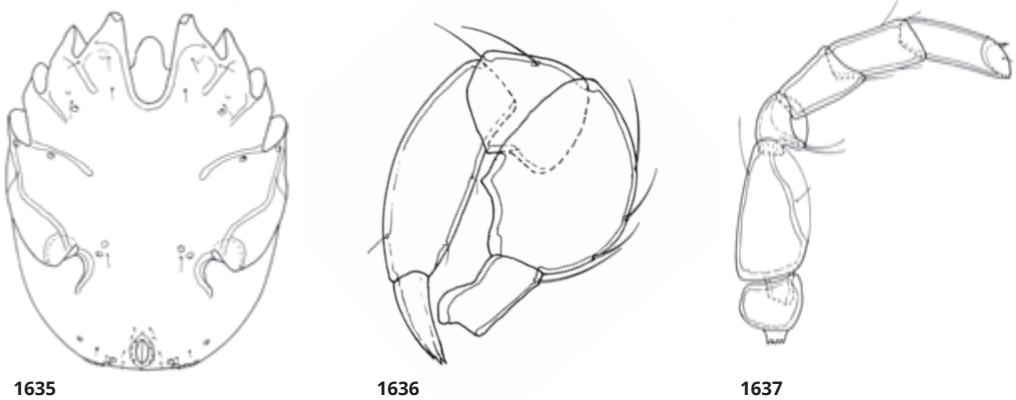
Genus *Hestaturus* Cook, 1991

(Figs. 1510, 1635-1637)

1991 *Hestaturus* Cook, Stygologia 6: 245.

Type species: *Hestaturus ovalis* Cook, 1991

DIAGNOSIS: (Male only) Dorsum with unpaired antero- and posteromedial plates and two pairs of lateral platelets (Fig. 1510). Anterolateral platelets with one pair of glandularia, posterolateral platelets without glandularia, posteromedial plate with three pairs of glandularia. Anterodorsal part of ventral shield with a hood-like structure not extending beyond anterior tips of Cx-I. Suture lines of coxae incomplete. Projections associated with insertions of fourth legs relatively large (Fig. 1635). Genital field with few acetabula mostly in a single row on each side. P2 swollen with a short ventral extension, P4 without ventral extensions (Fig. 1636). Leg segments somewhat laterally compressed, IV-L-1 small, IV-L-2 longer than other segments of leg (Fig. 1637).



1635 **1636** **1637**

1635 *Hestaturus ovalis* Cook, venter male (after Cook 1991)

1636 *Hestaturus ovalis* Cook, palp male (after Cook 1991)

1637 *Hestaturus ovalis* Cook, fourth leg male (after Cook 1991)

HABITAT: Deep interstitial waters.

DISTRIBUTION: Known from one species from South Island, New Zealand.

Genus *Kritaturus* Cook, 1983

(Figs. 1521, 1523, 1526, 1529, 1638-1641)

1983 *Kritaturus* Cook, Contributions of the American Entomological Institute 21: 95.

Type species: *Kritaturus gennadus* Cook, 1983

DIAGNOSIS: Dorsum with unpaired antero- and posteromedial plates and two pairs of lateral platelets. Anterolateral platelets with two pairs of glandularia, posterolateral platelets without glandularia, posteromedial plate with two pairs of glandularia. Anterodorsal part of ventral shield without a hood-like structure (Fig. 1523). A cauda may be present (Fig. 1526). Posterior suture lines of Cx-IV, if not obliterated, extending more or less at right angles to midline. Glandularia of Cx-IV located near suture line Cx-III/IV. Projections associated with insertions of IV-L well developed (Figs. 1638, 1639). P2 with (Fig. 1641) or without small denticles (Fig. 1529). Legs not laterally compressed. Fourth leg with (Fig. 1521) or without (Fig. 1640) sexual dimorphism.

KEY TO THE SUBGENERA

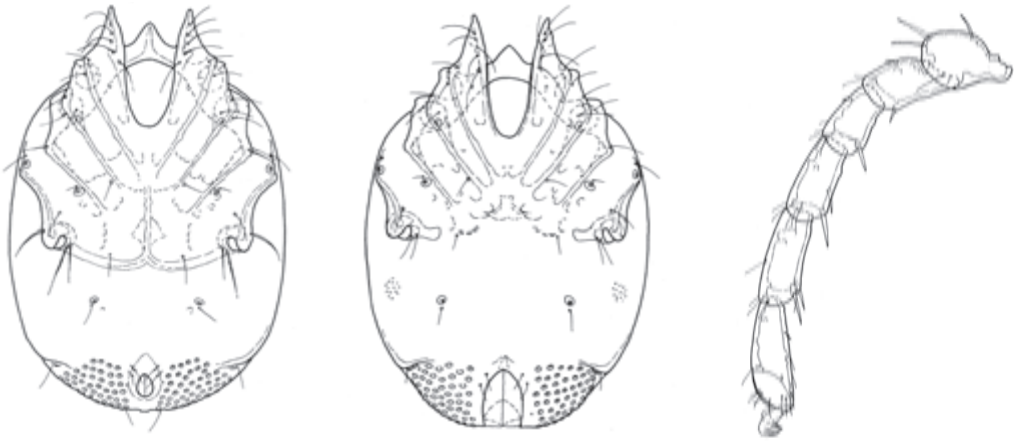
1 Idiosoma with a well-developed cauda, posteromedial plate highly modified (Fig. 1526) Subgenus *Caudaturus*

- Idiosoma without a well-developed cauda, posteromedial plate unmodified (Fig. 1523) Subgenus *Kritaturus* s.s.

Subgenus *Kritaturus* s.s.

(Figs. 1523, 1529, 1638-1640)

DIAGNOSIS: Idiosoma without a well-developed cauda (Fig. 1523), posteromedial plate unmodified. Fourth leg of male not (Fig. 1640) or only slightly modified, without enlarged setae on IV-leg-2 or -3.



1638 **1639** **1640**

1638 *Kritaturus* (*Kritaturus*) *gennadus* Cook, venter male (after Cook 1983)

1639 *Kritaturus* (*Kritaturus*) *gennadus* Cook, venter female (after Cook 1983)

1640 *Kritaturus* (*Kritaturus*) *gennadus* Cook, fourth leg male (after Cook 1983)

HABITAT: Streams.

DISTRIBUTION: Four or five species known from North and South Island, New Zealand (Cook 1983, Smit 2017b).

Subgenus *Caudaturus* Cook, 1983

(Figs. 1521, 1526, 1641)

1983 *Caudaturus* Cook, Contributions of the American Entomological Institute 21: 95.

Type species: *Kritaturus tenonus* Cook, 1983

DIAGNOSIS: Idiosoma with a well-developed cauda (Fig. 1526), posteromedial plate modified in various ways. IV-L of male with enlarged setae on IV-leg-2 or -3 (Fig. 1521).

HABITAT: Streams.

DISTRIBUTION: Four species known from North and South Island, New Zealand (Cook 1983, Smit 2017b)

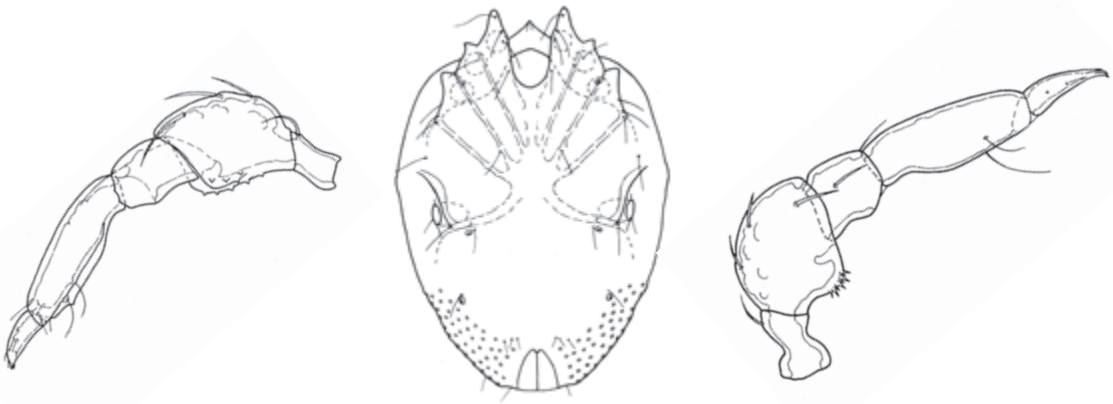
Genus *Masabania* Walter & Bader, 1952

(Figs. 1513, 1514, 1642-1644)

1952 *Masabania* Walter & Bader, Mémoires du Muséum national d'Histoire naturelle (nouvelle série), Série A, Zoologie 4: 207.

Type species: *Masabania spinosa* Walter & Bader, 1952

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with one pair of glandularia. Three pairs of dorsolateral platelets present, the anterolateral platelet with one pair of glandularia, and a second pair of which only a pair of glandularia setae present; the other two dorsolateral platelets each with one pair of glandularia. No free glandularia present (Fig. 1513). Preocularia lying on anterodorsal part of ventral shield. Insertions of IV-L without projections. Cx-IV without glandularia. Medial margins of Cx-IV reduced to angles in female (Fig. 1642) only slightly reduced in male (Fig. 1514). Genital field with numerous acetabula, these not on plates and extending laterally to lateral idiosoma margin. P2 ventrally with spiny setae. Male IV-L-5 enlarged with several stout setae, IV-leg-6 shortened and bowed (Fig. 1644). Legs without swimming setae.



1641 **1642** **1643**

1641 *Kritaturus* (*Caudaturus*) *tenonus* Cook, palp female (after Cook 1983)

1642 *Masabania plumosa* Walter & Bader, venter female (after Cook 1974)

1643 *Masabania plumosa* Walter & Bader, palp female (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: Two species known from Mt Elgon on the border of Uganda and Kenya.

Genus *Melanaturus* Cook, 1986

(Figs. 1587-1589, 1645-1648)

1986 *Melanaturus* Cook, Memoirs of the American Entomological Institute 40: 263.

Type species: *Melanaturus concavus* Cook, 1986

DIAGNOSIS: Dorsum with paired anteromedial plates and a posteromedial plate with three pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with two pairs of glandularia, posterolateral pair with one pair of glandularia. Free glandularia absent (Fig. 1645). Posterior part of ventral shield without sexual dimorphism. Glandularia of Cx-IV near anterior suture lines (Fig. 1588). Genital field with numerous acetabula. Male genital field triangular, the small gonopore located at posterior end, no glandularia incorporated, a pair of concavities anterior to gonopore (Figs. 1589, 1646). P2 with few denticles, P4 with a slight development of a ventral setal tubercle bearing the two longest setae, located in the middle of segment (Fig. 1587). Legs without swimming setae. Male III-L-6 with a slight central concavity (Fig. 1647) which is absent in female. Fourth leg without sexual dimorphism (Fig. 1648).

HABITAT: Interstitial.

DISTRIBUTION: One species known from southeast Australia.

Genus *Neotryssaturus* Cook, 1974

(Figs. 1566, 1567, 1571, 1649-1651)

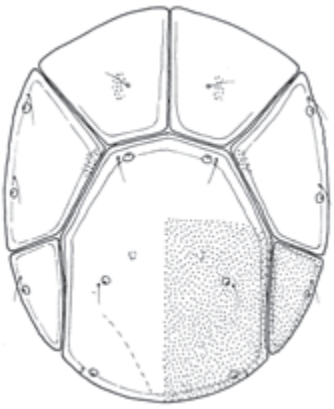
1974 *Neotryssaturus* Cook, Memoirs of the American Entomological Institute 21: 355 – Cook (1983).

Type species: *Tryssaturus inusitatus* Hopkins, 1967

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with two pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with one pair of glandularia, posterolateral pair without glandularia. A free pair of glandularia present. Glandularia



1644



1645



1646

1644 *Masabania plumosa* Walter & Bader, IV-leg-5-6 male (after Cook 1974)

1645 *Melanaturus concavus* Cook, dorsum male (after Cook 1986)

1646 *Melanaturus concavus* Cook, genital field male (after Cook 1986)

not on large tubercles, dorsal sclerites with low papillae. Males with a distinct cauda which is narrow at its base and widens at posterior end (Fig. 1571). Coxae confined to anterior half of idiosoma. Posterior margin of Cx-IV extending more or less at right angles to midline. Glandularia of Cx-IV located well posterior to suture lines Cx-III/IV (Figs. 1566, 1650). P2 without ventral denticles, P4 with a thickened mediodistal seta (Fig. 1651). Legs without swimming setae. Male fourth leg with either IV-leg-4 lengthened and IV-leg-5 enlarged, or IV-leg-3 with a stout, curved seta (Fig. 1567) and other segments with several less stout setae.

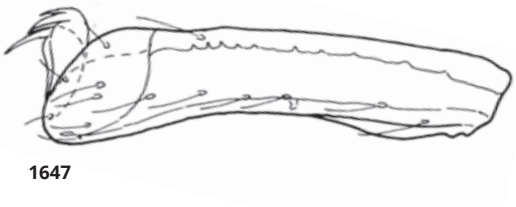
HABITAT: Interstitial and streams.

DISTRIBUTION: Two species known from North and South Island, New Zealand (Cook 1983).

Genus *Noesaturus* Cook, 1988

(Figs. 1519, 1590, 1591, 1652-1655)

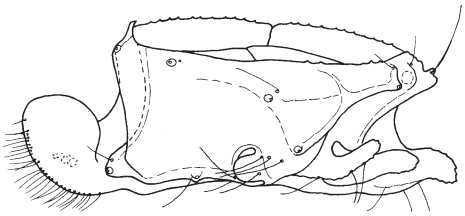
1988 *Noesaturus*, Memoirs of the American Entomological Institute 42: 175.
Type species: *Noesaturus hopkinsi* Cook, 1988



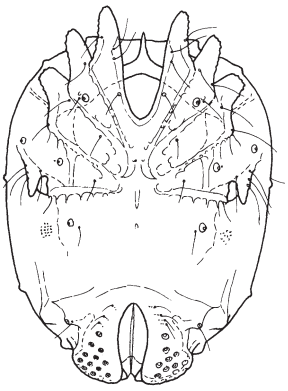
1647



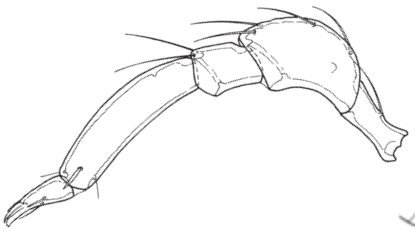
1648



1649



1650



1651



1652

1647 *Melanaturus concavus* Cook, III-leg-6 male (after Cook 1986)
1648 *Melanaturus concavus* Cook, IV-leg-4-6 male (after Cook 1986)
1649 *Neotryssaturus inusitatus* (Hopkins), lateral view male (after Cook 1983)
1650 *Neotryssaturus inusitatus* (Hopkins), venter female (after Cook 1983)
1651 *Neotryssaturus inusitatus* (Hopkins), palp female (after Cook 1983)
1652 *Noesaturus hopkinsi* Cook, genital field male (after Cook 1988)

DIAGNOSIS: Dorsum with an unpaired anteromedial plate in the male (Fig. 1519), but paired anteromedial platelets present in the female (Fig. 1590). Dorsal shield with six pairs of glandularia, three pairs on the posteromedial plate, to pairs on the anterolateral platelets and one pair on the posterolateral platelets. Associated setae of the glandularia on anterolateral platelets and first two pairs of glandularia on posteromedial plate greatly thickened in males, but normal in females. Glandularia of Cx-IV located near suture lines Cx-III/Cx-IV. Genital field with numerous acetabula. Male genital field terminal (Fig. 1591). A dorsally directed projection bearing the excretory pore present in males, best seen in posteroventral view (Fig. 1652). Female genital field subterminal (Fig. 1590). P4 may have an anteroventral extension (Fig. 1653). Legs without swimming setae. Fourth leg of male with thickened segments, a modified setae at distal end of IV-leg-5 (Fig.1654), and a stout distal seta at proximal end of IV-leg-6 (Fig. 1655).

HABITAT: Streams.

DISTRIBUTION: Four species known from Chile (Cook 1988).

Genus *Notoaturus* Besch, 1964

(Figs. 1515, 1574, 1656-1660)

1964 *Notoaturus* Besch, Beiträge zur Neotropischen Fauna 3: 158.

Type species: *Notoaturus leptoglyphus* Besch, 1964



1653



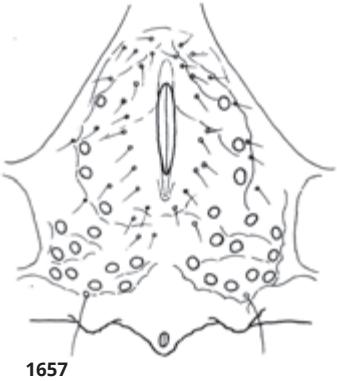
1654



1655



1656



1657



1658

1653 *Noesaturus hopkinsi* Cook, palp female (after Cook 1988)

1654 *Noesaturus hopkinsi* Cook, fourth leg male (after Cook 1988)

1655 *Noesaturus hopkinsi* Cook, IV-leg-6 male (after Cook 1988)

1656 *Notoaturus beschi* Cook, venter male (after Cook 1988)

1657 *Notoaturus beschi* Cook, genital field male (after Cook 1988)

1658 *Notoaturus beschi* Cook, venter female (after Cook 1988)

DIAGNOSIS: Dorsum with a series of platelets which bear six pairs of glandularia (the sixth pair difficult to see in the rugose integument and may have disappeared in some species). Paired anteromedial platelets bearing the postocularia, a single posteromedial plate with two pairs of glandularia, a pair of small, centrally located platelets bearing glandularia (Fig. 1515); the latter pair may be fused into a single platelet (Fig. 1574). A medial, apophyses-like sclerite may be present between the two small, centrally located platelets. The anterolateral platelet bears each two glandularia, the posterolateral platelets bear each one glandularium. A. prominent ridge on each side extending laterally from Cx-IV ending in a glandularium (Figs. 1656, 1658). Genital field with numerous acetabula (Fig. 1657). No sexual dimorphism in legs (Fig. 1660). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: Three species known from Chile (Cook 1988).

Genus *Notaxona* Besch, 1964

(Figs. 1505-1507, 1661-1663)

1964 *Notaxona* Besch, Beiträge zur Neotropischen Fauna 3: 163 - Cook (1988).

Type species: *Notaxona ochiepus* Besch, 1964



1659



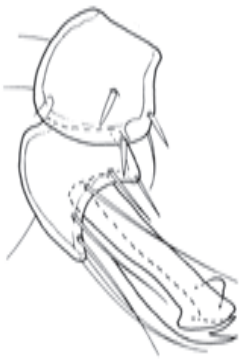
1660



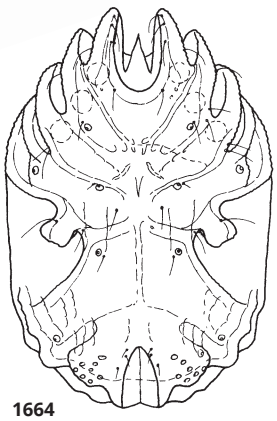
1661



1662



1663



1664

1659 *Notoaturus beschi* Cook, palp female (after Cook 1988)

1660 *Notoaturus beschi* Cook, fourth leg male (after Cook 1988)

1661 *Notaxona ochiepus* Besch, palp female (after Cook 1988)

1662 *Notaxona ochiepus* Besch, fourth leg male (after Cook 1988)

1663 *Notaxona ochiepus* Besch, IV-leg-5-6 leg male (after Cook 1988)

1664 *Omegaturus longipalpis* Cook, venter female (after Cook 1983)

DIAGNOSIS: Dorsum with an unpaired anteromedial plate with the postocularia, a posteromedial plate with two pairs of glandularia and four pairs of lateral platelets two of which bear glandularia (Fig. 1507). Tips of Cx-I somewhat pointed. Suture lines of coxae distinct (including medial suture line) except between Cx-II and Cx-III. Relatively large projections partially covering the insertions of the fourth legs (Fig. 1505). Genital field with four pairs of acetabula, the first three pairs in a line, fourth pair placed medial to third pair (Fig. 1506). Suture lines of genital plates distinct except anteriorly. P2 and P3 relatively elongated and without tubercles. P4 with a large distoventral seta which projects beyond insertion of P5 (Fig. 1661). Legs without swimming setae. First leg not modified, but segments of male fourth leg shortened and IV-leg-6 with very large claws (Figs. 1662, 1663).

HABITAT: Streams.

DISTRIBUTION: One species known from Chile.

Genus *Omegaturus* Cook, 1983

(Figs. 1538, 1542-1544, 1664)

1983 *Omegaturus* Cook, Contributions of the American Entomological Institute 21: 62.

Type species: *Omegaturus longipalpis* Cook, 1983

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with two pairs of glandularia. Two pairs of laterodorsal platelets present, anterolateral platelet with one pair of glandularia, posterolateral pair without glandularia. A free pair of glandularia present (Fig. 1542). Dorsal sclerites with small reticulation. Anterodorsal part of ventral shield with a broad hood-like structure which is indented medially. Gnathosoma long, with an anchoral process (Fig. 1544). Projections associated with insertion of IV-L of moderate size and truncate. A pair of glandularia located somewhat posteromedial to insertions of IV-L. Cx-IV with a pair of glandularia close to suture lines of Cx-III/IV (Figs. 1543, 1664). Palp segments elongated, P2 with a few spine-like denticles (Fig. 1544). IV-L-2 longest segment of leg, IV-L-3 short and only slightly covered by the slightly laterally compressed IV-L-2 (Fig. 1538). No sexual dimorphism in legs. Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: One species known from North and South Island, New Zealand.

Genus *Paratryssaturus* Imamura, 1979

(Figs. 1539, 1549, 1550, 1665, 1666)

1979 *Paratryssaturus* Imamura, Journal of the Speleological Society of Japan 4: 27.

Type species: *Tryssaturus minutus* Hopkins, 1969

DIAGNOSIS: Dorsum with a single anteromedial plate and a posteromedial plate with two pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with one pair of glandularia, posterolateral pair without glandularia. A free pair of glandularia present. Glandularia not on tubercles. Cauda absent. Anterodorsal part of ventral shield with a pointed hood-like structure (Fig. 1549). Cx-I-III projecting, coxae confined to anterior half of idiosoma. Posterior margin of Cx-IV extending more or less at right angles to midline. Glandularia of Cx-IV located near suture line Cx-III/IV. Projections associated with insertions of IV-L truncate and without setae. Genital field with numerous acetabula, gonopore located well anterior in both sexes (Fig. 1550, 1665). P2 with ventral denticles, P4 somewhat flattened ventrally and widened in a lateral to medial direction (Fig. 1666). Legs without swimming setae. Male IV-L-5 is slightly to

strongly expanded distally with 2-3 thickened setae, IV-leg-4 with three thickened setae (Fig. 1539). Fourth leg of female unmodified.

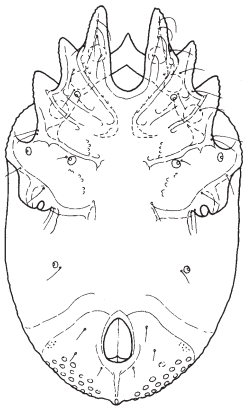
HABITAT: Streams, interstitial.

DISTRIBUTION: Four species known from North and South Island (Hopkins 1969, Cook 1987, Pesic et al. 2010c, Smit 2017b) and Stewart Island, New Zealand (Smit 2017b).

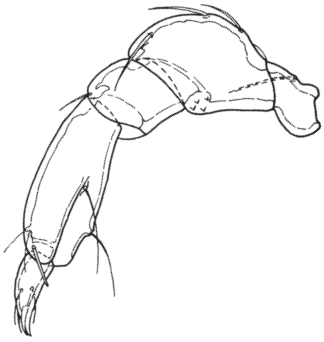
Genus *Piotaturus* Cook, 1983

(Figs. 1552, 1554-1556, 1667-1669)

1983 *Piotaturus* Cook, Contributions of the American Entomological Institute 21: 88.
Type species: *Piotaturus alvecaudatus* Cook, 1983



1665



1666



1667



1668



1669



1670

1665 *Paratryssaturus minutus* (Hopkins), venter female (after Cook 1983)
1666 *Paratryssaturus minutus* (Hopkins), palp female (after Cook 1983)
1667 *Piotaturus alvecaudatus* Cook, venter male (after Cook 1983)
1668 *Piotaturus alvecaudatus* Cook, genital field male (after Cook 1983)
1669 *Piotaturus alvecaudatus* Cook, palp female (after Cook 1983)
1670 *Pilosaturus villosus* (Hopkins), venter male (after Cook 1983)

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with two pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with one pair of glandularia, posterolateral pair without glandularia. A free pair of glandularia present. Dorsal sclerites papillate with distinct ridges (Fig. 1554). Anterodorsal part of ventral shield with a broad hood-like structure which is slightly to moderately projecting (Fig. 1552). Gnathosoma with an anchoral process. Projections associated with insertions of fourth legs more or less rounded. A pair of glandularia located well medial to anteromedial of insertions of fourth legs (Fig. 1555). Posterior part of ventral shield and genital field of male highly modified, with a large concavity and a large median cleft (Fig. 1667). Male gonopore hidden in ventral view by an anteriorly directed flap (Fig. 1668). P2 ventrally with spine-like denticles (Fig. 1669). Legs slightly compressed laterally, IV-leg-1 shorter than IV-leg-2, IV-L-5 with a large anterodorsal extension (Fig. 1556); second segment of anterior legs noticeably lengthened.

HABITAT: Interstitial.

DISTRIBUTION: Two species known from North and South Island, New Zealand (Cook 1983, Pesic et al 2010c).

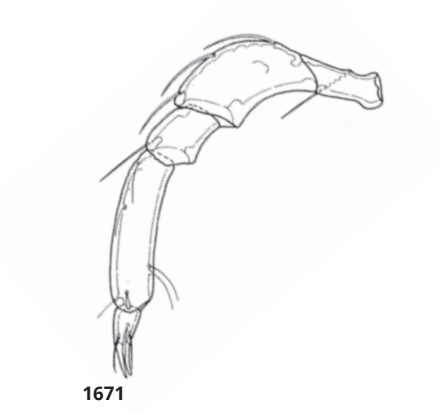
Genus *Pilosaturus* Cook, 1983

(Figs. 1551, 1553, 1670-1672)

1983 *Pilosaturus* Cook, Contributions of the American Entomological Institute 21: 69.

Type species: *Tryssaturus villosus* Hopkins, 1967

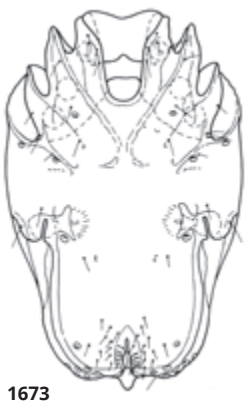
DIAGNOSIS: Dorsum with a single anteromedial plate and a posteromedial plate with two pairs of acetabula. Two pairs of laterodorsal platelets present, anterolateral platelet with one pair of glandularia, posterolateral pair without glandularia. A free pair of glandularia present. Postocularia and all dorsal glandularia on well-developed tubercles (Fig. 1551). Integument with numerous, closely packed, fine pointed projections, giving it a velvety appearance. Posterior margins of Cx-IV extending distinctly posteromedially (Fig. 1553). Glandularia of Cx-IV reduced in size and well distanced from suture line Cx-III/IV. Male without a distinct cauda, but genital field slightly set off from the idiosoma (Fig. 1670). P2 without ventral denticles (Fig. 1671). Legs without swimming setae, not laterally compressed. Male IV-L-1 relatively long, IV-leg-2 with a ventrally directed stout seta, IV-leg-3 with three stout setae and IV-leg-5 somewhat swollen (Fig. 1672). Female fourth leg not modified.



1671



1672



1673

1671 *Pilosaturus villosus* (Hopkins), palp female (after Cook 1983)

1672 *Pilosaturus villosus* (Hopkins), fourth leg male (after Cook 1983)

1673 *Planaturus setipalpis* Cook, venter male (after Cook 1983)

HABITAT: Streams.

DISTRIBUTION: One species known from North and South Island, New Zealand.

Genus *Planaturus* Cook, 1983

(Figs. 1517, 1520, 1673-1676)

1983 *Planaturus* Cook, Contributions of the American Entomological Institute 21: 52.
Type species: *Planaturus setipalpis* Cook, 1983

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with two pairs of glandularia. Two pairs of dorsolateral platelets, the anterolateral with two pairs of glandularia, the posterolateral without glandularia. No free glandularia present (Fig. 1517). Anterodorsal part of ventral shield with a well-developed hood-like structure. A pair of glandularia immediately medial to insertions of fourth legs. Projections associated with insertions of fourth legs relatively broad (Figs. 1673, 1674). Genital field with numerous acetabula. Ventral margin of P2 either smooth or with denticles, with (Fig. 1675) or without (Fig. 1676) a large, thickened seta. Legs without distinct sexual dimorphism. IV-leg-2 longer than other segments of leg, IV-leg-3 partially covered by IV-leg-2 (Fig. 1520). Leg segments laterally compressed.

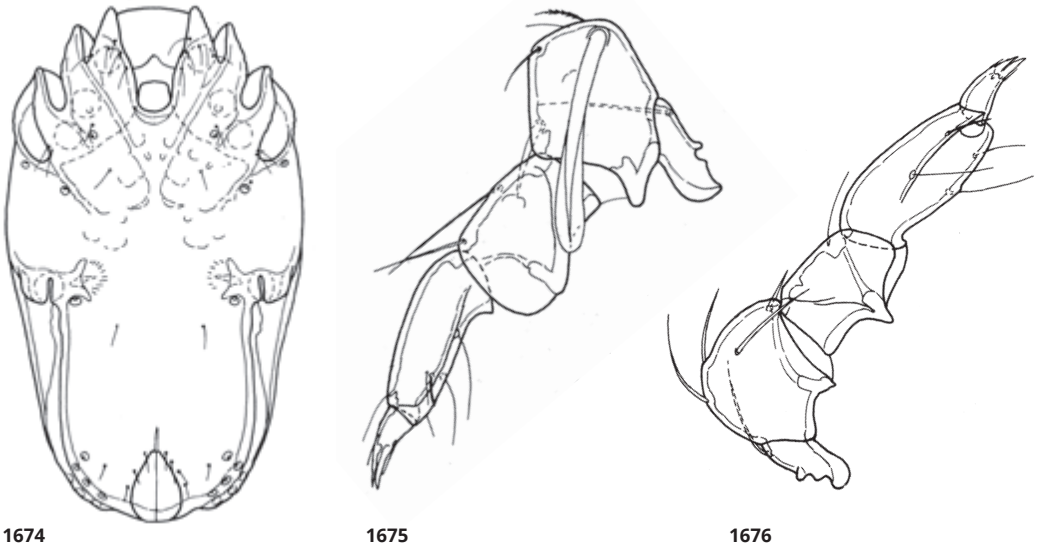
HABITAT: Interstitial, deep interstitial.

DISTRIBUTION: Five species known from North and South Island, New Zealand (Cook 1983, 1991, Pesic et al 2010c, Smit 2017b).

Genus *Pseudotryssaturus* Cook, 1983

(Figs. 1557, 1564, 1569, 1677, 1678)

1983 *Pseudotryssaturus* Cook, Contributions of the American Entomological Institute 21: 75.
Type species: *Tryssaturus indentatus* Hopkins, 1967



1674 **1675** **1676**

1674 *Planaturus setipalpis* Cook, venter female (after Cook 1983)

1675 *Planaturus setipalpis* Cook, palp male (after Cook 1983)

1676 *Planaturus lundbladi* Cook, palp female (after Cook 1983)

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with two pairs of glandularia. Two pairs of dorsolateral platelets, the anterolateral platelet with two pairs of glandularia, the posterolateral platelet without glandularia. Free glandularia present (Fig. 1569). Ornamentation of sclerites various. Cauda absent, but male genital field slightly set off from ventral shield. Coxae confined to anterior half of idiosoma. Posterior suture lines of coxae indistinct, if developed, they extend more or less at right angles to midline. Glandularia of Cx-IV near suture line Cx-III/IV (Fig. 1564). Projections associated with insertions of fourth legs somewhat pointed and with a few lateral setae (Fig. 1677). P2 with a few small ventral denticles, P4 with a small but thickened mediodistal seta (Fig. 1678). Legs without swimming setae. Male fourth leg with expanded segments and distal projections on certain segments (Fig. 1557). I-L-1 only moderately elongated. Leg setae do not exhibit sexual dimorphism.

HABITAT: Streams, interstitial.

DISTRIBUTION: Seven species known from North and South Island, New Zealand (Cook 1983, Pesic et al. 2010c, Smit 2017b).

Genus *Schwoerbelaturus* Smit, 2019

(Figs. 1533, 1534, 1679, 1680)

2019 *Schwoerbelaturus* Smit, Acarologia 59: 367.

Type species: *Zelandopsis aturoides* Schwoerbel, 1984

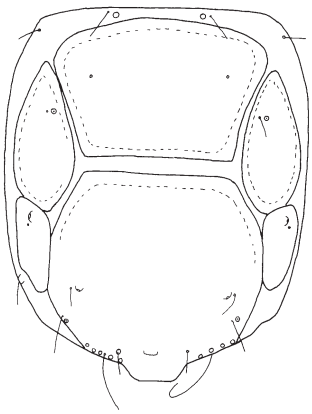
DIAGNOSIS: (Male only) Lateral eyes absent. Dorsum with large unpaired anteromedial and posteromedial plates; anteromedial plate with the postocularia, posteromedial plate with two pairs of glandularia. Posterior margin of posteromedial plate not visible in dorsal view. Two pairs of lateral platelets, each with a gland (Fig. 1679). Cx-I projecting far anteriorly beyond frontal idiosoma margin. Suture lines of coxae obliterated, those of Cx-IV completely absent. A pair of glandularia near suture line Cx-III/Cx-IV, and two pairs of glandularia between insertion of fourth legs and genital field (Fig. 1534). Genital field terminal, with five pairs of acetabula, two pairs shifted to the dorsum. Gonopore relatively wide. Palp slender, especially P4 and P5; P4 bulging ventrally, with a long ventral seta (Fig. 1680). Legs without swimming setae, leg segments slender and not modified (Fig. 1533).



1677



1678



1679

1677 *Pseudotryssaturus indentatus* (Hopkins), venter female (after Cook 1983)

1678 *Pseudotryssaturus indentatus* (Hopkins), palp female (after Cook 1983)

1679 *Schwoerbelaturus aturoides* (Schwoerbel), dorsum male (after Smit 2019a)

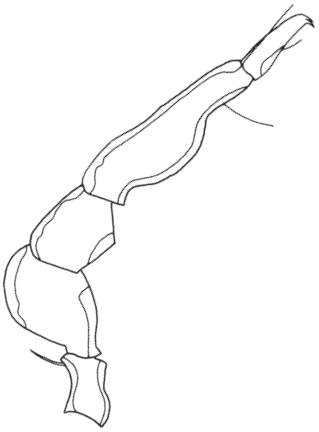
HABITAT: Interstitial.

DISTRIBUTION: One species known from North Island, New Zealand (Schwoerbel 1984, Smit 2019a).

Genus *Spinaturus* Cook, 1986

(Figs. 1527, 1528, 1681-1687)

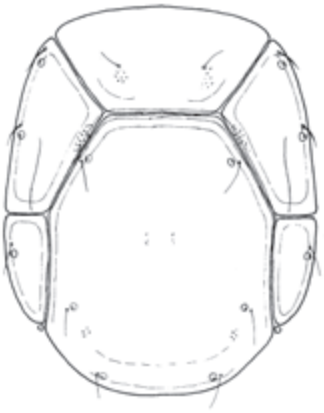
1986 *Spinaturus* Cook, Memoirs of the American Entomological Institute 40: 258.
Type species: *Spinaturus ctenophorus* Cook, 1986



1680



1681



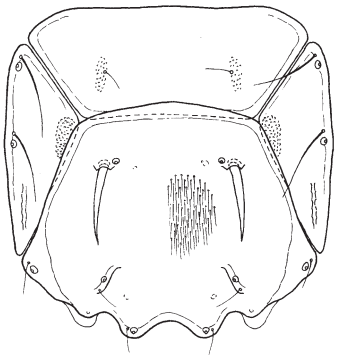
1682



1683



1684



1685

1680 *Schwoerbelaturus aturoides* (Schwoerbel), palp male (after Smit 2019a)
1681 *Spinaturus ctenophorus* Cook, venter male (after Cook 1986)
1682 *Spinaturus ctenophorus* Cook, dorsum female (after Cook 1986)
1683 *Spinaturus ctenophorus* Cook, genital field male (after Cook 1986)
1684 *Spinaturus ctenophorus* Cook, venter female (after Cook 1986)
1685 *Spinaturus bleptus* Cook, dorsum male (after Cook 1986)

DIAGNOSIS: Lateral eye pigment reduced. Dorsum with an unpaired anteromedial plate and a posteromedial plate with two or three pairs of glandularia. Anterior pair of glandularia on posteromedial plate with enlarged associated setae in male (Fig. 1528), posteromedial dorsal plate of female without enlarged setae (Fig. 1682). Two pairs of laterodorsal platelets present, posterolateral pair in males partially fused with posteromedial plate (Fig. 1685). Anterolateral platelet with two pairs of glandularia, posterolateral pair with one pair of glandularia. Free glandularia absent. Posterior part of ventral shield angular in males, with either a slight median cleft or with two, broad, truncate posterolateral projections (Fig. 1681). Glandularia of Cx-IV located near suture lines of CX-III/IV. Genital field with ten or more pairs of acetabula. Male gonopore ovally shaped, without glandularia closely flanking the anterior end of gonopore (Fig. 1683). P2 ventrally with denticles, P3 and P4 distinctly expanded (Fig. 1527). Legs without swimming setae. Male IV-leg-4 and -5 thickened with numerous stout setae (Figs. 1686, 1687). Legs of female not modified.

HABITAT: Interstitial.

DISTRIBUTION: Two species known from Tasmania, Australia (Cook 1986).



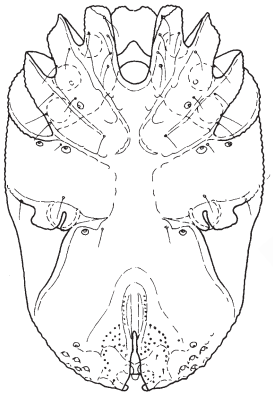
1686



1687



1688



1689



1690



1691

1686 *Spinaturus ctenophorus* Cook, fourth leg male (after Cook 1986)
1687 *Spinaturus ctenophorus* Cook, IV-leg-4-6 male (after Cook 1986)
1688 *Taintaturus hopkinsi* Cook, venter female (after Cook 1983)
1689 *Taintaturus accidens* Cook, venter male (after Cook 1983)
1690 *Taintaturus hopkinsi* Cook, palp female (after Cook 1983)
1691 *Taintaturus hopkinsi* Cook, fourth leg male (after Cook 1983)

Genus *Taintaturus* Cook, 1983

(Figs. 1516, 1548, 1688-1691)

1983 *Taintaturus* Cook, Contributions of the American Entomological Institute 21: 55.

Type species: *Taintaturus hopkinsi* Cook, 1983

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with two pairs of glandularia. Two pairs of dorsolateral platelets, the anterolateral with one pair of glandularia, the posterolateral without glandularia. A pair of free glandularia present between laterodorsal platelets and posteromedial plate (Fig. 1516). Anterodorsal part of ventral shield with a well-developed pointed hood-like structure which may extend beyond the anterior tips of Cx-I. Gnathosoma with an anchoral process. A pair of glandularia immediately medially of insertions of fourth legs. Projections associated with fourth legs moderately wide and somewhat truncated (Figs. 1548, 1688). Venter of male may have a posterior cleft (Fig. 1689). Genital field with numerous acetabula. P2 may have a pointed extension (Fig. 1690), P4 wider than high. IV-leg-2 longer than other segments of leg, IV-leg-3 partially covered by IV-leg-2 (Fig. 1691). Leg segments laterally compressed, without distinct sexual dimorphism; swimming setae absent.

HABITAT: Streams, shallow and deep interstitial habitats.

DISTRIBUTION: More than a dozen species known from New Zealand (Cook 1983, 1991; Pesic et al. 2010c, Smit 2017b).

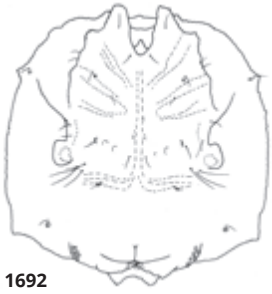
Genus *Thryptaturus* Harvey, 1998

(Figs. 1573, 1692-1695)

1998 *Thryptaturus* Harvey, Records of the Western Australian Museum 19: 94.

Type species: *Thryptaturus boultoni* Harvey, 1998

DIAGNOSIS: Lateral eye pigment reduced. Dorsum with paired anteromedial plates and a posteromedial plate with three pairs of acetabula. Between antero-and posteromedial plate an unpaired platelet without glandularia (Fig. 1573). Dorsum laterally with four pairs of platelets, only the most lateralmost three platelets each with one pair of glandularia. Suture lines of coxae indistinct, posterior margin of Cx-IV extending at right angles to midline. Glandularia of Cx-IV located in the centre. Posterior margin of ventral shield with a short indented extension in male (Fig. 1692). Genital field with several pairs of acetabula lying on lateral margin of ventral shield in male but flanking gonopore in female (Fig. 1693). Male genital field with a median cleft. Ventral margin of P2 with or without denticles, P4 somewhat expanded ventrally and ventral setae placed more or less medially (Fig. 1694).



1692



1693



1694

1692 *Thryptaturus boultoni* Harvey, venter male (after Harvey 1998b)

1693 *Thryptaturus boultoni* Harvey, venter female (after Harvey 1998b)

1694 *Thryptaturus boultoni* Harvey, palp male (after Harvey 1998b)

HABITAT: Interstitial.

DISTRIBUTION: Two species known from Australia (Harvey 1998b).

Genus *Tryssaturopsis* Cook, 1974

(Figs. 1518, 1696-1699)

1974 *Tryssaturopsis* Cook, Memoirs of the American Entomological Institute 21: 355 – Cook (1983).

Type species: *Tryssaturus novus* Hopkins, 1967



1695



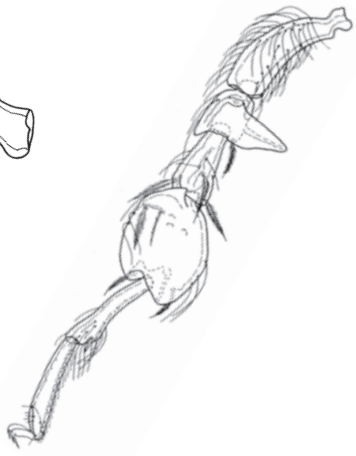
1696



1697



1698



1699



1700

1695 *Thryptaturus boultoni* Harvey, fourth leg male (after Harvey 1998b)

1696 *Tryssaturopsis novus* (Hopkins), venter male (after Cook 1983)

1697 *Tryssaturopsis novus* (Hopkins), venter female (after Cook 1983)

1698 *Tryssaturopsis asopos* Cook, palp female (after Cook 1983)

1699 *Tryssaturopsis novus* (Hopkins), fourth leg male (after Cook 1983)

1700 *Tryssaturus spinipes* Hopkins, venter male (after Cook 1983)

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with three pairs of glandularia. Two pairs of laterodorsal platelets, the anterolateral with one pair of glandularia, the posterolateral without glandularia. Free glandularia absent. Males with a distinct cauda (Fig. 1518). Projections associated with openings of IV-L pointed (Figs. 1696, 1697), a few to many setae along margins of these projections. P2 with or without ventral denticles, P4 with mediodistal thickened seta (Fig. 1698). Legs without swimming setae. Male IV-L-1 very long with numerous setae, IV-L-2 with a ventral or distoventral extension, IV-leg-4 enlarged to greatly expanded (Fig. 1699). Fourth leg of female not modified.

HABITAT: Streams.

DISTRIBUTION: Four species known from North Island, New Zealand (Hopkins 1967, Cook 1983).

Genus *Tryssaturus* Hopkins, 1967

(Figs. 1568, 1572, 1700-1702)

1967 *Tryssaturus* Hopkins, Transactions of the Royal Society of New Zealand, Zoology 10: 36.
Type species: *Tryssaturus spinipes* Hopkins, 1967

DIAGNOSIS: Dorsum with an unpaired anteromedial plate and a posteromedial plate with two pairs of glandularia. Two pairs of laterodorsal platelets, the anterolateral with one pair of glandularia, the posterolateral without glandularia. A pair of free glandularia present between the laterodorsal platelets and the posteromedial plate (Fig. 1572). Dorsal sclerites with a reticulate pattern. Male without a distinct cauda. Coxae confined to anterior half of idiosoma. Posterior margin of Cx-IV extending at right angles to midline. Glandularia of Cx-IV well distanced from suture line Cx-III/IV (Figs. 1700, 1701). P2 with a few ventral denticles, P4 with mediodistal thickened seta (Fig. 1702). Legs not laterally compressed, without swimming setae. Male IV-L-1 relative long with numerous setae; IV-L-2 with a distal extension and a group of setae, IV-L-3 with a large distal extension with a peg-like setae (Fig. 1568). Female IV-leg-2 with a distal extensions but with 2-3 setae only, IV-L-3 with a short distal extension with a short peg-like seta.

HABITAT: Streams.

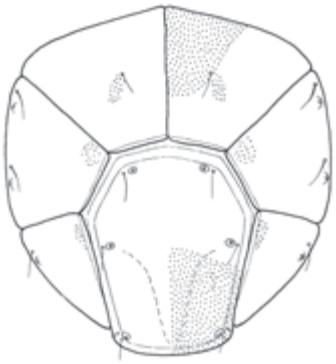
DISTRIBUTION: One species known from North Island, New Zealand (Hopkins 1967, Cook 1983).



1701



1702



1703

1701 *Tryssaturus spinipes* Hopkins, venter female (after Cook 1983)

1702 *Tryssaturus spinipes* Hopkins, palp female (after Cook 1983)

1703 *Twarntaturus australicus* Cook, dorsum female (after Cook 1986)

Genus *Twarntaturus* Cook, 1986

(Figs. 1582, 1583, 1703-1706)

1986 *Twarntaturus* Cook, Memoirs of the American Entomological Institute 40: 266.
Type species: *Twarntaturus zurus* Cook, 1986

DIAGNOSIS: Dorsum with paired anteromedial plates and a posteromedial plate with three pairs of glandularia (Fig. 1703). Two pairs of laterodorsal platelets, the anterolateral with two pairs of glandularia, the posterolateral with one pair of glandularia. Free glandularia absent. Idiosoma without sexual dimorphism. Glandularia of Cx-IV located well posterior to the anterior suture lines. Cx-III and Cx-IV with varying development of longitudinal ridges (Fig. 1582). Projections associated with insertions of IV-L rounded. Posterior margin of Cx-IV extending more or less at right angles to midline. Genital field with numerous acetabula, together with gonopore lying subterminally. Males with two pairs of glandularia close together on their respective sides immediately anterior to genital field; these glandularia in various position in the female. Gonopore of male somewhat elongated but appearing foreshortened in ventral view (In one species more ventrally located and oval in shape, Fig. 1705). P2 ventrally without denticles or with few to many denticles. P4 with slightly prominent ventral setal tubercles, these varying in position from well distal to the middle to well proximal to the middle (Fig. 1583). Legs without pronounced sexual dimorphism (Fig. 1706); swimming setae absent.

HABITAT: Streams.

DISTRIBUTION: More than a dozen species known from eastern and northern Australia (Cook 1986, Smit 2010a).

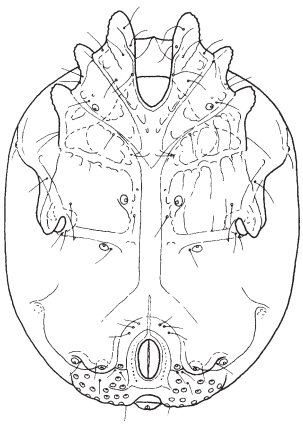
Genus *Uralbia* Hopkins, 1967

(Figs. 1535, 1536, 1707-1711)

1967 *Uralbia* Hopkins, Transactions of the Royal Society of New Zealand, Zoology 10: 44.
Type species: *Uralbia projecta* Hopkins, 1967



1704



1705



1706

1704 *Twarntaturus australicus* Cook, venter male (after Cook 1986)

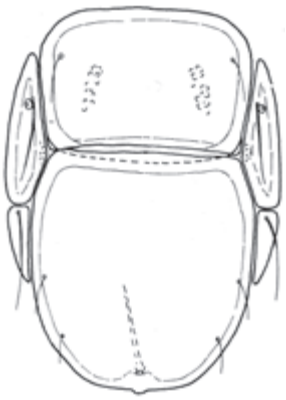
1705 *Twarntaturus cetonus* Cook, venter male (after Cook 1986)

1706 *Twarntaturus cetonus* Cook, fourth leg male (after Cook 1986)

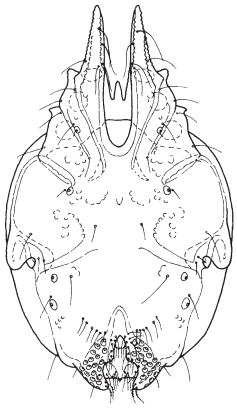
DIAGNOSIS: Dorsum with an unpaired anteromedial plate with widely separated postocularia, and posteromedial plate without glandularia (but two pairs of associated setae present). Two pairs of laterodorsal platelets, anterolateral platelet with one pair of glandularia posterolateral platelet with pair of long associated setae, (Fig. 1536). Excretory pore lying on the posteromedial plate in female (Fig. 1707), on dorsal side of ventral shield in male. Gnathosomal bay long and narrow. Coxae projecting far anteriorly and pointed (Figs. 1708, 1709). Suture lines of coxae incomplete. Projections associated with insertions of IV-L large and rounded. Glandularia of Cx-IV near suture lines Cx-III/IV. Genital field with numerous acetabula. Gonopore of female large and terminal, genital field of male with acetabula-bearing lobes extending posterior to gonopore. Palp segments elongated, P2 ventrally with spine-like setae (Fig. 1535). Legs without swimming setae. Fourth leg of male with elongated leg segments, IV-L-3 and -4 with numerous setae (Figs. 1710, 1711).

HABITAT: Interstitial.

DISTRIBUTION: Three species known from North and South Island, New Zealand (Hopkins 1967, Cook 1983, Pesic et al. 2010c; Schwoerbel 1984, Smit 2017c).



1707



1708



1709



1710



1711



1712

1707 *Uralbia projecta* Hopkins, dorsum female (after Cook 1983)
1708 *Uralbia projecta* Hopkins, venter male (after Cook 1983)
1709 *Uralbia projecta* Hopkins, venter female (after Cook 1983)
1710 *Uralbia projecta* Hopkins, fourth leg male (after Cook 1983)
1711 *Uralbia projecta* Hopkins, IV-leg-4 leg male (after Cook 1983)
1712 *Valsaturus longipalpis* Cook, venter male (after Cook 1998)

Genus *Valsaturus* Cook, 1998

(Figs. 1509, 1712-1716)

1998 *Valsaturus* Cook, Acarologia 39: 336.

Type species: *Valsaturus longipalpis* Cook, 1998

DIAGNOSIS: Dorsum with an unpaired anteromedial plate, a posteromedial plate without glandularia and three pairs of lateral platelets, each with a pair of glandularia. Anterolateral platelet with a pair of associated setae, gland portion absent. Free glandularia absent (Fig. 1509). Preocularia lying on anterior margin of anteromedial dorsal plate. Projections associated with openings of IV-L rounded. Anterior coxae narrow and projecting far anteriorly. Cx-IV with a pair of glandularia near suture lines of Cx-III/IV. Medial margins of Cx-IV obliterated. Genital field with 6-14 pairs of acetabula not lying on genital plates (Fig. 1713). Gonopore terminal in female (Fig. 1714), subterminal to ventral in males (Fig. 1712). Palp relatively long, especially P4; P2 ventrally with a single small projection (Fig. 1715. Legs without sexual dimorphism, swimming setae absent (Fig. 1716).

HABITAT: Streams.

DISTRIBUTION: Two species known from South Africa (Cook 1998).

Genus *Zelandalbia* Imamura, 1978

(Figs. 1524, 1531, 1532, 1717, 1718)

1978 *Zelandalbia* Imamura, Journal of the Speleological Society of Japan 3: 41 - Cook (1983).

Type species: *Uralbia hopkinsi* Imamura, 1978

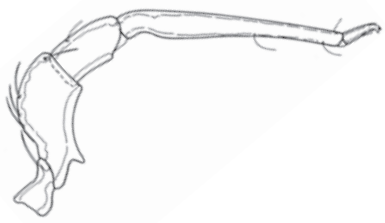
DIAGNOSIS: Dorsum with an unpaired anteromedial plate, posteromedial plate with two pairs of glandularia. Two pairs of laterodorsal platelets, each with a pair of glandularia (Fig. 1524). Excretory pore of female lying on the posteromedial plate, but not in male. Gnathosoma with a long rostrum, the latter in one species needle-like. Cx-I projecting, in some species beyond anterior idiosoma margin. Suture lines of coxae incomplete or obliterated. Projections associated with insertions of IV-L rounded or truncate. A ridge present posterior to openings for fourth legs (Figs. 1532, 1717). Glandularia of Cx-IV near suture line Cx-III/IV or well distanced from this suture line. Genital field with several pairs of acetabula. Gonopore of both sexes terminal. Palp segments elongated in all but one species (Fig. 1718). Leg segments short and laterally compressed (Fig. 1531).



1713



1714



1715

1713 *Valsaturus longipalpis* Cook, genital field male (after Cook 1998)

1714 *Valsaturus longipalpis* Cook, venter female (after Cook 1998)

1715 *Valsaturus longipalpis* Cook, palp male (after Cook 1998)

HABITAT: Interstitial and deep interstitial waters. One species collected in a cave.

DISTRIBUTION: Four species known from North and South Island, New Zealand (Hopkins 1967, Imamura 1978, Cook 1983, 1991, Pesic et al. 2010c, Schwoerbel 1984, Smit 2017b).

Genus *Zelandaturus* Smit, 2015

(Figs. 1559-1561, 1719)

2015 *Zelandaturus* Smit, Zootaxa 4033: 442.

Type species: *Zelandaturus magnipes* Smit, 2015

DIAGNOSIS: (Male only) Lateral eyes absent. Idiosoma anteriorly distinctly wider than posteriorly (Fig. 1561). Posterior idiosoma split in a dorsal and ventral part, only visible in lateral view; lateral margin of ventral part fringed with stout setae. Idiosoma posteriorly with a median cleft. Dorsum with unpaired anteromedial plate, posteromedial plate with two pairs of glandularia, two pairs of lateral platelets, anterolateral with one pair of glandularia, posterolateral without glandularia; posteromedial plate with two pairs of glandularia. A free pair of dorsoglandularia present. Posterior to posterior dorsal plate a concavity present with a petiole-like structure. Anterodorsal part of ventral shield with a short median hood-like structure with three pointed extensions. Suture lines of coxae incomplete. Projections associated with insertion of fourth legs rounded. Near gonopore two flaps which hide the slit-like gonopore (Fig. 1719). P2 ventrally with spine-like setae (Fig. 1559). Fourth leg very heavy, IV-leg-2-5 with long, curved setae (Fig. 1560).

HABITAT: Interstitial.

DISTRIBUTION: Known from one species from South Island, New Zealand.

Genus *Zelandopsis* Imamura, 1977

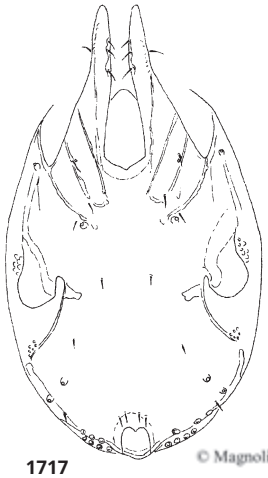
(Figs. 1540, 1541, 1720-1722)

1977 *Zelandopsis* Imamura, Journal of the Speleological Society of Japan 2: 10.

Type species: *Zelandopsis morimotoi* Imamura, 1977



1716



1717

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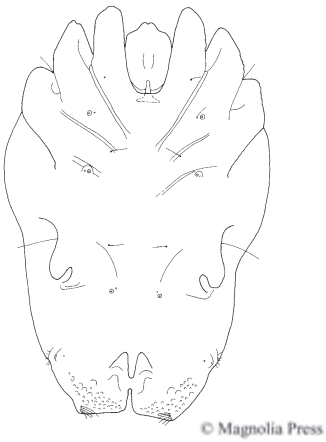
1718

1716 *Valsaturus longipalpis* Cook, fourth leg male (after Cook 1998)

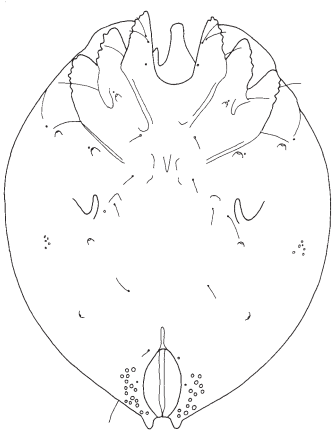
1717 *Zelandalbia longipalpis* Pesic & Smit, venter male (after Pesic et al. 2010c) Reproduced with permission from copyright holder

1718 *Zelandalbia imamurai* Cook, palp female (after Cook 1983)

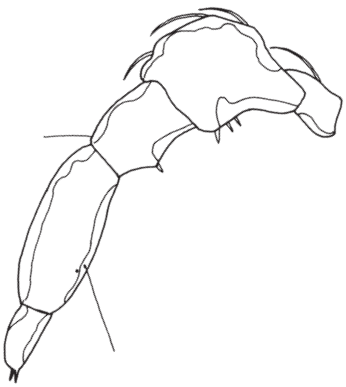
DIAGNOSIS: Lateral eye pigment absent, but in one female specimen eyes with red pigment, lying beneath integument. Idiosoma dome-shaped in lateral view, posteriorly tapering. Dorsum with a narrow anterior plate, much narrower than wide, with the postocularia. Posterior dorsal plate unpaired, with two pairs of glandularia. Two pairs of lateral dorsal platelets present, the anterior lateral platelets with a pair of glandularia, the posterolateral platelets without glandularia. Dorsum with one pair of "free" glandularia, located between the pair of lateral platelets and the posteromedial plate (Fig. 1540). Venter posteriorly with one rounded, hyaline extension in male (Fig. 1541), female with two rounded, hyaline extensions (Fig. 1721). Coxae extending slightly beyond frontal idiosoma margin. Suture lines of coxae indistinct. Gonopore of male away from posterior margin, gonopore of female near posterior idiosoma margin. Acetabula of male posterior to gonopore in two irregular rows (Fig. 1541), acetabula of female in two groups flanking the gonopore (Fig. 1721). P2 ventrally with small denticles (Fig. 1722). I-III-leg-2 longer than other segments (Fig. 1722). Legs without swimming setae. Excretory pore platelet located dorsally.


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1719



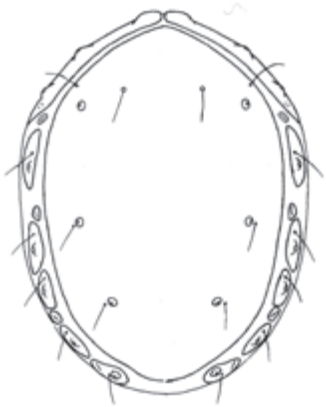
1720



1721



1722



1723



1724

1719 *Zelandaturus magnipes* Smit, venter male (after Smit 2015c) Reproduced with permission from copyright holder

1720 *Zelandopsis morimotoi* Imamura, venter female (after Smit 2019a)

1721 *Zelandopsis morimotoi* Imamura, palp male (after Smit 2019a)

1722 *Zelandopsis morimotoi* Imamura, I-leg-2-6 male (after Smit 2019a)

1723 *Feltria* (*Neofeltria*) *similis* Cook, dorsum male (after Cook 1974)

1724 *Feltria* (*Feltria*) *wyomingensis* Cook, dorsum male (after Cook 1974)

HABITAT: Cave waters, interstitial habitats.

DISTRIBUTION: One species known from New Zealand.

REMARKS: Schwoerbel (1984) assigned a second species, i.e. *Z. aturoides* Schwoerbel, 1984, preliminary to this genus. However, this species differs in many ways from *Zelandopsis* and is transferred by Smit (2019a) to *Schwoerbelaturus*.

Family Feltriidae K. Viets, 1926

1926 Feltriidae K. Viets, Zoologischer Anzeiger 69: 198.

1948 Azugofeltriinae Motaş & Tanasachi, Annales Scientifiques de l'Université de Jassy, Second section 31: 147 – Cook (1970a).

DIAGNOSIS: Lateral eyes not in capsules, but associated with laterofrontal platelets. Idiosoma flattened, dorsalia always present, these variously expanded and fused, often forming a large dorsal shield surrounded by smaller glandularia and muscle attachment platelets (Figs. 1723-1725, 1729-1731). Gnathosoma without rostrum, proximally with a well-developed anchoral process (Fig. 1726). Coxae typically in four groups, which may fuse variously to each other, sometimes also fused to the genital plate to form a ventral shield (Figs. 1732, 1733, 1738, 1739). Membranous integument strongly lined. Cx-I with short posterior apodemes, Cx-III and Cx-IV without glandularia but two pairs of glandularia present between Cx-IV and genital field. Posterior margins of Cx-IV without projections. Genital field with numerous acetabula located on plates flanking the gonopore; these plates separate in female but fused in male. Palp five-segmented, a ventral projection rarely developed on P2 (Fig. 1744). P4 occasionally with setal tubercles (Fig. 1745). Legs without swimming setae, claws with one or two clawlets and claw blade. Excretory pore in posteroventral, terminal or posterodorsal position, surrounded by a sclerotized ring, often fused to genital plate in males. III-leg-6 of male often with highly modified ventral setae (Figs. 1728, 1735). Monotypic.

Genus *Feltria* Koenike, 1892

(Figs. 108-110, 1723-1745)

1892 *Feltria* Koenike, Zoologischer Anzeiger, 15: 323.

1934 *Mesofeltria* Uchida, Journal of the Faculty of Science, Hokkaido University, serie 6, Zoology 3: 106.

Type species: *Feltria minuta* Koenike, 1892

DIAGNOSIS: As for family.

KEY TO THE SUBGENERA

1 Dgl-4 small, on platelets separate from the other dorsal platelets and glandularia, lacking muscle attachment scars; dorsum with a single large dorsal shield with three pairs of glandularia in both sexes (Fig. 1723) Subgenus *Neofeltria*

\- Dgl-4 larger and with muscle attachment scars, either separate (Fig. 1724), fused medially or fused with the dorsal shield; if a single, large dorsal shield is present, it bears four pairs of glandularia (Fig. 1725), or, if gland portion is lost, the associated setae are present 2

2 Posterior apodemes ("anchoral process") of gnathosoma as long as, or longer than, gnathosomal base (Fig. 1726) Subgenus *Azugofeltria*

\- Posterior apodemes of gnathosoma short, much shorter than gnathosomal base (subgenera not distinguishable in females) 3

3	III-leg-6 of male without specialized ventral setae (Fig. 1727)	Subgenus *Feltriella*
-	III-leg-6 of male with specialized ventral setae (Fig. 1728)	Subgenus *Feltria* s.s.

Subgenus *Feltria* s.s.

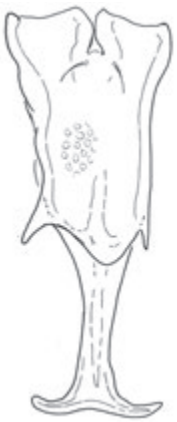
(Figs. 108-110, 1724, 1725, 1728, 1729, 1744, 1745)

DIAGNOSIS: Male dorsal shield large, bearing four pairs of glandularia or variously subdivided into a large plate and several paired or unpaired, smaller plates (Figs. 1724, 1725, 1729). Coxae separate in four groups or fused to various degree, in some cases forming a large coxal plate (Fig. 108). Glandularia between coxae and genital field free or fused to secondary sclerotized margin of Cx-IV. Male III-leg-6 with modified ventral setae (Fig. 1728). Gnathosoma with a short posterior apodeme. P5 typically shorter than P4 (Fig. 110).

HABITAT: Streams, springs, interstitial.



1725



1726



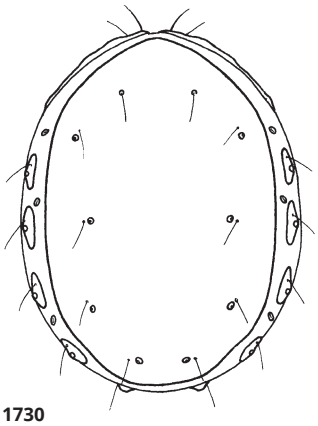
1727



1728



1729



1730

1725 *Feltria* (*Feltria*) *gennada* Cook, dorsum male (after Cook 1974)

1726 *Feltria* (*Azugofeltria*) *motasi* Schwoerbel, ventral view gnathosoma male (after Gerecke et al. 2016)

1727 *Feltria* (*Feltriella*) *rubra* Piersig, III-leg-5-6 male (after Gerecke et al. 2016)

1728 *Feltria* (*Feltria*) *armata* Koenike, III-leg-5-6 male (after Gerecke et al. 2016)

1729 *Feltria* (*Feltria*) *falcicorna* Cook, dorsum female (after Cook 1974)

1730 *Feltria* (*Azugofeltria*) *testudo* Cook, dorsum male (after Cook 1974)

DISTRIBUTION: Numerous species known from the Holarctic, in the New World extending south into Mexico; a few species known from the Oriental region (Burma, Lundblad 1967, 1969; India, Pesic & Panesar 2008).

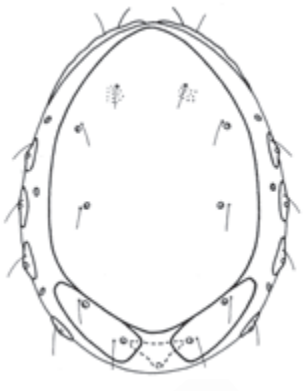
Subgenus *Azugofeltria* Motaş & Tanasachi, 1948

(Figs. 1726, 1730-1735)

1948 *Azugofeltria* Motaş & Tanasachi, Annales Scientifiques de l'Université de Jassy 31, Second section: 146.

Type species: *Azugofeltria mira* Motaş & Tanasachi, 1948

DIAGNOSIS: Male with a large dorsal shield bearing four pairs of glandularia (Fig. 1730), female with a large central plate surrounded by variously-shaped platelets (Fig. 1731). Gnathosoma with long posterior apodemes (Fig. 1726). Coxae fused to one large coxal plate, medial suture lines completely obliterated (Figs. 1732-1733). The two pairs of glandularia between coxae and genital field fused to secondary sclerotization margin of Cx-IV. Genital plates of the female fused together anteriorly with the pregenital sclerite in the European species but separate in the North American species. P5 nearly as long as P4 (Fig. 1734). Male III-leg-6 with modified ventral setae (Fig. 1735).



1731



1732



1733



1734



1735



1736

1731 *Feltria* (*Azugofeltria*) *testudo* Cook, dorsum female (after Cook 1974)

1732 *Feltria* (*Azugofeltria*) *testudo* Cook, venter male (after Cook 1974)

1733 *Feltria* (*Azugofeltria*) *testudo* Cook, venter female (after Cook 1974)

1734 *Feltria* (*Azugofeltria*) *motasi* Schwoerbel, palp male (after Gerecke et al. 2016)

1735 *Feltria* (*Azugofeltria*) *testudo* Cook, III-leg-6 male (after Cook 1974)

1736 *Feltria* (*Feltriella*) *geometrica* Habeeb, dorsum male (after Cook 1974)

HABITAT: Streams, interstitial.

DISTRIBUTION: Holarctic, two species known from Europe (Gerecke 2012), two from North America (Cook 1970a) and one from Japan (Imamura 1957a).

Subgenus *Feltriella* K. Viets, 1930

(Figs. 1727, 1736-1739)

1930 *Feltriella* K. Viets, Archiv für Hydrobiologie 21: 396.

1941 *Testudofeltria* Lundblad, Entomologisk Tidskrift 62: 118.

Type species: *Feltria rubra* Piersig, 1898

DIAGNOSIS: Sclerotization of dorsum variable, from numerous platelets (Fig. 1736) to a well-developed dorsal shield (Fig. 1737). Gnathosoma with short posterior apodemes. Coxae various, from separate in four groups to forming one large plate, but medial suture line always visible (Figs. 1738, 1739). P5 distinctly shorter than P4. Male III-leg-6 without modified ventral setae (Fig. 1727).

HABITAT: Streams, springs.

DISTRIBUTION: Several species known from the Holarctic (China, Yi & Jin 2011).

Subgenus *Neofeltria* Cook, 1963

(Figs. 1723, 1740-1743)

1963 *Neofeltria* Cook, Annals of the Entomological Society of America 56: 488.

Type species: *Feltria virginiensis* Cook, 1963

DIAGNOSIS: Dorsal and ventral shields present in both sexes; dorsal shield with three pairs of glandularia (Fig. 1723). Dgl-4 separated from the dorsal shield, similar in size to the lateroglandularia flanking the dorsal shield, and not bearing muscle attachment scars (Fig. 1740). Gnathosoma with posterior apodemes varying from moderately developed to very long. Median margins of Cx-IV reduced to median angles in male. Median coxal suture lines obliterated (Fig. 1741). P5 about as long as P4 or shorter (Fig. 1742). III-leg-6 of male without modified setae (Fig. 1743).

HABITAT: Interstitial.

DISTRIBUTION: Two species known from North America (Cook 1963c).



1737



1738



1739

1737 *Feltria* (*Feltriella*) *rubra* Piersig, dorsum male (after Gerecke et al. 2016)

1738 *Feltria* (*Feltriella*) *exilis* Cook, venter female (after Cook 1974)

1739 *Feltria* (*Feltriella*) *geometrica* Habeeb, venter male (after Cook 1974)

Family Ferradasiidae Cook, 1980

1980 Ferradasiidae Cook, Memoirs of the American Entomological Institute 31: 184.

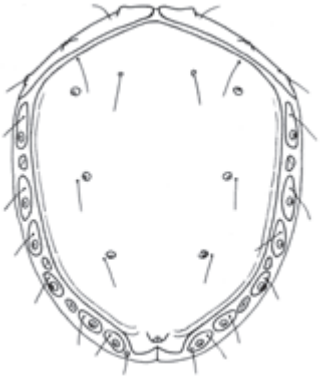
DIAGNOSIS: Coxal suture lines continuous on their respective sides, but well separated medially. Both Cx-III and Cx-IV without glandularia. Insertions of fourth legs with associated projections. Genital field with numerous acetabula. P2 with a distoventral projection, P3 slightly bulging ventrally (Fig. 1748). First leg of male with heavy setae (Fig. 1750), first leg of female without heavy setae and segments more slender (Fig. 1751). Legs without swimming setae. Male: Dorsal and ventral shields present (Fig. 1746). Gnathosoma fused to ventral shield. Cx-IV greatly reduced, medial margins reduced to angles; Cx-IV widely separated from each other. Cx-III extending far posteriorly (Fig. 46). Acetabula confined to posterior part. Gonopore shifted far forward to base of gnathosoma. Female: Without dorsal and ventral shields, but dorsum with five platelets (Fig. 1747). Gnathosoma long. Coxae in four groups; Cx-IV are reduced and with median margins reduced to median angles. Cx-III do not extend far posteriorly as in male (Fig. 45). Genital plates and gonopore in "normal" position at posterior end of venter. Palp more slender compared to male (Fig. 1749). Monotypic.

Genus *Ferradasia* Cook, 1980

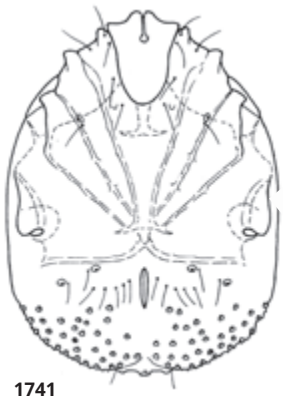
(Figs. 45, 46, 1746-1751)

1980 *Ferradasia* Cook, Memoirs of the American Entomological Institute 31: 184.

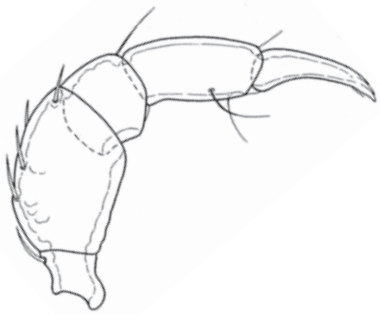
Type species: *Ferradasia musicola* Cook, 1980



1740



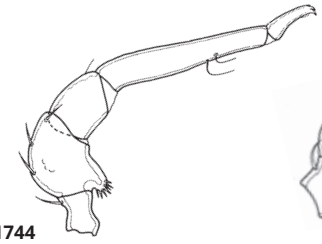
1741



1742



1743



1744



1745

1740 *Feltria* (*Neofeltria*) *virginiensis* Cook, dorsum female (after Cook 1974)

1741 *Feltria* (*Neofeltria*) *similis* Cook, venter male (after Cook 1974)

1742 *Feltria* (*Neofeltria*) *virginiensis* Cook, palp male (after Cook 1974)

1743 *Feltria* (*Neofeltria*) *virginiensis* Cook, III-leg-6 male (after Cook 1974)

1744 *Feltria* (*Feltria*) *echinopalpis projecta* Cook, palp female (after Cook 1974)

1745 *Feltria* (*Feltria*) *falcicorna* Cook, palp male (after Cook 1974)

DIAGNOSIS: As for family.

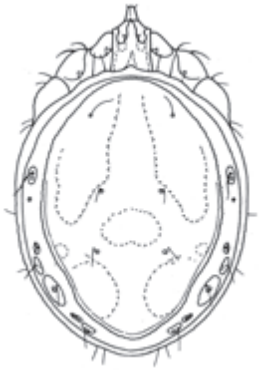
HABITAT: Streams.

DISTRIBUTION: One species known from Argentina and Chile (pers. observ.).

Family Frontipodopsidae K. Viets, 1931

1931 Frontipodopsinae K. Viets, Zoologischer Anzeiger 93: 46 – Cook et al. (2000).

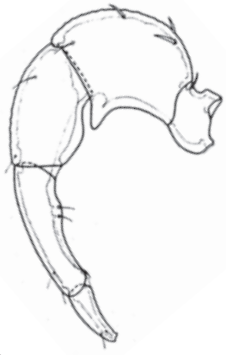
DIAGNOSIS: Idiosoma laterally compressed. Dorsum with a median strip of unsclerotized integument with several small platelets or a single elongate plate (Fig. 1756), associated with the postocularia and dorsoglandularia. Gnathosomal base separated from Cx-I. Venter nearly covered by coxae, with Cx-IV laterally expanded to flanks of idiosoma. Suture lines between coxae extending posteriorly beyond level of insertions of fourth leg (Figs. 1752, 1754); suture lines Cx-III/IV may be absent. Cx-IV without glandularia. All leg insertions shifted to anterior part of idiosoma, those of I-III-L near anterior end of idiosoma, IV-L insertion near midlength of idiosoma. Legs without swimming setae, not exhibiting sexual dimorphism. Fourth leg paddle-like, IV-leg-2-6 rather short, laterally expanded and flattened (Figs. 1753, 1755). Cxgl-2 located posterior to genital field together with genital field on a posteroventral plate. Genital field with three pairs of acetabula, gonopore surrounded by sclerotization, completely in male, only anteriorly and laterally in females. Palp five-segmented, P3 may have a distal peg-like seta (Fig. 1757). Monotypic.



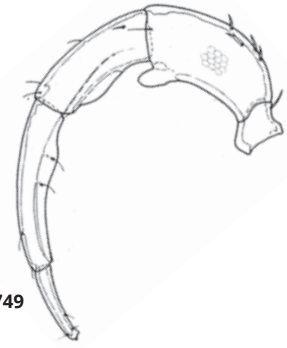
1746



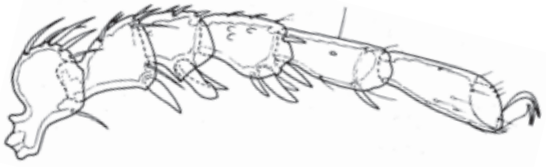
1747



1748



1749



1750



1751

1746 *Ferradasia musicola* Cook, dorsum male (after Cook 1980)

1747 *Ferradasia musicola* Cook, dorsum female (after Cook 1980)

1748 *Ferradasia musicola* Cook, palp male (after Cook 1980)

1749 *Ferradasia musicola* Cook, palp female (after Cook 1980)

1750 *Ferradasia musicola* Cook, first leg male (after Cook 1980)

1751 *Ferradasia musicola* Cook, I-leg-5-6 female (after Cook 1980)

Genus *Frontipodopsis* Walter, 1919

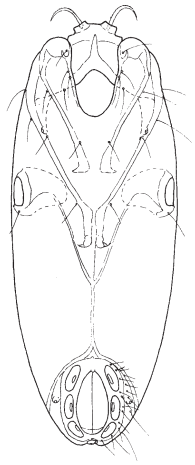
(Figs. 61, 66, 1752-1760)

1919 *Frontipodopsis* Walter, Zoologischer Anzeiger 50: 257.
Type species: *Frontipodopsis staheli* Walter, 1919

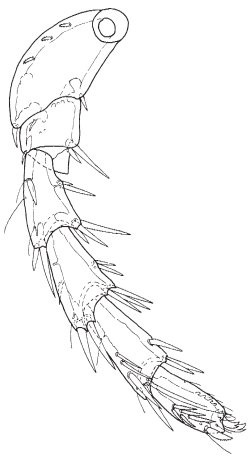
DIAGNOSIS: As for family.

KEY TO THE SUBGENERA

1 Posterior suture lines of Cx-III well-developed (Fig. 1752); IV-leg-1 dorsomedially with a row of small, thickened setae (Fig. 1753) Subgenus *Frontipodopsis* s.s.



1752



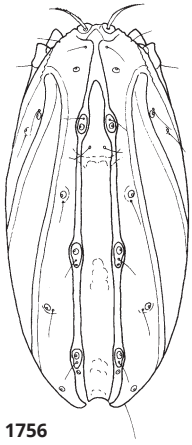
1753



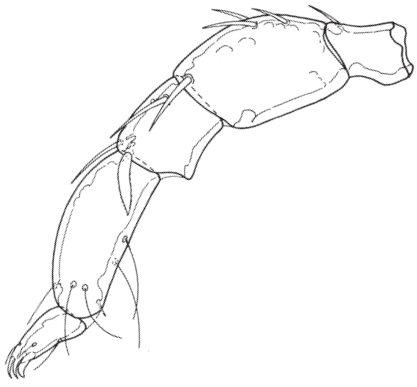
1754



1755



1756



1757

1752 *Frontipodopsis* (*Frontipodopsis*) *obscura* Cook, venter male (after Cook 1986)
1753 *Frontipodopsis* (*Frontipodopsis*) *australica* Cook, fourth leg male (after Cook 1986)
1754 *Frontipodopsis* (*Frontipodopsella*) *reticulatifrons* Szalay, venter male (after Gerecke et al. 2016)
1755 *Frontipodopsis* (*Frontipodopsella*) *reticulatifrons indica* Cook, fourth leg male (after Cook 1974)
1756 *Frontipodopsis* (*Frontipodopsis*) *australica* Cook, dorsum female (after Cook 1986)
1757 *Frontipodopsis* (*Frontipodopsis*) *australica* Cook, palp female (after Cook 1986)

- Posterior suture lines of Cx-III obliterated (Fig. 1754); IV-leg-1 leg without a dorsomedial row of setae (Fig. 1755) Subgenus *Frontipodopsella*

Subgenus *Frontipodopsis* s.s.

(Figs. 1752, 1753, 1756-1759)

DIAGNOSIS: Suture lines Cx-III/IV well developed (Fig. 1752). IV-L with a row of small, thickened setae dorsomedially on IV-L-1 (Fig. 1753) and a heavy dorsodistal seta on IV-L-6. Palp may exhibit sexual dimorphism. In two Australian species male P3 with a dorsodistal extension ending in a greatly enlarged seta (Fig. 1758), in female P3 not modified and heavy seta not greatly enlarged (Fig. 1757). In another species from Australia P2 and P4 modified as well (Fig. 1759).

HABITAT: Streams, interstitial.

DISTRIBUTION: Several species known from the Southern Hemisphere: Australia (Cook 1986), South America (Surinam; Brazil; Chile, Cook 1988); in Central America as north as Costa Rica (Cook 1980).

Subgenus *Frontipodopsella* Walter, 1947

(Figs. 61, 66, 1754, 1755, 1760)

1947 *Frontipodopsella* Walter, Verhandlungen der Naturforschenden Gesellschaft in Basel 58: 192.

Type species: *Frontipodopsella subterranea* Walter, 1947 = *F. reticulatifrons* Szalay, 1945

DIAGNOSIS: Suture lines Cx-III/IV obliterated (Fig. 1754); IV-L-1 dorsomedially without a row of setae, dorsodistal seta (Fig. 1755) on IV-L-6 rather thin. Palp without sexual dimorphism, in both sexes P3 without dorsodistal extension and stout seta (Fig, 1760).

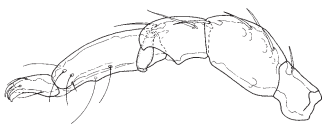
HABITAT: Streams, interstitial, springs.

DISTRIBUTION: Several species (and subspecies) known from the Holarctic (North America, Cook 1963a, Habeeb 1973; Europe), Iran (Schwoerbel & Sepasgosarian 1980), SE-Asia (India, Cook 1967; Borneo, Smit & Pešić 2014b), Siberia (Semenchenko 2016), Japan (Imamura 1957), South Africa (Cook et al. 2000).

Family Omartacaridae Cook, 1963

1963 Omartacaridae Cook, Entomological News 74: 37.

DIAGNOSIS: Lateral eyes absent. Dorsalia present or absent, integument soft. Idiosoma elongated, coxae confined to anterior part. Gnathosoma with a well-developed rostrum which may have tubercles (Fig. 1762). Chelicera may or may not be fused medially, cheliceral claw somewhat stylet-like. Coxae in four groups lying very close together. Cx-III more or less triangular, medial



1758



1759



1760

1758 *Frontipodopsis* (*Frontipodopsis*) *australica* Cook, palp male (after Cook 1986)

1759 *Frontipodopsis* (*Frontipodopsis*) *curvipalpis* Cook, palp male (after Cook 1986)

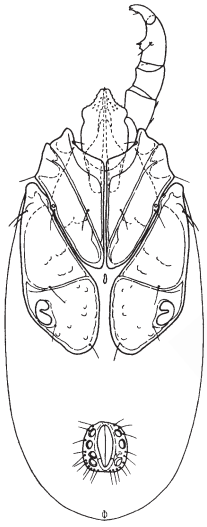
1760 *Frontipodopsis* (*Frontipodopsella*) *reticulatifrons indica* Cook, palp male (after Cook 1974)

margin absent. Cx-IV small and rounded posteriorly (Figs. 47, 1761). Cxgl-2 fused with Cx-II but occasionally not visible in ventral view when shifted to the lateral sides of Cx-II. Genital field with three to numerous acetabula, located well posterior to Cx-IV. Acetabula lying on genital plates separate in female, fused in male (Fig. 1767). Gonopore of female very long, much longer than genital plates (Figs. 47, 1763) (female of *Maharashtracarus* unknown). Palp five-segmented, P4 with a well-developed peg-like seta (Figs. 1765, 1766). Legs with long, fine setae but without true swimming setae (Fig. 1768); claws with clawlets.

KEY TO THE SUBFAMILIES

1 Genital field with 3-4 pairs of acetabula (Fig. 1761); gnathosoma with tubercles on rostrum (Fig. 1762) Subfamily Maharashtracarinae

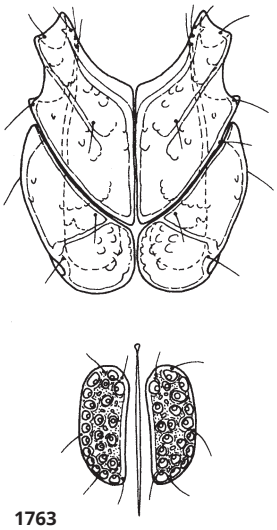
\- Genital field with numerous acetabula (Fig. 1763); gnathosoma without tubercles (Fig. 1764) Subfamily Omartacarinae



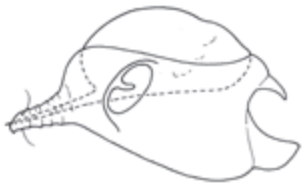
1761



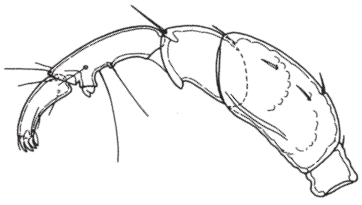
1762



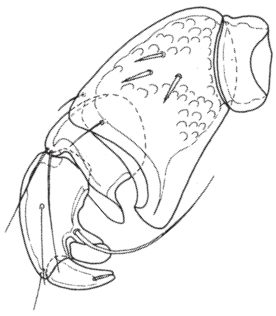
1763



1764



1765



1766

1761 *Maharashtracarus neotropicus* Cook, venter male (after Cook 1980)

1762 *Maharashtracarus phreaticus* Cook, gnathosoma + palp male (after Cook 1974)

1763 *Omartacarus* (*Omartacarus*) *motasi* Cook, venter female (after Cook 1980)

1764 *Omartacarus* (*Omartacarus*) *elongatus* Cook, gnathosoma female (after Cook 1974)

1765 *Omartacarus* (*Omartacarus*) *motasi* Cook, palp female (after Cook 1980)

1766 *Omartacarus* (*Omartacarellus*) *brevipalpis* Cook, palp female (after Cook 1980)

Subfamily Maharashtracarinae Cook, 1967

1967 Maharashtracarinae Cook, Memoirs of the American Entomological Institute 9: 114 – Cook (1980).

DIAGNOSIS: (Male only) Dorsum with or without small dorsalia (Fig. 1770). Gnathosoma with well-developed tubercles on rostrum (Fig. 1762). Chelicera not fused medially. Cxgl-2 fused with Cx-II. Genital field with 3-4 pairs of acetabula (Fig. 1761).

Genus *Maharashtracarus* Cook, 1967

(Figs. 1761, 1762, 1770, 1771)

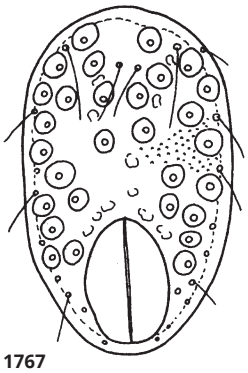
1967 *Maharashtracarus* Cook, Memoirs of the American Entomological Institute 9: 115.

Type species: *Maharashtracarus phreaticus* Cook, 1967

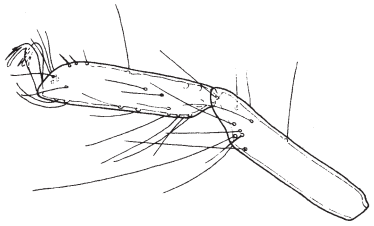
DIAGNOSIS: As for subfamily.

HABITAT: Interstitial.

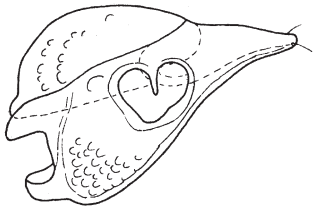
DISTRIBUTION: Two species known, one from India (Cook 1967) and one from Costa Rica (Cook 1980).



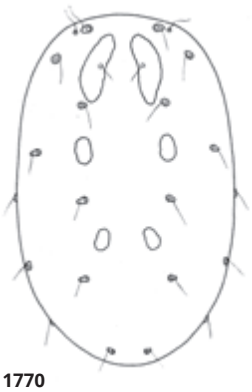
1767



1768



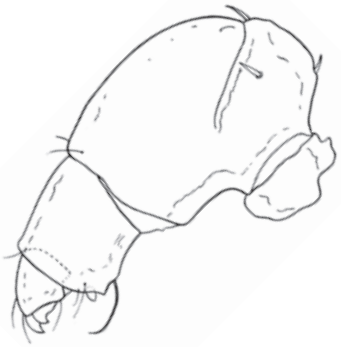
1769



1770



1771



1772

1767 *Omartacarus* (*Omartacarus*) *motasi* Cook, genital field male (after Cook 1980)

1768 *Omartacarus* (*Omartacarus*) *elongatus* Cook, I-leg-5-6 female (after Cook 1980)

1769 *Omartacarus* (*Omartacarellus*) *brevipalpis* Cook, gnathosoma female (after Cook 1980)

1770 *Maharashtracarus phreaticus* Cook, dorsum male (after Cook 1974)

1771 *Maharashtracarus phreaticus* Cook, I-leg-5-6 male (after Cook 1974)

1772 *Neocorticacarus validipalpis* Lundblad, palp female (after Cook 1974)

Subfamily Omartacarinae Cook, 1963

1963 Omartacaridae Cook, Entomological News 74: 37.

DIAGNOSIS: Dorsalia absent. Gnathosoma without tubercles. Chelicera fused medially. Cxgl-2 shifted to the lateral sides of Cx-II, not visible in ventral view. Genital field with numerous acetabula (Figs. 1763, 1767). Monotypic.

Genus *Omartacarus* Cook, 1963

(Figs. 47, 1763-1769)

1963 *Omartacarus* Cook, Entomological News 74: 38.

Type species: *Omartacarus elongatus* Cook, 1963

DIAGNOSIS: As for subfamily.

KEY TO THE SUBGENERA

1 Palp segments relatively long; P2 without a large distoventral projection (Fig. 1765) Subgenus *Omartacarus* s.s.

- Palp segments relatively short; P2 with a large distoventral projection (Fig. 1766) Subgenus *Omartacarellus*

Subgenus *Omartacarus* s.s.

(Figs. 47, 1763-1765, 1767, 1768)

DIAGNOSIS: Palp segments relatively long; P2 without a large distoventral projection (Fig. 1765).

HABITAT: Interstitial.

DISTRIBUTION: Several species known from North America (Cook 1963d), Central America (Mexico, Cook 1980; Costa Rica, Cook 1980; Guatemala, K.O. Viets 1978b), South America (Argentina, Fernández 1985, 2002, Fernández & Grosso 1991; Chile, Cook 1988) and Australia (K.O. Viets 1978a, Cook 1986).

Subgenus *Omartacarellus* Cook, 1974

(Figs. 1766, 1769)

1974 *Omartacarellus* Cook, Memoirs of the American Entomological Institute 21: 179.

Type species: *Omartacarus brevipalpis* Cook, 1974

DIAGNOSIS: Rostrum tapering gradually (Fig. 1769). Palp segments relatively short; P2 with a large distoventral projection (Fig. 1766).

HABITAT: Interstitial.

DISTRIBUTION: One species known from Mexico.

Family Hygrobatidae C.L. Koch, 1842

1842 Hygrobatides C.L. Koch, Übersicht des Arachnidensystems 3(1): 7.

1986 Rhynchaturinae Schwoerbel, Archiv für Hydrobiologie 106: 233 – new syn.

DIAGNOSIS: Lateral eyes located beneath the integument. Secondary sclerotization varying from none to various development of dorsal and ventral shields. Gnathosoma lying free (then with or without long posterior apodemes), or narrowly to broadly fused with Cx-I. A flask-shaped pharynx is usually evident. Chelicera separated medially. Fusion of coxae various in four groups, or by secondary sclerotization fused into a single group. Cx-IV typically with a pair of glandularia, but the latter may have shifted to (an apparent position on) Cx-III. In case the glandularia appear to be lying on Cx-III, this is the result of the suture line turning abruptly anteriorly and carrying the glandularia along. When the suture line becomes obliterated, the glandularia appear to be a part of Cx-III. Genital field with three to many acetabula. Genital plates of male usually joined anteriorly and posteriorly to completely surround the gonopore (In a few cases with plates not joined anteriorly, the pregenital sclerite is evident). Arrangement of acetabula in the female various, but movable flaps are not present. Palp typically five-segmented. A ventral projection may be present on P2, P3 or P4 (or in any combination), or none. A ventral seta always absent from P2. Legs with or without swimming setae. Distal end of I-leg-5 often with a characteristic downturned seta.

REMARKS: Schwoerbel (1986b) erected the subfamily Rhynchaturinae for the genera *Rhynchaturus* and *Brevaturus*. However, there are no characters or combination of characters to separate this subfamily from the remaining Hygrobatidae, and therefore it is synonymized here.

Cook (1974) discussed the separation of the Hygrobatidae and Axonopsinae. The Hygrobatidae grade into the Axonopsinae, and sometimes familiar assignment is arbitrary. This applies especially to the heavily sclerotized hygrobatids. In fact, since the publication of Cook (1974) four genera were shifted from the Aturidae to the Hygrobatidae, i.e. *Szalayella*, *Rhynchaturus*, *Actinacarus* and *Karlvietsia*. The Hygrobatidae are among the families with many new genera described since 1974. However, the phylogenetic relationships remain widely unclear (Gerecke et al. 2016).

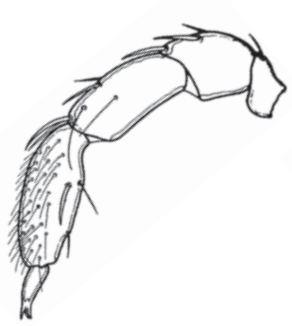
KEY TO THE GENERA

NB Not included: *Kyphohygrobates* (known from deutonymph only)

1 Palp segments short and stocky, P2 and P3 partly fused (Fig. 1772) Genus *Neocorticacarus*

\- Palp segments usually longer, P2 and P3 not partly fused 2

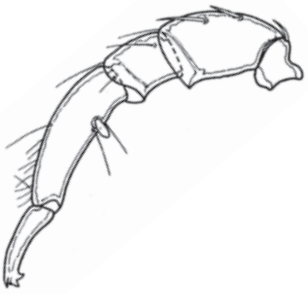
2 P4 with somewhat thickened seta on medial surface (Figs. 1773, 1774), species having this stout seta somewhat ventrally shifted, have no well-developed projection on the ventral side of P2 (Fig. 1775); exceptional species without thickened seta on medial surface of P4, have a I-leg-5 with two heavy setae ventrally and a bowed I-leg-6 (Fig. 1776) 3



1773



1774



1775

1773 *Atractides* (*Atractides*) *ootacamundis* Cook, palp male (after Cook 1974)

1774 *Crenohygrobates multiporus* Lundblad, palp male (after Cook 1974)

1775 *Atractides* (*Polymegapus*) *diversus* Cook, palp female (after Cook 1974)

- P4 either without a thickened seta or the thickened seta is ventral or nearly ventral in position; species with thickened seta shifted slightly up on medial surface of P4, have a well-developed ventral projection on P2 (Species without heavy seta on P4, or with this seta shifted medially, have I-leg-6 noticeably bowed) 19

3 Distal end of I-leg-5 with a single heavy seta which is expanded and pointed distally (Fig. 1777) Genus *Paraschizobates* (in part)

- Distal end of I-leg-5 various, but not as described and illustrated above 4

4 Distal end of I-leg-5 with a single heavy distoventrally-located seta and another stout, somewhat curved seta more dorsally located near middle of distal end (Fig. 1778) Genus *Megapella*

- Distal end of I-leg-5 various; if distal end with two stout seta, these both situated on ventral margin 5

5 Cx-I fused medially and gnathosoma either completely free or only narrowly joined to the coxae; no pronounced apodemes or muscle scars for Cx-IV (Fig. 1779) 6

- Cx-I often separated medially, if fused, or, gnathosoma broadly fused with coxae as well (Fig. 1780), or Cx-IV with well-developed apodemes or muscle scars extending from posterior margin to glandularia of Cx-IV (Fig. 1781) 7



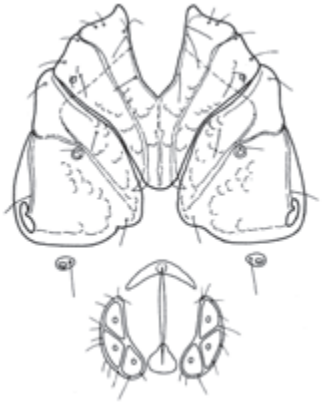
1776



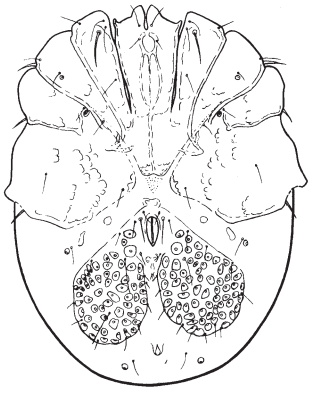
1777



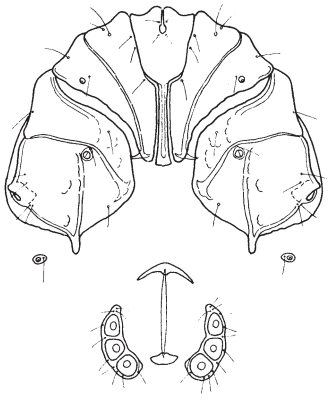
1778



1779



1780



1781

1776 *Atractides* (*Atractides*) *ootacamundis* Cook, I-leg-5-6 male (after Cook 1974)

1777 *Paraschizobates* (*Paraschizobates*) *megapoides* Lundblad, I-leg-5-6 male (after Cook 1974)

1778 *Megapella* (*Megapodellides*) *flabellum* (Lundblad), distal end of I-leg-5 female (after Cook 1974)

1779 *Atractides* (*Atractides*) *ootacamundis* Cook, venter female (after Cook 1974)

1780 *Crenohygrobates multiporus* Lundblad, venter male (after Cook 1974)

1781 *Australiobates* (*Australiobates*) *pilosus* (K. Viets), venter female (after Cook 1974)

6 Gnathosoma short with a curved rostrum (Fig. 1782); I-leg-5 without curved seta near distal margin (Fig. 1783) Genus *Sinhaladwipabates*

- Gnathosoma various, but not with a curved rostrum (Fig. 1784); I-leg-5 distally with a curved seta (Fig. 1776) Genus *Atractides*

7 Glandularia of Cx-IV shifted far anteriorly to a position very close to the suture line Cx-I/Cx-II (Fig. 1785); well-developed dorsal and ventral shields present Genus *Javanella*

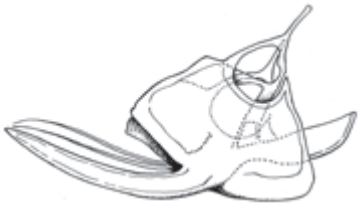
- Glandularia of Cx-IV more posterior, not located near suture line Cx-I/Cx-II; dorsal and ventral shields present or absent 8

8 Ventral side of P2 of male greatly expanded (Fig. 1786); male genital field terminal and with projections near gonopore (Fig. 1787); IV-leg-4 with a comb-like row of setae (Fig. 1788) Genus *Polyhygrobatella*

- Ventral side of P2 usually not greatly expanded, but if P2 is expanded ventrally, male genital field is ventral and lacks projections near gonopore; IV-leg-4 without a comb-like row of setae 9

9 Suture lines Cx-III/Cx-IV ending abruptly anteromedially in region of glandularia of Cx-IV (Fig. 1780) 10

- Suture line Cx-III/Cx-IV not ending abruptly anteromedially in region of glandularia of Cx-IV (Fig. 1789) 12



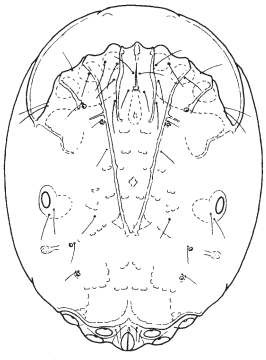
1782



1783



1784



1785



1786



1787

1782 *Sinhaladwipabates kumariae* Gledhill& Wiles, gnathosoma female (after Gledhill & Wiles 1997)

1783 *Sinhaladwipabates kumariae* Gledhill& Wiles, first leg female (after Gledhill & Wiles 1997)

1784 *Atractides* (*Tympanomegapus*) *acutirostris* (Motaş & C. Angelier), gnathosoma + palp male (after Gerecke et al. 2016)

1785 *Javanella crassipes* Lundblad, venter male (after Cook 1974)

1786 *Polyhygrobatella polypora* (Lundblad), palp male (after Cook 1974)

1787 *Polyhygrobatella polypora* (Lundblad), venter male (after Cook 1974)

10 Genital field with numerous acetabula, these on genital plates which extend more or less posterolaterally from the gonopore; gnathosoma of male fused with the coxae (Fig. 1780) Genus *Crenohygrobates*

- Genital field with three to numerous acetabula; if numerous, the acetabula lie on plates which extend more or less directly laterally; gnathosoma free in both sexes 11

11 Anchoral process of gnathosoma posteriorly abruptly widened; posterior margin of Cx-IV with short projections (Fig. 1790), P2 and P3 without denticles on ventral surface (Fig. 1791) Genus *Declinatobates*

- Anchoral process various; posterior margin of Cx-IV without projections (Fig. 1792), P2 and P3 with denticles (Fig. 1793) Genus *Hygrobatella*

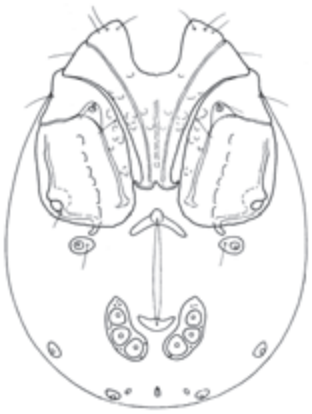
12(9) I-leg-5 with one heavy seta at distal end (Fig. 1794) 13

- I-leg-5 with two heavy setae at distal end, or one ventrally and one subterminally (Fig. 1795) 16

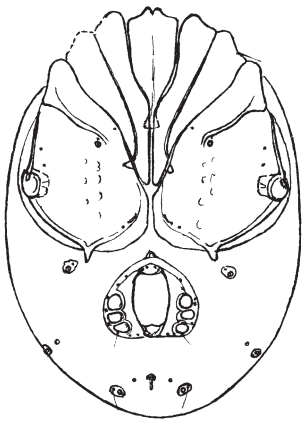
13 Apodemes or muscle scars extending from posterior end of Cx-IV towards the glandularia of Cx-IV, Cx-IV may have posterior projections (Fig. 1796) 14



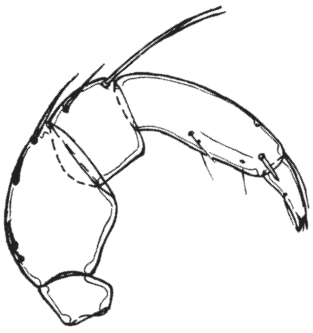
1788



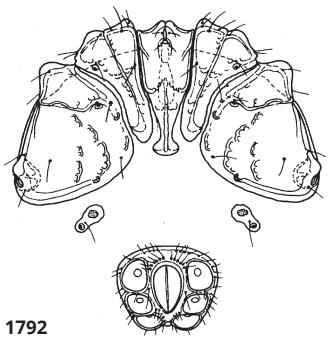
1789



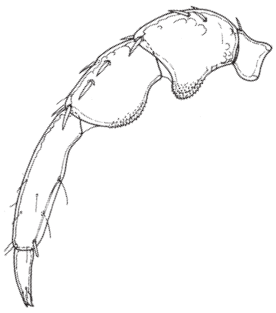
1790



1791



1792



1793

1788 *Polyhygrobatella polypora* (Lundblad), IV-leg-4-6 male (after Cook 1974)

1789 *Ambiguobatella peltophora* (K. Viets), venter female (after Cook 1974)

1790 *Declinatobates longmoreae* K.O. Viets, venter male (after K.O. Viets 1984a)

1791 *Declinatobates longmoreae* K.O. Viets, palp male (after K.O. Viets 1984a)

1792 *Hygrobatella* (*Hygrobatella*) *puberula puberula* K. Viets, venter male (after Cook 1980)

1793 *Hygrobatella* (*Hygrobatella*) *puberula puberula* K. Viets, palp male (after Cook 1980)

- No apodemes or muscle scars extending from posterior end of Cx-IV towards the glandularia of Cx-IV, the latter without posterior projections (Fig. 1797) Genus *Paraschizobates* (in part)

14 Direction of apodemes or muscle scars of Cx-IV slightly lateral to Cxgl-4 (Fig. 1798) 15

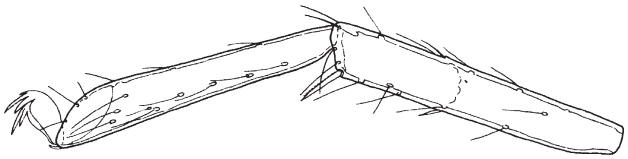
- Direction of apodemes or muscle scars of Cx-IV slightly medial to Cxgl-4 (Fig. 1799) Genus *Australiobates* (in part)

15 Suture line Cx-III/IV forming a pronounced bulge (Fig. 1789) Genus *Ambiguobatella*

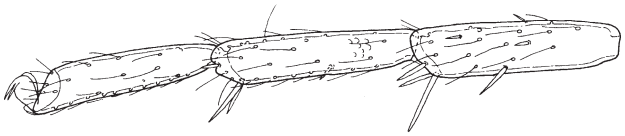
- Suture line Cx-III/IV only slightly curved near Cxgl-4 (Fig. 1798) Genus *Ambiguobates*

16(12) Cx-I fused medially, gnathosoma broadly fused with the anterior group of coxae (Fig. 1800) 17

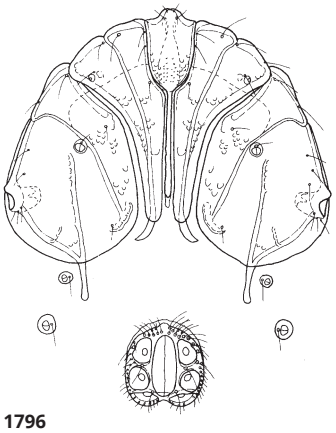
- Cx-I separated medially, gnathosoma not fused with the coxae (Fig. 1801) 18



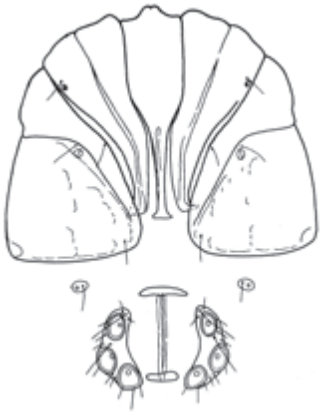
1794



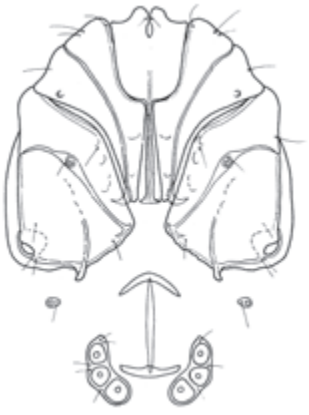
1795



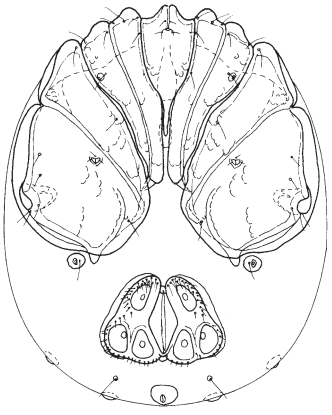
1796



1797



1798



1799

1794 *Australiobates* (*Lundbladobates*) *klaasseni* (Besch), I-leg-5-6 female (after Cook 1980)

1795 *Australiobates* (*Australiobates*) *emalus* Cook, I-leg-4-6 male (after Cook 1986)

1796 *Australiobates* (*Australiobates*) *mutatus* K.O. Viets, venter male (after Cook 1986)

1797 *Paraschizobates* (*Paraustraliobates*) *columbianus* Lundblad, venter female (after Cook 1974)

1798 *Ambiguobates permixtus* K. Viets, venter female (after Cook 1974)

1799 *Australiobates* (*Lundbladobates*) *klaasseni* (Besch), venter male (after Cook 1974)

17 Cxgl-4 near suture line Cx-III/Cx-IV (Fig. 1802); none of the heavy setae on I-leg-5 with heavy serration (Fig. 1803) Genus *Mesobates*

- Cxgl-4 well posterior to the suture line of Cx-III/Cx-IV (Fig. 1800); one of the heavy setae on I-leg-5 with heavy serration (Fig. 1804) Genus *Mesobatella*

18(16) Gnathosoma without a long posterior process (Fig. 1801) Genus *Australiobatella*

- Gnathosoma with a long posterior process (Fig. 1796) Genus *Australiobates* (in part)

19(2) Gnathosoma with a long, down-curved rostrum (Fig. 1805) 20

- Gnathosoma without a rostrum, or, if a rostrum is present not down-curved 21

20 P1 slightly longer than high, P3 much higher than P4 (Fig. 1806) Genus *Motasia*

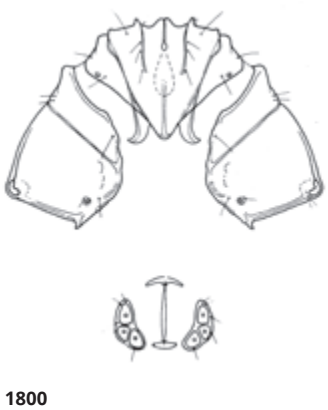
- P1 much longer than high, P3 about the same height as P4 (Fig. 1807) Genus *Africacarus*

21 Suture line Cx-III/IV medially bifurcating, one branch directed to medial, the other to posterior margin of Cx-IV; Cxgl-4 in an angle formed by the two branches (Fig. 1808); the Y-shaped structure may be very short (Fig. 1809) Genus *Tetrahygrobatella*

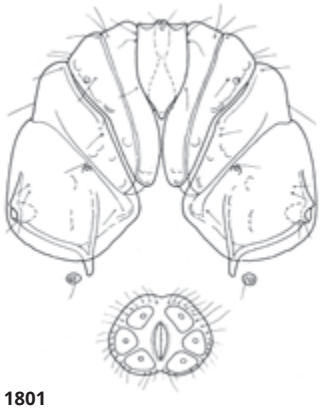
- Suture line Cx-III/IV medially not bifurcate (Fig. 1810) 22

22 Gnathosoma fused with coxae (occasionally only lightly fused) (Fig. 1811) 23

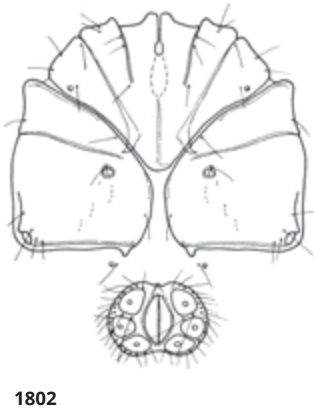
- Gnathosoma separated from coxae (Fig. 1812) 39



1800



1801



1802



1803



1804



1805

1800 *Mesobatella serratiseta* (K. Viets), venter female (after Cook 1974)

1801 *Australiobatella vietsi* Lundblad, venter male (after Cook 1974)

1802 *Mesobates forcipatus* Thor, venter male (after Cook 1974)

1803 *Mesobates forcipatus* Thor, I-leg-5-6 male (after Cook 1974)

1804 *Mesobatella serratiseta* (K. Viets), I-leg-5-6 female (after Cook 1974)

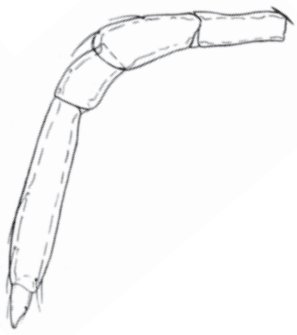
1805 *Motasia placoderma* Lundblad, gnathosoma female (after Cook 1974)

23 Idiosoma completely sclerotized except for a median dorsal strip (Fig. 1813) 24
- Idiosoma usually soft; if idiosoma heavily sclerotized, not as described above 26
24 Idiosoma laterally compressed (Fig. 1814) Genus *Karlvietsia* (in part)
- Genus not laterally compressed 25
25 Genital field fused with the ventral shield (Fig. 1811) Genus *Thoracohygrobates*
- Genital field surrounded by a narrow area of membranous integument (Fig. 1810) Genus *Scutobates*

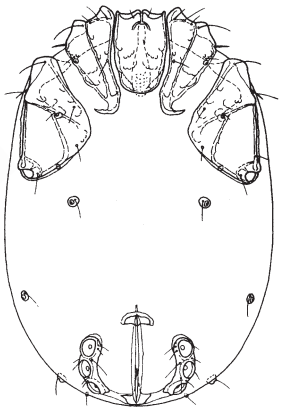
26(23) P5 very long, more than half the length of P4 (Fig. 1815); males with one large dorsal plate and two smaller posterior platelets (Fig. 1816), females with one large dorsal plate and four posterior platelets (Fig. 1817) Genus *Caledoniabates*
- P5 much shorter than half the length of P4; dorsum various, but not as described above 27



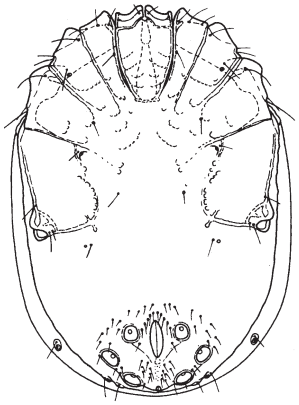
1806



1807



1808



1809



1810



1811

1806 *Motasia placoderma* Lundblad, palp female (after Cook 1974)
1807 *Africacarus strenzkei* K.O. Viets, palp male (after Cook 1974)
1808 *Tetrahygrobatella bovala* Cook, venter female (after Cook 1980)
1809 *Tetrahygrobatella bovala* Cook, venter male (after Cook 1980)
1810 *Scutobates ovalis* (Cook), venter male (after Cook 1974)
1811 *Thoracohygrobates cancellatus* Lundblad, venter male (after Cook 1974)

27 Both P2 and P3 with a ventral projection (Fig. 1818) 28

- P2 and P3 without ventral projection, or only P2 with a ventral projection (Fig. 1819) 29

28 Males with entire dorsal shield and ventral shields (Figs. 1820, 1821) (female unknown) Genus *Knysnabates*

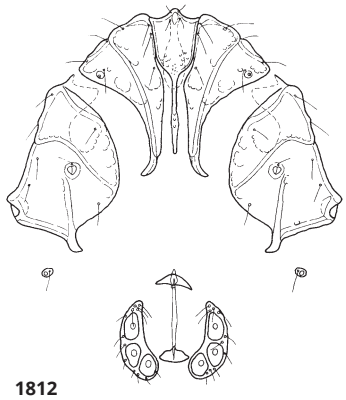
- Males (and female) without a dorsal or ventral shield (Fig. 1822) Genus *Iranobates*

29(27) First leg modified (Fig. 1823), dorsum with three pairs of closely fitting large plates (Fig. 1824) Genus *Sterkspruitia*

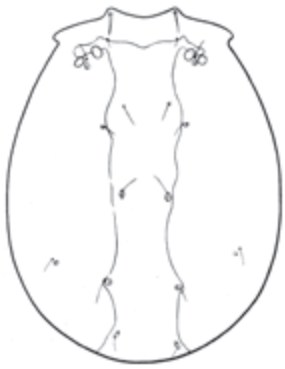
- First leg not modified, dorsum without closely fitting plates 30

30 I-leg-5 and II-leg-5 with a pair of S-shaped ventral setae (Figs. 1825, 1826) Genus *Hygrobatractides*

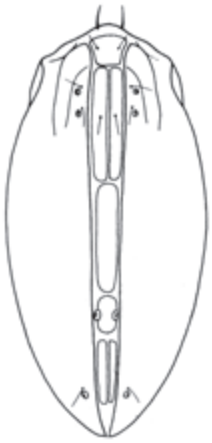
- I-leg-5 and II-leg-5 without a pair of S-shaped ventral seta 31



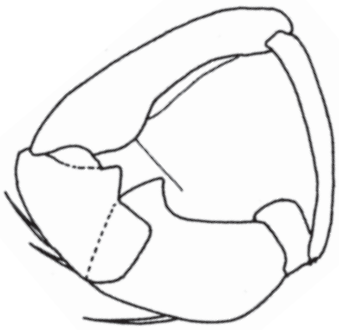
1812



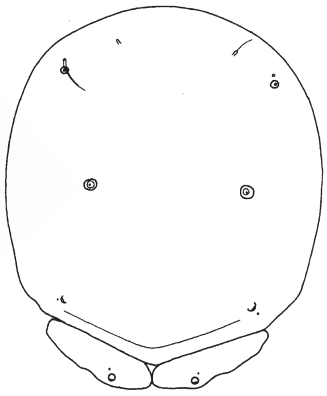
1813



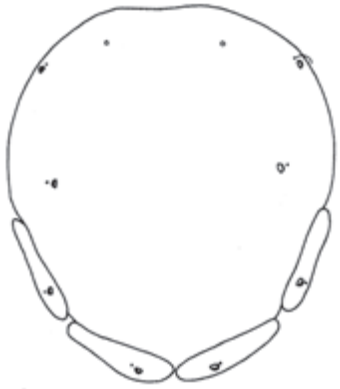
1814



1815



1816



1817

1812 *Dropursa babinda* Cook, venter female (after Cook 1986)

1813 *Thoracohygrobates cancellatus* Lundblad, dorsum male (after Cook 1974)

1814 *Karlvietsia angustipalpis* K.O. Viets, dorsum female (after Cook 1974)

1815 *Caledoniabates purpureus* Smit, palp female (after Smit 2002a)

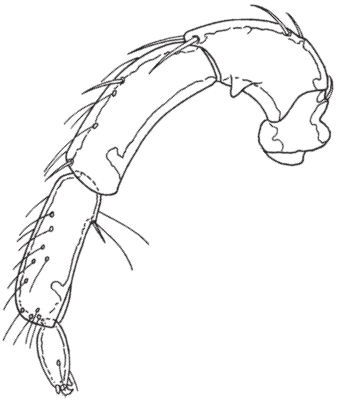
1816 *Caledoniabates inflatipalpis* Smit, dorsum male (after Smit 2002a)

1817 *Caledoniabates purpureus* Smit, dorsum female (after Smit 2002a)

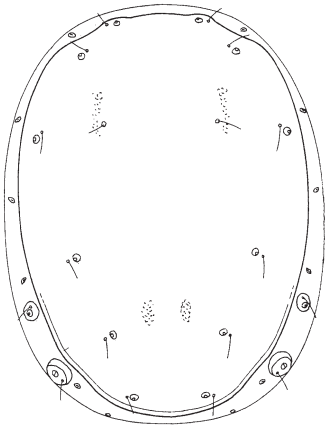
31	Chelicera with fine setae, either in a brush-like group (Fig. 1827), or forming a fringe (Fig. 1828)	Genus *Dockovdia*
-	Chelicera without setae	32
32	Dorsal and/or ventral shields present (Fig. 1829)	33
-	Without dorsal and ventral shields	35
33	Only a ventral shield present, dorsum with a large plate	Genus *Australiobates* (in part)
-	Both dorsal and ventral shields present	34



1818



1819



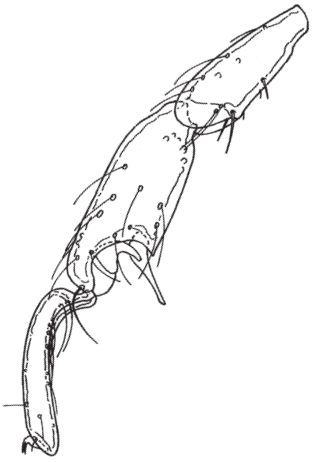
1820



1821



1822



1823

1818 *Knysnabates theroni* Cook, palp male (after Cook 2003)

1819 *Sterkspruitia ovalis* Cook, palp male (after Cook 2003)

1820 *Knysnabates theroni* Cook, dorsum male (after Cook 2003)

1821 *Knysnabates theroni* Cook, venter male (after Cook 2003)

1822 *Iranobates hesabii* Pešić, Smit & Asadi, venter female (after Pešić et al. 2011b) Reproduced with permission from copyright holder

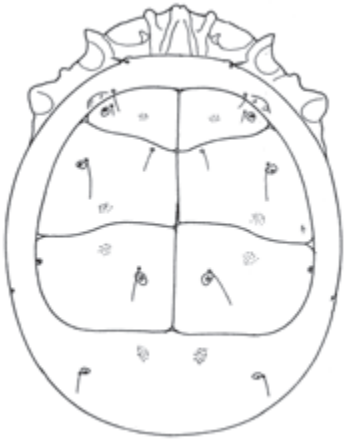
1823 *Sterkspruitia ovalis* Cook, I-leg-4-6 male (after Cook 2003)

34 Dorsal shield of male entire (Fig. 1829), dorsal shield of female made up of three paired plates and an unpaired posteromedial plate (Fig. 1830) Genus *Szalayella*

- Dorsal shield divided of both male and female into a small anterior plate and a larger posterior plate (Fig. 1831) Genus *Diamphidaxona*

35(32) P2 of female with large ventral projection with a smooth or irregularly serrated margin (Fig. 1832), dorsum of female with three large plates, anterior plate flanked by a pair of small, elongated platelets (Fig. 1833), dorsum of male with one large plate (Fig. 1834) Genus *Decussobates*

- P2 with or without a ventral extension, if a ventral projection is present, it is not as described above; dorsum various 36



1824



1825



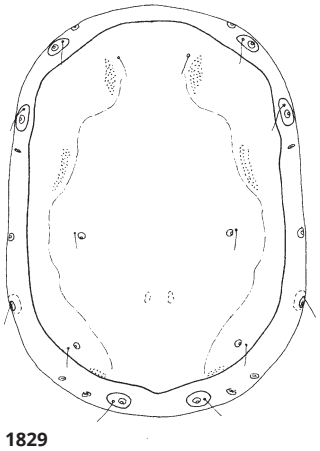
1826



1827



1828



1829

1824 *Sterkspruitia ovalis* Cook, dorsum male (after Cook 2003)

1825 *Hygrobatractides divaricatus* K.O. Viets, I-leg-5-6 female (after K.O. Viets 1981a)

1826 *Hygrobatractides divaricatus* K.O. Viets, II-leg-5-6 female (after K.O. Viets 1981a)

1827 *Dockovdia cookarum* Gledhill, chelicera female (after Gledhill 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

1828 *Dockovdia oruensis* Gledhill & Agbolade, chelicera male (after Gledhill & Agbolade 2006) Reproduced with permission from copyright holder

1829 *Szalayella lundbladi* Cook, dorsum male (after Cook 1988)

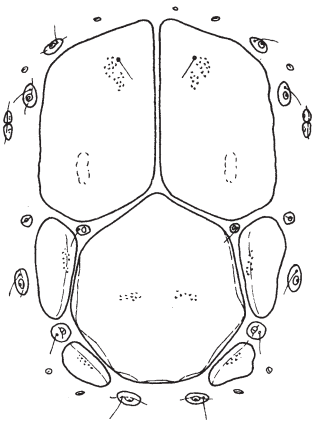
36 Gnathosoma relatively narrow and even more narrow where it joins the coxae (Fig. 1835); genital field with four pairs of acetabula Genus *Tetrabates* (males)

- Gnathosoma relatively broad (Fig. 1836); if four pairs of acetabula are present, gnathosoma is not noticeably narrowed where it joins the coxae 37

37 Genital field with more than 25 pairs of acetabula (Fig. 1837); P2 with a serrated tip, ventral margin of P3 projecting, serrated and with a small seta (Fig. 1838) Genus *Kyphohygrobatella*

- Genital field usually with three pairs of acetabula (Fig. 1836); palp various but not as described above 38

38 Cxgl-4 located in the middle of Cx-IV (Fig. 2197); ventrodistal setae on I-leg-5 short and stout (Fig. 114) Genus *Mixobates*



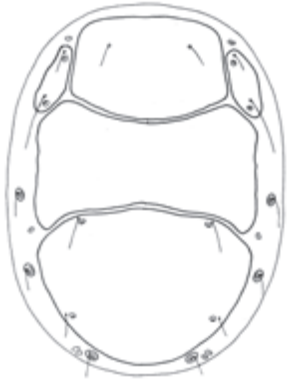
1830



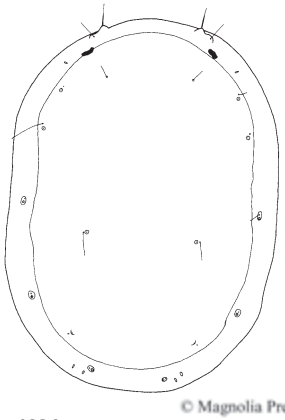
1831



1832

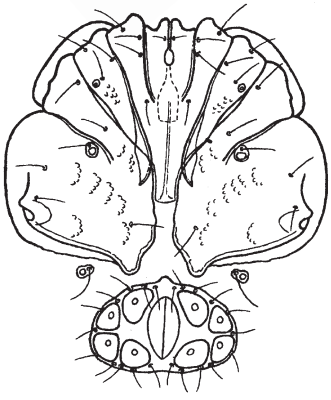


1833



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1834



1835

1830 *Szalayella lundbladi* Cook, dorsum female (after Cook 1980)

1831 *Diamphidaxona* (*Diamphidaxona*) *imamurai* Cook, dorsum male (after Cook 1974)

1832 *Decussobates planus* Cook, palp female (after Cook 1988)

1833 *Decussobates planus* Cook, dorsum female (after Cook 1988)

1834 *Decussobates minutipalpis* Smit, dorsum male (after Smit 2018b) Reproduced with permission from copyright holder

1835 *Tetrabates* (*Tetrabates*) *szalayi* (Lundblad), venter male (after Cook 1974)

- Cxgl-4 located usually near suture line Cx-III/IV (Fig. 111); ventrodistal setae on I-leg-5 pointed (Fig. 2129) Genus *Hygrobates*

39(22) Cx-I medially separated (Fig. 1839) 40

- Cx-I medially fused (Fig. 1840) 70

40 First legs strongly modified, with bowed terminal segments (Fig. 1840) 41

- First leg not strongly modified, with straight terminal segments (Fig. 1841) 42

41 Both first and second leg modified, with I- and II-leg-6 bowed (Figs. 1842-1843); ventral margin of P4 with one thickened seta (Fig.1844) Genus *Dropursides*

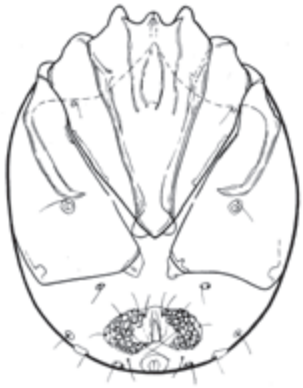
- II-leg-6 not bowed; ventral margin of P4 without thickened seta (Fig. 1845) Genus *Dropursa*

421(40) Idiosoma laterally compressed, Cx-IV expanding onto dorsum, leaving a relatively narrow strip of unsclerotized integument (Fig. 1814) Genus *Karlvietsia* (in part)

- Idiosoma not laterally compressed, Cx-IV not expanding onto dorsum 43



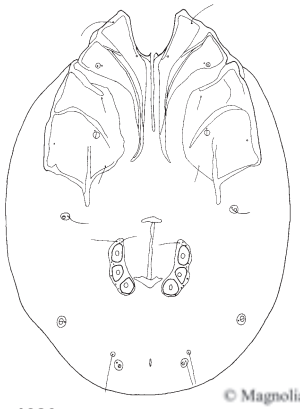
1836



1837



1838


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1839



1840



1841

1836 *Hygrobates* (*Hygrobates*) *grimshawi* Cook, venter male (after Cook 1974)

1837 *Kyphohygrobatella serratipalpis* Lundblad, venter male (after Cook 1974)

1838 *Kyphohygrobatella serratipalpis* Lundblad, palp male (after Cook 1974)

1839 *Dropursides aberratus* Smit, venter female (after Smit 2013b) Reproduced with permission from copyright holder

1840 *Dropursa babinda* Cook, I-leg-4-6 female (after Cook 1986)

1841 *Dodecabates dodecaporus* (Nordenskiöld), I-leg-5-6 female (after Cook 1980)

43 Cxgl-4 lying on Cx-III (Fig. 1846), or lying in a bow of the suture Cx-III/Cx-IV (Fig. 1847) 44

- Cxgl-4 located on Cx-IV (Fig 1848) or near suture Cx-III/IV 48

44 Cxgl-4 lying on Cx-III, and not in a bow of the suture line Cx-III/Cx-IV (Fig. 1846) 45

- Cxgl-4 located in a bow of the suture line Cx-III/Cx-IV (Fig. 1847) 46

45 Genital field with 6-7 pairs of acetabula (Fig. 1846); IV-leg-3 dorsally expanded with numerous setae, IV-leg-4 bowed and anterodorsally with numerous setae, IV-leg-4-6 much longer than IV-leg-1-3 (Fig. 1849) Genus *Dodecabates*

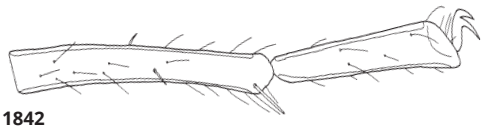
- Genital field with three pairs of acetabula (Fig. 1850), fourth leg not modified Genus *Eocorticacarus*

46(44) Cxgl-4 lying in a strong bow of the suture lines Cx-III/Cx-IV 47

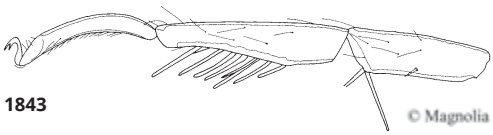
- Cxgl-4 lying in a shallow bow of the suture lines Cx-III/Cx-IV; with extensive secondary sclerotization posterior of Cx-IV (Fig. 1851) Genus *Camposea*

47 Dorsum without plates or platelets; genital plates much shorter than gonopore (Fig. 1995) Genus *Australiobates* (in part)

- Dorsum with three (male, Fig. 2013) to four pairs of platelets (female, Fig. 2015) and one unpaired platelet; genital field as long as gonopore (Fig. 1847) Genus *Callumobates*

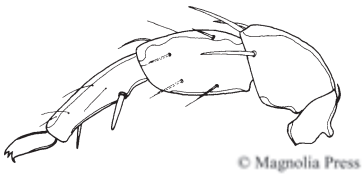


1842



1843

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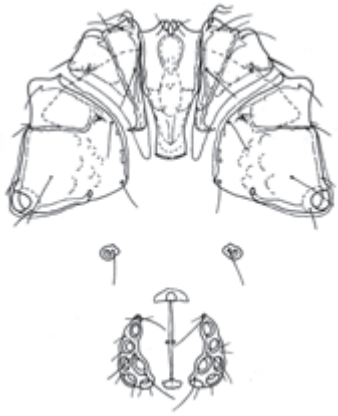


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1844



1845



1846



1847

1842 *Dropursides aberratus* Smit, IV-leg-5-6 female (after Smit 2013b) Reproduced with permission from copyright holder

1843 *Dropursides aberratus* Smit, II-leg-4-6 female (after Smit 2013b) Reproduced with permission from copyright holder

1844 *Dropursides aberratus* Smit, palp female (after Smit 2013b) Reproduced with permission from copyright holder

1845 *Dropursa babinda* Cook, palp female (after Cook 1986)

1846 *Dodecabates dodecaporus* (Nordenskiöld), venter female (after Cook 1980)

1847 *Callumobates kurtvietsi* Cook, venter female (after Cook 1988)

48(43) Male IV-leg-5 with two specialized large setae (Fig. 1852) (Female unknown) Genus *Osornobates*

- Male IV-leg-5 without specialized setae 49

49 Genital field with seven or more pairs of acetabula (Fig. 1853); P4 without a peg-like seta (Fig. 1854) 50

- Genital field generally with three or four pairs of acetabula; if more than four pairs are present, then P4 with a peg-like seta 51

50 Gnathosoma short, posteriorly not extending beyond posterior ends of Cx-I; posterior margin of Cx-IV without posterior projections (Fig. 1853) Genus *Plesiohygrobates*

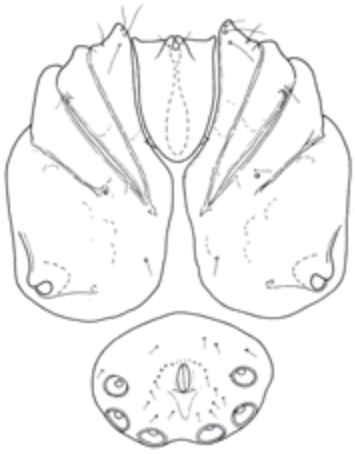
- Gnathosoma long, posteriorly extending beyond posterior ends of Cx-I; posterior margin of Cx-IV with short posterior projections (Fig. 1855) Genus *Moramangabates*



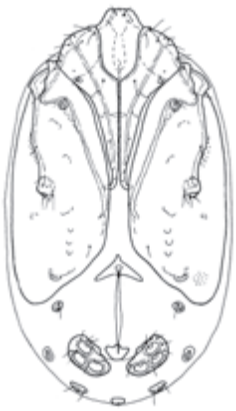
1848



1849



1850



1851



1852



1853

1848 *Osornobates gennadus* Cook, venter male (after Cook 1988)

1849 *Dodecabates dodecaporus* (Nordenskiöld), fourth leg male (after Cook 1980)

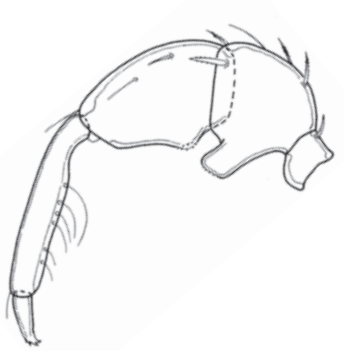
1850 *Eocorticacarus siolli* Besch, venter male (after Cook 1974)

1851 *Camposea phreatica* Schwoerbel, venter female (after Cook 1988)

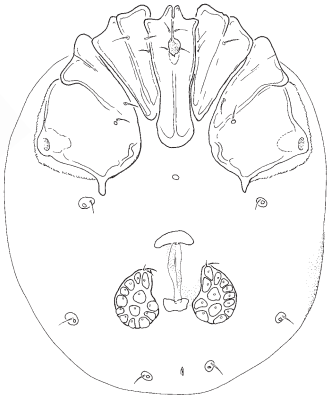
1852 *Osornobates gennadus* Cook, fourth leg male (after Cook 1988)

1853 *Plesiohygrobates pectinipalpis* K. Viets, venter male (after Cook 1974)

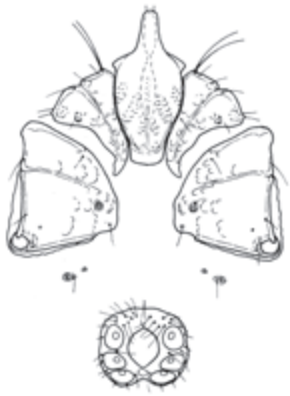
51(49) Gnathosoma with a distinct rostrum which extends well anterior to Cx-I (Fig. 1856) 52
- Gnathosoma without a distinct rostrum (Fig. 1857) 53
52 P4 with unusual tubercles and ridges (Fig. 1858) Genus *Zabobates*
- P4 without tubercles or ridges (Fig. 1859) Genus *Asiabates*
53(51) Gnathosoma attached to a protrusable tube (Fig. 1860) 54
- Gnathosoma not attached to a protrusable tube 55
54 All dorsal setae in posterior half of dorsum with accompanying glandularia (Fig. 1860) Genus *Rhynchaustrobates* (in part)
- Two dorsal setae in posterior half of dorsum without accompanying glandularia (Fig. 1861) Genus *Aciculacarus* (in part)
55(53) Cx-IV with apodemes extending anteriorly from posterior projections (Fig. 1857) 55
- Cx-IV without apodemes extending anteriorly from posterior projections (Fig. 1862) 58



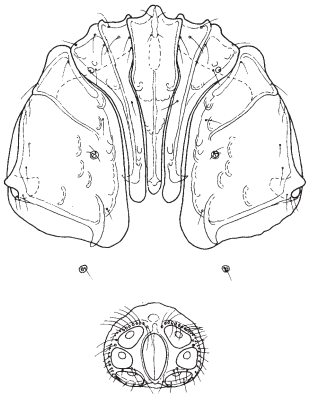
1854



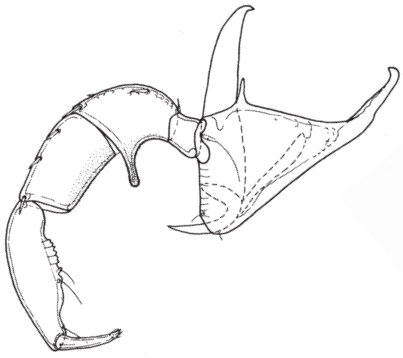
1855



1856



1857



1858



1859

1854 *Plesiohygrobates pectinipalpis* K. Viets, palp male (after Cook 1974)

1855 *Moramangabates pauliani* Gerecke, venter female (after Gerecke 2004c)

1856 *Zabobates alphus* Cook, venter male (after Cook 1988)

1857 *Coaustraliobates longipalpis* (Lundblad), venter male (after Cook 1986)

1858 *Zabobates gledhilli* Cook, gnathosoma + palp female (after Cook 1988)

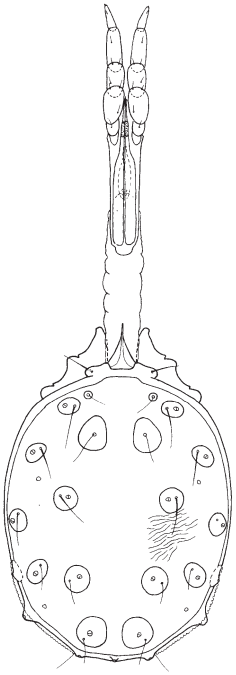
1859 *Asiabates longirostris* Wiles, palp male (after Wiles 1999) Reproduced with permission from Lee Kong Chian Natural History Museum

56 Apodemes of Cx-IV short, not extending to Cxgl-4 (Fig. 1857) Genus *Coaustraliobates*

- Apodemes of Cx-IV long, almost reaching Cxgl-4 (Fig. 1863) 57

57 P4 with an anteromedial peg-like seta, P3 with a large, rounded ventral extension with numerous small papillae (Fig. 1864) Genus *Pseudoaustraliobates*

- P4 without anteromedial peg-like seta, P3 without ventral extension and papillae (Fig. 1865) Genus *Australiobates* (in part)



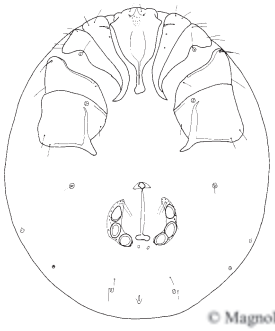
1860



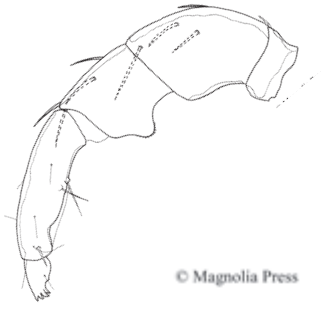
1861



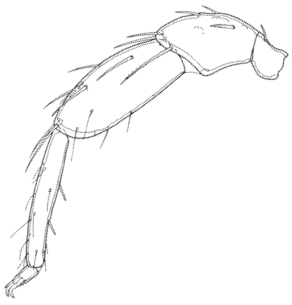
1862


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1863


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1864



1865

1860 *Rhynchaustrobates* (*Rhynchaustrobates*) *projectus* Cook, dorsum male (after Cook 1986)

1861 *Aciculacarus papillosus* Hopkins, dorsum female (after Cook 1983)

1862 *Tasmanobates scutatus* Cook, venter female (after Cook 1986)

1863 *Pseudoaustraliobates flindersi* Smit, venter female (after Smit 2009b) Reproduced with permission from copyright holder

1864 *Pseudoaustraliobates flindersi* Smit, palp male (after Smit 2009b) Reproduced with permission from copyright holder

1865 *Australiobates* (*Australiobates*) *linderi* Lundblad, palp male (after Cook 1986)

58(55) Gonopore extremely long, much longer than genital plate (Fig. 1862) (Male unknown) Genus *Tasmanobates*

- Gonopore not extremely long (Fig. 1866) 59

59 Anchoral process nearly as long as, or longer than gnathosoma (Fig. 1866) 60

- Anchoral process shorter much than gnathosoma (Fig. 1867) 64

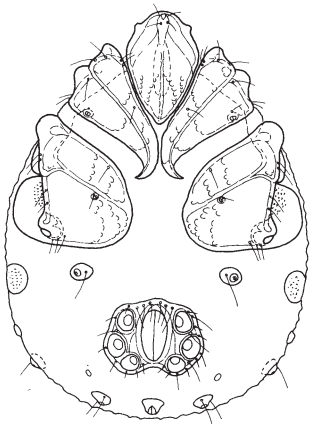
60 Anchoral process relatively wide and widening posteriorly (Fig. 1866) Genus *Vietnobates*

Anchoral process narrow and not widening posteriorly (Fig. 1868) 61

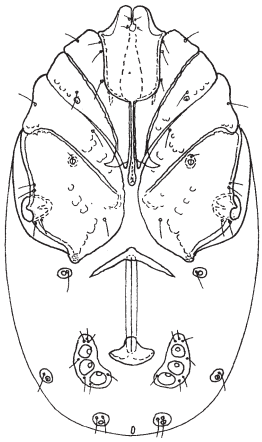
61 Gonopore lying for most of its length anterior to acetabula in both sexes; male with a large dorsal plate (Fig. 1869) and distal end of I-leg-5 with a stout seta knobbed at its end (Fig. 1870) Genus *Homtinibates*



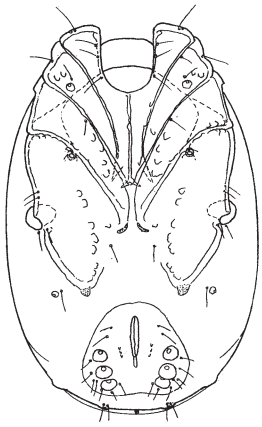
1866



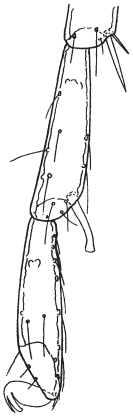
1867



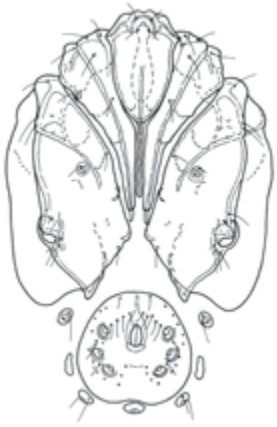
1868



1869



1870



1871

1866 *Vietnobates oryzae* Pešić & Smit, venter female (after Pešić & Smit 2016)

1867 *Zelandobatella naias* Hopkins, venter male (after Cook 1983)

1868 *Homtinibates lootsi* Cook, venter female (after Cook 2003)

1869 *Homtinibates lootsi* Cook, venter male (after Cook 2003)

1870 *Homtinibates lootsi* Cook, I-leg-5-6 male (after Cook 2003)

1871 *Notohygrobates kathrynae* Cook, venter male (after Cook 1983)

- Gonopore not lying anterior to acetabula for most of its length in both sexes (Fig. 1871); distal end of male I-leg-5 with a pointed or truncated seta (Fig. 1872) 62

62 Acetabula small, occupying only a small part of genital plate (Figs. 1871, 1873); dorsum with a large plate with the preocularia Genus *Notohygrobates*

- Acetabula large, occupying most of the area of genital plate (Fig. 1874); dorsum without a large plate 63

63 I-leg-5 distally with one anteroventral seta and without a curved seta (Fig. 1875) Genus *Schizobates*

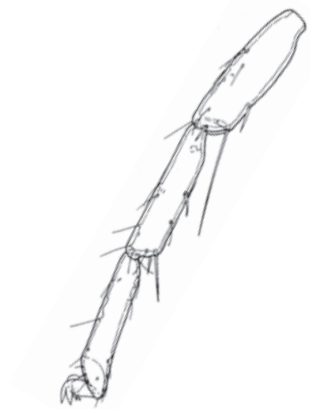
- I-leg-5 distally with two anteroventral setae and a curved seta (Fig. 1876) Genus *Tetrabates* (females)

64(59) Genital field of male very long, with widely separated acetabula and gonopore near anterior margin; Cx-IV of male long, somewhat triangular (Fig. 1943); Cxgl-4 of both sexes in a slight bowing of suture line Cx-III/IV (Fig. 1945) Genus *Andesobates*

- Genital field of male not with widely separated acetabula, Cx-IV not very long and triangular, Cxgl-4 not in a slight bowing of suture line Cx-III/IV 65

65 P4 with a ventral tubercle which bears a hair-like seta (Fig. 1877) Genus *Zelandobatella*

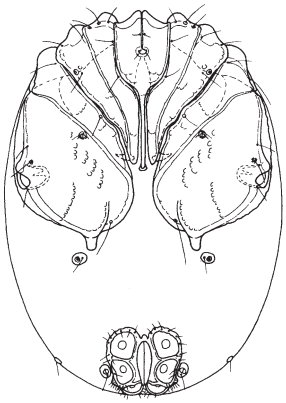
- P4 with ventral spine-like (Fig. 1878) or peg-like setae which may be located on a tubercle, or with a lateral tubercle 66



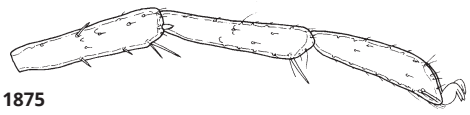
1872



1873



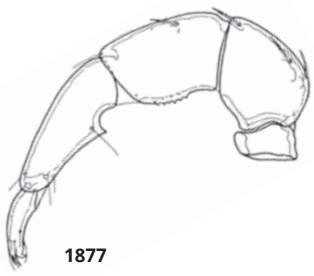
1874



1875



1876



1877

1872 *Notohygrobates kathrynae* Cook, I-leg-4-6 male (after Cook 1983)

1873 *Notohygrobates kathrynae* Cook, venter female (after Smit 2019a)

1874 *Schizobates disjunctus* (Walter), venter male (after Cook 1988)

1875 *Schizobates clanopus* Cook, I-leg-4-6 male (after Cook 1988)

1876 *Tetrabates* (*Tetrabates*) *szalayi* (Lundblad), I-leg-5-6 female (after Cook 1974)

1877 *Zelandobatella naias* Hopkins, palp male (after Cook 1983)

66 P4 with a lateral tubercle (Fig. 1879); insertions of fourth legs somewhat medial in position and with a ridge on each side extending anteriorly (Fig. 1880) Genus *Subcorticacarus*

- Tubercles on P4, if present, ventral in position (Fig. 1881); insertions of fourth legs more lateral in position; lateral ridge absent (Fig. 1882) 67

67 Dorsum with only very small glandularia sclerites, without muscle attachment platelets Genus *Stylohygrobates*

- Dorsum with various development of plates or platelets, both glandularia platelets and muscle attachment platelets present and usually well-developed (Fig. 1883) 68

68 Dorsum with either a complete dorsal shield or a large dorsal plate and two smaller platelets (Fig. 1884) Genus *Aspidiobates* (in part)

- Dorsum with 1-2 larger anterodorsal plates and many smaller glandularia platelets (Fig. 1883), rarely fused into several large dorsal plates (Fig. 1885) 69

69 Four pairs of the dorsal glandularia heart-shaped (Fig. 1883) Genus *Corticacarus* (in part)

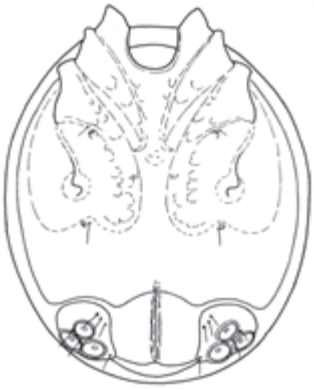
- Dorsal glandularia not heart-shaped (Fig. 1886) Genus *Procorticacarus* (in part)



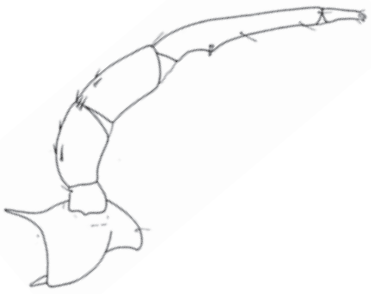
1878



1879



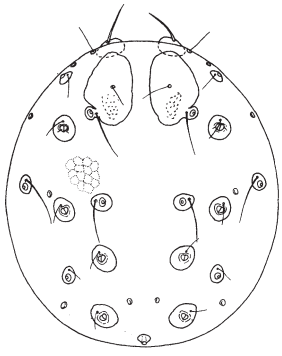
1880



1881



1882



1883

1878 *Subcorticacarus digitatus* Lundblad, palp female (after Cook 1974)

1879 *Subcorticacarus digitatus* Lundblad, dorsal view palp female (after Cook 1974)

1880 *Subcorticacarus digitatus* Lundblad, venter female (after Cook 1974)

1881 *Stylohygrobates longipalpis* K. Viets, gnathosoma + palp female (after Cook 1974)

1882 *Stylohygrobates longipalpis* K. Viets, venter female (after Cook 1974)

1883 *Corticacarus* (*Paracorticacarus*) *smithi* Cook, dorsum male (after Cook 1980)

70(39) Gnathosoma attached to a protrusable tube 71

- Gnathosoma not attached to a protrusable tube 74

71 Genital field located on a posterior projection of the idiosoma; posterior suture lines of Cx-IV not visible (Fig. 1887) Genus *Proboscibates*

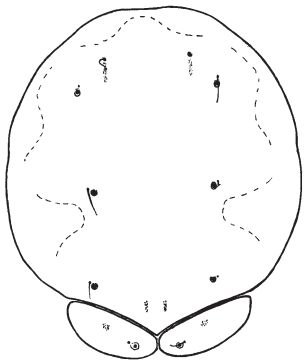
- Genital field located ventrally or terminally, but not on a projection; posterior suture lines of Cx-IV distinct 72

72 All dorsal plates and platelets closely fitting, no free platelets surrounded by membranous integument (Fig. 1888) Genus *Rhynchaturus*

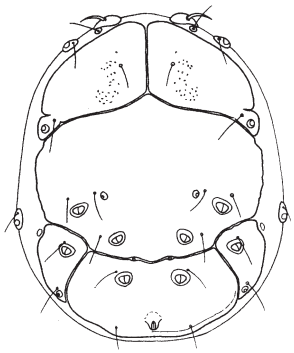
- At least some free dorsal platelets surrounded by membranous integument 73

73 All dorsal setae in posterior half of dorsum with accompanying glandularia (Fig. 1889) Genus *Rhynchaustrobates* (in part)

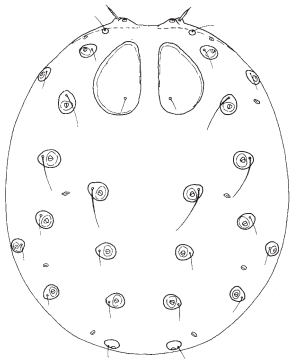
- Two dorsal setae in posterior half of dorsum without accompanying glandularia (Fig. 1861) Genus *Aciculacarus* (in part)



1884



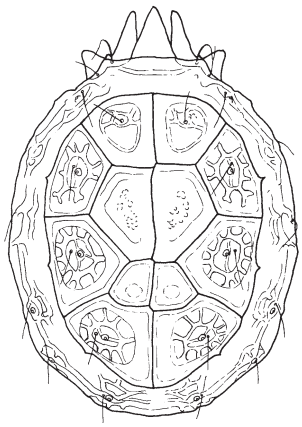
1885



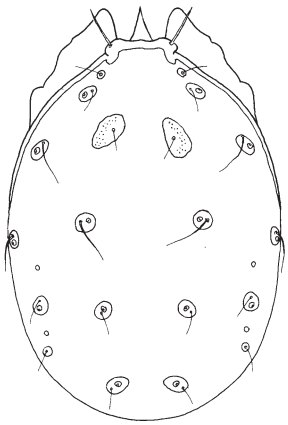
1886



1887



1888



1889

1884 *Aspidiobates spatiosus* K.O. Viets, dorsum male (after K.O. Viets 1969)

1885 *Corticacarus* (*Polycorticacarellus*) *memobus* Cook, dorsum male (after Cook 1980)

1886 *Procorticacarus angulicoxalis* (K.O. Viets), dorsum female (after Cook 1986)

1887 *Proboscibates tullyensis* Smit, venter male (after Smit 2015d)

1888 *Rhynchaturus hexaporus* Besch, dorsum female (after Cook 1988)

1889 *Rhynchaustrobates* (*Rhynchaustrobates*) *dividus* Cook, dorsum male (after Cook 1986)

74(70) Genital field with 6-9 pairs of acetabula 75
- Genital field with 3-4 pairs of acetabula 76

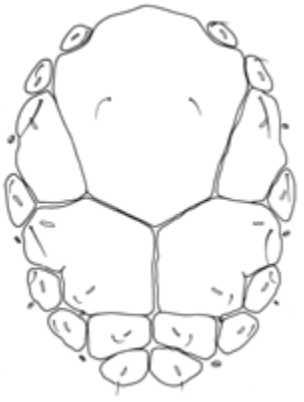
75 Dorsal and ventral shields present (Fig. 1890); P2 without ventral projection (Fig. 1891) Genus *Cookabates*

Dorsal and ventral shields absent (Fig. 1892); P2 with a ventral projection (Fig. 1893) Genus *Procorticacarus* (in part)

76(74) Gnathosoma with a long rostrum (Fig. 1894); P3 and in most species P2 with a large ventral projection (Fig. 1895) Genus *Atractidella*
- Gnathosoma without a short rostrum 77

77 Both dorsal and ventral shields present 78
- Only dorsal shield or ventral shield present, or idiosoma soft 90

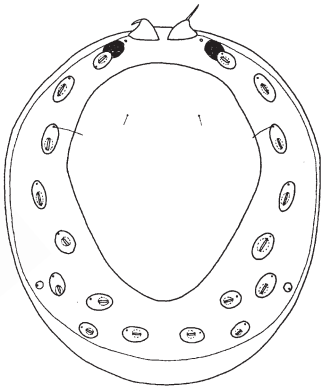
78 P4 with a serrate flange (Fig. 1896) Genus *Caenobates*
- P4 without a serrate flange (Fig. 1897) 79



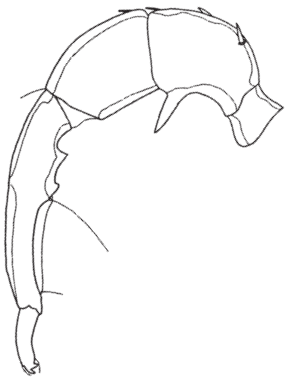
1890



1891



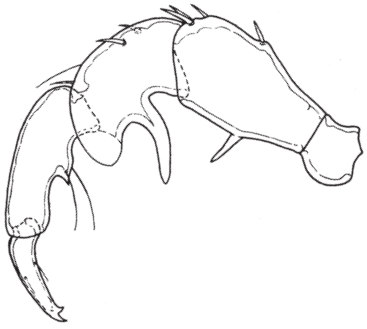
1892



1893



1894



1895

1890 *Cookabates inermis* Harvey, dorsum male (after Harvey 1988a)
1891 *Cookabates inermis* Harvey, palp female (after Harvey 1988)
1892 *Procorticacarus piriformis* Smit, dorsum female (after Smit 2001)
1893 *Procorticacarus piriformis* Smit, palp female (after Smit 2001)
1894 *Atractidella coriacea* Lundblad, venter male (after Cook 1974)
1895 *Atractidella lundbladi* Cook, palp male (after Cook 1980)

79 Genital field not incorporated into ventral shield (Fig. 1898) Genus *Hygrobatopsis* (males)

- Genital field incorporated into ventral shield (Fig. 1899) 80

80 Dorsal shield composed of 5-7 closely fitting platelets (Fig. 1900); Cxgl-4 located in the middle of Cx-IV (Fig. 1899) *Brevaturus* (in part)

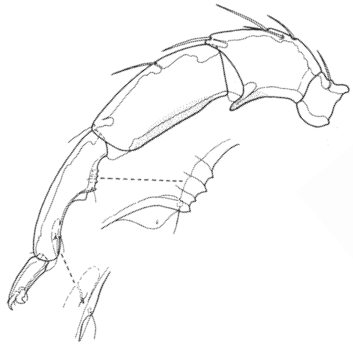
- Dorsum without a series of closely fitting platelets; Cxgl-4 located near suture line Cx-III/Cx-IV or on an anterior bowing of the suture line Cx-III/IV (Fig. 1901) 81

81 Dorsal shield divided in two large plates (Fig. 1902), anterior dorsal plate may be subdivided in two plates (Fig. 1903) 82

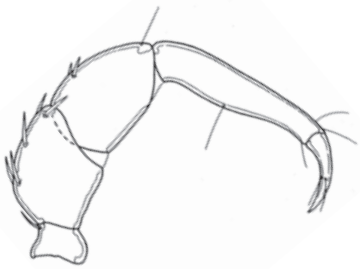
- Dorsal shield either entire, or consisting of one large plate and 2-5 posterior platelets (Fig. 1904) 85

82 Between the two large plates a pair of small lateral platelets without glandularia (Fig. 1902) 83

- No small lateral platelets present (Fig. 1905) 84



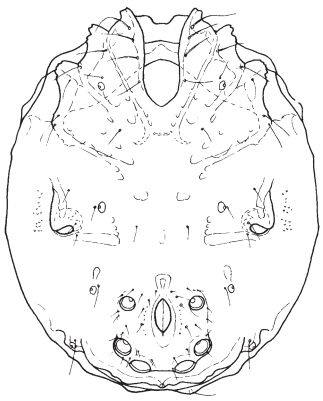
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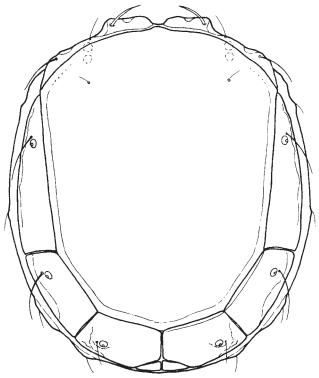
1897



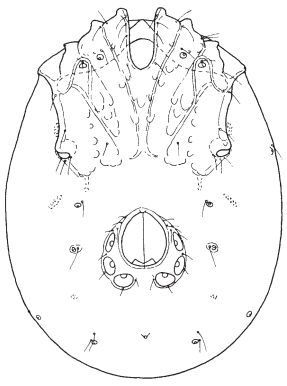
1898



1899



1900



1901

1896 *Caenobates acheronius* K.O. Viets, palp male (after Cook 1986)

1897 *Hygrobatopsis* (*Hygrobatopsis*) *levipalpis* (K. Viets), palp male (after Cook 1974)

1898 *Hygrobatopsis* (*Hygrobatopsis*) *levipalpis* (K. Viets), venter male (after Cook 1974)

1899 *Brevaturus* (*Paraspidiobates*) *wetzlari* (Schwoerbel), venter male (after Cook 1988)

1900 *Brevaturus* (*Paraspidiobates*) *wetzlari* (Schwoerbel), dorsum male (after Cook 1988)

1901 *Aspidiobatella smola* Cook, venter female (after Cook 1986)

83 Anterior dorsal plate without glandularia; posterior dorsal plate with three pairs of glandularia (Fig. 1906) Genus *Aspidiobatopsis*

- Anterior dorsal plate with three pairs of glandularia; dorsal posterior plate with 0-1 pair of glandularia (Fig. 1902) Genus *Aspidiobatella*

84(82) Posterior dorsal plate much smaller than anterior dorsal plate, the two plates lightly fused (Fig. 1905) Genus *Hopkinsobates*

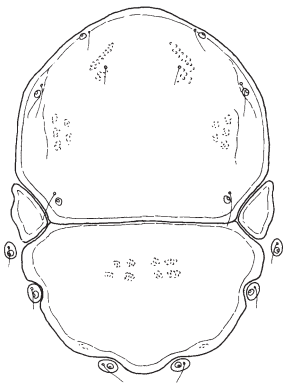
- Posterior and anterior dorsal plate (or the two divided anterior plates together) more or less of the same size, the two plates completely separated (Fig. 1903) Genus *Gondwanabates*

85(81) Dorsal shield with four pairs of "normal" glandularia and four pairs of enlarged glandularia with triangular openings, the latter in the posterior half (Fig. 1907) Genus *Actinacarus*

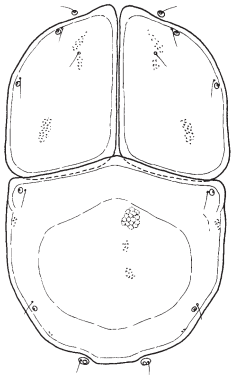
- All dorsal glandularia of the same shape 86

86 Cxgl-4 lying in a line with, or posterior to, the insertions of fourth legs (Fig. 1908) Genus *Dubiobates*

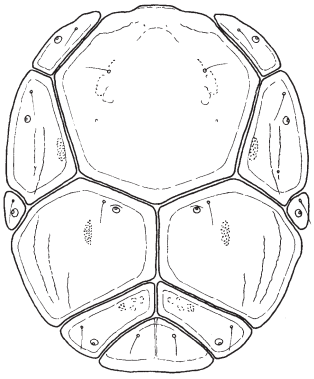
- Cxgl-4 lying anterior to the line of insertions of the fourth legs (Fig. 1909) 87



1902



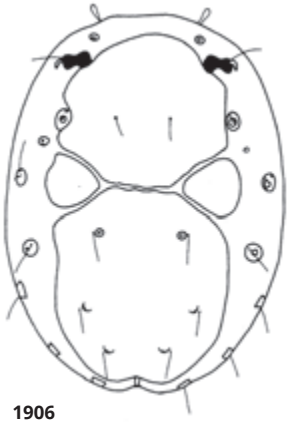
1903



1904



1905



1906



1907

1902 *Aspidiobatella smola* Cook, dorsum female (after Cook 1986)

1903 *Gondwanabates hopkinsi* Imamura, dorsum female (after Cook 1986)

1904 *Australorivacarus multiscutatus* K.O. Viets, dorsum male (after Cook 1986)

1905 *Hopkinsobates suzannae* Cook, dorsum female (after Cook 1983)

1906 *Aspidiobatopsis rubra* Smit, dorsum female (after Smit 2002a)

1907 *Actinacarus cardioporus* Lundblad, dorsum female (after Cook 1974)

87 Dorsal shield with three pairs of glandularia (Fig. 1910) Genus *Kallimobates*

- Dorsum either with an entire shield bearing 4-7 pairs of glandularia, or with several platelets various in size 88

88 Dorsal shield entire with seven pairs of glandularia (Fig. 2285), I-leg-5 with three short, heavy setae (Fig. 2286), Cxgl-4 lying in the middle of Cx-IV (Fig. 2287) (male unknown) Genus *Tobelobates*

- Dorsal shield usually not entire, but when entire, with four pairs of glandularia, I-leg-5 without stout setae, Cxgl-4 near suture line Cx-III/Cx-IV 89

89 Dorsum with a large anterior plate, a small posterior plate and five pairs of platelets of various in size (Fig. 1904) Genus *Australorivacarus*

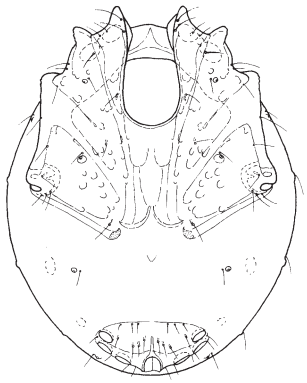
- Dorsum with a large anterior plate and 2-4 posterior platelets (Figs. 1911-1912), rarely five platelets present or dorsal shield entire (Fig. 1913) Genus *Aspidiobates*

90(77) Male genital field somewhat triangular, with the first pair of acetabula separated from the posterior two pairs (Female unknown) (Fig. 1914) Genus *Ioannibates*

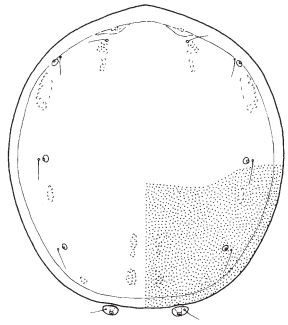
- Male genital field rounded (Fig. 1915) 91



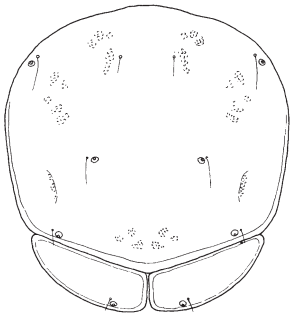
1908



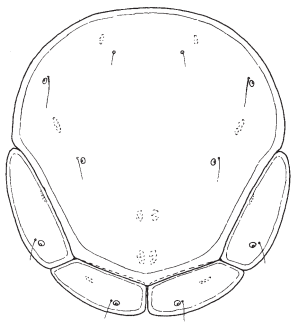
1909



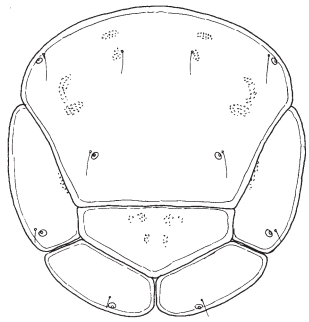
1910



1911



1912



1913

1908 *Dubiobates securipes* Cook, venter male (after Cook 1988)

1909 *Kallimobates australicus* K.O. Viets, venter male (after Cook 1986)

1910 *Kallimobates australicus* K.O. Viets, dorsum female (after Cook 1986)

1911 *Aspidiobates geometricus* Lundblad, dorsum male (after Cook 1986)

1912 *Aspidiobates scutatatus* Lundblad, dorsum male (after Cook 1986)

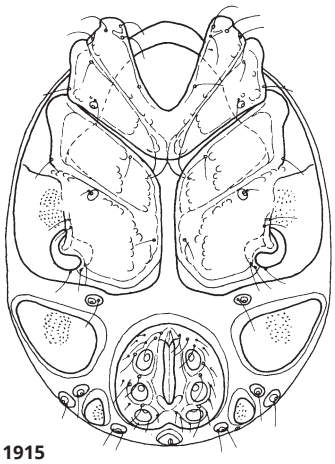
1913 *Aspidiobates geometricus* Lundblad, dorsum female (after Cook 1986)

91	P4 with a ventral tubercle which bears a hair-like seta (Fig. 1916)	Genus *Zelandobates*
-	P4 not with a hair-bearing ventral tubercle (Fig. 1917)	92
92	P5 curved and ending in a point, claws of P5 not discernible (Fig. 1917)	Genus *Hygrobatopsis* (females)
-	P5 not curved, claws of P5 distinct (Fig. 1918)	93
93	Male gonopore narrowed in the middle (Fig. 1919); palp very long, especially P4 (Fig. 1918)	Genus *Groonabates*
-	Male gonopore not narrowed in the middle (Fig. 1920), palp shorter (fig. 1921)	94
94	Dorsum without platelets (Fig. 1922)	Genus *Mapuchacarus*
-	Dorsum with platelets (Fig. 1923)	95



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1914



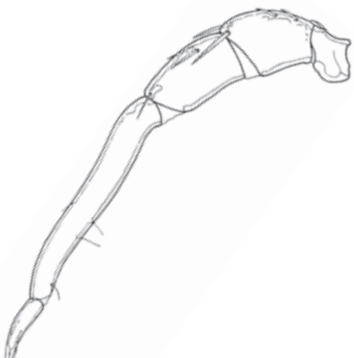
1915



1916



1917



1918



1919

1914 *Ioannibates papillosus* Smit, venter male (after Smit 2009b) Reproduced with permission from copyright holder

1915 *Zelandobates crinitus* Hopkins, venter male (after Cook 1983)

1916 *Zelandobates crinitus* Hopkins, gnathosoma + palp female (after Cook 1983)

1917 *Hygrobatopsis* (*Hygrobatopsella*) *bella* Cook, palp male (after Cook 2005)

1918 *Groonabates stanopus* Cook, palp male (after Cook 1986)

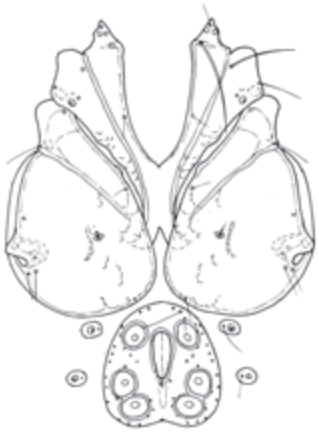
1919 *Groonabates stanopus* Cook, venter male (after Cook 1986)

95	Coxae with more or less distinct longitudinal ridges (Fig. 1924)	Genus *Brevaturus* (in part)
-	Coxae without longitudinal ridges (Fig. 1925)	96
96	Four pairs of the dorsal glandularia heart-shaped (Fig. 1926)	Genus *Corticacarus*
-	Dorsum without heart-shaped glandularia (Fig. 1927)	Genus *Procorticacarus* (in part)

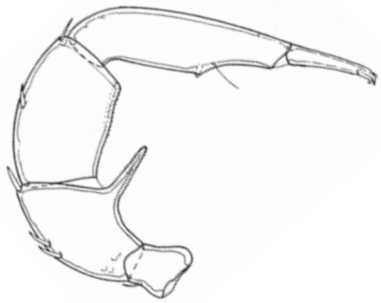
Genus *Aciculacarus* Hopkins, 1975

(Figs. 1861, 1928-1931)

1975 *Aciculacarus* Hopkins, Journal of the Royal Society of New Zealand 5: 7 – Cook (1988).
Type species: *Aciculacarus papillosus* Hopkins, 1975



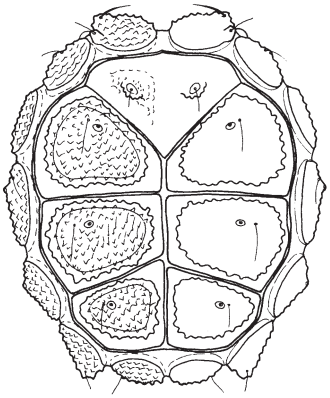
1920



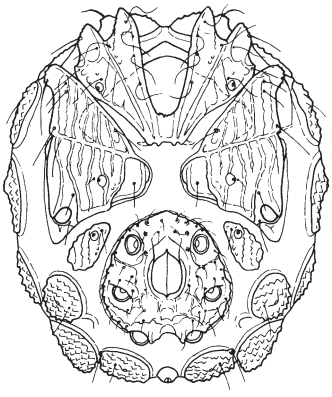
1921



1922



1923



1924



1925

1920 *Mapuchacarus condiscipulorum* Besch, venter male (after Cook 1988)
1921 *Mapuchacarus condiscipulorum* Besch, palp male (after Cook 1988)
1922 *Mapuchacarus condiscipulorum* Besch, dorsum male (part.) (after Cook 1988)
1923 *Brevaturus* (*Brevaturus*) *triangularis* Cook, dorsum male (after Cook 1988)
1924 *Brevaturus* (*Brevaturus*) *triangularis* Cook, venter male (after Cook 1988)
1925 *Corticacarus* (*Corticacarus*) *schwoerbeli* Cook, venter male (after Cook 1988)

DIAGNOSIS: Dorsum soft, but a ventral shield present. Dorsum with five pairs of normal glandularia with associated setae, and in posterior half two pairs of setae without glandularia (Fig. 1861). Gnathosoma separated from coxae. Cheliceral claw enlarged and needle-like (Fig. 1930). Cx-I fused or separated medially. Cxgl-4 near suture line Cx-III/Cx-IV (Figs. 1928-1929). Genital field with three pairs of acetabula lying on a plate which is fused with the ventral shield, suture lines distinct. Palp simple, without tubercles (Fig. 1931). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: Two species known from New Zealand (Hopkins 1975, Cook 1983).

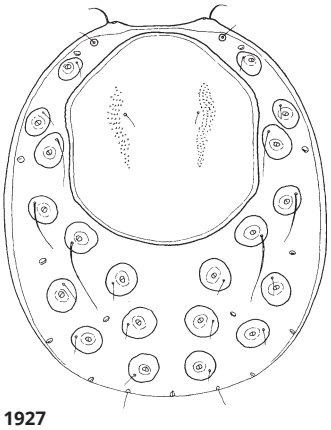
Genus *Actinacarus* Lundblad, 1954

(Figs. 1907, 1932, 1933)

1954 *Actinacarus* Lundblad, Arkiv för Zoologi (Serie 2) 5: 560 – Cook (1988).
Type species: *Actinacarus cardioporus* Lundblad, 1954



1926



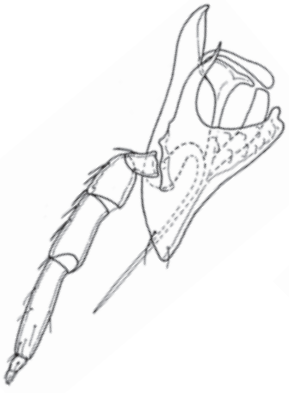
1927



1928



1929



1930



1931

1926 *Corticacarus* (*Corticacarus*) *schwoerbeli* Cook, dorsum male (after Cook 1988)
1927 *Procorticacarus tasmanicus* (Cook), dorsum male (after Cook 1986)
1928 *Aciculacarus papillosus* Hopkins, venter male (after Cook 1983)
1929 *Aciculacarus papillosus* Hopkins, venter female (after Cook 1983)
1930 *Aciculacarus papillosus* Hopkins, gnathosoma + palp female (after Cook 1983)
1931 *Aciculacarus papillosus* Hopkins, palp male (after Cook 1983)

DIAGNOSIS: (Female only) Dorsal and ventral shields present. Dorsal shield entire, with four pairs of "normal" glandularia and in the posterior half of the dorsal shield four pairs of enlarged glandularia with triangular-shaped openings (Fig. 1907). Excretory pore lying free in the integument in an indentation at posterior end of dorsal shield. Gnathosoma separated from the coxae, with mouth opening subterminal. Cxgl-4 shifted far forward, causing the suture line Cx-III/Cx-IV to extend abruptly anteriorly and making the Cx-III small and more or less rectangular (Fig. 1932). Insertion of fourth legs partially covered by rounded projections. Cx-IV rounded posteriorly. Genital field located at posterior end of ventral shield, with three pairs of acetabula, fused with ventral shield without a trace of a suture line. Palp simple, with a short heavy seta near middle of P4 (Fig. 1933. Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: Two species known from Colombia.

Genus *Africacarus* K.O. Viets, 1962

(Figs. 1807, 1934-1936)

1962 *Africacarus* K.O. Viets, Zoologischer Anzeiger 168: 375.

Type species: *Africacarus strenzkei* K.O. Viets, 1962

DIAGNOSIS: Dorsal and ventral shields present in male but idiosoma of female weakly sclerotized. Gnathosoma with an extremely long, downturned rostrum (Fig. 1936), separate or lightly joined to Cx-I by a sclerotized bridge at posterior end. Coxae completely fused with ventral shield in male (Fig. 1934), but in three groups in female (Fig. 1935). Cx-I fused medially. Glandularia of Cx-IV placed well posterior to the incomplete suture lines Cx-III/Cx-IV. Cx-IV with well-developed posterior projections, in the male incorporated into the ventral shield. Genital field with three pairs of acetabula. P1 elongated, approximately as long as P2 (Fig. 1807). Chaetotaxy of palp greatly reduced. Legs with a few swimming setae.

HABITAT: Streams.

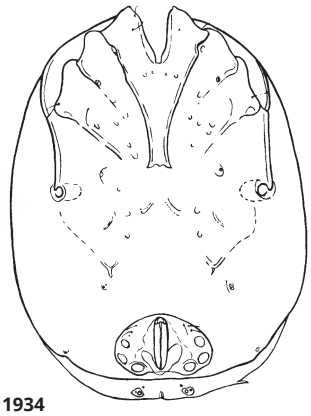
DISTRIBUTION: One species known from South Africa.



1932



1933



1934

1932 *Actinacarus cardioporus* Lundblad, venter female (after Cook 1974)

1933 *Actinacarus cardioporus* Lundblad, palp female (after Cook 1974)

1934 *Africacarus strenzkei* K.O. Viets, venter male (after Cook 1974)

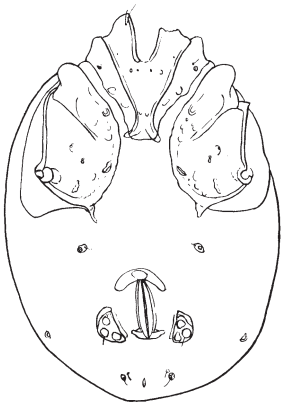
Genus *Ambiguobatella* K. Viets, 1956

(Figs. 1789, 1937-1939)

1956 *Ambiguobatella* K. Viets, Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere 84: 20 – Cook (1974).

Type species: *Ambiguobates peltophorus* K. Viets, 1956

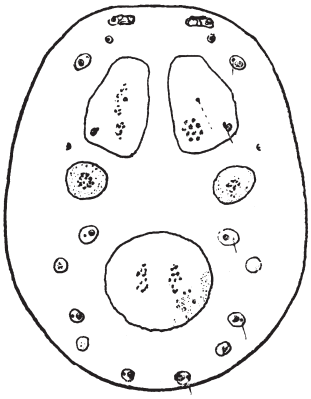
DIAGNOSIS: (Female only) Idiosoma weakly sclerotized ventrally, dorsum with a pair of anterior platelets with the preocularia and a pair of glandularia, a pair of small platelets and a rounded, unpaired posterior platelet (Fig. 1937). Gnathosoma separated from Cx-I, without a long posterior process. Cx-I fused medially; Cx-IV posteriorly with short projections. Well-developed muscle scars extending anteriorly from the posterior projection slightly lateral to the glandularia of Cx-IV. Glandularia of Cx-IV lying in an anterior bulge in the suture line Cx-III/Cx-IV and appearing to lie on Cx-III (Fig. 1789). Genital field with three pairs of acetabula. Genital plates extending well posterior to the unsclerotized excretory pore. Medial surface of P_4 with a heavy seta (Fig. 1938). Legs without swimming setae. I-leg-5 distally with one heavy seta and a curved seta (Fig. 1939).



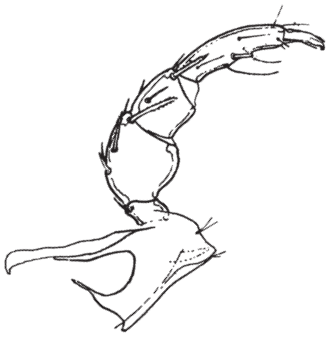
1935



1936



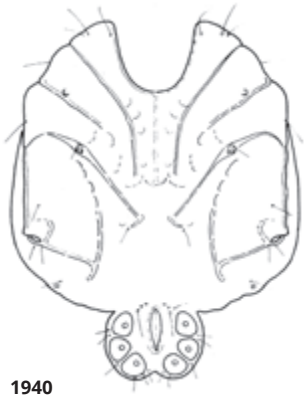
1937



1938



1939



1940

1935 *Africacarus strenzkei* K.O. Viets, venter female (after Cook 1974)

1936 *Africacarus strenzkei* K.O. Viets, gnathosoma male (after Cook 1974)

1937 *Ambiguobatella peltophora* (K. Viets), dorsum female (after K. Viets 1956a)

1938 *Ambiguobatella peltophora* (K. Viets), gnathosoma + palp male (after K. Viets 1956a)

1939 *Ambiguobatella peltophora* (K. Viets), I-leg-5-6 female (after Cook 1974)

1940 *Ambiguobates permixtus* K. Viets, venter male (after Cook 1974)

HABITAT: Streams.

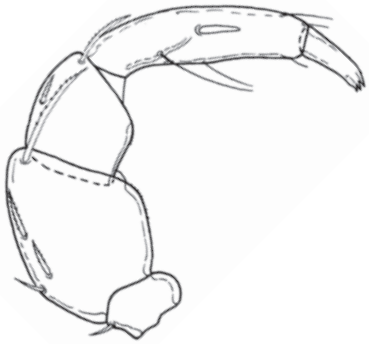
DISTRIBUTION: One species known from South Africa.

Genus *Ambiguobates* K. Viets, 1956

(Figs. 1798, 1940-1942)

1956 *Ambiguobates* K. Viets, Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere 84: 19.

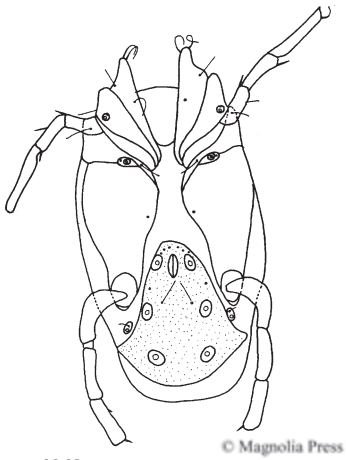
Type species: *Ambiguobates permixtus* K. Viets, 1956



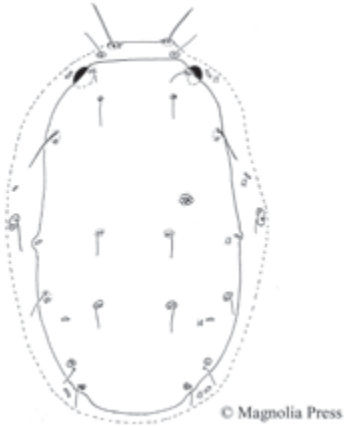
1941



1942



1943



1944



1945



1946

1941 *Ambiguobates permixtus* K. Viets, palp male (after Cook 1974)

1942 *Ambiguobates permixtus* K. Viets, l-leg-5-6 female (after Cook 1974)

1943 *Andesobates longipalpis* Smit, venter male (after Smit 2002c) Reproduced with permission from copyright holder

1944 *Andesobates longipalpis* Smit, dorsum male (after Tuzovskij & Stolbov 2016c) Reproduced with permission from copyright holder

1945 *Andesobates longipalpis* Smit, venter female (after Tuzovskij & Stolbov 2016c) Reproduced with permission from copyright holder

1946 *Andesobates longipalpis* Smit, dorsum female (after Tuzovskij & Stolbov 2016c) Reproduced with permission from copyright holder

DIAGNOSIS: Idiosoma weakly sclerotized, some secondary sclerotization of the venter may be developed in males. Gnathosoma separated from Cx-I; males without a long posterior process, females with long posterior process. Cx-I fused in male (Fig. 1940), separated in female (Fig, 1798). Cx-IV posteriorly with short projection, which might be hidden in secondary sclerotization. Well-developed apodemes and muscle scars extending anteriorly from the posterior projections slightly lateral to the glandularia of Cx-IV. Glandularia of Cx-IV appearing to lie on the suture lines between Cx-III and Cx-IV. Genital field with three pairs of acetabula. Genital plates of female extending well posterior to the postgenital sclerite. Medial surface of P4 with a heavy seta (Fig. 1941). Legs without swimming setae. I-leg-5 distally with one heavy seta and a curved fine seta (Fig. 1942).

HABITAT: Streams.

DISTRIBUTION: One species known from South Africa (Smit 2005).

Genus *Andesobates* Smit, 2002

(Figs. 1943-1949)

2002 *Andesobates* Smit, Zootaxa 103: 19.

2016 *Paratetrahygrobatella* Tuzovskij & Stolbov, Zootaxa 4161: 579 – new syn.

Type species: *Andesobates longipalpis* Smit, 2002

DIAGNOSIS: Male: Dorsum with a large dorsal plate occupying most of the dorsal surface (Fig. 1944); venter not sclerotized. Cx-IV of male very large and extended posteriorly, more or less triangular (Fig. 1943). Fourth legs inserted far posteriorly. Genital field large, with three widely separated acetabula; gonopore located near anterior margin of genital field. P2 with a large ventral projection, P3 with a small ventral projection (Fig. 1947). Female: Dorsum with a pair of platelets with the postocularia and small glandularia platelets (Fig. 1946). Genital field with a pair of slightly curved genital plates (Fig. 1945). P2 without a ventral projection (Fig. 1948). Both sexes: Gnathosoma separated from coxae. Suture lines of coxae complete. Cx-I separated medially. Cx-III small, triangular. Cxgl-4 located in a slight bowing of suture line Cx-III/Cx-IV (Figs. 1943, 1945). P2 and P3 with ventral denticles. Legs without swimming setae (Fig. 1949).

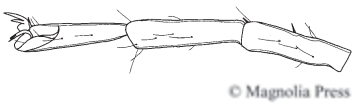
HABITAT: Streams.

DISTRIBUTION: One species known from Argentina and Chile (Tuzovskij & Stolbov 2016c).

REMARKS: The genus *Paratetrahygrobatella* matches the description of *Andesobates*. The large dorsal plate was not mentioned by Smit (2002c) but is present in the holotype. Therefore, *Paratetrahygrobatella* is synonymized with *Andesobates*.







1947 **1948** **1949**

1947 *Andesobates longipalpis* Smit, gnathosoma + palp male (after Smit 2002c) Reproduced with permission from copyright holder

1948 *Andesobates longipalpis* Smit, palp female (after Tuzovskij & Stolbov 2016c) Reproduced with permission from copyright holder

1949 *Andesobates longipalpis* Smit, I-leg-4-6 male (after Smit 2002c) Reproduced with permission from copyright holder

Genus *Asiabates* Wiles, 1999

(Figs. 1859, 1950, 1951)

1999 *Asiabates* Wiles, The Raffles Bulletin of Zoology 47: 418.

Type species: *Asiabates longirostris* Wiles, 1999

DIAGNOSIS: (Female only) Idiosoma soft, lacking secondary sclerotization, dorsal plates absent. Gnathosoma with a long rostrum, not fused with coxae (Fig. 1950); gnathosoma with a long posterior projection extending beyond posterior end of Cx-II. Cx-I separated medially. Suture line Cx-III/Cx-IV near-complete, bowed abruptly posteriorly at medial end. Cxgl-4 located in the middle of Cx-IV. Genital field with four pairs of acetabula. Palp without denticles or ventral projections (Fig. 1859). Legs without swimming setae. I-leg-5 distally without thickened or curved setae (Fig. 1951).

HABITAT: Streams.

DISTRIBUTION: One species known from Brunei (Borneo).

Genus *Aspidiobatella* Cook, 1986

(Figs. 1901, 1902, 1952-1955)

1986 *Aspidiobatella* Cook, Memoirs of the American Entomological Institute 40: 109.

Type species: *Aspidiobatella smola* Cook, 1986

DIAGNOSIS: Dorsal and ventral shields present. Dorsal shield divided in a large anterior plate with three pairs of glandularia and a somewhat smaller posterior plate without glandularia in the female and with one pair of glandularia in the male (Fig. 1953). A pair of small triangular platelets present laterally at the junction of the two large plates (Fig. 1902). Gnathosoma separated from coxae, with a relatively short anchoral process. Cx-I fused medially. Cxgl-4 shifted well up onto Cx-III, in a line with Cxgl-2 (Figs. 1901, 1902). Genital field with three pairs of acetabula. A ridge on each side extending anteriorly from the insertion of the fourth legs to the lateral margin of the ventral shield. P3 with two large distoventral setae (Fig. 1954). Legs without swimming setae (Fig. 1955).

HABITAT: Streams.

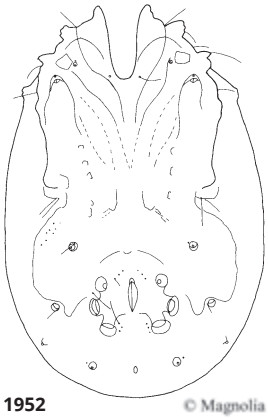
DISTRIBUTION: One species known from Australia (Smit 2015a).



1950



1951



1952

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1950 *Asiabates longirostris* Wiles, venter female (after Wiles 1999) Reproduced with permission from Lee Kong Chian Natural History Museum

1951 *Asiabates longirostris* Wiles, first leg female (after Wiles 1999) Reproduced with permission from Lee Kong Chian Natural History Museum

1952 *Aspidiobatella smola* Cook, venter male (after Smit 2015a) Reproduced with permission from copyright holder

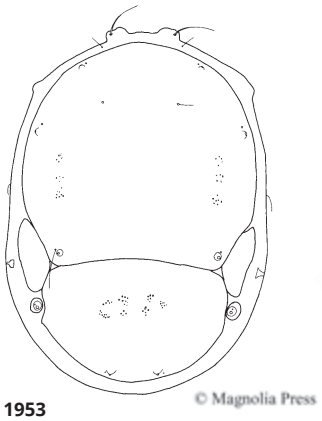
Genus *Aspidiobates* Lundblad, 1941

(Figs. 112, 1884, 1911-1913, 1956-1959)

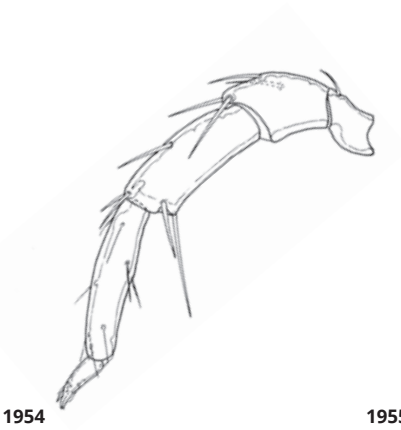
1941 *Aspidiobates* Lundblad, Entomologisk Tidskrift 62: 115.

Type species: *Aspidiobates scutatus* Lundblad, 1941

DIAGNOSIS: Dorsal and ventral shields present in both sexes. Membranous parts of integument smooth, occasionally with spine-like papillae. Dorsal shield typically consisting of a large anterior plate and one (males, Figs. 1884, 1911) or two pairs (females, Fig, 1912) of posterior platelets. However, there is a large variation in the number of dorsal platelets, even within a species. Occasionally the large dorsal plate is divided (Fig. 1913), or the posterior platelets may be fused with the large dorsal plate to form a complete dorsal shield, or one pair of the posterior platelets is divided resulting in three pairs of posterior platelets. Gnathosoma separated from the coxae, with a well-developed anchoral process (Fig. 1957), occasionally with a distinct rostrum. Cx-I either fused or separated medially (Fig. 1956). Suture lines of coxae either distinct or obliterated. Cxgl-4 located near suture line Cx-III/Cx-IV or shifted onto Cx-III in an anterior bow of this suture line (Fig. 112). Posterior margin of Cx-IV typically without short projections. Genital field fused with the ventral shield, with three or four pairs of acetabula. Palp various, without ventral projections, or with P2


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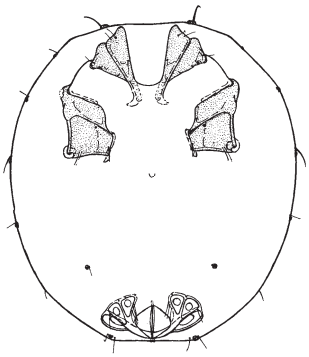
1953



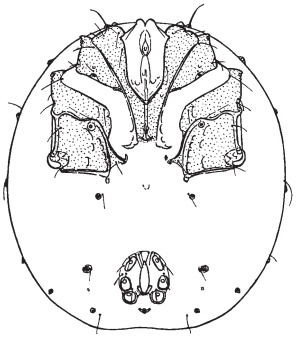
1954



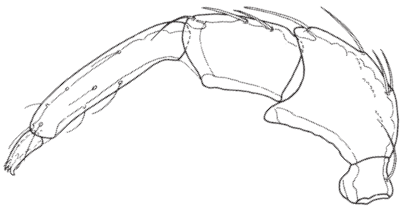
1955



1956



1957



1958

1953 *Aspidiobatella smola* Cook, dorsum male (after Smit 2015a) Reproduced with permission from copyright holder

1954 *Aspidiobatella smola* Cook, palp female (after Cook 1986)

1955 *Aspidiobatella smola* Cook, I-leg-4-6 female (after Cook 1986)

1956 *Aspidiobates spatiosus* K.O. Viets, venter female (after K.O. Viets 1969)

1957 *Aspidiobates violaceus* K.O. Viets, venter male (after K.O. Viets 1969)

1958 *Aspidiobates similis* Cook, palp female (after Cook 1986)

(and occasionally also P3) with a ventral projection, occasionally with small denticles. P4 with (Fig. 1959) or without (Fig. 1958) setal tubercles. Legs without swimming setae.

HABITAT: Streams, springs.

DISTRIBUTION: The genus has a typical Gondwanan distribution, with numerous species known from Australia, New Zealand, New Caledonia, South Africa and Chile. In New Caledonia the genus has undergone an extensive radiation, with 19 species described (Smit 2009a). Outside these former parts of Gondwana two species are known from Vanuatu (Smit 2004b).

Genus *Aspidiobatopsis* Smit, 2002

(Figs. 1906, 1960-1964)

2002 *Aspidiobatopsis* Smit, Mémoires du Muséum national d'Histoire naturelle 187: 186.

Type species: *Aspidiobatopsis rubra* Smit, 2002

DIAGNOSIS: Dorsal and ventral shields present. Dorsum with a large anterior and a posterior plate, and a pair of triangular platelets laterally at the junction of the two large plates. Anterior dorsal plate without glandularia, posterior plate with three pairs of glandularia (Fig. 1906). Gnathosoma separated from the coxae, with a long anchoral process. Cx-I fused medially. Suture lines of coxae incomplete, Cx-IV without posterior suture line. Genital field fused with ventral shield, with three pairs of acetabula. Gonopore somewhat triangular in male (Fig. 1960). Genital field with complete suture lines in male, in female incomplete (Fig. 1961). Palp simple, without ventral projections or setal tubercles (Fig. 1962). Legs with swimming setae (Fig. 1964).



1959



1960



1961



1962



1963



1964

1959 *Aspidiobates violaceus* K.O. Viets, palp male (after K.O. Viets 1969)

1960 *Aspidiobatopsis rubra* Smit, venter male (after Smit 2002a)

1961 *Aspidiobatopsis rubra* Smit, venter female (after Smit 2002a)

1962 *Aspidiobatopsis rubra* Smit, palp male (after Smit 2002a)

1963 *Aspidiobatopsis rubra* Smit, I-leg-4-6 female (after Smit 2002a)

1964 *Aspidiobatopsis rubra* Smit, IV-leg-4-6 male (after Smit 2002a)

HABITAT: Streams.

DISTRIBUTION: One species known from New Caledonia.

Genus *Atractidella* Lundblad, 1936

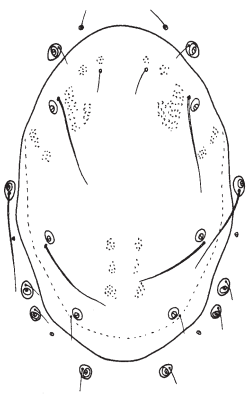
(Figs. 1894, 1895, 1965-1969)

1936 *Atractidella* Lundblad, Zoologischer Anzeiger 115: 35.

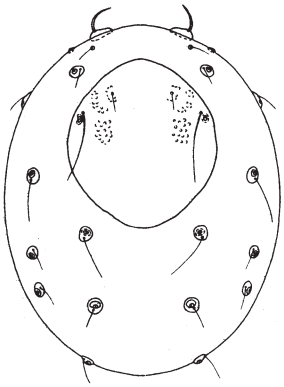
1936 *Atractidopsis* Lundblad, Zoologischer Anzeiger 115: 36.

Type species: *Atractidella hamata* Lundblad, 1936

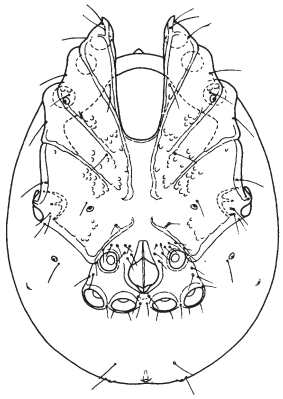
DIAGNOSIS: Males with dorsal and ventral shields, males with a large dorsal plate covering nearly entire dorsum (Fig. 1965), females dorsally with a large anterior plate (Fig. 1966) or a pair of platelets. Gnathosoma separate from the coxae, with a long rostrum and anchoral process (Fig. 1894). Cx-I fused medially. Glandularia of Cx-IV placed well posterior to the suture line Cx-III/Cx-IV. Posterior margin of Cx-IV pointed in male (Fig. 1967), more or less straight in female with a short posterior projection (Fig. 1968). Genital field with three pairs of acetabula, in males fused with the ventral shield, in females on a pair of somewhat triangular genital plates.



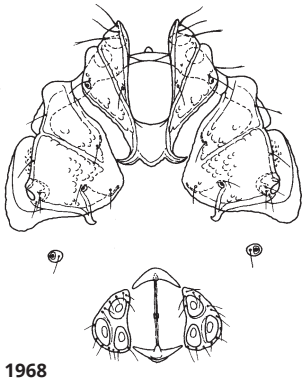
1965



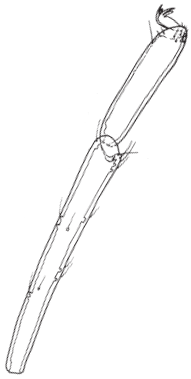
1966



1967



1968



1969



1970

1965 *Atractidella porophora* K. Viets, dorsum male (after Cook 1980)

1966 *Atractidella mesoamericana* Cook, dorsum female (after Cook 1980)

1967 *Atractidella mesoamericana* Cook, venter male (after Cook 1980)

1968 *Atractidella mesoamericana* Cook, venter female (after Cook 1980)

1969 *Atractidella porophora* K. Viets, I-leg-5-6 female (after Cook 1980)

1970 *Atractides* (*Tympanomegapus*) *pavesii* Maglio, palp female (after Gerecke et al. 2016)

P2 with or without a ventral projection (present in females and absent in males of most species), P3 with a large projection, P4 ventrally with a peg-like seta (Fig. 1895). Legs without swimming setae. None of the setae of the first leg enlarged or modified, I-leg-5 usually elongated, I-leg-6 not bowed (Fig. 1969).

HABITAT: Streams.

DISTRIBUTION: Several species known from South America (Brazil, Besch 1965; Peru; Colombia; Argentina, Cook 1980, Rosso de Ferradás & Mattoni 1999) and Central America (Mexico, Cook 1980; Costa Rica, Cook 1980).

Genus *Atractides* C.L. Koch, 1837

(Figs. 115, 1773, 1775, 1776, 1779, 1784, 1970-1986)

1837 *Atractides* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 11: 16.

1880 *Megapus* Neuman, Kongliga Svenska vetenskaps-akademiens handlingar 17: 63.

1924 *Megabates* K. Viets, Zoologischen Anzeiger 58: 104 - new syn.

1926 *Tetramegapus* K. Viets, Zoologischer Anzeiger 69: 193 – Gerecke (2003).

1926 *Octomegapus* K. Viets, Zoologischer Anzeiger 69: 193 – Gerecke (2003).

1928 *Taeniomegapus* Maglio, Anuario Liceo Ginnasio "Ugo Fiscolo", Pavia 4: 8.

1936 *Megapoides* Lundblad, Zoologischer Anzeiger 116: 20 - K.O. Viets (1963).

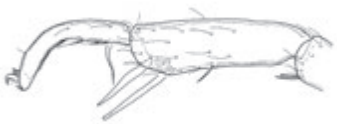
1941 *Megapodides* Lundblad, Zoologiska bidrag från Uppsala 20: 366 - K.O. Viets (1963).



1971



1972



1973



1974



1975



1976

1971 *Atractides* (*Polymegapus*) *polyporus* (K. Viets), gnathosoma + palp male (after Gerecke et al. 2016)

1972 *Atractides* (*Polymegapus*) *polyporus* (K. Viets), I-leg-5-6 male (after Gerecke et al. 2016)

1973 *Atractides* (*Atractides*) *nodipalpis* (Thor), I-leg-5-6 female (after Gerecke et al. 2016)

1974 *Atractides* (*Maderomegapus*) *hystricipes* (Lundblad), first leg male (after Gerecke et al. 2016)

1975 *Atractides* (*Maderomegapus*) *hystricipes* (Lundblad), first leg female (after Gerecke et al. 2016)

1976 *Atractides* (*Atractides*) *denticulatus* (Walter), dorsum male (after Gerecke et al. 2016)

1976 *Iranomegapus* Schwoerbel & Sepasgozarian, Acta Ecologica Iranica 1: 12.

Type species: *Megapes spinipes* C.L. Koch, 1837

DIAGNOSIS: Dorsal and posteroventral idiosoma from completely unsclerotized to widely covered by ventral and dorsal shields (Figs. 1976, 1977). Gnathosoma without a posterior anchoral process, not broadly fused with Cx-I, but joined by a very narrow median bridge. Cx-I fused medially (Figs. 1779, 1979). Glandularia of Cx-IV located near suture line Cx-III/Cx-IV. Genital field with three to numerous acetabula. Palp often showing sexual dimorphism (Figs. 1979, 1980). P4 bearing two fine ventral setae, and a strong, often peg-like setae in medioventral position (Fig. 1773). Legs very rarely with swimming setae. I-leg-5 often enlarged, with a short ventral seta, a whip-like seta at anterior distal margin and two characteristic distally located sword-like setae (the proximal called S1, the distal S2) (Fig. 1973). I-leg-6 variously modified, from nearly straight to strongly bowed.

REMARKS: The subgenus *Megabates*, originally described as a full genus, is characterized by an unbowed I-leg-6. However, many species bridge the gap nowadays between an unbowed and a bowed I-leg-6. Therefore, I propose to synonymize the subgenus with the nominate taxon.

KEY TO THE SUBGENERA

1 Gnathosomal rostrum strongly elongated (Fig. 1784); P1 longer than high and centrally narrowed (Fig. 1970) Subgenus *Tympanomegapus*

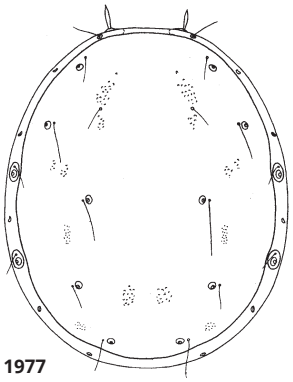
- Gnathosomal rostrum short or only slightly elongated; P1 normally shorter than high or subquadratic (Fig. 1971) 2

2 Ventral margin of I-leg-5 longer than dorsal margin; setae S1/2 closely together, occasionally twisted, S1 strongly enlarged in proximal part; I-leg-6 shortened, with a swollen base, but rapidly narrowed distally (Fig. 1972) Subgenus *Polymegapus*

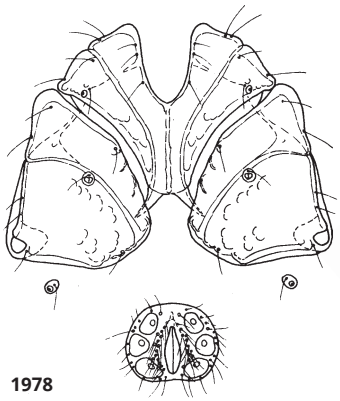
- Ventral margin of I-leg-5 shorter than dorsal margin; setae S1/2 various, if close together, generally similar in shape and not contorted (Fig. 1973); I-leg-6 various 3

3 I-leg-5 typically with one ventral seta (Fig. 1973); I-leg-3/4 of males not extended, without densely arranged setae; I-leg-3 of females without a distinct group of setae Subgenus *Atractides* s.s.

- I-leg-5 with two or more ventral setae; I-leg-3/4 of male extended, flattened, with densely arranged long setae (Fig. 1974); I-leg-3 of females with a group of slender ventral setae (Fig. 1975) Subgenus *Maderomegapus*



1977



1978



1979

1977 *Atractides* (*Atractides*) *travanus* Cook, dorsum male (after Cook 1980)

1978 *Atractides* (*Atractides*) *imitatus* K.O. Viets, venter male (after Cook 1980)

1979 *Atractides* (*Atractides*) *nodipalpis* (Thor), palp male (after Gerecke et al. 2016)

Subgenus *Atractides* s.s.

(Figs. 115, 1773, 1776, 1779, 1973, 1976-1980)

DIAGNOSIS: P1 subquadratic or only slightly elongated (Fig. 1773). Vary rarely legs with swimming setae. Without pronounced sexual dimorphism in setation of first and second legs. Ventrodistal tip of I-leg-5 not extended beyond dorsodistal margin of segment. S2 not extremely inflated (Fig. 1973).

HABITAT: Streams, springs, interstitial, lakes, ditches.

DISTRIBUTION: Numerous species described; the subgenus has a nearly cosmopolitan distribution, only absent from the Australasian region. According to Gerecke (2003) a paraphyletic subgenus.

Subgenus *Polymegapus* K. Viets, 1926

(Figs. 1775, 1971, 1972, 1981, 1982)

1926 *Polymegapus* K. Viets, Zoologischer Anzeiger 69: 193.

1942 *Allomegapus* Lundblad, Arkiv för Zoologi 34A: 80 – Gerecke (2003).

Type species: *Megapus polyporus* K. Viets, 1922

DIAGNOSIS: Cx-IV may have a triangular posterolateral extension of secondary sclerotization (Fig. 1981). Gnathosoma robust and short. Genital field with 3-10 pairs of acetabula (Fig. 1982). P2 and P3 without ventral extensions, stout medioventral seta of P4 strong and finger-like (Figs. 1775, 1971). Ventrodistal tip of I-leg-5 extended beyond dorsodistal margin of segment. S1/2 strongly heteromorphic, located at the same level and partly embracing each other. Whip-like setae at distal end of I-leg-5 long and fine, I-leg-6 stout, very thick at its base, distally strongly tapering (Fig. 1972). Excretory pore sclerotized.

HABITAT: Streams, springs, interstitial.

DISTRIBUTION: Several species described from the Holarctic (Iran, Asadi et al. 2010), Afrotropical and Oriental regions (India, Cook 1967).



1980



1981



1982

1980 *Atractides* (*Atractides*) *nodipalpis* (Thor), palp female (after Gerecke et al. 2016)

1981 *Atractides* (*Polymegapus*) *polyporus* (K. Viets, venter male (part.) (after Gerecke et al. 2016)

1982 *Atractides* (*Polymegapus*) *diversus* Cook, venter female (after Cook 1974)

Subgenus *Maderomegapus* Lundblad, 1941

(Figs. 1974, 1975, 1984-1986)

1941 *Maderomegapus* Lundblad, Entomologisk Tidskrift 62: 96 – Gerecke (2003).

Type species: *Maderomegapus hystricipes* Lundblad, 1941

DIAGNOSIS: Male: Anterior margin of genital plate embracing an anteromedial pit (Fig. 1984). P2 with a large truncate extension in male (Fig. 1985), P2 without a truncate extension in female (Fig. 1986). I-leg-5 with two or more ventral setae; I-leg-3/4 extended, flattened, with densely arranged long setae (Fig. 1974). Female: I-leg-3 with a group of slender ventral setae (Fig. 1975).

HABITAT: Streams.

DISTRIBUTION: One species known from Madeira.

Subgenus *Tympanomegapus* Thor, 1923

(Figs. 1784, 1970, 1983)

1923 *Tympanomegapus* Thor, Arbeiten der Biologischen Wolga-Station, Saratow 7: 54.

1948 *Rhynchomegapus* Motaş & Tanasachi, Annales Scientifiques de l'Université de Jassy 31: 155.

Type species: *Atractides pavesii* Maglio, 1905

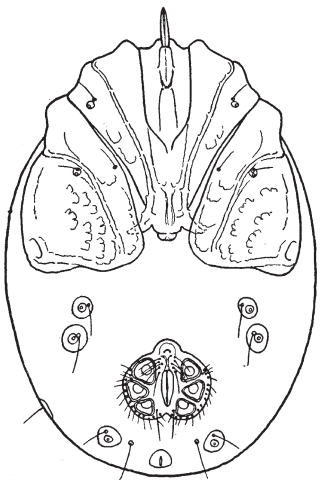
DIAGNOSIS: Gnathosoma with a strongly projecting rostrum (Fig. 1784). Posterior margin of Cx-I narrowed and medially truncated. Genital field with three pairs of acetabula. I-leg-5 and -6 slightly modified with S1 and S2 similar in shape (Fig. 1983). P1 elongated, longer than high and centrally narrowed (Figs. 1784, 1970). P5 may develop "cheek-like" lateral extensions.

HABITAT: Streams, lakes.

DISTRIBUTION: Several species known from the Palaearctis (China, Yi et al. 2010, Wang et al. 2015), Afrotropical (South Africa, Pešić et al. 2011), Oriental regions (India, Cook 1967; Indonesia, Pesic & Smit 2009c; Oman, Smit & Pešić 2010; Borneo, Smit & Pešić 2014b) and Neotropical regions (Mexico, Cook 1980).



1983



1984



1985

1983 *Atractides* (*Tympanomegapus*) *lacustris* (Lundblad), I-leg-5-6 male (after Gerecke et al. 2016)

1984 *Atractides* (*Maderomegapus*) *hystricipes* (Lundblad), venter male (after Lundblad 1942b)

1985 *Atractides* (*Maderomegapus*) *hystricipes* (Lundblad), palp male (after Lundblad 1942b)

Genus *Australiobatella* Lundblad, 1954

(Figs. 1801, 1987, 1988)

1954 *Australiobatella* Lundblad, Arkin för Zoologi (Serie 2) 5: 516.

Type species: *Australiobatella vietsi* Lundblad, 1954

DIAGNOSIS: (Male only) Idiosoma soft. Gnathosoma separated from the coxae, with a very short posterior process (Fig. 1801). Cx-I separated medially. Posterior margin of Cx-IV with well-developed projections, apodemes extending anteriorly from these posterior projections nearly to the glandularia of Cx-IV. Glandularia of Cx-IV located near suture lines Cx-III/Cx-IV. Genital field with three pairs of acetabula. Legs with a few swimming setae. I-leg-5 distally with two heavy setae (Fig. 1988).

HABITAT: Streams.

DISTRIBUTION: One species known from Colombia.

Genus *Australiobates* Lundblad, 1941

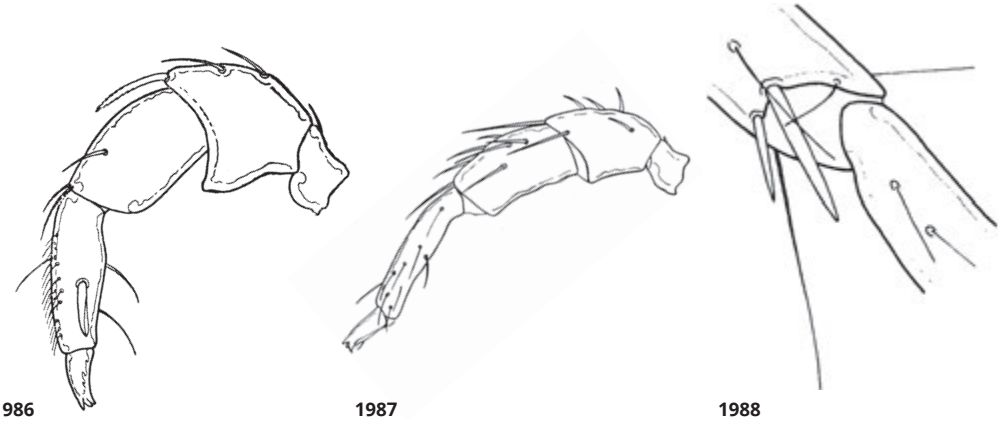
(Figs. 1781, 1794-1796, 1799, 1865, 1989-1996)

1941 *Australiobates* Lundblad, Entomologisk Tidskrift 62: 116.

1956 *Diversibates* K. Viets, Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere 84: 18 – Besch (1964).

Type species: *Australiobates violaceus* Lundblad, 1941

DIAGNOSIS: Idiosoma soft, rarely males with extensive secondary sclerotization forming a complete ventral shield (Fig. 1992) and with a large dorsal plate (Fig. 1993); females occasionally with small dorsal platelets (Fig. 1994). Gnathosoma with a long posterior process, which can be rather narrow or relatively wide. Cx-I separated medially, rarely fused. Posterior margin of Cx-IV with short to very long projections. Apodemes extending anteriorly from these projections various in length (Figs. 1781, 1796), dorsum always without sclerotized muscle attachments. Medial margins of Cx-IV reduced more or less to a median angle. Cxgl-4 located near suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. Male genital field not closely flanked by a pair of glandularia. P4 with either peg-like or hair-like setae (Fig. 1865). I-leg-5 distally with either one (Fig. 1794) or two (Fig. 1795) heavy setae and a curved seta. Legs with or without swimming setae.



1986 **1987** **1988**

1986 *Atractides* (*Maderomegapus*) *hystricipes* (Lundblad), palp female (after Lundblad 1942b)

1987 *Australiobatella vietsi* Lundblad, palp male (after Cook 1974)

1988 *Australiobatella vietsi* Lundblad, distal part I-leg-5 male (after Cook 1974)

KEY TO THE SUBGENERA

1 Apodemes of Cx-IV relatively short and directed medially to the area medially from Cxgl-4 (Fig. 1989); I-leg-5 distally with one heavy seta (Fig. 1794) Subgenus *Lundbladobates*

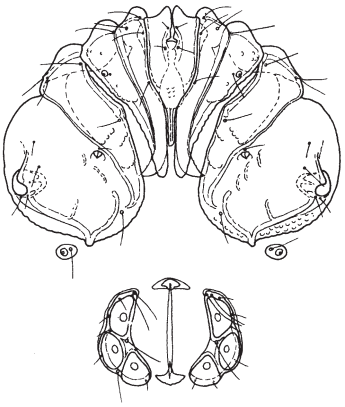
- Apodemes of Cx-IV relatively long and directed to the area lateral from Cxgl-4 (Fig. 1990); I-leg-5 distally with two heavy setae (Fig. 1991) Subgenus *Australiobates* s.s.

Subgenus *Australiobates* s.s.

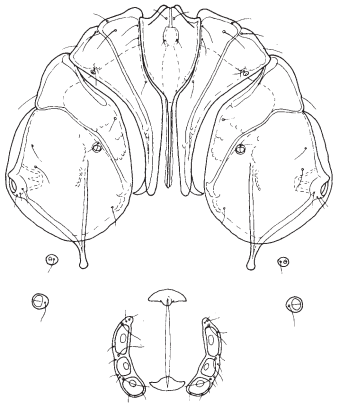
(Figs. 1781, 1795-1796, 1865, 1990-1995)

DIAGNOSIS: Cx-IV with long projections at posterior margin and well-developed apodemes extending from these projections (Figs. 1781, 1796, 1990). I-leg-5 with two heavy setae at distal end (Fig. 1795, 1991). Cxgl-4 located on Cx-IV, but in one Australian species shifted onto Cx-III (Fig. 1995).

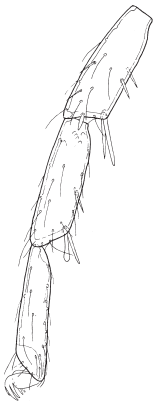
HABITAT: Streams, lakes, interstitial.



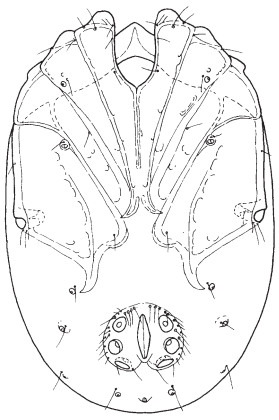
1989



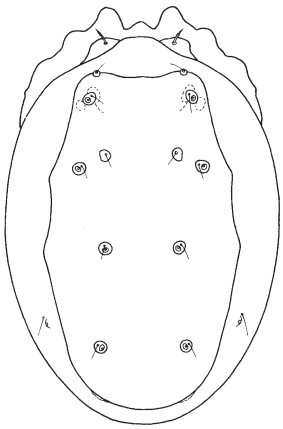
1990



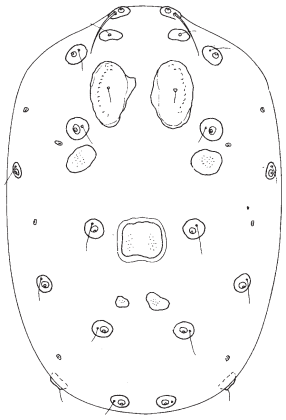
1991



1992



1993



1994

1989 *Australiobates* (*Lundbladobates*) *klaasseni* (Besch), venter female (after Cook 1980)

1990 *Australiobates* (*Australiobates*) *neolinderi* Cook, venter female (after Cook 1986)

1991 *Australiobates* (*Australiobates*) *queenslandensis* Cook, I-leg-4-6 female (after Cook 1986)

1992 *Australiobates* (*Australiobates*) *ventriscutatus* Cook, venter male (after Cook 1986)

1993 *Australiobates* (*Australiobates*) *ventriscutatus* Cook, dorsum male (after Cook 1986)

1994 *Australiobates* (*Australiobates*) *vantermus* Cook, dorsum female (after Cook 1988)

DISTRIBUTION: The subgenus has a Gondwanan distribution, with numerous species known from Australia, New Zealand, New Guinea, South Africa and South America (Argentina, Chile).

Subgenus *Lundbladobates* Besch, 1964

(Figs. 1794, 1799, 1989, 1996)

1964 *Lundbladobates* Besch, Beiträge zur Neotropischen Fauna 3: 130 – Cook (1988).

Type species: *Lundbladobates klaasseni* Besch, 1964

DIAGNOSIS: Cx-IV with short or moderately developed projections at posterior margin; apodemes extending from these projections not reaching Cxgl-4 (Fig. 1799, 1989). Palp without ventral projections (Fig. 1996). I-leg-5 with one heavy seta at distal end (Fig. 1794).

HABITAT: Streams, lakes.

DISTRIBUTION: Two species known from South America (Chile, Besch 1964, Cook 1988; Argentina, Cook 1980).

Genus *Australorivacarus* K.O. Viets, 1978

(Figs. 1904, 1997-2000)

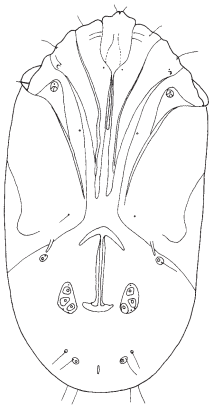
1978 *Australorivacarus* K.O. Viets, Australian Journal of Marine and Freshwater Research 29: 86.

Type species: *Australorivacarus multiscutatus* K.O. Viets, 1978

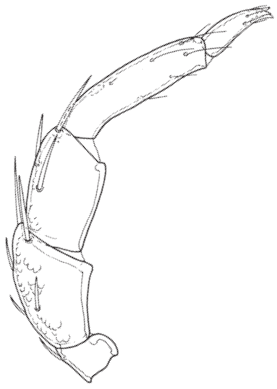
DIAGNOSIS: Dorsal and ventral shields present. Dorsal shield consisting of a large anterior plate, a smaller posterior plate and five pairs of paired platelets varying in size (Fig. 1904). Gnathosoma separated from the coxae. Cx-I fused medially. Suture lines Cx-III/Cx-IV incomplete and extending anterolaterally at a sharp angle, or completely obliterated. Cxgl-4 extending onto Cx-III (Fig. 1997). Genital field with three pairs of acetabula (Fig. 1998). Palp either simple without ventral projections (Fig. 1999) or P2 with a ventrodistal projection and P3 with two ventrodistal lobes. Legs without swimming setae. I-leg-5 with (Fig. 2000) or without a stout ventrodistal seta.

HABITAT: Streams.

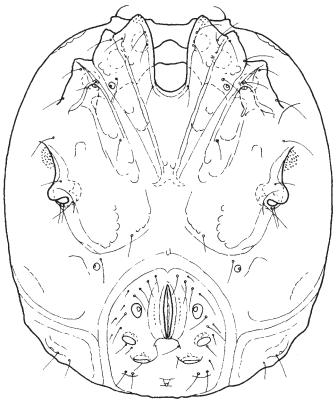
DISTRIBUTION: Three species known from south-eastern Australia (K.O. Viets 1978a, Cook 1983, Harvey 1989a, Smit 2015a).



1995



1996



1997

1995 *Australiobates* (*Australiobates*) *hyporheicus* Smit, venter female (after Smit 2007a)

1996 *Australiobates* (*Lundbladobates*) *ogavus* Cook, palp male (after Cook 1988)

1997 *Australorivacarus multiscutatus* K.O. Viets, venter male (after Cook 1986)

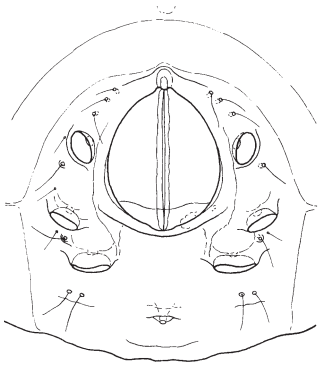
Genus *Brevaturus* Schwoerbel, 1986

(Figs. 1899, 1900, 1923, 1924, 2001-2006)

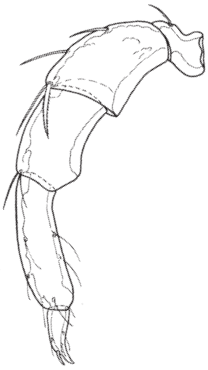
1986 *Brevaturus* Schwoerbel, Archiv für Hydrobiologie 106: 236 - Cook (1988).

Type species: *Rhynchaturus gonseri* Schwoerbel, 1986

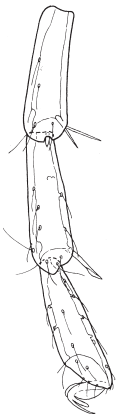
DIAGNOSIS: Integument papillate. Dorsum with a dorsal shield with closely fitting platelets (Fig. 1923) or leaving extended areas of integument (Fig. 2002). Postocularia various, on a pair of small platelets, or on an anteromedial plate occupying most area of the dorsum. The platelets of the dorsum with (Fig. 2002) or without (Fig. 1900) rugose areas. Anterodorsal part of ventral shield without a hood-like structure. Gnathosoma narrowly fused with Cx-I at posterior end of gnathosomal bay (Fig. 2001) or completely separated (Fig. 2003), not on a protrusable tube. Venter with or without (Fig. 1924) ventral shield. Cxgl-4 located in the middle or closer to posterior margin. Genital field with three pairs of acetabula. P2 without a ventral projection, but P3 may have a ventral projection (Fig. 2005); P2 and P3 without denticles. P4 ventrally with only some hair-like setae. Legs without swimming setae. I-leg-5 anteroventrally with 1-2 short, straight or curved (Fig. 2006) stout setae or with hair-like setae only.



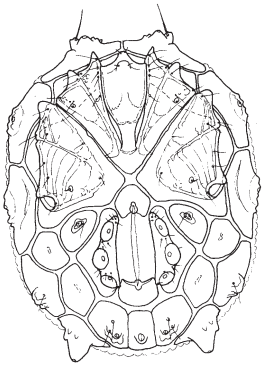
1998



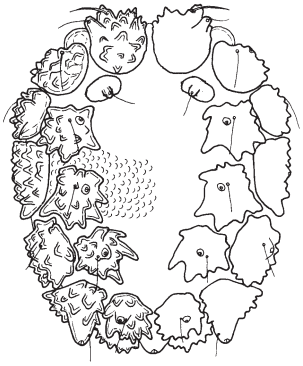
1999



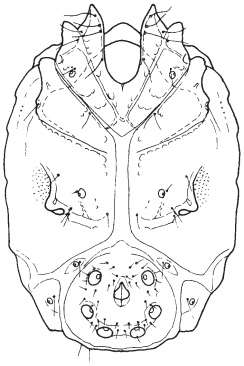
2000



2001



2002



2003

1998 *Australorivacarus multiscutatus* K.O. Viets, genital field female (after Cook 1986)

1999 *Australorivacarus multiscutatus* K.O. Viets, palp male (after Cook 1986)

2000 *Australorivacarus multiscutatus* K.O. Viets, I-leg-4-6 male (after Cook 1986)

2001 *Brevaturus* (*Brevaturus*) *chilensis* (Schwoerbel), venter female (after Cook 1988)

2002 *Brevaturus* (*Brevaturus*) *stellatus* (Schwoerbel), dorsum male (after Cook 1988)

2003 *Brevaturus* (*Paraspidiobates*) *lenbus* Cook, venter male (after Cook 1988)

KEY TO THE SUBGENERA

1 Gnathosoma narrowly fused with Cx-I (Fig. 2001); glandularia platelets of dorsum with rugose areas (Fig. 2002) Subgenus *Brevaturus* s.s.

- Gnathosoma completely separated from Cx-I (Fig. 2003); glandularia platelets of dorsum without rugose areas (Fig. 2004) Subgenus *Paraspidiobates*

Subgenus *Brevaturus* s.s.

(Figs. 1923, 1924, 2001, 2002, 2005, 2006)

DIAGNOSIS: Gnathosoma narrowly fused with Cx-I (Fig. 2001); glandularia platelets of dorsum with rugose areas (Fig. 1923).

HABITAT: Streams.

DISTRIBUTION: Several species known from Chile (Schwoerbel 1986b, Cook 1988).

Subgenus *Paraspidiobates* Schwoerbel, 1986

(Figs. 1899, 1900, 2003, 2004)

1986 *Paraspidiobates* Schwoerbel, Archiv für Hydrobiologie 106: 242 – Cook (1988).

Type species: *Paraspidiobates wetzlari* Schwoerbel, 1986

DIAGNOSIS: Gnathosoma completely separated from Cx-I (Fig. 2003); glandularia platelets of dorsum without rugose areas (Fig. 1900, 2004).

HABITAT: Streams.

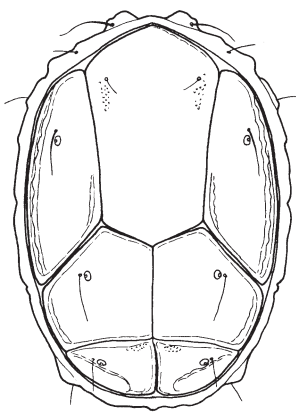
DISTRIBUTION: Three species known from Chile (Schwoerbel 1986b, Cook 1988).

Genus *Caenobates* K.O. Viets, 1978

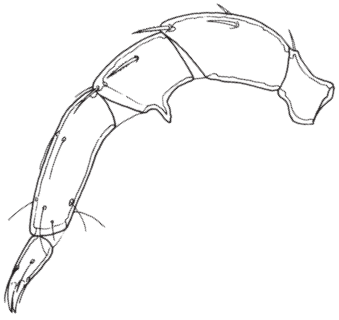
(Figs. 1896, 2007-2010)

1978 *Caenobates* K.O. Viets, Australian Journal of Marine and Freshwater Research 29: 84.

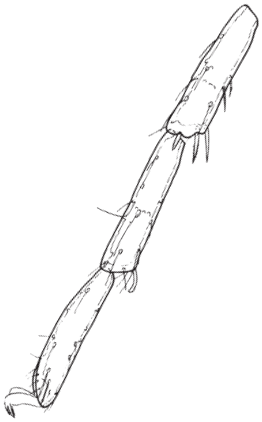
Type species: *Caenobates acheronius* K.O. Viets, 1978



2004



2005



2006

2004 *Brevaturus* (*Paraspidiobates*) *lenbus* Cook, dorsum male (after Cook 1988)

2005 *Brevaturus* (*Brevaturus*) *chilensis* (Schwoerbel), palp female (after Cook 1988)

2006 *Brevaturus* (*Brevaturus*) *triangularis* Cook, I-leg-4-6 male (after Cook 1988)

DIAGNOSIS: Complete dorsal and ventral shields present, dorsal shield with the postocularia and three pairs of glandularia (Fig. 2007). Gnathosoma separated from coxae, anchoral process short or absent. Cx-I fused medially. Cxgl-4 located near suture line Cx-III/Cx-IV (Figs. 2008, 2009). Genital field with four pairs of acetabula. P2 with a distoventral projection. P2, in one species also P3, with minute denticles, P4 with a serrate flange (Fig. 1896). Legs with swimming setae. I-leg-5 with hair-like anteroventral stout setae (Fig. 2010).

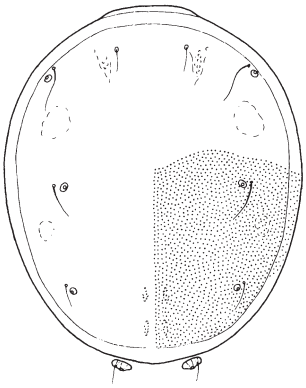
HABITAT: Streams.

DISTRIBUTION: Two species known from Australia (K.O. Viets 1978, Cook 1986, Smit 2001) and New Guinea (Wiles 1997c).

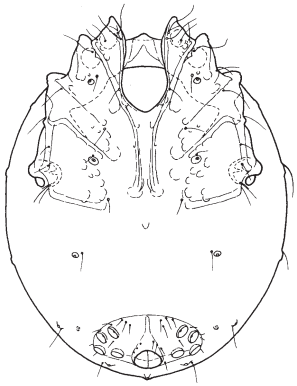
Genus *Caledoniabates* Smit, 2002

(Figs. 1815-1817, 2011, 2012)

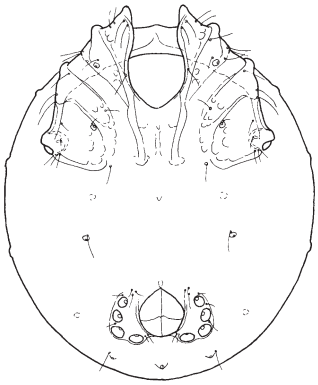
2002 *Caledoniabates* Smit, Mémoires du Muséum national d'Histoire naturelle 187: 187.
Type species: *Caledoniabates purpureus* Smit, 2002



2007



2008



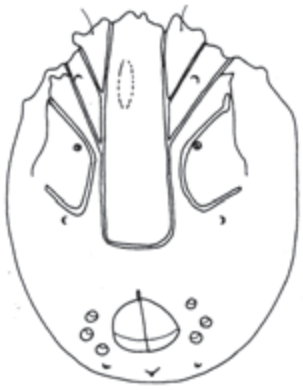
2009



2010



2011



2012

2007 *Caenobates acheronius* K.O. Viets, dorsum male (after Cook 1986)
2008 *Caenobates acheronius* K.O. Viets, venter male (after Cook 1986)
2009 *Caenobates lundbladi* Cook, venter female (after Cook 1986)
2010 *Caenobates acheronius* K.O. Viets, I-leg-4-6 male (after Cook 1986)
2011 *Caledoniabates purpureus* Smit, venter male (after Smit 2002a)
2012 *Caledoniabates purpureus* Smit, venter female (after Smit 2002a)

DIAGNOSIS: Dorsal and ventral shields present. Dorsum with one large anterior plate and two (males, Fig. 1816) or four posterior platelets (females, Fig. 1817). Gnathosoma large, U-shaped in ventral view, extended beyond posterior margin of Cx-IV and fused with anterior coxae (Figs. 2011, 2012). Cxgl-4 near suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. P2 and P3 with a ventral projection; P4 with a hyaline membrane, setal tubercles may be present; P5 elongated, at last half the length of P4 (Fig. 1815). Legs with swimming setae, occasionally rudimentary.

HABITAT: Streams.

DISTRIBUTION: Three species known from New Caledonia (Smit 2002a, 2009a).

Genus *Callumobates* Cook, 1988

(Figs. 1847, 2013-2017)

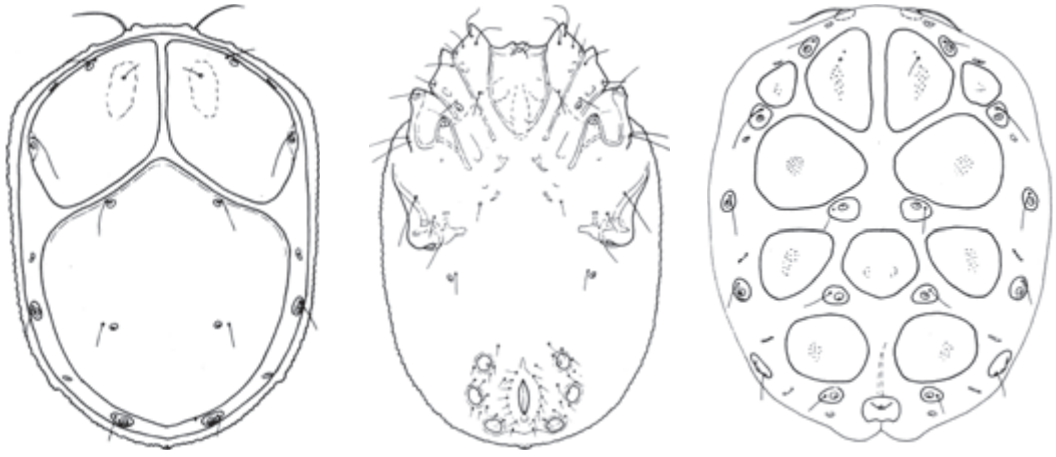
1988 *Callumobates* Cook, Memoirs of the American Entomological Institute 42: 85.

Type species: *Callumobates kurtvietsi* Cook, 1988

DIAGNOSIS: Males: With dorsal and ventral shields, dorsal shield a pair of anterior plates and a larger posterior plate occupying most of the area of the dorsum (Fig. 2013). Gnathosoma fused with anterior coxae. Coxae fused with ventral shield, suture lines of coxae incomplete (Fig. 2014). Females: Dorsally with five pairs of platelets and one median platelet (Fig. 2015). Gnathosoma separated from anterior coxae. Coxae in four groups, with a large area of secondary sclerotization extending posterolaterally (Fig. 1847). Both sexes: Cxgl-4 shifted forward to a position near Cxgl-2, causing a looping of the suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. P2 and P2 with a few denticles, P3 with a curved distoventral seta, P4 with moderately developed setal tubercles but without a distal peg-like seta (Fig. 2016). Legs without swimming setae. I-leg-5 with anteroventral hair-like setae (Fig. 2017).

HABITAT: Streams.

DISTRIBUTION: One species known from Chile.



2013 **2014** **2015**

2013 *Callumobates kurtvietsi* Cook, dorsum male (after Cook 1988)

2014 *Callumobates kurtvietsi* Cook, venter male (after Cook 1988)

2015 *Callumobates kurtvietsi* Cook, dorsum female (after Cook 1988)

Genus *Camposea* Schwoerbel, 1986

(Figs. 1851, 2018-2022)

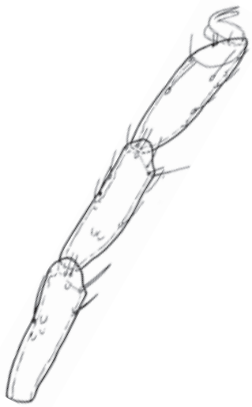
1986 *Camposea* Schwoerbel, Archiv für Hydrobiologie 106: 72.

Type species: *Camposea phreaticola* Schwoerbel, 1986

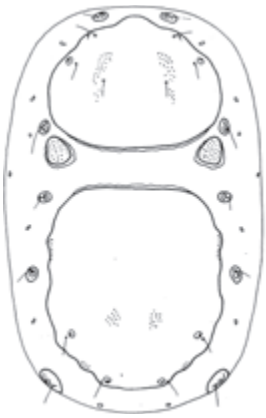
DIAGNOSIS: Dorsum with two large plates and a pair of small platelets posterolateral to anterior plate (Fig. 2018). Gnathosoma not fused to from anterior coxae, with a long anchoral process (Fig. 2021). Coxae in four groups, Cx-I separated medially. Suture lines Cx-III/Cx-IV extending posteriorly at a very oblique angle. Cx-IV with a large area of secondary sclerotization posterior to insertion of fourth legs. Cxgl-4 lying far forward causing a slight bowing of the suture line Cx-III/Cx-IV (Fig. 2019). Genital field with three pairs of acetabula, in female acetabula at extreme posterior end of the genital field (Fig. 1851). P2 and P3 with numerous small denticles. P4 without setal tubercles, a small peg-like seta well set back from distal end (Fig. 2020). Legs without swimming setae. I-leg-5 with one anteroventral stout, pointed seta (Fig. 2022).



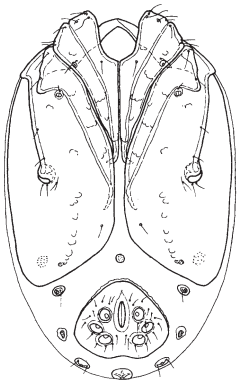
2016



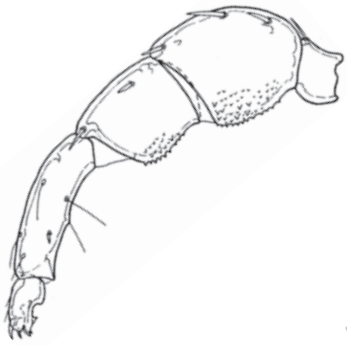
2017



2018



2019



2020



2021

2016 *Callumobates kurtvietsi* Cook, palp female (after Cook 1988)

2017 *Callumobates kurtvietsi* Cook, I-leg-4-6 female (after Cook 1988)

2018 *Camposea phreaticola* Schwoerbel, dorsum female (after Cook 1988)

2019 *Camposea phreaticola* Schwoerbel, venter male (after Cook 1988)

2020 *Camposea phreaticola* Schwoerbel, palp female (after Cook 1988)

2021 *Camposea phreaticola* Schwoerbel, gnathosoma female (after Cook 1988)

HABITAT: Streams, interstitial.

DISTRIBUTION: One species known from Chile.

Genus *Coaustraliobates* Cook, 1974

(Figs. 1857, 2023-2025)

1974 *Coaustraliobates* Cook, Memoirs of the American Entomological Institute 21: 210 – Cook (1986).

Type species: *Australiobates longipalpis* Lundblad, 1941

DIAGNOSIS: Idiosoma soft. Gnathosoma separated from anterior coxae, with a wide anchoral process not distinctly set off from base (Fig. 1857, 2023). Coxae in four groups, Cx-IV with short posterior projections, apodemes extending from these projections not reaching Cxgl-4. Medial margins of Cx-IV well developed. Cxgl-4 lying well-posterior to suture lines Cx-III/Cx-IV. Genital field with three pairs of acetabula. Palp with reduced setation, P4 very long (Fig. 2024). Legs with swimming setae. I-leg-5 anteroventrally with a pair of short, straight or curved, stout or hair-like setae, ventral margin may have numerous short hair-like setae (Fig. 2025).

HABITAT: Streams, lakes.

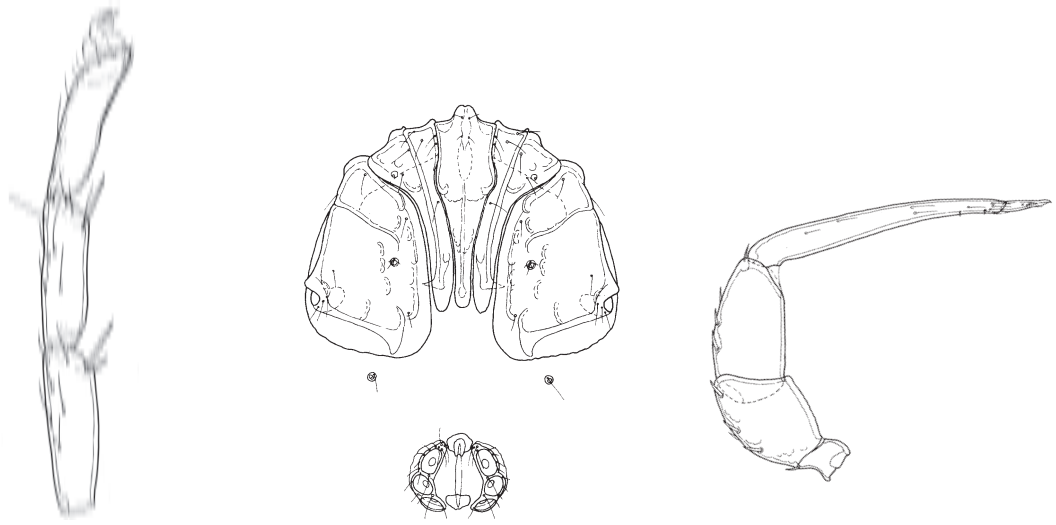
DISTRIBUTION: Four species known from Australia (Cook 1974, 1986, Smit 1992b, 2001), New Caledonia (K.O. Viets 1969, Smit 2002a) and New Guinea (Wiles 1997c,d).

Genus *Cookabates* Harvey, 1988

(Figs. 1890, 1891, 2026-2029)

1988 *Cookabates* Harvey, Memoirs of Museum Victoria 49: 357.

Type species: *Cookabates inermis* Harvey, 1988



2022 **2023** **2024**

2022 *Camposea phreaticola* Schwoerbel, I-leg-4-6 female (after Cook 1988)

2023 *Coaustraliobates longipalpis* (Lundblad), venter female (after Cook 1986)

2024 *Coaustraliobates longipalpis* (Lundblad), palp female (after Cook 1986)

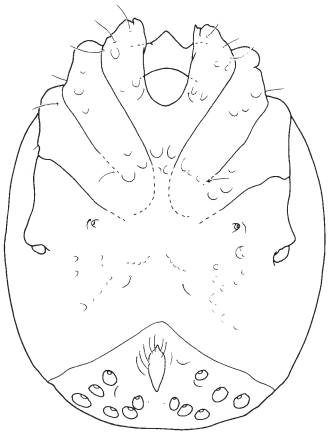
DIAGNOSIS: Dorsal and ventral shields present. Dorsal shield divided into 10 (male, Fig. 1890) to 11 (female, Fig. 2027) pairs of platelets and the larger anterior plate with the postocularia; most anterior pair incorporated into ventral shield (and not visible in dorsal view). Gnathosoma separated from anterior coxae, with a short rostrum. Cx-I fused medially, suture lines incomplete, Cx-IV without a visible posterior suture line. Cxgl-4 well posterior to suture line Cx-III/Cx-IV (Fig. 2026). Genital field with six pairs of acetabula, occasionally 4-5 (males), 7-9 pairs in female, occasionally 6 or 10 (females, Fig. 2028). Palp without ventral projections or tubercles (Fig. 1891). Legs without swimming setae. I-leg-5 anteroventrally without stout seta (Fig. 2029).

HABITAT: Streams.

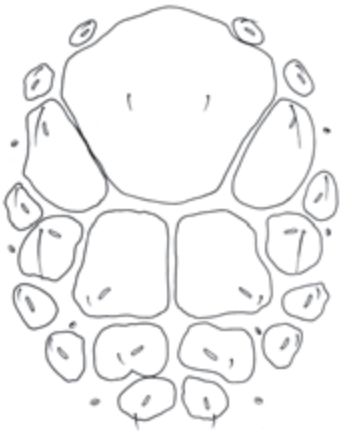
DISTRIBUTION: One species known from south-eastern Australia.



2025



2026



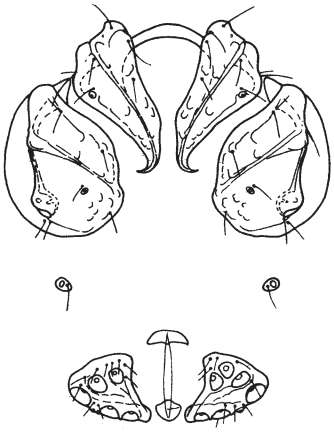
2027



2028



2029



2030

2025 *Coaustraliobates longipalpis* (Lundblad), I-leg-4-6 female (after Cook 1986)

2026 *Cookabates inermis* Harvey, venter male (after Harvey 1988a)

2027 *Cookabates inermis* Harvey, dorsum female (after Harvey 1988a)

2028 *Cookabates inermis* Harvey, genital field female (after Harvey 1988a)

2029 *Cookabates inermis* Harvey, first leg male (after Harvey 1988a)

2030 *Corticacarus* (*Polycorticacarellus*) *similis* Cook, venter female (after Cook 1980)

Genus *Corticacarus* Lundblad, 1936

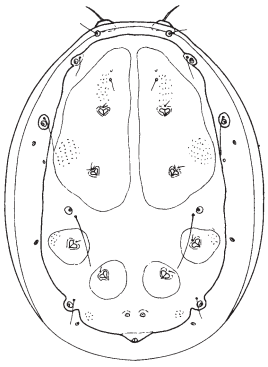
(Figs. 1883, 1885, 1925, 1926, 2030-2046)

1936 *Corticacarus* Lundblad, Zoologischer Anzeiger 115: 31.

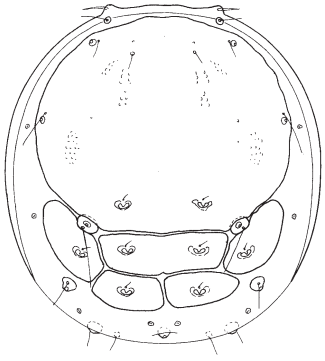
1941 *Corticacarides* Lundblad, Entomologisk Tidskrift 62: 122 – new syn.

Type species: *Corticacarus dentipalpis* Lundblad, 1936

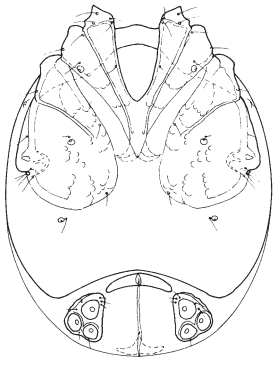
DIAGNOSIS: Idiosoma exhibiting various degrees of sclerotization. Dorsalia (at least postocularia platelets) present, usually numerous, often expanded, and occasionally fused into a complete shield. Four pairs of the dorsal glandularia heart-shaped, these covered with a thin integumental flap and with an extremely small associated seta close to the gland opening. Gnathosoma separate from anterior coxae and with a short anchoral process and a pair of posterodorsal apodemes. Cx-I either fused or separated medially. Cxgl-4 typically lying somewhat posterior to, occasionally near suture line Cx-III/Cx-IV. Genital field with 3-7 pairs of acetabula. The male gonopore is typically somewhat heart-shaped. Insertion of fourth legs as distanced from the midline as insertions of third legs. P2 with (Fig. 2040) or without (Fig. 2041) ventral projection, and with or without small denticles. Rarely P3 with a ventral projection (Figs. 2042, 2043). P4 with a ventral peg-like setae. Legs without swimming setae. I-leg-5 without modified setae.



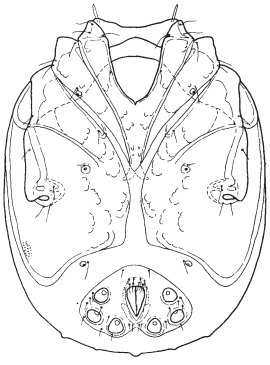
2031



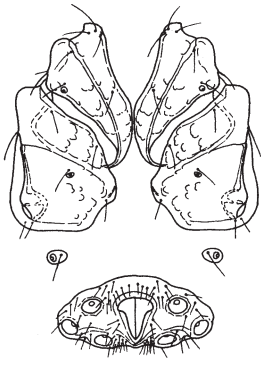
2032



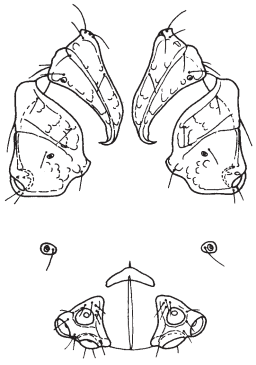
2033



2034



2035



2036

2031 *Corticacarus* (*Lundbladacarus*) *chilensis* K.O. Viets, dorsum male (after Cook 1988)

2032 *Corticacarus* (*Corticacarus*) *exilis* Cook, dorsum female (after Cook 1988)

2033 *Corticacarus* (*Corticacarus*) *patagonicus* Besch, venter female (after Cook 1988)

2034 *Corticacarus* (*Corticacarus*) *rostratus* Cook, venter male (after Cook 1988)

2035 *Corticacarus* (*Paracorticacarus*) *mexicanus* Cook, venter male (after Cook 1980)

2036 *Corticacarus* (*Paracorticacarus*) *mexicanus* Cook, venter female (after Cook 1980)

REMARKS: *Corticacarides* differs in the number of acetabula only from the nominate subgenus (four pairs in *Corticacarides* versus three pairs in *Corticacarus* s.s.). Initially *Corticacarides* was erected as a full genus, later on lowered in ranking to a subgenus by Cook (1974). Given the taxonomic insignificance of three or four pairs of acetabula, I propose to synonymize *Corticacarides* with *Corticacarus*.

KEY TO THE SUBGENERA

1	Genital field with three or four pairs of acetabula	2
-	Genital field with more than four pairs of acetabula (Fig. 2030)	Subgenus *Polycorticacarellus*
2	Males (and occasionally females) with a complete dorsal shield, in which the individual platelets are poorly delineated (Fig. 2031)	Subgenus *Lundbladacarus*
-	Dorsal plates and platelets separate from each other in both sexes (Fig. 2032)	3
3	Cx-I fused in both males and females (Figs. 2033, 2034)	Subgenus *Corticacarus*
-	Cx-I either separated in both sexes, or fused in males and separate in females	4
4	Cx-I separated in both sexes (Figs. 2035, 2036)	Subgenus *Paracorticacarus*
-	Cx-I fused in males (Fig. 2037), separated in females (Fig. 2038)	Subgenus *Corticacarellus*

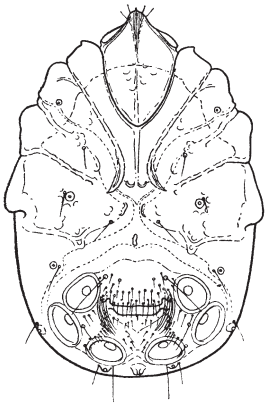
Subgenus *Corticacarus* s.s.

(Figs. 1925, 1926, 2032-2034, 2039-2043)

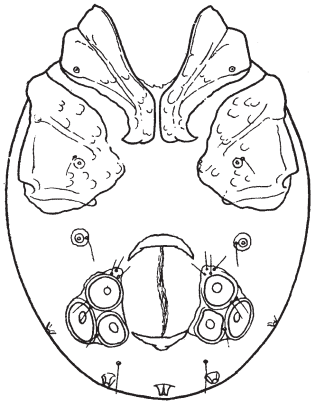
DIAGNOSIS: Dorsalia variously developed (Figs. 1926, 2032, 2039), but never fused into a dorsal shield in which the individual plates are obscured. Cx-I fused medially in both sexes (Figs. 1925, 2033, 2034). Genital field with three or four pairs of acetabula.

HABITAT: Streams.

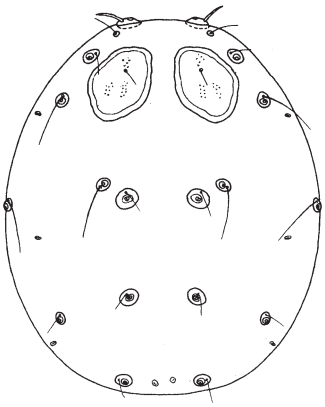
DISTRIBUTION: Several species known from South America (Argentina, Cook 1980; Brazil, Paraguay; Chile, Besch 1964, Cook 1988, Tuzovskij 2016; Colombia) and Central America (Mexico, Cramer & Cook 1998). Habeeb (1962a) reported the subgenus from Arizona (USA), but subgeneric assignment uncertain as no males are known.



2037



2038



2039

2037 *Corticacarus* (*Corticacarellus*) *labialis* Lundblad, venter male (after Lundblad 1942a)

2038 *Corticacarus* (*Corticacarellus*) *labialis* Lundblad, venter female (after Lundblad 1942a)

2039 *Corticacarus* (*Corticacarus*) *nilsoni* Besch, dorsum female (after Cook 1980)

Subgenus *Corticacarellus* Lundblad, 1937

(Figs. 2037, 2038)

1937 *Corticacarellus* Lundblad, Zoologischer Anzeiger 118: 253.

1941 *Tetracorticacarellus* Lundblad, Entomologisk Tidskrift 62: 122 – new syn.

Type species: *Corticacarellus labialis* Lundblad, 1936

DIAGNOSIS: Male often with a small dorsal shield. Cx-I fused medially in the male (Fig. 2037), separated in the female (Fig. 2038). Genital field with three or four pairs of acetabula. Male gonopore typically much wider than long.

HABITAT: Streams, springs.

DISTRIBUTION: Six species known from South America (Brazil, Paraguay, Peru, Columbia).

REMARKS: The only difference between the subgenera *Corticacarellus* and *Tetracorticacarellus* is the number of acetabula, three pairs in the former and four pairs in the latter. This difference has no taxonomic significance, and therefore I propose to synonymize *Tetracorticacarellus* with *Corticacarellus*.

Subgenus *Lundbladacarus* Motaş & Tanasachi, 1960

(Figs. 2031, 2044, 2045)

1960 *Lundbladacarus* Motaş & Tanasachi, Acta Societatis Zoologicae Bohemoslovacae 24: 346.

Type species: *Corticacarus angelescui* Motaş & Tanasachi, 1960

DIAGNOSIS: Dorsal plates of male fused into a complete dorsal shield in which the individual platelets have been obscured (Fig. 2031). Female with or without (Fig. 2044) dorsal shield. Venter with large areas of secondary sclerotization (Fig. 2045). Cx-I fused medially in both sexes. Genital field with three pairs of acetabula.

HABITAT: Streams.

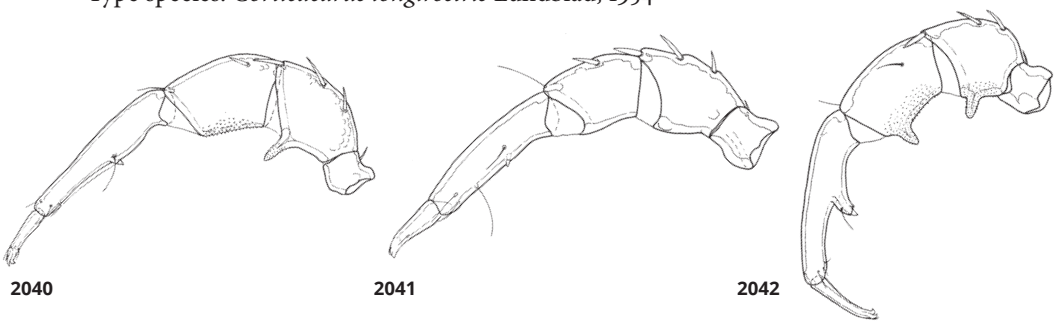
DISTRIBUTION: Several species known from South America (Chile, Besch 1964, K.O. Viets 1967, Cook 1988, Tuzovskij & Stolbov 2016a; Argentina, Motaş & Tanasachi 1960, Cook 1980; Brazil, K.O. Viets 1977c).

Subgenus *Paracorticacarus* Lundblad, 1954

(Figs. 1883, 2035, 2036)

1954 *Paracorticacarus* Lundblad, Arkiv för Zoologi (Serie 2) 5: 532.

Type species: *Corticacarus longirostris* Lundblad, 1954



2040 **2041** **2042**

2040 *Corticacarus* (*Corticacarus*) *jemobus* Cook, palp female (after Cook 1988)

2041 *Corticacarus* (*Corticacarus*) *rostratus* Cook, palp male (after Cook 1988)

2042 *Corticacarus* (*Corticacarus*) *schwoerbeli* Cook, palp male (after Cook 1988)

DIAGNOSIS: Dorsalia and glandularia platelets varying from poorly developed to expanded and occupying most of the area of the dorsum. Cx-I separated medially in both sexes (Figs. 2035, 2036). Genital field with three pairs of acetabula.

HABITAT: Streams.

DISTRIBUTION: Several species known from South America (Colombia; Argentina, Cook 1980, Rosso de Ferradas 1991), Central America (Mexico, Costa Rica, Cook 1980) and North America (New Mexico, Arizona).

Subgenus *Polycorticacarellus* Lundblad, 1954

(Figs. 1885, 2030, 2046)

1954 *Polycorticacarellus* Lundblad, Arkiv för Zoologi (Serie 2) 5: 529.

Type species: *Corticacarus multiporus* Lundblad, 1954

DIAGNOSIS: Dorsum various, from a pair of enlarged plates with the preocularia to dorsum completely covered by plates and platelets (Fig. 1885). Cx-I separated medially in both sexes (Figs. 2030, 2046). Genital field with 5-7 pairs of acetabula. Male P2 may have a much larger ventral extension than females.

HABITAT: Streams.

DISTRIBUTION: Several species known from South America (Colombia; Argentina, Cook 1980), Central America (Mexico, Cook 1980) and the Caribbean (St. Vincent, K.O. Viets 1976).

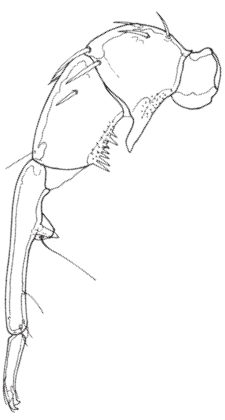
Genus *Crenohygrobates* Lundblad, 1938

(Figs. 1774, 1780, 2047, 2048)

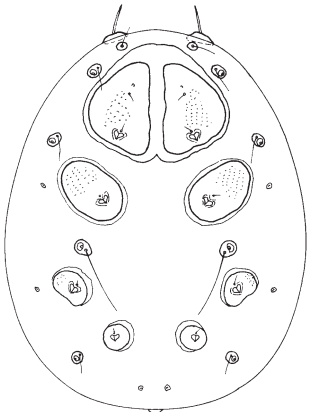
1938 *Crenohygrobates* Lundblad, Zoologischer Anzeiger 122: 37

Type species: *Crenohygrobates multiporus* Lundblad, 1938

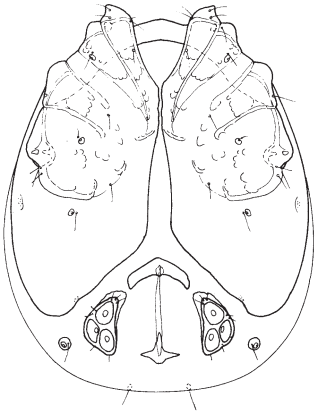
DIAGNOSIS: Dorsum without sclerites, venter in male completely sclerotized, idiosoma of female soft. Gnathosoma of female with a posterior process. Cx-I fused medially in male (Fig. 1780) but separated in female (Fig. 2047). Suture lines Cx-III/Cx-IV angling abruptly anteriorly in the vicinity



2043



2044



2045

2043 *Corticacarus* (*Corticacarus*) *exilis* Cook, palp female (after Cook 1988)

2044 *Corticacarus* (*Lundbladacarus*) *chilensis* K.O. Viets, dorsum female (after Cook 1988)

2045 *Corticacarus* (*Lundbladacarus*) *dividus* Cook, venter female (after Cook 1988)

of Cxgl-4. Genital field with numerous acetabula, genital plates extending posterolaterally. Gonopore of male small and located well anterior to most of the acetabula; gonopore of female between anterior part of genital plates. P4 with a peg-like seta on medial surface (Fig. 1774). Ventral side of P2 (and P3 in male) with a large projection (Fig. 2048). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: One species known from Santa Catharina State, Brazil.

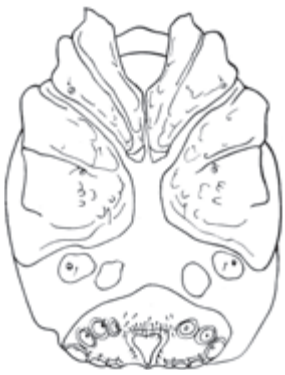
Genus *Declinatobates* K.O. Viets, 1984

(Figs. 1790, 1791, 2049, 2050)

1984 *Declinatobates* K.O. Viets, Mitteilungen aus dem Zoologischen Museum in Berlin 60: 213.

2009 *Declinobates* (laps.) Smit, Zootaxa 2114: 62.

Type species: *Declinatobates longmoreae* K.O. Viets, 1984



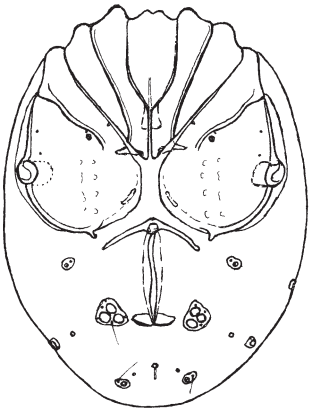
2046



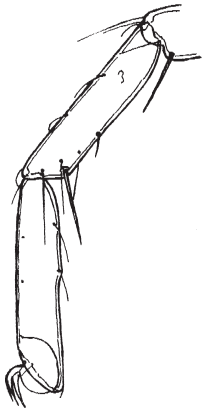
2047



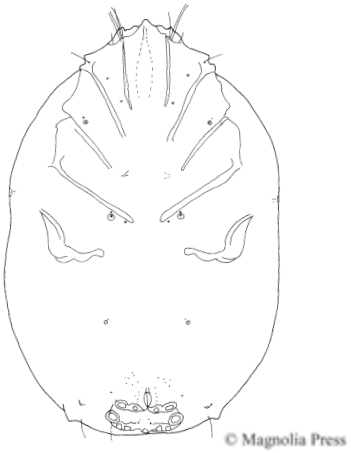
2048



2049



2050



2051

2046 *Corticacarus* (*Polycorticacarellus*) *multiporus* Lundblad, venter male (after Cook 1974)

2047 *Crenohygrobates multiporus* Lundblad, venter female (after Cook 1974)

2048 *Crenohygrobates multiporus* Lundblad, palp female (after Cook 1974)

2049 *Declinatobates longmoreae* K.O. Viets, venter female (after K.O. Viets 1984a)

2050 *Declinatobates longmoreae* K.O. Viets, l-leg-5-6 male (after K.O. Viets 1984a)

2051 *Decussobates minutipalpis* Smit, venter male (after Smit 2018b) Reproduced with permission from copyright holder

DIAGNOSIS: Idiosoma soft, small glandularia platelets may be present. Gnathosoma separated from coxae, anchoral process abruptly widened posteriorly in male, moderately long in male, very short in female. Cx-I separated medially. Suture lines Cx-III/Cx-IV incomplete, Cxgl-4 located near these suture lines. Posterior margins of Cx-IV with short projections, no apodemes extending from here anteriorly (Figs. 1790, 2049). Genital field with three pairs of acetabula. Palp relatively stocky, especially P4, with a heavy seta located near distal margin. P2 and P3 without denticles (Fig. 1791). Legs with a few swimming setae. I-leg-5 distally with one heavy seta (Fig. 2050).

HABITAT: Lakes.

DISTRIBUTION: Two species known from eastern and southern Australia (K.O. Viets 1984a, Smit 2009b.

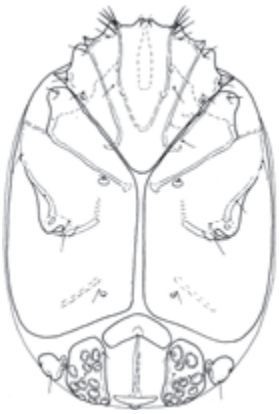
Genus *Decussobates* Cook, 1988

(Figs. 1832-1834, 2051-2054)

1988 *Decussobates* Cook, Memoirs of the American Entomological Institute 42: 86.

Type species: *Decussobates planus* Cook, 1988

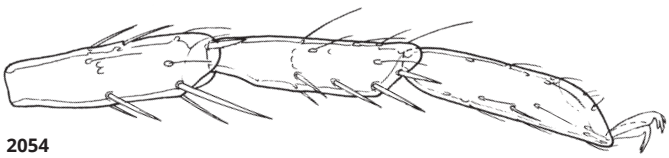
DIAGNOSIS: Lateral eyes present but small. Dorsum of male with one large plate bearing four pairs of glandularia and the postocularia (Fig. 1834). Dorsum of female with three large unpaired plates, anterior plate bearing the postocularia flanked by a pair of small platelets, each with two glandularia. Anterior dorsal plate with the postocularia. Central dorsal plate without glandularia, posterior dorsal plate with 1-2 pairs of glandularia (Fig. 1833). Dorsal furrow with three pairs of glandularia in both sexes. Gnathosoma fused with coxae. Cx-I fused medially. Venter of male with a ventral shield (Fig. 2051). All suture lines incomplete in male and female, except suture line Cx-III/Cx-IV in female, which is near-complete (Fig. 2052). In female posteriorly of Cx-IV a large area of secondary sclerotization, but genital field free in the integument. Cxgl-4 near suture line Cx-III/Cx-IV. Between insertions of fourth legs and genital field one pair of glandularia. Genital field with five pairs of acetabula in male, and 6-12 pairs in female. Palp stocky, especially P4. P2 with a pointed anteroventral extension, and ventral margin either serrated (Fig. 1832) or smooth. Legs without swimming setae. I-leg-5 with several pointed setae (antero)ventrally (Figs. 2053, 2054).



2052



2053



2054

2052 *Decussobates planus* Cook, venter female (after Cook 1988)

2053 *Decussobates planus* Cook, I-leg-4-6 female (after Cook 1988)

2054 *Decussobates angustus* Cook, I-leg-4-6 female (after Cook 1988)

HABITAT: Streams.

DISTRIBUTION: Three species known, two from Chile (Cook 1988) and one from southern Argentina (Smit 2018b).

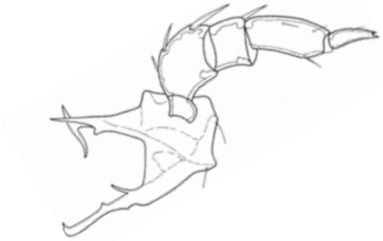
Genus *Diamphidaxona* Cook, 1963

(Figs. 1831, 2055-2061)

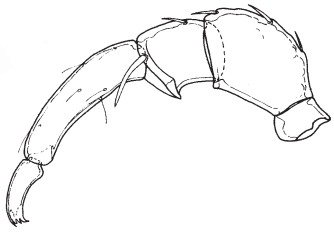
1963 *Diamphidaxona* Cook, American Midland Naturalist 70: 111 – Cook (1980).

Type species: *Diamphidaxona pallida* Cook, 1963

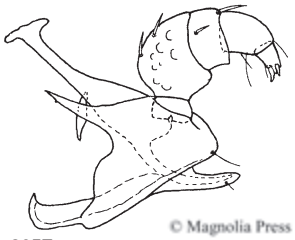
DIAGNOSIS: Lateral eyes absent. Dorsal and ventral shield present. Dorsal shield divided in a relatively small anterior and a larger posterior plate (Fig. 1831). Gnathosoma separated from coxae, with a long anchoral process, rostrum various in length. Suture lines of coxae incomplete, medial suture lines obliterated as well as posterior suture line of Cx-IV. Cx-I medially fused. Cxgl-4 extending far forward causing a looped condition of the suture line Cx-III/Cx-IV. A pair of large projections partially covering de insertions of the fourth legs. Genital field with three pairs of acetabula on plates, either separated (Fig. 2059) or fused (Fig. 2060) with ventral shield in male, always separated in female (Fig. 2061). Palp with P2 and/or P3 with or without a short anteroventral projection (Figs. 2056, 2058). Legs not exhibiting sexual dimorphism, lacking swimming setae.



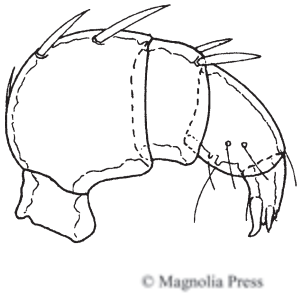
2055



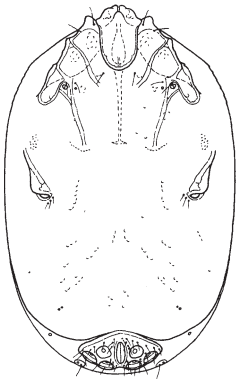
2056



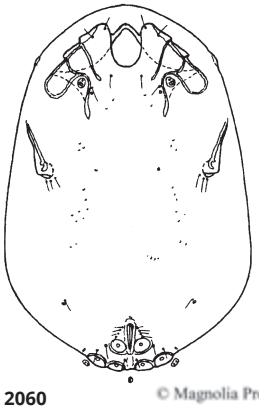
2057



2058



2059



2060

2055 *Diamphidaxona* (*Diamphidaxona*) *imamurai* Cook, gnathosoma + palp male (after Cook 1974)

2056 *Diamphidaxona* (*Diamphidaxona*) *separata* Cook, palp male (after Cook 1980)

2057 *Diamphidaxona* (*Diamphidaxonella*) *neomexicana* I.M. Smith & Cook, gnathosoma + palp female (after I.M. Smith & Cook 2006) Reproduced with permission from copyright holder

2058 *Diamphidaxona* (*Diamphidaxonella*) *neomexicana* I.M. Smith & Cook, palp female (after I.M. Smith & Cook 2006) Reproduced with permission from copyright holder

2059 *Diamphidaxona* (*Diamphidaxona*) *separata* Cook, venter male (after Cook 1980)

2060 *Diamphidaxona* (*Diamphidaxona*) *pallida* Cook, venter male (after I.M. Smith & Cook 2006) Reproduced with permission from copyright holder

KEY TO THE SUBGENERA

1 Gnathosoma with a short rostrum not extending beyond insertion of palps (Fig. 2055); palp with relatively long, slender segments (Fig. 2056) Subgenus *Diamphidaxona* s.s.

- Gnathosoma with a long rostrum, extending well beyond insertions of palps (Fig. 2057); palp with relatively short and stocky segments (Fig. 2058) Subgenus *Diamphidaxonella*

Subgenus *Diamphidaxona* s.s.

(Figs. 1831, 2055, 2056, 2059-2061)

DIAGNOSIS: Gnathosoma with a short rostrum not extending beyond insertion of palps (Fig. 2055); palp with relatively long, slender segments, especially P4 (Fig. 2056). Ventral spine-like seta of P5 smooth or with one or more denticles.

HABITAT: Interstitial.

DISTRIBUTION: A dozen species known from North America (United States, Cook 1963a, 1974, I.M. Smith & Cook 2006; Canada, I.M. Smith & Cook 2006), Central America (Mexico, Cook 1980; Guatemala, K.O. Viets 1977c) and South America (Argentina, Cook 1980).

Subgenus *Diamphidaxonella* I.M. Smith & Cook, 2006

(Figs. 2057, 2058)

2006 *Diamphidaxonella* I.M. Smith & Cook, Zootaxa 1279: 18.

Type species: *Diamphidaxona neomexicana* I.M. Smith & Cook, 2006

DIAGNOSIS: Gnathosoma with a long rostrum, extending well beyond insertions of palps (Fig. 2057). Palp with relatively short and stocky segments, especially P4, and without ventral projections (Fig. 2058). Ventral spine-like seta on P5 smooth.

HABITAT: Interstitial.

DISTRIBUTION: Five species known from southwestern United States (I.M. Smith & Cook 2006).


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2061



2062



2063

2061 *Diamphidaxona* (*Diamphidaxona*) *pallida* Cook, venter female (after I.M. Smith & Cook 2006) Reproduced with permission from copyright holder

2062 *Dockovdia cookarum* Gledhill, venter male (after Gledhill 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

2063 *Dockovdia cookarum* Gledhill, venter female (after Gledhill 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

Genus *Dockovdia* Gledhill, 2003

(Figs. 1827, 1828, 2062-2067)

2003 *Dockovdia* Gledhill, Tribute to David R. Cook: 76.

Type species: *Dockovdia cookarum* Gledhill, 2003

DIAGNOSIS: Idiosoma soft. Gnathosoma broadly fused with Cx-I (Fig. 2062). Chelicera stout, claw with a brush-like group of setae (Fig. 1827) or a fringe of short setae (Fig. 1828). Suture lines Cx-III/Cx-IV complete or incomplete. Cxgl-4 near suture between Cx-III and Cx-IV (Fig. 2063). Genital field with three or four pairs of acetabula. P5 with two claws (Figs. 2064-2066). Legs without swimming setae. I-leg-5 ventrodistally with two stout setae, I-leg-6 not bowed (Fig. 2067).

HABITAT: Mantle cavities of gastropods of the genera *Lanistes* (Ampullariidae) and *Potadoma* (Pachychilidae).

DISTRIBUTION: Two species known from Nigeria (Gledhill 2003, Gledhill & Agbolade 2006).

Genus *Dodecabates* K. Viets, 1926

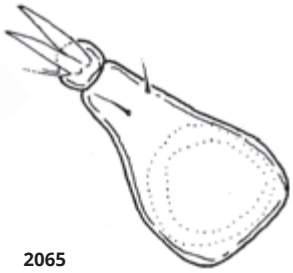
(Figs. 1841, 1846, 1849, 2068-2070)

1926 *Dodecabates* K. Viets, Zoologischer Anzeiger 69: 192.

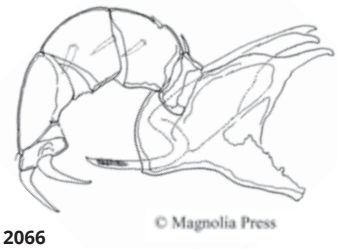
Type species: *Hygrobates dodecaporus* Nordenskiöld, 1904



2064



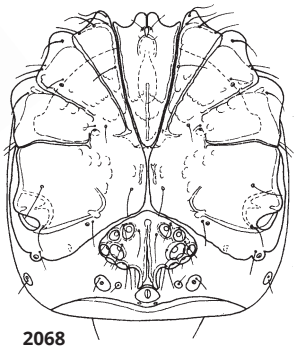
2065



2066



2067



2068



2069

2064 *Dockovdia cookarum* Gledhill, palp female (after Gledhill 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

2065 *Dockovdia cookarum* Gledhill, dorsal view P4-5 female (after Gledhill 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

2066 *Dockovdia oruensis* Gledhill & Agbolade, gnathosoma + palp male (after Gledhill & Agbolade 2006) Reproduced with permission from copyright holder

2067 *Dockovdia cookarum* Gledhill, I-leg-2-6 female (after Gledhill 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

2068 *Dodecabates dodecaporus* (Nordenskiöld), venter male (after Cook 1980)

2069 *Dodecabates dodecaporus* (Nordenskiöld), palp male (after Cook 1980)

DIAGNOSIS: Gnathosoma separate from anterior coxae, with a posterior projection which is strongly tapering in the male, but only slightly narrowed in the female. Coxae in two groups in male, in four groups in female. Cx-I separated medially; Cxgl-4 shifted onto Cx-III (Fig. 1846). Posterior to Cx-IV a relatively narrow area of secondary sclerotization in male which incorporates Cxgl-2 (Fig. 2068); female without such secondary sclerotization. Genital field typically with six, occasionally with seven pairs of acetabula. Genital field with a posterior projection in male. P2 with a ventral projection in male with denticles (Fig. 2069), P2 without ventral projection in female (Fig. 2070) but both P2 and P3 with denticles. Legs without swimming setae. IV-leg-3 dorsally expanded with numerous setae, IV-leg-4 bowed and anterodorsally with numerous setae, IV-leg-4-6 much longer than IV-leg-1-3 (Fig. 1849).

HABITAT: Streams.

DISTRIBUTION: One species known from Argentina (Cook 1980, Rosso de Ferradás 2000).

REMARKS: See under *Hygrobatella* for its relationship with multiacetabulate species of the latter genus.

Genus *Dropursa* Cook, 1986

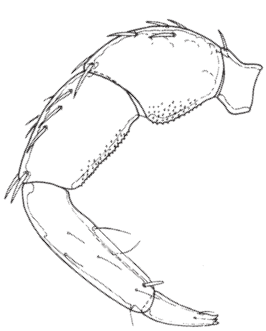
(Figs. 1812, 1840, 1845, 2071-2074)

1986 *Dropursa* Cook, Memoirs of the American Entomological Institute 40: 97.
Type species: *Dropursa harveyi* Cook, 1986

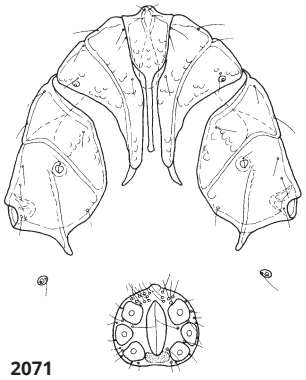
DIAGNOSIS: Idiosoma soft. Gnathosoma separated from anterior coxae, with a long anchoral process. Cx-I separated medially in both sexes. Cx-IV with short posterior projections, apodemes extending anteriorly from here reaching Cxgl-4 (Fig. 1812). Cxgl-4 located either close to suture line Cx-III/Cx-IV (Fig. 2071) or more posteriorly, near middle of Cx-IV (Fig. 2072). Genital field with three pairs of acetabula. Palp simple, without ventral projections; P4 ventrally with hair-like setae (Fig. 1845), a mediodistal peg-like seta may be present. I-leg-5 variously modified, expanded ventrally, distally with several to many long setae and a fine, curved seta (Fig. 1840), or distally with two long setae and a fine, curved seta only (Fig. 2074). In some species I-leg-5 ventrally hardly if at all expanded (Fig. 2073). I-leg-6 bowed in both sexes, ventral margin with numerous setae.

HABITAT: Streams.

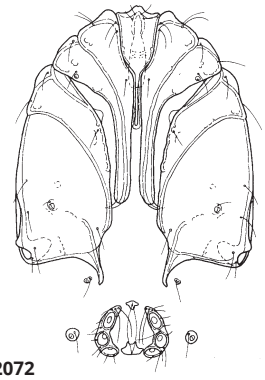
DISTRIBUTION: Three species known from Australia (Cook 1986, Smit 2001) and New Guinea (Wiles 1997c,d, Smit 2011, 2013b).



2070



2071



2072

2070 *Dodecabates dodecaporus* (Nordenskiöld), palp female (after Cook 1980)

2071 *Dropursa babinda* Cook, venter male (after Cook 1986)

2072 *Dropursa boultoni* Cook, venter female (after Cook 1986)

Genus *Dropursides* Smit, 2013

(Figs. 1839, 1842-1844)

2013 *Dropursides* Smit, Zootaxa 3716: 220.

Type species: *Dropursides aberratus* Smit, 2013

DIAGNOSIS: (Male unknown) Idiosoma soft. Gnathosoma separated from anterior coxae, with a long anchoral process. Cx-I separated medially. Posterior margin of Cx-IV with short projections, apodemes extending anteriorly from these projections of moderate length, almost reaching Cxgl-4. Cxgl-4 located near suture lines Cx-III/Cx-IV (Fig. 1839). Genital field with three pairs of acetabula. Palp without ventral projections. P4 with a ventral peg-like seta and a more medially located peg-like seta (Fig. 1844). I-leg-5 and II-leg-5 expanded proximally, ventral margin with numerous stout setae. I-leg-6 and II-leg-6 bowed, ventral margin with numerous fine setae (Figs. 1842, 1843).

HABITAT: Streams.

DISTRIBUTION: One species known from New Guinea.

Genus *Dubiobates* Cook, 1988

(Figs. 1908, 2075-2084)

1988 *Dubiobates* Cook, Memoirs of the American Entomological Institute 42: 142.

Type species: *Dubiobates securipes* Cook, 1988



2073



2074



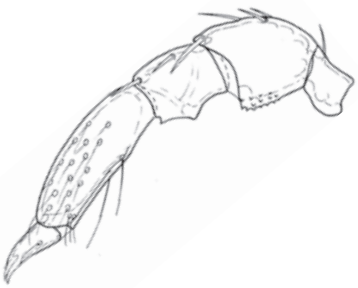
2075



2076



2077



2078

2073 *Dropursa boultoni* Cook, I-leg-4-6 male (after Cook 1986)

2074 *Dropursa harveyi* Cook, I-leg-5-6 female (after Cook 1986)

2075 *Dubiobates securipes* Cook, dorsum male (after Cook 1988)

2076 *Dubiobates securipes* Cook, dorsum female (after Cook 1988)

2077 *Dubiobates securipes* Cook, venter female (after Cook 1988)

2078 *Dubiobates securipes* Cook, palp male (after Cook 1988)

DIAGNOSIS: Dorsal shield entire in both sexes with four pairs of glandularia and the postocularia (Fig. 2075). Gnathosoma separated from anterior coxae. Ventral shield with or without a pair of apophyses near anterior margin. Cx-I fused medially. A ridge may be present anterolaterally from insertions of fourth legs. Cxgl-4 in a line with the insertions of the fourth legs or more posterior (Figs. 1908, 2077), occasionally near posterior margin of Cx-IV. Well-developed projections partially covering the insertions of the fourth legs. Genital field with three pairs of acetabula. P2 generally with denticles, with or without ventral projection (Fig. 2080). P4 with a slight sexual dimorphism, male with numerous small setae (Fig. 2078) which are lacking in the female (Fig. 2079). P4 occasionally very broad (Fig. 2081). Legs with swimming setae, but low in number and generally short. I-leg-5 without a downturned seta. First legs with or without sexual dimorphism (Figs. 2082, 2083). Occasionally third leg modified (Fig. 2084). Excretory pore posterior to genital field in male but fused with dorsal shield in female (Fig. 2076).

HABITAT: Streams.

DISTRIBUTION: Almost a dozen species known from Chile (Cook 1988).

REMARKS: Cook (1988) was not certain about the assignment of the genus to the Hygrobatidae. Indications that the genus belongs in the Hygrobatidae and not in the Aturidae are the more medially located Cxgl-4 and the palp with denticles.

Genus *Eocorticacarus* Besch, 1964

(Figs. 1850, 2085-2087)

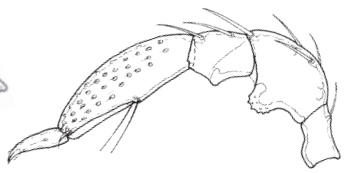
1964 *Eocorticacarus* Besch, Beiträge zur Neotropischen Fauna 3: 139.

Type species: *Eocorticacarus siolii* Besch, 1964

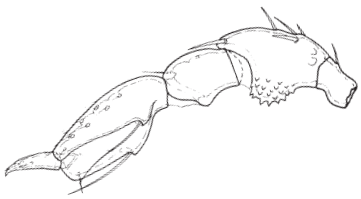
DIAGNOSIS: Male with a complete dorsal shield, female with only a pair of small postocularia platelets. Gnathosoma separated from anterior coxae, with very short posterolateral apodemes (homologs of anchoral process). Cx-I separated. Cxgl-4 shifted far forward and appearing to lie on Cx-III (Fig. 2085). Genital field with three pairs of acetabula, male gonopore small (Fig. 1850), female genital plates arranged in an arc (Fig. 2086). P2 with a well-developed ventral projection



2079



2080



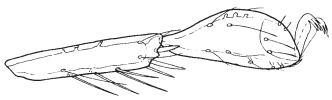
2081



2082



2083



2084

2079 *Dubiobates securipes* Cook, palp female (after Cook 1988)
2080 *Dubiobates recurvus* Cook, palp male (after Cook 1988)
2081 *Dubiobates minutus* Cook, palp male (after Cook 1988)
2082 *Dubiobates securipes* Cook, I-leg-4-6 male (after Cook 1988)
2083 *Dubiobates securipes* Cook, I-leg-4-6 female (after Cook 1988)
2084 *Dubiobates penai* Cook, III-leg-5-6 male (after Cook 1988)

with a few denticles. P4 with two setal tubercles bearing hair-like setae. P4 without a peg-like seta (Fig. 2087). Legs without swimming setae. I-leg-5 relatively unmodified.

HABITAT: Springs.

DISTRIBUTION: One species known from southern Peru.

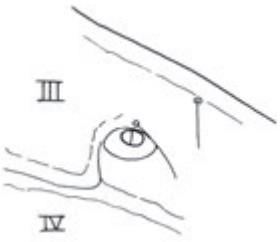
Genus *Gondwanabates* Imamura, 1984

(Figs. 1903, 2088-2093)

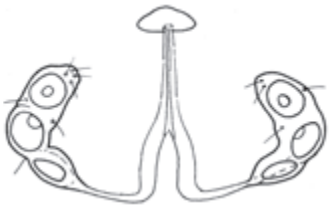
1984 *Gondwanabates* Imamura, Human Science, Tokiwa University 2: 64.

Type species: *Gondwanabates hopkinsi* Imamura, 1984

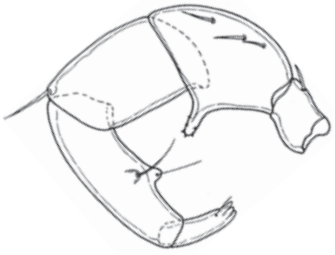
DIAGNOSIS: Dorsal and ventral shields present. Typically, the dorsal shield divided in a single anterior and a single posterior plate (Fig. 2088), but the anterior plate may be subdivided (Fig. 1903). Anterior plate with two pairs of glandularia, posterior plate with two or three pairs of glandularia. Gnathosoma separated from anterior coxae, with a well-developed anchoral process (Fig. 2090). Ventral shield entire, but occasionally genital field on a separate plate. Cx-I fused medially. A ridge extending from the lateral margins of Cx-IV to the lateral margins of the ventral shield. Cxgl-4 lying near suture line Cx-III/Cx-IV, occasionally causing a bowing of the suture line (Fig. 2089). However, Cxgl-4 not shifted onto Cx-III. Genital field with three pairs of acetabula. P2 and usually P3 with ventral denticles (Fig. 2091). P3 without a ventrodistal seta. Legs with rudimentary swimming setae. I-leg-5 distally with a curved seta and a stout (antero)ventral seta (Figs. 2092, 2093). Excretory pore posterior to genital field.



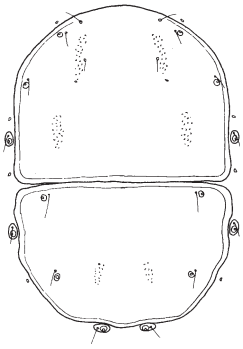
2085



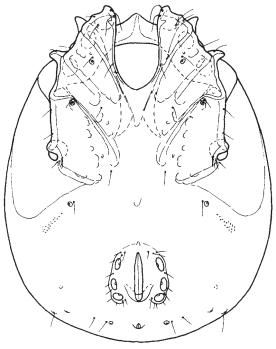
2086



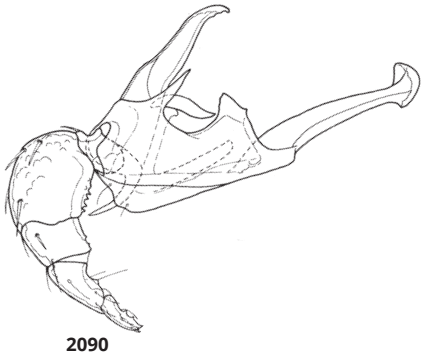
2087



2088



2089



2090

2085 *Eocorticacarus siolii* Besch, Cxgl-4 female (after Cook 1974)

2086 *Eocorticacarus siolii* Besch, genital field female (after Cook 1974)

2087 *Eocorticacarus siolii* Besch, palp male (after Cook 1974)

2088 *Gondwanabates bodivus* Cook, dorsum male (after Cook 1986)

2089 *Gondwanabates vietsi* (Imamura), venter male (after Cook 1986)

2090 *Gondwanabates vietsi* (Imamura), gnathosoma + palp female (after Cook 1986)

HABITAT: Streams.

DISTRIBUTION: Several species known from Australia (Imamura 1984, Cook 1986, Smit 2001, 2015a) and New Caledonia (Smit 2009a).

Genus *Groonabates* Cook, 1986

(Figs. 1918, 1919, 2094-2096)

1986 *Groonabates* Cook, Memoirs of the American Entomological Institute 40: 132.

Type species: *Groonabates stanopus* Cook, 1986

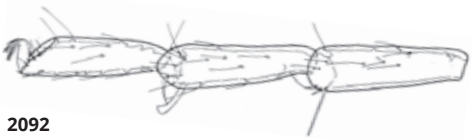
DIAGNOSIS: Male with a ventral shield (Fig. 1919), but dorsum unsclerotized (Fig. 2094); female with both dorsum and venter unsclerotized. Dorsum with eight pairs of glandularia, two pairs of these posterolaterally close together on their respective sides. Gnathosoma not protrusable, separated from anterior coxae in both sexes and with a short anchoral process. Coxae and genital field fused into a ventral shield in male, coxae in three groups in female and genital field separate (Fig. 2095). Cxgl-4 near middle of Cx-IV (Fig. 1919). Genital field with three pairs of acetabula. Male gonopore long, narrowed in the middle. Palp segments long, especially P4, and relatively unmodified (Fig. 1918). Legs without swimming setae. I-leg-5 without downturned seta (Fig. 2096).

HABITAT: Streams.

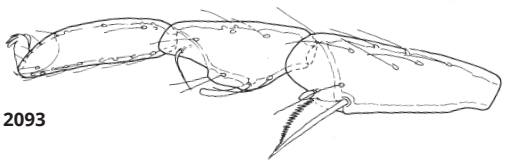
DISTRIBUTION: One species known from Tasmania, Australia (Cook 1986, Smit 2001).



2091



2092



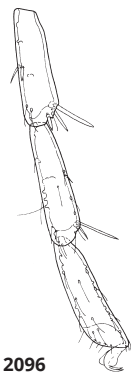
2093



2094



2095



2096

2091 *Gondwanabates hopkinsi* Imamura, palp female (after Cook 1986)

2092 *Gondwanabates hopkinsi* Imamura, I-leg-4-6 female (after Cook 1986)

2093 *Gondwanabates crassipes* Cook, I-leg-4-6 male (after Cook 1986)

2094 *Groonabates stanopus* Cook, dorsum male (after Cook 1986)

2095 *Groonabates stanopus* Cook, venter female (after Cook 1986)

2096 *Groonabates stanopus* Cook, I-leg-4-6 female (after Cook 1986)

Genus *Homtinibates* Cook, 2003

(Figs. 1868-1870, 2097-2099)

2003 *Homtinibates* Cook, International Journal of Acarology 29: 237.

Type species: *Homtinibates lootsi* Cook, 2003

DIAGNOSIS: Male with a complete ventral shield and a large anterodorsal plate (Fig. 2097), female without dorsal and ventral shields. Gnathosoma of male narrowly attached to ventral shield, its apodeme fused with ventral shield (Fig. 1869), gnathosoma of female separated from coxae (Fig. 1868). Gnathosoma with a long anchoral process in both sexes. Suture lines Cx-III/Cx-IV nearly complete, in males more acute angled than in females, and with a short posterior projections in both sexes. Genital field with three pairs of acetabula. Gonopore of male long and narrow, located anterior to the acetabula. Palp with ventral projections, P2 and P3 with numerous denticles. Palp with a slight sexual dimorphism, especially in the shape of P4 (Figs. 2098, 2099). Legs without swimming setae. l-leg-5 without downturned distal seta, but with a stout distoventral seta which is knob-shaped at its end (Fig. 1870).

HABITAT: Streams.

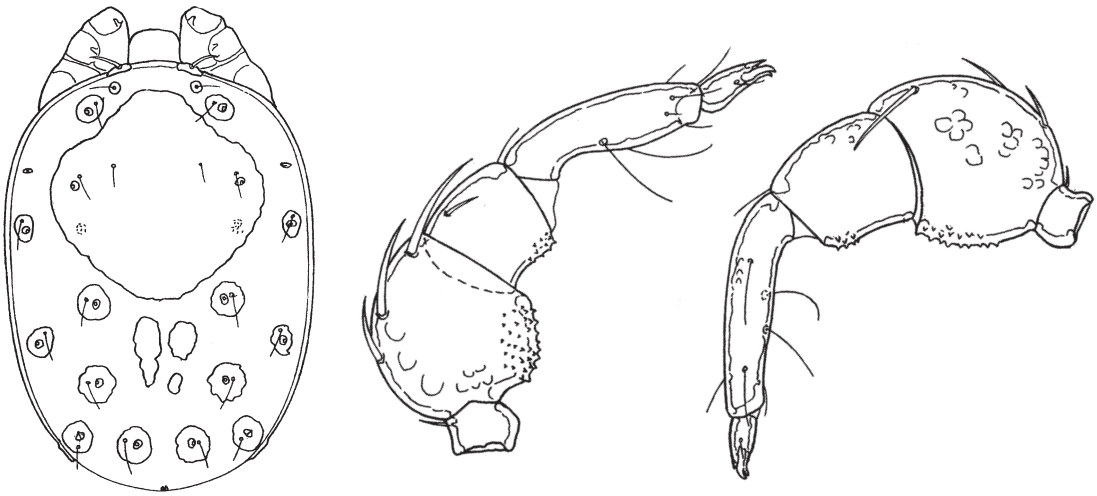
DISTRIBUTION: One species known from South Africa (Smit 2005).

Genus *Hopkinsobates* Cook, 1983

(Figs. 1905, 2100-2104)

1983 *Hopkinsobates* Cook, Contributions of the American Entomological Institute 21: 34.

Type species: *Hopkinsobates suzannae* Cook, 1983



2097 **2098** **2099**

2097 *Homtinibates lootsi* Cook, dorsum male (after Cook 2003)

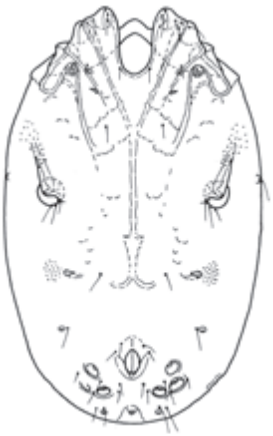
2098 *Homtinibates lootsi* Cook, palp male (after Cook 2003)

2099 *Homtinibates lootsi* Cook, palp female (after Cook 2003)

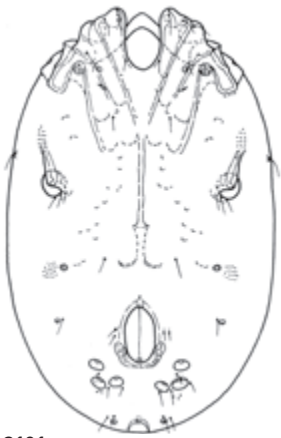
DIAGNOSIS: Dorsal and ventral shields present. Dorsal shield consisting of a large anterior plate with the postocularia and two pairs of setae without the accompanying glandularia and a posterior plate with two pairs of glandularia, the most posterior pair greatly enlarged and three pairs of setae without accompanying glandularia (Fig. 1905). Gnathosoma separated from anterior coxae, with a very long anchoral process (Fig. 2102). Ventral shield entire, incorporating genital field and excretory pore. Cx-I fused medially. First three pairs of coxae placed well anterior, median suture lines of Cx-I, Cx-II and Cx-III distinct. Cxgl-4 shifted far forward causing a bowing of the suture line Cx-III/Cx-IV (Figs. 2100, 2101). Insertions of fourth legs associated with projections of Cx-IV. Genital field with three pairs of acetabula, located posterior to gonopore in both sexes. P3 with a heavy, curved medial seta (Fig. 2103). Legs without swimming setae. I-leg-5 anteroventrally with a pointed seta (Fig. 2104).

HABITAT: Streams.

DISTRIBUTION: One species known from South Island, New Zealand.



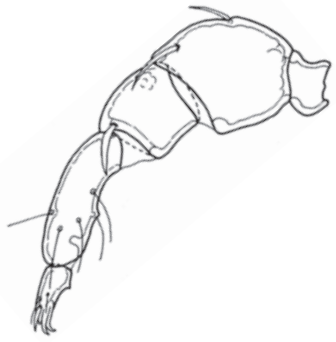
2100



2101



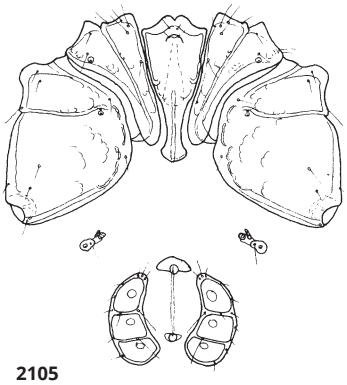
2102



2103



2104



2105

2100 *Hopkinsobates suzannae* Cook, venter male (after Cook 1983)

2101 *Hopkinsobates suzannae* Cook, venter female (after Cook 1983)

2102 *Hopkinsobates suzannae* Cook, gnathosoma + palp female (after Cook 1983)

2103 *Hopkinsobates suzannae* Cook, palp male (after Cook 1983)

2104 *Hopkinsobates suzannae* Cook, I-leg-4-6 female (after Cook 1983)

2105 *Hygrobatella* (*Hygrobatella*) *neopuberula* Cook, venter female (after Cook 1988)

Genus *Hygrobatella* K. Viets, 1926

(Figs. 1792, 1793, 2105-2112)

1926 *Hygrobatella* K. Viets, Zoologischer Anzeiger 69: 193.

1927 *Placobates* Lundblad, Zoologischer Anzeiger 72: 60.

1935 *Neohygrobates* Viets, Zoologischer Anzeiger 112: 195.

Type species: *Hygrobates placophorus* Walter, 1919

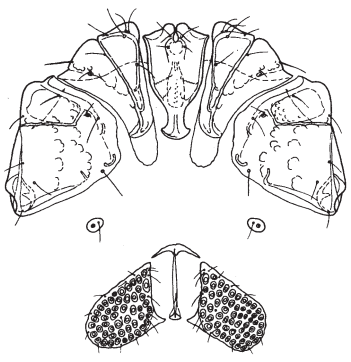
DIAGNOSIS: Idiosoma either weakly sclerotized or with various development of dorsalia (Fig. 2107) and ventralia. Gnathosoma lying free in both sexes, with a relatively wide posterior process various in length. Cx-I separated medially in both sexes. Posterior apodemes of first coxal group variously developed. Posterior to anterior coxae secondary sclerotization variously extended. Suture lines Cx-III/Cx-IV extending slightly or decidedly anteriorly in the region of the glandularia of Cx-IV (Figs. 1792, 2105). Genital field with three to many pairs of acetabula. Ventral side of P2 and P3 with numerous denticles, without pronounced ventral projections (Fig. 1793). P4 distomedially with a small peg-like seta. Legs without swimming setae (Fig. 2109). I-leg-5 without downturned seta (Fig. 2108).

REMARKS: Multiacetabulate species were previously assigned to *Hygrobatella*, subgenus *Hygrobatulus*. However, Cook (1980) suggested that *Hygrobatulus* is not a *Hygrobatella*, but probably a synonym of *Dodecabates*. Unfortunately, the male of the type species of *Hygrobatulus*, i.e. *H. linguliger* Viets, 1953 is unknown. According to Cook (1980), *H. linguliger* is definitely not a multiacetabulate species of *Hygrobatella* but, as the male is unknown, he refrained from erecting a new (sub)generic name for this species. The status of the subgenus *Hygrobatulus* remains therefore unknown, and it is not treated here.

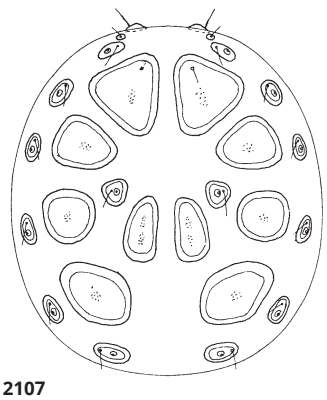
Cook (1980) assigned two multiacetabulate species to *Hygrobatella*, i.e. *H. polygramma* Lundblad, 1954 and *H. multiacetabulata* Cook, 1980. The latter assignment was confirmed by Fernández (1994) with the description of the male. For the latter two species Rosso de Ferradás et al. (2004) erected the subgenus *Schwoerbelobatella* (see below.)

KEY TO THE SUBGENERA

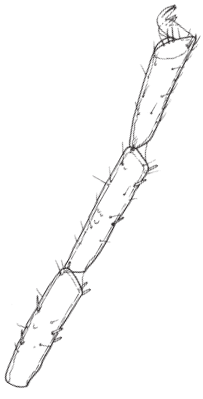
1	Genital field with three pairs of acetabula (Fig. 2105)	Subgenus *Hygrobatella* s.s.
-	Genital field with more than 20 pairs of acetabula (Fig. 2106)	Subgenus *Schwoerbelobatella*



2106



2107



2108

2106 *Hygrobatella* (*Schwoerbelobatella*) *multiacetabulata* Cook, venter female (after Cook 1980)

2107 *Hygrobatella* (*Hygrobatella*) *elegantula* Lundblad, dorsum female (after Cook 1988)

2108 *Hygrobatella* (*Hygrobatella*) *puberula puberula* K. Viets, I-leg-4-6 male (after Cook 1988)

Subgenus *Hygrobatella* s.s.

(Figs. 1792, 1793, 2105, 2107-2109)

DIAGNOSIS: Genital field with three pairs of acetabula (Figs. 1792, 2105). No small sclerite between Cx-IV in the male (Fig. 1792). P5 distally with a stout setae (Fig. 1793).

HABITAT: Streams, lakes.

DISTRIBUTION: Several species known from South America (Argentina, Cook 1980, Smit 2002c; Colombia; Peru; Bolivia, Besch 1964; Chile, Besch 1964, Cook 1988)

Subgenus *Schwoerbelobatella* Rosso de Ferradás, Fernández & Rocabado, 2004

(Figs. 2106, 2110-2112)

2004 *Schwoerbelobatella* Rosso de Ferradás, Fernández & Rocabado, Iheringia, Série Zoologia 94: 311.

Type species: *Hygrobatella polygramma* Lundblad, 1954

DIAGNOSIS: Genital field with more than 20 pairs of acetabula (Fig. 2106). P5 more slender and more curved in male (Fig. 2111) compared to female (Fig. 2112), distally with either a spatulate seta or a stout seta. A small sclerite between Cx-IV may be present in the male (Fig. 2110).

HABITAT: Streams.

DISTRIBUTION: Two species are known from South America (Colombia; Argentina and Bolivia, Cook 1980, Fernández 1994, Rosso de Ferradás et al. 2004).

Genus *Hygrobates* C.L. Koch, 1837

(Figs. 111, 1836, 2113-2150)

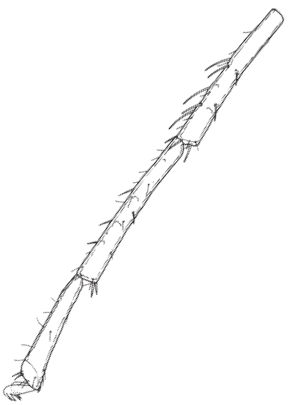
1837 *Hygrobates* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 10: 8.

1874 *Campognatha* Lebert, Sitzungsberichte der Akademie der Wissenschaften in Wien, mathematisch-naturwissenschaftlichen Klasse 69: 41.

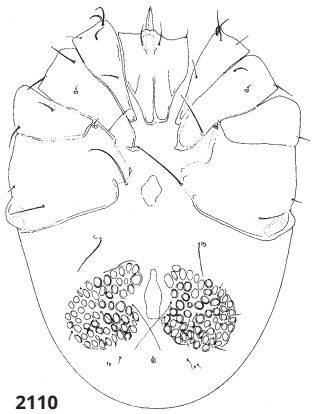
1878 *Lemania* Forel, Matériaux, série 4; Bulletin 15: 502.

1898 *Capobates* Thor, Christiania Videnskaps-Selskaps Forhandlinger 1: 3 - Smit (2005).

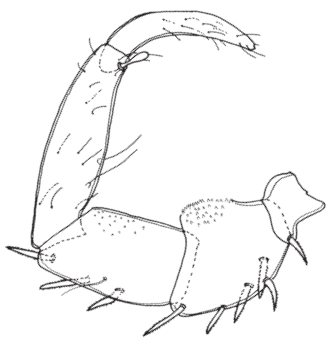
1927 *Diktyobates* Thor, Norsk Entomologisk Tidskrift 2: 122.



2109



2110



2111

2109 *Hygrobatella* (*Hygrobatella*) *puberula puberula* K. Viets, IV-leg-4-6 male (after Cook 1988)

2110 *Hygrobatella* (*Schwoerbelobatella*) *multiacetabulata* Cook, venter male (after Fernández 1994)

2111 *Hygrobatella* (*Schwoerbelobatella*) *multiacetabulata* Cook, palp male (after Rosso de Ferradás et al. 2004)

1927 *Rhabdotobates* Thor, Norsk Entomologisk Tidskrift 2: 122.

1978 *Spongibates* Wainstein, Zoologiceskij Zurnal 57: 787 – Tuzovskij & Smit (2018).

Type species: *Hygrobates lutescens* C.L. Koch, 1841 = *Hydrarachna longipalpis* Hermann, 1804

DIAGNOSIS: Idiosoma usually weakly sclerotized. When extensive secondary sclerotization is present, it is with a large dorsomedial unsclerotized strip (Fig. 2130). Dorsally to the gnathosoma no sclerotized ridges or lamella present. Gnathosoma broadly fused with anterior coxae in both sexes (Fig. 1836). Cx-I fused medially. Suture line Cx-III/Cx-IV usually complete, if incomplete, then genital field with more than ten pairs of acetabula. Genital field with three to numerous pairs of acetabula. I-leg-6 generally not, rarely slightly bowed. P2 with or without ventral projection (Fig. 2127-2128), P2 and P3 often with denticulate ventral margin. P4 lacking a medial sword-like setae and dense dorsodistal setation. I-leg-5 with one or two thickened distoventral, unmodified setae and a terminal thin, curved seta (Fig. 2129).

KEY TO THE SUBGENERA

1 Genital field with three or four pairs of acetabula 2

- Genital field with more than four pairs of acetabula; if four pairs of acetabula are present, then IV-leg-4-5 with a double row of long, stiff setae 11

2 P5 with a proximo-ventral extension and two strong, curved claws (Fig. 2113) Subgenus *Lurchibates*

- P5 without such strong claws 3

3 I-leg-5 swollen, with two long distal setae (Fig. 2114), acetabula not on a genital plate (Fig. 2115) Subgenus *Inflatibates*

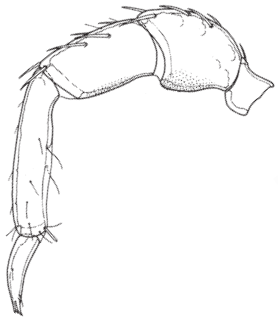
- I-leg-5 not swollen, acetabula usually on a genital plate 4

4 Genital plates fused anteriorly and posteriorly (rarely only posteriorly) (males, Fig. 2116) 5

- Genital plates separated from each other both anteriorly and posteriorly (females, Fig. 2117) 9

5 Pregenital sclerite separate from the genital field (Fig. 2118); ventral margin of P2 with a very large projection (Fig. 2119) 6

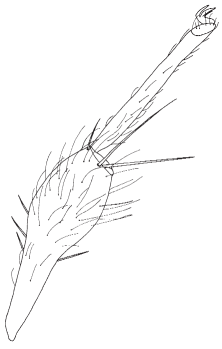
- Pregenital sclerite incorporated into the fused anterior part of the genital plates; projections of P2 present or absent 7



2112



2113



2114

2112 *Hygrobatella* (*Schwoerbelobatella*) *multiacetabulata* Cook, palp female (after Cook 1980)

2113 *Hygrobates* (*Lurchibates*) *aloisii* Goldschmidt & Wing Kan Fu, palp male (after Goldschmidt & Wing Kan Fu 2010)

2114 *Hygrobates* (*Inflatibates*) *inflatipes* Smit, I-leg-5-6 male (after Smit 2005)

6 Posterior part of genital field with a pronounced indentation (Fig. 2119) Subgenus *Thonia*

- Posterior part of genital field only slightly indented (Fig. 2120) Subgenus *Hygrobatomegapus*

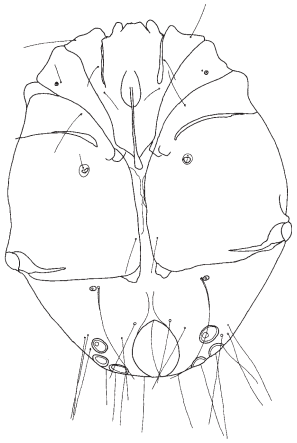
7(5) Fourth legs of male with elongate segments, IV-leg-4 with numerous small setae and four long distal setae (Fig. 2121) Subgenus *Schubartella*

- Fourth leg not modified 8

8 Cxgl-4 extending far forward, producing a somewhat S-shaped suture line Cx-III/Cx-IV (Fig. 2131) Subgenus *Hygrobatides*

- Cxgl-4 not extending far forward Subgenera *Hygrobates*, *Monobates*

9(4) Cxgl-4 extending far forward, producing a somewhat S-shaped suture line Cx-III/Cx-IV; all acetabula lying in the integument or posterior two pairs lightly joined (Fig. 2122) Subgenus *Hygrobatides*



2115



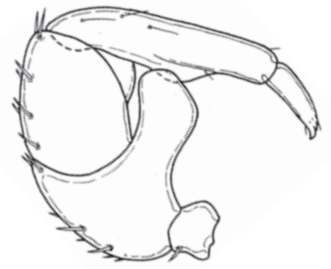
2116



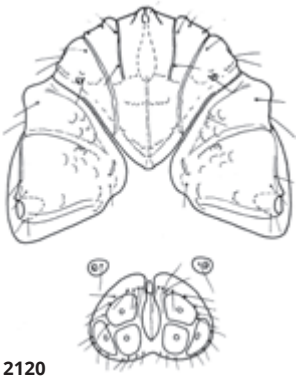
2117



2118



2119



2120

2115 *Hygrobates* (*Inflatibates*) *inflatipes* Smit, venter male (after Smit 2005)

2116 *Hygrobates* (*Hygrobates*) *longipalpis* (Hermann), genital field male (after Gerecke et al. 2016)

2117 *Hygrobates* (*Hygrobates*) *longipalpis* (Hermann), genital field female (after Gerecke et al. 2016)

2118 *Hygrobates* (*Thonia*) *loveni* Lundblad, venter male (after Cook 1974)

2119 *Hygrobates* (*Thonia*) *loveni* Lundblad, palp male (after Cook 1974)

2120 *Hygrobates* (*Hygrobatomegapus*) *spatuliferus* (Lundblad), venter male (after Cook 1974)

- Cxgl-4 usually not forming S-shaped suture lines as described above; if an S-shaped suture line is present between Cx-III and Cx-IV, all acetabula are lying on 1-2 common genital plates on each side 10

10 First pair of acetabula separate on each side; suture line Cx-III/Cx-IV not extending abruptly anteromedially near glandularia (Fig. 2123) Subgenus *Monobates*

- Usually all acetabula on each side lying on a common genital plate; if anterior acetabula are separate on each side, suture lines Cx-III/Cx-IV extending abruptly anteromedially near glandularia Subgenera *Inflatibates*, *Hygrobatomegapus*, *Hygrobates*, *Thonia*

11(1) IV-leg-4 and -5 distally with a double row of 3-4 moderately long setae (Fig. 2124); genital field with four pairs of acetabula (Fig. 2125) Subgenus *Hygrotetrabates*

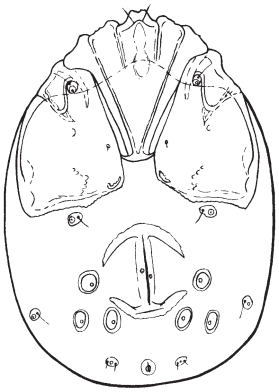
- IV-leg-4 and -5 distally without a double row of moderate long setae; genital field with five or more pairs of acetabula (Fig. 2126) Subgenus *Rivobates*

Subgenus *Hygrobates* s.s.

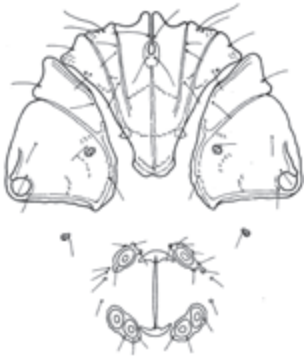
(Figs. 111, 1836, 2116, 2117, 2127-2130)



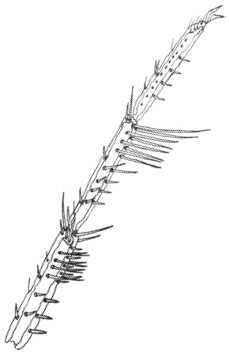
2121



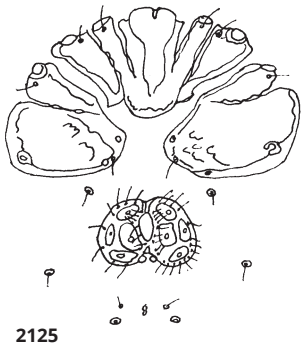
2122



2123



2124



2125



2126

2121 *Hygrobates* (*Schubartella*) *longipes* (K. Viets), IV-leg-4-6 male (after Cook 1974)

2122 *Hygrobates* (*Hygrobatides*) *pachydermis* (Lundblad), venter female ((after Cook 1974)

2123 *Hygrobates* (*Monobates*) *karekari* Cook, venter female (after Cook 1974)

2124 *Hygrobates* (*Hygrotetrabates*) *neooctoporus* Marshall, IV-leg-4-6 adult (after Modlin 1970)

2125 *Hygrobates* (*Hygrotetrabates*) *neooctoporus* Marshall, venter male (after Modlin 1970)

2126 *Hygrobates* (*Rivobates*) *angelieri* Cook, venter female (after Cook 1974)

DIAGNOSIS: If, rarely, extensive sclerotization is developed, there is a wide area of soft integument dorsally. Cxgl-4 lying near suture line Cx-III/Cx-IV. Genital field with three or four pairs of acetabula. Acetabula in male occupying most of the genital plates (Fig. 2116). Gonopore of male completely surrounded by sclerotization, incorporating the pregenital sclerite. Female gonopore flanked by 1-2 pairs of genital plates (Fig. 2117); anterior pairs of acetabula, very rarely posterior pair, lying free. Ventral margin of P2 with or without a distal projection, very often with small denticles (Figs. 2127, 2128), P3 with or without denticles. Legs without sexual dimorphism.

HABITAT: Standing waters (lakes, ditches, ponds), streams.

DISTRIBUTION: Worldwide, numerous species described.

Subgenus *Hygrobatides* Lundblad, 1936

(Figs. 2122, 2131-2133)

1936 *Hygrobatides* Lundblad, Zoologischer Anzeiger 115: 33.
Type species: *Hygrobatides pachydermis* Lundblad, 1936

DIAGNOSIS: Usually without secondary sclerotization, rarely almost completely sclerotized leaving only a dorsal strip of soft integument. Cxgl-4 extending far anteriorly, producing a somewhat S-shaped suture line Cx-III/Cx-IV (Figs. 2122, 2131). Genital field with three pairs of acetabula. Male acetabula on a common genital plate (but in two species one pair of acetabula lying free in the integument lateral to genital plate, Fig. 2132). Gonopore of male completely surrounded by sclerotization. Females without genital plates, all acetabula free in the integument or the posterior two pairs are lightly fused on their respective sides (Fig. 2122). Palp without well-developed projections, denticles are present in some species (Fig. 2133), rarely P2 with a setiferous ventral projection. Legs without sexual dimorphism.

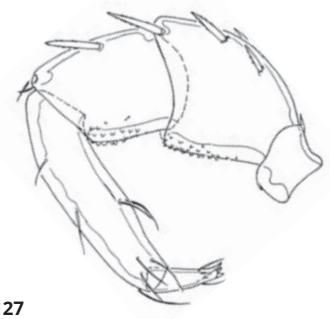
HABITAT: Streams.

DISTRIBUTION: Several species known from South America (Colombia, Surinam, Brazil, Paraguay, Ecuador, Cook et al. 2000) and Central America (Costa Rica, Cook 1980).

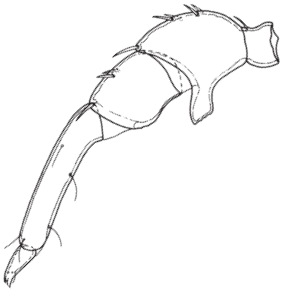
Subgenus *Hygrobatomegapus* Lundblad, 1927

(Figs. 2120, 2134-2137)

1927 *Hygrobatomegapus* Lundblad, Zoologischer Anzeiger 70: 331.
Type species: *Hygrobatomegapus spathuliferus* Lundblad, 1927



2127



2128



2129

2127 *Hygrobates* (*Hygrobates*) *nigromaculatus* Lebert, palp male (after Gerecke et al. 2016)
2128 *Hygrobates* (*Hygrobates*) *blatolus* Cook, palp male (after Cook 1980)
2129 *Hygrobates* (*Hygrobates*) *dadayi* Cook, l-leg-5-6 male (after Cook 1974)

DIAGNOSIS: Cxgl-4 located near the suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula, the latter occupying most of the genital plate (Fig. 2134). Male gonopore not completely surrounded by sclerotization, the small pregenital sclerite lies free in the integument (Fig. 2120). Male genital field with a slight posterior indentation. Ventral sclerotization may be present. P2 with a large ventral projection (Figs. 2135-2136), which may have numerous small denticles apically. I-leg-5 with a single stout seta, I-leg-6 slightly bowed (Fig. 2137).

HABITAT: Streams.

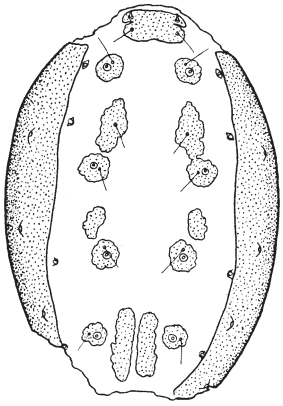
DISTRIBUTION: One species with three subspecies known from East and South Africa (K.O. Viets 1963, Smit 2005).

Subgenus *Hygrotetrabates* K.O. Viets, 1972

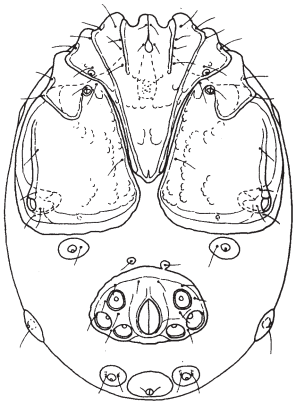
(Figs. 2124, 2125, 2138)

1972 *Hygrotetrabates* K.O. Viets, Acarologia 14: 207.

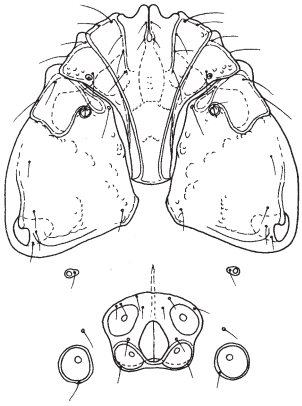
Type species: *Hygrobates neooctoporus* Marshall, 1926



2130



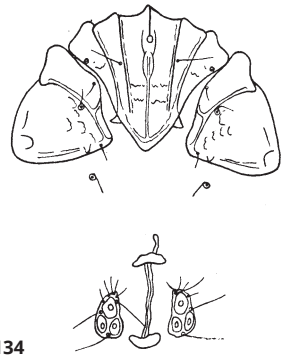
2131



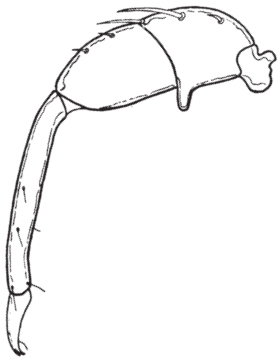
2132



2133



2134



2135

2130 *Hygrobates* (*Hygrobates*) *porosus* Lundblad, dorsum male (after Lundblad 1942a)

2131 *Hygrobates* (*Hygrobatides*) *calvotus* Cook, venter male (after Cook 1980)

2132 *Hygrobates* (*Hygrobatides*) *distendens* Lundblad, venter male (after Cook 1980)

2133 *Hygrobates* (*Hygrobatides*) *pachydermis* (Lundblad), palp male (after Cook 1974)

2134 *Hygrobates* (*Hygrobatomegapus*) *spathuliferus* (Lundblad), venter female (after Lundblad 1952b)

2135 *Hygrobates* (*Hygrobatomegapus*) *spathuliferus coriaceus* (Lundblad), palp male (after Lundblad 1952b)

DIAGNOSIS: Idiosoma soft. Genital field with four pairs of acetabula, all on genital plates (Fig. 2125). P2 with a short, rounded anteroventral projection (Fig. 2138), P2 and P3 with numerous denticles. Fourth leg modified, IV-leg-4 and -5 distally with a double row of 3-4 moderately long setae (Fig. 2124).

HABITAT: Lakes, ponds.

DISTRIBUTION: One species known from North America (Modlin 1970). Cook (1974) and K.O. Viets (1986) assigned *H. zuxsus* Habeeb, 1958 to this subgenus, but this species lacks the typical double row of setae on the fourth leg. Therefore, this species should be assigned to *Hygrobates* s.s.

Subgenus *Inflatibates* Smit, 2005

(Figs. 2114, 2115, 2139-2141)

2005 *Inflatibates* Smit, Journal of Natural History 39: 3391.

Type species: *Hygrobates inflatipes* Smit, 2005

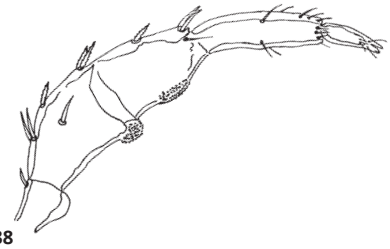
DIAGNOSIS: Idiosoma soft. Gnathosoma with a short anchoral process. Cxgl-4 located posterior to suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula, not on genital plates in male (Fig. 2115), in female either free (Fig. 2139) in the integument or on genital plates (Fig. 2140). P2 with a large, rounded anteroventral projection (Fig. 2141). I-leg-5 of male swollen, with two long distal setae and numerous fine setae (Fig. 2114).



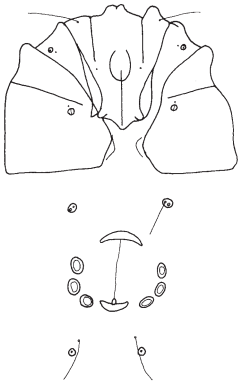
2136



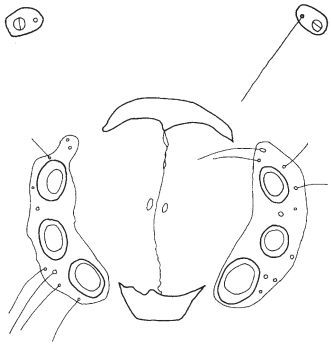
2137



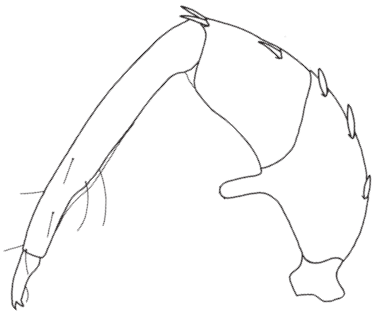
2138



2139



2140



2141

2136 *Hygrobates* (*Hygrobatomegapus*) *spathuliferus* (Lundblad), ventral projection P2 male (after Cook 1974)

2137 *Hygrobates* (*Hygrobatomegapus*) *spathuliferus* (Lundblad), I-leg-5-6 male (after Cook 1974)

2138 *Hygrobates* (*Hygrotetrabates*) *neooctoporus* Marshall, palp female (after Modlin 1970)

2139 *Hygrobates* (*Inflatibates*) *inflatipes* Smit, venter female (after Smit 2005)

2140 *Hygrobates* (*Inflatibates*) *inflatipes* Smit, genital field female (after Smit 2005)

2141 *Hygrobates* (*Inflatibates*) *inflatipes* Smit, palp male (after Smit 2005)

HABITAT: Streams.

DISTRIBUTION: One species known from South Africa.

Subgenus *Lurchibates* Goldschmidt & Wing Kan Fu, 2011

(Figs. 2113, 2142, 2143)

2011 *Lurchibates* Goldschmidt & Wing Kan Fu, Zoologischer Anzeiger 250: 22.

Type species: *Hygrobates aloisii* Goldschmidt & Wing Kan Fu, 2011

DIAGNOSIS: Cheliceral claws very large, dorsal margin curved and serrated (Fig. 2142). Genital field with three pairs of acetabula on more or less triangular genital plates (Fig. 2143). P2 ventrally without a projection, P3 ventrally smooth or with denticles. P5 with a proximo-ventral extension and two strong, curved distal claws, forming like a grasping organ (Fig. 2113). Legs without sexual dimorphism. I-leg-5 ventrodistally with a pair of strong, short, blunt setae; I-leg-6 straight.

HABITAT: Adults and deutonymphs live parasitic on newts, the latter living at least a part of their life cycle in streams.

DISTRIBUTION: Four species known from Hong Kong, South China, Laos and Vietnam (Goldschmidt & Koehler 2007, Goldschmidt & Wing Kan Fu 2011).

Subgenus *Monobates* Walter, 1935

(Figs. 2123, 2144, 2145)

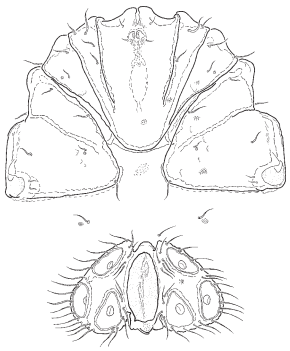
1935 *Monobates* Walter, Archiv für Hydrobiologie 28: 99.

Type species: *Hygrobates falcipalpis* Koenike, 1906

DIAGNOSIS: Suture line Cx-III/Cx-IV of normal shape, not S-shaped; Cxgl-4 tending to be located slightly or well away from the suture line. Secondary sclerotization absent. Genital field with three pairs of acetabula. Genital plates of male either broad or narrow. Gonopore of male completely surrounded by sclerotization (Fig. 2144). Anterior pair of acetabula in female separate, lateral to pregenital sclerite; posterior two pairs on a small but distinct genital plate (Fig. 2123). P2 with a ventral projection, denticles may be present on the ventral sides of P2 and P3 (Fig. 2145). Legs without sexual dimorphism. I-leg-5 with two thickened, long or short distoventral setae.



2142



2143



2144

2142 *Hygrobates* (*Lurchibates*) *aloisii* Goldschmidt & Wing Kan Fu, chelicera female (after Goldschmidt & Wing Kan Fu 2011)

2143 *Hygrobates* (*Lurchibates*) *aloisii* Goldschmidt & Wing Kan Fu, venter male (after Goldschmidt & Wing Kan Fu 2011)

2144 *Hygrobates* (*Monobates*) *karekari* Cook, genital field male (after Cook 1974)

HABITAT: Streams, standing waters.

DISTRIBUTION: Several species known from Asia (India, Cook 1967; Thailand, Savatenalinton & Smit 2017; China, Java and Sumatra) and Africa (Liberia, Ivory Coast, Kenya, Congo).

Subgenus *Rivobates* Thor, 1897

(Figs. 2126, 2146)

1897 *Rivobates* Thor, Archiv or mathematik og Naturvidenskab 19: 39.

1922 *Dekabates* Thor, Nyt Magazin for Naturvidenskaberne 61: 117 – new syn.

Type species: *Rivobates norvegicus* Thor, 1897

DIAGNOSIS: Genital field with five or more pairs of acetabula (Fig. 2126, 2146). Fourth leg not modified, IV-leg-4-5 ventrally with several, short, stout setae.

HABITAT: Springs, streams.

DISTRIBUTION: Several species known from Europe (Poland, Biesiadka & Kowalik 1978; Italy, Gerecke & Di Sabatino 2013; Macedonia, Pešić 2015), Asia (Japan; Turkey, Esen et al. 2013b; Iran, Schwoerbel & Sepasgozarian 1976; China, Jin 1996, 1997a) and North America (Habeeb 1968).

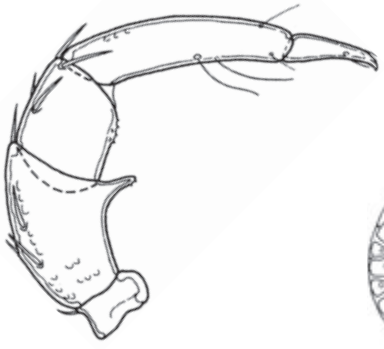
REMARKS: Previously, the subgenera *Dekabates* and *Rivobates* were separated based on the number of acetabula only, 5-6 pairs in *Dekabates*, more than seven pairs in *Rivobates*. However, recently a *Rivobates* species is described from Lake Ochrid with five pairs of acetabula (Pešić 2015) blurring the separation of the two subgenera. Therefore, the separation of the two subgenera cannot be maintained, and *Dekabates* is synonymized with *Rivobates*.

Subgenus *Schubartella* K. Viets, 1937

(Figs. 2121, 2147, 2148)

1937 *Schubartella* K. Viets, Zoologischer Anzeiger 117: 168.

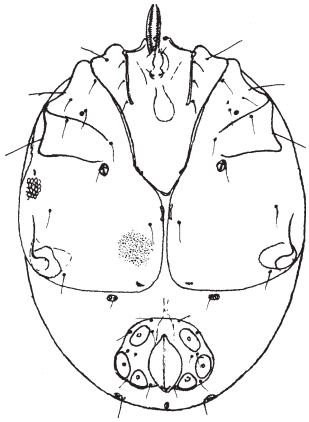
Type species: *Schubartella longipes* K. Viets, 1937



2145



2146



2147

2145 *Hygrobates* (*Monobates*) *keralensis* Cook, palp male (after Cook 1974)

2146 *Hygrobates* (*Rivobates*) *norvegicus* (Thor), genital field male (after Gerecke et al. 2016)

2147 *Hygrobates* (*Schubartella*) *longipes* (K. Viets), venter male (after K. Viets 1954)

DIAGNOSIS: (Male only) Idiosoma soft, secondary sclerotization absent. Cxgl-4 located near suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. Gonopore of male completely surrounded by sclerotization, acetabula occupying most of the area of the genital plate (Fig. 2147). P2 with a large ventral projection (Fig. 2148). Fourth leg exhibiting a moderate sexual dimorphism: IV-leg-4 with numerous small setae on medial side and distally four long setae (Fig. 2121).

HABITAT: Ponds.

DISTRIBUTION: One species known from Brazil. Besch (1969) assigned a second species to this subgenus, collected in Brazil as well. However, the assignment is doubtful, as it concerns a single female, and the characters of the female are not known.

Subgenus *Thonia* Halík, 1941

(Figs. 2118, 2119, 2149, 2150)

1941 *Thonia* Halík, Sborník Entomologického Oddeleni Zemského Musea v Praze 19: 166.

1951 *Amplipalpus* Lundblad, Entomologisk Tidskrift 72: 160.

Type species: *Thonia barbata* Halík, 1941

DIAGNOSIS: Idiosoma soft, secondary sclerotization absent. Cxgl-4 located near suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula, male genital plates lightly fused. Male gonopore not completely surrounded by sclerotization, the pregenital sclerite free and relatively large (Fig. 2118). Acetabula occupying most of the area of the genital field. Genital field of male with a large posterior indentation. P2 with a large ventral projection, expanded distally in male (Fig. 2119), pointed in female (Fig. 2149). Ventral margins of P3 and P4 slightly swollen. I-leg-6 not bowed. IV-leg-5 slightly enlarged proximally (Fig. 2150).

HABITAT: Streams.

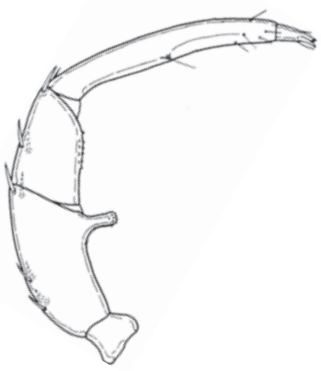
DISTRIBUTION: One species known from East Africa.

Genus *Hygrobatopsis* K. Viets, 1924

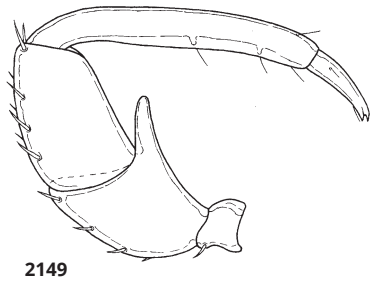
(Figs. 1897, 1898, 1917, 2151-2157)

1924 *Hygrobatopsis* K. Viets, Zoologischer Anzeiger 58: 103.

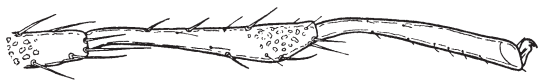
Type species: *Hygrobates levipalpis* K. Viets, 1924



2148



2149



2150

2148 *Hygrobates* (*Schubartella*) *longipes* (K. Viets), palp male (after Cook 1974)

2149 *Hygrobates* (*Thonia*) *loveni* Lundblad, palp female (after Cook 1974)

2150 *Hygrobates* (*Thonia*) *loveni* Lundblad, IV-leg-5-6 male (after Lundblad 1952b)

DIAGNOSIS: Idiosoma soft in female, male with dorsal and ventral shields. Dorsal shield of male either a single plate (Fig. 2151) or consisting of four platelets (Fig. 2152). Gnathosoma nearly separated from Cx-I in both sexes but joined very narrowly to Cx-I. Gnathosoma without well-developed apodemes. Coxae in three groups in female (Fig. 2153) but fused into a ventral shield in male (Figs. 1898, 2156). Cx-I fused medially in both sexes. Posterior suture lines of Cx-IV extending more or less at right angles to main axis of idiosoma. Cxgl-4 located near suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula, male genital field lying free in a genital bay formed by secondary sclerotization. Female genital field with a large pregenital sclerite. Male genital field with either the genital plates completely separated or only attached posteriorly. P4 without a stout medial seta, P5 curved and pointed (Figs. 1897, 1917). Legs without swimming setae. I-leg-5 distally with a very small downturned seta, I-leg-6 not bowed. Fourth leg with or without a slight sexual dimorphism (Fig. 2157). Leg claws simple.

KEY TO THE SUBGENERA

1 P2 without a ventral projection (Fig. 1897), male dorsal shield composed of one single plate (Fig. 2151) Subgenus *Hygrobatopsis* s.s.

- P2 with a well-developed ventral projection (Fig. 1917), male dorsal shield composed of four platelets (Fig. 2152) Subgenus *Hygrobatopsella*

Subgenus *Hygrobatopsis* s.s.

(Figs. 1897, 1898, 2151, 2153, 2154)

DIAGNOSIS: Male dorsal shield composed of one single plate (Fig. 2151). Antenniform setae of female on small, widely separated platelets. P2 without a ventral projection (Fig. 1897).

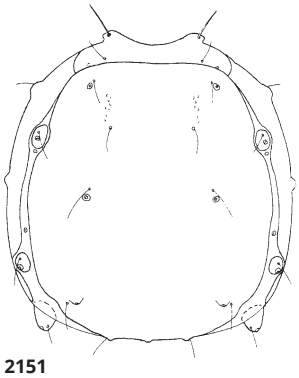
HABITAT: Streams.

DISTRIBUTION: Two species known from East and South Africa (Cook 2005).

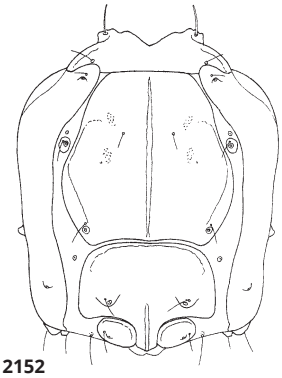
Subgenus *Hygrobatopsella* Cook, 2005

(Figs. 1917, 2152, 2155-2157)

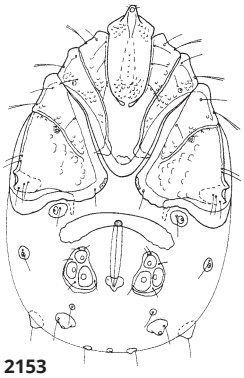
2005 *Hygrobatopsella* Cook, International Journal of Acarology 31: 251.
Type species: *Hygrobatopsella bella* Cook, 2005



2151



2152



2153

2151 *Hygrobatopsis* (*Hygrobatopsis*) *sudafricana* Cook, dorsum male (after Cook 2005)

2152 *Hygrobatopsis* (*Hygrobatopsella*) *bella* Cook, dorsum male (after Cook 2005)

2153 *Hygrobatopsis* (*Hygrobatopsis*) *sudafricana* Cook, venter female (after Cook 2005)

DIAGNOSIS: Dorsal shield of male composed of four platelets (Fig. 2152). Anterior platelet with the postocularia and a pair of glandularia, a posterior platelet bearing a pair of glandularia and a pair of much smaller platelets, each with a glandularium, flanking a posterior extension of the posterior platelet. Antenniform setae of female on a relatively large single platelet (Fig. 2155). P2 with a ventral projection (Fig. 1917). Fourth leg of male slightly modified (Fig. 2157).

HABITAT: Streams.

DISTRIBUTION: One species known from South Africa.

Genus *Hygrobatractides* K.O. Viets, 1981

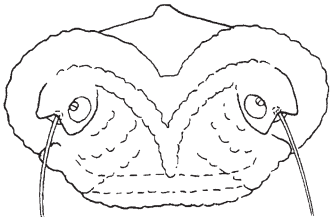
(Figs. 1825, 1826, 2158-2161)

1981 *Hygrobatractides* K.O. Viets, Acarologia 22: 379.

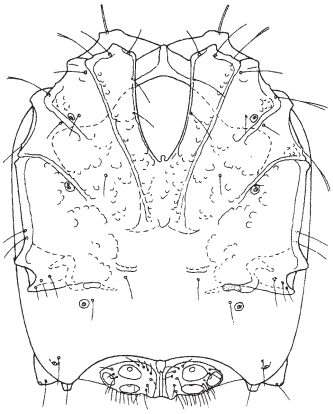
Type species: *Hygrobatractides divaricatus* K.O. Viets, 1981



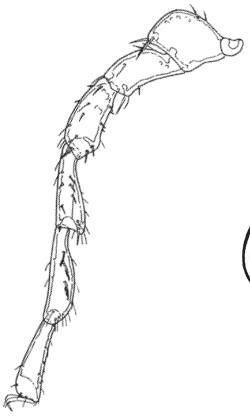
2154



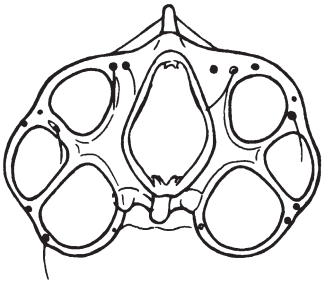
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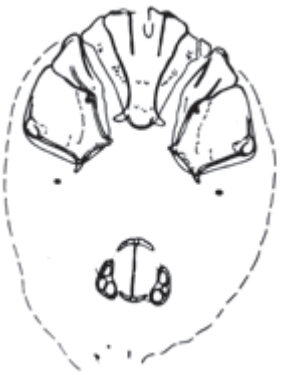
2156



2157



2158



2159

2154 *Hygrobatopsis* (*Hygrobatopsis*) *levipalpis* (K. Viets), l-leg-5-6 male (after Cook 1974)

2155 *Hygrobatopsis* (*Hygrobatopsella*) *bella* Cook, antenniform setae platelet female (after Cook 2005)

2156 *Hygrobatopsis* (*Hygrobatopsella*) *bella* Cook, venter male (after Cook 2005)

2157 *Hygrobatopsis* (*Hygrobatopsella*) *bella* Cook, fourth leg male (after Cook 2005)

2158 *Hygrobatractides divaricatus* K.O. Viets, genital field male (after K.O. Viets 1981a)

2159 *Hygrobatractides divaricatus* K.O. Viets, venter female (after K.O. Viets 1981a)

DIAGNOSIS: Idiosoma soft. Gnathosoma fused with Cx-I. Cx-I fused medially. Cxgl-4 located near suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. Gonopore of male completely surrounded by sclerotization (Fig. 2158). P2 without a ventral projection, P2 and P3 with small denticles (Fig. 2060). P4 without a stout medial seta. IV-leg-5 with a long swimming seta. Both I-leg-5 and II-leg-5 distally with two S-shaped, curved setae (Figs. 1825, 1826), I-leg-5 with a distal downturned seta (Fig. 2161); I-leg-6 straight.

HABITAT: Streams.

DISTRIBUTION: One species known from South Africa and Namibia (Smit 2005).

Genus *Ioannibates* Smit, 2009

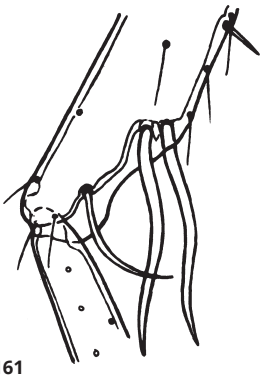
(Figs. 1914, 2162-2164)

2009 *Ioannibates* Smit, Zootaxa 2114: 64.

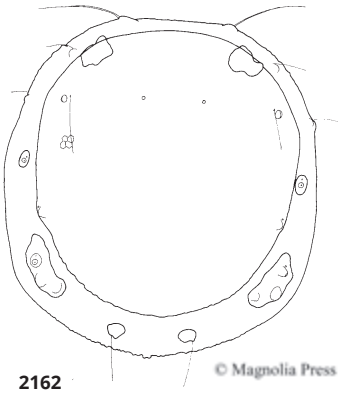
Type species: *Ioannibates papillosus* Smit, 2009



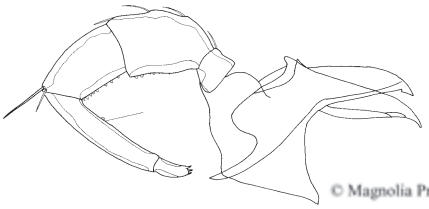
2160



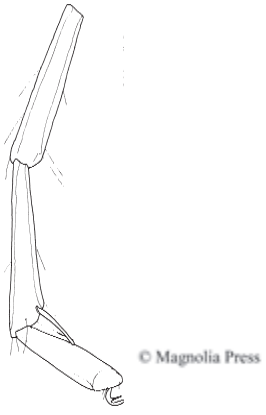
2161



2162



2163



2164



2165

2160 *Hygrobatractides divaricatus* K.O. Viets, palp male (after K.O. Viets 1981a)

2161 *Hygrobatractides divaricatus* K.O. Viets, distal end of I-leg-5 male (after K.O. Viets 1981a)

2162 *Ioannibates papillosus* Smit, dorsum male (after Smit 2009b) Reproduced with permission from copyright holder

2163 *Ioannibates papillosus* Smit, gnathosoma + palp male (after Smit 2009b) Reproduced with permission from copyright holder

2164 *Ioannibates papillosus* Smit, I-leg-4-6 male (after Smit 2009b) Reproduced with permission from copyright holder

2165 *Iranobates hesabii* Pešić, Smit & Asadi, venter male (after Pešić et al. 2011b) Reproduced with permission from copyright holder

DIAGNOSIS: (Male only) Membranous parts of idiosoma papillate. Dorsum with a large plate and a pair of smaller platelets (Fig. 2162). Gnathosoma separated from Cx-I. Coxae in three groups, Cx-I fused medially. Posterior to Cx-IV extensive secondary sclerotization. Cxgl-4 located near suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula, on a somewhat triangular platelet; first pair of acetabula away from posterior two pairs (Fig. 1914). Gonopore elliptical. P2 without a ventral projection, P2 and P3 ventrally with large denticles (Fig. 2163). Legs without swimming setae. I-leg-5 slightly modified, distally with a stout, slightly curved seta and a straight hair-like seta (Fig. 2164).

HABITAT: Streams.

DISTRIBUTION: One species known from SW-Australia.

Genus *Iranobates* Pešić, Smit & Asadi, 2011

(Figs. 1822, 2165-2168)

2011 *Iranobates* Pešić, Smit & Asadi, Zootaxa 2783: 22.

Type species: *Iranobates hesabii* Pešić, Smit & Asadi, 2011

DIAGNOSIS: Idiosoma soft. Gnathosoma fused with Cx-I. Coxae in three groups, Cx-I fused medially. Cxgl-4 located far posterior to suture line Cx-III/Cx-IV (Figs. 1822, 2165). Genital field with three pairs of acetabula. P2 with a long, slender, bluntly-pointed ventral projection with a few denticles at its tip, P3 with a lamellar ventral projection, denticulated at its tip, P4 with a long ventral seta, and a shorter, more medially located seta (Fig. 2166). Legs with a slight sexually dimorphism, I-III-leg-6 with seta in proximal part relatively long in males (Fig. 2168), shorter in females (Fig. 2167). I-leg-5 in both sexes with one short, rounded distal seta and a hair-like downturned seta.

HABITAT: Streams.

DISTRIBUTION: One species known from Iran.

Genus *Javanella* Lundblad, 1971

(Figs. 1785, 2169-2174)

1971 *Javanella* Lundblad, Arkiv för Zoologi (Serie 2) 23: 345 – Cook (1974).

Type species: *Javanella crassipes* Lundblad, 1971



2166



2167



2168

2166 *Iranobates hesabii* Pešić, Smit & Asadi, palp female (after Pešić et al. 2011b) Reproduced with permission from copyright holder

2167 *Iranobates hesabii* Pešić, Smit & Asadi, I-leg-5-6 female (after Pešić et al. 2011b) Reproduced with permission from copyright holder

2168 *Iranobates hesabii* Pešić, Smit & Asadi, I-leg-5-6 male (after Pešić et al. 2011b) Reproduced with permission from copyright holder

DIAGNOSIS: Dorsal and ventral shields present in both sexes. Excretory pore lying on the dorsal shield, the latter in the male extending somewhat laterally in the posterior part and in lateral view bulging (Fig. 2169), in the female not modified (Fig. 2171). Gnathosoma broadly fused with Cx-I, pharynx evident. Coxae incorporated into ventral shield. Posterior suture lines of first coxal group long, extending posteriorly beyond the insertion of the fourth legs. Suture lines Cx-III/Cx-IV incomplete, turning abruptly anteromedially. Glandularia of Cx-IV shifted far forward and lying near suture line of the first coxal group (Fig. 1785). Genital field terminal, with three pairs of acetabula. Genital plates fused with the ventral shield in male but separated in females (Fig. 2169). Palp without ventral tubercles. P4 with a heavy terminal seta on medial surface (Fig. 2172). Legs segments stocky, without swimming setae. I-leg-5 with two heavy distoventral setae and one slightly downturned seta (Fig. 2173). IV-leg-2 with a somewhat spatulate seta (Fig. 2174).

HABITAT: Streams.

DISTRIBUTION: One species known from Java, Indonesia.

Genus *Kallimobates* K.O. Viets, 1978

(Figs. 1909, 1910, 2175-2177)

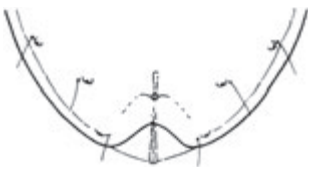
1978 *Kallimobates* K.O. Viets, Australian Journal of Marine and Freshwater Research 29: 81.
Type species: *Kallimobates australicus* K.O. Viets, 1978



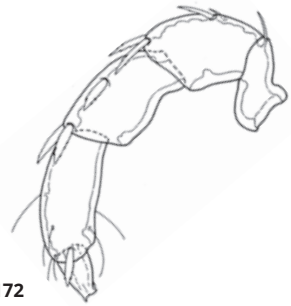
2169



2170



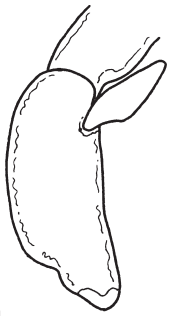
2171



2172



2173



2174

2169 *Javanella crassipes* Lundblad, dorsum male (after Cook 1974)
2170 *Javanella crassipes* Lundblad, venter female (after Cook 1974)
2171 *Javanella crassipes* Lundblad, posterior end of dorsum female (after Cook 1974)
2172 *Javanella crassipes* Lundblad, palp female (after Cook 1974)
2173 *Javanella crassipes* Lundblad, I-leg-5-6 female (after Cook 1974)
2174 *Javanella crassipes* Lundblad, IV-leg-2 male (after Lundblad 1971)

DIAGNOSIS: Dorsal and ventral shields present, dorsal shield composed of a single large plate with three pairs of glandularia (Fig. 1910). Gnathosoma separated from Cx-I, with a long rostrum, without an anchoral process. Posterior margins of Cx-I and Cx-II obliterated. Cxgl-4 located near suture line Cx-III/Cx-IV (Fig. 1909, 2175). Genital field with three pairs of acetabula. P2 with a ventral projection, P3 with a ventral projection larger in size in male (Fig. 2176) than in female (Fig. 2177); P2 and P3 without denticles. Fourth leg with two short swimming setae.

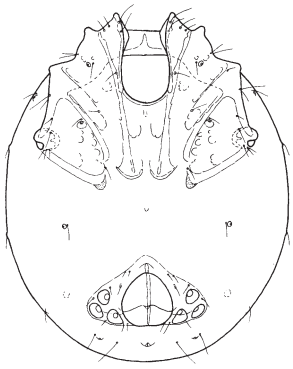
HABITAT: Streams.

DISTRIBUTION: Two species known from eastern and south-eastern Australia (K.O. Viets 1978a, Cook 1986, Smit 1992b, 2001).

Genus *Karlvietsia* K.O. Viets, 1962

(Figs. 1814, 2178-2181)

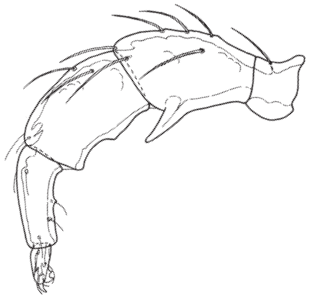
1962 *Karlvietsia* K.O. Viets, Zoologischer Anzeiger 168: 381 – Cook et al. (2000),
Type species: *Karlvietsia angustipalpis* K.O. Viets, 1962



2175



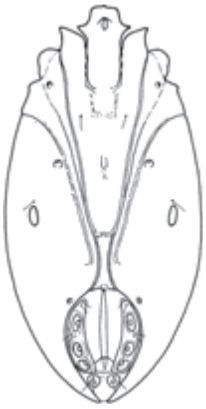
2176



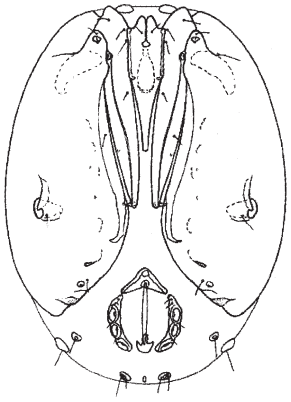
2177



2178



2179



2180

2175 *Kallimobates australicus* K.O. Viets, venter female (after Cook 1986)
2176 *Kallimobates australicus* K.O. Viets, palp male (after Cook 1986)
2177 *Kallimobates australicus* K.O. Viets, palp female (after Cook 1986)
2178 *Karlvietsia brevipalpis* K.O. Viets, genital field male (after Cook 1974)
2179 *Karlvietsia angustipalpis* K.O. Viets, venter female (after Cook 1974)
2180 *Karlvietsia brevipalpis* K.O. Viets, venter female (after Cook et al. 2000)

DIAGNOSIS: Idiosoma laterally compressed. Gnathosoma separated or partially fused with Cx-I, with a long anchoral process. Coxae expanded onto dorsum leaving a narrow to moderately wide strip of unsclerotized integument; this dorsal strip with tiny sclerites or small platelets (Fig. 1814). Main part of venter covered by coxae, Cx-I separated (Fig. 2180) or fused medially (Fig. 2179), Cx-IV greatly expanded. Anterior and posterior coxal group separate from one another or partially fused. Insertions of first three legs near anterior end of idiosoma, insertions of fourth legs near midlength of idiosoma and without associated projections. Suture lines of coxae extending far posteriorly. Cxgl-4 variable in position, from slightly anterior to level of insertion of fourth legs to anterior of level of Cxgl-2. Genital field with three pairs of acetabula, surrounded by soft integument. Legs with swimming setae, without sexual dimorphism.

HABITAT: Streams.

DISTRIBUTION: Three species known from South Africa (K.O. Viets 1962a, Cook et al. 2000).

Genus *Knysnabates* Cook, 2003

(Figs. 1818, 1820, 1821, 2182)

2003 *Knysnabates* Cook, International Journal of Acarology 29: 239.
Type species: *Knysnabates theroni* Cook, 2003

DIAGNOSIS: (Male only) Dorsal and ventral shields present (Figs. 1820, 1821). Gnathosoma broadly fused with Cx-I, its long, narrow apodemes visible as parts of the ventral shield. Cx-I fused medially. Suture lines Cx-III/Cx-IV incomplete, Cx-IV long, its posterior suture lines obliterated, ending in short, V-shaped apodemes. Genital field with three pairs of acetabula, separate from ventral shield. Gonopore short, moderately wide, located between the acetabula. Palp stocky, P2 and P3 with small ventral projections (Fig. 1818). Setae on ventral side of P4 hair-like. Legs without swimming setae. I-leg-5 with two, somewhat thickened, sharply pointed distal setae (Fig. 2182).

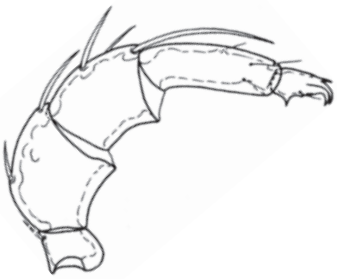
HABITAT: Streams.

DISTRIBUTION: One species known from South Africa.

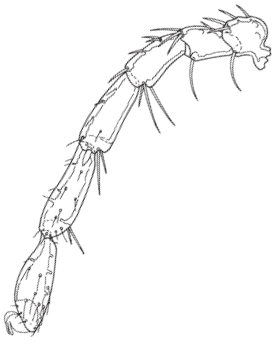
Genus *Kyphohygrobatella* Lundblad, 1936

(Figs. 1837, 1838)

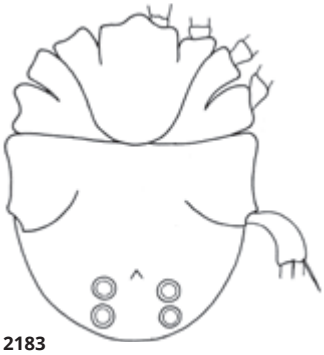
1936 *Kyphohygrobatella* Lundblad, Zoologischer Anzeiger 116: 206.
Type species: *Kyphohygrobatella serratipalpis* Lundblad, 1936



2181



2182



2183

2181 *Karlvietsia brevipalpis* K.O. Viets, palp male (after Cook 1974)

2182 *Knysnabates theroni* Cook, first leg male (after Cook 2003)

2183 *Kyphohygrobates verrucifer* (Daday), venter deutonymph (after Cook 1974)

DIAGNOSIS: (Male only) Idiosoma soft. Gnathosoma broadly fused with Cx-I. A sclerotized ridge or lamella present dorsal to the gnathosoma. Suture line Cx-III/Cx-IV incomplete. Cxgl-4 located near suture line Cx-III/Cx-IV. Genital field with numerous acetabula (Fig. 1837). P2 with a ventral projection with a serrated tip. Ventral side of P3 with a serrated ridge and bearing a seta (Fig. 1838). Ventral side of P4 expanded, bearing a long seta closer to the proximal end. Legs with a few swimming setae. First leg not modified. Legs without sexual dimorphism.

HABITAT: Streams.

DISTRIBUTION: One species known from Santa Catharina State, Brazil.

Genus *Kyphohygrobates* K. Viets, 1935

(Figs. 2183-2185)

1935 *Kyphohygrobates* K. Viets, Zoologischer Anzeiger 112: 276.

Type species: *Hygrobates verrucifer* Daday, 1905

DIAGNOSIS: (Deutonymph only) Gnathosoma broadly fused with Cx-I. Suture lines Cx-I/II separate Cx-I and the gnathosoma from Cx-II. Cx-II and Cx-III are partly fused, Cx-IV separated by a distinct suture line from the other coxae (Fig. 2183). P2 with a ventral projection, ventral side of P3 with several large denticles located on a low tubercle (Fig. 2184). Third and fourth legs with swimming setae. Distal end of third and fourth legs with a raised dorsal area (with a seta) at beginning of claw sockets (Fig. 2185).

HABITAT: Streams, possibly with temporary flow.

DISTRIBUTION: One species known from Paraguay.

REMARKS: Systematic position uncertain, see Cook (1974). The original drawings of Daday (1905) are very diagrammatic and do not allow a certain conclusion about its taxonomic position.

Genus *Mapuchacarus* Besch, 1964

(Figs. 1920-1922, 2186, 2187)

1964 *Mapuchacarus* Besch, Beiträge zur Neotropischen Fauna 3: 150.

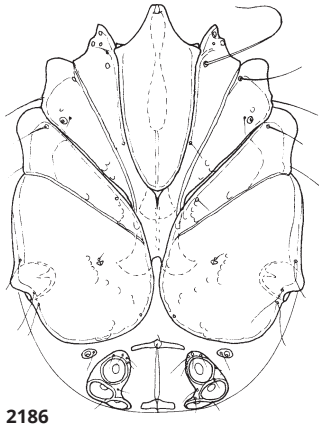
Type species: *Mapuchacarus condiscipulorum* Besch, 1964.



2184



2185



2186

2184 *Kyphohygrobates verrucifer* (Daday), palp deutonymph (after Cook 1974)

2185 *Kyphohygrobates verrucifer* (Daday), distal end fourth leg deutonymph (after Cook 1974)

2186 *Mapuchacarus condiscipulorum* Besch, venter female (after Cook 1988)

DIAGNOSIS: Idiosoma not sclerotized, dorsalia and ventralia absent, glandularia not enlarged (Fig. 1922). Gnathosoma separated from Cx-I, greatly enlarged and with a short posterior projection. Cx-I lightly fused in the male but separated medially in the female. First coxal group with relatively long apodemes posteriorly, extending to middle of Cx-IV. Cxgl-4 located close to middle of Cx-IV. Cxgl-2 located lateral to genital field (Fig. 1920, 2186). Genital field with three pairs of acetabula, arranged in an arc. P2 with a well-developed ventral projection, P2 and P3 with small denticles, P4 with a ventral peg-like seta near middle (Fig. 1921). Legs with a few swimming setae. I-leg-5 distally with two somewhat curved, thickened setae and 2-3 hair-like setae (Fig. 2187).

HABITAT: Streams.

DISTRIBUTION: One species known from Chile.

Genus *Megapella* Lundblad, 1936

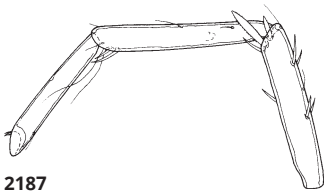
(Figs. 1778, 2188-2192)

1936 *Megapella* Lundblad, Zoologischer Anzeiger 115: 32.

1936 *Megapodella* Lundblad, Zoologiska bidrag från Uppsala 20: 366.

Type species: *Megapella longimaxillaris* Lundblad, 1936

DIAGNOSIS: Idiosoma soft. Gnathosoma broadly fused with coxae in male (Fig. 2190) but separated and tapering posteriorly in female (Fig. 2191). Cx-I fused in male but separated in female. Glandularia of Cx-IV located near suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. Legs without swimming setae. I-leg-5 with two heavy setae distally, the more dorsal of which is downturned; I-leg-6 bowed (Figs. 2188, 2189).



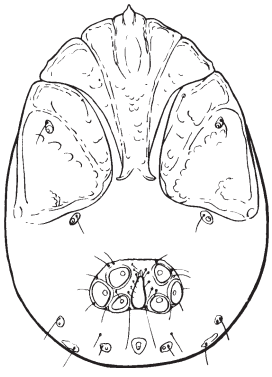
2187



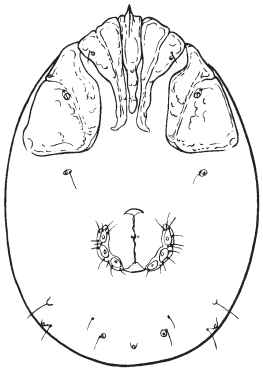
2188



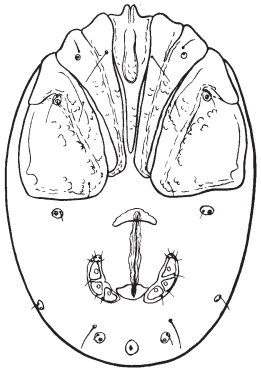
2189



2190



2191



2192

2187 *Mapuchacarus condiscipulorum* Besch, I-leg-4-6 male (after Cook 1988)

2188 *Megapella* (*Megapella*) *longimaxillaris* Lundblad, I-leg-5-6 female (after Cook 1974)

2189 *Megapella* (*Megapodellides*) *flabellum* I-leg-5-6 female (after Cook 1974)

2190 *Megapella* (*Megapella*) *longimaxillaris* Lundblad, venter male (after Cook 1974)

2191 *Megapella* (*Megapella*) *longimaxillaris* Lundblad, venter female (after Cook 1974)

2192 *Megapella* (*Megapodellides*) *flabellum* venter female (after Cook 1974)

KEY TO THE SUBGENERA

1 The more dorsal one of the two heavy distal setae of I-leg-5 simple (Fig. 2188) Subgenus *Megapella* s.s.

- The more dorsal one of the two heavy distal setae of I-leg-5 palmately feathered (Fig. 1778, 2189) Subgenus *Megapodellides*

Subgenus *Megapella* s.s.

(Figs. 2188, 2190, 2191)

DIAGNOSIS: Both heavy distal setae of I-leg-5 simple (Fig. 2188). Cx-III only slightly expanded laterally to the glandularia of Cx-IV (Figs. 2190, 2191).

HABITAT: Streams.

DISTRIBUTION: One species known from Brazil.

Subgenus *Megapodellides* Lundblad, 1941

(Figs. 1778, 2189, 2192)

1941 *Megapodellides* Lundblad, Entomologisk Tidskrift 62: 122.

Type species: *Megapodellides flabellum* Lundblad, 1941

DIAGNOSIS: The more dorsal of the heavy distal setae of I-leg-5 palmately feathered (Figs. 1778, 2189). Cx-III abruptly expanded laterally to the glandularia of Cx-IV. Cxgl-4 located in an anterior bowing of the suture line Cx-III/IV (Fig. 2192).

HABITAT: Streams.

DISTRIBUTION: One species known from Brazil.

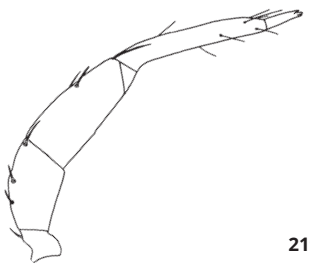
Genus *Mesobatella* K. Viets, 1931

(Figs. 1800, 1804, 2193, 2194)

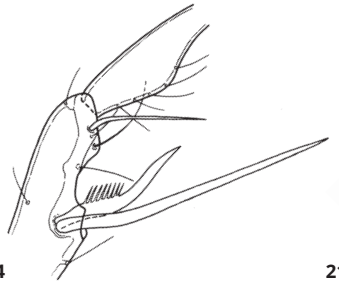
1931 *Mesobatella* K. Viets, Zoologischer Anzeiger 93: 224.

Type species: *Megapus serratisetus* K. Viets, 1916

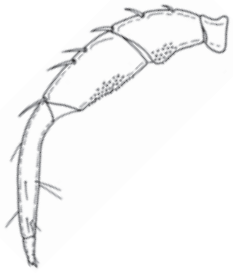
DIAGNOSIS: Idiosoma soft. Gnathosoma broadly fused with Cx-I (Fig. 1800). Apodemes associated with the suture lines Cx-I/Cx-II well developed. Suture lines Cx-III/Cx-IV complete and directed anterolaterally. Glandularia of Cx-IV placed well posteriorly. Palp slender, without ventral projections or denticles (Fig. 2193). I-leg-5 with two enlarged setae distally, one of which is serrate (Fig. 2194). I-leg-6 decidedly bowed (Fig. 1804).



2193



2194



2195

2193 *Mesobatella serratiseta* (K. Viets), palp female (after K. Viets 1916)

2194 *Mesobatella serratiseta* (K. Viets), distal end of I-leg-5 female (after Cook 1974)

2195 *Mesobates forcipatus* Thor, palp male (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: One species known from Cameroon.

Genus *Mesobates* Thor, 1901

(Figs. 1802, 1803, 2195)

1901 *Mesobates* Thor, Zoologischer Anzeiger 24: 677.

Type species: *Mesobates forcipatus* Thor, 1901

DIAGNOSIS: Idiosoma soft. Gnathosoma broadly fused with Cx-I. Suture line Cx-III/Cx-IV nearly complete and more or less at right angle to the median idiosoma axis. Glandularia of Cx-IV located somewhat posterior to the suture line Cx-III/Cx-IV (Fig. 1802). Posterior margin of Cx-IV more or less truncate. Genital field with three pairs of acetabula. Palp without ventral projections, P2 and P3 with denticles (Fig. 2195). The two heavy setae of I-leg-5 short and away from distal margin, the distal "curved" seta thickened and only slightly curved. None of the heavy setae of I-leg-5 pectinate, I-leg-6 distinctly bowed (Fig. 1803).

HABITAT: Streams.

DISTRIBUTION: Mostly circumpolar. Three species known from the Holarctic (Conroy 1982, Gerecke 2000).

Genus *Mixobates* Thor, 1905

(Figs. 114, 2196-2198)

1905 *Mixobates* Thor, Zoologischer Anzeiger 29: 373 - Tuzovskij & Gerecke (2003).

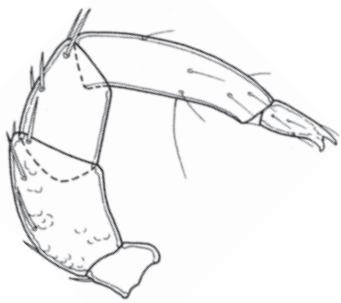
Type species: *Hygrobates processifer* Thor, 1905



2196



2197



2198

2196 *Mixobates inermis* Cook, venter male (after Cook 1974)

2197 *Mixobates inermis* Cook, venter female (after Cook 1974)

2198 *Mixobates inermis* Cook, palp female (after Cook 1974)

DIAGNOSIS: Idiosoma soft. Gnathosoma fused with Cx-I. Coxae in three groups, or fused into a large plate due to secondary sclerotization; Cx-I fused medially. Cxgl-4 near suture line Cx-III/Cx-IV (Figs. 2196, 2197). In mature specimens there may be an extended border of secondary sclerotization lateral to Cx-III or posterior to Cx-IV. Genital field with three pairs of acetabula. Legs without swimming setae. P2 with a ventrodistal projection, which may be very short, bearing denticles at its tip. P3 ventrally smooth or with a low number of denticles. P4 ventrally with two hair-like setae, P5 with a long distal claw (Figs. 2198, 2199). Ventral margin of I-leg-5 in the middle with a pair of short setae, distal margin with a fine, whip-like seta and ventrally with a pair of short, apically rounded, stout setae nearly equal in length; I-leg-6 straight (Fig. 114).

HABITAT: Streams.

DISTRIBUTION: Almost a dozen species known from Europe (Russia, Tuzovskij & Gerecke 2003), North Africa (Tuzovskij & Gerecke 2003), Siberia (Tuzovskij & Semenchenko 2009), North America (Habeeb 1957, 1962b, Cook 1974) and Central America (Guatemala, K.O. Viets 1978b; Costa Rica, Cook 1980), a subspecies is known from Turkey (Pešić & Turan 2006).

Genus *Moramangabates* Gerecke, 2004

(Figs. 1855, 2200, 2201)

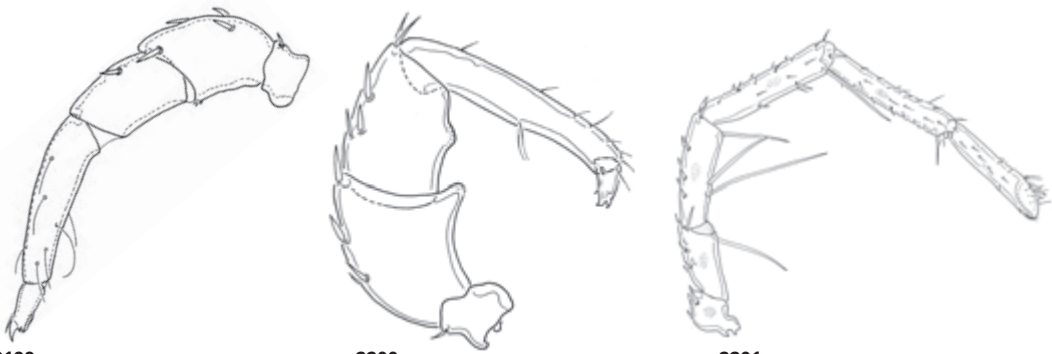
2004 *Moramangabates* Gerecke, Zoosystema 26: 400.

Type species: *Moramangabates pauliani* Gerecke, 2004

DIAGNOSIS: (Female only) Idiosoma soft. Gnathosoma elongated, separated from Cx-I. Cx-I separated medially. Suture line Cx-III/Cx-IV not extending abruptly anteriorly near Cxgl-4. Cxgl-4 located near suture line Cx-III/Cx-IV. Posterior margin of Cx-IV with a short apodeme (Fig. 1855). Genital field with 13 pairs of acetabula. P2 with a ventrodistal projection, P3 with a central hump, both with fine denticles (Fig. 2200). I-leg-5 ventrodistally with a fine whip-like seta and two ventral stout setae (Fig. 2201). True swimming setae absent, but instead legs II-IV with very long, stiff, hyaline setae.

HABITAT: Probably standing waters.

DISTRIBUTION: One species known from Madagascar.



2199 **2200** **2201**

2199 *Mixobates processifer* (Thor), palp female (after Gerecke et al. 2016)

2200 *Moramangabates pauliani* Gerecke, palp female (after Gerecke 2004c)

2201 *Moramangabates pauliani* Gerecke, first leg female (after Gerecke 2004c)

Genus *Motasia* Lundblad, 1954

(Figs. 1805, 1806, 2202, 2203)

1954 *Motasia* Lundblad, Arkiv för Zoologi (Serie 2) 5: 526.

Type species: *Motasia placoderma* Lundblad, 1954

DIAGNOSIS: (Female only) Dorsum with postocularia and glandularia platelets (Fig. 2202). Gnathosoma separated from coxae, with a downturned rostrum (Fig. 1805); gnathosoma with one pair of posterodorsal projections. Cx-I separated medially. Glandularia of Cx-IV located near suture line Cx-III/Cx-IV (Fig. 2203). Insertions of fourth legs as far distanced from midline as third legs. Cxgl-4 located well anterior to genital field. Genital field with three pairs of acetabula. Gonopore at posterior end of idiosoma. Palp, especially P4, elongated; P4 without peg-like seta. P2 and P3 without denticles or projections (Fig. 1806). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: One species known from Colombia.

Genus *Neocorticacarus* Lundblad, 1954

(Figs. 1772, 2204, 2205)

1954 *Neocorticacarus* Lundblad, Arkiv för Zoologi (Serie 2) 5: 524.

Type species: *Neocorticacarus validipalpis* Lundblad, 1954

DIAGNOSIS: Dorsum with dorsalia and glandularia platelets, larger in male than in female. Gnathosoma separated from the coxae. Cx-I separated medially in both sexes. Glandularia of Cx-IV located near suture line Cx-III/Cx-IV (Fig. 2204). Insertions of fourth legs as far distanced from midline as third legs. Cxgl-4 lying well anterior to the genital field. Genital field with five to six pairs of acetabula (Fig. 2205). Palp stocky, with a partial fusion of P2 and P3, ventral side of these segments without projections or denticles (Fig. 1772). Peg-like seta on P4 somewhat distal in position. Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: One species known from Colombia.



2202



2203



2204

2202 *Motasia placoderma* Lundblad, dorsum female (after Cook 1974)

2203 *Motasia placoderma* Lundblad, venter female (after Cook 1974)

2204 *Neocorticacarus validipalpis* Lundblad, venter male (after Cook 1974)

Genus *Notohygrobates* Cook, 1983

(Figs. 1871-1873, 2206-2209)

1983 *Notohygrobates* Cook, Contributions of the American Entomological Institute 21: 33.
Type species: *Notohygrobates kathrynae* Cook, 1983

DIAGNOSIS: Lateral eyes absent. Integument papillate. Dorsum with a large anteromedial platelet with the postocularia, two pairs of smaller dorsalia, and a pair of greatly enlarged, posteriorly located glandularia. In the female a pair of glandularia incorporated in the anterior plate (Fig. 2207), in the male these glandularia free in the integument (Fig. 2206). Gnathosoma separated from Cx-I, with a long anchoral process (Fig. 2208). Cx-I long and pointed, separated medially. Cx-IV without distinct apodemes extending from the short posterior projections. Cxgl-4 located near suture line Cx-III/Cx-IV. Lateral to Cx-III and Cx-IV an extensive area of secondary sclerotization. Genital field with three pairs of acetabula. Male gonopore small, acetabula small in both sexes, occupying only a small area of the genital field (Figs. 1871, 1873), female genital field with a pair of broad, somewhat curved genital plates. P2 and P3 with ventral bulges with numerous fine denticles. P4 ventrally with a peg-like seta (Fig. 2209). Legs without swimming setae. I-leg-5 ventrodistally with two stout, pointed setae and a hair-like whip-like seta (Fig. 1872). Excretory pore platelet near posterior idiosoma margin.



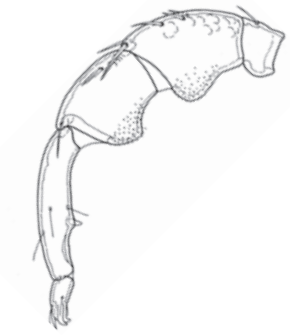
2205



2206



2207



2209



2210



2211

2205 *Neocorticacarus validipalpis* Lundblad, genital field female (after Cook 1974)

2206 *Notohygrobates kathrynae* Cook, dorsum male (after Cook 1983)

2207 *Notohygrobates kathrynae* Cook, dorsum female (after Smit 2019a)

2209 *Notohygrobates kathrynae* Cook, palp male (after Cook 1983)

2210 *Osornobates gennadus* Cook, dorsum male (after Cook 1988)

2211 *Osornobates gennadus* Cook, palp male (after Cook 1988)

HABITAT: Interstitial.

DISTRIBUTION: One species known from North and South Island, New Zealand (Smit 2019a).

Genus *Osornobates* Cook, 1988

(Figs. 1848, 1852, 2210-2212)

1988 *Osornobates* Cook, Memoirs of the American Entomological Institute 42: 81.
Type species: *Osornobates gennadus* Cook, 1988

DIAGNOSIS: (Male only) Membranous part of integument with extremely fine papillae. Idiosoma with extensive dorsal and ventral sclerotization, dorsum with a pair of platelets with the preocularia and a large unpaired posterior plate (Fig. 2210), venter with three pairs of platelets and a large unpaired posterior plate (Fig. 1848). Gnathosoma separated from Cx-I, with a tapering posterior process. Cx-I separated medially, posteriorly elongated, posterior margin of Cx-IV with distinct projections. Cxgl-4 located more or less centrally, away from suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. Gonopore and acetabula large, occupying most of the genital field. P2 without a ventral projection and denticles, P3 with a few denticles. P4 without a distal peg-like seta (Fig. 2211). Legs without swimming setae. Segments of third leg much longer and thinner than in other legs (Fig. 2212). IV-leg-5 with two enlarged, modified setae, one proximoventrally, the other ventrodistally. IV-leg-6 curved (Fig. 1852).

HABITAT: Streams.

DISTRIBUTION: One species known from Chile.

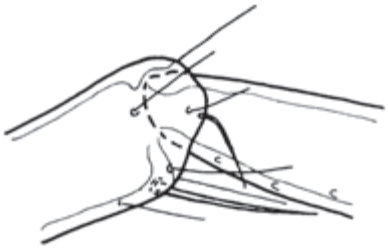
Genus *Paraschizobates* Lundblad, 1937

(Figs. 1777, 1797, 2213-2217)

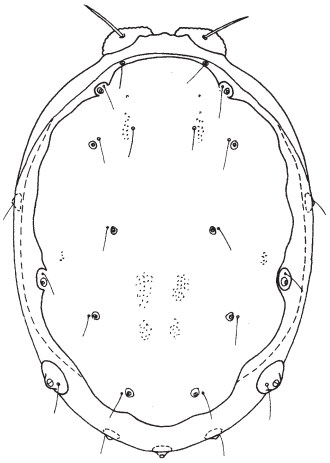
1937 *Paraschizobates* Lundblad, Zoologischer Anzeiger 120: 284.
Type species: *Paraschizobates megapoides* Lundblad, 1937



2212



2213



2214

2212 *Osornobates gennadus* Cook, third leg male (after Cook 1988)

2213 *Paraschizobates* (*Paraustraliobates*) *columbianus* (Lundblad), distal end of I-leg-5 female (after Cook 1974)

2214 *Paraschizobates* (*Paraschizobates*) *scutatus* Cook, dorsum male (after Cook 1980)

DIAGNOSIS: Idiosoma in both sexes soft or male with dorsal and ventral shields (Fig. 2214). Gnathosoma lightly fused to Cx-I by a very narrow bridge in the male (Fig. 2215) but free and with a long posterior process in the female (Fig. 1797). Cx-I fused medially in male but separated in female. Cx-IV without projections at posterior margin and without apodemes or series of muscle scars extending from here anteriorly (Fig. 1797). Cxgl-4 near suture line Cx-III/IV. Genital field with three pairs of acetabula. P4 with a heavy seta on medial surface (Fig. 2216). Legs without swimming setae. I-leg-5 with one heavy seta, I-leg-6 not bowed (Figs. 1777, 2213).

KEY TO THE SUBGENERA

1 Heavy seta at distal end of I-leg-5 expanded in distal half and then tapering to a fine tip; I-leg-5 without a curved seta at distal end (Fig. 1777) Subgenus *Paraschizobates* s.s.

- Heavy seta at distal end of I-leg-5 not expanded, gradually tapering to a fine tip; a small curved seta present at distal end of I-leg-5 (Fig. 2213) Subgenus *Paraustraliobates*

Subgenus *Paraschizobates* s.s.

(Figs. 1777, 2214-2216)

DIAGNOSIS: Heavy seta at distal end of I-leg-5 expanded in distal half and then tapering to a fine tip; I-leg-5 without a curved seta at distal end (Fig. 1777).

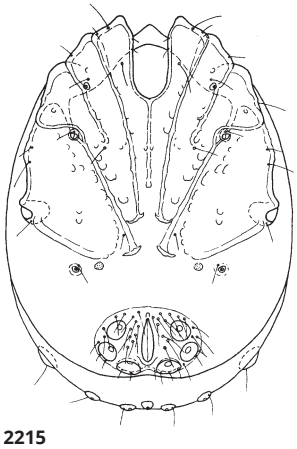
HABITAT: Streams.

DISTRIBUTION: Two species known from South America (Brazil, Surinam and Paraguay) and Central America (Mexico + Costa Rica, Cook 1980).

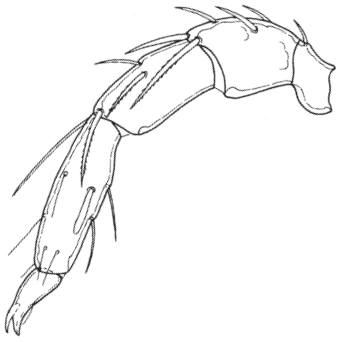
Subgenus *Paraustraliobates* Lundblad, 1954

(Figs. 1797, 2213, 2217)

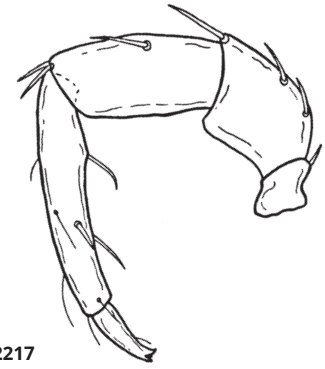
1954 *Paraustraliobates* Lundblad, Arkiv för Zoologi (Serie 2) 5: 517.
Type species: *Paraustraliobates columbianus* Lundblad, 1954



2215



2216



2217

2215 *Paraschizobates* (*Paraschizobates*) *scutatus* Cook, venter male (after Cook 1980)

2216 *Paraschizobates* (*Paraschizobates*) *scutatus* Cook, palp male (after Cook 1980)

2217 *Paraschizobates* (*Paraustraliobates*) *columbianus* (Lundblad), palp female (after Lundblad 1954)

DIAGNOSIS: (Female only) Heavy seta at distal end of I-leg-5 gradually tapering to a fine tip; a small curved seta present at distal end of I-leg-5 (Fig. 2213).

HABITAT: Streams.

DISTRIBUTION: One species known from Colombia.

Genus *Plesiohygrobates* K. Viets, 1956

(Figs. 1853, 1854, 2218-2220)

1956 *Plesiohygrobates* K. Viets, Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere 84: 14.

Type species: *Plesiohygrobates pectinipalpis* K. Viets, 1956

DIAGNOSIS: Idiosoma soft. Gnathosoma with an anchoral process and separated from the coxae. Cx-I separated medially. Suture line between Cx-III and Cx-IV bowed nearly 90° and Cxgl-4 appearing to lie on Cx-III (Fig. 1853, 2218). Genital field with 7-10 pairs of acetabula. P2 with a ventral projection, larger in male than in female. Ventral margin of P3 somewhat bulging in male but not in female. P4 without stout setae, ventral margin with a row of small setae more developed in male (Fig. 1854) than in female (Fig. 2219). Legs without swimming setae. I-leg-5 with one distoventral seta and a distal curved seta (Fig. 2220).

HABITAT: Streams.

DISTRIBUTION: One species known from South Africa (Smit 2005).

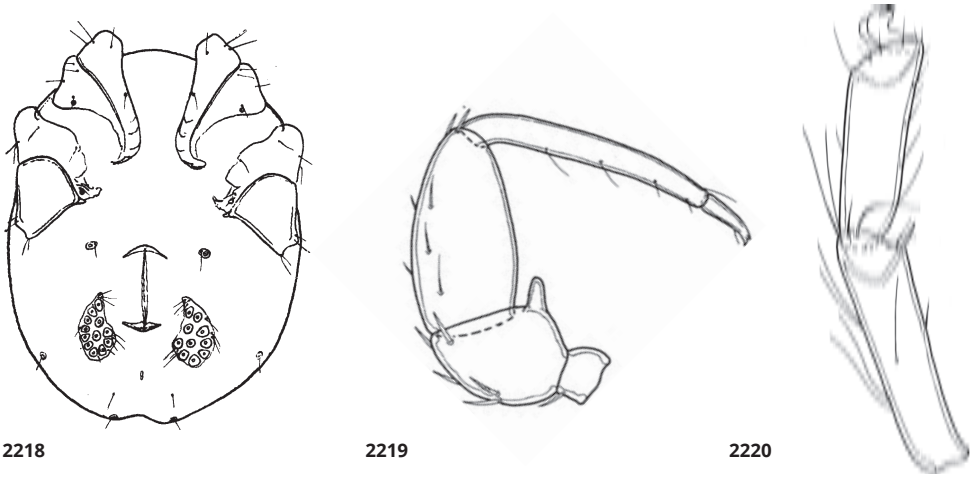
Genus *Polyhygrobatella* Lundblad, 1954

(Figs. 1786-1788, 2221-2223)

1954 *Polyhygrobatella* Lundblad, Arkiv för Zoologi (Serie 2) 5: 513.

1954 *Hesperohygrobates* Lundblad, Arkiv för Zoologi (Serie 2) 5: 518 – Cook (1980)

Type species: *Hygrobatella polypora* Lundblad, 1954



2218 **2219** **2220**

2218 *Plesiohygrobates pectinipalpis* K. Viets, venter female (after K. Viets 1956c)

2219 *Plesiohygrobates pectinipalpis* K. Viets, palp female (after Cook 1974)

2220 *Plesiohygrobates pectinipalpis* K. Viets, I-leg-5-6 male (after Cook 1974)

DIAGNOSIS: Glandularia of the posterior coxal group shifted anteriorly and appearing to lie on Cx-III. Genital field lying terminal and with numerous acetabula. P4 with a peg-like seta on medial surface. Legs without swimming setae. Male: Idiosoma with a well-developed dorsal shield. Gnathosoma broadly fused with the coxae. Cx-I fused medially, all coxae united by secondary sclerotization, secondary sclerotization present between Cx-IV and genital field (Fig. 1787). Gonopore narrow and with raised ridges along each side on the genital plates (Fig. 2221). P2 with a greatly enlarged ventral projection, P2 and P3 without denticles (Fig. 1786). IV-leg-4 anterodorsally with a row of stout setae, IV-leg-5 and especially IV-leg-6 narrowed proximally (Fig. 1788). Female: Idiosoma without extensive secondary sclerotization. Gnathosoma separated from Cx-I. Coxae in four groups, anterior coxae tapering posteriorly (Fig. 2222). Genital field without ridges. P2 slightly projecting ventrally, P2 and P3 with numerous small denticles (Fig. 2223). Fourth leg not modified,

HABITAT: Streams.

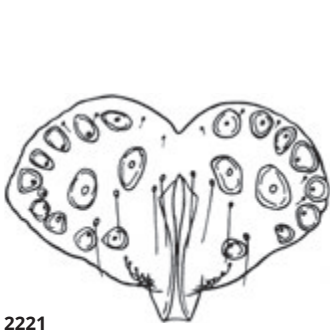
DISTRIBUTION: One species known from Colombia.

Genus *Procorticacarus* K.O. Viets, 1978

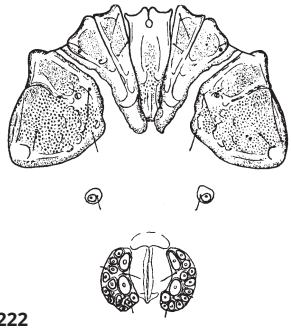
(Figs. 113, 1886, 1892-1893, 1927, 2224-2230)

1978 *Procorticacarus* K.O. Viets, Entomologica Scandinavica 9: 267 – Harvey (1998a).

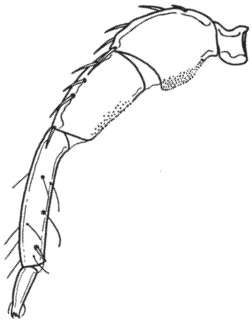
1984 *Notorheobates* Imamura, Human Science 2: 68 – Harvey (1998a).



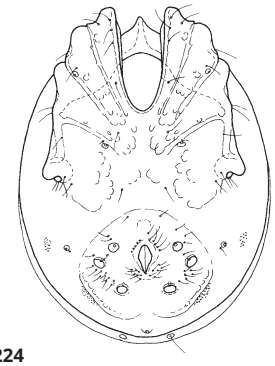
2221



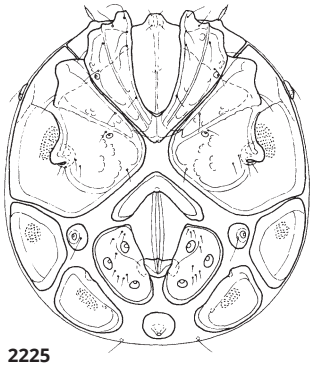
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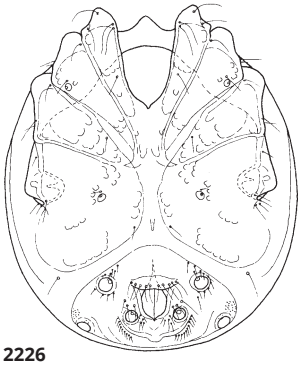
2223



2224



2225



2226

2221 *Polyhygrobatella polypora* (Lundblad), genital field male (after Cook 1974)

2222 *Polyhygrobatella polypora* (Lundblad), venter female (after Lundblad 1954)

2223 *Polyhygrobatella polypora* (Lundblad), palp female (after Lundblad 1954)

2224 *Procorticacarus gennadus* (Cook), venter male (after Cook 1986)

2225 *Procorticacarus gennadus* (Cook), venter female (after Cook 1986)

2226 *Procorticacarus hirsutus* (K.O. Viets), venter male (after Cook 1986)

Type species: *Corticacarus australicus* K.O. Viets, 1978

DIAGNOSIS: Dorsum without a dorsal shield but with several platelets varying in size from small postocularia platelets to a large plate covering most of the dorsum (Figs. 113, 1886, 1892, 1927). Openings of glandularia either rounded or slit-like, not heart-shaped. Venter with varying degrees of sclerotization up to the formation of a complete ventral shield. Gnathosoma separated from Cx-I. Cx-I either fused medially or separated. Cxgl-4 variable in position, from near (Figs. 2224, 2225) to away (Figs. 2226, 2227) from suture lines Cx-III/Cx-IV. Genital field usually with three or four, but occasionally up to six pairs of acetabula (Fig. 2228). Male gonopore relatively short and widened. P2 typically with a large ventral projection (Fig. 1893), occasionally reduced to a hump (Fig. 2229). P2 and P3 with numerous small denticles. P4 ventrally with a peg-like seta. Legs without swimming setae. I-leg-5 anteroventrally with hair-like setae only (Fig. 2230).

HABITAT: Streams.

DISTRIBUTION: Numerous species known from Australia (Cook 1986, Smit 2001, 2015b, Pesic & Smit 2009b), New Guinea (Wiles 1994) and New Caledonia (Smit 2015b).

Genus *Proboscibates* Smit, 2015

(Figs. 1887, 2231-2234)

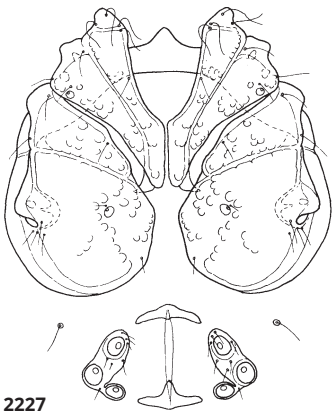
2015 *Proboscibates* Smit, Acarologia 55: 431.

Type species: *Proboscibates tullyensis* Smit, 2015

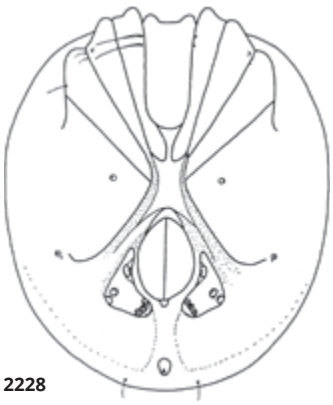
DIAGNOSIS: (Male only) Idiosoma with four large plates, anteromedial and posteromedial plates unpaired, central plates paired (Fig. 2231). Anterodorsal part of ventral shield with a short medial projection. Ventral shield present. Gnathosoma attached to a protrusable tube. Chelicera stylet-like. Cx-I medially fused, suture lines of coxae incomplete, Cx-IV without posterior suture lines. Cxgl-4 located near insertions of fourth legs, distanced from suture line Cx-III/Cx-IV (Fig. 1887). Anterior to fourth leg sockets a short ridge. Genital field on a short posterior projection of the idiosoma, with three pairs of acetabula (Fig. 2232). P2 and P3 without ventral projections and denticles. Ventral margin of P4 with distally located hair-like seta (Fig. 2233). Legs without swimming setae. I-leg-5 ventrodistally with a hair-like seta (Fig. 2234).

HABITAT: Streams.

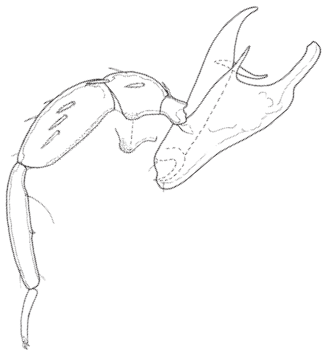
DISTRIBUTION: One species known from eastern Australia.



2227



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2227 *Procorticacarus hirsutus* (K.O. Viets), venter female (after Cook 1986)

2228 *Procorticacarus piriformis* Smit, venter female (after Smit 2001)

2229 *Procorticacarus cramerae* (Cook), gnathosoma + palp male (after Cook 1986)

Genus *Pseudoaustraliobates* Smit, 2009

(Figs. 1863, 1864, 2235-2237)

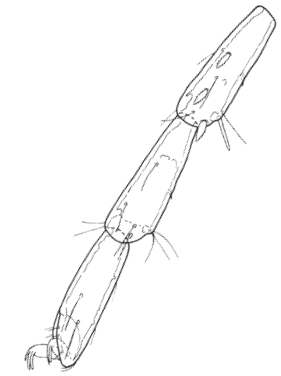
2009 *Pseudoaustraliobates* Smit, Zootaxa 2114: 66.

Type species: *Pseudoaustraliobates flindersi* Smit, 2009

DIAGNOSIS: Idiosoma soft, membranous parts of integument with small papillae. Gnathosoma separated from Cx-I, with a moderately long anchoral process. Coxae in four groups, Cx-I separated medially. Posterior margin of Cx-IV with a short projection, apodemes of Cx-IV almost reaching Cxgl-4, the latter lying somewhat away from suture line Cx-III/Cx-IV (Figs. 1863, 2235). Genital field with three pairs of acetabula; male gonopore wide (Fig. 2236). P2 without ventral projection and with minute denticles, P3 with a bulge with denticles (Fig. 1864). P4 with small setal tubercles, anteromedially with a stout seta. Legs without swimming setae. I-leg-5 anteroventrally with two short, stout setae (Fig. 2237).

HABITAT: Streams.

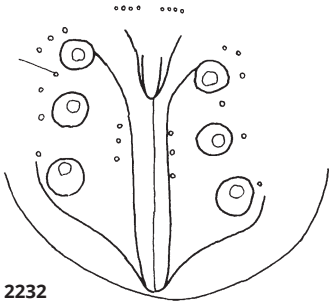
DISTRIBUTION: One species known from South Australia.



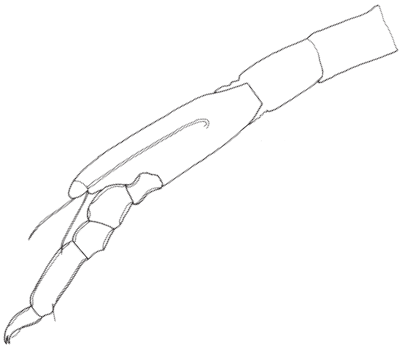
2230



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2230 *Procorticacarus aloonus* (Cook), I-leg-4-6 female (after Cook 1986)

2231 *Proboscibates tullyensis* Smit, dorsum male (after Smit 2015d)

2232 *Proboscibates tullyensis* Smit, genital field male (after Smit 2015d)

2233 *Proboscibates tullyensis* Smit, gnathosoma + palp male (after Smit 2015d)

2234 *Proboscibates tullyensis* Smit, I-leg-4-6 male (after Smit 2015d)

2235 *Pseudoaustraliobates flindersi* Smit, venter male (after Smit 2009b) Reproduced with permission from copyright holder

Genus *Rhynchaturus* Besch, 1964

(Figs. 1888, 2238-2242)

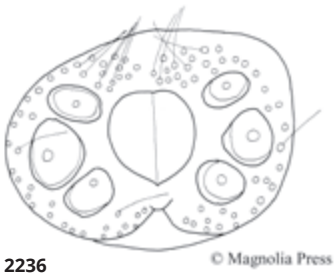
1964 *Rhynchaturus* Besch, Beiträge zur Neotropischen Fauna 3: 160.

Type species: *Rhynchaturus hexaporus* Besch, 1964

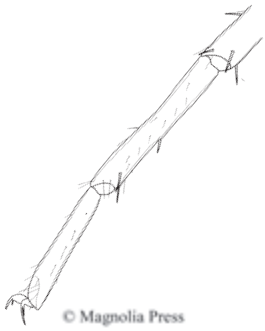
DIAGNOSIS: Dorsum with 5-6 pairs of closely fitting reticulate or stellate platelets, with a characteristic cuticular thickening (Fig. 1888). The most anterior pair bearing the postocularia. Lateral pairs of platelets always with glandularia, but in the medial pairs glandularia may be lacking. Anterodorsal part of ventral shield pointed or trifid. Gnathosoma on a protrusable tube (Fig. 2238). Cx-I and Cx-II extending beyond anterior idiosoma margin. Cxgl-4 away from suture line Cx-III/Cx-IV (Figs. 2239, 2240). Genital field with three or four pairs of acetabula. Palp without ventral projections or denticles, P4 with some ventrodistal hair-like setae only (Fig. 2241). Legs without swimming setae. I-leg-5 with a short straight or curved anteroventral seta (Fig. 2242) or with hair-like setae only.

HABITAT: Streams.

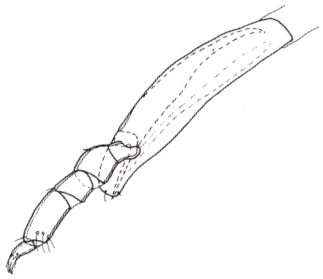
DISTRIBUTION: Several species known from Chile (Besch 1964, Schwoerbel 1986b, Cook 1988, Tuzovsky & Stolbov 2017) and Argentina (Cook 1980).


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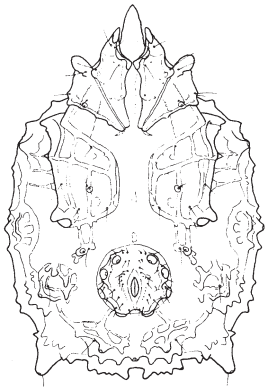
2236


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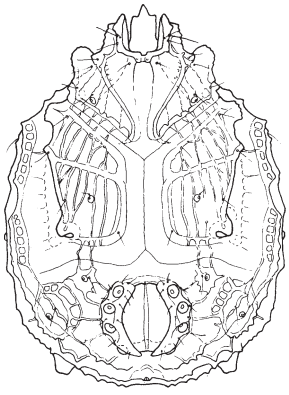
2237



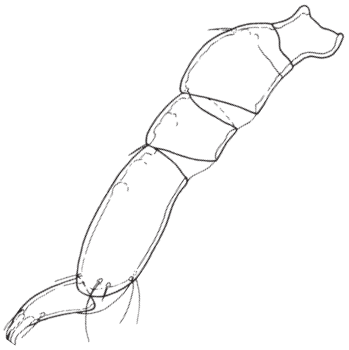
2238



2239



2240



2241

2236 *Pseudoaustraliobates flindersi* Smit, genital field male (after Smit 2009b) Reproduced with permission from copyright holder

2237 *Pseudoaustraliobates flindersi* Smit, I-leg-5-6 male (after Smit 2009b) Reproduced with permission from copyright holder

2238 *Rhynchaturus octoporus* Schwoerbel, gnathosoma + palp female (after Cook 1988)

2239 *Rhynchaturus projectus* Cook, venter male (after Cook 1988)

2240 *Rhynchaturus octoporus* Schwoerbel, venter female (after Cook 1988)

2241 *Rhynchaturus hexaporus* Besch, palp female (after Cook 1988)

Genus *Rhynchaustrobates* Cook, 1986

(Figs. 1860, 1889, 2243-2248)

1986 *Rhynchaustrobates* Cook, Memoirs of the American Entomological Institute 40: 123.
Type species: *Rhynchaustrobates projectus* Cook, 1986

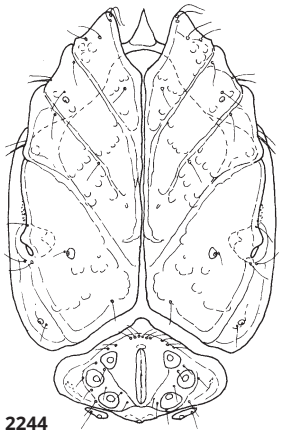
DIAGNOSIS: Sclerotization of dorsum varying from a series of small platelets (Figs. 1860, 1889) to almost completely covered by larger and smaller platelets (Fig. 2243) or a single large plate. Males with an extensive ventral sclerotization (usually with a complete ventral shield), females with variable ventral sclerotization. Anterodorsal part of ventral shield with a pointed hood-like structure. Gnathosoma attached to a protrusable tube. Cx-I either separated medially (Fig. 2244) or fused (Fig. 2245). Cxgl-4 located near middle of Cx-IV. Genital field with three or four pairs of acetabula. P2 without a ventral projection, P3 may have a ventral projection (Fig. 2246). P2 and P3 without denticles. P4 with hair-like setae only. Legs without swimming setae. I-leg-5 anteroventrally with hair-like setae only, anteromedially with a hair-like downturned seta (Fig. 2247).



2242



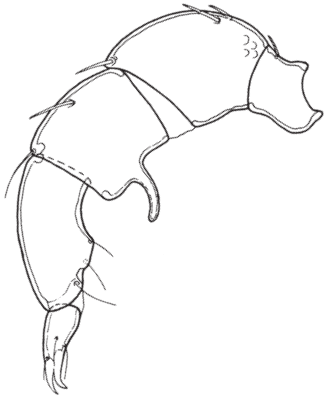
2243



2244



2245



2246



2247

2242 *Rhynchaturus cautinensis* Cook, I-leg-4-6 female (after Cook 1988)

2243 *Rhynchaustrobates* (*Victoriabates*) *geometricus* Cook, dorsum female (after Cook 1986)

2244 *Rhynchaustrobates* (*Rhynchaustrobates*) *dividus* Cook, venter male (after Cook 1986)

2245 *Rhynchaustrobates* (*Rhynchaustrobates*) *projectus* Cook, venter female (after Cook 1986)

2246 *Rhynchaustrobates* (*Rhynchaustrobates*) *tasmanicus* Cook, palp male (after Cook 1986)

2247 *Rhynchaustrobates* (*Rhynchaustrobates*) *projectus* Cook, I-leg-4-6 female (after Cook 1986)

KEY TO THE SUBGENERA

1 Dorsum soft and without dorsalia, anterodorsal part of ventral shield with a long pointed hood-like structure (Figs. 1860, 1889) Subgenus *Rhynchaustrobates* s.s.

- Dorsum soft but with expanded glandularia platelets occupying most of the surface; anterodorsal part of ventral shield with a short medially pointed hood-like structure (Fig. 2243) Subgenus *Victoriabates*

Subgenus *Rhynchaustrobates* s.s.

(Figs. 1860, 1889, 2244-2247)

DIAGNOSIS: Dorsum with small platelets only (Figs. 1860, 1889). Males with extensive ventral sclerotization, usually a complete ventral shield, females without a ventral shield. Anterodorsal part of ventral shield with a long pointed process (Figs. 1860, 1889). Genital field with three pairs of acetabula. Male, usually also female, with a ventral projection of P3 (Fig. 2246).

HABITAT: Streams.

DISTRIBUTION: Several species known from Australia (Cook 1986, Smit 2001, 2015a).

Subgenus *Victoriabates* Cook, 1986

(Figs. 2243, 2248)

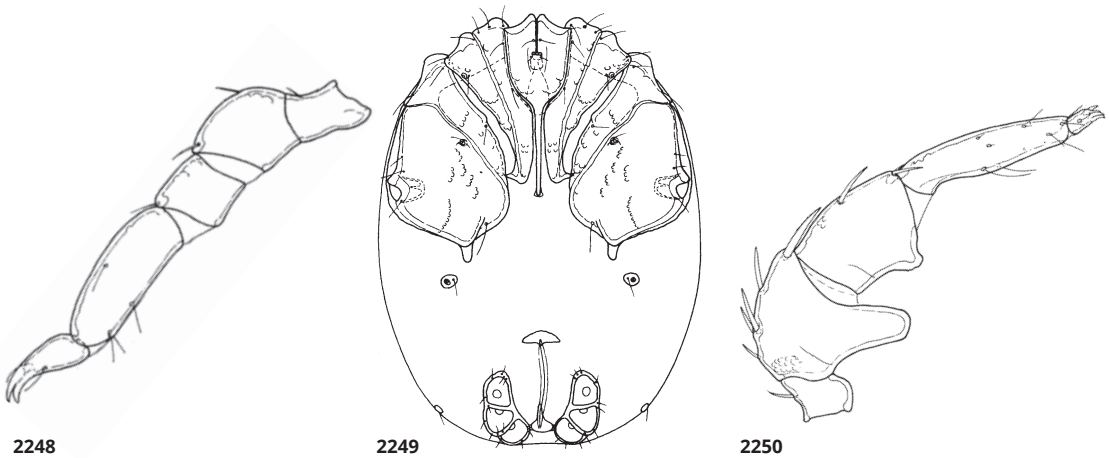
1986 *Victoriabates* Cook, Memoirs of the American Entomological Institute 40: 124.

Type species: *Rhynchaustrobates geometricus* Cook, 1986

DIAGNOSIS: Dorsum covered by expanded glandularia platelets or a single large plate. Anterodorsal part of ventral shield with a short medially pointed process (Fig. 2243). Genital field with three or four pairs of acetabula. P3 without ventral projection (Fig. 2248).

HABITAT: Streams.

DISTRIBUTION: Three species known from Australia (Cook 1986, Smit 2015a).



2248 **2249** **2250**

2248 *Rhynchaustrobates* (*Victoriabates*) *geometricus* Cook, palp female (after Cook 1986)

2249 *Schizobates disjunctus* (Walter), venter female (after Cook 1988)

2250 *Schizobates clanopus* Cook, palp male (after Cook 1988)

Genus *Schizobates* Thor, 1927

(Figs. 1874, 1875, 2249-2251)

1927 *Schizobates* Thor, Norsk Entomologisk Tidskrift 2: 123.

Type species: *Hygrobates disjunctus* Walter, 1925

DIAGNOSIS: Idiosoma soft. Gnathosoma separated from Cx-I, with a long anchoral process. Posterior margin of Cx-IV with short projections and short apodemes. Cxgl-4 located near suture line Cx-III/Cx-IV (Fig. 2249). Genital field with three pairs of acetabula. Male genital field closely flanked by a pair of glandularia (Fig. 1874). P2 and P3 with or without ventral projections (Figs. 2250, 2251), P2 and P3 without denticles, P4 ventrally with two hair-like setae. Legs with swimming setae. I-leg-5 anteroventrally with one stout seta, anteromedially without a hair-like downturned seta (Fig. 1875).

HABITAT: Standing waters (lakes, ponds), streams.

DISTRIBUTION: Four species described from South America (Argentina, Cook 1980; Chile, Besch, 1964, Cook 1988).

Genus *Scutobates* Cook, 1966

(Figs. 1810, 2252-2254)

1966 *Scutobates* Cook, Memoirs of the American Entomological Institute 6: 115 – Smit & Clavier (2019).

Type species: *Hygrobates ovalis* Cook, 1966

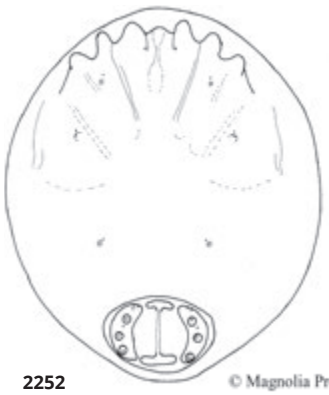
DIAGNOSIS: Idiosoma completely sclerotized except for an area surrounding the genital field; dorsal furrow absent. Gnathosoma fused with Cx-I. Cx-I fused medially. Posterior margin of Cx-IV obliterated. Cxgl-4 located near suture line Cx-III/Cx-IV (Fig. 1810). Genital field with three pairs of acetabula. Gonopore and acetabula small in both sexes, occupying only a small area of genital field (Figs. 1810, 2252). Palp without pronounced ventral projections, P2 and P3 with or without small denticles (Fig. 2253). Legs without swimming setae. I-leg-5 anteroventrally with two stout setae, anteromedially without a hair-like downturned seta (Fig. 2254).

HABITAT: Streams.

DISTRIBUTION: Two species known, one from Liberia (Cook 1966) and one from French Guiana (Smit & Clavier 2019).



2251



2252

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2253

2251 *Schizobates disjunctus* (Walter), palp female (after Cook 1988)

2252 *Scutobates guianaensis* Smit & Clavier, venter female (after Smit & Clavier 2019) Reproduced with permission from copyright holder

2253 *Scutobates ovalis* (Cook), palp male (after Cook 1974)

Genus *Sinhaladwipabates* Gledhill & Wiles, 1997

(Figs. 1782, 1783, 2255-2258)

1997 *Sinhaladwipabates* Gledhill & Wiles, Archiv für Hydrobiologie, Supplement 107: 522.
Type species: *Sinhaladwipabates kumariae* Gledhill & Wiles, 1997

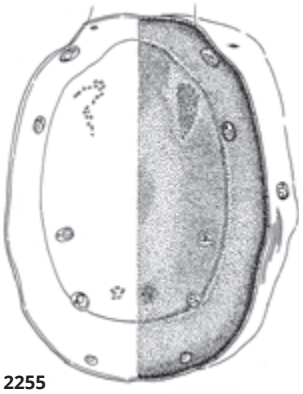
DIAGNOSIS: (Female only) Idiosoma with dorsal and ventral shields. Dorsal shield with a central area (dorsal plate) with two pairs of glandularia (Fig. 2255). Gnathosoma separated from coxae, with short base and with long, curved rostrum (Fig. 1782), dorsally of rostrum 1-2 long ventrodistal setae. Cheliceral claw strongly curved, longer than basal segment (Fig. 2256). Cx-I fused medially, extending posteriorly beyond fourth leg sockets. Suture line Cx-II/Cx-III incomplete, not reaching midline (Fig. 2257). Genital field with four pairs of acetabula, located in an inverse V-shaped bay of the ventral shield. P4 with a stout, distolateral seta and two long ventral setae (Fig. 2258). Legs with a few swimming setae. I-leg-5 without distal curved setae, I-leg-6 not bowed (Fig. 1783).

HABITAT: Streams.

DISTRIBUTION: Two species known, one from Sri Lanka (Gledhill & Wiles 1997) and one from Thailand (Smit 2018c).



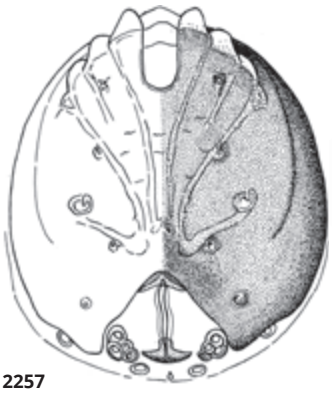
2254



2255



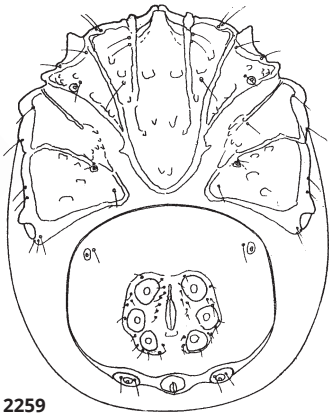
2256



2257



2258



2259

2254 *Scutobates guianaensis* Smit & Clavier, I-leg-4-6 female (after Smit & Clavier 2019) Reproduced with permission from copyright holder

2255 *Sinhaladwipabates kumariae* Gledhill & Wiles, dorsum female (after Gledhill & Wiles 1997)

2256 *Sinhaladwipabates kumariae* Gledhill & Wiles, chelicera female (after Gledhill & Wiles 1997)

2257 *Sinhaladwipabates kumariae* Gledhill & Wiles, venter female (after Gledhill & Wiles 1997)

2258 *Sinhaladwipabates kumariae* Gledhill & Wiles, palp female (after Gledhill & Wiles 1997)

2259 *Sterkspruitia ovalis* Cook, venter male (after Cook 2003)

Genus *Sterkspruitia* Cook, 2003

(Figs. 1819, 1823, 1824, 2259-2263)

2003 *Sterkspruitia* Cook, International Journal of Acarology 29: 242.

Type species: *Sterkspruitia ovalis* Cook, 2003

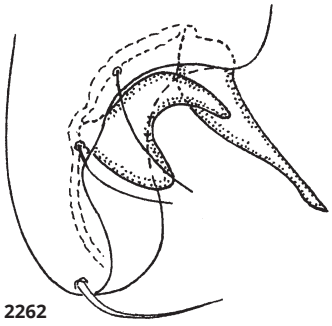
DIAGNOSIS: Dorsal and ventral shields present. Dorsal shield of male composed of three pairs of large plates, each bearing a glandularium, the middle pair also with the postocularia (Fig. 1824). Dorsal shield of female composed of four pairs of large plates, each with a glandularium (Fig. 2260). Gnathosoma broadly fused with Cx-I. Coxae in three groups, Cx-I fused medially. Cxgl-4 located near suture line Cx-III/Cx-IV. Genital field of male with three pairs of acetabula on a plate separated from ventral shield by articular membrane (Fig. 2259). Genital field of female composed of two plates each with three acetabula. Anterior to these platelets a single platelet flanked by pair of glandularia on a platelet (Fig. 2261). All these sclerites separated from ventral shield by articular membrane. Palp segments long and narrow, with P3 of approximately same length as P4. P2 with a ventral projection, ventral margin of P3 either straight (Fig. 1819) or bulging (Fig. 2263). Legs without swimming setae. I-leg-5 enlarged and terminating in two stout, highly modified setae; I-leg-5 anteromedially with a downturned hair-like seta (Figs. 1823, 2262).



2260



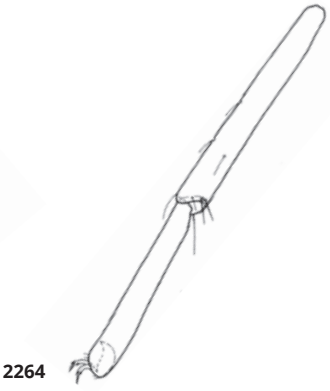
2261



2262



2263



2264



2265

2260 *Sterkspruitia comorosensis* Pešić & Smit, dorsum female (after Pešić et al. 2018c)

2261 *Sterkspruitia comorosensis* Pešić & Smit, venter female (after Pešić et al. 2018c)

2262 *Sterkspruitia ovalis* Cook, modified setae at distal end of I-leg-5 male (after Cook 2003)

2263 *Sterkspruitia comorosensis* Pešić & Smit, palp female (after Pešić et al. 2018c)

2264 *Stylohygrobates longipalpis* K. Viets, I-leg-5-6 female (after Cook 1974)

2265 *Subcorticacarus digitatus* Lundblad, dorsum female (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: Two species known from Africa (South Africa, Cook 2003, Smit 2017c; Comoros, Pešić et al. 2015a, 2018c).

Genus *Stylohygrobates* K. Viets, 1935

(Figs. 1881, 1882, 2264)

1935 *Stylohygrobates* K. Viets, Zoologischer Anzeiger 112: 275.

Type species: *Stylohygrobates longipalpis* K. Viets, 1935

DIAGNOSIS: (Female only) Idiosoma soft, glandularia platelets not enlarged. Gnathosoma separated from Cx-I, with a short anchoral process. Cx-I separated medially. Cxgl-4 distanced from suture line Cx-III/Cx-IV (Fig. 1882). Insertions of fourth legs lying somewhat lateral to the insertions of third legs. Genital field with three pairs of acetabula. Cxgl-2 lying lateral to genital field. Palp slender, P2 and P3 without ventral projections or denticles, P4 with a proximal peg-like seta (Fig. 1881). Legs without swimming setae. I-leg-5 anteroventrally with two hair-like setae, mediodistally with a straight hair-like seta (Fig. 2264).

HABITAT: Standing waters (ditches).

DISTRIBUTION: One species known from Brazil.

Genus *Subcorticacarus* Lundblad, 1937

(Figs. 1878-1880, 2265)

1937 *Subcorticacarus* Lundblad, Zoologischer Anzeiger 118: 252.

Type species: *Subcorticacarus digitatus* Lundblad, 1937

DIAGNOSIS: (Female only) Dorsum with three large unpaired plates and a pair of platelets flanking the middle plate (Fig. 2265). Gnathosoma separated from Cx-I, with a small anchoral process and two pairs of pointed posterodorsal projections. Coxae fused into a single group. Cxgl-4 located near suture line Cx-III/Cx-IV. Insertions of fourth legs lying medial to the insertion of the third legs; a ridge on each side extending anteriorly from the area of insertions of the fourth legs (Fig. 1880). A pair of glandularia lying far distanced anteriorly of genital field, near posterior margin of Cx-IV. Genital field with three pairs of acetabula. P2 with a ventral projection, P2 and P3 with denticles, P4 with a peg-like seta located on a well-developed lateral tubercle (Figs. 1878, 1879). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: Two species known from Santa Catharina and Rio States, Brazil.

Genus *Szalayella* Lundblad, 1954

(Figs. 1829, 1830, 2266-2269)

1954 *Szalayella* Lundblad, Arkiv för Zoologi (Serie 2) 5: 563 – Cook (1980).

Type species: *Szalayella incisa* Lundblad, 1954

DIAGNOSIS: Dorsum of male with an entire dorsal plate including two pairs of glandularia and the postocularia (Fig. 1829). Dorsum of female with three pairs of platelets and an unpaired posteromedial plate, anterior pair with the postocularia and without glandularia (Fig. 1830). Gnathosoma fused with Cx-I. Venter of male with a ventral shield (Fig. 2266), venter of female with extensive sclerotization posterior to posterior suture lines of Cx-IV (Fig. 2267). Coxae fused into one group in male, in three groups in female. Cx-I fused medially. Cxgl-4 lying at the anterior

end of a forked suture line. Genital field with three or four pairs of acetabula. Genital field of male included into the ventral shield. P2 with anteroventral projection, P3 and P3 without denticles. P4 with a small mediodistal peg-like seta (Fig. 2268). Legs without swimming setae. I-leg-5 without downturned seta (Fig. 2269).

HABITAT: Streams.

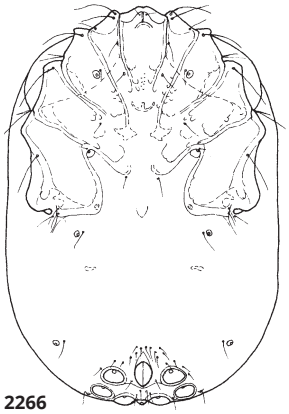
DISTRIBUTION: Three species known from South America (Colombia; Argentina, Cook 1980; Chile, Tuzovskij & Stolbov 2016b).

Genus *Tasmanobates* Cook, 1986

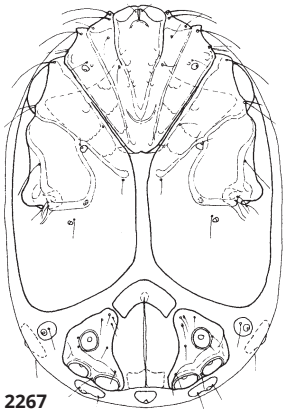
(Figs. 1862, 2270-2273)

1986 *Tasmanobates* Cook, Memoirs of the American Entomological Institute 40: 130.

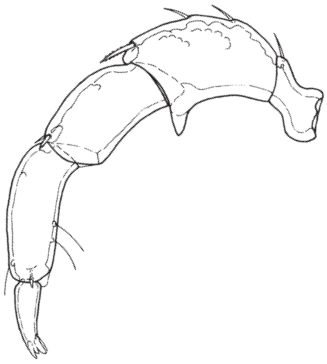
Type species: *Tasmanobates scutatus* Cook, 1986



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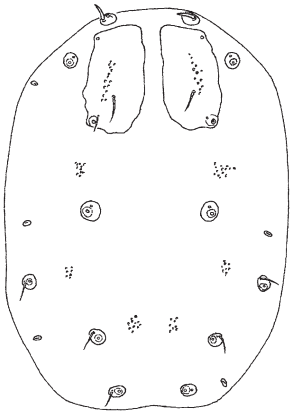
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2266 *Szalayella lundbladi* Cook, venter male (after Cook 1988)

2267 *Szalayella lundbladi* Cook, venter female (after Cook 1988)

2268 *Szalayella lundbladi* Cook, palp male (after Cook 1988)

2269 *Szalayella lundbladi* Cook, I-leg-4-6 male (after Cook 1988)

2270 *Tasmanobates scutatus* Cook, dorsum female (after Cook 1986)

2271 *Tasmanobates separatus* Pesic & Smit, dorsum female (after Pesic & Smit 2009b) Reproduced with permission from copyright holder

DIAGNOSIS: (Female only) Dorsum with either a large plate bearing the pre- and postocularia and three pairs of glandularia (Fig. 2270), or with a pair of smaller platelets with the pre- and postocularia and one pair of glandularia (Fig. 2271). Gnathosoma separated from Cx-I, with a well-developed anchoral process. Coxae either fused or separated on their respective sides, Cx-I separated medially. Cxgl-4 located near suture lines Cx-III/Cx-IV. Cx-IV without apodemes extending anteriorly from posterior projections (Fig. 1862). Genital field small, with three pairs of acetabula. Gonopore much longer than genital field. Palp without ventral projections or denticles (Fig. 2272). Legs without swimming setae. I-leg-5 with distoventrally either with a pair of stout, pointed setae or with one club-shaped seta; a mediodistal hair-like downturned seta may be present (Fig. 2273).

HABITAT: Streams.

DISTRIBUTION: Two species known from Tasmania, Australia (Cook 1986, Pesic & Smit 2009b.

Genus *Tetrabates* Thor, 1922

(Figs. 1835, 1876, 2274-2279)

1922 *Tetrabates* Thor, Nyt Magazin for Naturvidenskaberne 61: 117.

1949 *Africobates* Lundblad, Exploration du Parc National Albert, 2. Mission Damas 18: 43.

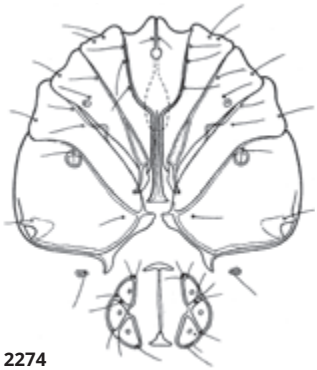
Type species: *Hygrobates williamsoni* K. Viets, 1913



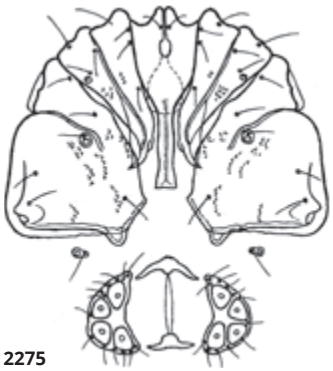
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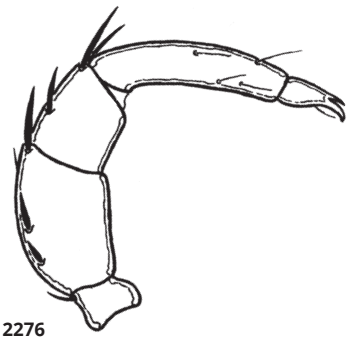
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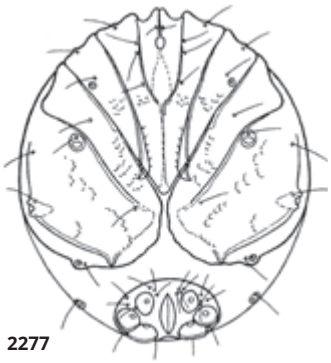
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2272 *Tasmanobates scutatus* Cook, palp female (after Cook 1986)

2273 *Tasmanobates scutatus* Cook, I-leg-4-6 female (after Cook 1986)

2274 *Tetrabates* (*Liberiobates*) *bomiensis* Cook, venter female (after Cook 1974)

2275 *Tetrabates* (*Tetrabates*) *szalayi* (Lundblad), venter female (after Cook 1974)

2276 *Tetrabates* (*Tetrabates*) *szalayi* (Lundblad), palp female (after Cook 1974)

2277 *Tetrabates* (*Liberiobates*) *bomiensis* Cook, venter male (after Cook 1974)

DIAGNOSIS: Idiosoma soft. Gnathosoma fused slightly or moderately with Cx-I in male (Fig. 1835), separated in female with a long anchoral process (Figs. 2274, 2275). Cx-I fused medially in male, separated in female. Posterior margin of Cx-IV with short projections which may be hidden in secondary sclerotization, with well-developed apodemes or series of muscle scars extending anteriorly from these projections. Cxgl-4 near suture lines Cx-III/Cx-IV. Genital field with three or four pairs of acetabula. P2 without a ventral projection, P2 and P3 with (Fig. 2278) or without (Fig. 2276) denticles. P4 without a stout seta. Legs without swimming setae or with a single swimming seta on III- and IV-leg-5. I-leg-5 with two stout distoventral setae and a mediodistal hair-like downturned seta (Figs. 1876, 2279). I-leg-6 not bowed.

KEY TO THE SUBGENERA

1 Suture lines Cx-III/Cx-IV more or less complete, extending well medial to Cxgl-4; genital field with three pairs of acetabula (Fig. 2274) Subgenus *Liberiobates*

- Suture lines Cx-III/Cx-IV incomplete, ending near Cxgl-4; genital field with four pairs of acetabula (Fig. 2275) Subgenus *Tetrabates* s.s.

Subgenus *Tetrabates* s.s.

(Figs. 1835, 1876, 2275, 2276)

DIAGNOSIS: Gnathosoma of male broadly fused with Cx-I (Fig. 1835). Suture lines Cx-III/Cx-IV incomplete, ending near Cxgl-4. Genital field with four pairs of acetabula (Fig. 2275).

HABITAT: Streams.

DISTRIBUTION: Two species known from Africa (Congo; Cameroon; Liberia, Cook 1966; Namibia, Smit 2005).

Subgenus *Liberiobates* Cook, 1974

(Figs. 2274, 2277-2279)

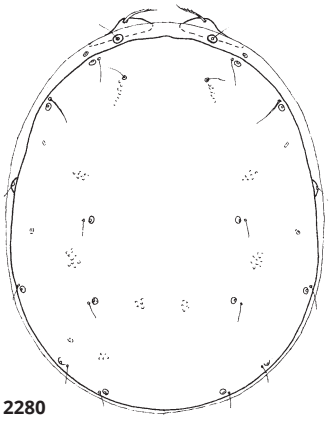
1974 *Liberiobates* Cook, Memoirs of the American Entomological Institute 21: 208.
Type species: *Diversibates bomiensis* Cook, 1966



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2278 *Tetrabates* (*Liberiobates*) *bomiensis* Cook, palp male (after Cook 1974)

2279 *Tetrabates* (*Liberiobates*) *bomiensis* Cook, I-leg-5-6 female (after Cook 1974)

2280 *Tetrahygrobatella chilensis* (Besch), dorsum male (after Cook 1988)

DIAGNOSIS: Gnathosoma of male narrowly joined with (Fig. 2277) Cx-I. Suture lines Cx-III/Cx-IV more or less complete, extending well over the level of Cxgl-4 (Fig. 2274). Genital field with three pairs of acetabula.

HABITAT: Streams.

DISTRIBUTION: One species known from Liberia.

Genus *Tetrahygrobatella* Lundblad, 1954

(Figs. 1808, 1809, 2280-2283)

1954 *Tetrahygrobatella* Lundblad, Arkiv för Zoologi (Serie 2) 5: 512 – Cook (1980).

Type species: *Hygrobatella dictyoderma* Lundblad, 1954

DIAGNOSIS: Dorsal and ventral shields present in male (Fig. 2280), but absent in female (Fig. 2281). Gnathosoma with a very short posterior process; gnathosoma separate in female but may be (lightly) fused with Cx-I in male. Suture line Cx-III/Cx-IV extending to medial border of posterior coxal group. Cx-IV with medial border reduced to more or less a median angle. Cxgl-4 located in a Y-shaped apodeme formed by the suture line Cx-III/Cx-IV and the more posterior muscle attachment scar apodemes of Cx-IV (Fig. 1808); this Y-shaped structure may be somewhat broken up or very short (Fig. 1809). Genital field with three to five pairs of acetabula. P2 and P3 ventrally with numerous small denticles (Fig. 2282). Legs without swimming setae. I-leg-5 anteroventrally with a relatively stout seta (Fig. 2283).

HABITAT: Streams.

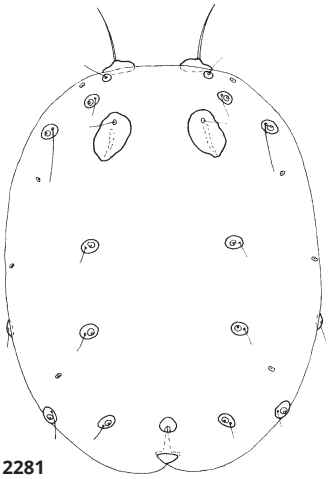
DISTRIBUTION: Several species known from South America (Chile, Besch 1964; Argentina, Cook 1980; Colombia).

Genus *Thoracohygrobates* Lundblad, 1936

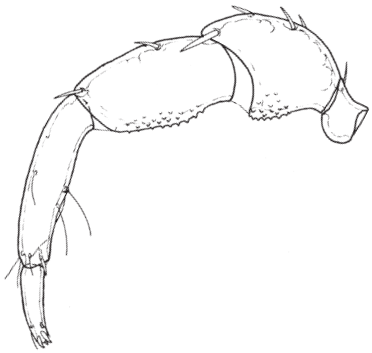
(Figs. 1811, 1813, 2284)

1936 *Thoracohygrobates* Lundblad, Zoologischer Anzeiger 116: 205.

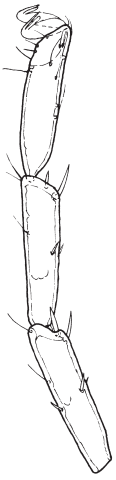
Type species: *Thoracohygrobates cancellatus* Lundblad, 1936



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2281 *Tetrahygrobatella chilensis* (Besch), dorsum female (after Cook 1988)

2282 *Tetrahygrobatella chilensis* (Besch), palp female (after Cook 1988)

2283 *Tetrahygrobatella chilensis* (Besch), I-leg-4-6 female (after Cook 1988)

DIAGNOSIS: (Male only) Idiosoma heavily sclerotized. Gnathosoma broadly fused with Cx-I (Fig. 1811). Coxae laterally extended to reach dorsal surface, leaving only a narrow strip of soft integument (Fig. 1813). Suture line Cx-II/Cx-III not extending far medially. Glandularia of Cx-IV located somewhat posterior to the suture line Cx-III/Cx-IV. Genital field with three pairs of acetabula. Palp without ventral projections. P4 with three well-developed setae near distal end (Fig. 2284). Legs with swimming setae. Legs without sexual dimorphism. First leg without particular modifications in the shape of segments and setae.

HABITAT: Streams.

DISTRIBUTION: One species known from Santa Catharina State, Brazil.

Genus *Tobelobates* Cook, 1986

(Figs. 2285-2288)

1986 *Tobelobates* Cook, Memoirs of the American Entomological Institute 40: 131.

Type species: *Tobelobates confusus* Cook, 1986

DIAGNOSIS: (Female only) Dorsal and ventral shields present. Dorsal shield bearing six pairs of glandularia and the postocularia (Fig. 2285). Gnathosoma lightly fused with Cx-I at extreme posterior end of gnathosomal bay. Coxae and genital field completely fused into the ventral shield. Cx-I fused medially and extending beyond anterior idiosoma margin. Cxgl-4 located near middle of Cx-IV (Fig. 2287). Genital field with three pairs of acetabula. Gonopore large and extending well anterior to the acetabula. A pair of glandularia placed close together on each side lateral to the first pair of acetabula. P2 with a short distoventral projection (Fig. 2288). Legs without swimming setae. I-leg-4 and -5 with three short stout setae (Fig. 2286), I-leg-5 without a mediodistal downturned seta.

HABITAT: Streams.

DISTRIBUTION: One species known from SE Australia.

Genus *Vietnobates* Pešić & Smit, 2016

(Figs. 1866, 2289, 2290)

2016 *Vietnobates* Pešić & Smit, Acarologia 56: 407.

Type species: *Vietnobates oryzae* Pešić & Smit, 2016



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2284 *Thoracohygrobates cancellatus* Lundblad, palp male (after Cook 1974)

2285 *Tobelobates confusus* Cook, dorsum female (after Cook 1986)

2286 *Tobelobates confusus* Cook, I-leg-4-6 female (after Cook 1986)

DIAGNOSIS: Idiosoma soft. Gnathosoma separated from Cx-I, with a long anchoral process extending beyond posterior end of Cx-I+II (Fig. 1866). Coxae in four groups, Cx-I separated medially. Cxgl-4 near suture lines Cx-III/Cx-IV. Posterior margin of Cx-IV with a very short projection, no apodemes extending anteriorly from these projections. Genital field with three pairs of acetabula. P2 with a short distoventral projection with a few denticles at its tip, P3 with a few denticles. P4 without peg-like setae or tubercles (Fig. 2289). Third and fourth legs with swimming setae. I-leg-5 distoventrally with two stout, pointed setae, I-leg-6 not bowed (Fig. 2290).

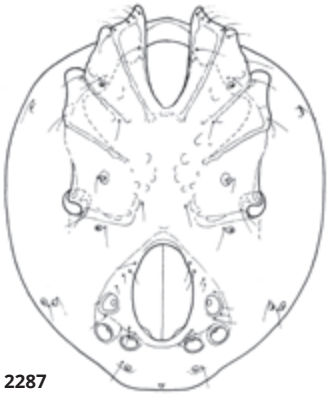
HABITAT: Standing waters (rice fields).

DISTRIBUTION: One species known from Vietnam.

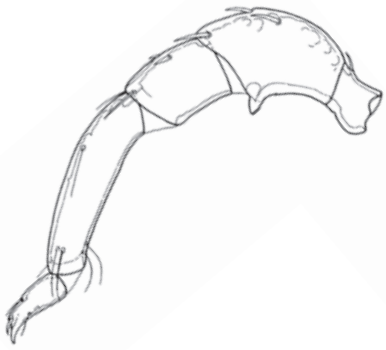
Genus *Zabobates* Cook, 1988

(Figs. 1856, 1858, 2291-2293)

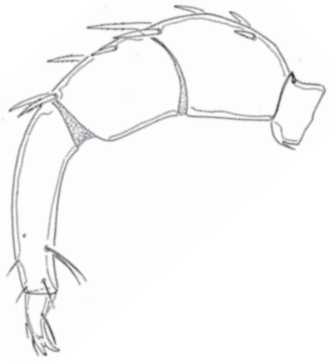
1988 *Zabobates* Cook, Memoirs of the American Entomological Institute 42: 89.
Type species: *Zabobates alphus* Cook, 1988



2287



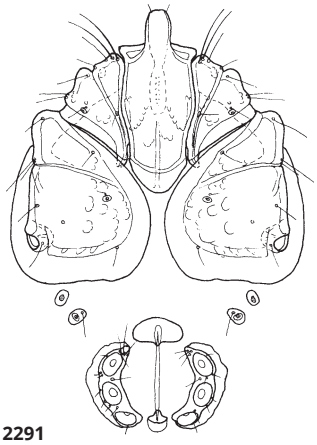
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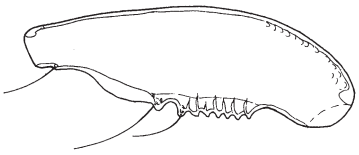
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2287 *Tobelobates confusus* Cook, venter female (after Cook 1986)
2288 *Tobelobates confusus* Cook, palp female (after Cook 1986)
2289 *Vietnobates oryzae* Pešić & Smit, palp female (after Pešić & Smit 2016)
2290 *Vietnobates oryzae* Pešić & Smit, I-leg-5-6 female (after Pešić & Smit 2016)
2291 *Zabobates facetus* Cook, venter female (after Cook 1988)
2292 *Zabobates gledhilli* Cook, P4 female (after Cook 1988)

DIAGNOSIS: Idiosoma soft. Gnathosoma with a large rostrum which extends well anterior to tips of Cx-I, separated from Cx-I, with a short, broad posterior process (Fig. 1856). Coxae in four groups, Cx-I separated medially, their tips with very long setae. Cxgl-4 away from suture line Cx-III/Cx-IV (Fig. 2291). Genital field with three pairs of acetabula. Male gonopore relatively wide. P2 with a long anteroventral projection. P2 and P3 with numerous fine ventral denticles (Fig. 1858). Ventral side of P4 with tubercles and ridges (Fig. 2292). Legs without swimming setae and sexual dimorphism. I-leg-5 anteroventrally with two stout setae or with hair-like setae (Fig. 2293).

HABITAT: Streams.

DISTRIBUTION: Three species known from Chile (Cook 1988).

Genus *Zelandobatella* Hopkins, 1975

(Figs. 1867, 1877, 2294-2296)

1975 *Zelandobatella* Hopkins, Journal of the Royal Society of New Zealand 5: 8.

Type species: *Zelandobatella naias* Hopkins, 1975

DIAGNOSIS: Idiosoma soft, reticulate with large, slightly raised areas, with small platelets. Dorsum with the postocularia each on a small platelet and three pairs of lateral platelets (Fig. 2294). Gnathosoma separated from Cx-I. Coxae in four groups, Cx-I separated medially. Cxgl-4 located near suture line Cx-III/Cx-IV (Fig. 2295). Genital field with three pairs of acetabula. Male gonopore a little widened (Fig. 1867). P2 without ventral projection and denticles, P3 with denticles, P4 with a large ventral extension with a hair-like seta (Fig. 1877). Legs without swimming setae. I-leg-5 distoventrally with a few hair-like setae, mediodistally with a hair-like downturned seta (Fig. 2296).

HABITAT: Streams.

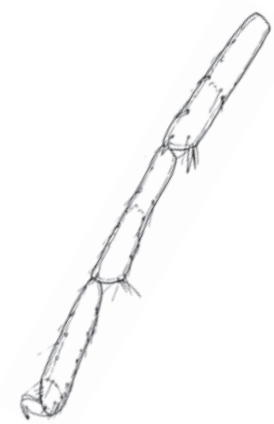
DISTRIBUTION: One species known from New Zealand (Cook 1983).

Genus *Zelandobates* Hopkins, 1966

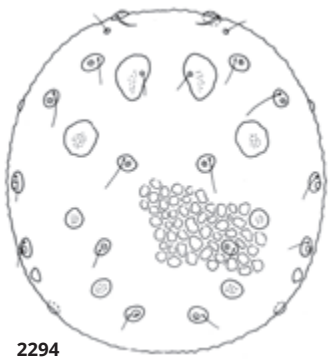
(Figs. 1915, 1916, 2297-2301)

1966 *Zelandobates* Hopkins, Transaction of the Royal Society of New Zealand, Zoology 8: 111.

Type species: *Zelandobates crinitus* Hopkins, 1966



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2293 *Zabobates alphus* Cook, I-leg-4-6 female (after Cook 1988)

2294 *Zelandobatella naias* Hopkins, dorsum male (after Cook 1983)

2295 *Zelandobatella naias* Hopkins, venter female (after Cook 1983)

DIAGNOSIS: Membranous parts of integument varying from smooth to rough and papillate. Dorsum of male with a large anteromedial plate including the postocularia and three pairs of glandularia (Fig. 2297), dorsum of female with a large anteromedial plate bearing the postocularia only (Fig. 2298). Posterior part of the male dorsum with a smaller median platelet and two lateral platelets, posterior part of dorsum of female with three pairs of glandularia sclerites, one of which is associated with muscle attachment platelets. Gnathosoma separated from Cx-I, with a small anchoral process. Coxae in three groups. Cx-I fused medially, Cx-IV without well-developed posterior projections. Cxgl-2 fused with Cx-II, Cxgl-4 located near suture line Cx-III/Cx-IV (Fig. 1915). Genital field with three pairs of acetabula, flanked by two pairs of muscle attachment platelets in all but one species. P2 without ventral projection, P3 may be bulging ventrally; P2 and P3 with denticles, P4 with a ventral extension with a hair-like seta, P4 without stout setae (Figs. 1916, 2300). Legs without swimming setae. I-leg-5 without stout setae, mediodistally with a downturned hair-like setae (Fig. 2301).

HABITAT: Streams, interstitial.

DISTRIBUTION: Four species known from New Zealand (Hopkins 1966, Cook 1983, Schwoerbel 1984).



2296



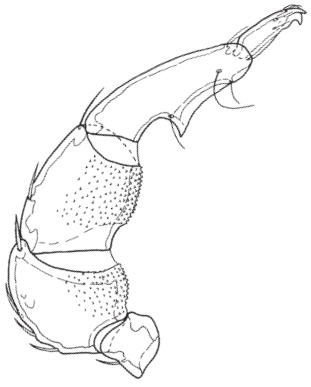
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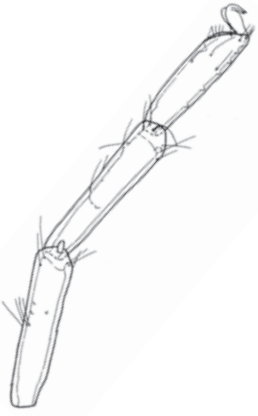
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2300



2301

2296 *Zelandobatella naias* Hopkins, I-leg-4-6 female (after Cook 1983)

2297 *Zelandobates crinitus* Hopkins, dorsum male (after Cook 1983)

2298 *Zelandobates crinitus* Hopkins, dorsum female (after Cook 1983)

2299 *Zelandobates crinitus* Hopkins, venter female (after Cook 1983)

2300 *Zelandobates clevatus* Cook, palp female (after Cook 1983)

2301 *Zelandobates crinitus* Hopkins, I-leg-4-6 female (after Cook 1983)

Family Lethaxonidae Cook, I.M. Smith & Harvey, 2000

2000 Lethaxonidae Cook, I.M. Smith & Harvey, Invertebrate Taxonomy 14: 441.

DIAGNOSIS: Idiosoma extremely flattened dorsoventrally. Dorsum covered by a large central plate with two pairs of glandularia and the postocularia, surrounded by smaller platelets (Fig. 63). Venter with a ventral shield incorporating coxal plates and genital field. Gnathosoma separated from Cx-I. Suture lines of coxae obliterated. Cxgl-2 located near posterior margin of Cx-II. Cx-IV with or without a pair of glandularia immediately posterior to insertion of fourth legs. Genital field with three pairs of glandularia arranged in an arc or triangles or 4-6 pairs arranged in an arc (Figs. 62, 2303). Palp usually with two stout setae on P4, highly modified in some species (Fig. 2304). Legs without swimming setae, with no, slight or strong sexual dimorphism. Claw sockets of legs large and deep, occupying more than half of dorsal surface of segment (Fig. 60).

KEY TO THE GENERA

1 Genital field with more than three pairs of acetabula (Fig. 2302) Genus *Lethaxonella*

\- Genital field with three pairs of acetabula 2

2 Genital field arranged in an arc or triangle (Fig. 2303); P5 not very slender (Figs. 2304-2306) Genus *Lethaxona*

\- Genital field arranged in a bowed line (Fig. 2307); P5 very slender in both sexes (Fig. 2308) Genus *Transitia*

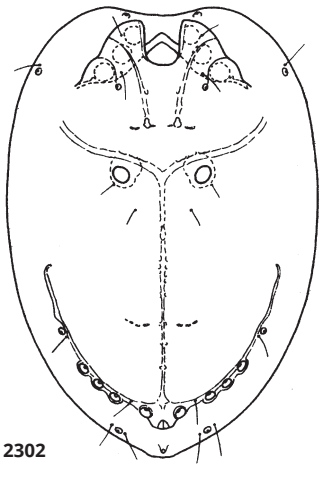
Genus *Lethaxona* K. Viets, 1932

(Figs. 60, 62, 63, 2303-2306, 2309, 2310)

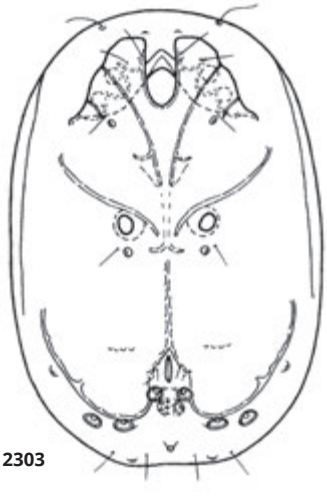
1932 *Lethaxona* K. Viets, Zoologischer Anzeiger 100: 296.

Type species: *Lethaxona pygmaea* K. Viets, 1932

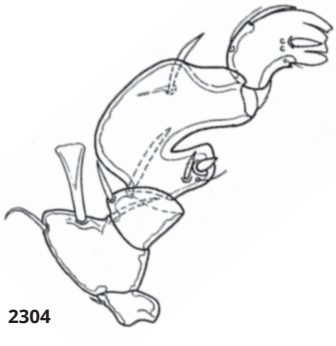
DIAGNOSIS: Cxgl-4 located posteriorly to insertions of fourth legs (Fig. 2303). Genital field with three pairs of glandularia arranged in an arc or a triangle. Palp with or without a strong sexual dimorphism.



2302



2303



2304

2302 *Lethaxonella argentinensis* Cook, venter male (after Cook 1980)

2303 *Lethaxona* (*Lethaxona*) *panduvarna* Cook, venter male (after Cook 1974)

2304 *Lethaxona* (*Lethaxona*) *panduvarna* Cook, palp male (after Cook 1974)

KEY TO THE SUBGENERA

1 Male palp exhibiting a strong sexual dimorphism, especially P4 (Fig. 2304); III-leg-3-4 with enlarged setae (Fig. 2309) Subgenus *Lethaxona*

- Male palp not exhibiting a strong sexual dimorphism (Fig. 2306); III-leg-3-4 without enlarged setae Subgenus *Eolethaxona*

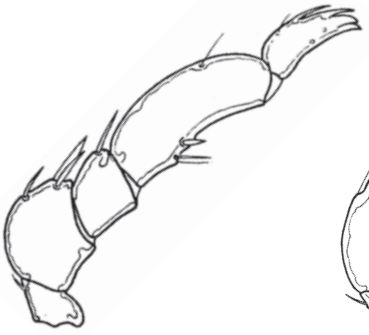
Subgenus *Lethaxona* s.s.

(Figs. 60, 62, 63, 2303-2305, 2309)

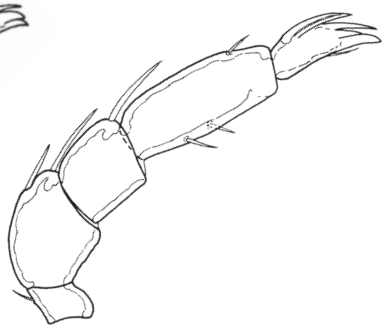
DIAGNOSIS: Posterior two pairs of acetabula away from first pairs in male (Fig. 2303). Male palp with a strong sexual dimorphism, P4 strongly bowed (Fig. 2304). Palp of female not modified (Fig. 2305). III-leg-3 and -4 of male with enlarged setae (Fig. 2309).

HABITAT: Interstitial, streams.

DISTRIBUTION: Several species known from Eurasia (India, Cook 1967), North America (Cook 1981b), East Africa and Japan (Imamura 1957a, 1977b).



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2305 *Lethaxona* (*Lethaxona*) *panduvarna* Cook, palp female (after Cook 1974)

2306 *Lethaxona* (*Eolethaxona*) *oregonensis* Cook, palp male (after Cook 1974)

2307 *Transitia carlosi* Valdecasas, venter male (after Valdecasas 2010)

2308 *Transitia carlosi* Valdecasas, palp male (after Valdecasas 2010)

2309 *Lethaxona* (*Lethaxona*) *panduvarna* Cook, III-leg-3-4 male (after Cook 1974)

2310 *Lethaxona* (*Eolethaxona*) *oregonensis* Cook, venter male (after Cook 1974)

Subgenus *Eolethaxona* Cook, 1963

(Figs. 2306, 2310)

1963 *Eolethaxona* Cook, American Midland Naturalist 70: 115.

Type species: *Lethaxona oregonensis* Cook, 1963

DIAGNOSIS: Male acetabula close together on their respective sides (Fig. 2310). Palp without sexual dimorphism (Fig. 2306). III-leg-3 and -4 without enlarged setae.

HABITAT: Interstitial.

DISTRIBUTION: One species known from North America.

Genus *Lethaxonella* Cook, 1963

(Fig. 2302, 2311-2314)

1963 *Lethaxonella* Cook, American Midland Naturalist 70: 118.

Type species: *Lethaxonella parva* Cook, 1963

DIAGNOSIS: Dorsal shield consisting of a large central plate surrounded by nine pairs of smaller platelets (Fig. 2311), the anterior pairs of which are fused medially in female (Fig. 2312). Seven pairs of these platelets bear glandularia. Cx-IV lacking glandularia (Fig. 2313). Genital field with 4-6 pairs of acetabula arranged in a single row flanking the gonopore, included in the ventral shield without a trace of a suture line (Fig. 2302). Palp of male and female equal in shape, P5 slender (Fig. 2314).

HABITAT: Interstitial.

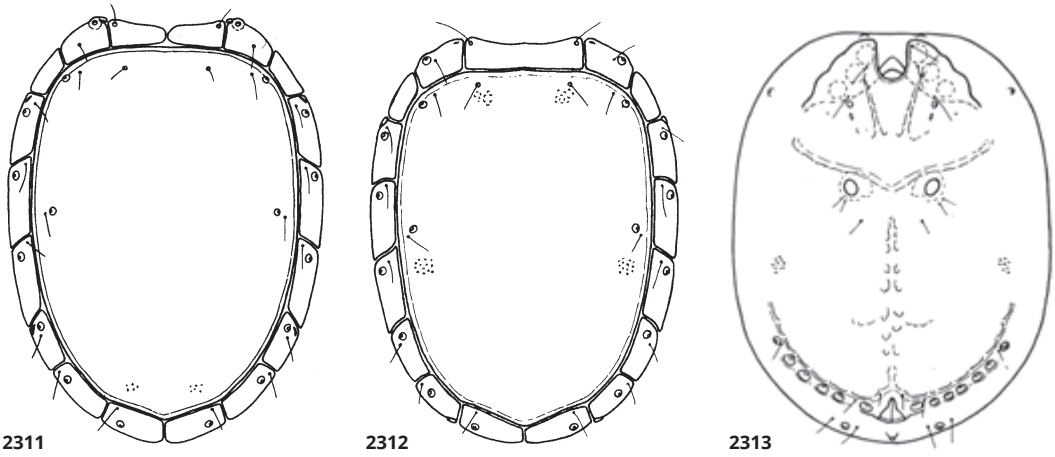
DISTRIBUTION: Two species known, one from North America (Cook 1963a) and one from Argentina (Cook 1980).

Genus *Transitia* Valdecasas, 2010

(Figs. 2307, 2308, 2315-2319)

2010 *Transitia* Valdecasas, Graellsia 66: 24.

Type species: *Transitia carlosi* Valdecasas, 2010



2311 **2312** **2313**

2311 *Lethaxonella argentinensis* Cook, dorsum male (after Cook 1980)

2312 *Lethaxonella parva* Cook, dorsum female (after Cook 1974)

2313 *Lethaxonella parva* Cook, venter female (after Cook 1974)

DIAGNOSIS: Anterior pairs of dorsal platelets separated in both sexes (Figs. 2315-2316). Suture lines of coxae obliterated. Cxgl-4 between insertions of Cx-IV and genital field. Genital field with three pairs of acetabula arranged in a bowed line (Fig. 2307). Palp without sexual dimorphism, P5 slender (Fig. 2308). Male I-leg-3 expanded ventrally (Fig. 2318), IV-leg-4-5 with two combed setae, IV-leg-3-5 with numerous stout setae (Fig. 2319). Legs of female not modified.

HABITAT: Streams.

DISTRIBUTION: One species known from Panama.

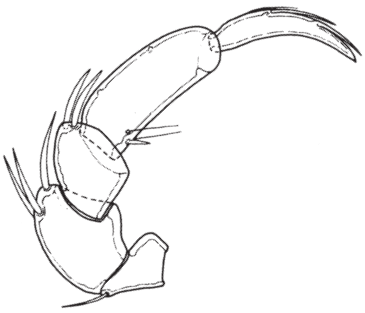
Family Pionidae Thor, 1900

1900 Pionidae Thor, Nyt Magazin for Naturvidenskaberne 38: 3.

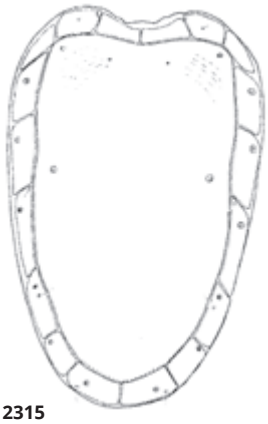
1900 Curvipedidae Thor, Zoologischer Anzeiger 38: 3.

1909 Acercidae Thor, Mémoires de l'Académie des Sciences, St. Pétersbourg, Classe Physico-Mathématique, (série 8) 18: 19.

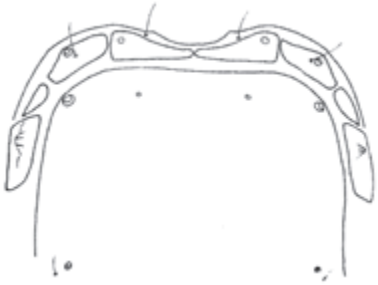
1923 Foreliidae Thor, Arbeiten der Biologischen Wolga-Station, Saratow 7: 46.



2314



2315



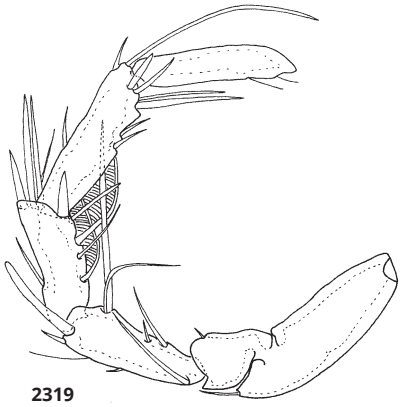
2316



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2318



2319

2314 *Lethaxonella argentinensis* Cook, palp male (after Cook 1980)

2315 *Transitia carlosi* Valdecasas, dorsum male (after Valdecasas 2010)

2316 *Transitia carlosi* Valdecasas, anterior part of dorsum female (after Valdecasas 2010)

2317 *Transitia carlosi* Valdecasas, venter female (part.) (after Valdecasas 2010)

2318 *Transitia carlosi* Valdecasas, first leg male (after Valdecasas 2010)

2319 *Transitia carlosi* Valdecasas, fourth leg male (after Valdecasas 2010)

1925 Nautarachnidae Walter, Internationale Revue der gesamten Hydrobiologie und Hydrographie 14: 45.

1942 Hydrochoreutidae K. Viets, Zoologischer Anzeiger 138: 210.

DIAGNOSIS: Membranous parts of integument typically smooth, rarely lineate or papillate. Muscle attachments often unsclerotized or developed as small platelets, but complete dorsal and ventral shields are occasionally formed. Gnathosoma separated from Cx-I, with or without anchoral process. Coxae usually in four, rarely in three groups or fused into a single group. Posterior apodemes of Cx-I short. Cx-III and Cx-IV without glandularia. One pair of glandularia located between Cx-IV and genital field. Posterior margins of Cx-IV usually with projections or apodemes. Genital plates of males generally fused into a single plate surrounding the gonopore, or at least fused posterior to the gonopore. Genital plates of females separate. Number of acetabula varying from three pairs to numerous. P4 usually with a distal peg-like seta in medial or medioventral position, but absent in *Nautarachna*. Legs with or without swimming setae. Third and fourth legs usually exhibiting sexual dimorphism.

KEY TO THE SUBFAMILIES

1 Dorsum in both sexes with two large plates (Fig. 2320); venter sclerotized (Fig. 2321); IV-leg-5 of male inflated, with a large curved seta (Fig. 2322) Subfamily Schminkeinae

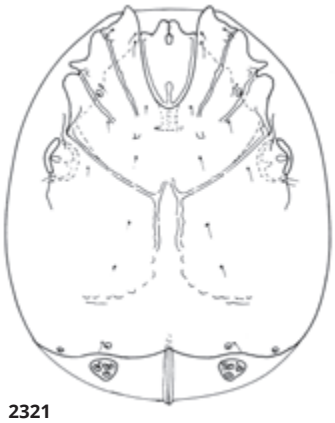
\- Dorsum without two large plates, if present, not divided in two plates; venter not completely sclerotized; IV-leg-5 of male not inflated 2

2 Genital field usually with three pairs of acetabula; if more than three pairs of acetabula are present, then IV-leg-4 of males is expanded (as in Fig. 2325) or with very large, blade-like setae (Fig. 2323)(NB In one multiacetabulate species, *Australotiphys barmutai* Harvey, these large blade-like setae are lacking); Cx-IV quadrangular or pentangular in shape, medial margin well developed (Fig. 2324); IV-leg-6 not or only slightly curved and without specialized setae (Fig. 2325) 3

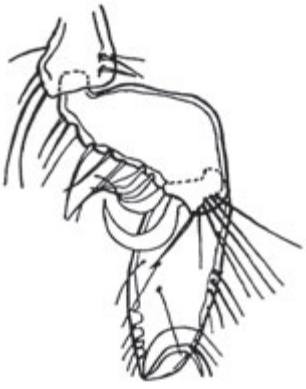
\- Genital field with more than three pairs of acetabula; if three pairs of acetabula are present, then females have a triangular Cx-IV with the medial margin reduced to a median angle (Fig. 2326) and male IV-leg-4 is not strongly inflated, male IV-leg-6 may be curved and with specialized peg-like setae (Fig. 2327) 4



2320



2321



2322

2320 *Schminkea pacifica* Schwoebel, dorsum female (after Cook 1992)

2321 *Schminkea pacifica* Schwoerbel, venter female (after Cook 1992)

2322 *Schminkea pacifica* Schwoerbel, IV-leg-4-5 male (after Schwoerbel 1984)

3 Palp extremely long and narrow, P4 bearing numerous spine-like setae (Fig. 2328); males with a petiole at posterior idiosoma margin (Fig. 2329) and III-leg-4 distally with two large, stout setae and a dorsodistal extension (Fig. 2330); female genital plates only weakly curved (Fig. 2324) Subfamily Hydrochoreutinae

- Palp not extremely long, P4 with only a few setae (Fig. 2331); males without a petiole, III-leg-4 not modified; female genital plates more strongly curved or triangular in shape (Fig. 2332) Subfamily Tiphyinae

4 Cx-II and Cx-III each with a strong, lateral seta (Fig 2333); P3 with a very long lateral seta (Fig. 2334); legs without sexual dimorphism Subfamily Huitfeldtiinae

- All setae on Cx-III and Cx-IV fine, not thickened (Fig. 2335); lateral seta on P3 short (Fig. 2336); third and fourth legs may be variously modified for sperm transfer 5



2323



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2328

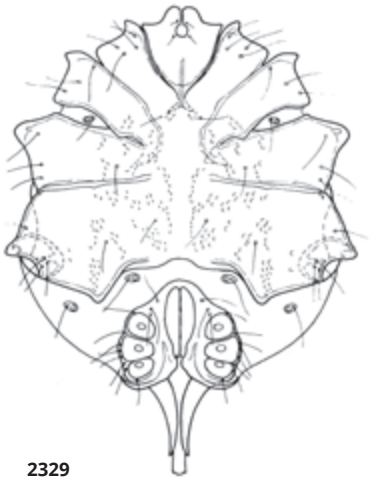
2323 *Australotiphys magnisetus* Cook, fourth leg male (after Cook 1986)
2324 *Hydrochoreutes intermedius* Cook, venter female (after Cook 1974)
2325 *Tiphys weaveri* Cook, fourth leg male (after Cook 1974)
2326 *Pionacercopsis vatrax* (Koch), venter female (after Gerecke et al. 2016)
2327 *Pionacercus leuckarti* Piersig, IV-leg-4-6 male (after Gerecke et al. 2016)
2328 *Hydrochoreutes intermedius* Cook, palp male (after Cook 1974)

5 Medial margin of Cx-IV in most taxa reduced to an angle (Fig. 2335); males with a longer medial margin of Cx-IV are characterized by a somewhat ventrally curved IV-leg-6 and bearing a series of peg-like setae in proximal part (Fig. 2337); gnathosoma with an anchoral process Subfamily Foreliinae

- Both Cx-III and Cx-IV with well-developed medial margins (Fig. 2338); gnathosoma with or without an anchoral process 6

6 Gnathosoma with a distinct anchoral process (Fig. 2339); male III-leg-6 enlarged in various ways, with (Figs. 2340-2341) or without (Fig. 2342) elongated claw; IV-leg-4 ventrally concave with associated peg-like setae (Fig. 2343) Subfamily Pioninae

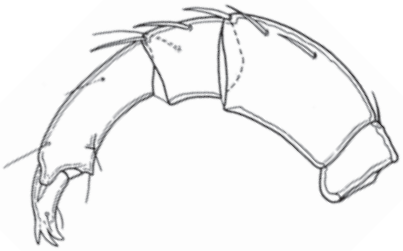
- Gnathosoma without anchoral process (Fig. 2344), male and female legs equal in shape Subfamily Najadicolinae



2329



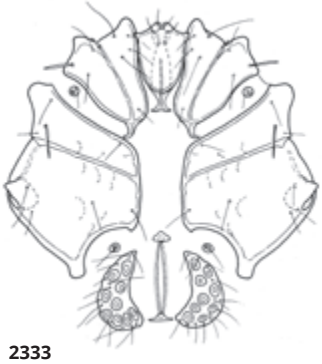
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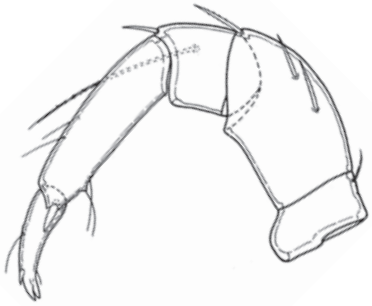
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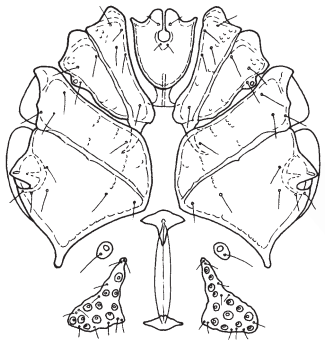
2329 *Hydrochoreutes intermedius* Cook, venter male (after Cook 1974)
2330 *Hydrochoreutes intermedius* Cook, III-leg-4 male (after Cook 1974)
2331 *Tiphys gracilipes* Cook, palp male (after Cook 1974)
2332 *Tiphys latipes* (Müller), venter female (after Gerecke et al. 2016)
2333 *Huitfeldtia rectipes* Thor, venter female (after Cook 1974)
2334 *Huitfeldtia rectipes* Thor, palp female (after Cook 1974)

Subfamily Foreliinae Thor, 1923

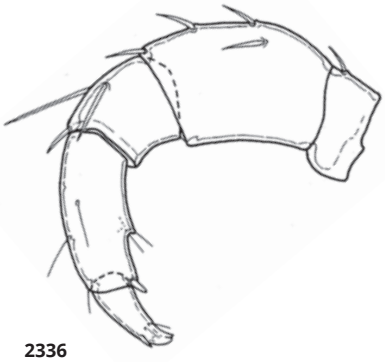
1923 Foreliinae Thor, Arbeiten der Biologischen Wolga-Station, Saratow 7: 46 – Gerecke (2014a); I.M. Smith et al (2015).

DIAGNOSIS: Membranous parts of integument smooth or lineated, sclerotization of muscle attachments varying from small dorsalia to extended dorsal and ventral shields. Anchoral process of gnathosoma well developed (Fig. 2362). Posterior apodemes of Cx-I varying from short to moderate long. Medial margins of Cx-IV generally reduced to median angles (Fig. 2335, always in multiacetabulate species). If medial margins of Cx-IV are developed, in females their posterior part is blunt or rounded, never sharp angled. Genital field with three to numerous pairs of acetabula; in males genital field along its whole anterior margin fused to Cx-IV. P4 bearing several ventral setae and a peg-like distomedial seta. Males with a simple IV-leg-5 but IV-leg-6 with a dorsal concavity flanked by two to numerous peg-like setae (Fig. 2347). Occasionally also IV-leg-4 and/or III-leg-6 modified in males.

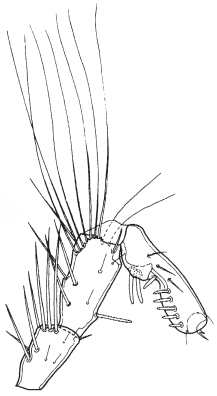
REMARKS: Previously the subfamily contained only multiacetabulate genera, but Gerecke (2014a) and I.M. Smith et al. (2015) shifted the genera *Pionacercopsis* and *Pionacercus* from the Tiphyinae to the Foreliinae.



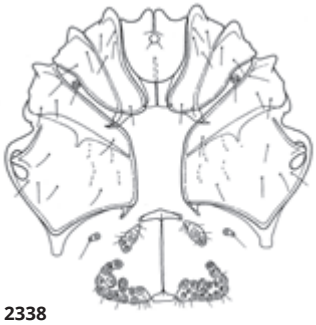
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2335 *Forelia floridensis* Cook, venter female (after Cook 1974)

2336 *Forelia floridensis* Cook, palp female (after Cook 1974)

2337 *Forelia floridensis* Cook, IV-leg-4-6 male (after Cook 1974)

2338 *Piona catatama* Cook, venter female (after Cook 1974)

2339 *Piona indica* Cook, venter male (after Cook 1974)

2340 *Piona indica* Cook, III-leg-6 male (after Cook 1974)

KEY TO THE GENERA (MALES ONLY)

1	Genital field with three pairs of acetabula	2
-	Genital field with more than three pairs of acetabula	3
2	IV-leg-4 of male forming a spur projecting well beyond base of IV-leg-5 (Fig. 2345)	Genus *Pionacercopsis*
-	IV-leg-4 of male not projecting beyond base of IV-leg-5 (Fig. 2346)	Genus *Pionacercus*
3	Legs without swimming setae (Fig. 2347); male third leg not modified	Genus *Pseudofeltria*
-	Legs with swimming setae (Fig. 2348); male third leg modified in various ways	4
4	IV-leg-4 of male with a spur extending beyond base of IV-leg-5 (Fig. 2348)	Genus *Madawaska*
-	IV-leg-4 of male not extending beyond base of IV-leg-5 (Fig. 2349)	Genus *Forelia*

Genus *Forelia* Haller, 1882

(Figs. 124, 2335-2337, 2349, 2350)

1882 *Forelia* Haller, Mittheilungen der Naturforschenden Gesellschaft in Bern 2: 58.

Type species: *Limnesia cassidiformis* Lebert, 1879 = *Forelia variegator* (C.L. Koch, 1837).



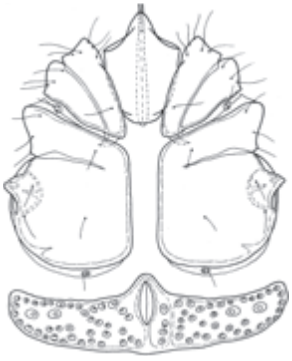
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2341 *Piona coccinea* (Koch), III-leg-6 male (after Gerecke et al. 2016)

2342 *Piona seyrigi continentalis* Lundblad, III-leg-6 male (after Cook 1974)

2343 *Piona indica* Cook, IV-leg-4 male (after Cook 1974)

2344 *Najadicola ingens* (Koenike), venter male (after Cook 1974)

2345 *Pionacercopsis vatrax* (Koch), IV-leg-4-6 male (after Gerecke et al. 2016)

2346 *Pionacercus norvegicus* Thor, IV-leg-4-6 male (after Gerecke et al. 2016)

DIAGNOSIS: Coxal plates in 2-4 groups (Fig. 2335), in males often fused medially (Fig. 2350). Genital field with five or more pairs of acetabula. Palp may show sexual dimorphism. Ventral seta of P4 often on tubercles (Fig. 2336). Legs with swimming setae. Male fourth leg, to a lesser degree also third leg, with inflated segments and specialized setae (Figs. 2337, 2349). IV-leg-4 of both sexes not projecting beyond base of IV-leg-5. Claws of first, second and third legs of female large, clawlet almost as large as claw (Fig. 124).

HABITAT: Standing waters (lakes, ditches, ponds), slow running streams.

DISTRIBUTION: Numerous species known, mainly from the Holarctic region; several species known from the Oriental region (Burma, Lundblad 1969; Malaysia, Wiles & Chamberlain 2006; Laos, Pešić & Smit 2016).

Genus *Madawaska* Habeeb, 1954

(Figs. 2348, 2351-2353)

1954 *Madawaska* Habeeb, Leaflets of Acadian Biology 2: 10 - I.M. Smith et al. (2015).

Type species: *Madawaska borealis* Habeeb, 1954

DIAGNOSIS: Dorsum with only small glandularia platelets. Males with a ventral shield which incorporates the genital field, venter of female with small glandularia platelets only. First coxal plates with elongated apodemes. Medial margin of Cx-IV in male short but not reduced to an angle (Fig. 2351), in female acute angled (Fig. 2352). Genital field with 5-7 pairs of acetabula. P4 with a ventral projection with two setae (Fig. 2353). Legs with swimming setae. IV-leg-4 of male



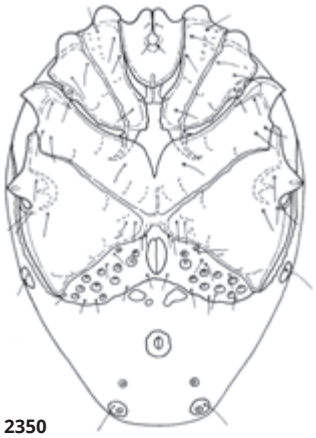
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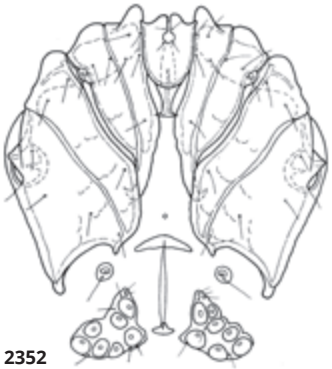
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2347 *Pseudofeltria scourfieldi* Soar, IV-leg-2-6 male (after Gerecke et al. 2016)

2348 *Madawaska borealis* Habeeb, IV-leg-4-6 male (after Cook 1974)

2349 *Forelia spatulifera* (Marucci), IV-leg-4-6 male (after Gerecke et al. 2016)

2350 *Forelia floridensis* Cook, venter male (after Cook 1974)

2351 *Madawaska borealis* Habeeb, venter male (after Cook 1974)

2352 *Madawaska borealis* Habeeb, venter female (after Cook 1974)

with a prominent distoventral projection bearing patches of stout, blade-like setae at the base and at its tip; this projection extending well beyond insertion of IV-leg-5 (Fig. 2348).

HABITAT: Standing waters (lakes, ponds).

DISTRIBUTION: One species known from eastern North America.

Genus *Pionacercopsis* K. Viets, 1926

(Figs. 2326, 2345, 2354, 2355)

1926 *Pionacercopsis* K. Viets, Zoologischer Anzeiger 69: 195 – Gerecke (2014).

Type species: *Acercus vatrax* C.L. Koch, 1837

DIAGNOSIS: Idiosoma with dorsal and ventral shields in male, but without sclerotized muscle attachments in female. Anterior coxae with short posterior apodemes. Median margin of Cx-IV well developed in both sexes (although rather short in female, Fig. 2326). Genital field with three pairs of large acetabula, fused to ventral shield (Fig. 2354). P4 bowed, mediodistally with a small peg-like setae (Fig. 2355). Male IV-leg-4 with a dorsodistal spur with numerous peg-like setae, and IV-leg-6 bowed, with 7-8 peg-like setae on concave margin (Fig. 2345).

HABITAT: Standing waters (lakes, ponds, ditches).

DISTRIBUTION: One species described from Europe, where it is reported from a limited number of countries.

Genus *Pionacercus* Piersig, 1894

(Figs. 2327, 2346, 2356-2359)

1894 *Pionacercus* Piersig, Zoologischer Anzeiger 17: 50 – I.M. Smith (1976a).

Type species: *Pionacercus leuckarti* Piersig, 1894

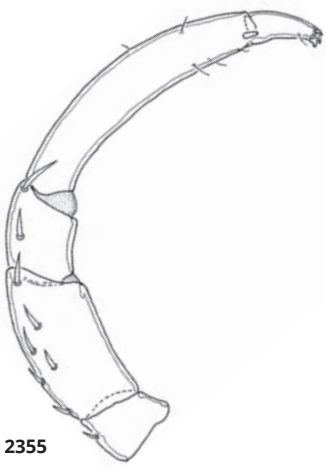
DIAGNOSIS: Male with dorsal and ventral shields, but idiosoma soft in female (Fig. 2356). Anterior coxae with short apodemes. Cx-IV with medial margin distinct in males (Fig. 2357), but short in female (Fig. 2358). Genital field with three pairs of acetabula. Male IV-leg-4 without a spur, dorsodistally with a group of stout setae. IV-leg-6 bowed, with 5-10 peg-like setae on concave margin (Figs. 2327, 2346).



2353



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2353 *Madawaska borealis* Habeeb, palp male (after Cook 1974)

2354 *Pionacercopsis vatrax* (Koch), venter male (after Gerecke et al. 2016)

2355 *Pionacercopsis vatrax* (Koch), palp male (after Gerecke et al. 2016)

HABITAT: Permanent and temporary standing waters (ponds, ditches, lakes, moorland pools), springs.

DISTRIBUTION: Several species known from the Holarctic (Siberia, Tuzovskij 2013b and references therein).

Genus *Pseudofeltria* Soar, 1904

(Figs. 117, 118, 2347, 2360-2364)

1904 *Pseudofeltria* Soar, Journal of the Quekett Microscopical Club 9: 105.

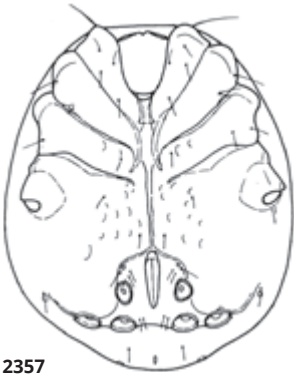
Type species: *Pseudofeltria scourfeldi* Soar, 1904

DIAGNOSIS: Dorsum with several plates or one large shield, sexual dimorphism frequent (Figs. 2360-2361). Venter with coxal plates and genital field surrounded by soft integument or incorporated in a ventral shield. Gnathosoma with an anchoral process. Medial margins of Cx-IV reduced to median angles. Genital field with 7-30 pairs of acetabula (Fig. 118). Legs without swimming setae. Male IV-leg-5 enlarged distally with a patch of setae distoventrally, IV-leg-6 curved or dorsally convex, bearing a row of stout, peg-like setae (Fig. 2347). Claws of third legs without sexual dimorphism.

HABITAT: Springs.



2356



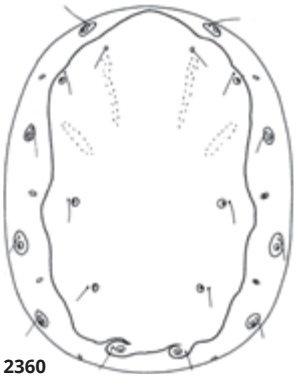
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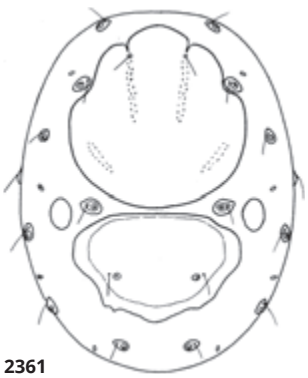
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2356 *Pionacercus norvegicus* Thor, dorsum female (after Gerecke et al. 2016)

2357 *Pionacercus leuckarti* Piersig, venter male (after Cook 1974)

2358 *Pionacercus leuckarti* Piersig, venter female (after Gerecke et al. 2016)

2359 *Pionacercus leuckarti* Piersig, palp female (after Gerecke et al. 2016)

2360 *Pseudofeltria laversi* Cook, dorsum male (after Cook 1974)

2361 *Pseudofeltria laversi* Cook, dorsum female (after Cook 1974)

DISTRIBUTION: Several species known from the Holarctic (Europe: Poland, Biesiadka 1971; Italy, Gerecke 2014a; North America: Habeeb 1977, Cook 1974).

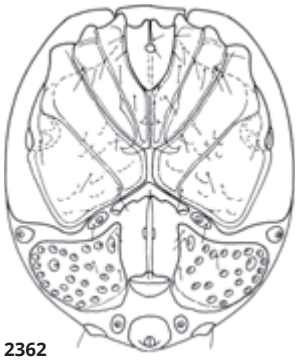
Subfamily Huitfeldtiinae K. Viets, 1924

1924 Huitfeldtiinae K. Viets, Archiv für Hydrobiologie, Supplement 4: 78.

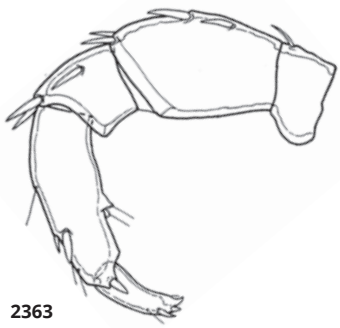
DIAGNOSIS: Idiosoma with only small glandularia platelets. Gnathosoma with a well-developed anchoral process. Cx-I, Cx-II and Cx-III with (Fig. 2333) or without spatulate setae near lateral margins. Posterior margin of Cx-IV forming a genital bay in both sexes. Genital field with three to ten pairs of acetabula borne on genital plates completely surrounding the gonopore in males, laterally flanking the gonopore in females. P4 with two setae on small ventral projections. Legs without sexual dimorphism, distal segments with or without spatulate setae.

KEY TO THE GENERA

1	Genital field with more than three pairs of acetabula (Fig. 2365)	Genus *Huitfeldtia*
-	Genital field with three pairs of acetabula (Fig. 2366)	2
2	Coxae and legs without spatulate setae (Fig. 2367)	Genus *Larri*
-	Coxae and legs with spatulate setae (Fig. 2368)	Genus *Gereckea*



2362



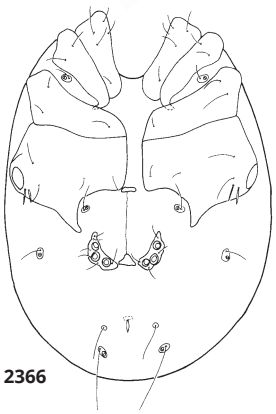
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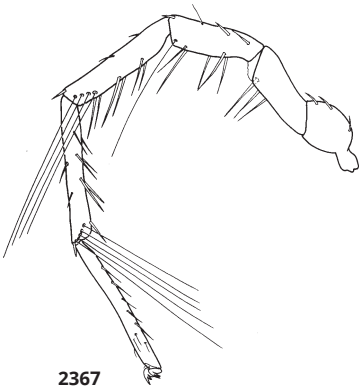
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2362 *Pseudofeltria laversi* Cook, venter female (after Cook 1974)

2363 *Pseudofeltria laversi* Cook, palp female (after Cook 1974)

2364 *Pseudofeltria laversi* Cook, I-leg-5-6 female (after Cook 1974)

2365 *Huitfeldtia rectipes* Thor, venter male (after Gerecke et al. 2016)

2366 *Larri laffa* Harvey, venter female (after Harvey 1996b)

2367 *Larri laffa* Harvey, fourth leg male (after Harvey 1996b)

Genus *Gereckea* I.M. Smith & Cook, 2009

(Figs. 2368-2372)

2009 *Gereckea* I.M. Smith & Cook, International Journal of Acarology 35: 448.

Type species: *Gereckea columbiensis* I.M. Smith & Cook, 2009

DIAGNOSIS: Cx-I, Cx-II and Cx-III with spatulate setae (Figs. 2369-2370). Genital field with three pairs of acetabula. P2, P3 and P4 (Fig. 2371) and second, third and fourth legs with numerous spatulate setae (Figs. 2368, 2372).

HABITAT: Streams.

DISTRIBUTION: One species known from western North America.

Genus *Huitfeldtia* Thor, 1898

(Figs. 2333, 2334, 2365, 2373)

1898 *Huitfeldtia* Thor, Archiv for mathematik og naturvidenskab 20 (7): 3.

Type species: *Huitfeldtia rectipes* Thor, 1898

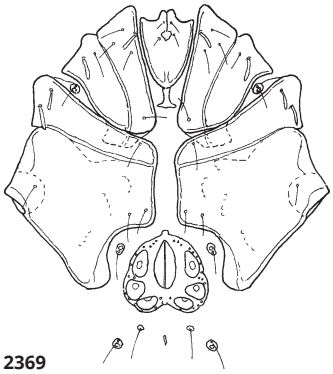
DIAGNOSIS: Cx-I, Cx-II and Cx-III with spatulate setae (Figs. 2333, 2365). Genital field with 8-10 pairs of acetabula. Palp without spatulate setae, P3 with a long lateral seta, ventral setae of P4 not on tubercles (Fig. 2334). Legs with spatulate setae (Fig. 2373).

HABITAT: Large lakes and ponds and there occurring at greater depth.

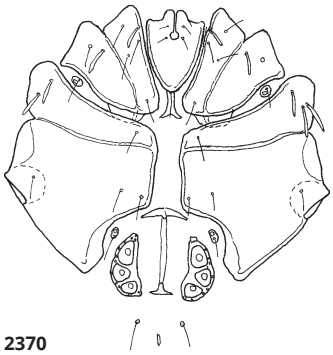
DISTRIBUTION: One species known occurring in Europe and North America.



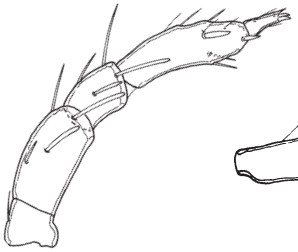
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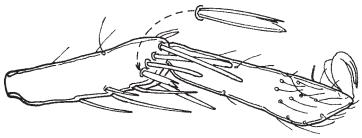
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2368 *Gereckea columbiensis* I.M. Smith & Cook, IV-leg-4-6 male (after I.M. Smith & Cook 2009b)

2369 *Gereckea columbiensis* I.M. Smith & Cook, venter male (after I.M. Smith & Cook 2009b)

2370 *Gereckea columbiensis* I.M. Smith & Cook, venter female (after I.M. Smith & Cook 2009b)

2371 *Gereckea columbiensis* I.M. Smith & Cook, palp male (after I.M. Smith & Cook 2009b)

2372 *Gereckea columbiensis* I.M. Smith & Cook, II-leg-5-6 male (after I.M. Smith & Cook 200

2373 *Huitfeldtia rectipes* Thor, IV-leg-4-6 male (after Gerecke et al. 2016)

Genus *Larri* Harvey, 1996

(Figs. 2366, 2367, 2374-2376)

1996 *Larri* Harvey, Records of the Western Australian Museum 17: 363.

Type species: *Larri laffa* Harvey, 1996

DIAGNOSIS: Coxae without spatulate setae (Fig. 2366). Genital field with three pairs of acetabula. Male genital plates only lightly fused anteriorly and posteriorly (Fig. 2375). Palp without spatulate setae, P4 with two setae on small tubercles (Fig. 2376). Legs with swimming setae, but without spatulate setae (Fig. 2367).

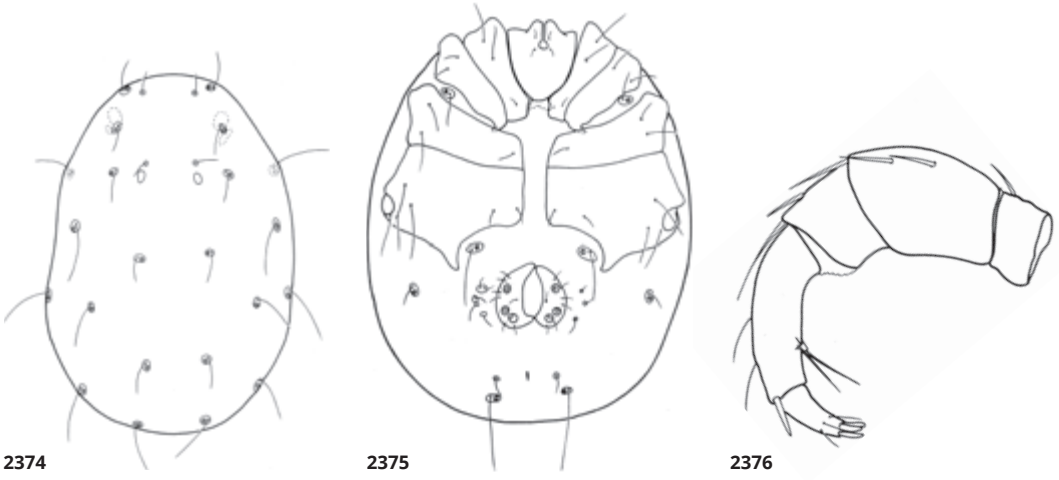
HABITAT: Standing waters (lakes, pools).

DISTRIBUTION: One species known from SW Australia.

Subfamily Hydrochoreutinae K. Viets, 1942

1942 Hydrochoreutinae K. Viets, Zoologischer Anzeiger 138: 210.

DIAGNOSIS: Idiosoma with unsclerotized muscle attachments, posterior margin nearly straight in males, rounded in females. Gnathosoma with anchoral process. Coxae without spatulate setae, in female in four groups, in males from four groups to fused into a complete ventral shield. Posterior apodemes of anterior coxae short. Suture lines Cx-III/Cx-IV at right angles to median idiosoma axis; medial margin of Cx-IV well developed, posterior margin with angular projection. Insertion of fourth legs covered by a large, rounded projection. Genital field with three pairs of acetabula. Male genital plates not fused to Cx-IV, located at posterior idiosoma margin. Immediately posterior to and in sclerotized contact with genital plate a long, narrow, 3-5 parted petiole (Fig. 2329). Female genital plates narrow, sickle-shaped, distanced from posterior idiosoma margin (Fig. 2324). Palp very long and slender, P4 ventrally with numerous stout setae, but without a peg-like distomedial seta (Fig. 2328). Legs very long and slender. Third and fourth legs with swimming setae, III-leg-6 very long and narrowed. Male III-leg-4 distally inflated, often with a long curved seta on dorsodistal extension and 1-3 stout, slightly curved ventrodistal setae (Fig. 2330). Fourth leg without sexual dimorphism. Monotypic.



2374 *Larri laffa* Harvey, dorsum female (after Harvey 1996b)

2375 *Larri laffa* Harvey, venter male (after Harvey 1996b)

2376 *Larri laffa* Harvey, palp male (after Harvey 1996b)

Genus *Hydrochoreutes* C.L. Koch, 1837

(Figs. 2324, 2328-2330)

1836 *Spio* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 5: 16 (praeocc.).

1837 *Hydrochoreutes* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 11: 11.

Types species: *Spio ungulata* C.L. Koch, 1836

DIAGNOSIS: As for subfamily.

HABITAT: Standing waters (lakes, ponds), slow running steams, less common in temporary waters and moorland pools.

DISTRIBUTION: Several species known from the Holarctic (Russia and the Russian Far East, Tuzovskij 2003b, 2012 and references therein; North America, Cook 1970b).

Subfamily Najadicolinae K. Viets, 1935

1935 Najadicolinae K. Viets, Archiv für Hydrobiologie, Supplement 13: 652 – Simmons & I.M. Smith (1984).

DIAGNOSIS: Idiosoma with only small glandularia platelets, muscle attachments not sclerotized. Gnathosoma without a distinct anchoral process (Fig. 2344). Coxae in four groups. Anterior coxae with short apodemes. Suture lines Cx-III/Cx-IV incomplete. Posterior margin of Cx-IV without projections. Genital field with numerous acetabula on wing-shaped genital plates in both sexes. Two pairs of acetabula noticeably larger the others (Fig. 2377). Palp with ventral projections and with a reduced chaetotaxy. Distal end of P4 with a peg-like seta (Fig. 2378). Legs without swimming setae. Monotypic.

REMARKS: Simmons & I.M. Smith (1984) shifted the subfamily from the Unionicolidae to the Pionidae.

Genus *Najadicola* Piersig, 1897

(Figs. 2344, 2377, 2378)

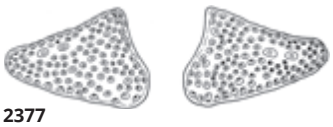
1897 *Najadicola* Piersig, Zoologischer Anzeiger 20: 60.

Type species: *Atax ingens* Koenike, 1895

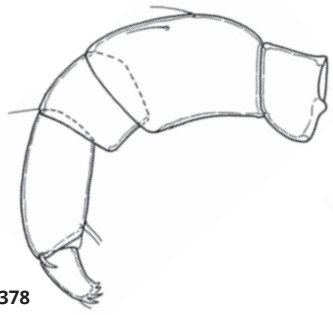
DIAGNOSIS: As for subfamily.

HABITAT: Parasites of freshwater clams.

DISTRIBUTION: One species known occurring in North America, and one in SE Asia (Chapurina et al. 2019).



2377



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2377 *Najadicola ingens* (Koenike), genital plates female (after Cook 1974)

2378 *Najadicola ingens* (Koenike), palp female (after Cook 1974)

2379 *Nautarachna crassa* (Koenike), gnathosoma + palp male (after Gerecke et al. 2016)

Subfamily Pioninae Thor, 1900

1900 Pioninae Thor, Nyt Magazin for Naturvidenskaberne 38: 3.

1888 Nautarachninae Walter, Internationale Revue der gesamten Hydrobiologie und Hydrographie 14: 45 – I.M. Smith (1976).

1909 Delmeinae Koenike, Die Süsswasserfauna Deutschlands 12: 51.

1937 Pionellinae K. Viets, Zoologischer Anzeiger 120: 295.

DIAGNOSIS: Idiosoma sclerotization various, from smooth to complete dorsal and ventral shields. Gnathosoma with or without an anchoral process. Coxae without thickened setae. Medial margins of posterior coxal plates formed by Cx-III and Cx-IV, posterior margin of Cx-IV with an angular projection. Genital field usually with numerous acetabula, but occasionally as few as five pairs. P4 with two ventral peg-like setae, and in general with an additional distoventral peg-like seta. Legs usually with well-developed swimming setae. Male II-leg-6 enlarged in various ways, with or without elongated claw; IV-leg-4 ventrally concave with associated peg-like setae. IV-leg-5 with a dorsal notch. Posterior margin of idiosoma without petiole.

KEY TO THE GENERA

1 Gnathosoma without an anchoral process (Fig. 2379); P4 lacking a distoventral peg-like seta (Fig. 2380) Genus *Nautarachna*

- Gnathosoma with an anchoral process (Fig. 2381), P4 with a distoventral peg-like seta (Fig. 2382) 2

2 P3 with a long lateral seta (Fig. 2383), gonopore much longer than genital plates, the latter with only five pairs of acetabula (Fig. 2384, female known only) Genus *Schwoerbelia*

- P3 without a long lateral seta (Fig. 2385), gonopore not extremely long, genital field usually with more than five pairs of acetabula (Fig. 2386) Genus *Piona*

Genus *Nautarachna* Moniez, 1888

(Figs. 116, 126, 2379, 2380, 2387)

1888 *Nautarachna* Moniez, Revue biologique du nord de la France 1: 64.

1908 *Delmea* Koenike, Zoologischer Anzeiger 32: 704.



2380



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2380 *Nautarachna pioniformis* Cook, palp female (after Cook 1974)

2381 *Piona damasiella* Cook, venter female (after Cook 1974)

2382 *Piona mahisa* Cook, palp male (after Cook 1974)

1937 *Pionella* K. Viets, Zoologischer Anzeiger 120: 294 – I.M. Smith (1972).

Type species: *Nautarachna asperrimum* Moniez, 1888

DIAGNOSIS: Idiosoma either membranous or with extensive sclerotization. Gnathosoma without an anchoral process (Fig. 2379). Coxae in four groups or incorporated in ventral sclerotization. Tips of Cx-I with stout setae. Medial margin Cx-IV well developed in males (Fig. 2387) but reduced to median angles in females (Fig. 126). P3 without a long lateral seta, P4 without peg-like setae (Fig. 2380). Legs with swimming setae. Male with III-leg-6 modified for spermatophore transfer, IV-leg-4 concave with many stout setae (Fig. 116).

HABITAT: Streams, occasionally in lakes.

DISTRIBUTION: In Europe one species is known, from North America several species have been described (Cook 1960; I.M. Smith 1972; Habeeb 1979).

Genus *Piona* C.L. Koch, 1842

(Figs. 125, 2338-2343, 2381, 2382, 2385, 2386, 2388, 2389)

1836 *Nesaea* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 5: 21 (praeocc.).



2383



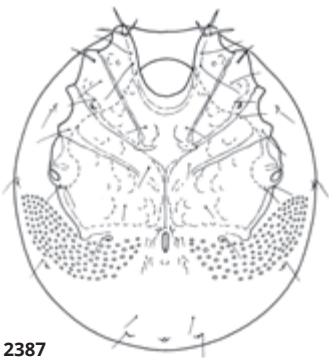
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2383 *Schwoerbelia pioniformis* Pešić & Smit, palp female (after Pešić & Smit 2016)

2384 *Schwoerbelia pioniformis* Pešić & Smit, venter female (after Pešić & Smit 2016)

2385 *Piona alpicola* (Neuman), palp female (after Gerecke et al. 2016)

2386 *Piona stjordalensis* (Thor), genital field female (after Gerecke et al. 2016)

2387 *Nautarachna queticoensis* I.M. Smith, venter male (after Cook 1974)

2388 *Piona interrupta* Marshall, venter male (after Cook 1974)

1842 *Piona* C.L. Koch, Übersicht des Arachnidensystems 3: 13.

1891 *Curvipes* Koenike, Zoologischer Anzeiger 14: 20.

Type species: *Nesaea ovata* C.L. Koch, 1836 = ? *Piona variabilis* C.L. Koch, 1836)

DIAGNOSIS: Idiosoma weakly sclerotized, occasionally with small dorsalia or rarely males with a dorsal shield. Males notably smaller than females. Gnathosoma with an anchoral process (Fig. 2339). Cx-IV enlarged, posterior margin drawn out to form a genital bay in females. Coxal plates in female in four groups (Fig. 125, 2338), Cx-IV in males generally posteromedially fused and mostly connected with the genital area. Legs always with swimming setae. Third leg exhibiting sexual dimorphism, male III-leg-6 with differently shaped claws (Figs. 2340-2342), IV-leg-4 with a deep dorsal concavity bearing numerous short, blunt, peg-like setae (Fig. 2343). Genital field with numerous acetabula (5 to more than 100) generally on genital plates, but occasionally in females free in the membranous integument. Female gonopore large, with a distinct pregenital sclerite (Figs. 2381, 2386); male gonopore small, often at the edge of a concavity ("genital pit", Fig. 2388). Ventral margin of P4 generally with a varying number of mostly prominent setal tubercles (Figs. 2382, 2385), occasionally P4 without setal tubercles (Fig. 2389).

HABITAT: Standing waters (lakes, ponds, ditches, pools), slow running streams, temporary waters.

DISTRIBUTION: Numerous species known occurring worldwide.

REMARKS: In the past a subgeneric classification was used, but this was unsatisfactory, and nowadays this is not used anymore.

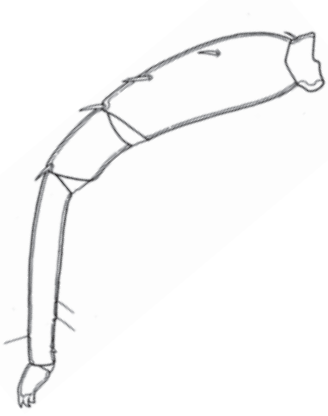
Genus *Schwoerbelia* Pešić & Smit, 2016

(Figs. 2383, 2384, 2390)

2016 *Schwoerbelia* Pešić & Smit, Acarologia 56: 409.

Type species: *Schwoerbelia pioniformis* Pešić & Smit, 2016

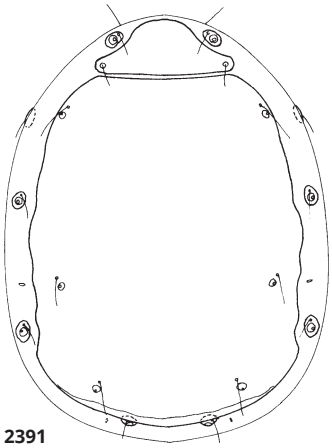
DIAGNOSIS: (Female only) Idiosoma soft. Gnathosoma with an anchoral process (Fig. 2390). Coxae in four groups, Cx-III and CX-IV medially close. Genital bay very shallow. Genital field with five pairs of acetabula. Gonopore much longer than genital plates (Fig. 2384). P3 with a long lateral seta (Fig. 2383). P4 with a peg-like mediodistal seta, ventral setae not associated with tubercles. Legs with swimming setae.



2389



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2389 *Piona dadayi* Piersig, palp female (after Cook 1974)

2390 *Schwoerbelia pioniformis* Pešić & Smit, gnathosoma female (after Pešić & Smit 2016)

2391 *Twinforksella tura* Cook, dorsum male (after Cook 1992)

HABITAT: Streams.

DISTRIBUTION: One species known from Vietnam.

Subfamily Schminkeinae Schwoerbel, 1984

1984 Schminkeinae Schwoerbel, Archiv für Hydrobiologie, Supplement 66: 296.

DIAGNOSIS: Dorsum with two plates in both sexes, anterior plate may be much smaller than posterior plate. Gnathosoma with an anchoral process. Coxae in four groups or fused into a ventral shield, but suture lines complete. Posterior margin of Cx-IV without projections, in males either forming a genital bay or straight, in females without genital bay, but genital plates fused with posterior margin of Cx-IV. Genital field with three pairs of acetabula, with two plates in males lying close to each other, in females widely separated from each other. P4 with three setal tubercles, two of which end in hair-like setae and the third in a peg-like seta. Fourth legs either not modified or IV-leg-5 of male inflated and with a stout, curved seta, IV-leg-6 of female enlarged.

KEY TO THE GENERA

1 Anterior dorsal plate much smaller than posterior dorsal plate and bearing the postocularia only (Fig. 2391) Genus *Twinforksella*

- Anterior dorsal plate more or less the same size as posterior plate and bearing the postocularia and a pair of glandularia (Fig. 2392) Genus *Schminkea*

Genus *Schminkea* Schwoerbel, 1984

(Figs. 2320-2322, 2392-2397)

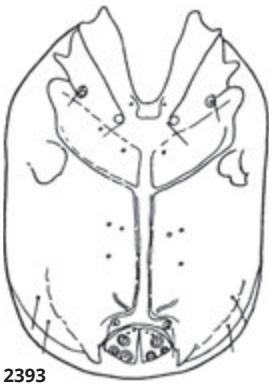
1984 *Schminkea* Schwoerbel, Archiv für Hydrobiologie, Supplement 66: 296.

Type species: *Schminkea pacifica* Schwoerbel, 1984

DIAGNOSIS: Anterior dorsal plate almost as large as posterior plate, the latter bearing one pair of glandularia (Figs. 2320, 2392). Venter sclerotized apart from a small area posterior to genital field. Medial margin of Cx-IV much longer than medial margin of Cx-III. Posterior margin of Cx-IV forming a genital bay in male (Fig. 2393, posterior margin in female straight (Fig. 2321). Acetabula occupying most of genital plates (Fig. 2394). P4 with two tubercles bearing hair-like setae (Fig. 2395), in female one near middle of ventral side, the other projecting as a broad plate on the



2392



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2392 *Schminkea pacifica* Schwoebel, dorsum male (after Schwoerbel 1984)

2393 *Schminkea pacifica* Schwoebel, venter male (after Schwoerbel 1984)

2394 *Schminkea pacifica* Schwoebel, genital field male (after Schwoerbel 1984)

lateral surface and extending anteriorly to insertion of P5 (Fig. 2396). IV-leg-5 of male inflated and with a stout, curved seta (Fig. 2322),

HABITAT: Interstitial.

DISTRIBUTION: One species known from South Island, New Zealand.

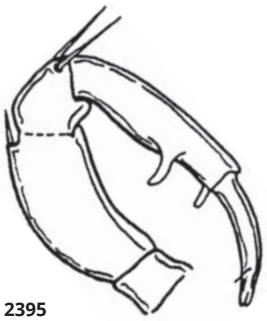
Genus *Twinforksella* Cook, 1992

(Figs. 2391, 2398-2401)

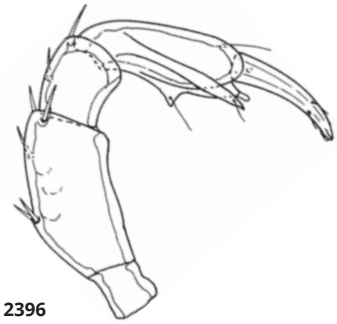
1992 *Twinforksella* Cook, Stygologia 7: 48

Type species: *Twinforksella tura* Cook, 1992

DIAGNOSIS: (Male only) Dorsum with a small anterior plate with the postocularia only and a large posterior plate (with three pairs of glandularia, Fig. 2391). Gnathosoma with an anchoral process. Venter without a ventral shield, coxae and genital field occupy most of the ventral surface. Cx-IV not forming a genital bay. Medial margin of Cx-III slightly longer than medial margin of Cx-IV. Posterior apodemes of anterior coxae short. Cxgl-2 near posterior margin of Cx-II. Posterior margins of Cx-IV without posterior projections, a large area of secondary sclerotization posterior and lateral to Cx-IV. Acetabula occupying on a small part of genital plates (Fig. 2398). P4 with two ventral tubercles bearing hair-like setae, and a small distoventral peg-like seta (Fig. 2399). Legs without swimming setae, legs not modified (Figs. 2400-2401).



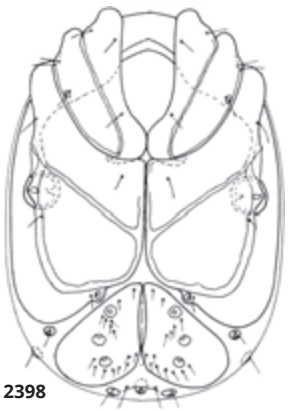
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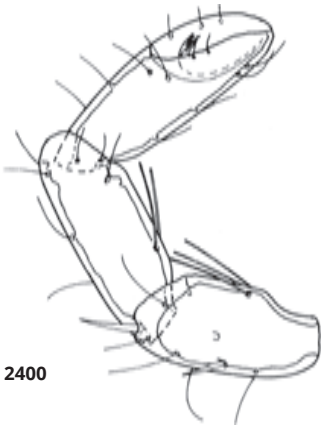
2397



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2399



2400

2395 *Schminkea pacifica* Schwoebel, palp male (after Schwoerbel 1984)

2396 *Schminkea pacifica* Schwoebel, palp female (after Schwoerbel 1984)

2397 *Schminkea pacifica* Schwoebel, I-leg-4-6 female (after Cook 1992)

2398 *Twinforksella tura* Cook, venter male (after Cook 1992)

2399 *Twinforksella tura* Cook, palp male (after Cook 1992)

2400 *Twinforksella tura* Cook, I-leg-4-6 male (after Cook 1992)

HABITAT: Stream in cave.

DISTRIBUTION: One species known from South Island, New Zealand.

Subfamily Tiphyinae Oudemans, 1941

1941 Tiphyinae Oudemans, Zoologischer Anzeiger 136: 178.

DIAGNOSIS: Idiosoma weakly sclerotized, occasionally with small paired muscle attachment platelets. Gnathosoma with an anchoral process. Coxae without spatulate setae. Medial margins of Cx-IV usually well developed, posterior margins forming a genital bay, deeper in females, occasionally very shallow or absent in males. Genital field with 3-12 pairs of acetabula. Genital plates in males surrounding the gonopore, or, in some species anteriorly not fused, in females separate. P4 with a peg-like mediodistal seta. Male fourth legs, in most genera also third legs, modified for spermatophore transfer.

KEY TO THE GENERA (MALES ONLY)

1 IV-leg-5 extending dorsodistally far beyond insertion of IV-leg-6 (Fig. 2402) Genus *Acercella*

\- IV-leg-5 not extending far distally beyond insertion of IV-leg-6 (Fig. 2403) 2

2 IV-leg-4 either greatly expanded, or, if only slightly expanded, dorsally with a large seta or a row of enlarged setal bases (Fig. 2403) 3

\- IV-leg-4 only slightly expanded, lacking a large dorsal seta or a row of enlarged setal bases (Fig. 2404) 5

3 A large, stout and somewhat curved seta inserted on dorsodistal part of IV-leg-4, its tip extending to middle of IV-leg-5; IV-leg-4 only slightly enlarged (Fig. 2403) Genus *Pionides*

\- Either IV-leg-4 without a dorsodistal seta or this seta short and not greatly curved; IV-leg-4 greatly enlarged (Fig. 2405) 4

4 II-leg-5 with one or two stout setae distoventrally; acetabula arranged in an arc (Fig. 2405) Genus *Acercopsis*

\- II-leg-5 without greatly thickened setae; acetabula arranged more or less in a triangle (Fig. 2406) Genus *Tiphys*

5 IV-leg-5 with a stout, dorsodistal curved seta (Fig. 2404) Genus *Neotiphys*

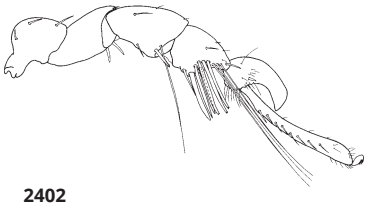
\- IV-leg-5 without a stout dorsodistal seta (Fig. 2407) 6

6 IV-leg-5 anteroventrally with a row of stout setae (Fig. 2407) Genus *Pionopsis*

\- IV-leg-5 anteroventrally without a row of stout setae (Fig. 2408) Genus *Australotiphys*



2401



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2401 *Twinforksella tura* Cook, IV-leg-4-6 male (after Cook 1992)

2402 *Acercella falcipes* Lundblad, fourth leg male (after Harvey 1996b)

2403 *Pionides ensifer* (Koenike), IV-leg-4-6 (after Gerecke et al. 2016)

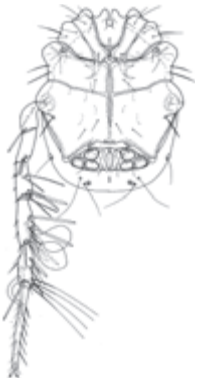
Genus *Acercella* Lundblad, 1941

(Figs. 2402, 2409-2413)

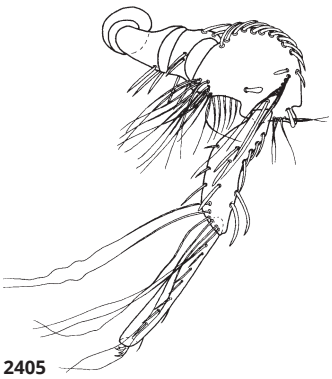
1941 *Acercella* Lundblad, Entomologisk Tidskrift 62: 119.

Type species: *Acercella falcipes* Lundblad, 1941

DIAGNOSIS: Dorsum with 1-2 pairs of small platelets (Fig.2409). Posterior apodemes of anterior coxae short. Coxae in four groups in female (Fig. 2311) but Cx-IV partially fused medially in male (Fig. 2310). Suture lines Cx-III/Cx-IV directed more or less at right angles to main idiosoma axis. Medial margins of Cx-IV well developed in female but somewhat reduced in male. Genital field with three pairs of acetabula, somewhat triangular in females, extending laterally and partially fused with Cx-IV in male. Peg-like seta at distal end of P4 relatively large, located somewhat dorsally (Fig. 2412). Legs with swimming setae. Fourth leg exhibiting a pronounced sexual dimorphism; male IV-leg-4 expanded, dorsal part of IV-leg-5 extending far beyond insertion of IV-leg-6 (Fig. 2402). IV-leg-6 not greatly curved, not bearing a row of peg-like setae. III-leg-6 of male slightly to strongly expanded and bearing unequal claws modified for spermatophore transfer (Fig. 2413).



2404



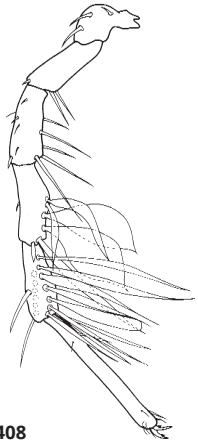
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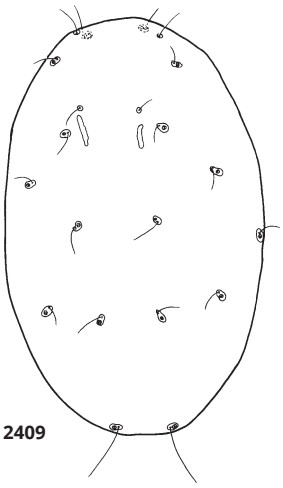
2406



2407



2408



2409

2404 *Neotiphys drepaniseta* (Cook), venter male (after Cook 1974)

2405 *Acercopsis pistillifer* (Koenike), fourth leg male (after Cook 1974)

2406 *Tiphys latipes* (Müller), IV-leg-3-6 male (after Gerecke et al. 2016)

2407 *Pionopsis paludis* Habeeb, fourth leg male (after Cook 1974)

2408 *Australotiphys himonius* Harvey, fourth leg male (after Harvey 1996b)

2409 *Acercella falcipes* Lundblad, dorsum female (after Harvey 1996b)

HABITAT: Ponds, lakes.

DISTRIBUTION: Two species known from Western Australia and Victoria, Australia (Harvey 1996b).

Genus *Acercopsis* K. Viets, 1926

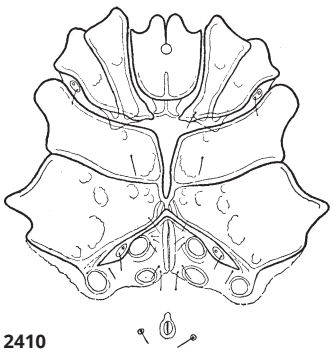
(Figs. 2405, 2414-2416)

1926 *Acercopsis* K. Viets, Zoologischer Anzeiger 69: 195 – I.M. Smith et al. (2015).

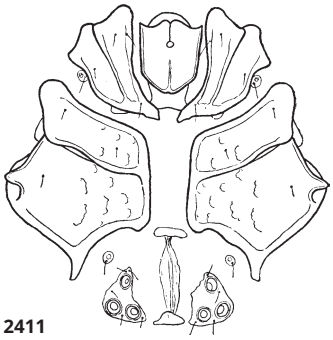
1944 *Freemania* Halbert, Proceedings of the Royal Irish Academy, Section B, Biological, Geological, and Chemical Science 50: 84.

Type species: *Acercus pistillifer* Koenike, 1908

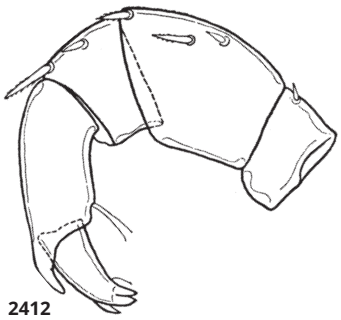
DIAGNOSIS: Dorsum with 2-3 pairs of platelets. Cx-IV with a genital bay, deep in male (Fig. 2414), less deep in female (Fig. 2415). Legs with swimming setae. Males: Cx-IV with a distinct medial margin. II-leg-5 with one or two large, specialized setae (Fig. 2416). IV-leg-4 expanded, dorsal margin with stout, curved setae, ventral margin with long, flexible setae. IV-leg-5 bowed dorsally, with a modified dorsodistal seta (Fig. 2405). Females: Medial margin of Cx-IV reduced, genital bay shallow. Acetabula in a triangle.



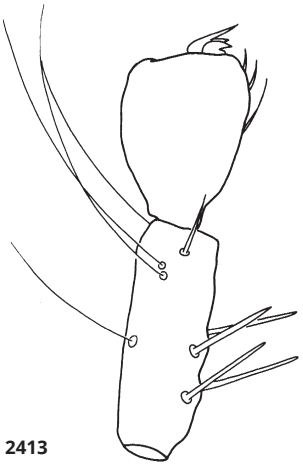
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2411



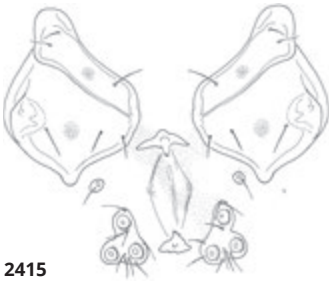
2412



2413



2414



2415

2410 *Acercella falcipes* Lundblad, venter male (after Lundblad 1947)

2411 *Acercella falcipes* Lundblad, venter female (after Lundblad 1947)

2412 *Acercella falcipes* Lundblad, palp male (after Lundblad 1947)

2413 *Acercella poorginup* Harvey, III-leg-5-6 male (after Harvey 1996b)

2414 *Acercopsis pistillifer* (Koenike), venter male (after Gerecke et al. 2016)

2415 *Acercopsis pistillifer* (Koenike), venter female (after Gerecke et al. 2016)

HABITAT: Temporary and permanent waters (quackfens, terrestrializing ditches, ponds).

DISTRIBUTION: One species known from the Palaearctic and one species from North America (Habeeb 1954b).

Genus *Australotiphys* Cook, 1986

(Figs. 2323, 2408, 2417-2421)

1986 *Australotiphys* Cook, Memoirs of the American Entomological Institute 40: 202.

Type species: *Australotiphys magnisetus* Cook, 1986

DIAGNOSIS: Dorsum with two pairs of dorsalia (Fig. 2417, venter with or without a ventral shield. Coxae fused into a single group in both sexes (Figs. 2418, 2419). Cx-IV with long medial margins. Posterior apodemes of anterior coxae short. Genital field with four or more pairs of acetabula. P4 with a distoventrally located peg-like seta (Fig. 2420). Legs with swimming setae. Fourth leg segments not greatly expanded. IV-leg-4 and -5 of male with greatly expanded setae (Fig. 2323, 2408), but in one species these setae not enlarged (Fig. 2421).

HABITAT: Streams, springs, pools.

DISTRIBUTION: Three species known from Australia (Cook 1986, Harvey 1996b).



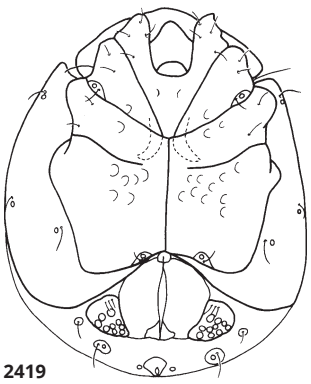
2416



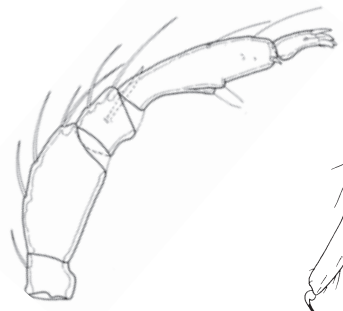
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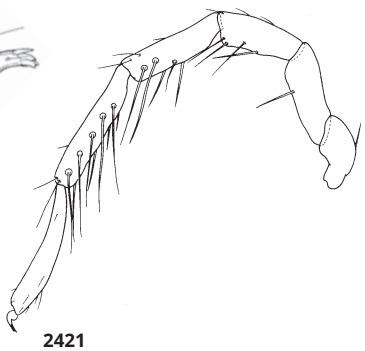
2418



2419



2420



2421

2416 *Acercopsis pistillifer* (Koenike), II-leg-4-6 male (after Gerecke et al. 2016)

2417 *Australotiphys magnisetus* Cook, dorsum male (after Cook 1986)

2418 *Australotiphys magnisetus* Cook, venter male (after Cook 1986)

2419 *Australotiphys himonius* Harvey, venter female (after Harvey 1996b)

2420 *Australotiphys magnisetus* Cook, palp male (after Cook 1986)

2421 *Australotiphys barmutai* Harvey, fourth leg male (after Harvey 1996b)

Genus *Neotiphys* Habeeb, 1957

(Figs. 2404, 2422-2424)

1957 *Neotiphys* Habeeb, Leaflets of Acadian Biology 15: 2 – I.M. Smith (1976a).
Type species: *Tiphys pionoidellus* Habeeb, 1956

DIAGNOSIS: Cx-IV with anteriorly convex projections covering the insertions of the fourth legs. Genital field with three pairs of acetabula. Male genital field with the acetabula on plates that surround the gonopore, plates not extending laterally beyond posteromedial angles of Cx-IV (Fig. 2404). Female genital plates triangular (Fig. 2422). P4 with a distomedial peg-like seta. IV-leg-4 of male with two spatulate or paddle-shaped setae distoventrally, IV-leg-5 slightly expanded and bearing a long, stout curved seta distodorsally (Figs. 2404, 2424).

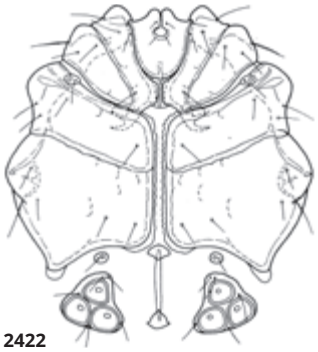
HABITAT: Streams, ponds.

DISTRIBUTION: Three species known from North America (Cook 1974, Conroy 1979).

Genus *Pionides* Thor, 1901

(Figs. 2403, 2425-2427)

1901 *Pionides* Thor, Archiv or mathematik og Naturvidenskab 23: 30 - I.M. Smith et al (2015).
Type species: *Piona ensifer* Koenike, 1895



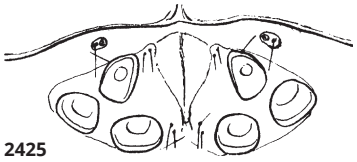
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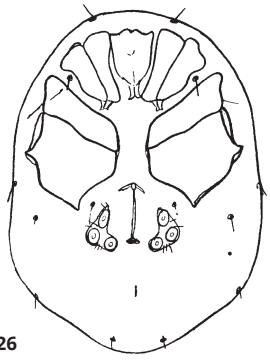
2423



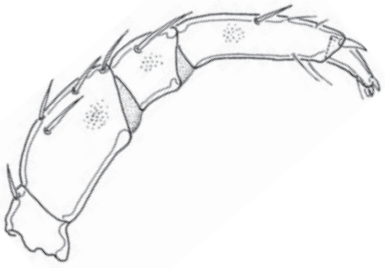
2424



2425



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2427

2422 *Neotiphys drepaniseta* (Cook), venter female (after Cook 1974)
2423 *Neotiphys drepaniseta* (Cook), palp female (after Cook 1974)
2424 *Neotiphys drepaniseta* (Cook), IV-leg-5 male (after Cook 1974)
2425 *Pionides ensifer* (Koenike), genital field male (after K. Viets 1936)
2426 *Pionides ensifer* (Koenike), venter female (after K. Viets 1936)
2427 *Pionides ensifer* (Koenike), palp female (after Gerecke et al. 2016)

DIAGNOSIS: Dorsum with a pair of small, elongate platelets. Genital field with three pairs of acetabula in a triangular formation (Fig. 2426). Peg-like seta of P4 dorsodistally, in length reaching nearly 50 % of P5 (Fig. 2427). Legs with swimming setae. Males: Genital bay very shallow (Fig. 2425). Cx-IV with anteriorly concave projections covering insertions of fourth legs. Genital plates fused posteromedially, separate anteromedially. P4 with a long mediodistal blade-like seta. II-leg-5 without stout setae. IV-leg-4 not widened, with a long, curved dorsodistal seta (Fig. 2403), other segments of the fourth leg without noteworthy sexual dimorphism. Female: Genital bay shallow. Acetabula either in a triangle or in a weakly curved line.

HABITAT: Temporary and permanent standing waters, e.g. ditches, ponds, pools in reedbeds.

DISTRIBUTION: One species known from Europe, a subspecies known from Japan.

Genus *Pionopsis* Piersig, 1894

(Figs. 127, 2407, 2428, 2429)

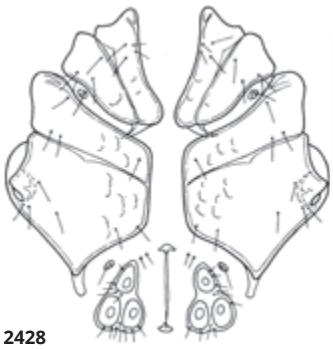
1894 *Pionopsis* Piersig, Zoologischer Anzeiger 17: 216.

Type species: *Hydrachna lutescens* Hermann, 1804

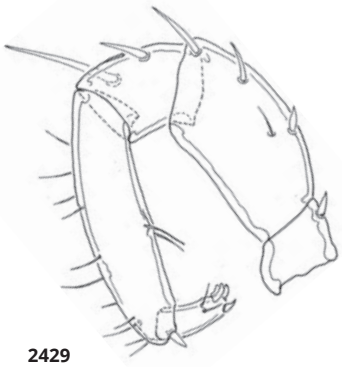
DIAGNOSIS: Dorsum with or without a pair of small platelets. Posterior apodemes of anterior coxae short. Suture lines Cx-III/Cx-IV at right angle. Legs with swimming setae. Males: II-leg-5 without stout setae. Coxae in three groups. Cx-III and Cx-IV fused medially and posteromedial margins of Cx-IV forming a genital bay (Fig. 127). Fourth leg insertions ventrally covered by rounded projections. Male genital plates fused posteromedially, separate anteromedially. P4 with a long, peg-like mediodistal seta (Fig. 2429). Fourth legs slightly modified, IV-leg-5 about the same height as IV-leg-3, IV-leg-5 and -6 with numerous spine-like setae, IV-leg-5 slightly bent dorsally, IV-leg-6 straight (Fig. 2407). Females: Coxae in four groups, Medial margin of Cx-III and Cx-IV well developed and posteromedial margin of Cx-IV strongly concave, Cx-III + Cx-IV medially well separated. Fourth leg insertions ventrally without projections, but dorsally covered by a large, semi-circular extension.

HABITAT: Standing permanent and temporary waters, pools of streams.

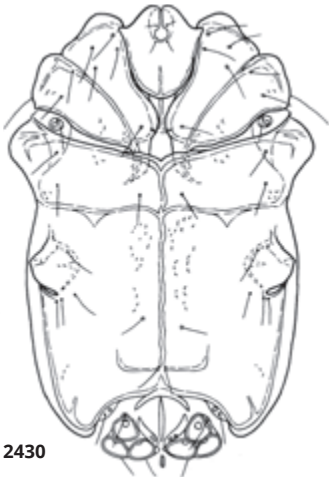
DISTRIBUTION: Several species known from the Holarctic, including China (Jin & Wiles 1996).



2428



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2428 *Pionopsis paludis* Habeeb, venter male (after Cook 1974)

2429 *Pionopsis lutescens* (Hermann), palp male (after Gerecke et al. 2016)

2430 *Tiphys gracilipes* Cook, venter male (after Cook 1974)

Genus *Tiphys* C.L. Koch, 1836

(Fig. 2325, 2331, 2332, 2406, 2430)

1836 *Tiphys* C.L. Koch, Deutschlands Crustaceen, Myriapoden und Arachniden 5: 19.

1901 *Laminipes* Piersig, Übersicht des Arachnidensystems 3: 23.

Type species: *Tiphys sagulatus* C.L. Koch, 1837 (= *species incerta*)

DIAGNOSIS: Dorsum with a pair of platelets. Coxae in four groups in females (Fig. 2332), in males usually Cx-III and Cx-IV fused, in some species also Cx-I and Cx-II. Posterior apodemes of anterior coxae short. Cx-IV with well-developed medial margins. Genital field usually with three, occasionally 4-6, pairs of acetabula. Male pregenital sclerite typically separated from the remainder of genital field, rarely fused (Fig. 2430). Posterior idiosoma margin without petiole. Ventral setae of P4 not thickened, peg-like setae at mediodistal margin well developed (Fig. 2331). Legs with swimming setae, second leg without spatulate setae. Insertions of fourth legs covered by large, anteriorly concave projections. Male IV-leg-4 inflated and often with modified setae (Figs. 2325, 2406).

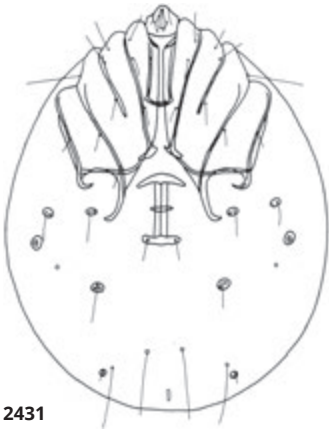
HABITAT: Temporary and permanent standing waters.

DISTRIBUTION: Numerous species known from the Holarctic, one species known from China (Yi et al. 2009b).

Family Pontarachnidae Koenike, 1910

1910 Pontarachnidae Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 129.

DIAGNOSIS: Lateral eyes present, in one interstitial species lacking pigment. Coxae in one or two groups. Suture lines between coxae posteriorly directed, complete or incomplete. Cx-I medially separated or fused, Cx-III+IV posteriorly with well-developed medial and lateral apodemes, either hook-shaped or straight. Gonopore of male surrounded by a sclerotized ring with few to many setae. Typical acetabula absent, but acetabula-like structures present, consisting of a small area of integument with radiating spokes ("wheel-like"), surrounded by a band of sclerotization (In one species from Australia these structures absent). A pair of ventral glandularia often located in heart-shaped or triangular platelets. Females with well-developed pre- and post-genital sclerites, the postgenital sclerite with or without setae. P4 with or without ventral setal tubercles. Legs without or with few swimming setae.



2431



2432



2433

2431 *Pontarachna punctulum* Philippi, venter female (after Gerecke et al. 2016)

2432 *Pontarachna punctulum* Philippi, gnathosoma female (after Gerecke et al. 2016)

2433 *Pontarachna punctulum* Philippi, chelicera male (after Cook 1974)

REMARKS: A well-defined clade, thus far with uncertain relationships to other families. In most studies it is placed in the Hygrobatoidea, although Tuzovskij (1983) placed it in its own superfamily, the Pontarachnoidea. According to Smit & Albert (2010), the wheel-like structures have probably the same osmoregulatory function as acetabula. Nothing is known about the life cycle of pontarachnids.

KEY TO THE GENERA

1 Suture lines Cx-III/IV ending in posteromedial apodemes (Fig. 2431); gnathosoma with a well-developed rostrum (Fig. 2432); all setae associated with genital field lying on a sclerite surrounding gonopore in male (Fig. 4), pre- and postgenital sclerites usually short in female (Fig. 2431); chelicera stylet-like (Fig. 2433) Genus *Pontarachna*

- Suture lines Cx-III/IV not ending in posteromedial apodemes; some setae lying free in the integument surrounding genital field in male (Fig. 2435); pre- and postgenital sclerites arrow-like in female (Fig. 2436); chelicera not stylet-like (Fig. 2437) Genus *Litarachna*

Genus *Pontarachna* Philippi, 1840

(Figs. 4, 2431-2434)

1840 *Pontarachna* Philippi, Archiv für Naturgeschichte 6: 191.

Type species: *Pontarachna punctulum* Philippi, 1840

DIAGNOSIS: Gnathosoma with a well-developed rostrum (Fig. 2432). Chelicera stylet-like, with a straight, pointed claw not distinctly separate from basal segment (Fig. 2433). Suture lines Cx-III/IV ending in posteromedial apodemes in both sexes (Figs. 4, 2431). Sclerotized ring surrounding gonopore with few to many setae, no setae lying in area around genital field. Wheel-like acetabula free in the venter in males, in females one pair of wheel-like acetabula incorporated in the postgenital sclerite, the other pair on small sclerites posteriorly to genital field.

HABITAT: Most species known from the marine littoral, but one species in the Caribbean found at a depth of 52-67 m (Pešić et al. 2012a).

DISTRIBUTION: Numerous species, occurring in all tropical and subtropical seas; known from all continents, but no species described from South America (see Pešić et al. 2012c). Two species are known from cold-temperate parts of the NW-Pacific Ocean and one species is known from a fresh water habitat, but in or near an estuary (Cook 1996).



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2434 *Pontarachna punctulum* Philippi, palp male (after Walter 1925)

2435 *Litarachna communis* Walter, venter male (after Gerecke et al. 2016)

2436 *Litarachna duboscqi* Walter, venter female (after Gerecke et al. 2016)

Genus *Litarachna* Walter, 1925

(Figs. 5, 2435-2439)

1925 *Litarachna* Walter, Internationale Revue der gesamten Hydrobiologie und Hydrographie 14: 32.

1958 *Paralitarachna* Cook, Proceedings of the Entomological Society of Washington 60: 19 – Cook (1986).

Type species: *Litarachna communis* Walter, 1925

DIAGNOSIS: Gnathosoma with or without a short rostrum (Fig. 2438). Chelicera two segmented, not stylet-like (Fig. 2437). Suture lines Cx-III/IV complete or incomplete, not ending in posteromedial apodemes. Males with a few pairs of setae on the sclerotized ring surrounding the gonopore, few to many setae in the integument surrounding the genital field (Figs. 5, 2435). In both sexes, wheel-like acetabula posterior to genital field; no wheel-like acetabula in post-genital sclerite (Fig. 2436), but very rarely these may be present (Durucan et al. 2018).

HABITAT: Marine littoral of tropical and subtropical seas. One species from the Caribbean found at a depth of nearly 70 m (Pešić et al. 2014), two species known from marine interstitial in South Korea (Pešić 2013a) and one species known from fresh water habitat, but in or near an estuary (Pešić et al. 2012b). Furthermore, one species is known from cold-temperate parts of the NW-Pacific Ocean.

DISTRIBUTION: Numerous species, occurring on all continents with tropical and subtropical seas.

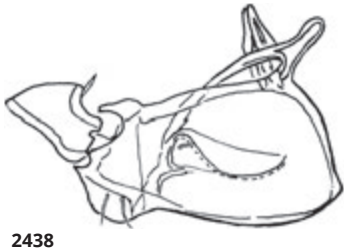
Family Wettinidae Cook, 1956

1956 Wettini Cook, Annals of the Entomological Society of America: 273 - Cook et al. (2000).

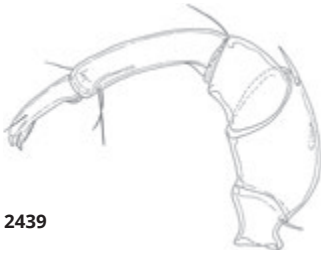
DIAGNOSIS: Idiosoma usually oval, occasionally moderately compressed laterally or strongly compressed dorsoventrally. Dorsal sclerotization various, either soft consisting of two pairs of small anterior platelets (Fig. 2447), or numerous small platelets flanked by dorsally extended coxal plates (Fig. 2444), or a large shield surrounded by small glandularia platelets (Fig. 2441). Gnathosoma not fused to Cx-I, with a prominent anchoral process (Fig. 2450). Extended parts of venter covered by coxae and genital plates, which may fuse into a ventral shield. Genital field with 3-9 acetabula, in some species fused with surrounding ventral sclerotization. Male gonopore completely surrounded by ventral sclerotization of genital plates, genital field of females with paired triangular plates. I-III-L insertions near anterior idiosoma margin, IV-L insertions near midlength of idiosoma. Suture lines Cx-I/II, -II/III and –III/IV well developed, directed posteriorly. Cxgl-1 in posterior margins of Cx-II; Cx-IV without glandularia. Cxgl-2 between Cx-IV and genital field. Palp five-segmented, slender, P4 with at least two stout setae with short, or without, ventral extensions. Legs not exhibiting sexual dimorphism. I-L stocky, I-L-6 with a long



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2437 *Litarachna communis* Walter, chelicera male (after Gerecke et al. 2016)

2438 *Litarachna communis* Walter, gnathosoma female (after Gerecke et al. 2016)

2439 *Litarachna communis* Walter, palp male (after Gerecke et al. 2016)

claw socket which is longer than half of segment (Figs. 2460, 2467); claw large, pointed, ventral clawlet apically rounded, slightly longer than main claw. IV-leg long and slender, II-IV-L with a few or without swimming setae, slender terminal segments with small claws, their sockets reduced (Fig. 2467).

KEY TO THE GENERA

1 Genital field with 7-9 pairs of acetabula (Fig. 2440); dorsum with a large plate surrounded by platelets of different size (Fig. 2441) Genus *Bromeliacarus*

\- Genital field with 3-4 acetabula (Fig. 2442), dorsum various 2

2 Genital field with four pairs of acetabula (Fig. 2442), dorsum with a large plate surrounded by platelets of different size (Fig. 2443) Genus *Stormaxonella*

\- Genital field with 3-4 pairs of acetabula, dorsum various but not as described above 3

3 Dorsum with one plate covering nearly complete surface (Fig. 2444); coxae and genital field fused into a ventral shield (Fig. 2445) Genus *Tasmanaxona*

\- Dorsum without large plate, venter various 4



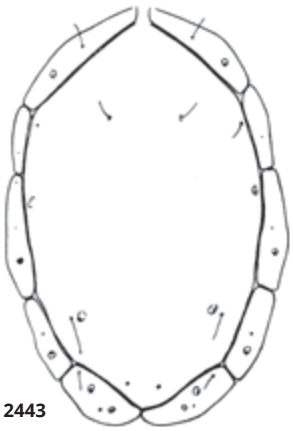
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2440 *Bromeliacarus cardoso* Pešić, venter female (after Pešić et al. 2015b)

2441 *Bromeliacarus cardoso* Pešić, dorsum female (after Pešić et al. 2015b)

2442 *Stormaxonella scutulata* K.O. Viets, venter male (after Cook 1974)

2443 *Stormaxonella scutulata* K.O. Viets, dorsum male (after Cook 1974)

2444 *Tasmanaxona kurtvietsi* Cook, dorsum female (after Cook 1986)

2445 *Tasmanaxona kurtvietsi* Cook, venter male (after Cook 1986)

4 Coxae and genital field separated by membranous strips (Fig. 2446) Genus *Wettina*

- Coxae and genital field fused into a ventral shield 5

5 Dorsum with two pairs of small platelets, anterior platelets larger than posterior platelets (Fig. 2447) Genus *Wheenyoides*

- Dorsum with several small platelets surrounded by expanded coxae (Fig. 2448) Genus *Wheenyella*

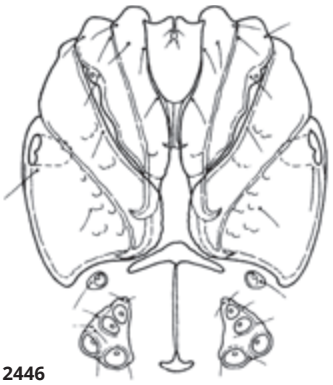
Genus *Bromeliacarus* Pešić, 2015

(Figs. 2440, 2441, 2449-2452)

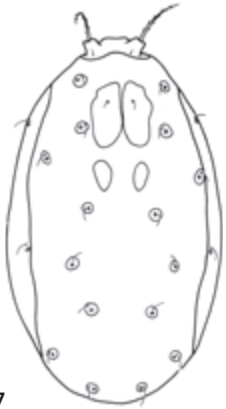
2015 *Bromeliacarus* Pešić, Zookeys 516: 29.

Type species: *Bromeliacarus cardoso* Pešić, 2015

DIAGNOSIS: Dorsum with a large shield including two pairs of glandularia and the postocularia, surrounded by a ring of six pairs of platelets of different size; sixth pair fused medially (Fig. 2441). Gnathosoma with a relatively large anchoral process (Fig. 2450). Coxal plates and genital field fused into a ventral shield. Suture line of anterior three coxae indistinct. Cxgl-1 in posterior



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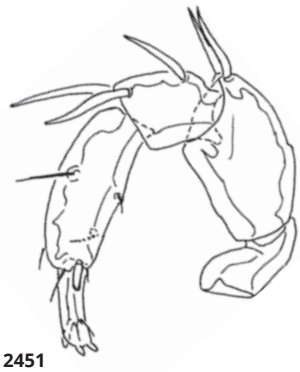
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2446 *Wettina octopora* Cook, venter female (after Cook 1974)

2447 *Wheenyoides cooki* Harvey, dorsum male (after Harvey 1990d)

2448 *Wheenyella smithi* Cook, dorsum female (after Cook 1986)

2449 *Bromeliacarus cardoso* Pešić, venter male (after Pešić et al. 2015b)

2450 *Bromeliacarus cardoso* Pešić, gnathosoma female (after Pešić et al. 2015b)

2451 *Bromeliacarus cardoso* Pešić, palp female (after Pešić et al. 2015b)

margins of Cx-II. Genital field with 7-9 acetabula, these incorporated into ventral shield in both sexes (Fig. 2440, 2449). Suture line between genital field and ventral shield obliterated. Excretory pore incorporated in ventral shield. Palp slender, P4 with two short ventral setae and a peg-like mediodistal seta (Fig. 2451). Legs without swimming setae.

HABITAT: Water-filled leaf axis of a bromeliad.

DISTRIBUTION: Known from one species in Brazil.

Genus *Stormaxonella* K.O. Viets, 1962

(Figs. 65, 2442, 2443, 2453, 2454)

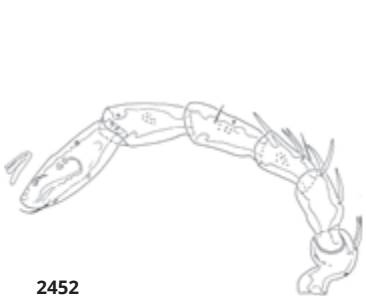
1962 *Stormaxonella* K.O. Viets, Zoologischer Anzeiger 168: 369 – Cook et al. (2000).

Type species: *Stormaxonella scutulata* K.O. Viets, 1962

DIAGNOSIS: Dorsal shield with a large plate surrounded by five smaller platelets of different size (Figs. 65, 2443). Coxae and genital field fused into a ventral shield in both sexes. Suture lines of coxae well developed. Genital field with four pairs of acetabula (Figs. 2442, 2453). P4 medially with a large spatulate seta (Fig. 2454. Legs with swimming setae.

HABITAT: Streams.

DISTRIBUTION: Known from one species from South Africa.



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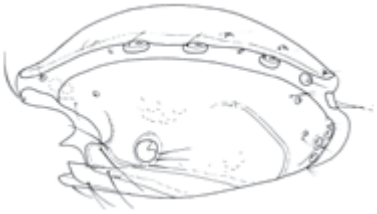
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2452 *Bromeliacarus cardoso* Pešić, first leg (+ claw) female (after Pešić et al. 2015b)

2453 *Stormaxonella scutulata* K.O. Viets, genital field female (after Cook 1974)

2454 *Stormaxonella scutulata* K.O. Viets, palp male (after Cook 1974)

2455 *Tasmanaxona kurtvietsi* Cook, genital field male (after Cook 1986)

2456 *Tasmanaxona kurtvietsi* Cook, venter female (after Cook 1986)

2457 *Tasmanaxona kurtvietsi* Cook, lateral view female (after Cook 1986)

Genus *Tasmanaxona* Cook, 1986

(Figs. 2444, 2445, 2455-2458)

1986 *Tasmanaxona* Cook, Memoirs of the American Entomological Institute 40: 207 – Cook et al. (2000).

Type species: *Tasmanaxona kurtvietsi* Cook, 1986

DIAGNOSIS: Dorsum with a large plate covering nearly complete surface flanked by three pairs of glandularia sclerites (Fig. 2444). Coxae extending well up to lateral sides of idiosoma (Fig. 2457). Gnathosoma with a long anchoral process. Coxal suture lines complete laterally, obliterated medially (Figs. 2445, 2456). Genital field with three pairs of acetabula (Fig. 2455). P4 with two heavy blade-like setae midventrally (Fig. 2458). II- and III-leg-5 with numerous swimming setae, IV-L-5 with two swimming setae.

HABITAT: Pools in streams and rivers.

DISTRIBUTION: Known from one species from Tasmania, Australia.

Genus *Wettina* Piersig, 1892

(Figs. 64, 2446, 2459, 2460)

1892 *Wettina* Piersig, Zoologischer Anzeiger 15: 410.

Type species: *Wettina macroplicus* Piersig, 1892 = *W. podagrica* (C.L. Koch, 1837)

DIAGNOSIS: Dorsum anteriorly with two pairs of small platelets, posterior part without sclerites. Venter with soft integument surrounding coxal and genital plates (Figs. 64, 2446). Posterior apodemes of first coxae relatively long. Coxae in four groups, suture line Cx-III/IV extending posteromedially, Cx-IV triangular, not reaching midline. Genital field with three or four pairs of acetabula. Males without petiole. Legs with numerous swimming setae, not exhibiting sexual dimorphism.

HABITAT: Streams, springs and lakes.

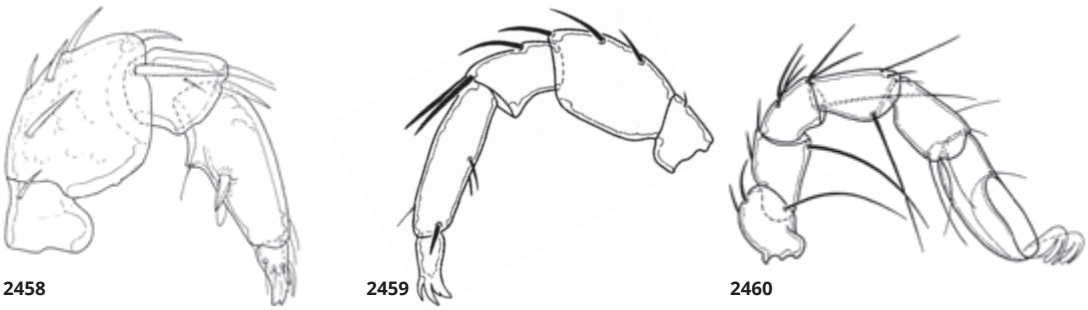
DISTRIBUTION: Holarctic, with two species known from Europe (Pešić & Smit 2018a) and three species from North America (Cook 1961, I.M. Smith 1976a).

Genus *Wheenyella* Cook, 1986

(Figs. 2448, 2461-2467)

1986 *Wheenyella* Cook, Memoirs of the American Entomological Institute 40: 209 – Cook et al. (2000).

Type species: *Wheenyella smithi* Cook, 1986



2458 **2459** **2460**

2458 *Tasmanaxona kurtvietsi* Cook, palp female (after Cook 1986)

2459 *Wettina octopora* Cook, palp male (after Cook 1974)

2460 *Wettina octopora* Cook, first leg male (after Cook 1974)

DIAGNOSIS: Dorsum with several small platelets laterally flanked by dorsally expanded coxal plates (Fig. 2463). Venter with coxal plates and genital plates fused into a ventral shield in both sexes (Figs. 2461, 2464). Genital field with three pairs of acetabula (Fig. 2462). P4 with two thickened, blade-like setae. II- and III-leg with numerous swimming setae, IV-L-5 with three swimming setae (Fig. 2467).

HABITAT: Pools in streams.

DISTRIBUTION: Known from one species from eastern Australia.

Genus *Wheenyoides* Harvey, 1990

(Figs. 2447, 2468-2470)

1990 *Wheenyoides* Harvey, Memoirs of Museum Victoria 50: 341 – Cook et al. (2000).

Type species: *Wheenyoides cooki* Harvey, 1990



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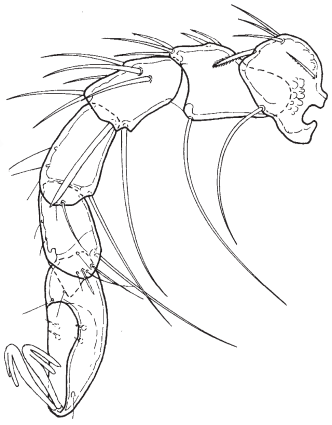
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2461 *Wheenyella smithi* Cook, venter male (after Cook 1986)

2462 *Wheenyella smithi* Cook, genital field male (after Cook 1986)

2463 *Wheenyella smithi* Cook, lateral view male (after Cook 1986)

2464 *Wheenyella smithi* Cook, venter female (after Cook 1986)

2465 *Wheenyella smithi* Cook, palp female (after Cook 1986)

2466 *Wheenyella smithi* Cook, first leg female (after Cook 1986)

DIAGNOSIS: Dorsum with two pairs of platelets, anterior pair larger than posterior pair, and tiny glandularia sclerites (Fig. 2447). Coxae and genital field fused into a ventral shield, in male covering the whole venter (Fig. 2468), in female divided at midline and ending at posterior margin of genital field (Fig. 2469). Suture lines of coxae complete; posterior margin of Cx-IV distinct in male, in female obliterated. Genital field with three pairs of acetabula. P4 with two thickened, blade-like setae in anterior half of segment (Fig. 2470). Legs with numerous swimming setae.

HABITAT: Pools in streams, ponds.

DISTRIBUTION: Known from one species from SW-Australia.

Family Unionicolidae Oudemans, 1909

1900 Atacidae Thor, Nyt Magazin for Naturvidenskaberne 38: 3.

1909 Unionicolidae Oudemans, Tijdschrift voor Entomologie 52: 60.

1923 Neumaniidae Thor, Arbeiten der Biologischen Wolga-Station, Saratow 7: 47.

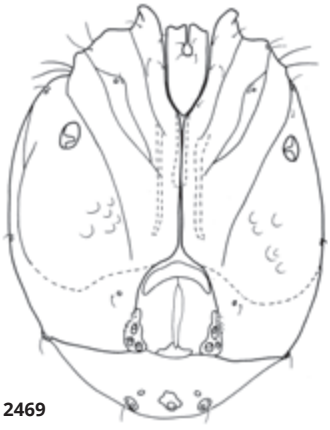
DIAGNOSIS: Lateral eyes lying beneath the integument. Idiosoma sclerotization varying from none to development of dorsalia and ventralia, to complete dorsal and ventral shields. Gnathosoma separated from Cx-I, with a well-developed anchoral process in most genera. Chelicera may or may not be fused medially. Coxae variable, typically in four groups in species with a soft integument, but fused into a single group in more heavily sclerotized species. Suture lines Cx-III/Cx-IV either complete or incomplete. Cx-III and Cx-IV usually without glandularia, rarely Cx-IV with glandularia. Posterior apodemes of anterior coxae often long, but may be short, even within the same genus. Posterior margin of Cx-IV typically with projections or apodemes, but these occasionally absent. Palp typically five-segmented but rarely there may be a partial or complete fusion of some segments. Palp rather various in morphology but more or less typical within a subfamily. P4 usually with a peg-like seta, but this seta occasionally absent. Legs often with heavily, movable setae ("fluted " or "grooved setae") in the free-living species. Legs usually with swimming setae and occasionally with sexual dimorphism. Genital field with four to numerous pairs of acetabula.



2467



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2467 *Wheenyella smithi* Cook, fourth leg male (after Cook 1986)

2468 *Wheenyoides cooki* Harvey, venter male (after Harvey 1990d)

2469 *Wheenyoides cooki* Harvey, venter female (after Harvey 1990d)

KEY TO THE SUBFAMILIES

1 P4 flattened, its dorsodistal margin projecting far beyond insertion of P5 (Fig. 2471); excretory pore dorsal in position Subfamily Pollicipalpinae

- P4 in general not projecting far beyond insertion of P5 (Fig. 2473); excretory pore ventral in position (Fig. 2474) 2

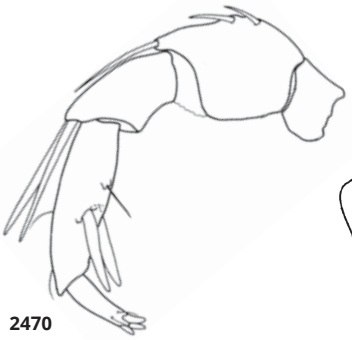
2 Fourth leg either without claws or claws greatly reduced (Fig. 2475); acetabula lying free in the integument (Fig. 2476) Subfamily Encentridophorinae

- Fourth leg with well-developed claws (Fig. 2477); acetabula either on genital plates (Fig. 2478) or incorporated in the ventral shield (Fig. 2474) 3

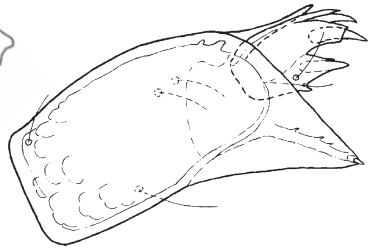
3 Posterior apodemes of first coxal group relatively short (Fig. 2658); genital field usually as wide as long or longer then wide 4

- Posterior apodemes of first coxal group usually relatively long (Fig. 2479); genital field usually wider then long with numerous acetabula Subfamily Pionatacinae

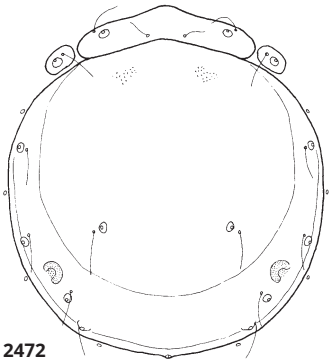
4 Idiosoma weakly sclerotized, rarely males with extensive sclerotization; acetabula usually on genital plates (Fig. 2478); P4 of male without a dorsodistal extension; II-leg-3 of male without a ventral hump Subfamily Unionicolinae



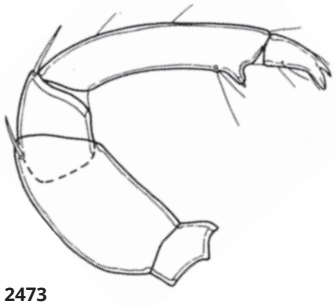
2470



2471



2472



2473



2474



2475

2470 *Wheenyoides cooki* Harvey, palp female (after Harvey 1990d)

2471 *Pollicipalpus* (*Pollicipalpella*) *australicus* Cook, P4-5 male (after Cook 1986)

2472 *Pollicipalpus* (*Pollicipalpella*) *australicus* Cook, dorsum male (after Cook 1986)

2473 *Encentridophorus* (*Encentridophorus*) *similis* Cook, palp female (after Cook 1974)

2474 *Koenikea* (*Koenikea*) *concava* Wolcott, venter female (after Cook 1974)

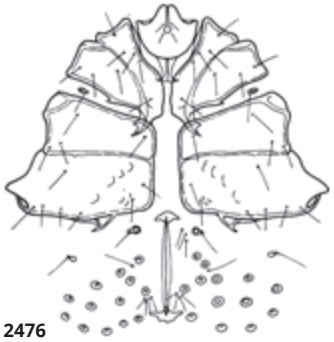
2475 *Encentridophorus* (*Encentridophorellus*) *falcipes* Lundblad, IV-leg-5-6 male (after Cook 1974)

- Idiosoma with dorsal and ventral shields; acetabula fused with ventral shield (Fig. 2480); P4 of male with a dorsodistal extension (Fig. 2481); II-leg-3 of male with a ventral hump (Fig. 2482) Subfamily Omanohydracarinae

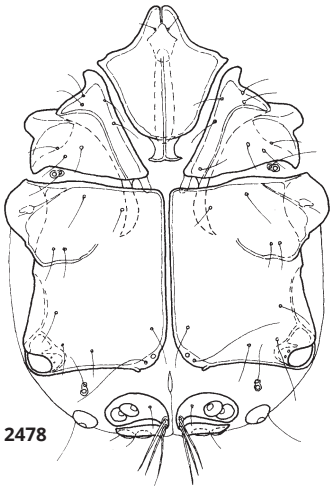
Subfamily Encentridophorinae K. Viets, 1935

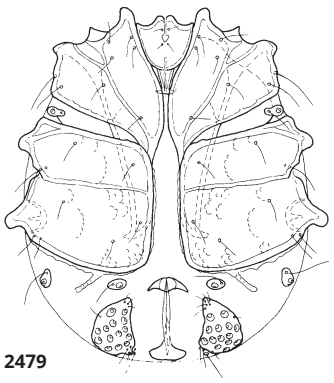
1935 Encentridophorinae K. Viets, Archiv für Hydrobiologie, Supplement 13: 647.

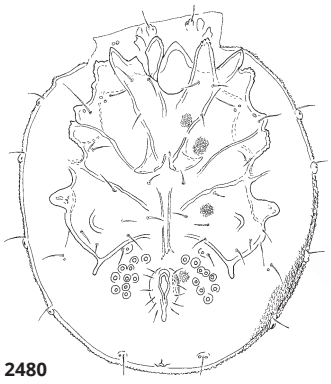
DIAGNOSIS: Idiosoma soft. Posterior margin of idiosoma of male with paired rows of stout setae (Fig. 2484). Coxae in four groups, posterior apodemes of anterior coxae short. Genital field with numerous acetabula. Most of the acetabula lie usually free in the integument (Fig. 2476), rarely on a pair of plates (Fig. 2485). Gonopore of male typically not completely surrounded by sclerotization, rarely pre- and postgenital sclerites fused with acetabula. P4 with an anteroventral tubercle bearing a small peg-like seta; tip of P5 bifurcate (Fig. 2473). Legs with swimming setae. Third leg of males modified in various ways, with large claws (Fig. 2486). Fourth legs without claws or claws of this leg extremely reduced (Fig. 121). Other legs with simple claws. Monotypic.













2476 *Encentridophorus* (*Encentridophorus*) *similis* Cook, venter female (after Cook 1974)

2477 *Unionicola crassipalpis* Walter, first leg female (after Cook 1986)

2478 *Unionicola crassipalpis* Walter, venter female (after Cook 1986)

2479 *Neumania* (*Neumania*) *ambigua* Piersig, venter female (after Cook 1986)

2480 *Omanohydracarus arabicus* Gerecke, venter male (after Gerecke 2004b)

2481 *Omanohydracarus arabicus* Gerecke, palp male (after Gerecke 2004b)

Genus *Encentridophorus* Piersig, 1897

(Figs. 121, 122, 2473, 2475, 2476, 2483-2486)

1897 *Encentridophorus* Piersig, Zoologischer Anzeiger 20: 60.
Type species: *Atax spinifer* Koenike, 1893

DIAGNOSIS: As for subfamily.

KEY TO THE SUBGENERA (MALES ONLY)

1 IV-leg-6 of male bowed (Fig. 2475) — Subgenus *Encentridophorellus*

- IV-leg-6 of male not bowed (Fig. 2483) — Subgenus *Encentridophorus*

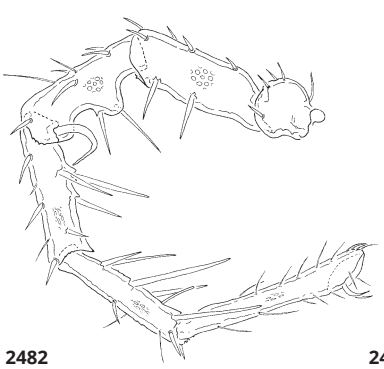
Subgenus *Encentridophorus* s.s.

(Figs. 121, 122, 2473, 2476, 2483-2486)

DIAGNOSIS: IV-leg-6 of male not bowed (Fig. 2483).

HABITAT: Standing waters and slow flowing streams.

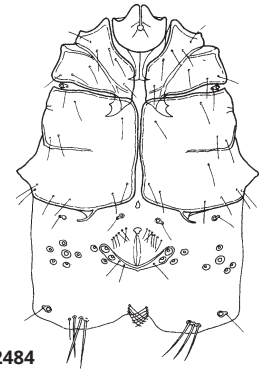
DISTRIBUTION: A dozen species known from the Afrotropical (Cook 1966; Bader 1968, 1981), Oriental (Cook 1967; Imamura 1976b) and Australasian regions (Cook 1968).



2482



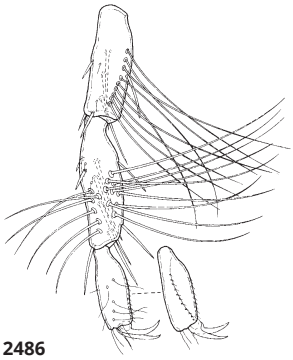
2483



2484



2485



2486



2487

2482 *Omanohydracarus arabicus* Gerecke, second leg male (after Gerecke 2004b)

2483 *Encentridophorus* (*Encentridophorus*) *sarasini* Walter, IV-leg-6 male (after Cook 1986)

2484 *Encentridophorus* (*Encentridophorus*) *similis* Cook, venter male (after Cook 1974)

2485 *Encentridophorus* (*Encentridophorus*) *alatus* Cook, genital field male (after Cook 1974)

2486 *Encentridophorus* (*Encentridophorus*) *sarasini* Walter, III-leg-4-6 male (after Cook 1986)

2487 *Omanohydracarus arabicus* Gerecke, venter female (after Gerecke 2004b)

Subgenus *Encentridophorellus* Lundblad, 1951

(Fig. 2475)

1951 *Encentridophorellus* Lundblad, Entomologisk Tidskrift 72: 161.
Type species: *Encentridophorus falcipes* Lundblad, 1951

DIAGNOSIS: IV-leg-6 of male bowed (Fig. 2475).

HABITAT: Standing waters.

DISTRIBUTION: Two species known from Africa (Kenya, Rwanda, Bader 1968).

Subfamily Omanohydracarinae Gerecke, 2004

2004 Omanohydracarinae Gerecke, Journal of Natural History 38: 2837.

DIAGNOSIS: Lateral eyes strongly reduced. Idiosoma with dorsal and ventral shields. All glandularia of the dorsum and venter lying on the dorsal and ventral shields. Gnathosoma without anchoral process. Lateral margin of Cx-I-III with paired extensions not curved or hook-like. Posterior margins of Cx-I-II with well-developed, short apodemes. Cx-IV with an unpaired lateral extension covering the insertion of the fourth leg. Suture lines Cx-III/Cx-IV near-complete. Cx-IV with posterior apodemes extending from a triangular posterior extension. Cxgl-4 located between Cx-IV and genital field. Genital field with 10 (male, Fig. 2480) or 6 pairs (female, Fig. 2487) of acetabula, located in the genital bay formed by Cx-IV. Palp exhibiting a strong sexual dimorphism; P4 with a pointed dorsodistal extension in both sexes. Male P2 with an anteroventral pointed extension, peg-like seta of P4 located distally (Fig. 2481). Female P2 without extension, in both sexes P4 with a peg-like ventral seta and paired setal tubercles (Fig. 2488). Legs without swimming setae (Fig. 2489), but with many moderately long setae (Fig. 2490). II-leg-3 of male with a ventral hump and a stout (Fig. 2486), curved distal seta, second leg of female not modified. Monotypic.

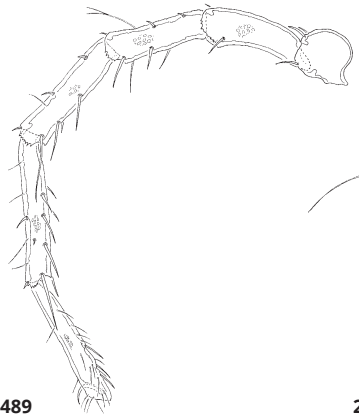
Genus *Omanohydracarus* Gerecke, 2004

(Figs. 2480-2482, 2487-2492)

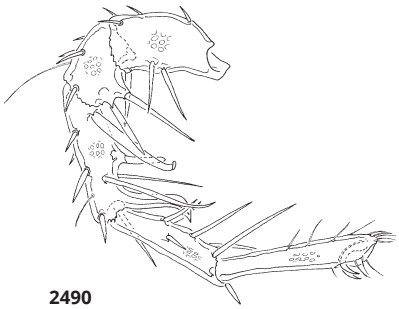
2004 *Omanohydracarus* Gerecke, Journal of Natural History 38: 2839.
Type species: *Omanohydracarus arabicus* Gerecke, 2004



2488



2489



2490

2488 *Omanohydracarus arabicus* Gerecke, palp female (after Gerecke 2004b)

2489 *Omanohydracarus arabicus* Gerecke, fourth leg male (after Gerecke 2004b)

2490 *Omanohydracarus arabicus* Gerecke, third leg male (after Gerecke 2004b)

DIAGNOSIS: As for subfamily.

HABITAT: Interstitial.

DISTRIBUTION: One species known from Oman.

Subfamily Pionatacinae K. Viets, 1916

1916 Pionatacinae K. Viets, Archiv für Hydrobiologie 11: 299.

1931 Neumaniinae K. Viets, Zoologischer Anzeiger 93: 226 – Cook (1974).

1938 Schadeelliinae Lundblad, Zoologischer Anzeiger 122: 11.

DIAGNOSIS: Sclerotization of idiosoma varying from weak development of various dorsalia and ventralia to complete dorsal and ventral shields. Gnathosoma typically with an anchoral process. Chelicera usually fused medially. Coxae in four groups in weakly sclerotized species, but tending to fuse in more heavily sclerotized species. Suture lines Cx-III/Cx-IV usually complete. Apodemes of the anterior coxae long, especially in the weakly sclerotized species. Genital field usually wider than long with numerous acetabula, but occasionally as few as four pairs. Females typically with a single pair of genital plates, always without stout setae. Palp typically five-segmented, but occasionally there may be a fusion of P2 and P3 or P4 and P5. Legs with or without sexual dimorphism. All legs with simple claws.

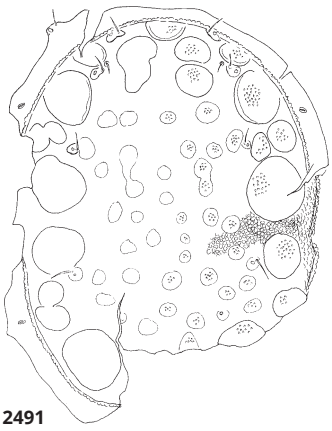
KEY TO THE GENERA

1 Idiosoma heavily sclerotized, dorsal and ventral shields present; dorsal shield may be divided into 5-8 platelets (Fig. 2493), these closely fitting in both sexes 2

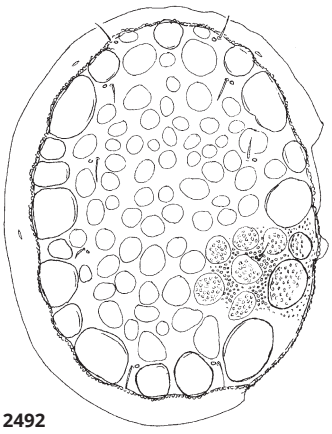
- Idiosoma usually soft, but a ventral shield is present in a number of species and a dorsal shield consisting of closely fitting dorsalia and glandularia is present in males of the subgenus *Ecpolopsis* of *Neumania* (Fig. 2494); however, females always have areas of soft integument dorsally 9

2 Dorsal furrow either absent or not visible in dorsal or ventral view (Fig. 2495) 3

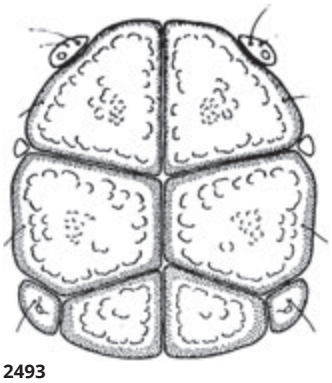
- A dorsal furrow always present (occasionally incomplete posteriorly, Fig. 2496), visible in dorsal view 4



2491



2492



2493

2491 *Omanohydracarus arabicus* Gerecke, dorsum male (after Gerecke 2004b)

2492 *Omanohydracarus arabicus* Gerecke, dorsum female (after Gerecke 2004b)

2493 *Nyangalla* (*Ecpolopella*) *peltophora* (K. Viets), dorsum female (after Cook 1974)

3 Acetabula in 2-3 rows on well-delineated, wing-like genital plates (Fig. 2497); dorsal furrow along sides of the idiosoma; male with IV-leg-3 and -4 expanded ventrally and with modified setae (Fig. 2498) Genus *Pionatax*

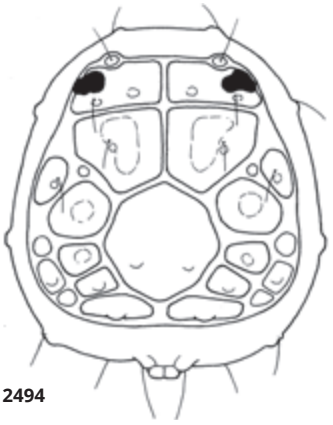
- Acetabula in numerous rows, not on well-delineated genital plates (Fig. 2499); dorsal furrow absent; none of the legs exhibiting sexual dimorphism Genus *Ecpolus*

4(2) P3 with a very long seta, extending beyond P5 (Fig. 2500); female with two pairs of genital plates (Fig. 2501) Genus *Amazonella* (in part)

- P3 without a very long seta (Fig. 2502); female with one pair of genital plates (Fig. 2503) 5

5 A relatively large, median tubercle located between the genital field and the excretory pore (Fig. 2504); dorsal shield with four pairs of glandularia (Fig. 2505) (Female unknown) Genus *Esekalla*

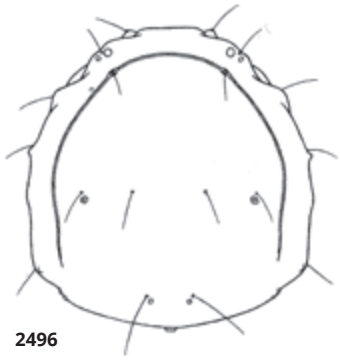
- No median tubercle between the genital field and the excretory pore (Fig. 2506); dorsal shield with 2-6 pairs of glandularia (Fig. 2507) 6



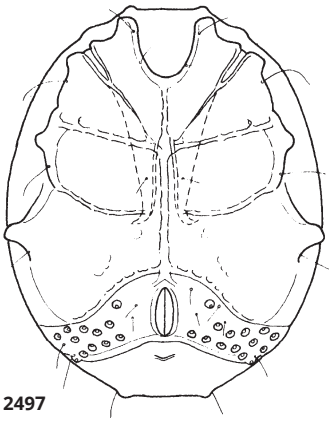
2494



2495



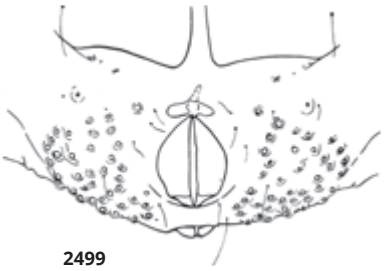
2496



2497



2498



2499

2494 *Neumania* (*Ecpolopsis*) *multiscutata walteri* Cook, dorsum male (after Cook 1974)

2495 *Pionatax uncipes* K. Viets, dorsum male (after Cook 1974)

2496 *Nyangalla* (*Subkoenikea*) *gennada* (Cook), dorsum female (after Cook 1974)

2497 *Pionatax uncipes* K. Viets, venter male (after Cook 1974)

2498 *Pionatax uncipes* K. Viets, IV-leg-3-4 male (after Cook 1974)

2499 *Ecpolus tuberatus tuberatus* Koenike, genital field female (after Cook 1974)

6 Dorsal shield either divided (Fig. 2508) or, if entire, with only two pairs of glandularia (Fig. 2497); first legs with long, stout, movable setae (Fig. 2509) Genus *Nyangalla*

- Dorsal shield always entire, with three or more pairs of glandularia (Figs. 2510); setae of first leg various, but as described above 7

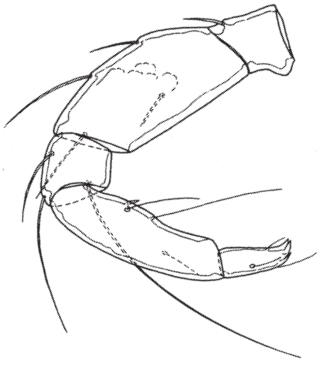
7 Dorsal shield with 3-4 pairs of glandularia (Fig. 2510) Genus *Recifella*

- Dorsal shield with 5-6 pairs of glandularia (fig. 2511) 8

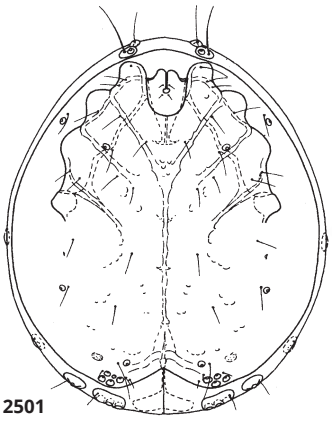
8 Gnathosoma attached to a short protrusable tube, gnathosoma with a large upturned rostrum (Fig. 2512) Genus *Tanaognathus*

- Gnathosoma not attached to a protrusable tube, a rostrum may be present, but it is not upturned (fig. 2513) Genus *Koenikea*

9(1) Coxae fused into a single group; female genital field with two pairs of genital plates (Fig. 2514; P3 with a long seta located more or less ventrally (Fig. 2515) Genus *Amazonella* (in part)



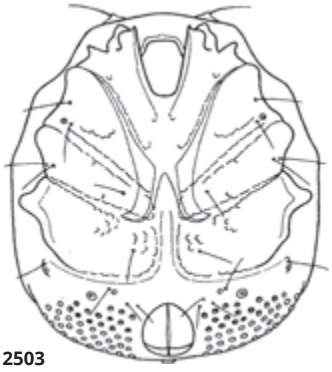
2500



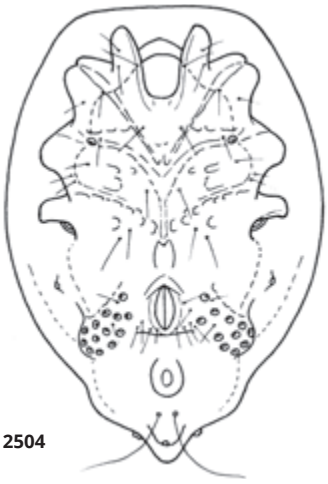
2501



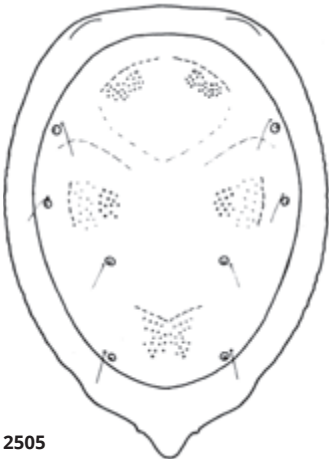
2502



2503



2504



2505

2500 *Amazonella mesomamericana* Cook, palp female (after Cook 1980)

2501 *Amazonella mesomamericana* Cook, venter female (after Cook 1980)

2502 *Nyangalla* (*Nyangalla*) *gantaensis* (Cook), palp female (after Cook 1974)

2503 *Nyangalla* (*Subkoenikea*) *gennada* (Cook), venter female (after Cook 1974)

2504 *Esekalla oxyura* (K. Viets), venter male (after Cook 1974)

2505 *Esekalla oxyura* (K. Viets), dorsum male (after Cook 1974)

- Coxae rarely fused into a single group; if coxae fused into a single group, there is extensive sclerotization of the integument (Fig. 2516); female genital field rarely with two pairs of genital plates (Fig. 2517); P3 always with a short seta located more dorsally (Fig. 2518) 10

10 Palp with a large medial tubercle on P4 (Fig. 2519) Genus *Schadeella*

- Palp without a large medial tubercle on P4 (Fig. 2518) Genus *Neumania*

Genus *Amazonella* Lundblad, 1930

(Figs. 2500, 2501, 2514, 2515, 2520-2522)

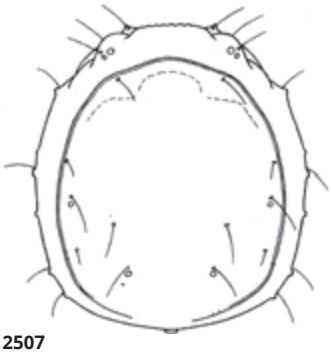
1930 *Amazonella* Lundblad, Zoologiska bidrag från Uppsala 13: 36.

Type species: *Amazonella ribagai* Lundblad, 1930

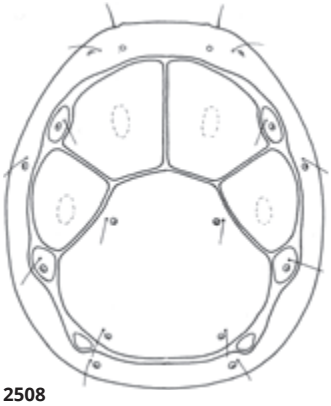
DIAGNOSIS: Idiosoma either weakly sclerotized (Figs. 2515, 2521) or with dorsal and ventral shields (Fig. 2501, 2520). Chelicera not fused medially. Coxae fused into a single group. Cx-I projecting beyond frontal idiosoma margin, posterior apodemes of anterior coxae short. Suture line Cx-I/Cx-II complete, suture lines between other coxae incomplete. Cx-IV rounded laterally, with



2506



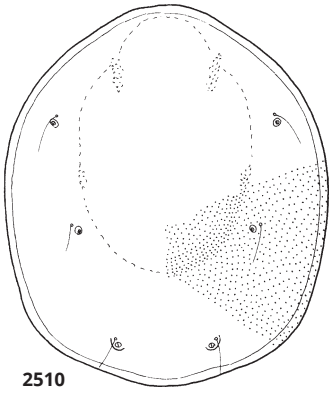
2507



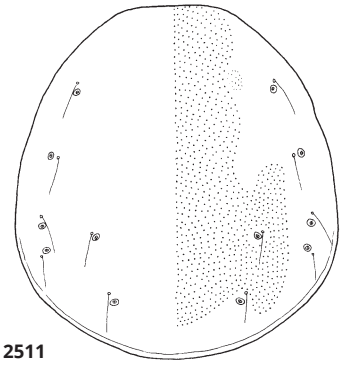
2508



2509



2510



2511

2506 *Nyangalla* (*Nyangalla*) *gantaensis* (Cook), venter male (after Cook 1974)

2507 *Nyangalla* (*Nyangalla*) *gantaensis* (Cook), dorsum female (after Cook 1974)

2508 *Nyangalla* (*Ecpolopella*) *tesselata tesselata* (Daday), dorsum female (after Cook 1974)

2509 *Nyangalla* (*Ecpolopella*) *tesselata acuticaudata* (K. Viets), first leg male (after Cook 1974)

2510 *Recifella* (*Eorecifella*) *australica* Cook, dorsum female (after Cook 1986)

2511 *Koenikea* (*Notomideopsis*) *branacha* Cook, dorsum male (after Cook 1986)

two pairs of glandularia near periphery. Cx-IV with posterior projections or posterior margin completely obliterated. Genital field with 6 till numerous acetabula. Female with two pairs of oval genital plates not fused with either the pre- or postgenital sclerites (Fig. 2514). If a ventral shield is present, then anterior pair of genital plates fused with it (Fig. 2501). Male genital field surrounding the gonopore. P3 with a very long, more or less ventrally placed seta (Figs. 2500, 2515), P4 with a peg-like seta and a long somewhat thickened seta. First leg relatively unmodified, with a few long, thickened setae as typical for *Neumania*-like species (Fig. 2522).

HABITAT: Standing waters, streams.

DISTRIBUTION: Several species known from South America (Brazil, Surinam, Paraguay, K. Viets 1959a) and one from Central America (Costa Rica, Cook 1980).

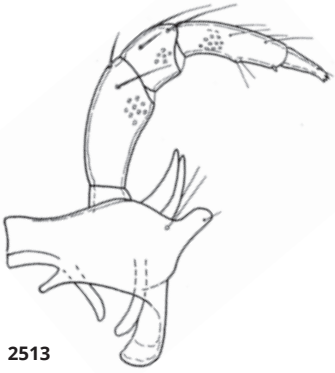
Genus *Ecpolus* Koenike, 1898

(Figs. 2499, 2523-2526)

1898 *Ecpolus* Koenike, Abhandlungen der Senckenberg Gesellschaft für Naturforschung 21: 368.
Type species: *Ecpolus tuberatus* Koenike, 1898



2512



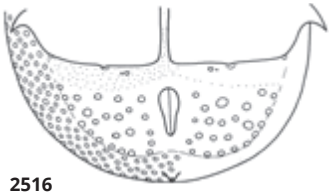
2513



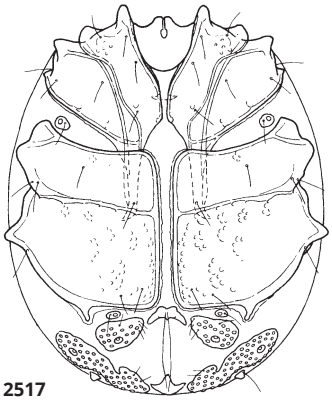
2514



2515



2516



2517

2512 *Tanaognathus* (*Tanaognathella*) *wolcotti* (K. Viets), gnathosoma + palp female (after Cook 1976a)

2513 *Koenikea* (*Jurucuia*) *oblongata* (K. Viets), gnathosoma + palp female (after Cook 1974)

2514 *Amazonella polypora* Lundblad, venter female (after Cook 1974)

2515 *Amazonella polypora* Lundblad, palp male (after Cook 1974)

2516 *Neumania* (*Nicksatax*) *arrenuroides* (Habeeb), venter male (part.) (after Cook 1974)

2517 *Neumania* (*Tetraneumania*) *distincta* Marshall, venter female (after Cook 1974)

DIAGNOSIS: Idiosoma completely sclerotized in both sexes; dorsal furrow not developed (Fig. 2523). Dorsal sclerotization with pronounced sculpturing. Tips of Cx-I bluntly projecting. Apodemes of anterior coxae long (Figs. 2524, 2525). Genital field with numerous acetabula, fused with ventral shield without suture lines (Fig. 2499). P4 with a small ventral setal tubercle (Fig. 2526). Legs without sexual dimorphism.

HABITAT: Lakes, streams.

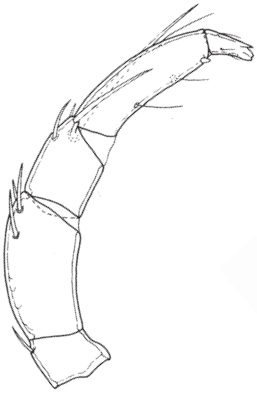
DISTRIBUTION: Two species and one subspecies known from the Afrotropical region (Bader 1968, K.O. Viets 1965a).

Genus *Esekalla* K. Viets, 1942

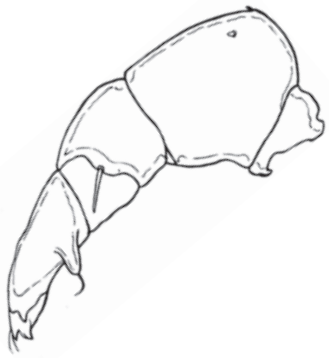
(Figs. 2504, 2505)

1942 *Esekalla* K. Viets, Zoologischer Anzeiger 138: 211.

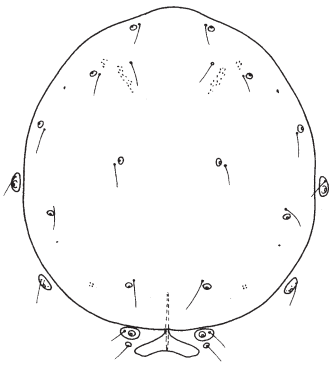
Type species: *Koenikea oxyura* K. Viets, 1925



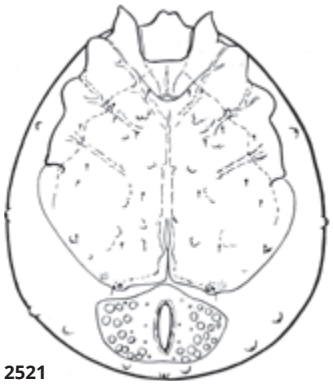
2518



2519



2520



2521



2522



2523

2518 *Neumania* (*Tetraneumania*) *nondanda* Cook, palp male (after Cook 1980)

2519 *Schadeella crassipalpis* Lundblad, palp female (after Cook 1974)

2520 *Amazonella mesoamericana* Cook, dorsum female (after Cook 1980)

2521 *Amazonella polypora* Lundblad, venter male (after Cook 1974)

2522 *Amazonella polypora* Lundblad, first leg male (after Cook 1974)

2523 *Ecpolus tuberatus tuberatus* Koenike, dorsum male (after Cook 1974)

DIAGNOSIS: (Male only) Idiosoma bluntly pointed posteriorly. Dorsal shield entire, bearing four pairs of glandularia; dorsal furrow complete (Fig. 2505). Posterior margin of Cx-IV obliterated. Genital field with 10-12 pairs of acetabula, suture lines obliterated. A prominent ventral projection present between the excretory pore and the genital field (Fig. 2504). Excretory pore lying on a tubercle immediately ventral to the posterior idiosoma projection. Shape of palp and legs not known.

HABITAT: Streams.

DISTRIBUTION: One species known from Cameroon.

Genus *Koenikea* Wolcott, 1900

(Figs. 2474, 2511, 2513, 2527-2548, 3085-3087)

1900 *Koenikea* Wolcott, Transactions of the American Microscopical Society 21: 189.

Type species: *Koenikea concava* Wolcott, 1900

DIAGNOSIS: Idiosoma typically flattened but in the early derivative *Notomideopsis* relatively high. Dorsal and ventral shields present in both sexes, dorsal shield always entire, with 5-6 pairs of glandularia (Fig. 2511). Dorsum and venter with (Figs. 2537, 2546) or without (Figs. 2511, 2528) apophyses. Apodemes of anterior coxae short (Figs. 2474, 2534), but in two subgenera extending to the middle of Cx-IV (Fig. 3086). Postocularia always incorporated into the dorsolateral portion of ventral shield. Genital field with numerous acetabula; genital plates fused with ventral shield, suture lines varying from prominent to obliterated. Typically, a pair of glandularia incorporated in the acetabular region. Palp various in the different subgenera. Setae of first legs varying from well-developed, *Neumania*-like, movable setae (Fig. 2527) reduced in number and size (Fig. 2539). Idiosoma, palp, and legs with or without sexual dimorphism.

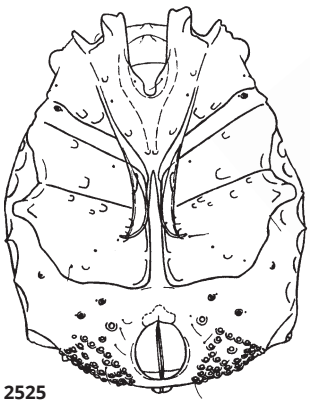
KEY TO THE SUBGENERA

1 First and usually also second legs with long, thickened movable setae (Fig. 2527); posterior apodemes of anterior coxae extending beyond suture line Cx-III/IV (Fig. 2528); dorsum without apophyses (Fig. 2511) 2

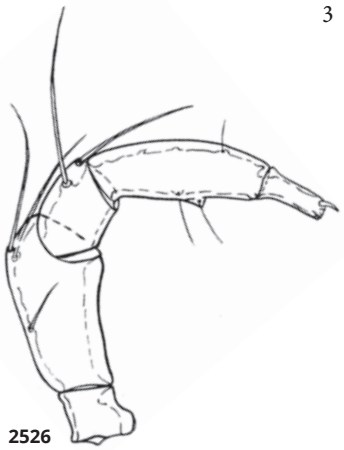
\- First and second legs without such setae; posterior apodemes shorter; apophyses on dorsum present or absent 3



2524



2525



2526

2524 *Ecpolus tuberatus tuberatus* Koenike, venter male (after Cook 1974)

2525 *Ecpolus tuberatus tuberatus* Koenike, venter female (after K.O. Viets 1965a)

2526 *Ecpolus tuberatus tuberatus* Koenike, palp female (after Cook 1974)

2 Male dorsal shield with a posteromedial extension (Fig. 3085) Subgenus *Neumanikea*

- Male dorsal shield without a posteromedial extension (Fig. 2511) Subgenus *Notomideopsis*

3 Gnathosoma in lateral view with two long posteroventral projections (Fig. 2529) 4

- Gnathosoma in lateral view with one, or lacking posteroventral projection (Fig. 2530) 7

4 Palp with a pronounced sexual dimorphism, male palp much stockier than female palp (Fig. 2531), with the setae of P2 and P3 much stouter (female not distinguishable at subgenus level) Subgenus *Sespekoenikea*

- Palp without a pronounced sexual dimorphism 5

5 Legs without sexual dimorphism of the segments or setae; dorsum with 5-6 pairs of glandularia 6

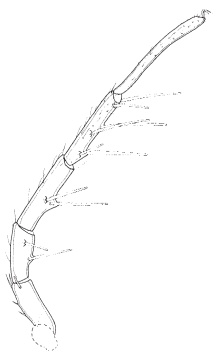
- III-leg-4 with several stout or long setae (Fig. 2532); dorsum with six pairs of glandularia (Fig. 2540) Subgenus *Diplokoenikea*

6 Cx-IV approximately as long as wide; lateral suture lines of Cx-IV well-delineated (Fig. 2533) Subgenus *Jurucuia*

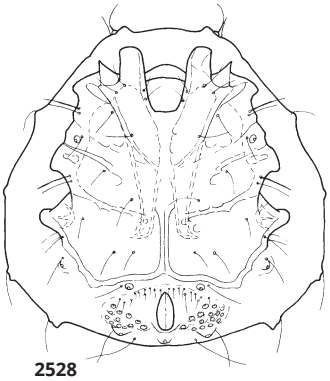
- Cx-IV wider than long; lateral suture lines of Cx-IV somewhat indistinct (Fig. 2534) Subgenus *Koenikea*

7(3) Palp "typical" of *Koenikea* (segments not modified and without stout or long setae) (Fig. 2530) Subgenus *Pseudokoenikea*

- Palp "atypical" of *Koenikea* (either palp with long setae and P2 ventrally expanded, or P5 curved and longer than P4) 8



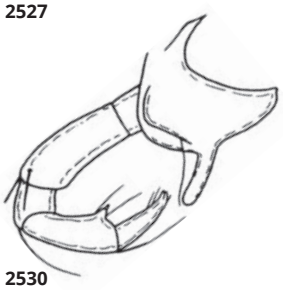
2527



2528



2529



2530



2531



2532

2527 *Koenikea* (*Notomideopsis*) *australica* Lundblad, first leg male (after Cook 1986)

2528 *Koenikea* (*Notomideopsis*) *australica* Lundblad, venter male (after Cook 1986)

2529 *Koenikea* (*Sespekoenikea*) *expansipalpis* Cook, gnathosoma + palp female (after Cook 1974)

2530 *Koenikea* (*Pseudokoenikea*) *rutae* Lundblad, gnathosoma + palp female (after Cook 1974)

2531 *Koenikea* (*Sespekoenikea*) *expansipalpis* Cook, palp male (after Cook 1974)

2532 *Koenikea* (*Diplokoenikea*) *pectinifera* Lundblad, IV-leg-4-6 male (after Cook 1974)

8	P2 expanded ventrally; P4 longer than P3 (Fig. 2535)	Subgenus *Parakoenikea*
-	P2 not expanded ventrally, P4 shorter than P3 (Fig. 2536)	Subgenus *Koenikella*

Subgenus *Koenikea* s.s.

(Figs. 2474, 2534, 2537-2539)

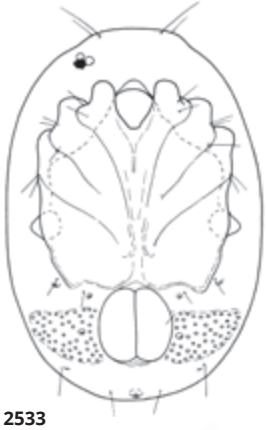
1954 *Tamboella* Lundblad, Arkiv för Zoologi (Serie 2) 5: 555 – nov. syn.

DIAGNOSIS: Dorsal shield with 5-6 pairs of glandularia. Dorsum with apophyses (Fig. 2537). Gnathosoma in lateral view with two posteroventral projections, with a short rostrum or none (Fig. 2538). Apodemes of anterior coxae either short (Figs. 2474, 2534) or relatively long. Legs and palp without or with a slight sexual dimorphism (Fig. 2539).

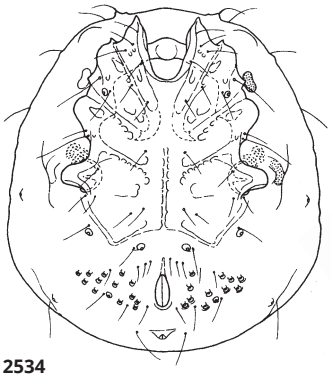
HABITAT: Standing waters, streams.

DISTRIBUTION: Numerous species known from North, Central and South America; one species known from Australia (Cook 1986).

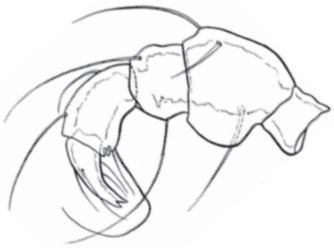
REMARKS: The sexual dimorphism of the only known species of *Tamboella* is very slight, and falls within the variation found in *Koenikea* s.s. As no other characters separate *Tamboella* from *Koenikea*, it is synonymized with the nominate subgenus.



2533



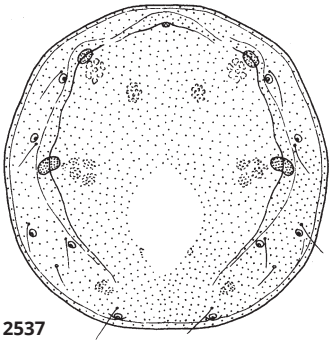
2534



2535



2536



2537



2538

2533 *Koenikea* (*Jurucuia*) *oblongata* (K. Viets), venter female (after Cook 1974)

2534 *Koenikea* (*Koenikea*) *vietsi* Lundblad, venter male (after Cook 1980)

2535 *Koenikea* (*Parakoenikea*) *curvipalpis*, palp male (after Cook 1974)

2536 *Koenikea* (*Koenikella*) *crassipalpis* Lundblad, palp female (after Cook 1974)

2537 *Koenikea* (*Koenikea*) *yenona* Cook, dorsum male (after Cook 1980)

2538 *Koenikea* (*Koenikea*) *gracilipes* Cook, gnathosoma + palp female (after Cook 1980)

Subgenus *Diplokoenikea* Lundblad, 1936

(Figs. 2532, 2540)

1936 *Diplokoenikea* Lundblad, Zoologischer Anzeiger 115: 45.

Type species: *Koenikea pectinata* Lundblad, 1936

DIAGNOSIS: Dorsal shield with six pairs of glandularia and with apophyses (Fig. 2540). Gnathosoma in lateral view with two posteroventral projections, with a short rostrum or none. Apodemes of anterior coxae short. Male third leg, especially III-leg-4, exhibiting sexual dimorphism, primarily modifications of the setae of III-leg-4 (Fig. 2532), fourth leg without sexual dimorphism.

HABITAT: Standing waters, streams.

DISTRIBUTION: Numerous species known from South America (Brazil, Paraguay, Chile), a few species known from Central America (Mexico, Costa Rica, Cook 1980), Haiti and North America (Florida, Cook 1976a).

Subgenus *Jurucuia* K. Viets, 1954

(Figs. 2513, 2533, 2541)

1954 *Jurucuia* K. Viets, Schweizerische Zeitschrift für Hydrologie 16: 135.

Type species: *Jurucuia oblongata* K. Viets, 1954

DIAGNOSIS: Idiosoma more or less elongated. Dorsal shield with six pairs of glandularia (Fig. 2541), apophyses of dorsum apparently absent. Gnathosoma in lateral view with two posteroventral projections and with a short rostrum (Fig. 2513). Coxal area noticeably longer than wide (Fig. 2533). Legs without sexual dimorphism.

HABITAT: Standing waters, streams.

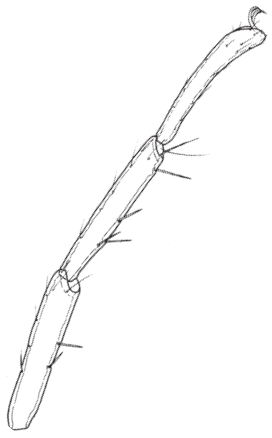
DISTRIBUTION: One species known from Brazil.

Subgenus *Koenikella* Lundblad, 1936

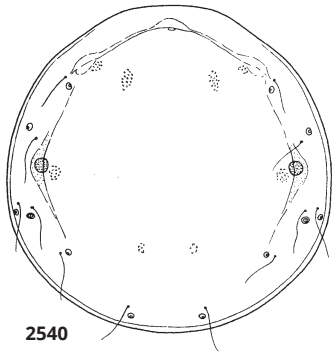
(Figs. 2536, 2542, 2543)

1936 *Koenikella* Lundblad, Zoologischer Anzeiger 115: 46.

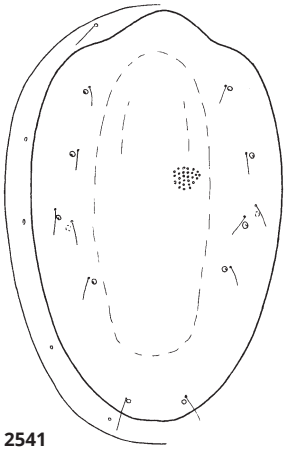
Type species: *Koenikea crassipalpis* Lundblad, 1936



2539



2540



2541

2539 *Koenikea* (*Koenikea*) *gracilipes* Cook, IV-leg-4-6 female (after Cook 1980)

2540 *Koenikea* (*Diplokoenikea*) *beltista* Cook, dorsum male (after Cook 1980)

2541 *Koenikea* (*Jurucuia*) *oblongata* (K. Viets), dorsum female (after Cook 1974)

DIAGNOSIS: Dorsal shield with six pairs of glandularia (in one species one pair of glandularia lacking but associated setae are present, Fig. 2542) and apophyses. Gnathosoma in lateral view with very short projections, and with a moderately developed rostrum (Fig. 2543). Palp with a very short P4 and a long, curved P5 (Fig. 2536). Legs without sexual dimorphism.

HABITAT: Streams.

DISTRIBUTION: Two species known from South America (Brazil, Paraguay) and one from Central America (Costa Rica, Cook 1980).

Subgenus *Neumanikea* Orghidan & Gruia, 1980

(Figs. 3085-3087)

1980 *Neumanikea* Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 19: 125 - nov. stat.

Type species: *Neumanikea coenotica* Orghidan & Gruia, 1980

DIAGNOSIS: Male dorsal shield with a posteromedial extension and with a series of rounded depressions (Fig. 3085). Both male and female dorsal shield with five pairs of glandularia, apophyses of dorsal shield absent. First legs with long, thickened setae ("fluted" or "grooved" setae). Legs without sexual dimorphism.

HABITAT: Caves, ponds.

DISTRIBUTION: Two species known from Cuba.

REMARKS: Orghidan & Gruia (1980a) erected the genus *Neumanikea*, but K.O. Viets (1987) synonymized it with *Koenikea* (*Notomideopsis*). However, given the peculiar extension of the dorsal shield, the taxon deserves a ranking as a subgenus of *Koenikea*.

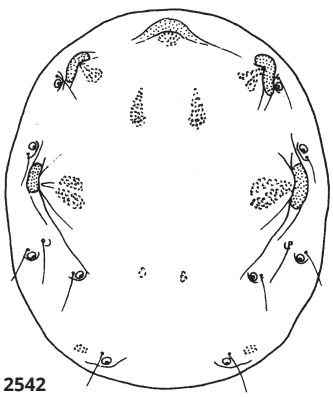
Subgenus *Notomideopsis* Wolcott, 1905

(Figs. 2511, 2527, 2528)

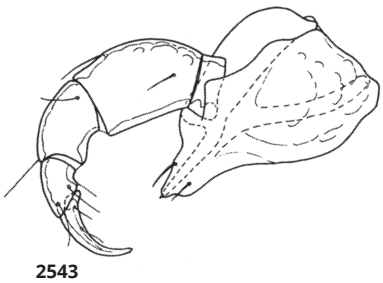
1905 *Notomideopsis* Wolcott, Transactions of the American Microscopical Society 26: 198.

1907 *Nordenskioeldia* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 19: 127.

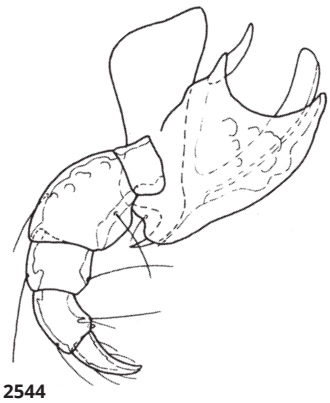
1910 *Erikia* Strand, Societas entomologica 25: 34.



2542



2543



2544

2542 *Koenikea* (*Koenikella*) *noyara* Cook, dorsum female (after Cook 1980)

2543 *Koenikea* (*Koenikella*) *noyara* Cook, gnathosoma + palp female (after Cook 1980)

2544 *Koenikea* (*Parakoenikea*) *curvipalpis* Lundblad, gnathosoma + palp female (after Cook 1980)

1936 *Neokoenikea* Lundblad, Zoologischer Anzeiger 115: 46 – new syn.

Type species: *Mideopsis spinipes* Nordenskiöld, 1904 (praeocc.) = *Koenikea nordenskioldi* Cook, 1980

DIAGNOSIS: Idiosoma tending to be high. Dorsal shield with 5-6 pairs of glandularia (Fig. 2511). Occasionally dorsum with enlarged tubercles. Posterior apodemes of the anterior coxae tending to be long, usually extending posterior to the suture line Cx-III/Cx-IV (Fig. 2528). First legs, usually also second legs, with long, thickened setae ("fluted" or "grooved setae"); these setae typically with papillae (Fig. 2527).

HABITAT: Standing waters, streams, interstitial.

DISTRIBUTION: Numerous species known from Central and South America, Australia (Cook 1986, Smit 2004a), New Guinea (Wiles 1997c; Smit 2013b), New Caledonia (Smit 2002a) and Fiji (Smit 2003b).

REMARKS: Cook (1980) pointed to the similarity of *Neokoenikea* and *Notomideopsis* but did not synonymize the two subgenera. As *Neokoenikea* has the first legs typical for *Notomideopsis*, with movable setae, it is clear that the subgenus is a synonym of the latter.

Subgenus *Parakoenikea* Lundblad, 1936

(Figs. 2535, 2544)

1936 *Parakoenikea* Lundblad, Zoologischer Anzeiger 115: 47.

Type species: *Koenikea curvipalpis* Lundblad, 1936

DIAGNOSIS: Dorsal shield with six pairs of glandularia and apophyses. Gnathosoma in lateral view with one short posterior projection, with a very short rostrum (Fig. 2544). Palp with very long setae, palp segments stocky, P2 expanded ventrally (Fig. 2535).

HABITAT: Standing waters, streams.

DISTRIBUTION: One species known from Santa Catharina State, Brazil.

Subgenus *Pseudokoenikea* Lundblad, 1941

(Figs. 2530, 2545)

1941 *Pseudokoenikea* Lundblad, Zoologiska bidrag från Uppsala 20: 367.

Type species: *Koenikea rutae* Lundblad, 1930

DIAGNOSIS: Dorsal shield with six pairs of glandularia, with greatly elongated tubercles (Fig. 2545). Presence or absence of apophyses not known but apparently absent. Gnathosoma in lateral view with one short posteroventral projection, with a well-developed rostrum and bearing a long dorsal seta (Fig. 2530). Palp typical for the genus. Legs without sexual dimorphism.

HABITAT: Standing waters, streams.

DISTRIBUTION: Two species and one subspecies known from Brazil.

Subgenus *Sespekoenikea* Cook, 1974

(Figs. 2529, 2531, 2546-2548)

1974 *Sespekoenikea* Cook, Memoirs of the American Entomological Institute 21: 261.

Type species: *Koenikea expansipalpis* Cook, 1974

DIAGNOSIS: Dorsal shield with six pairs of glandularia and apophyses. Gnathosoma in lateral view with two posteroventral projections, with a very short rostrum (Fig. 2529). Palp of male much

stockier than that of female, P2 and P3 with much stouter setae (Figs. 2547-2548). Legs without sexual dimorphism.

HABITAT: Streams, interstitial.

DISTRIBUTION: One species known from North America (California, Cook 1974) and three species from Central America (Guatemala, K.O. Viets 1977d; Mexico, Costa Rica, Cook 1980).

Genus *Neumania* Lebert, 1879

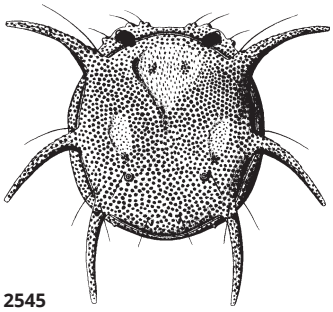
(Figs. 2479, 2494, 2516-2518, 2549-2598)

1879 *Neumania* Lebert, Bulletin de la Société vaudoise des sciences naturelles (serie 2) 16: 357.

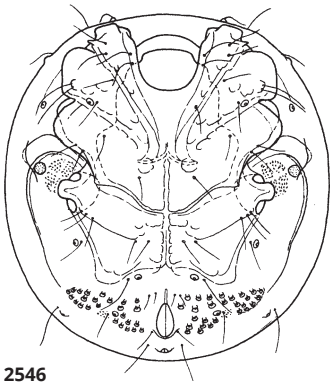
1894 *Cochleophorus* Piersig, Zoologischer Anzeiger 17: 216.

1911 *Pseudoatax* Kent, Journal of the Quekett Microscopical Club (serie 2) 11: 262 (nomen nudum)

Type species: *Hydrachna spinipes* Müller, 1776



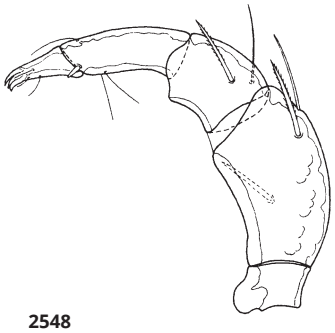
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2546



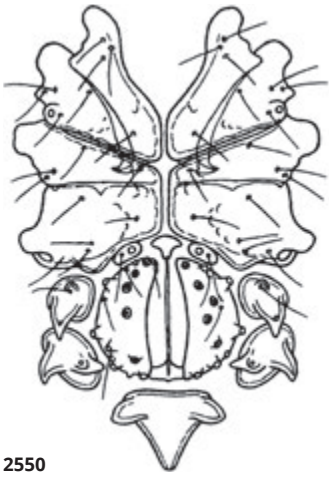
2547



2548



2549



2550

2545 *Koenikea* (*Pseudokoenikea*) *horrida* Lundblad, dorsum male (after Lundblad 1930)

2546 *Koenikea* (*Sespekoenikea*) *piotiformis* Cook, venter male (after Cook 1980)

2547 *Koenikea* (*Sespekoenikea*) *piotiformis* Cook, palp male (after Cook 1980)

2548 *Koenikea* (*Sespekoenikea*) *piotiformis* Cook, palp female (after Cook 1980)

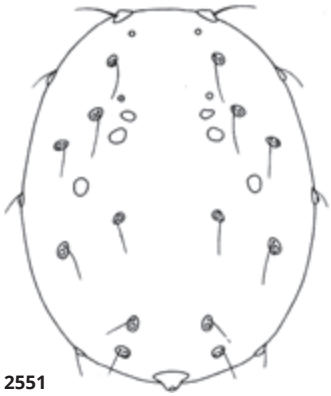
2549 *Neumania* (*Soarella*) *echinata* Cook, dorsum female (after Cook 1974)

2550 *Neumania* (*Soarella*) *echinata* Cook, venter female (after Cook 1974)

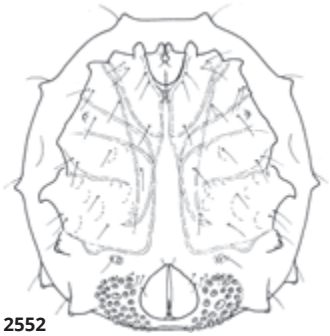
DIAGNOSIS: Idiosoma weakly sclerotized in many species (Figs. 2551, 2563) but certain species exhibit various development of dorsalia, ventralia and glandularia platelets (Figs. 2549, 2559). However, dorsum always with a considerable area of soft integument between the glandularia platelets, at least in the female. Chelicera typically fused medially. Coxae in four groups in weakly sclerotized species, but fused into a single group in more sclerotized species. Anterior coxae usually with well-developed posterior apodemes. Genital field with numerous acetabula, but occasionally as few as 4-5 pairs of acetabula. Females typically with one pair of genital plates, if genital plates are subdivided on their respective sides, they are either completely free (Fig. 2517) or the anterior ones fused medially with the pregenital sclerite (Fig. 2557); the posterior genital plates are generally not fused with the postgenital sclerite. If P3 bears a long seta, it is dorsal in position.

KEY TO THE SUBGENERA

1	Dorsum with numerous, enlarged glandularia tubercles (Fig. 2549); ventral shield absent; genital field ventral (Fig. 2550)	2
-	Dorsum typically without enlarged glandularia tubercles (Fig. 2551); if such tubercles are present, there is a well-developed ventral shield (Fig. 2552); genital field usually terminal or subterminal	3
2	P5 with four long, pectinate setae (Fig. 2553)	Subgenus *Leptopterotrichophorus*
-	P5 with short, smooth setae (Fig. 2554)	Subgenus *Soarella*
3(1)	Female with the genital plates separated into an anterior and posterior portion on each side (Fig. 2555)	4
-	Females with a single genital plate on each side (Fig. 2552)	5
4	Females with the anterior and posterior genital plates both fused medially (Fig. 2555); I-leg-4 with two stout terminal setae, I-leg-5 with three stout setae (Fig. 2556) (Male unknown)	Subgenus *Neoneumania*
-	Females with all genital plates separate (Fig. 2517) or only the anterior pair fused medially (Fig. 2557); I-leg-4 with only one stout terminal seta, I-leg-5 not enlarged, with 3-5 stout setae (Fig. 2558)	Subgenus *Tetraneumania*
5(3)	Dorsal glandularia platelets noticeably enlarged (Fig. 2559)	6
-	Dorsal glandularia platelets not enlarged (Fig. 2551)	7



2551



2552



2553

2551 *Neumania* (*Neumania*) *vivarna* Cook, dorsum male (after Cook 1974)

2552 *Neumania* (*Coneumania*) *floridana* Cook, venter female (after Cook 1974)

2553 *Neumania* (*Leptopterotrichophorus*) *manokensis* K. Viets, palp female (after Cook 1974)

6 Posterior margins of Cx-IV with pronounced projections; pre- and postocularia lying free in the integument (Fig. 2560) Subgenus *Coneumania*

- Posterior margin of Cx-IV without projections; pre- and postocularia on platelets (Fig. 2561) Subgenus *Ecpolopsis*

7(5) Males (and occasionally females) with a well-developed ventral shield which extends up onto the dorsum leaving a circular or rectangular area of soft integument near middle of dorsum (Fig. 2562) 8

- Males usually (and females always) without a ventral shield; if a ventral shield is present, the dorsum may be variously modified, but not with the restricted area of soft integument described above (Fig. 2563) 10

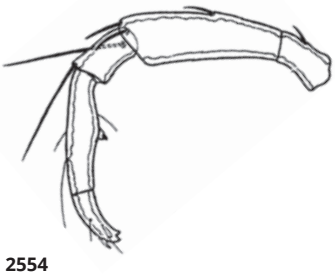
8 The extensive area of the ventral shield described above found in both sexes (Figs. 2516, 2564) Subgenus *Nicksatax*

- The extensive area of the ventral shield described above restricted to the male 9

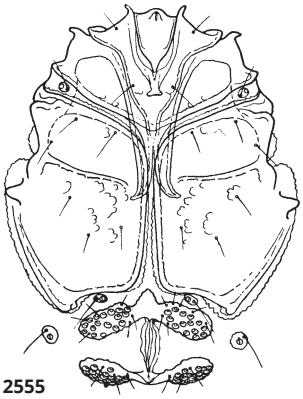
(From here on only males can be assigned to a subgenus)

9 IV-leg-6 bowed (Fig. 2565) Subgenus *Alloneumania*

- IV-leg-6 not bowed Subgenus *Subneumania*



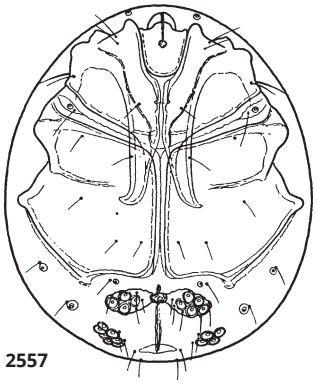
2554



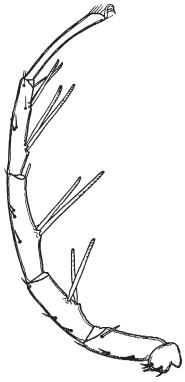
2555



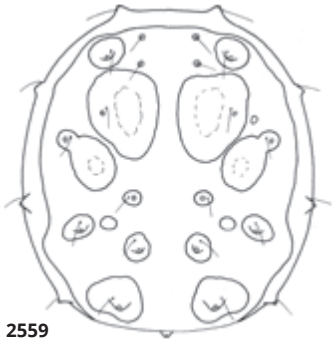
2556



2557



2558



2559

2554 *Neumania* (*Soarella*) *echinata* Cook, palp female (after Cook 1974)

2555 *Neumania* (*Neoneumania*) *xiphophora* Lundblad, venter female (after Lundblad 1942a)

2556 *Neumania* (*Neoneumania*) *xiphophora* Lundblad, I-leg-5-6 female (after Lundblad 1942a)

2557 *Neumania* (*Tetraneumania*) *schadei* Lundblad, venter female (after Lundblad 1942a)

2558 *Neumania* (*Tetraneumania*) *schadei* Lundblad, first leg female (after Lundblad 1942a)

2559 *Neumania* (*Coneumania*) *michiganensis* Cook, dorsum female (after Cook 1974)

10(7)	Either IV-leg-5 somewhat concave ventrally (Fig. 2566) or IV-leg-6 bowed (Fig. 2567)	Subgenus *Lemienia*
-	IV-leg-5 ventrally straight, IV-leg-6 not bowed	11
11	Claws greatly enlarged on II-leg-6 and IV-leg-6 (Fig. 2568)	Subgenus *Allolemienia*
-	None of the claws of either sex greatly enlarged (Fig. 2569)	Subgenus *Neumania*

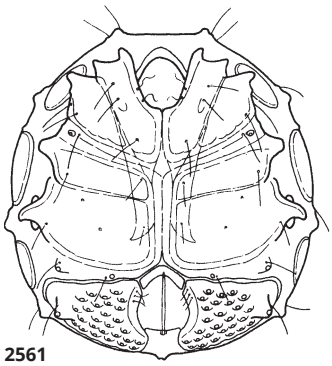
Subgenus *Neumania* s.s.

(Figs. 2479, 2551, 2563, 2569)

DIAGNOSIS: Idiosoma usually soft in both sexes (Fig. 2551), but a ventral shield may be present extending up to sides of idiosoma (Fig. 2563). Sclerites of glandularia flat or weakly raised, but never wart-like. Female genital field with only a single pair of genital plates, these not fused with pre- or postgenital sclerites (Fig. 2479). Genital field tending to be terminal or subterminal. IV-leg-6 of male not bowed, leg claws of not enlarged (Fig. 2569).



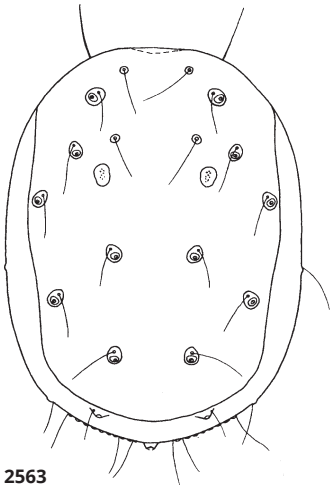
2560



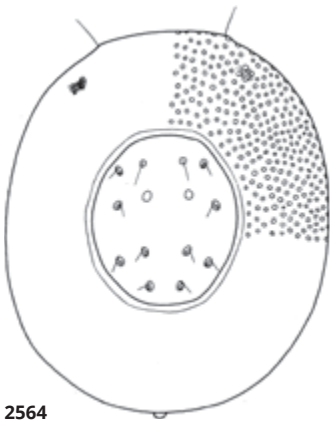
2561



2562



2563



2564



2565

2560 *Neumania* (*Coneumania*) *michiganensis* Cook, genital field female (after Cook 1974)

2561 *Neumania* (*Ecpolopsis*) *multiscutata bharatensis* Cook, venter female (after Cook 1974)

2562 *Neumania* (*Subneumania*) *dura dura* K. Viets, dorsum male (after Cook 1974)

2563 *Neumania* (*Neumania*) *conroyi* Cook, dorsum male (after Cook 1980)

2564 *Neumania* (*Nicksatax*) *arrenuroides* (Habeeb), dorsum female (after Cook 1974)

2565 *Neumania* (*Alloneumania*) *lundbladi* (Cook), IV-leg-5-6 male (after Cook 1974)

HABITAT: Standing waters, streams, springs.

DISTRIBUTION: Numerous species known, the subgenus has a near-cosmopolitan distribution, but no species have been reported from South America.

Subgenus *Allolemienia* Lundblad, 1949

(Figs. 2568, 2570-2572)

1949 *Allolemienia* Lundblad, Exploration du Parc National Albert, 2. Mission Damas 18: 54.

Type species: *Neumania fissiseta* Lundblad, 1949

DIAGNOSIS: Idiosoma soft in both sexes (Fig. 2570). Sclerites of glandularia not greatly enlarged. Female genital field with one pair of plates, these not fused with pre- or postgenital sclerites. IV-leg-6 of male not bowed. Leg claws of male enlarged, especially at second (Fig. 2572) and fourth leg (Fig. 2568). Female leg claws not enlarged.

HABITAT: Standing waters.

DISTRIBUTION: Two species known from the Afrotropical region (Congo; Uganda, Cook 1974).

Subgenus *Alloneumania* Lundblad, 1949

(Figs. 2565, 2573-2576)

1949 *Alloneumania* Lundblad, Exploration du Parc National Albert, 2. Mission Damas 18: 59 – Cook (1974).

Type species: *Ecpolus dorsofenestratus* Lundblad, 1949

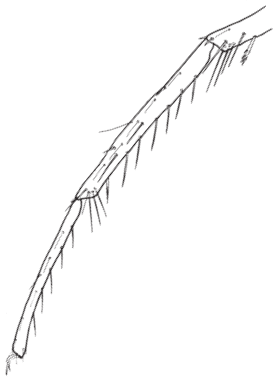


2566

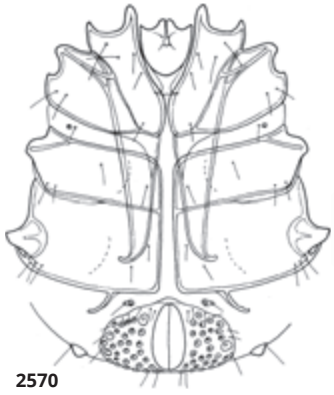
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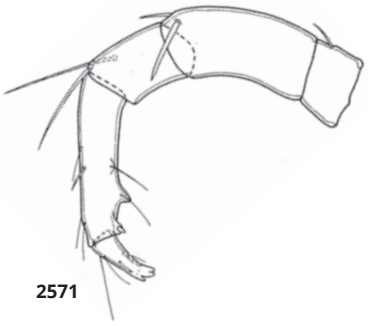
2568



2569



2570



2571

2566 *Neumania* (*Lemienia*) *maharashtris* Cook, IV-leg-5-6 (after Cook 1974)

2567 *Neumania* (*Lemienia*) *separata* Cook, IV-leg-5-6 male (after Cook 1974)

2568 *Neumania* (*Allolemienia*) *falcifera* Cook, claws of IV-leg-6 male (after Cook 1974)

2569 *Neumania* (*Neumania*) *bondana* Cook, IV-leg-4-6 male (after Cook 1986)

2570 *Neumania* (*Allolemienia*) *falcifera* Cook, venter male (after Cook 1974)

2571 *Neumania* (*Allolemienia*) *falcifera* Cook, palp male (after Cook 1974)

DIAGNOSIS: Palp typical for *Neumania* in both sexes (Fig. 2576). Males: Ventral shield complete, central area of the dorsum with soft integument, here four pairs of glandularia and in same species two pairs of platelets (Fig. 2573). Genital field consisting of one plate (Fig. 2574). IV-leg-6 of male bowed (Fig. 2565); claws much enlarged, especially on second and fourth legs. Female: Idiosoma not sclerotized. Genital field with one pair of plates, pre- and postgenital sclerites not fused with genital plates (Fig. 2575). Leg claws not enlarged

HABITAT: Standing waters (lakes, ditches).

DISTRIBUTION: Two species known from the Afrotropical region (Congo; Liberia, Cook 1966).

Subgenus *Coneumania* Cook, 1974

(Figs. 2552, 2559, 2560, 2577, 2578)

1974 *Coneumania* Cook, Memoirs of the American Entomological Institute 21: 252.

Type species: *Neumania floridana* Cook, 1974

DIAGNOSIS: Idiosoma heavily sclerotized. Dorsum with extended parts of membranous integument but also with well-developed glandularia platelets (Figs. 2559, 2577). Pre-and postocularia lying free in the integument on small platelets. Glandularia, especially in male, may be on well-



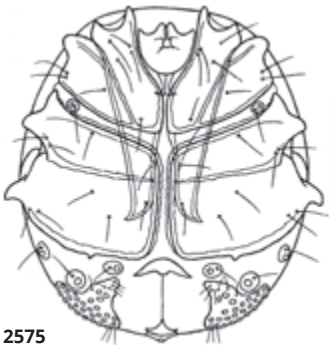
2572



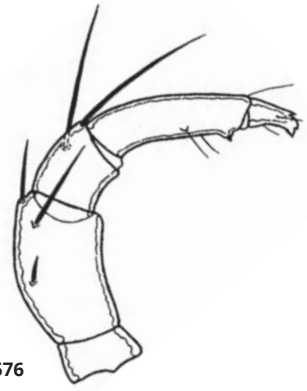
2573



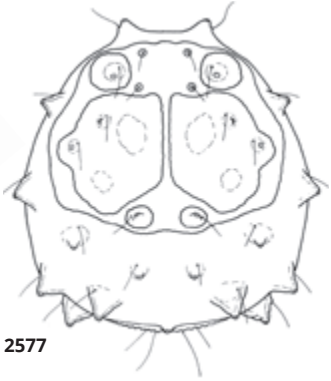
2574



2575



2576



2577

2572 *Neumania* (*Allolemienia*) *falcifera* Cook, II-leg-6 male (after Cook 1974)
2573 *Neumania* (*Alloneumania*) *lundbladi* (Cook), dorsum male (after Cook 1974)
2574 *Neumania* (*Alloneumania*) *lundbladi* (Cook), venter male (after Cook 1974)
2575 *Neumania* (*Alloneumania*) *lundbladi* (Cook), venter female (after Cook 1974)
2576 *Neumania* (*Alloneumania*) *lundbladi* (Cook), palp male (after Cook 1974)
2577 *Neumania* (*Coneumania*) *floridana* Cook, dorsum male (after Cook 1974)

developed tubercles (Figs. 2552, 2577). Posterior margins of Cx-IV with well-developed projections (Figs. 2560, 2578). Genital field and pregenital sclerite fused with ventral shield. P4 ventrally with a well-developed setal tubercle. Legs without sexual dimorphism.

HABITAT: Standing waters (lakes, ponds).

DISTRIBUTION: Two species known from North America (Michigan, Florida, Cook 1974).

Subgenus *Ecpolopsis* Piersig, 1906

(Figs. 2494, 2561, 2579, 2580)

1906 *Ecpolopsis* Piersig, Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Tiere 23: 330.

Type species: *Ecpolopsis multiscutata* Piersig, 1906

DIAGNOSIS: Idiosoma heavily sclerotized ventrally. Dorsum with extended parts of membranous integument, but also with numerous dorsalia and glandularia platelets, lying much closer together in male (Fig. 2494) than in female (Fig. 2579). Pre- and postocularia fused with platelets of ventral shield. Glandularia expanded but not greatly raised. Pregenital sclerite usually lying free in the integument. Cx-IV posteriorly with either very small projections or none (Figs. 2561). Anterior to female genital field two pairs of glandularia. Legs without sexual dimorphism.

HABITAT: Standing waters.

DISTRIBUTION: One species with several subspecies known from Asia (India, Cook 1967; Thailand; Malaysia, Wiles & Chamberlain 2006; Japan; China; Sumatra; New Guinea, Wiles 1997c; Bangladesh, Pešić et al. 2018b).

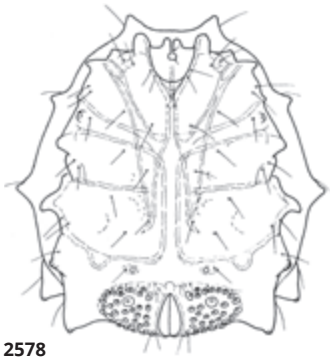
Subgenus *Lemienia* Koenike, 1910

(Figs. 2566, 2567, 2581-2584)

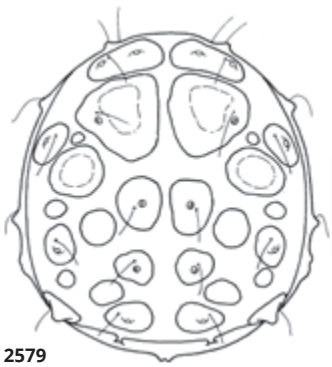
1905 *Dadaya* Wolcott, Transactions of the American Microscopical Society 26: 210 (praeocc.).

1910 *Lemienia* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 140.

Type species: *Atax multiporus* Daday, 1900



2578



2579



2580

2578 *Neumania* (*Coneumania*) *floridana* Cook, venter male (after Cook 1974)

2579 *Neumania* (*Ecpolopsis*) *multiscutata bharatensis* Cook, dorsum female (after Cook 1974)

2580 *Neumania* (*Ecpolopsis*) *multiscutata bharatensis* Cook, palp female (after Cook 1974)

DIAGNOSIS: Idiosoma soft in both sexes, the venter of males may be sclerotized. Glandularia of the dorsum not greatly raised. Female with one pair of genital plates, not fused with either the pre- or postgenital sclerites (Fig. 2584). Male genital field may be fused with Cx-IV (Fig. 2582). A pair of glandularia usually closely flanking or actually fused with the male genital field (Figs. 2581, 2583). Fourth leg of male modified, either IV-leg-5 somewhat concave ventrally (Fig. 2566) or IV-leg-6 bowed (Fig. 2567).

HABITAT: Standing waters, streams.

DISTRIBUTION: Numerous species known from the Afrotropical and Oriental regions, Australia (K.O. Viets 1975b), New Guinea (Wiles 1997c), New Caledonia (Smit 2002a) and Fiji (Smit 2003b).

Subgenus *Leptopterotrichophorus* K. Viets, 1914

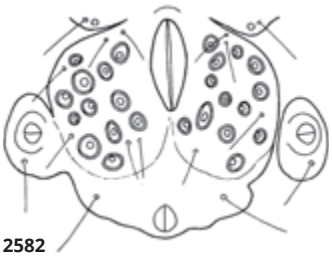
(Figs. 2553, 2585-2587)

1914 *Leptopterotrichophorus* K. Viets, Archiv für Hydrobiologie 9: 183.

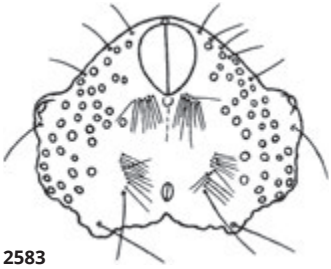
Type species: *Leptopterotrichophorus verrucosus* K. Viets, 1914 = *Neumania manokensis* K. Viets, 1942



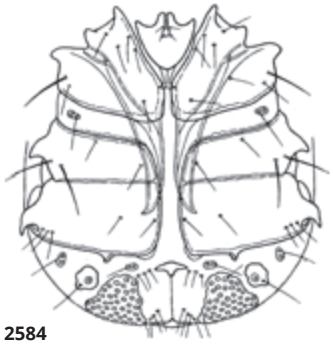
2581



2582



2583



2584



2585



2586

2581 *Neumania* (*Lemienia*) *maharashtris* Cook, venter male (after Cook 1974)

2582 *Neumania* (*Lemienia*) *maharashtris* Cook, genital field male (after Cook 1974)

2583 *Neumania* (*Lemienia*) *separata* Cook, genital field male (after Cook 1974)

2584 *Neumania* (*Lemienia*) *separata* Cook, venter female (after Cook 1974)

2585 *Neumania* (*Leptopterotrichophorus*) *manokensis* K. Viets, dorsum female (after Cook 1974)

2586 *Neumania* (*Leptopterotrichophorus*) *manokensis* K. Viets, genital field male (after Cook 1974)

DIAGNOSIS: Idiosoma with expanded dorsalia and ventralia (Fig. 2585). Two pairs of glandularia fused with posterior margin of Cx-IV. Excretory pore located on a greatly enlarged tubercle. Male genital field consisting of one plate (Fig. 2586), female with one pair of genital plates (Fig. 2587). Pre- and postgenital sclerites not fused with genital plates. P4 with four long, pectinate setae (Fig. 2553). Legs without sexual dimorphism.

HABITAT: Streams.

DISTRIBUTION: Two species known from West Africa (Cameroon; Liberia, Cook 1966).

Subgenus *Neoneumania* Lundblad, 1941

(Figs. 2555, 2556, 2588)

1941 *Neoneumania* Lundblad, Entomologisk Tidskrift 62: 123.

Type species: *Neumania xiphophora* Lundblad, 1941

DIAGNOSIS: (Female only) Idiosoma soft. Glandularia of dorsum not greatly enlarged. Genital plates divided into an anterior and posterior sclerite on each side, these medially fused with the pre- and postgenital sclerites, respectively (Fig. 2555). I-leg-4 distally with two, IV-leg-5 enlarged and distally with three stout setae, I-leg-6 slightly bowed (Fig. 2556).

HABITAT: Slow flowing streams.

DISTRIBUTION: One species known from Paraguay.

Subgenus *Nicksatax* Habeeb, 1964

(Figs. 2516, 2564, 2589)

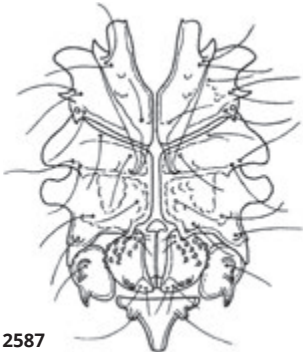
1964 *Nicksatax* Habeeb, Leaflets of Acadian Biology 36: 1.

Type species: *Nicksatax arrenuroides* Habeeb, 1964

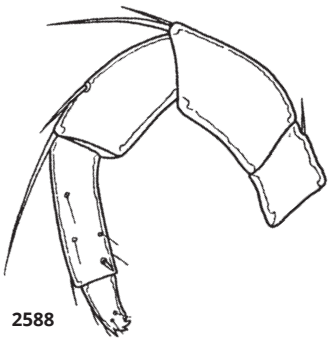
DIAGNOSIS: Idiosoma heavily sclerotized in both sexes (Figs. 2516, 2589). Dorsum with only a small area of unsclerotized integument, bearing the postocularia, five pairs of glandularia and one pair of small dorsalia (Fig. 2564). Tips of Cx-III and Cx-IV pointed. Genital field incorporated into the ventral shield in both sexes, with suture lines distinct in females, but somewhat obliterated in males. Palp typical of *Neumania*. Legs without sexual dimorphism.

HABITAT: Pools.

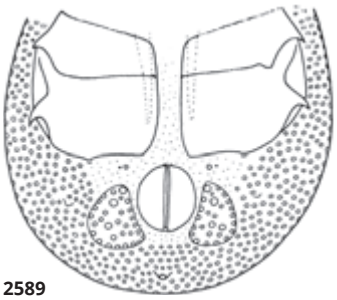
DISTRIBUTION: One species known from North America (California).



2587



2588



2589

2587 *Neumania* (*Leptopterotrichophorus*) *manokensis* K. Viets, venter female (after Cook 1974)

2588 *Neumania* (*Neoneumania*) *xiphophora* Lundblad, palp female (after Lundblad 1942a)

2589 *Neumania* (*Nicksatax*) *arrenuroides* (Habeeb), venter female (part.) (after Cook 1974)

Subgenus *Soarella* Koenike, 1907

(Figs. 2549, 2550, 2554, 2590)

1907 *Soarella* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 19: 131.

Type species: *Ecpolus papillosus* Soar, 1902

DIAGNOSIS: Idiosoma usually unsclerotized in both sexes but the glandularia are (greatly) enlarged (Fig. 2549). Excretory pore usually on a well-developed tubercle various in size. Glandularia not fused with posterior margins of Cx-IV (Fig. 2590). Genital field tending to be ventral in position. Females with one pair of genital plates (Fig. 2550). Palp five-segmented, rarely P4 and P5 fused. P5 without long pectinate setae (Fig. 2554). Legs without sexual dimorphism.

HABITAT: Standing waters, streams, interstitial.

DISTRIBUTION: A dozen species known from the Palaearctic (only one species), Afrotropical and Oriental regions (all other species).

Subgenus *Subneumania* K. Viets, 1930

(Figs. 2562, 2591-2593)

1930 *Subneumania* K. Viets, Zoologischer Anzeiger 89: 286.

Type species: *Ecpolus durus* K. Viets, 1930

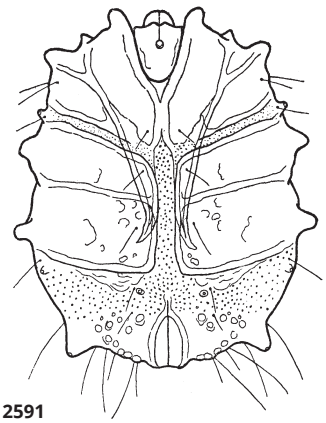
DIAGNOSIS: Idiosoma of male with a complete ventral shield, but central area of dorsum unsclerotized, with two pairs of platelets (Fig. 2562). Idiosoma of female unsclerotized (Fig. 2592). Genital field of male fused with ventral shield (Fig. 2581), female with one pair of genital plates. Palp typical of *Neumania* (Fig. 2593). Legs without sexual dimorphism.

HABITAT: Standing waters, streams.

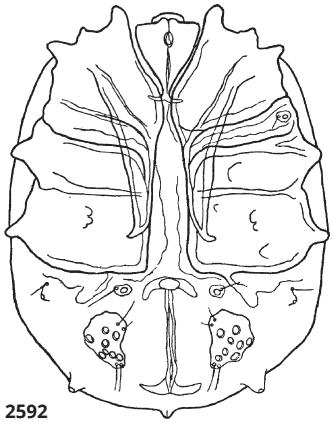
DISTRIBUTION: One species known (with two subspecies) widely distributed in Africa (Algeria; Congo; East Africa; South Africa, K.O. Viets 1965b).



2590



2591



2592

2590 *Neumania* (*Soarella*) *ecphyma* Cook, venter male (after Cook 1974)

2591 *Neumania* (*Subneumania*) *dura circumscripta* (Lundblad) venter male (after Lundblad 1949)

2592 *Neumania* (*Subneumania*) *dura circumscripta* (Lundblad) venter female (after Lundblad 1949)

Subgenus *Tetraneumania* Lundblad, 1930

(Figs. 2517, 2518, 2557, 2558, 2594-2598)

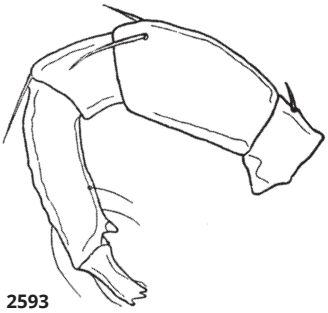
1930 *Tetraneumania* Lundblad, Zoologiska bidrag från Uppsala 13: 32.

Type species: *Neumania curvipes* Lundblad, 1930

DIAGNOSIS: Males often extensively sclerotized, with several small platelets (Fig. 2596) to a large dorsal plate covering dorsum completely (Fig. 2597). However, males of a species from North America and females weakly sclerotized. Dorsal glandularia not greatly enlarged. Male genital field fused with ventral shield, genital field (Fig. 2594), in females with two pairs of genital plates, either all separate (Fig. 2517) or anterior pair (Fig. 2557) fused with the pregenital sclerite. Posterolateral to male gonopore and/or near posterior margin of male venter several tufts of setae (Fig. 2595). I-leg-5 not enlarged, with three or four long ventral setae (Fig. 2558). Fourth leg of male may be modified (Fig. 2598).

HABITAT: Standing waters, streams.

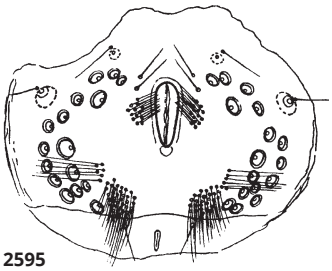
DISTRIBUTION: One species known from North America, and a dozen species from South America (Brazil, K. Viets 1959a; Paraguay, Rosso de Ferradás & Böttger 1997; Argentina, Rosso de Ferradas 1982) and Central America (one species, Mexico, Cook 1980).



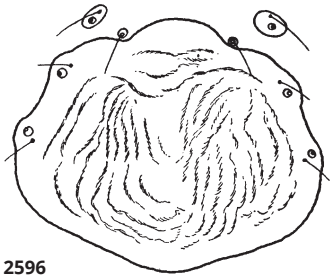
2593



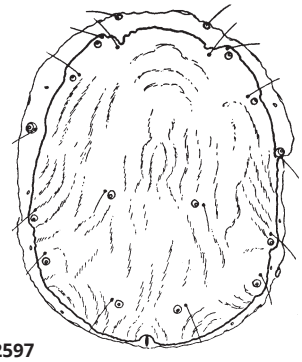
2594



2595



2596



2597



2598

2593 *Neumania* (*Subneumania*) *dura circumscripta* (Lundblad) palp female (after Lundblad 1949)

2594 *Neumania* (*Tetraneumania*) *polytricha* Lundblad, venter male (after Cook 1974)

2595 *Neumania* (*Tetraneumania*) *bituberculata* Lundblad, genital field male (after Lundblad 1942a)

2596 *Neumania* (*Tetraneumania*) *polytricha* Lundblad, dorsum male (after Lundblad 1942a)

2597 *Neumania* (*Tetraneumania*) *dorsoscutata* Lundblad, dorsum male (after Lundblad 1942a)

2598 *Neumania* (*Tetraneumania*) *polytricha* Lundblad, IV-leg-4-6 male (after Lundblad 1942a)

Genus *Nyangalla* K. Viets, 1935

(Figs. 2493, 2496, 2502, 2503, 2506-2509, 2599-2608)

1935 *Nyangalla* K. Viets, Zoologischer Anzeiger 112: 278.

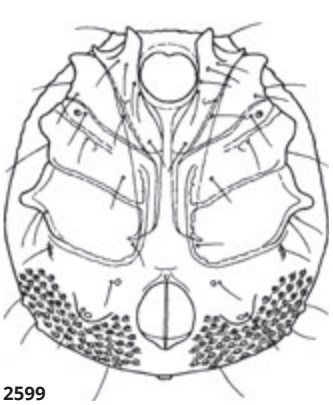
Type species: *Nyangalla acanthophora* K. Viets, 1935

DIAGNOSIS: Idiosoma usually not flattened, with or without sexual dimorphism. Dorsal and ventral shields present. Dorsal furrow dorsal in position and may be incomplete posteriorly. Dorsal shield either entire or composed of five to eight closely fitting platelets. Apodemes of anterior coxae long in species with a complete dorsal shield and in most species with a divided dorsal shield. Dorsal shield (or largest platelet in species with a divided shield) with two or less pairs of glandularia (Fig. 2507). Genital field with numerous acetabula (Fig. 2503). Genital plates fused with ventral shield, suture lines occasionally obliterated (Figs. 2506, 2603). Legs with stout, movable setae (Fig. 2605), with or without sexual dimorphism in third and fourth legs.

KEY TO THE SUBGENERA

1 Dorsal shield divided into five to eight major platelets (Fig. 2493) Subgenus *Ecpolopella*

- Dorsal shield entire but may be fused posteriorly with the ventral shield (Fig. 2507) 2



2599



2600



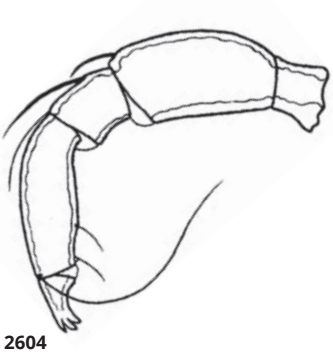
2601



2602



2603



2604

2599 *Nyangalla* (*Nyangalla*) *gantaensis* (Cook), venter female (after Cook 1974)

2600 *Nyangalla* (*Nyangalla*) *gantaensis* (Cook), III-leg-6 male (after Cook 1974)

2601 *Nyangalla* (*Nyangalla*) *gantaensis* (Cook), IV-leg-5-6 male (after Cook 1974)

2602 *Nyangalla* (*Ecpolopella*) *tesselata acuticaudata* (K. Viets), dorsum male (after Cook 1974)

2603 *Nyangalla* (*Ecpolopella*) *peltophora* (K. Viets), venter female (after Cook 1974)

2604 *Nyangalla* (*Ecpolopella*) *peltophora* (K. Viets), palp female (after Cook 1974)

2 Dorsal shield broadly fused with the ventral shield posteriorly (Fig. 2496)
Subgenus *Subkoenikea*

- Dorsal shield separated or only narrowly joined to the ventral shield posteriorly (Fig. 2507)
Subgenus *Nyangalla*

Subgenus *Nyangalla* s.s.

(Figs. 2502, 2506, 2507, 2599-2601)

DIAGNOSIS: Dorsal shield entire, dorsal furrow complete or ventral shield narrowly fused posteriorly (Fig. 2507). Apodemes of anterior coxae long (Fig. 2599). III-leg-6 and IV-leg-5 and -6 of male slightly bowed (Fig. 2600), IV-leg-5 ventrally with several pectinate setae (Fig. 2601).

HABITAT: Streams, standing waters.

DISTRIBUTION: Three species known from the Afrotropical region (Liberia, Cook 1966; Cameroon; South Africa, K. Viets 1956c).

Subgenus *Ecpolopella* Cook, 1967

(Figs. 2493, 2508, 2509, 2602-2605)

1967 *Ecpolopella* Cook, Memoirs of the American Entomological Institute 9: 136.
Type species: *Koenikea peltophora* K. Viets, 1916

DIAGNOSIS: Dorsal shield entire, composed of five to eight closely fitting platelets in both sexes (Figs. 2493, 2508, 2602). A pronounced sexual dimorphism of the idiosoma may be present, shape of idiosoma varying from elliptical to posteriorly narrowed. Legs not exhibiting sexual dimorphism.

HABITAT: Standing waters, streams.

DISTRIBUTION: Four species known from the Afrotropical region (Cameroon; Liberia, Cook 1966; Congo; East Africa; Rwanda, Burundi, Bader 1968).

Subgenus *Subkoenikea* Lundblad, 1941

(Figs. 2496, 2503, 2606-2608)

1941 *Subkoenikea* Lundblad, Entomologisk Tidskrift 62: 117.
Type species: *Subkoenikea capensis* Lundblad, 1941



2605



2606



2607

2605 *Nyangalla* (*Ecpolopella*) *tesselata acuticaudata* (K. Viets), first leg male (after Cook 1974)

2606 *Nyangalla* (*Subkoenikea*) *capensis differens* (K.O. Viets), dorsum male (after Cook 1974)

2607 *Nyangalla* (*Subkoenikea*) *capensis differens* (K.O. Viets), venter male (after Cook 1974)

DIAGNOSIS: Dorsal shield entire, but dorsal furrow incomplete (Fig. 2496). Dorsal and ventral shields broadly fused posteriorly. Apodemes of anterior coxae long (Figs. 2503, 2607). Legs not exhibiting sexual dimorphism.

HABITAT: Streams, standing waters.

DISTRIBUTION: Two species known from the Afrotropical region (South Africa, K.O. Viets 1965b; Liberia, Cook 1966).

Genus *Pionatax* K. Viets, 1916

(Figs. 2495, 2497, 2498, 2609)

1916 *Pionatax* K. Viets, Archiv für Hydrobiologie 11: 300.

Type species: *Pionatax uncipes* K. Viets, 1916

DIAGNOSIS: (Male only) Dorsal and ventral shields present, dorsal furrow located peripherally (Fig. 2495). Dorsal shield with six pairs of glandularia and ridges. Coxae included into ventral shield, suture lines of coxae more or less complete. Tips of Cx-I bluntly projecting, posterior apodemes of anterior coxae long. Genital field with 11-13 pairs of acetabula on wing-like genital plates (Fig. 2497); suture lines of genital field distinct. Palp without ventral tubercles (Fig. 2609). First legs with long, thickened setae. IV-leg-3 and especially IV-leg-4 expanded ventrally, IV-leg-3 anteroventrally with a stout seta (Fig. 2498). All leg claws simple.

HABITAT: Streams.

DISTRIBUTION: One species known from Cameroon.

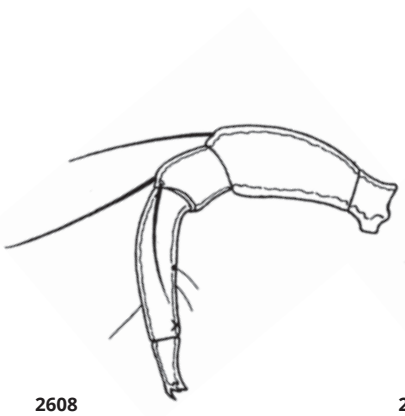
Genus *Recifella* K. Viets, 1935

(Figs. 2510, 2610-2618)

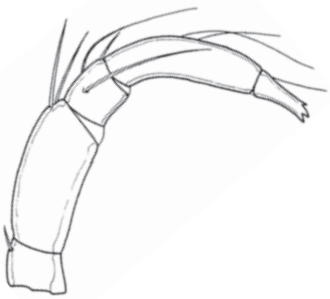
1935 *Recifella* K. Viets, Zoologischer Anzeiger 112: 276 – Cook (1980).

Type species: *Koenikea laminipes* K. Viets, 1935

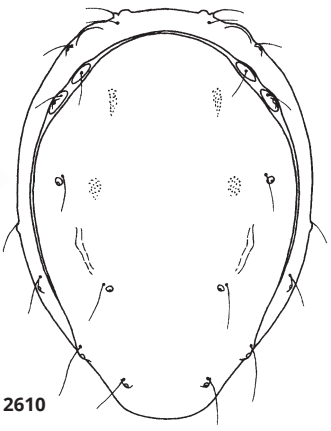
DIAGNOSIS: Dorsal and ventral shields present, dorsal shield with 3-4 pairs of glandularia, typically posteriorly fused in males, but dorsal furrow complete in females (Fig. 2510) and in males of some species (Fig. 2611). Postocularia typically on a pair of small platelets in the anterior part of the dorsal furrow, but occasionally fused with the dorsal part of ventral shield. Gnathosoma with



2608



2609



2610

2608 *Nyangalla* (*Subkoenikea*) *gennada* (Cook), palp female (after Cook 1974)

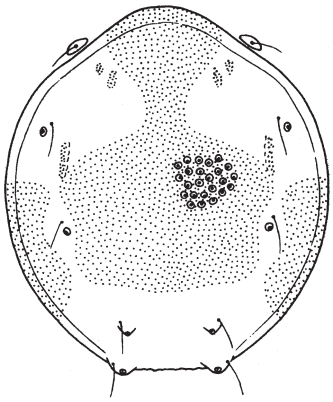
2609 *Pionatax uncipes* K. Viets, palp male (after Cook 1974)

2610 *Recifella* (*Recifellopsis*) *smithi* Cook, dorsum male (after Cook 1980)

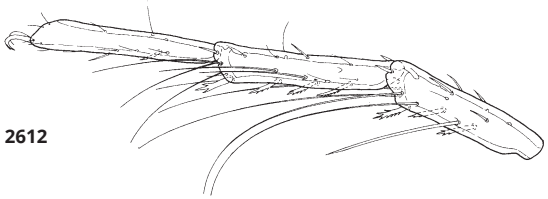
two posteroventral projections. Genital plates not surrounding a pair of glandularia. Legs with or without long, movable setae.

KEY TO THE SUBGENERA (MALES ONLY)

1	Idiosoma with a cauda (Fig. 2610)	Subgenus *Recifellopsis*
-	Idiosoma without a cauda (Fig. 2611)	2
2	Third and fourth legs without a pronounced sexual dimorphism (Fig. 2612)	Subgenus *Eorecifella*
-	Third and/or fourth legs with a strong sexual dimorphism (Fig. 2613)	3
3	Third and fourth legs with a pronounced sexual dimorphism (Figs. 2613, 2614)	Subgenus *Vietsiella*
-	Only fourth leg with a strong sexual dimorphism but if third leg exhibits some degree of sexual dimorphism, postocularia fused with dorsal portion of ventral shield	4
4	IV-leg-5 swollen, without modified setae (Fig. 2615); legs without movable setae	Subgenus *Monokoenikea*
-	IV-leg-5 not swollen, with or without modified setae; legs various	5



2611



2612



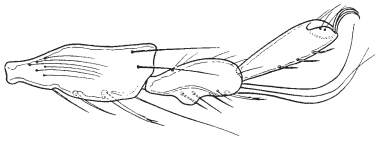
2613



2614



2615



2616

2611 *Recifella* (*Eorecifella*) *laversi* Cook, dorsum male (after Cook 1980)

2612 *Recifella* (*Eorecifella*) *australica* Cook, IV-leg-4-6 male (after Cook 1986)

2613 *Recifella* (*Vietsiella*) *veracruzana* Cramer & Cook, III-leg-5-6 male (after Cramer & Cook 1998)

2614 *Recifella* (*Vietsiella*) *veracruzana* Cramer & Cook, IV-leg-4-6 male (after Cramer & Cook 1998)

2615 *Recifella* (*Monokoenikea*) *melini* (Lundblad), IV-leg-5 male (after Cook 1974)

2616 *Recifella* (*Recifella*) *laminipes* (Lundblad), IV-leg-4-6 male (after Lundblad 1943)

5 IV-leg-4 and IV-leg-5 moderately to strongly expanded, without modified setae (Figs. 2616, 2617) Subgenus *Recifella*

- IV-leg-4 and IV-leg-5 not expanded, but slender and tending to be curved, with modified setae (Fig. 2618) Subgenus *Recifellida*

Subgenus *Recifella* s.s.

(Figs. 2616, 2617)

DIAGNOSIS: Dorsal shield with three (rarely four) pairs of glandularia. Dorsal furrow incomplete in males, complete in females. Males without a cauda or a depression immediately posterior to the genital field. IV-leg-4 and IV-leg-5 moderately to strongly expanded and without modified setae (Figs. 2616, 2617).

HABITAT: Streams, springs, standing waters (lakes, ditches).

DISTRIBUTION: Several species known from South America (Brazil, Paraguay, Surinam) and Central America (Mexico, Costa Rica, Cook 1980).

Subgenus *Eorecifella* Cook, 1980

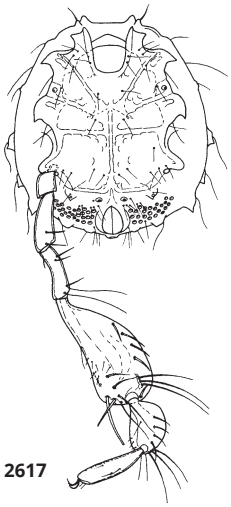
(Figs. 2510, 2611, 2612)

1980 *Eorecifella* Cook, Memoirs of the American Entomological Institute 31: 201.
Type species: *Koenikea balteata* Lundblad, 1943

DIAGNOSIS: Dorsal shield with 3-4 pairs of glandularia. Dorsal furrow incomplete in males (Fig. 2611), complete in females (Fig. 2510). Males without a pronounced sexual dimorphism of the legs (Fig. 2612) and without a cauda.

HABITAT: Streams, springs, interstitial, standing waters (marshes).

DISTRIBUTION: Numerous species known from Australia (Cook 1986, Smit 2007b), New Caledonia (Smit 2002a), New Guinea (Smit 2013b), South America (Brazil, K.O. Viets 1975a, 1977e; Paraguay, Rosso de Ferradás & Böttger 1997) and Central America (Mexico, Cook 1980; Honduras, Wiles 2005).



2617



2618



2619

2617 *Recifella* (*Recifella*) *bella* Cook, venter + fourth leg male (after Cook 1980)

2618 *Recifella* (*Recifellida*) *bifida* Cook, IV-leg-4-6 male (after Cook 1986)

2619 *Schadeella crassipalpis* Lundblad, dorsal view gnathosoma female (after Cook 1974)

Subgenus *Monokoenikea* Lundblad, 1941

(Fig. 2615)

1941 *Monokoenikea* Lundblad, Zoologiska bidrag från Uppsala 20: 367 – Cook (1980).

Type species: *Koenikea melini* Lundblad, 1930

DIAGNOSIS: (Male only) Dorsal shield with four pairs of glandularia; dorsal furrow complete. Third leg not modified. IV-leg-5 of male swollen, without modified setae (Fig. 2615).

HABITAT: Standings waters (ponds).

DISTRIBUTION: One species known from Brazil.

Subgenus *Recifellida* Cook, 1986

(Fig. 2618)

1986 *Recifellida* Cook, Memoirs of the American Entomological Institute 40: 168.

Type species: *Recifella bifida* Cook, 1986

DIAGNOSIS: Dorsal shield with three or four pairs of glandularia. Dorsal furrow incomplete in males, complete in females. IV-leg-5 of male longer than IV-leg-6 and tending to be curved. Three of the ventral setae of IV-leg-5 exhibiting various degrees of modification (Fig. 2618). Third leg exhibiting a certain degree of sexual dimorphism in the shape and number of setae.

HABITAT: Streams.

DISTRIBUTION: Numerous species known from Australia (Cook 1986, Smit 2007b), one species known from New Caledonia (Smit 2002a).

Subgenus *Recifellopsis* Cook, 1980

(Fig. 2610)

1980 *Recifellopsis* Cook, Memoirs of the American Entomological Institute 31: 198.

Type species: *Recifella smithi* Cook, 1980

DIAGNOSIS: Dorsal shield with three or four pairs of glandularia. Males: Dorsal furrow incomplete, cauda a well-developed (Fig. 2610). Genital field located well anterior to posterior idiosoma margin. IVB-leg-4 and occasionally IV-leg-5 inflated. Excretory pore located immediately posterior to the gonopore, in a shallow to very deep concavity which extends posteriorly from the genital field.

HABITAT: Streams.

DISTRIBUTION: Two species known from Central America (Mexico, Costa Rica, Cook 1980).

Subgenus *Vietsiella* Cramer & Cook, 1998

(Figs. 2613, 2614)

1998 *Vietsiella* Cramer & Cook, International Journal of Acarology 24: 133.

Type species: *Recifella veracruzana* Cramer & Cook, 1998

DIAGNOSIS: Dorsal shield with four pairs of glandularia in male and three pairs of glandularia in female. Male III-leg-5 with a stout anteroventral seta, III-leg-6 stocky (Fig. 2613), IV-leg-4 bowed, bearing two rows of three stout setae (one row curved at tip), IV-leg-5 bowed, ventrally with a large concavity from which originate several long, curved setae, some of these pectinate (Fig. 2614).

HABITAT: Standing waters (ponds).

DISTRIBUTION: One species known from Mexico.

Genus *Schadeella* Lundblad, 1938

(Figs. 2519, 2619-2622)

1938 *Schadeella* Lundblad, Zoologischer Anzeiger 122: 11.

Type species: *Schadeella crassipalpis* Lundblad, 1938

DIAGNOSIS: Idiosoma soft. Gnathosoma with a well-developed rostrum (Fig. 2619); chelicera not fused medially. Coxae in three groups in male (Fig. 2620), in four groups in female (Fig. 2621). Posterior apodemes of anterior coxae short. Cx-IV with short posterior projections. Genital field with numerous acetabula. Genital plates of female divided in anterior and posterior portions, posterior pair fused medially with postgenital sclerite. Palp stocky, atypical of the Pionatacinae, P4 with a large medial tubercle (Fig. 2519). Legs without a strong sexual dimorphism, but IV-leg-6 of male slightly enlarged distally, with a large claw.

HABITAT: Standing waters.

DISTRIBUTION: One species known from Paraguay.

Genus *Tanaognathus* Wolcott, 1900

(Figs. 2512, 2623-2629)

1900 *Tanaognathus* Wolcott, Transactions of the American Microscopical Society 21: 193 – nov. stat.

Type species: *Tanaognathus spinipes* Wolcott, 1900

DIAGNOSIS: Dorsal shield with six pairs of glandularia without apophyses (Fig. 2624); dorsal furrow complete in both sexes. Gnathosoma attached to a short protrusable tube, lacking a second proximal projection or anchoral process, with a long upturned rostrum, dorsally bearing a pair of long, setae, which are either pectinate or simple (Fig. 2512). Posterior apodemes of anterior coxae short (Fig. 2625). A curved ridge may be present lateral to the coxae (Fig. 2626). Palp either four- or five-segmented.

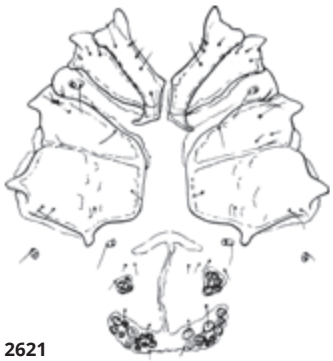
REMARKS: The gnathosoma with a long rostrum, attached to a protrusable tube warrants the status as a separate genus.

KEY TO THE SUBGENERA

1	Palp four-segmented (Fig. 2623)	Subgenus *Tanaognathus*
-	Palp five segmented (Fig. 2512)	Subgenus *Tanaognathella*



2620



2621



2622

2620 *Schadeella crassipalpis* Lundblad, venter male (after Cook 1974)

2621 *Schadeella crassipalpis* Lundblad, venter female (after Cook 1974)

2622 *Schadeella crassipalpis* Lundblad, IV-leg-6 male (after Lundblad 1942a)

Subgenus *Tanaognathus* s.s.

(Figs. 2623-2628)

DIAGNOSIS: Palp four-segmented, P2 and P3 fused, P4 very short (Fig. 2623). Either one of the claws of the first leg (Fig. 2627), or both (Fig. 2628), enlarged.

HABITAT: Standing waters (lakes, ponds), streams.

DISTRIBUTION: Two species known from North America (Michigan, Wisconsin, Illinois, Florida, Ontario, Cook 1976a) and one species from Mexico (Cook 1980).

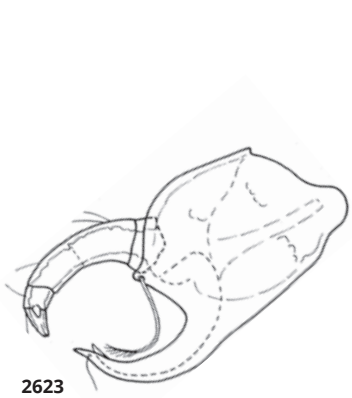
Subgenus *Tanaognathella* Lundblad, 1941

(Figs. 2512, 2629)

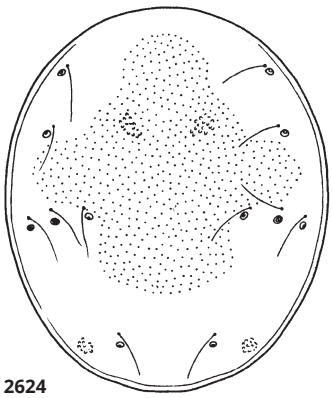
1941 *Tanaognathella* Lundblad, Zoologiska bidrag från Uppsala 20: 367.

Type species: *Koenikea marshallae* K. Viets, 1930 = *Koenikea wolcotti* K. Viets, 1930

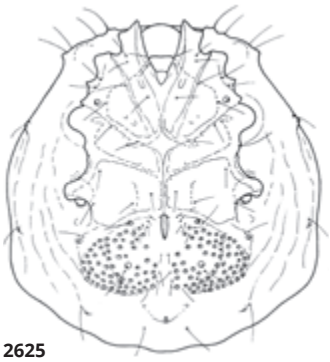
DIAGNOSIS: Palp five-segmented (Fig. 2512). III-leg-4 and -5 of male ventrally with several stout setae, medially with 2-3 long setae.



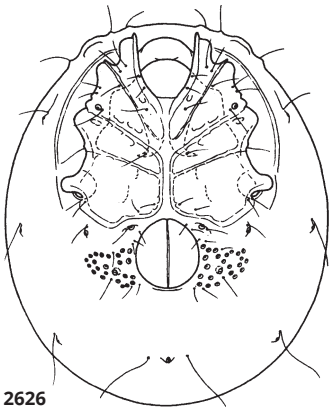
2623



2624



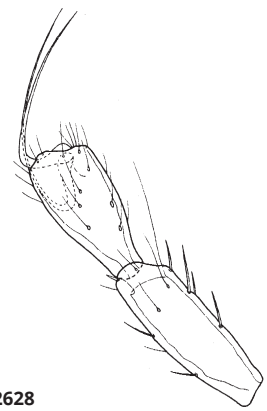
2625



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2623 *Tanaognathus* (*Tanaognathus*) *spinipes* Wolcott, gnathosoma + palp male (after Cook 1974)

2624 *Tanaognathus* (*Tanaognathus*) *kurtvietsi* Cook, dorsum female (after Cook 1980)

2625 *Tanaognathus* (*Tanaognathus*) *spinipes spinipes* Wolcott, venter male (after Cook 1976a)

2626 *Tanaognathus* (*Tanaognathus*) *kurtvietsi* Cook, venter female (after Cook 1980)

2627 *Tanaognathus* (*Tanaognathus*) *spinipes* Wolcott, I-leg-6 male (after Cook 1974)

2628 *Tanaognathus* (*Tanaognathus*) *kurtvietsi* Cook, I-leg-5-6 (after Cook 1980)

HABITAT: Standing waters (lakes, ponds, canals), slow flowing streams.

DISTRIBUTION: Several species known from North America (Cook 1976a).

Subfamily Pollicipalpinae K. Viets, 1924

1924 Pollicipalpinae K. Viets, Zoologischer Anzeiger 58: 104.

DIAGNOSIS: Dorsal and ventral shields present. Dorsal shield either complete or composed of a large posterior plate and a narrow anterior plate. Coxae fused with the ventral shield, suture lines of coxae distinct; suture lines between Cx-III and Cx-IV incomplete. Anterior coxae with short apodemes. Tips of Cx-I and Cx-II either with two sharp-pointed projections or only somewhat notched. Genital field with 4-5 pairs of acetabula. Palp five-segmented, distal end of P4 with a flattened projection which extends well beyond the insertion of P5 (Figs. 2471, 2632). P3 with a long lateral seta. Legs with a few swimming setae, no movable setae present (Fig. 2636). Legs without sexual dimorphism, claws with a clawlet. Monotypic.

Genus *Pollicipalpus* K. Viets, 1924

(Figs. 119, 2471, 2472, 2620-2626)

1924 *Pollicipalpus* K. Viets, Zoologischer Anzeiger 58: 104.

Type species: *Pollicipalpus scutatus* K. Viets, 1924

DIAGNOSIS: As for subfamily.

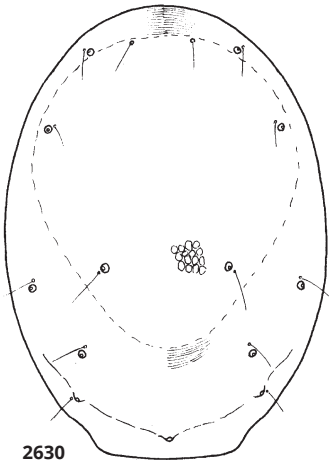
KEY TO THE SUBGENERA

1 Dorsal shield complete (Fig. 2630), Cx-I and Cx-II with hook-like extensions; Cx-IV without glandularia (Fig. 119) Subgenus *Pollicipalpus*

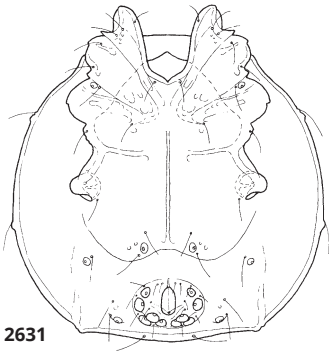
- Dorsal shield composed of a narrow anterior plate and a large posterior plate (Fig. 2472); Cx-I and Cx-II without hook-like extensions, Cx-IV with a pair of glandularia (Figs. 2631, 2633) Subgenus *Pollicipalpella*



2629



2630



2631

2629 *Tanaognathus* (*Tanaognathella*) *wolcotti* (K. Viets), III-leg-4-5 male (after Cook 1974)

2630 *Pollicipalpus* (*Pollicipalpus*) *scutatus* K. Viets, dorsum male (after Cook 1974)

2631 *Pollicipalpus* (*Pollicipalpella*) *australicus* Cook, venter male (after Cook 1986)

Subgenus *Pollicipalpus* s.s.

(Figs. 119, 2630, 2632)

DIAGNOSIS: (Male only) Dorsal shield complete and bearing the postocularia, six pairs of glandularia and the excretory pore (Fig. 2630). Cx-I and Cx-II with two sharp-pointed projections. Cx-IV without glandularia (Fig. 119). Genital field with 4-5 pairs of acetabula.

HABITAT: Streams.

DISTRIBUTION: Two species known from West Africa (Cameroon, Ivory Coast).

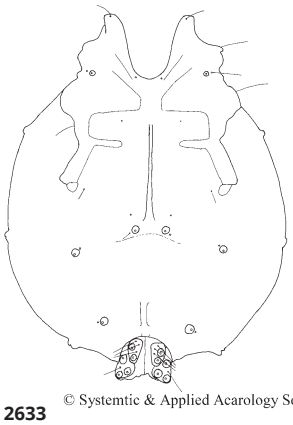
Subgenus *Pollicipalpella* Cook, 1986

(Figs. 2471, 2472, 2631, 2633-2636)

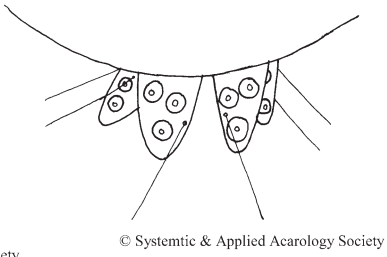
1986 *Pollicipalpella* Cook, Memoirs of the American Entomological Institute 40: 200.
Type species: *Pollicipalpus australicus* Cook, 1986



2632


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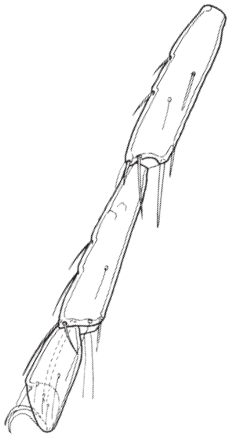
2633


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2634



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2637

2632 *Pollicipalpus* (*Pollicipalpus*) *scutatus* K. Viets, P5 male (after Cook 1974)

2633 *Pollicipalpus* (*Pollicipalpella*) *australicus* Cook, venter female (after Smit 2007c) Reproduced with permission from copyright holder

2634 *Pollicipalpus* (*Pollicipalpella*) *australicus* Cook, detail of genital field female (after Smit 2007c) Reproduced with permission from copyright holder

2635 *Pollicipalpus* (*Pollicipalpella*) *australicus* Cook, gnathosoma + palp male (after Cook 1986)

2636 *Pollicipalpus* (*Pollicipalpella*) *australicus* Cook, I-leg-4-6 male (after Cook 1986)

2637 *Vietsatax parasitica* Uchida & Imamura, dorsum male (after Cook 1974)

DIAGNOSIS: Dorsal shield composed of a narrow anterior plate and a large posterior plate (Fig. 2472). Anterior plate with the postocularia and a pair of glandularia, posterior plate bearing five pairs of glandularia and a pair of posterolateral apophyses. A pair of free glandularia lying in the dorsal furrow lateral to anterior platelet. Tips of Cx-I and Cx-II somewhat notched but without hook-like projections. Cx-IV with a pair of glandularia. Genital field with five pairs of acetabula. Genital field of male surrounding the gonopore (Fig. 2631), but genital field of female composed of two pairs of comb-like projections, bearing two and three pairs of acetabula, respectively (Fig. 2633); comb-like projections situated perpendicularly to idiosoma (Fig. 2634).

HABITAT: Streams.

DISTRIBUTION: One species known from northern and eastern Australia (Cook 1986, Smit 2007c).

Subfamily Unionicolinae Oudemans, 1909

1909 Unionicolinae Oudemans, Tijdschrift voor Entomologie 52: 60.

1941 Heteratacinae Lundblad, Entomologisk Tidskrift 62: 116 – Cook (1974).

DIAGNOSIS: Lateral eyes lying beneath the integument. Idiosoma usually soft but occasionally with extensive secondary sclerotization. Chelicera may or may not be fused medially. Coxae typically in four groups, but occasionally fused by secondary sclerotization into a single group. Posterior apodemes of anterior coxae relatively short. Suture lines Cx-III/Cx-IV usually incomplete, if complete, genital field with five or six pairs of acetabula or mite was collected in a clam. Number of acetabula of genital field varying from five pairs to numerous. Females often with two pairs of genital plates, which bear three pairs of stout setae medially; occasionally these setae absent, or only one pair of genital plates present. Palp various in shape. Legs with long and movable setae in free-living species, but much stockier and lacking the movable setae in species which are molluscan parasites as adults. All legs with claws.

REMARKS: Cook (1974) used a more limited concept of the genus *Unionicola*, and recognized three more genera within the Unionicolinae, i.e. *Atacella* Lundblad, 1973, *Vietsatax* Uchida & Imamura, 1938 and *Heteratax* Lundblad, 1941. However, Vidrine (1985a, 1986) used a broader concept, and considered these genera as subgenera of *Unionicola*. As stated by Cook (1974), the male sexual dimorphism of *Vietsatax* is very pronounced, especially in the genital field, and unlike any other unionicoline species. Therefore, I agree with Cook (1974) that *Vietsatax* deserves ranking as a full genus.

KEY TO THE GENERA

1	Male genital field extending onto dorsum; male gonopore located near middle of dorsum (Fig. 2637) (female not distinguishable at subgeneric level)	Genus *Vietsatax*
-	Male genital field terminal or subterminal (Figs. 123, 2638)	Genus *Unionicola*

Genus *Unionicola* Haldeman, 1842

(Figs. 120, 123, 2477, 2478, 2638-2657) hier alleen 2639 tm 2657

1842 *Unionicola* Haldeman, Zoological Contributions, Philadelphia 1: 1.

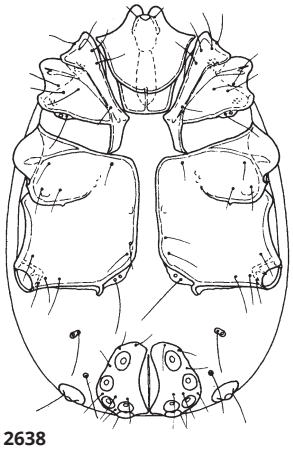
1922 *Pentatax* Thor, Nyt Magazin for Naturvidenskaberne 61: 117 – new syn.

1926 *Hexatax* Thor, Annuaire du Musée Zoologique de l'Academie des Sciences de l'U.R.S.S. 27: 167 – new syn.

1933 *Polyatax* K. Viets, Zoologischer Anzeiger 104: 265 – new syn.

1937 *Unionicolides* Lundblad, Zoologischer Anzeiger 120: 285 – new syn.

1937 *Atacella* Lundblad, Zoologischer Anzeiger 120: 286 – new syn.
1941 *Neoatax* Lundblad, Zoologiska bidrag från Uppsala 20: 366 – new syn.
1941 *Polyatacides* Lundblad, Zoologiska bidrag från Uppsala 20: 366 – new syn.
1941 *Atacellides* Lundblad, Zoologiska bidrag från Uppsala 20: 367 – new syn.
1941 *Heteratax* Lundblad, Entomologisk Tidskrift 62: 116 – new syn.
1941 *Unionicolella* Lundblad, Entomologisk Tidskrift 62: 123 – new syn.
1949 *Parasitatax* K. Viets, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 32: 307 – Harvey (1998a).
1966 *Bassatax* Cook, Memoirs of the American Entomological Institute 6: 144 – new syn.
1975 *Giselatax* K.O. Viets, Zoologica Scripta 4: 95 – new syn.
1980 *Unionicolopsis* K.O. Viets, Transactions of the Royal Society of South Australia 104: 36 – new syn.
1981 *Armatax* Bader, Revue de Zoologie africaine 95: 941– new syn.
1984 *Fulleratax* Vidrine, International Journal of Acarology 12: 105 – new syn.
1985 *Ampullariatax* Vidrine, International Journal of Acarology 11: 286 – new syn.
1986 *Anodontinax* Vidrine, International Journal of Acarology 12: 95 – new syn.
1986 *Berezatax* Vidrine, International Journal of Acarology 12: 105 – new syn.
1986 *Australatax* Vidrine, International Journal of Acarology 12: 105 – new syn.
1986 *Kovietsatax* Vidrine, International Journal of Acarology 12: 238 – new syn.
1986 *Cookatax* Vidrine, International Journal of Acarology 12: 238 – new syn.
1988 *Baderatax* Vidrine, Proceedings of the Louisiana Academy of Sciences 51: 31 – new syn.
1988 *Heversatax* Vidrine, Proceedings of the Louisiana Academy of Sciences 51: 32 – new syn.
1988 *Lundbladatax* Vidrine, Proceedings of the Louisiana Academy of Sciences 51: 32– new syn.
1988 *Ferradasatax* Vidrine, Proceedings of the Louisiana Academy of Sciences 51: 32 – new syn.
1988 *Crameratax* Vidrine, Proceedings of the Louisiana Academy of Sciences 51: 33 – new syn.
1992 *Dimockatax* Vidrine, Proceedings of the Louisiana Academy of Sciences 55: 27 – new syn.



2638



2639



2640

2638 *Unionicola furculopsis* Cook, venter male (after Cook 1980)
2639 *Unionicola pachyscela* Lundblad, first leg male (after Cook 1974)
2640 *Unionicola clathrata* (Lundblad), first leg female (after Cook 1974)

1992 *Wolcottatax* Vidrine, Proceedings of the Louisiana Academy of Sciences 55: 27 – new syn.
1992 *Prasadatax* Vidrine, Proceedings of the Louisiana Academy of Sciences 55: 28 – new syn.
1992 *Mitchellatax* Vidrine, Texas Journal of Science 44: 460 – new syn.
1992 *Everittatax* Vidrine, Texas Journal of Science 44: 461– new syn.
1992 *Poundsatax* Vidrine, Texas Journal of Science 44: 461 – new syn.
1992 *Wilsonatax* Vidrine, Texas Journal of Science 44: 461 – new syn.
1992 *Bakeratax* Vidrine, Texas Journal of Science 44: 462 – new syn.
1992 *Gledhillatax* Vidrine, Texas Journal of Science 44: 462 – new syn.
1992 *Davidsatax* Vidrine, Texas Journal of Science 44: 463 – new syn.
1992 *Downesatax* Vidrine, Texas Journal of Science 44: 463 – new syn.
1992 *Lasalleatax* Vidrine, Texas Journal of Science 44: 463 – new syn.
1992 *Smithatax* Vidrine, Texas Journal of Science 44: 463 – new syn.
1992 *Conroyatax* Vidrine, Texas Journal of Science 44: 464 – new syn.
1992 *Curryatax* Vidrine, Texas Journal of Science 44: 464 – new syn.
1992 *Edwardsatax* Vidrine, Texas Journal of Science 44: 464 – new syn.
1992 *Crowellatax* Vidrine, Texas Journal of Science 44: 465 – new syn.
1992 *Australionicola* Smit, Tijdschrift voor Entomogie 135: 99 – new syn.
1993 *Majumderatax* Vidrine, International Journal of Acarology 19: 101 – new syn.
1994 *Imamuratax* Vidrine, Texas Journal of Science 46: 158 – new syn.
1994 *Causeyatax* Vidrine, Texas Journal of Science 46: 159 – new syn.
1994 *Breaudatax* Vidrine, Texas Journal of Science 46: 160 – new syn.
1994 *Clarkatax* Vidrine, Texas Journal of Science 46: 160 – new syn.
2002 *Mutelicola* Gledhill & Vidrine, Journal of Natural History 36: 1354 – new syn.
2005 *Chambardicola* Vidrine, Borsari & Bastian-Stanford, International Journal of Acarology 31: 255 – new syn.
2006 *Iridinicola* Vidrine, Lötter, Van As, Bastian-Stanford & Hazelton-Robichaux, International Journal of Acarology 32: 1 – new syn.
2007 *Hyricola* Vidrine, Bogan & Hazelton-Robichaux, International Journal of Acarology 33: 51 – new syn.
2007 *Coelaturicola* Vidrine, Lötter, Van As, Bogan & Bastian-Stanford, International Journal of Acarology 33: 168 – new syn.
2008 *Vidrineatax* Smit, Zootaxa 1674: 21 – new syn.
2008 *Geikienicola* Smit, Zootaxa 1674: 23 – new syn.
2009 *Vidrinatax* Wen, Hu & Zhu, Acarologia 48: 191 – new syn.

Type species: *Acarus ypsilophorus* Bonz, 1783 = *Unionicola oviformis* Haldeman, 1842

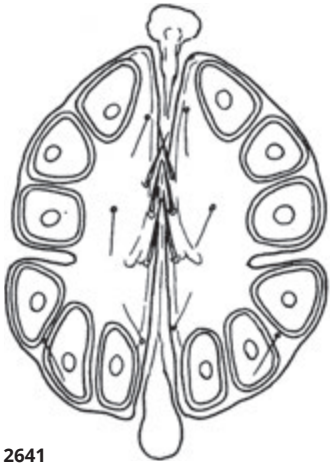
DIAGNOSIS: Idiosoma typically weakly sclerotized but (extensive) secondary sclerotization may be present. Cx-III+IV large and mostly rectangular in outline, with or without an indentation where the suture line Cx-III/Cx-IV meets the lateral plate margin. Coxal surface in general with a reticular surface. Suture line Cx-III/IV complete or incomplete. Genital field with 5 to many pairs of acetabula, in females on one (Fig. 2641) or two pairs (Fig. 2642) of plates and with distinct setae along medial margin, occasionally the pairs widely separated on each side (Fig. 2643). In males acetabula usually on one pair of plates various in shape, either completely surrounding gonopore

(Figs. 2644, 2645), or anteriorly or posteriorly fused or touching (Fig. 2646), or completely separated (Fig. 2647); rarely male genital field with two pairs of genital plates. Palp well-sclerotized, either cylindrical or dorsoventrally flattened, from slender to very stocky (Fig. 2648). P4 with (Fig. 2649) or without setal tubercles (Fig. 2650), P5 rarely with a modified seta (Figs. 2651, 2652). Leg setation and claws extremely variable. First leg generally stout, in free-living species usually armed with long stout, movable setae (Fig. 2477), but occasionally with simple setae (Figs. 2639, 2640, 2653); rarely first leg segments modified (Fig. 2654). Fourth leg with (Figs. 2655-2657) or without sexual dimorphism.

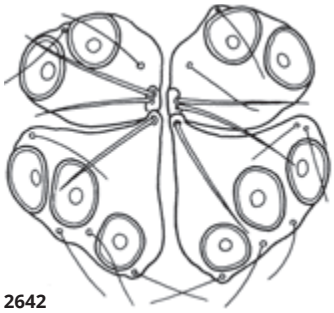
HABITAT: Standing waters, streams. Many species inhabiting mussels.

DISTRIBUTION: Many species known worldwide.

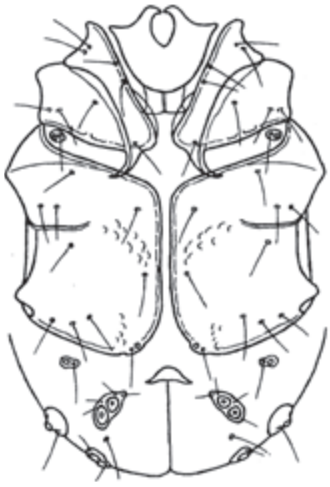
REMARKS: Since the publication of Cook (1974) the number of taxa increased dramatically, in particular the number of subgenera. Edwards & Vidrine (2013) listed 57 subgenera, 22 of these are monotypic. A number of these subgenera were previously considered separate genera, i.e. *Atacella* Lundblad and *Heteratax* Lundblad. Hevers (2010, 2012) criticised this oversplitting, and pointed out that many of the recently described subgenera lack differential criteria. Moreover, Tuzovskij & Semenchenko (2015) abandoned the use of subgenera.



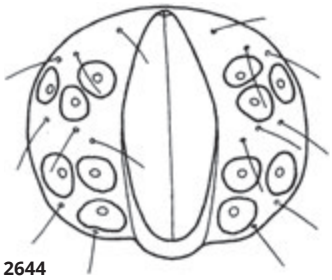
2641



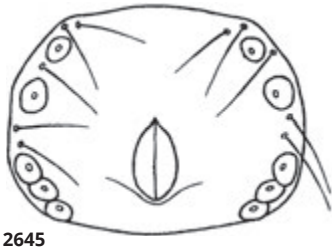
2642



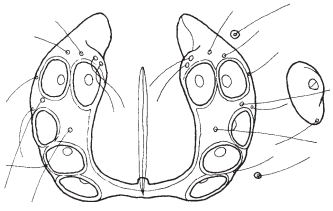
2643



2644



2645



2646

2641 *Unionicola sica* Lundblad, genital field female (after Cook 1974)

2642 *Unionicola setifera* Cook, genital field female (after Cook 1974)

2643 *Unionicola separata* Cook, venter female (after Cook 1974)

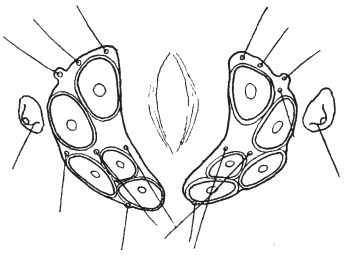
2644 *Unionicola dentifera* Cook, genital field male (after Cook 1974)

2645 *Unionicola separata* Cook, genital field male (after Cook 1974)

2646 *Unionicola longiseta* Walter, genital field male (after Cook 1986)

The traditional system of subgenera was based on genital morphology (number of acetabula) and sexual dimorphism of the legs, and resulted in an artificial subdivision (Cook 1974). However, as stated above, many new subgenera are not well defined, and occasionally the description of additional species blurred the system even more (e.g. Smit 2008). The genus *Unionicola* is very diversified, especially in leg setation. As stated by Cook (1974, p. 419) for the genus *Arrenurus*, "……. appears to be a highly successful and very plastic group which has undergone an explosive speciation along numerous independent lines. For the most part there seem to be species groups rather than easily defined subgenera, and there is no truly satisfactory classification. To put subgeneric names on the species groups would certainly necessitate proposing over 100 names and the result would be so unwieldy as to be useless."

However, this is what has happened with the genus *Unionicola*. A plethora of subgenera has been described, but this doesn't bring us to a better understanding of the phylogeny of the genus. As stated above, nearly half the number of subgenera is monotypic. Moreover, the variation in characters is very large, and this could lead to a further increase in monotypic subgenera. Edwards & Vidrine (2013), in discussing *Hexatax*, listed seven more species which are candidates for new monotypic subgenera. A few of the recently described subgenera seem to be natural groups, but others are not, especially the two largest subgenera, *Hexatax* and *Pentatax*. These are separable in the female sex only by the shape of the anterior genital plates, *Hexatax* has plates more or less similar in shape, while in *Pentatax* the genital plates have a medial flap with setae that is modified for oviposition into mussel tissue. However, this flap can be short, and that it's not clear to which subgenus such a species belongs.



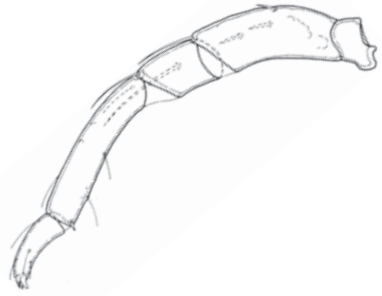
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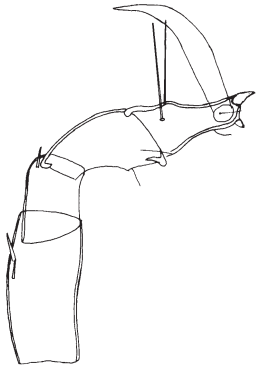
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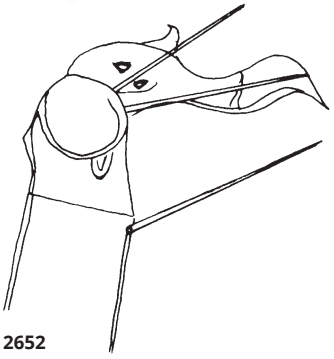
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2647 *Unionicola plaumanni* Lundblad, genital field male (after Lundblad 1942a)

2648 *Unionicola prominens* (Koenike), palp male (after Cook 1974)

2649 *Unionicola longiseta* Walter, palp female (after Cook 1986)

2650 *Unionicola vidrinei* Cook, palp male (after Cook 1986)

2651 *Unionicola hammeni* Smit, P2-5 male (after Smit 1992b)

2652 *Unionicola hammeni* Smit, dorsal view P4-5 male (after Smit 1992b)

Up to now, species with conspicuous characters have been put in separate, often monotypic, subgenera. As the variation within *Unionicola* seems almost endless, especially in leg setation, many more subgenera could be erected. As stated before, this doesn't give us a better understanding in the phylogeny, nor does it gives us a better overview of this large genus.

Molecular studies could shed light on the phylogeny of *Unionicola*. However, only a few studies have been conducted, e.g. Edwards et al. (2010), who used COI to study the phylogeny. However, COI alone is not suitable for this purpose in mites (Kreipe et al. 2015, Blattner et al. 2019, Dabert et al. 2016). Therefore I propose to synonymize all subgenera with the nominate taxon. It is possible that future studies reveal that a number of subgenera are diagnosable, monophyletic subgenera, but for the time being I propose to abandon the use of subgenera for this genus.

Genus *Vietsatax* Uchida & Imamura, 1938

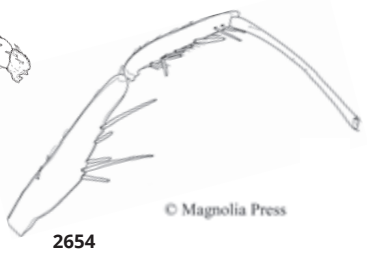
(Figs. 2637, 2658, 2659)

1938 *Vietsatax* Uchida & Imamura, Zoological magazine 50: 462.

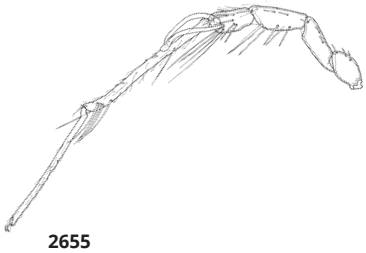
Type species: *Vietsatax parasiticum* Uchida & Imamura, 1938



2653


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2654



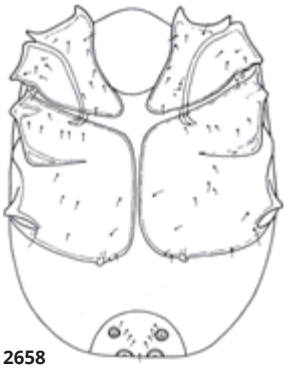
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2653 *Unionicola flabelliseta* Cook, first leg male (after Cook 1986)

2654 *Unionicola insolita* Smit, I-leg-4-6 female (after Smit 2008) Reproduced with permission from copyright holder

2655 *Unionicola aberrans* K.O. Viets, fourth leg male (after Cook 1986)

2656 *Unionicola falcipes* (Lundblad), IV-leg-5-6 male (after Cook 1974)

2657 *Unionicola indistincta* (Wolcott), IV-leg-4-6 male (after Cook 1974)

2658 *Vietsatax parasitica* Uchida & Imamura, venter male (after Cook 1974)

2659 *Vietsatax parasitica* Uchida & Imamura, fourth leg male (after Cook 1974)

DIAGNOSIS: Idiosoma weakly sclerotized. Suture lines Cx-III/Cx-IV incomplete; without an indentation laterally between Cx-III and Cx-IV. Genital field with five pairs of acetabula, in females on two pairs of plates, anterior plate with two pairs of short stout setae, posterior plate without stout setae. Male genital field consisting of one elongated plate, posteriorly extending far onto dorsum (Fig. 2637); two pairs of acetabula can be seen in ventral view (Fig. 2658) and three pairs in dorsal view, gonopore located near the middle of dorsum. Female genital field with two pairs of genital plates; females not distinguishable from *Unionicola*. Male IV-leg-3-5 with many long setae, especially IV-leg-4 (Fig. 2659).

HABITAT: Mussel parasites of *Anodonta* (Unionidae).

DISTRIBUTION: Two species known from Japan and China (Wen et al. 2008).

SUPERFAMILY ARRENUROIDEA THOR, 1900

1900 Arrenuridae Thor, Nyt Magazin for Naturvidenskaberne 38: 4.

DIAGNOSIS: Idiosoma with lateral eyes absent or present, not shifted medially and not associated to a frontal eye. Idiosoma highly variable in shape, ranging from ovoid to dorsoventrally flattened, and degree of sclerotization, ranging from soft with dorsum bearing only glandularia platelets to heavily sclerotized with dorsum entirely covered by a dorsal shield. Gnathosoma never attached to a protrusable tube. Chelicera two-segmented. Genital field without movable flaps, with the acetabula lying in the gonopore, on genital plates flanking the gonopore, or both. Palp not chelate but often uncate.

Family Acalyptonotidae Walter, 1911

1911 Acalyptonotidae Walter, Naturwissenschaftliche Untersuchungen des Sarek-Gebirges Schwedisch-Lapland, geleitet von Dr. Axel Hamberg 4: 608.

DIAGNOSIS: Lateral eyes lying below integument. Idiosoma dorsally flattened, ventrally convex. Dorsal integument membranous (Fig. 2660) or with large plate (Fig. 2661), membranous parts longitudinally striated. Gnathosoma separated from the coxae. Suture lines Cx-I/Cx-II and Cx-III/Cx-IV incomplete. Suture lines Cx-II/III reaching the medial margin of Cx-III + IV, the latter in general reduced to a medial angle (Figs. 67, 2662). Venter covered by a shield including coxae and in general also genital area and the excretory pore. Genital field with 3-16 pairs of acetabula, lying in a shallow bay formed by the posterior margins of Cx-IV. Male genital field with acetabula in a single row in the gonopore (Fig. 2663), female genital field with acetabula in 1-3 rows on distinct genital plates which either lie posterolaterally in the membranous area surrounding the gonopore (Fig. 67), or are fused into the ventral shield. Palp five-segmented, distoventral part of P4 projecting to form an obtuse or slightly pointed angle, bearing a small, thickened (Fig. 2664) or hair-like seta (Fig. 2667). Legs without sexual dimorphism. IV-leg-5 occasionally with one long setae, but typical swimming setae absent. Monotypic.

Genus *Acalyptonotus* Walter, 1911

(Figs. 67, 2660-2667)

1911 *Acalyptonotus* Walter, Naturwissenschaftliche Untersuchungen des Sarek-Gebirges Schwedisch-Lapland, geleitet von Dr. Axel Hamberg 4: 608.

Type species: *Acalyptonotus violaceus* Walter, 1911

DIAGNOSIS: As for family.

KEY TO THE SUBGENERA

1	Dorsum without a large plate (Fig. 2660)	Subgenus *Acalyptonotus* s.s.
-	Dorsum with a large plate (Fig. 2661)	Subgenus *Paenecalyptonotus*

Subgenus *Acalyptonotus* s.s.

(Figs. 67, 2660, 2662-2664)

DIAGNOSIS: Dorsum unsclerotized, without a large plate (Fig. 2660). Genital field with 3-16 pairs of acetabula (Figs. 67, 2662-2663).

HABITAT: Profundal of lakes, subalpine lakes and pools, cold spring-fed pools.

DISTRIBUTION: Three species known, two from northern part of the Nearctic (I.M. Smith 1983c) and one with a Holarctic distribution.

Subgenus *Paenecalyptonotus* I.M. Smith, 1976

(Figs. 2661, 2665-2667)

1976 *Paenecalyptonotus* I.M. Smith, The Canadian Entomologist 108: 997 – I.M. Smith (1983c).
Type species: *Paenecalyptonotus fontinalis* I.M. Smith, 1976

DIAGNOSIS: Dorsum with a large dorsal plate (Fig. 2661). Genital field with three pairs of acetabula (Figs. 2665, 2666).

HABITAT: Springs.

DISTRIBUTION: One species known from Canada.

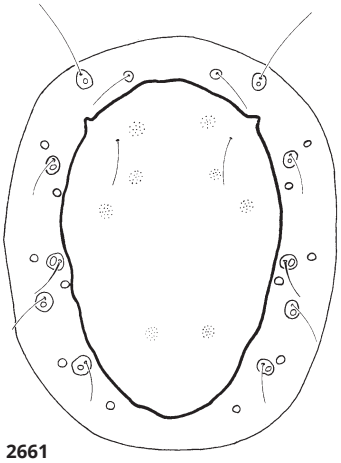
Family Amoenacaridae I.M. Smith & Cook, 1997

1997 Amoenacaridae I.M. Smith & Cook, International Journal of Acarology 23: 107.

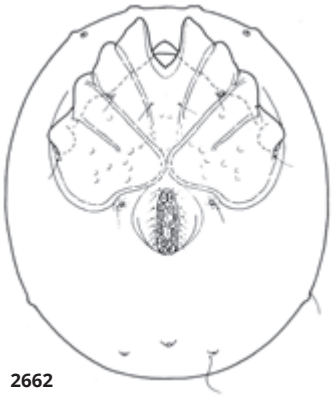
DIAGNOSIS: Idiosoma elongate and oval in male (Fig. 2668), nearly round in female (Fig. 2669), arched dorsally, nearly flat ventrally. Dorsum bearing a prominent medial tubercle anteriorly between the eyes. Dorsal shield complete, strongly arched anteriorly and anteriorly and steeply declivitous and concave posteriorly in males. Coxae completely fused medially with medial suture lines obliterated. Posterior margins of Cx-IV ending medially at vestigial posteromedial angles (Figs. 94, 97). Prominent projections associated with insertions of fourth legs. Genital field of male with 2-3 pairs of acetabula in the gonopore field and 12-15 pairs of acetabula on genital plates flanking the gonopore (Fig. 2670). Female genital field with 20-22 pairs of acetabula on genital plates flanking the gonopore field. P2 and P4 with pointed ventral tubercles, P5 long and tapering distally (Fig. 98). Legs with swimming setae. Male IV-leg-5 slightly bowed (Fig. 95), IV-leg-6 greatly expanded dorsoventrally and notched ventrally (Fig. 96). Monotypic.



2660



2661



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2660 *Acalyptonotus* (*Acalyptonotus*) *violaceus* Walter, dorsum male (after Gerecke et al. 2016)

2661 *Acalyptonotus* (*Paenecalyptonotus*) *fontinalis* (I.M. Smith), dorsum male (after I. M. Smith 1976c)

2662 *Acalyptonotus* (*Acalyptonotus*) *violaceus* Walter, venter male (after Gerecke et al. 2016)

Genus *Amoenacarus* I.M. Smith & Cook, 1997

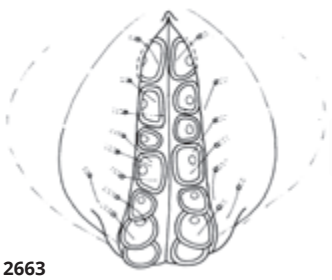
(Figs. 94-98, 2668-2670)

1997 *Amoenacarus* I.M. Smith & Cook, International Journal of Acarology 23: 109.
Type species: *Amoenacarus dixiensis* I.M. Smith & Cook, 1997

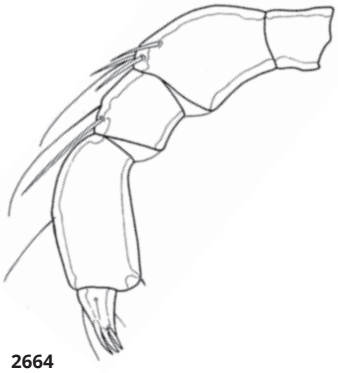
DIAGNOSIS: As for family.

HABITAT: Streams.

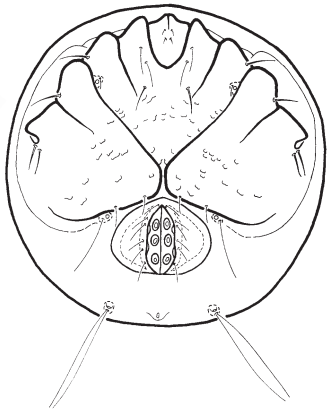
DISTRIBUTION: One species known from the USA (Alabama, Mississippi, North Carolina, Texas).



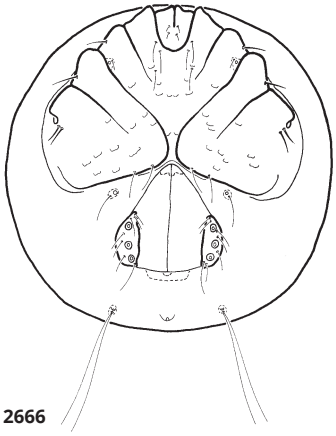
2663



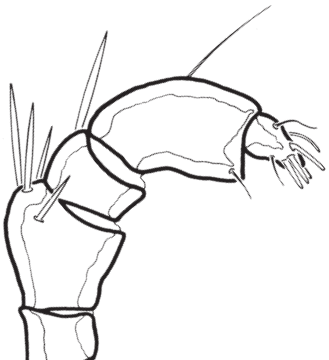
2664



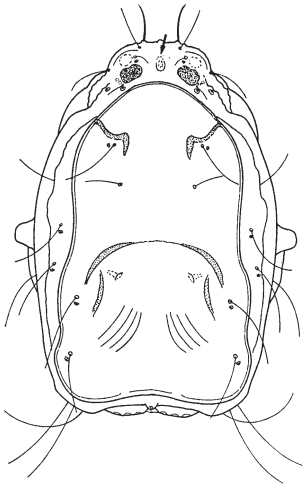
2665



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2668

2663 *Acalyptonotus* (*Acalyptonotus*) *violaceus* Walter, genital field male (after Cook 1974)

2664 *Acalyptonotus* (*Acalyptonotus*) *violaceus* Walter, palp male (after Gerecke et al. 2016)

2665 *Acalyptonotus* (*Paenecalyptonotus*) *fontinalis* (I.M. Smith), venter male (after I. M. Smith 1976c)

2666 *Acalyptonotus* (*Paenecalyptonotus*) *fontinalis* (I.M. Smith), venter female (after I. M. Smith 1976c)

2667 *Acalyptonotus* (*Paenecalyptonotus*) *fontinalis* (I.M. Smith), palp male (after I. M. Smith 1976c)

2668 *Amoenacarus dixiensis* I.M. Smith & Cook, dorsum male (after I.M. Smith & Cook 1997)

Family Arenohydracaridae Cook, 1974

1974 Arenohydracaridae Cook, Memoirs of the American Entomological Institute 21: 412.

DIAGNOSIS: Lateral eyes lying below the integument, eye pigment reduced. Idiosoma somewhat flattened. Dorsal and ventral shields present. Dorsal shield with the postocularia and three pairs of glandularia (Fig. 2671). Gnathosoma separated from the coxae. Anterior margin of Cx-I+II somewhat rounded and projecting. Coxae fused into a single group, their suture lines distinct to obliterated laterally, medial suture line absent. No glandularia present between the genital field and Cx-IV, these glandularia (Cxgl-4) shifted laterally (Fig. 89). Insertions of fourth legs not shifted far forward and lacking associated projections. No ridge on each side extending anteriorly from area of insertions of fourth legs. Male without cauda development, with two pairs of acetabula occupying most of the area of the gonopore field and six pairs of acetabula lying on poorly delineated genital plates which are fused with the ventral shield (Fig. 2672). Female with 6-11 pairs of acetabula, all fused with the ventral shield, suture lines of genital plates completely obliterated (Fig. 90). Palp five-segmented and appearing slightly uncate. Palp stocky, ventral margin of P2 with a variously developed hyaline ridge but without setae, P4 with a distoventral projection with a short, stout, pointed seta in male (Fig. 91), this seta much smaller in female (Fig. 2673). Legs stocky, without sexual dimorphism and lacking swimming setae. Excretory pore lying immediately posterior to genital field. Monotypic.

Genus *Arenohydracarus* Cook, 1974

(Figs. 89-91, 2671-2673)

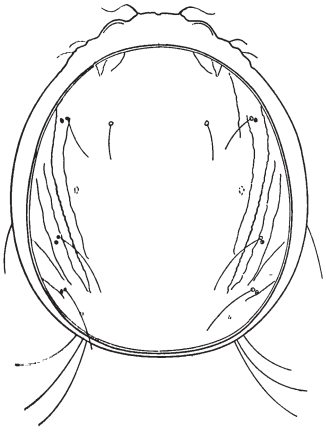
1974 *Arenohydracarus* Cook, Memoirs of the American Entomological Institute 21: 413.

Type species: *Arenohydracarus minimus* Cook, 1974

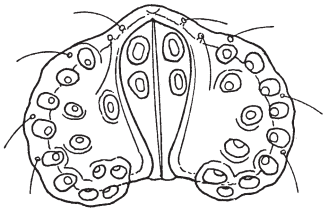
DIAGNOSIS: As for family.

HABITAT: Interstitial.

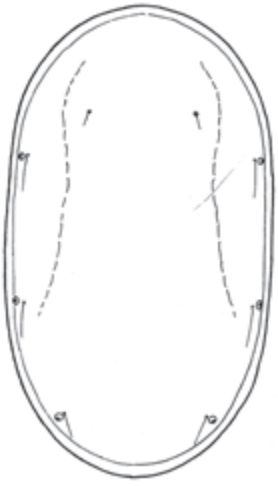
DISTRIBUTION: Three species known, one from Mexico (Cook 1974), one from the USA (New Mexico, Cook 1974) and one from Cuba (Orghidan & Gruia 1983c).



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2669 *Amoenacarus dixiensis* I.M. Smith & Cook, dorsum female (after I.M. Smith & Cook 1997)

2670 *Amoenacarus dixiensis* I.M. Smith & Cook, genital field male (after I.M. Smith & Cook 1997)

2671 *Arenohydracarus minimus* Cook, dorsum male (after Cook 1974)

Family Arrenuridae Thor, 1900

1900 Arrenuridae Thor, Nyt Magazin for Naturvidenskaberne 38: 4.

DIAGNOSIS: Lateral eyes beneath the integument. Idiosoma heavily sclerotized, perforated by large, round pores. Dorsal and ventral shields generally present, separated by a dorsal furrow, which may be incomplete or even absent (Fig. 2676). Dorsal shield occupying most of the dorsum and bearing 1-3 pairs of glandularia, occasionally reduced to a smaller plate. Suture lines of coxae generally distinct, dividing them into three groups. A pair of glandularia (Cxgl-2) present between genital field and coxae. Cx-IV without glandularia, median margins varying from well-developed to reduced with Cx-IV touching midline only at median angles. Insertions of IV-L with associated projections. Swimming setae present or absent. Genital field with numerous acetabula on plates fused with the ventral shield; in the case of one exceptional monotypic genus, one pair of acetabula in male gonopore field. Legs may exhibit sexual dimorphism; swimming setae rarely absent. Males with or without cauda development. Palp five-segmented and typically uncate (Fig. 2675), the only exception is found in *Micruracaropsis* (Fig. 2674).

KEY TO THE GENERA AND SUBGENERA

1	Palp not uncate (Fig. 2674)	Genus *Micruracaropsis*
-	Palp uncate (Fig. 2675)	2
2	Dorsal furrow absent (Fig. 2676)	3
	Dorsal furrow present (Fig. 2677)	5
3	Male gonopore dorsal in position (Fig. 2678); gnathosoma with a large exposed pharynx (Fig. 2679)	Genus *Hamappendix*
-	Male (and female) gonopore ventral in position (Fig. 2682); gnathosoma without a large exposed pharynx(females not distinguishable)	4
4	A pair of acetabula lying in the male gonopore (Fig. 2681)	Genus *Xenthoracaphorus*
-	Male gonopore without acetabula (Fig. 2682)	Genus *Thoracophoracarus*
5(2)	Setae on palp, including antagonistic bristle, long and whip-like (Fig. 2683); gnathosoma long and without paired proximal projections (Fig. 2684)	Genus *Allarrenurus*
-	Setae on palp not whip-like (Fig. 2685); gnathosoma relatively short and with paired proximal projections (Fig. 2686)	6



2672



2673



2674

2672 *Arenohydracarus minimus* Cook, genital field male (after Cook 1974)

2673 *Arenohydracarus minimus* Cook, palp female (after Cook 1974)

2674 *Micruracaropsis phytotelmaticola* (K. Viets), palp male (after Cook 1974)

6 Two pairs of glandularia between Cx-IV and genital field; gonopore field of male slit-like, genital plates of male triangular (Fig. 2687) Genus *Srilankurus*

- Only one pair of glandularia between Cx-IV and genital field; male gonopore field oval-shaped, genital plates not triangular (Fig. 2688) 7

7 Acetabular fields projecting posterolaterally, genital plates indistinct; gnathosomal bay very shallow and not V-shaped (Fig. 2689) Genus *Wuria*

- Acetabular fields often projecting laterally, usually on distinct genital plates (Fig. 2690); if genital plates projecting posterolaterally, then gnathosomal bay V-shaped Genus *Arrenurus*

Genus *Allarrenurus* K.O. Viets, 1961

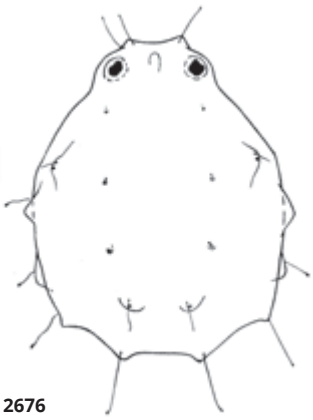
(Figs. 2683, 2684)

1961 *Allarenurus* K.O. Viets, Senckenbergiana biologica 42: 114.

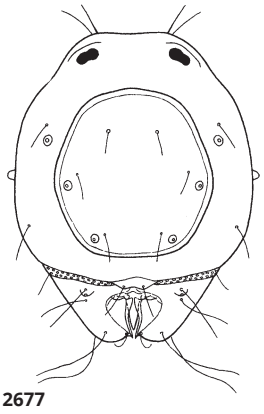
Type species: *Arrenurus pudens* Koenike, 1898



2675



2676



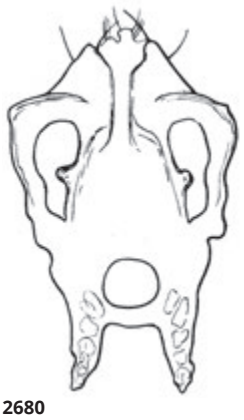
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2675 *Arrenurus* (*Megaluracarus*) *ceylonicus* Daday, palp male (after Cook 1974)

2676 *Thoracophoracarus* (*Thoracophoracarus*) *gibberosus* K.O. Viets, dorsum female (after Cook 1974)

2677 *Arrenurus* (*Micruracarus*) *madaraszi* Daday, dorsum male (after Cook 1974)

2678 *Hamappendix chappuisi* Walter & Bader, dorsum male (after Cook 1974)

2679 *Hamappendix chappuisi* Walter & Bader, dorsal view gnathosoma male (after Cook 1974)

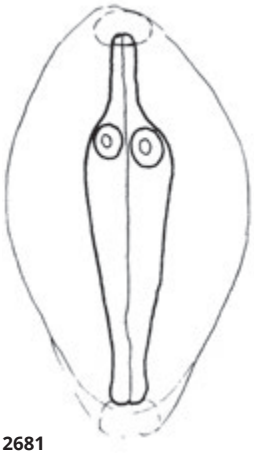
2680 *Arrenurus* (*Dadayella*) *projectus* (Lundblad), dorsal view gnathosoma female (after Cook 1974)

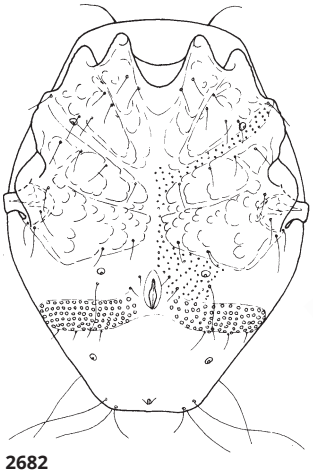
DIAGNOSIS: Dorsal furrow present; male with a well-developed petiole. Palp uncate and not rotated, setae of palp, including antagonistic bristle, elongated and whip-like (Fig. 2683). Gnathosoma long and without paired proximal projections (Fig. 2684). Chelicera relatively long.
DISTRIBUTION: Known from one species from Madagascar.

Genus *Arrenurus* Dugès, 1834

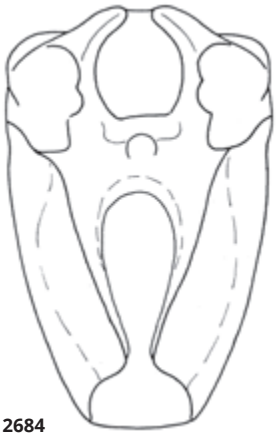
(Figs. 52, 101, 102, 105, 106, 2675, 2677, 2680, 2686, 2688, 2690-2723)

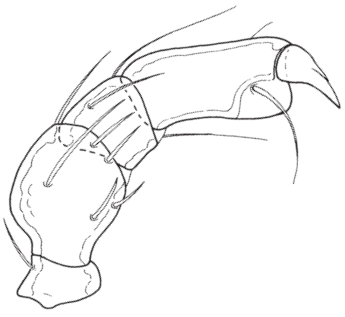
1834 *Arrenurus* Dugès, Annales des Sciences naturelles, Paris (Série. 2) 1: 17.
1880 *Anurania* Neuman, Kongliga Svenska vetenskaps-akademiens handlingar (N.F.) 17: 95.
1900 *Petiolurus* Thon, Verhandlungen der deutschen Zoologischen Gesellschaft 1900: 126.
1901 *Steganapsis* Wolcott, Transactions of the American Microscopical Society 22: 105.

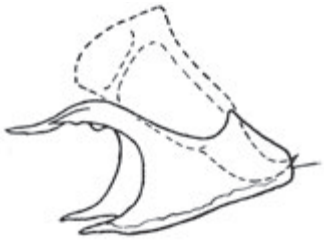

2681


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2681 *Xenthoracaphorus chilensis* (Cook), gonopore male (after Cook 1988)
2682 *Thoracophoracarus* (*Thoracophoracarus*) *simplex* Cook, venter male (after Cook 1988)
2683 *Allarrenurus pudens* (Koenike), palp male (after Cook 1974)
2684 *Allarrenurus pudens* (Koenike), dorsal view gnathosoma male (after Cook 1974)
2685 *Wuria sumatrensis* (K. Viets), palp female (after Cook 1974)
2686 *Arrenurus* (*Rhinophoracarus*) *suehnensis* (Cook), gnathosoma female (after Cook 1974)

1910 *Lacallea* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 137.

1966 *Micrarrenurus* Cassagne-Méjean, Acarologia 8: 21.

Type species: *Arrenurus viridis* Dugès, 1834

DIAGNOSIS: Dorsal furrow complete or incomplete, confined to dorsum or passing onto lateral sides. Colouration often very conspicuous, e.g. red, orange, blue or green. Coxae in three groups, separated by strips of porose sclerotization. Sexual dimorphism pronounced in shape of idiosoma and legs. Females are rounded or elliptical in shape (Fig. 2692), but males exhibiting various degrees of cauda development with or without a terminal petiole. Gonopore of male relatively small and without sclerotized patches; female gonopore field rounded, with (Fig. 2706) or without (Fig. 2692) sclerotized patches. Genital plates narrower in males compared to females. Males may have IV-leg-4 with an extension, the so-called spur, used during mating (Fig. 2707). Legs usually with swimming setae. Gnathosomal bay V-shaped or as a relatively deep U-shape. Chaetotaxy of P2 simple or with an (occasionally bristle-like) patch of setae (Fig. 2675); P4 with a thick antagonistic bristle. Chelicera stout, with a strong, hooked claw.

REMARKS: *Arrenurus* is the most species-rich genus of all water mites, with almost 1000 species described worldwide. Subgeneric classification is based on the males and was developed first for the European fauna, where the subgenera *Arrenurus*, *Megaluracarus*, *Micruracarus* and *Truncaturus* were reasonably natural groups, with the latter three subgenera tending to grade into each other. When one takes into consideration the world fauna, the subgeneric classification is completely blurred (Cook 1974). However, given the large number of species, most authors prefer to keep using this artificial subdivision.

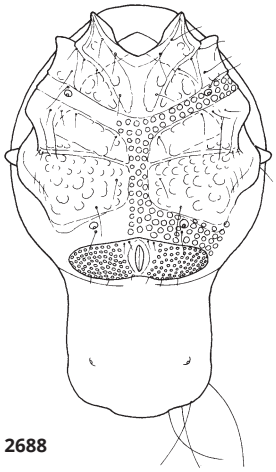
KEY TO THE SUBGENERA (FEMALES NOT ALWAYS DISTINGUISHABLE AT SUBGENERIC LEVEL)

1 Female gonopore field large, anteriorly tapering and bluntly (Fig. 2691)(Male unknown) Subgenus *Rhomborificias*

- Female gonopore rounded, oval or elliptical (Fig. 2692) 2



2687



2688



2689

2687 *Srilankurus biprojectus* Pešić, Zawal, Smit & Bańkowska, venter male (after Pešić et al. 2018d) Reproduced with permission from copyright holder

2688 *Arrenurus* (*Megaluracarus*) *cheetus* Cook, venter male (after Cook 1986)

2689 *Wuria falciseta* K. Viets, venter male (after Cook 1974)

2 Medial margin of Cx-IV reduced to angles; a pair of glandularia immediately posterior to genital plates (Fig. 2693); palp rotated (Fig. 2694) Subgenus *Dadayella*

- Without above mentioned combination of characters (from here on males only); palp may be rotated 3

3 Idiosoma divided in three parts with complete suture lines; posterior idiosoma part with a large median cleft; no petiole present but instead with a protrusable, hyaline tube-like structure (Fig. 2695) Subgenus *Dividuracarus*

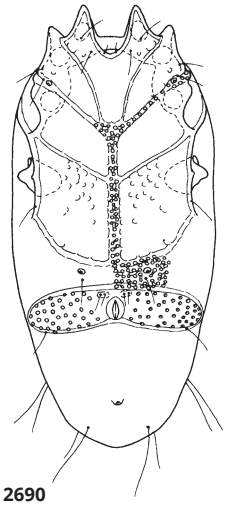
- Without above mentioned combination of characters 4

4 Dorsal shield small, with one pair of glandularia only (Fig. 2696) 5

- Dorsal small or large, with more than one pair of glandularia (Fig. 2697) 6

5 Petiole absent (Fig. 2696) Subgenus *Arrhenuropsides*

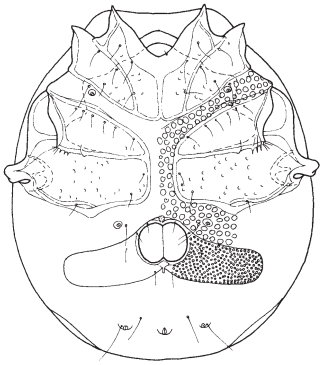
- Petiole present (Fig. 2698) Subgenus *Arrhenuropsis*



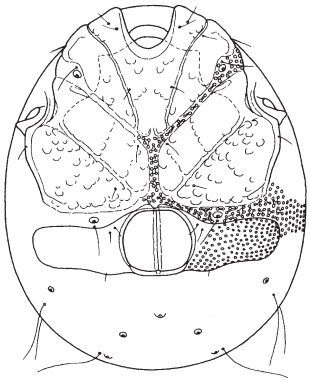
2690



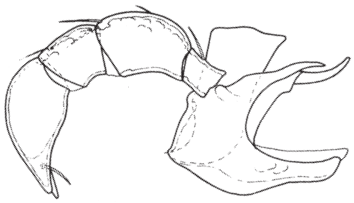
2691



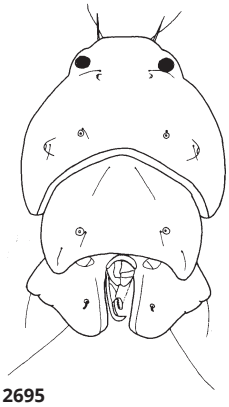
2692



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2690 *Arrenurus* (*Truncaturus*) *plevamus* Cook, venter male (after Cook 1980)

2691 *Arrenurus* (*Rhomborificias*) *lincangensis* Jin & Li, venter female (after Jin & Li 1993)

2692 *Arrenurus* (*Arrenurus*) *fissipetiolatus* Lundblad, venter female (after Cook 1986)

2693 *Arrenurus* (*Dadayella*) *zempoala* Cook, venter female (after Cook 1980)

2694 *Arrenurus* (*Dadayella*) *zempoala* Cook, gnathosoma + palp female (after Cook 1980)

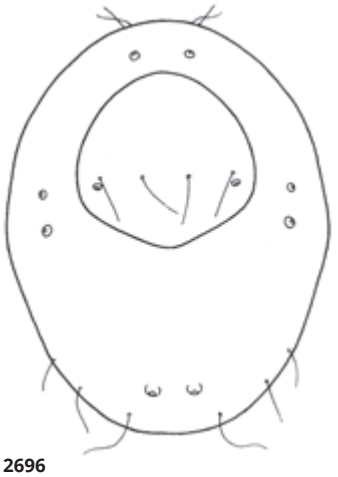
2695 *Arrenurus* (*Dividuracarus*) *tripartitus* Smit, dorsum male (after Smit 1997a)

6 Males with a well-developed petiole, tip of petiole with a hyaline extension and extending well beyond posterior end of idiosoma; pygal lobes poorly developed (Fig. 2699)
Subgenus *Rhinophoracarus*

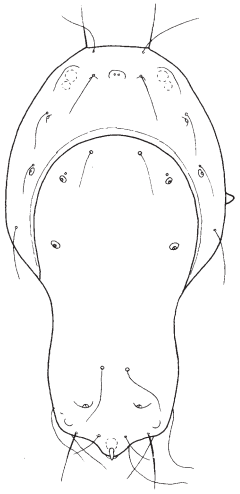
- Petiole of male present or absent; if a well-developed petiole is present with a hyaline extension, then pygal lobes are well developed 7

7 Males with a petiole, pygal lobes usually present (Figs. 2700); if pygal lobes are reduced, then petiole is large and extends well beyond posterior end of idiosoma (Figs. 2701)
Subgenus *Arrenurus*

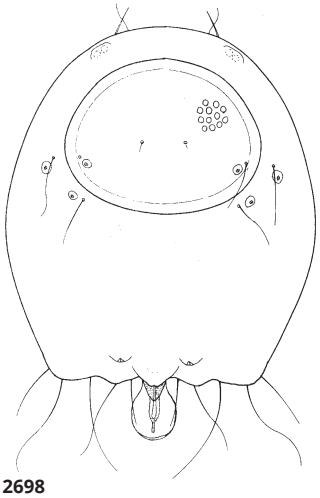
- Male usually lacking a petiole; if a petiole is present, without the combination of characters mentioned above 8



2696



2697



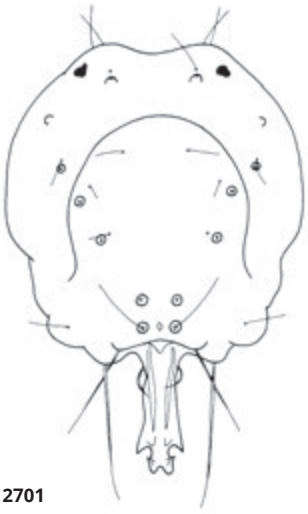
2698



2699



2700



2701

2696 *Arrenurus* (*Arrhenuropsides*) *parviscutatus* (K. Viets), dorsum male (after Cook 1974)

2697 *Arrenurus* (*Megaluracarus*) *margatellus* Cook, dorsum male (after Cook 1986)

2698 *Arrenurus* (*Arrhenuropsis*) *mexicanus* Cramer & Cook, dorsum male (after Cramer & Cook 1992b)

2699 *Arrenurus* (*Rhinophoracarus*) *truncatus* (Walter), dorsum male (after Cook 1974)

2700 *Arrenurus* (*Arrenurus*) *ornatus* George, dorsum male (after Gerecke et al. 2016)

2701 *Arrenurus* (*Arrenurus*) *berolinensis* Protz, dorsum male (after Gerecke et al. 2016)

8 Dgl-1, often also other glandularia, on large humps; cauda short and wide, usually with a median cleft (Fig. 2702) Subgenus *Brevicaudaturus*

- Dgl-1 not on large humps, cauda various 9

9 Cauda weakly developed; dorsal furrow confined to dorsum, often incomplete, rarely passing onto lateral sides; posterior idiosoma margin usually entire, occasionally with a notch (Fig. 2703) Subgenus *Truncaturus*

- Cauda development various, usually distinctly set off from anterior idiosoma 10

10 Posterior margin of cauda with a well-developed cleft; cauda relatively short (Fig. 2704) Subgenus *Micruracarus*

- Posterior margin of cauda either without a cleft or, if a cleft is present, cauda relatively long (Fig. 2705) Subgenus *Megaluracarus*

Subgenus *Arrenurus* s.s.

(Figs. 52, 106, 2692, 2700, 2701, 2706, 2707)

DIAGNOSIS: Males typically with a well-developed petiole and pygal lobes (Figs. 106, 2700); posterior margin of cauda without a distinct cleft. If pygal lobes reduced, then petiole is large and extends well beyond posterior end of idiosoma (Fig. 2701). Petiole may have dorsally a central piece, called ligulate process (Fig. 2700).

HABITAT: Temporary and permanent standing waters (lakes, pools, ponds, ditches, marshes), slow flowing streams, springs.

DISTRIBUTION: Numerous species known worldwide.

Subgenus *Arrhenuropsides* K. Viets, 1954

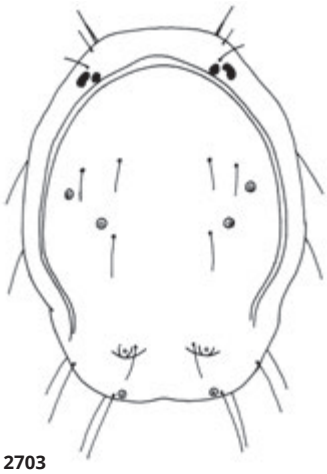
(Figs. 2696, 2708, 2709)

1954 *Arrhenuropsides* K. Viets, Schweizerische Zeitschrift für Hydrologie 16: 176.

Type species: *Arrhenuropsides parviscutatus* K. Viets, 1954



2702



2703



2704

2702 *Arrenurus* (*Brevicaudaturus*) *lohmanni* Piersig, dorsum male (after Cook & Bright 1983)

2703 *Arrenurus* (*Truncaturus*) *fontinalis* K. Viets, dorsum male (after Gerecke et al. 2016)

2704 *Arrenurus* (*Micruracarus*) *forpicatus* Neuman, dorsum male (after Gerecke et al. 2016)

DIAGNOSIS: (Male only) Cauda of male indistinctly set off from anterior part of idiosoma; dorsal furrow complete, dorsal shield very small, with only one pair of glandularia and the postocularia (Fig. 2696). Petiole and posteromedial cleft absent. Medial margins of Cx-IV indistinct; genital plates extending posterolaterally from gonopore (Fig. 2708).

HABITAT: Lakes, ditches.

DISTRIBUTION: Known from two species, one species from Brazil and Argentina (Rosso de Ferradás 2006) and one species from Argentina (Rosso de Ferradas 1978).

Subgenus *Arrhenuropsis* K. Viets, 1954

(Figs. 2698, 2710-2713)

1954 *Arrhenuropsis* K. Viets, Schweizerische Zeitschrift für Hydrologie 16: 172.

Type species: *Arrhenuropsis curvipalpis* K. Viets, 1954

DIAGNOSIS: Male with a small, complete dorsal shield, covering less than half the surface of dorsum, with the preocularia and one pair of glandularia. A petiole present (Fig. 2698). Cauda and pygal lobes absent in male. Female dorsal shield large, covering nearly entire surface of dorsum. No glandularia posterior to genital field. Palp rotated (Fig. 2712). IV-leg-5 of male expanded and projecting beyond the insertion of IV-leg-6 (Fig. 2713)



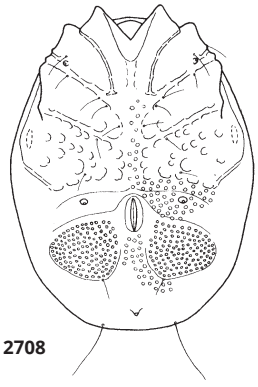
2705



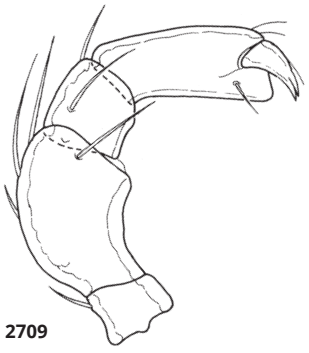
2706



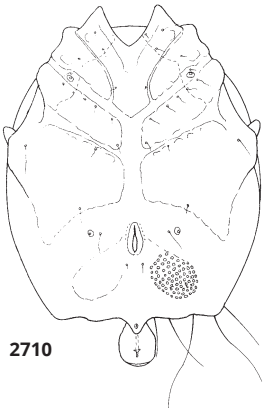
2707



2708



2709



2710

2705 *Arrenurus* (*Megaluracarus*) *poonaensis* Cook, dorsum male (after Cook 1974)

2706 *Arrenurus* (*Arrenurus*) *virens* Neuman, venter female (after Gerecke et al. 2016)

2707 *Arrenurus* (*Arrenurus*) *rodriguensis* Lundblad, IV-leg-4-5 male (after Gerecke et al. 2016)

2708 *Arrenurus* (*Arrhenuropsides*) *parviscutatus* (K. Viets), venter male (after Cook 1974)

2709 *Arrenurus* (*Arrhenuropsides*) *parviscutatus* (K. Viets), palp male (after Cook 1974)

2710 *Arrenurus* (*Arrhenuropsis*) *mexicanus* Cramer & Cook, venter male (after Cramer & Cook 1992b)

HABITAT: Lakes.

DISTRIBUTION: Known from two species from Brazil and possibly one species from Mexico (Cramer & Cook 1992b).

REMARKS: The type species is known in the female sex only, and its systematic position is therefore uncertain. A third species, including a male, is reported from Mexico (Cramer & Cook 1992b), but its assignment to the present subgenus is preliminary given the uncertain taxonomic position. For the time being, this species (*Arrenurus mexicanus* Cramer & Cook) is here considered as belonging to *Arrhenuropsis*.

Subgenus *Brevicaudaturus* Smit, 1997

(Figs. 2702, 2714, 2715)

1997 *Brevicaudaturus* Smit, Records of the Western Australian Museum 18: 252.

Type species: *Arrenurus lohmanni* Piersig, 1898

DIAGNOSIS: Dorsal furrow complete or posteriorly passing onto lateral sides and ending here. Cauda short and wide, posterior margin usually with a median cleft. Dgl-1 on very large humps, other glandularia may be lying on large humps too (Fig. 2702). Relatively large in size, especially females, which measure often more than 2000 µm.

HABITAT: Standing waters (lakes, pools, ponds).

DISTRIBUTION: Numerous species known from tropical and subtropical areas worldwide.

REMARKS: In the past, members of the subgenus were assigned to the subgenus *Megaluracarus*. However, males lack the long cauda typical for the latter subgenus.

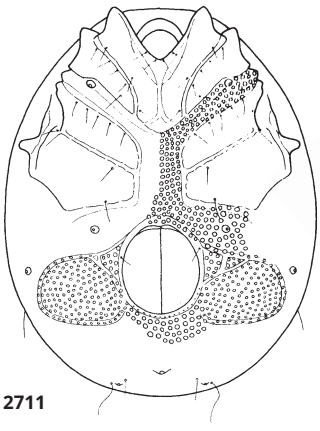
Subgenus *Dadayella* Koenike, 1907

(Figs. 2680, 2693, 2694, 2716)

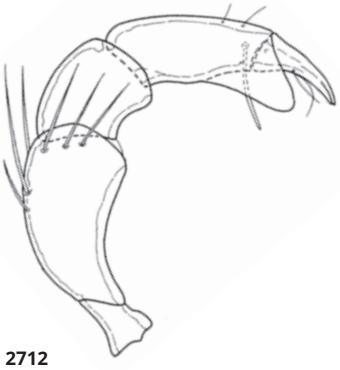
1907 *Dadayella* Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 19: 128 – Cramer & Cook (1992a).

1905 *Arrhenurella* Daday, Mathematikai és Természettudományi Értesitö 23: 337.

Type species: *Arrhenurella minima* Daday, 1903



2711



2712



2713

2711 *Arrenurus* (*Arrhenuropsis*) *curvipalpis* (K. Viets), venter female (after Cook 1974)

2712 *Arrenurus* (*Arrhenuropsis*) *curvipalpis* (K. Viets), palp female (after Cook 1974)

2713 *Arrenurus* (*Arrhenuropsis*) *mexicanus* Cramer & Cook, IV-leg-5-6 male (after Cramer & Cook 1992b)

DIAGNOSIS: Dorsal furrow confined to dorsum, complete in female but incomplete in male; males with little if any cauda development, petiole always absent; medial margin of Cx-IV reduced to angles; females, occasionally also males, with a pair of glandularia immediately posterior to genital field (Figs. 2693, 2716). Palp with P4 tending to be rotated relative to P3, often by nearly 90 degrees (Fig. 2694).

HABITAT: Standing waters (ponds), streams, springs.

DISTRIBUTION: A dozen species known from South America (Colombia; Surinam; Paraguay, K.O. Viets & Böttger 1986) and Central America (Mexico, Cramer & Cook 1992a).

Subgenus *Dividuracarus* Smit, 1997

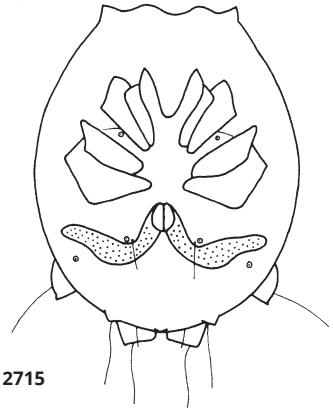
(Figs. 2695, 2717-2720)

1997 *Dividuracarus* Smit, Records of the Western Australian Museum 18: 255.

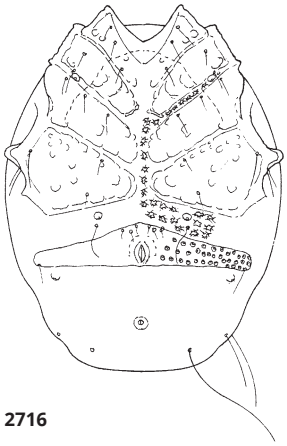
Type species: *Arrenurus tripartitus* Smit, 1997



2714



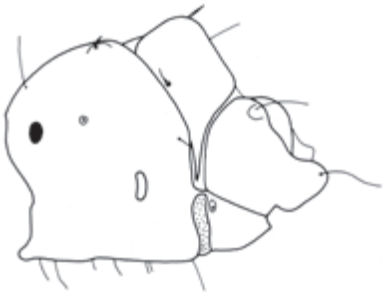
2715



2716



2717



2718



2719

2714 *Arrenurus* (*Brevicaudaturus*) *laticodulus* Piersig, dorsum male (after Cook 1974)

2715 *Arrenurus* (*Brevicaudaturus*) *lohmanni* Piersig, venter female (after Smit 1997a)

2716 *Arrenurus* (*Dadayella*) *adrianae* Cramer & Cook, venter male (after Cramer & Cook 1992a)

2717 *Arrenurus* (*Dividuracarus*) *tripartitus* Smit, venter male (after Smit 1997a)

2718 *Arrenurus* (*Dividuracarus*) *tripartitus* Smit, lateral view male (after Smit 1997a)

2719 *Arrenurus* (*Dividuracarus*) *tripartitus* Smit, venter female (after Smit 1997a)

DIAGNOSIS: Idiosoma of male divided in three parts with complete suture lines (Fig. 2695); anterior idiosoma part dorsally with three pairs of glandularia and ventrally with the coxae and the genital field, central part extending in lateral view nearly till lateral end of genital plates (Fig. 2718) and with one pair of glandularia and the postocularia, posterior idiosoma part with a large median cleft; a petiole absent but instead with a protrusable, tube-like hyaline structure. Female genital plates short, in one species gonopore field with lateral extension (Fig. 2720).

HABITAT: Standing waters (pools).

DISTRIBUTION: Three species known from northern Australia (Smit 1997a, 2002d, 2010b).

Subgenus *Megaluracarus* K. Viets, 1911

(Figs. 101, 102, 105, 2675, 2688, 2697, 2705)

1900 *Megalurus* Thon, Verhandlungen der Deutschen Zoologischen Gesellschaft, 1900: 126 (praeocc.).

1911 *Megaluracarus* K. Viets, Zoologischer Anzeiger 38: 504.

Type species: *Hydrachna globator* Müller, 1776

DIAGNOSIS: Males with a cauda typically set off from anterior body part (Fig. 2697). Dorsal furrow complete or passing over onto lateral sides of idiosoma and ending here. Petiole absent or rudimentary, peg-like; pygal lobes absent.

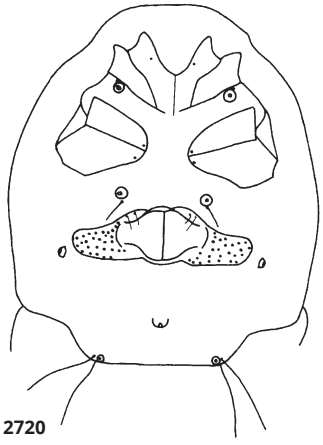
HABITAT: Standing waters (lakes, pools, ponds, ditches), streams, springs.

DISTRIBUTION: Numerous species known worldwide.

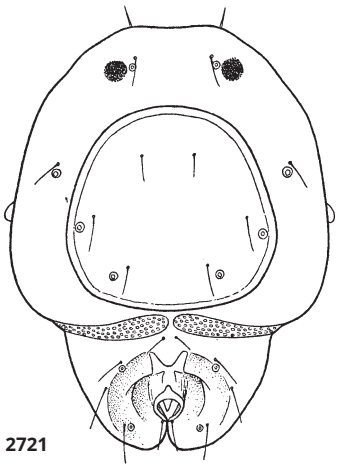
Subgenus *Micruracarus* K. Viets, 1911

(Figs. 2677, 2704, 2721)

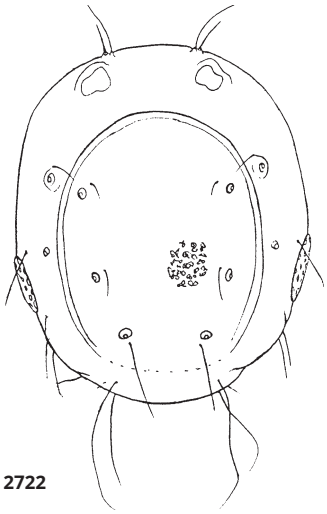
1900 *Micrurus* Thon, Verhandlungen der deutschen Zoologischen Gesellschaft 1900: 126 (praeocc.).



2720



2721



2722

2720 *Arrenurus* (*Dividuracarus*) *gereckei* Smit, venter female (after Smit 2002d)

2721 *Arrenurus* (*Micruracarus*) *voeltzkowi* Koenike, dorsum male (after Lundblad 1946)

2722 *Arrenurus* (*Rhomborificias*) *lincangensis* Jin & Li, dorsum female (after Jin & Li 1993)

1911 *Micruracarus* K. Viets, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 504.

1952 *Uchidacarus* Imamura, Journal of the Faculty of Science, Hokkaido University, (serie 6), Zoology 11: 164.

Type species: *Arrenurus forpicatus* Neuman, 1880

DIAGNOSIS: Cauda of male shorter than anterior part of idiosoma; pygal lopes absent. Posterior margin of cauda often with a median cleft (Figs. 2677, 2704). Petiole absent or present, when present varying from rudimentary to well-developed; a large group of species with a hyaline, tube-like petiole (Fig. 2721). Dorsal furrow complete or incomplete, and either confined to dorsum or passing onto lateral sides of idiosoma. According to Cook (1974) a paraphyletic subgenus.

HABITAT: Standing waters (lakes, pools, ponds, ditches), springs.

DISTRIBUTION: Numerous species known worldwide.

Subgenus *Rhinophoracarus* K. Viets, 1916

(Figs. 2686, 2699)

1916 *Rhinophoracarus* K. Viets, Archiv für Hydrobiologie 11: 361.

Type species: *Rhinophoracarus praeacutus* K. Viets, 1916

DIAGNOSIS: Males with a well-developed petiole having a hyaline posterior extension. Pygal lobes not well developed, posterior part of cauda somewhat truncate (Fig. 2699). Cauda short and posterior margin without median cleft. Palp somewhat rotated, gnathosoma with a short rostrum (Fig. 2686).

HABITAT: Standing waters (lakes, ponds, pools).

DISTRIBUTION: Several species known from the Afrotropical and Oriental regions.

Subgenus *Rhomborificias* Jin & Li, 1993

(Figs. 2691, 2722, 2723)

1993 *Rhomborificias* Jin & Li, Journal of Guizhou Agricultural College, Supplement 12: 65 - nov. stat.

Type species: *Rhomborificias lincangensis* Jin & Li, 1993

DIAGNOSIS: Dorsal furrow incomplete (Fig. 2722). Genital plates wing-like. Gonopore large, tapering anteriorly (Fig. 2691). Palp rotated (Fig. 2723).

HABITAT: Standing waters (ponds).

DISTRIBUTION: One species known from Yunnan, China.

REMARKS: The genus *Rhomborificias* is based on the female only, while males in arrenurid genera have the typical (sub)generic characters. Most characters of *Rhomborificias* are found in other arrenurid genera as well, only the shape of the genital field is unusual. Until males are found, the best option is to lower the status to that of a subgenus.

Subgenus *Truncaturus* Thor, 1901

(Figs. 2690, 2703)

1901 *Truncaturus* Thor, Nyt Magazin for Naturvidenskaberne 38: 379.

1959 *Corsicohydracarus* Motaş, Tanasachi & Orghidan, Universitatea Iaşi, Lucrările sesiunii Ştiintifice (15.-17 septembre 1956) a Staţiunii Zoologice Marine Agigea: 428.

Type species: *Arrenurus knauthei* Koenike, 1895

DIAGNOSIS: Cauda indistinctly set off from anterior idiosoma. Dorsal furrow typically incomplete, dorsal shield relatively large (Fig. 2703). Petiole typically absent, but if present, rudimentary. Pygal lobes absent, posterior margin of cauda typically without a median cleft but the latter sometimes present.

HABITAT: Temporary and permanent standing waters, springs, interstitial.

DISTRIBUTION: Numerous species known worldwide.

REMARKS: A para- or polyphyletic clade (Gerecke et al. 2016). This is the least modified subgenus, grading into *Micruracarus*.

Genus *Hamappendix* Walter & Bader, 1952

(Figs. 2678, 2679, 2724, 2725)

1952 *Hamappendix* Walter & Bader, Mémoires du Muséum national d'Histoire naturelle (nouvelle série), Série A, Zoologie 4: 214.

Type species: *Hamappendix chappuisi* Walter & Bader, 1952

DIAGNOSIS: Dorsal furrow absent (Fig. 2678). Gonopore located dorsally. Gnathosoma with a large bulbous pharynx extending posterior to the paired posterior projections (Fig. 2679). Palp uncate (Fig. 2725).

HABITAT: Probably streams, but not exactly known.

DISTRIBUTION: Known from one species, collected at 4000 m altitude on Mt. Elgon on the border of Kenya and Uganda.

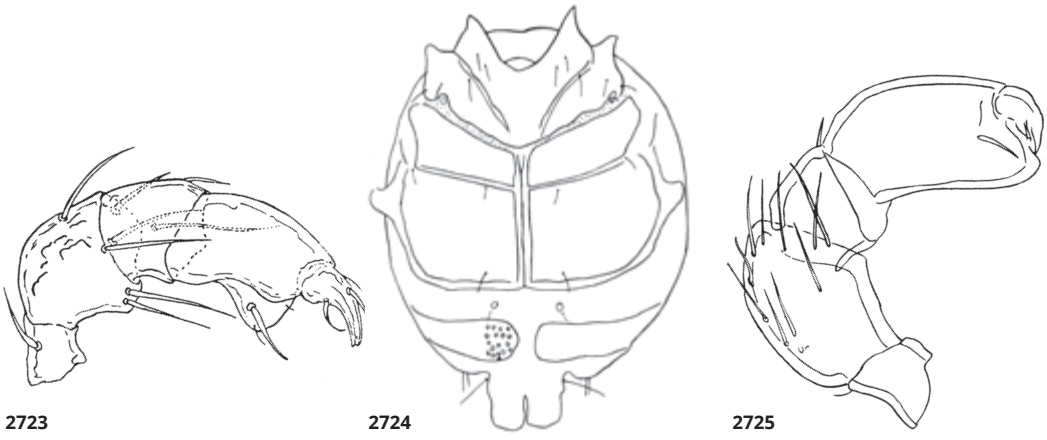
REMARKS: Cook (1974) questioned the position of the gonopore, as it is originally illustrated as not lying between the genital plates. Unfortunately, the type is lost and new material is needed to solve this problem.

Genus *Micruracaropsis* K. Viets, 1939

(Fig. 107, 2674, 2726-2728)

1939 *Micruracaropsis* K. Viets, Zoologischer Anzeiger 128: 72.

Type species: *Micruracaropsis phytotelmaticola* K. Viets, 1939



2723 *Arrenurus* (*Rhomborificias*) *lincangensis* Jin & Li, palp female (after Jin & Li 1993)

2724 *Hamappendix chappuisi* Walter & Bader, venter male (after Cook 1974)

2725 *Hamappendix chappuisi* Walter & Bader, palp male (after Cook 1974)

DIAGNOSIS: Male with short, simple cauda, without petiole (Fig. 2726). Dorsal furrow complete, passing laterally and joining ventrally posterior to genital plates. Dorsum of female with a large plate covering nearly complete surface. Palp not uncate, antagonistic bristle short and peg-like (Figs. 107, 2674). Other characters (coxae, genital field) as in *Arrenurus*.

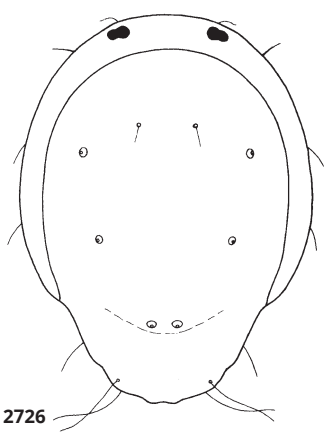
HABITAT: Phytotelmata.

DISTRIBUTION: Known from one species found in an epiphytic bromeliad in Surinam.

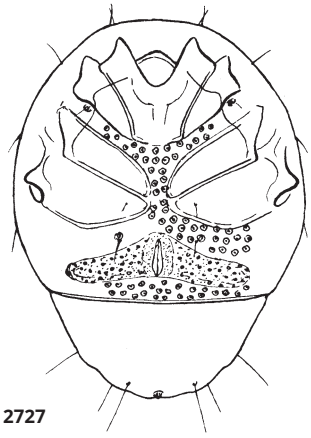
Genus *Srilankurus* Pešić, Zawal, Smit & Bańkowska, 2018

(Figs. 2687, 2729-2731)

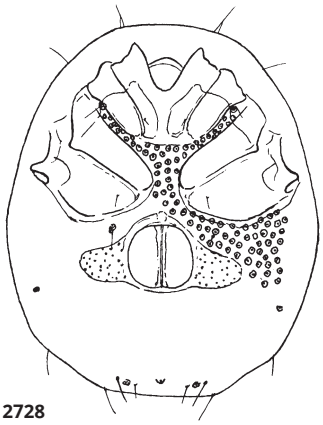
2018 *Srilankurus* Pešić, Zawal, Smit & Bańkowska, Systematic & Applied Acarology 23: 192.
Type species: *Srilankurus biprojectus* Smit, Zawal & Pešić, 2018



2726



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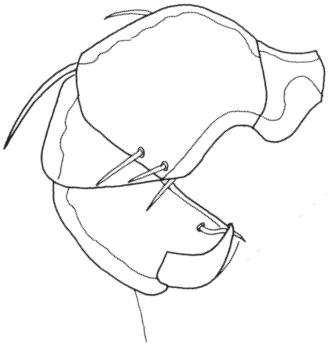


2728



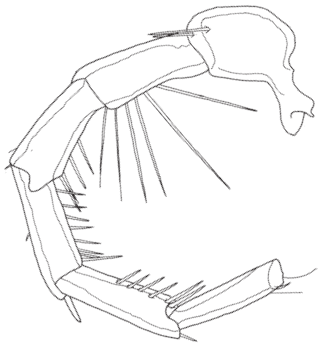
2729

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2730

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2731

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2726 *Micruracaropsis phytotelmaticola* (K. Viets), dorsum male (after Cook 1974)

2727 *Micruracaropsis phytotelmaticola* (K. Viets), venter male (after K. Viets 1939)

2728 *Micruracaropsis phytotelmaticola* (K. Viets), venter female (after K. Viets 1939)

2729 *Srilankurus biprojectus* Pešić, Zawal, Smit & Bańkowska, dorsum male (after Pešić et al. 2018d) Reproduced with permission from copyright holder

2730 *Srilankurus biprojectus* Pešić, Zawal, Smit & Bańkowska, palp male (after Pešić et al. 2018d) Reproduced with permission from copyright holder

2731 *Srilankurus biprojectus* Pešić, Zawal, Smit & Bańkowska, fourth leg male (Swimming setae not illustrated) (after Pešić et al. 2018d) Reproduced with permission from copyright holder

DIAGNOSIS: (Male only) Dorsum with an incomplete dorsal shield bearing the postocularia and three pairs of glandularia. Idiosoma posteriorly with a large concavity. Petiole a hyaline structure made up of two parts. Suture lines Cx-I/Cx-II absent or indistinct, suture lines Cx-III/Cx-IV distinct. Gonopore slit-like, genital plates triangular. Two pairs of glandularia present between Cx-IV and genital field (Fig. 2687). Legs with swimming setae.

HABITAT: Slow flowing streams.

DISTRIBUTION: One species known from Sri Lanka.

Genus *Thoracophoracarus* K. Viets, 1914

(Figs. 2676, 2682, 2732-2735)

1914 *Thoracophoracarus* K. Viets, Archiv für Hydrobiologie 9: 354.

Type species: *Thoracophoracarus arrhenuroides* K. Viets, 1914

DIAGNOSIS: Dorsal furrow absent (Fig. 2676). Posterior idiosoma margin with (Fig. 2734) or without a cleft, idiosoma with (Fig. 2735) or without a cauda. Gnathosoma without an obvious pharynx extending beyond the paired proximal projections. Gonopore of both male and female ventral in position (Figs. 2682). Palp uncate.

KEY TO THE SUBGENERA (FEMALES NOT DISTINGUISHABLE AT SUBGENERIC LEVEL)

1	Males with a petiole (Fig. 2732)	Subgenus *Thoracophorurus*
-	Males without a petiole (Fig. 2733)	Subgenus *Thoracophoracarus* s.s

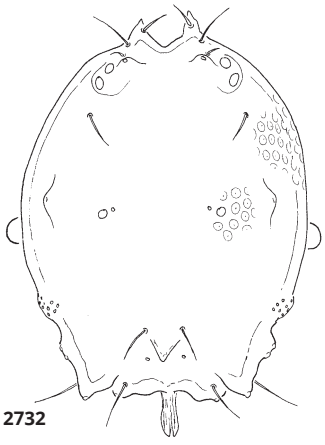
Subgenus *Thoracophoracarus* s.s.

(Figs. 2676, 2682, 2733-2735) hier alleen 2734, 2735

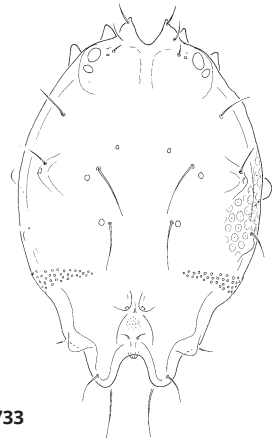
DIAGNOSIS: Males lacking a distinct petiole (Fig. 2733).

HABITAT: Permanent and temporary streams.

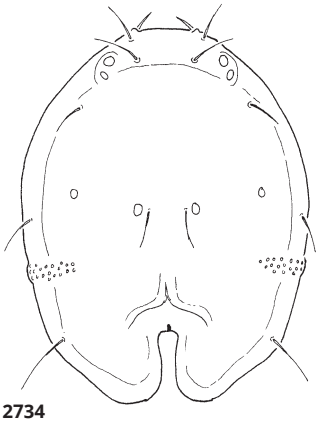
DISTRIBUTION: Eight species known from Cameroon, Kenya, South Africa (K.O. Viets 1962b), Liberia (Cook 1966), Madagascar, Chile (Cook 1988) and South Korea (Gerecke 2009b, Smit & Pešić 2014a).



2732



2733



2734

2732 *Thoracophoracarus* (*Thoracophorurus*) *petioluriger* K. Viets, dorsum male (after Gerecke 2009b)

2733 *Thoracophoracarus* (*Thoracophoracarus*) *whartoni* Cook, dorsum male (after Gerecke 2009b)

2734 *Thoracophoracarus* (*Thoracophoracarus*) *kuehnei* K. Viets, dorsum male (after Gerecke 2009b)

Subgenus *Thoracophorurus* K. Viets, 1942

(Fig. 2732)

1942 *Thoracophorurus* K. Viets, Zoologischer Anzeiger 138: 212.

Type species: *Thoracophorurus petioluriger* K. Viets, 1925

DIAGNOSIS: Males with a well-developed petiole and short, pygal lobe-like structures (Fig. 2732).

HABITAT: Streams.

DISTRIBUTION: Known from one species from Cameroon.

Genus *Wuria* K. Viets, 1916

(Figs. 2685, 2689, 2736-2738)

1916 *Wuria* K. Viets, Archiv für Hydrobiologie 11: 365.

1935 *Wuriella* K. Viets, Archiv für Hydrobiologie, Supplement 13: 731 – Cook (1974).

Type species: *Wuria falciseta* K. Viets, 1916

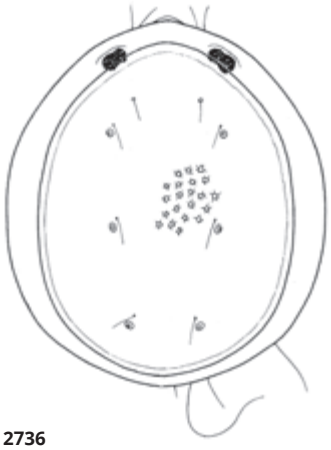
DIAGNOSIS: Dorsal furrow confined to dorsum, complete in female (Fig. 2736), incomplete in male (Fig. 2737). Male without a cauda, the two anterior pairs of glandularia of the dorsal shield close to each other and away from the posterior pair, in females the three pairs equidistant. Genital plates extending posterolaterally from gonopore (Figs. 2689, 2738). Palp uncate, setae short and thickened; slightly rotated (Fig. 2685). A moderate sexual dimorphism of the legs present in a species from Madagascar, with IV-leg-6 more slender in the female, and with differences in the setation of the fourth legs between male and female.

HABITAT: Standing waters (lakes, pools), streams.

DISTRIBUTION: Known from the Afrotropical region (West Africa; Madagascar, Gerecke 2004c), the Oriental region (Sumatra; India, Pešić et al. 2010d) and Australasian region (Australia, Harvey 1989b; New Caledonia, Smit 2002a).



2735



2736



2737

2735 *Thoracophoracarus* (*Thoracophoracarus*) *gibberosus* K.O. Viets, dorsum male (after Cook 1974)

2736 *Wuria falciseta* K. Viets, dorsum female (after Cook 1974)

2737 *Wuria falciseta* K. Viets, dorsum male (after Cook 1974)

Genus *Xenthoracaphorus* (Cook, 1988)

(Figs. 103, 104, 2681, 2739-2741)

1988 *Xenthoracaphorus* Cook, Memoirs of the American Entomological Institute 42: 187 – nov. stat.

Type species: *Thoracophoracarus chilensis* Cook, 1988

DIAGNOSIS: Males with short cauda, petiole absent (Fig. 2739), dorsal furrow absent (Fig. 2740). Males with a pair of acetabula lying in the gonopore field (Figs. 104, 2681). Vgl-4 lying on the genital plates in the male (Fig. 103), but separated in the female (Fig. 2741). Palp uncate.

HABITAT: Streams.

DISTRIBUTION: One species known from Chile.

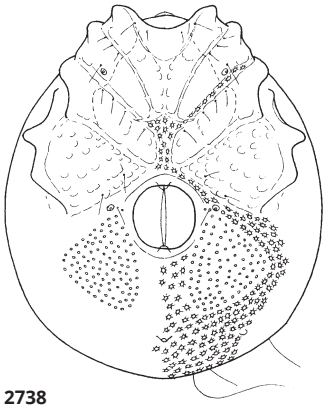
REMARKS: The acetabula lying in the gonopore field is unique within the Arrenuridae, and warrants the status as a separate genus.

Family Athienemanniidae K. Viets, 1922

1922 Athienemanniidae K. Viets, Archiv für Naturgeschichte (A9) 88: 71.

1962 Chelomideopsinae Lundblad, Arkiv för Zoologi (Serie 2) 14: 220.

DIAGNOSIS: Lateral eyes lying beneath the integument. Idiosoma may or may not be somewhat flattened dorsoventrally. Dorsal and ventral shields present. Gnathosoma separated from the coxae, with a spatulate distal end; the more lateral of the two pairs of setae at the distal end very long. Chelicera separated medially. Coxae fused with the ventral shield. Medial margin of Cx-IV not reduced to a median angle. A pair of glandularia typically present between genital field and Cx-IV. Projections associated with insertions of fourth legs small or absent. Genital field with numerous acetabula, in of male in 1-5 rows on each side and confined to gonopore field, or both in the gonopore field and on genital plates, or on genital plates only and not in rows. Acetabula of female in 1-5 rows and these located on genital plates, or lying in the gonopore and not in rows on distinct genital plates, or irregularly scattered on indistinct genital plates. Genital plates either free or fused with the ventral shield. Palp five-segmented, uncate and rotated. P2 without ventral or medioventral setae. Legs with or without swimming setae, with or without sexual dimorphism.



2738



2739



2740

2738 *Wuria falciseta* K. Viets, venter female (after Cook 1974)

2739 *Xenthoracaphorus chilensis* (Cook), dorsum male (after Cook 1988)

2740 *Xenthoracaphorus chilensis* (Cook), lateral view male (after Cook 1988)

KEY TO THE SUBFAMILIES

1 P3 with a pronounced ventral projection (Fig. 2742); genital field of male with 4-7 pairs of acetabula in a single row posteriorly followed by paired posterior groups of 5-7 acetabula on small platelets in the gonopore field (Fig. 2743); genital field of female with 8-10 pairs of acetabula in an irregular row on narrow genital plates at lateral margins of large gonopore field (Fig. 2744) Subfamily Stygameracarinae

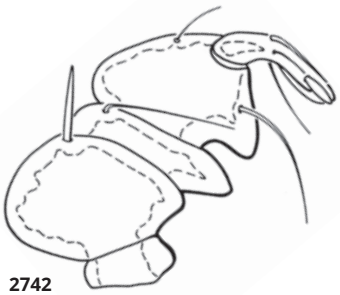
- P3 without pronounced ventral projection; genital field with numerous acetabula, either in 1-7 rows or dispersed 2

2 Without acetabula in the gonopore field of the male (Fig. 2745); dorsum with radiating lines (Fig. 2746) Subfamily Africasiinae

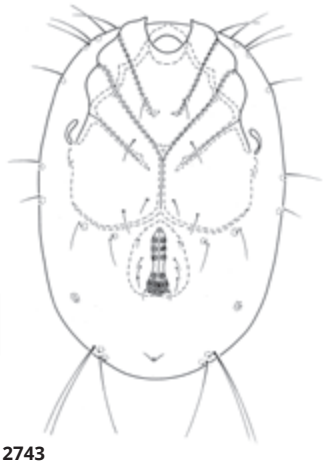
- With acetabula in the gonopore field, either only in the male or in both sexes; dorsum without radiating lines 3



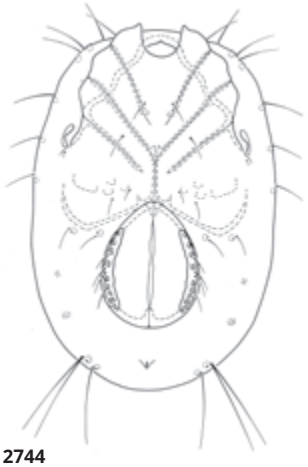
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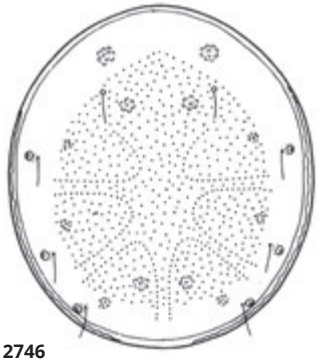
2743



2744



2745



2746

2741 *Xenthoracaphorus chilensis* (Cook), venter female (after Cook 1988)
2742 *Stygameracarus cooki* I.M. Smith, palp male (after I.M. Smith 1990a)
2743 *Stygameracarus cooki* I.M. Smith, venter male (after I.M. Smith 1990a)
2744 *Stygameracarus cooki* I.M. Smith, venter female (after I.M. Smith 1990a)
2745 *Africasia subterranea* Cook, venter male (after Cook 1974)
2746 *Africasia mahadensis* Cook, dorsum female (after Cook 1974)

3 Only acetabula of male lying in the gonopore field (Fig. 2747), acetabula of female on genital plates flanking the gonopore field (Fig. 2748); sexual dimorphism of legs moderate or absent Subfamily Athienemanniinae

- Acetabula of both male (Fig. 2749) and female (Fig. 2750) lying in the gonopore field, acetabula of male also on genital plates; male third and/or fourth leg modified in various ways Subfamily Notomundamellinae

Subfamily Africasiinae Cook, 1974

1974 Africasiinae Cook, Memoirs of the American Entomological Institute 21: 417 – Cook (2001).

DIAGNOSIS: Lateral eyes lying beneath the integument, occasionally without pigment. Idiosoma without sexual dimorphism, except for genital area. Idiosoma somewhat flattened. Dorsal and ventral shields present, dorsal furrow complete. Dorsal shield with several radiating lines and bearing the postocularia and three pairs of glandularia (Fig. 2746). Gnathosoma broad anteriorly when viewed dorsally but appearing somewhat pointed in lateral view; gnathosoma with a pair of long hair-like setae (Fig. 2751). Coxae more or less in a single group. A distinct ridge on each side extending anteriorly and posteriorly from the region of insertions of the fourth legs (Fig. 2752). Genital plates with three to numerous acetabula, distinctly longer than wide (Fig. 2745). Suture lines of genital plates usually indistinct, occasionally distinct. Palp rotated about 90°. Antagonistic bristle of P5 hair-like (Fig. 2753). Legs without sexual dimorphism, swimming setae absent or present. Monotypic.

Genus *Africasia* K. Viets, 1931

(Figs. 2745, 2746, 2751-2753)

1931 *Africasia* K. Viets, Zoologischer Anzeiger 93: 45.

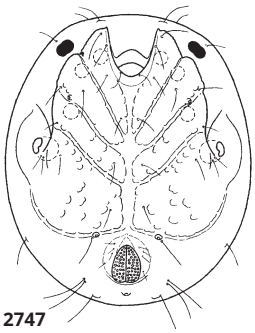
1959 *Tortipalpus* K. Viets, Mitteilungen aus dem Zoologischen Museum in Berlin 35: 52.

Type species: *Mundamella arrhenuripalpis* K. Viets, 1913

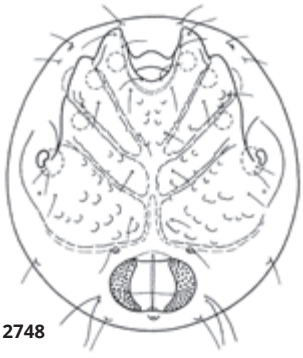
DIAGNOSIS: As for subfamily.

HABITAT: Surface and interstitial waters, streams.

DISTRIBUTION: More than a dozen species known from the Afrotropical (South Africa, K. Viets 1959b, Cook 2001; Liberia, Cook 1966; Comoros, Smit et al. 2010) and Oriental regions (India, Cook 1967; Java, Indonesia, Lundblad 1971; Vietnam, Pešić & Gerecke 2014; Borneo, Malaysia, Smit & Pešić 2014b; Laos, Pešić & Smit 2016).



2747



2748



2749

2747 *Chelomideopsis besselingi* (Cook), venter male (after Cook 1974)

2748 *Chelomideopsis besselingi* (Cook), venter female (after Cook 1974)

2749 *Notomundamella harveyi* Cook, venter male (after Cook 1986)

Subfamily Athienemanniinae K. Viets, 1922

1922 Athienemanniinae K. Viets, Archiv für Naturgeschichte (A9) 88: 71.

1932 Mundamellinae K. Viets, Archiv für Hydrobiologie 23: 679 – Cook (1974).

1943 Stygohydracarinae Szalay, Zoologischer Anzeiger 142: 47 – Cook (1974).

DIAGNOSIS: Dorsal shield unsculptured. Gnathosoma broadened anteriorly and bearing a pair of long setae. Palp rotated, antagonistic bristle of P4 hair-like.

KEY TO THE GENERA

1 Genital field with three pairs of acetabula (Fig. 2754), leg segments laterally compressed (Fig. 2755) Genus *Anamundamella*

- Genital field with numerous acetabula, leg segments not compressed 2

(From here on females not always distinguishable)

2 Males with tufts of setae-like projections posterior to the gonopore (Fig. 2756) 3

- Males without tufts of setae-like projections posterior to the gonopore (Fig. 2757) 4

3 Male gonopore field strongly tapering posteriorly; well-developed posterior suture lines of Cx-IV (Fig. 2756) Genus *Mundamella*



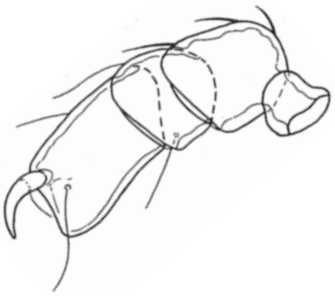
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2750 *Notomundamella harveyi* Cook, venter female (after Cook 1986)

2751 *Africasia subterranea* Cook, gnathosoma + palp female (after Cook 1974)

2752 *Africasia subterranea* Cook, venter female (after Cook 1974)

2753 *Africasia rucira* Cook, palp female (after Cook 1974)

2754 *Anamundamella zelandica* Cook, venter male (after Cook 1992)

2755 *Anamundamella zelandica* Cook, fourth leg male (after Cook 1992)

- Male gonopore field not strongly tapering posteriorly, Cx-IV without well-developed posterior suture lines (Fig. 2758) Genus *Penemundamella*

4 Male genital field with a deep oval cavity anterior to the gonopore over which extends a series of blade-like setae and with a single row of acetabula on each side of gonopore (Fig. 2757); gonopore field of female with up to three rows of acetabula on each side (Fig. 2759) Genus *Bleptomundamella*

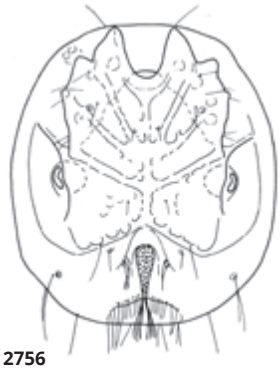
- Male genital field without a deep cavity with blade-like setae; gonopore field of female with one to several rows of acetabula 5

5 Male genital field with acetabula lying in the gonopore field and on flanking genital plates (Fig. 2760); female genital plates not fused with ventral shield (Fig. 2761) Genus *Platyhydracarus*

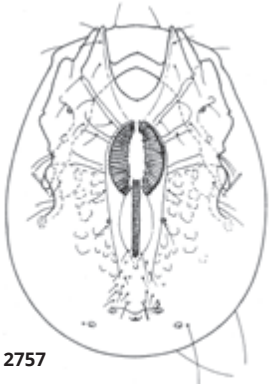
- Acetabula of male genital field only in the gonopore field; genital plates of female may or may not be fused with the ventral shield 6

6 Male gonopore field either decidedly narrowed or widened posteriorly (Fig. 2762), acetabula of female lying on plates which are fused with the ventral shield (Fig. 2763) Genus *Stygohydracarus*

- Male gonopore field oval and not noticeably narrowed posteriorly; acetabula of female (if known) lying on plates which are separated from the ventral shield 7



2756



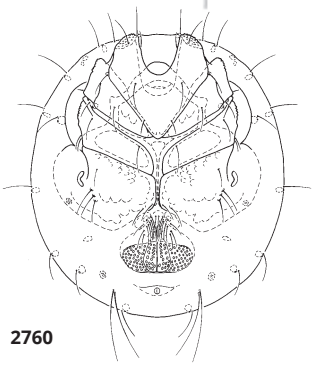
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2756 *Mundamella germanica* K. Viets, venter male (after Cook 1974)

2757 *Bleptomundamella wenona* Cook, venter male (after Cook 2001)

2758 *Penemundamella renona* Cook, venter male (after Cook 2001)

2759 *Bleptomundamella wenona* Cook, venter female (after Cook 2001)

2760 *Platyhydracarus juliani* I.M. Smith, venter male (after I.M. Smith 1989c)

2761 *Platyhydracarus juliani* I.M. Smith, venter female (after I.M. Smith 1989c)

7 Genital field with 10 or less pairs of acetabula, in two rows in male (Fig. 2764), in one row in female (Fig. 2765) Genus *Phreatohydracarus*

- Genital field with more than 10 pairs of acetabula 8

9 Male gonopore field with 12 pairs of acetabula, arranged anteriorly in one row, posteriorly in two irregular rows (Figs. 2766-2767) Genus *Chelohydracarus*

- Male gonopore field with 30-50 pairs of acetabula in 3-5 irregular rows (Fig. 2768) Genus *Chelomideopsis*

Genus *Anamundamella* Cook, 1992

(Figs. 2754, 2755, 2769-2773)

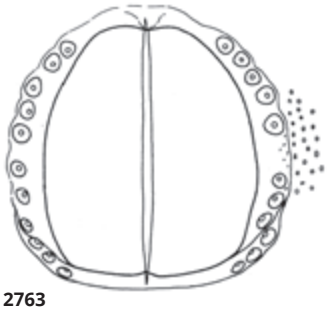
1992 *Anamundamella* Cook, Stygologia 7: 59.

Type species: *Anamundamella zelandica* Cook, 1992

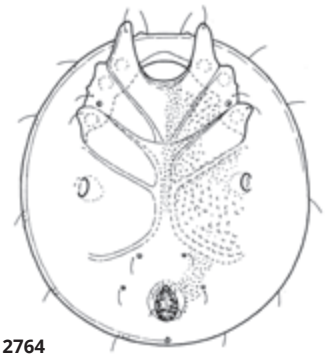
DIAGNOSIS: Lateral eye pigment reduced. Dorsal shield with the postocularia and three pairs of glandularia (Fig. 2769). Gnathosoma in lateral view narrowed distally (Fig. 2771), broadened in ventral view (Fig. 2760). Distal end of gnathosoma with a pair of long setae. Genital field with three pairs of acetabula (Figs. 2754, 2772). Palp uncate and rotated (Fig. 2773). Legs without sexual dimorphism. Leg segments greatly expanded dorsally and laterally compressed (Fig. 2755).



2762



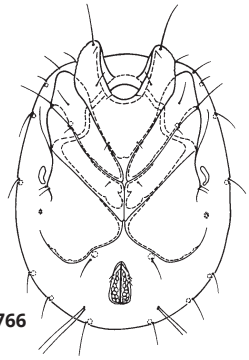
2763



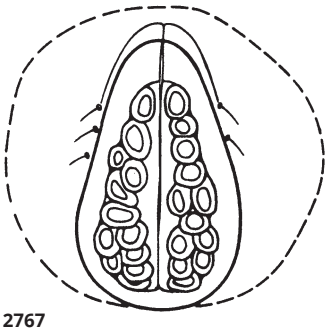
2764



2765



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2767

2762 *Stygohydracarus* (*Stygohydracarus*) *troglobius* K. Viets, venter male (after Cook 1974)

2763 *Stygohydracarus* (*Stygohydracarus*) *troglobius* K. Viets, genital field female (after Cook 1974)

2764 *Phreatohydracarus mosticus* Tanasachi & Orghidan, venter male (after Cook 1974)

2765 *Phreatohydracarus mosticus* Tanasachi & Orghidan, genital field female (after Cook 1974)

2766 *Chelohydracarus navarrensis* I.M. Smith, venter male (after I.M. Smith 1998)

2767 *Chelohydracarus navarrensis* I.M. Smith, genital field male (after I.M. Smith 1998)

HABITAT: Interstitial.

DISTRIBUTION: One species known from South Island, New Zealand.

Genus *Bleptomundamella* Cook, 2001

(Figs. 2757, 2759, 2774-2777)

2001 *Bleptomundamella* Cook, Acarologia 42: 242.

Type species: *Bleptomundamella wenona* Cook, 2001

DIAGNOSIS: Anterior tip of Cx-I extending slightly beyond frontal idiosoma margin. Posterior suture lines of Cx-IV indistinct, no ridges extending anterolaterally from insertion of fourth legs, but short ridges extending posteriorly from these openings (Fig. 2757). Genital field with numerous acetabula. Gonopore of male with a single row of acetabula on each side. A deep oval cavity present anterior to the genital field over which extend a series of blade-like setae (Fig. 2774). A median concavity present posterior to the gonopore which is flanked by a number of setae-like projections. The tufts of these projections reduced to one or two filaments on each side. Female gonopore flanked by genital plates which are fused with the ventral shield and bearing up to three rows of acetabula on each side (Fig. 2759). Palp of the male much stockier than palp of female (Fig. 2775). III-leg-6 of male expanded anteroventrally, with large claws (Fig. 2776). Segments of male fourth leg more expanded than third leg, especially IV-leg-6 (Fig. 2777). Third and fourth legs with several long swimming setae.

HABITAT: Streams.

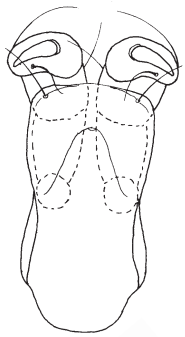
DISTRIBUTION: One species known from South Africa.



2768



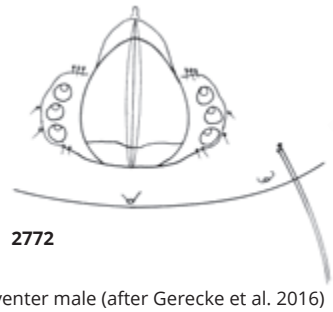
2769



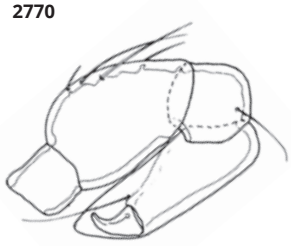
2770



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2768 *Chelomideopsis annemiae* Romijn, venter male (after Gerecke et al. 2016)

2769 *Anamundamella zelandica* Cook, dorsum male (after Cook 1992)

2770 *Anamundamella zelandica* Cook, ventral view gnathosoma + palps male (after Cook 1992)

2771 *Anamundamella zelandica* Cook, lateral view gnathosoma + palp male (after Cook 1992)

2772 *Anamundamella zelandica* Cook, genital field female (after Cook 1992)

2773 *Anamundamella zelandica* Cook, palp male (after Cook 1992)

Genus *Chelohydracarus* I.M. Smith, 1998

(Figs. 2766, 2767, 2778)

1998 *Chelohydracarus* I.M. Smith, International Journal of Acarology 24: 327.
Type species: *Chelohydracarus navarrensis* I.M. Smith, 1998

DIAGNOSIS: (Male only) Lateral eyes reduced. Cx-I fused medially without a suture line. Cx-II separated medially, extending beyond frontal idiosoma margin. Cx-III and Cx-IV medially closely adpressed but with distinct suture lines. Medial margin of Cx-IV reduced to angles (Fig. 2766). Gonopore field oval in shape, bearing 12 pairs of acetabula arranged anteriorly in a single row on each side, posteriorly in two irregular rows (Fig. 2767). Palp rotated (Fig. 2778).

HABITAT: Interstitial.

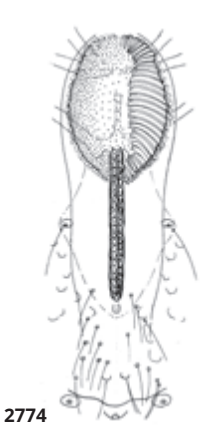
DISTRIBUTION: One species known from California, USA.

Genus *Chelomideopsis* Romijn, 1920

(Figs. 2747, 2748, 2768, 2779)

1920 *Chelomideopsis* Romijn, Jaarboek 1919 Natuurhistorisch Genootschap in Limburg: 85[1].

1920 *Athienemannia* K. Viets, Archiv für Hydrobiologie 12: 813.
Type species: *Chelomideopsis annemiae* Romijn, 1920



2774



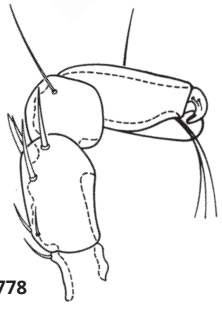
2775



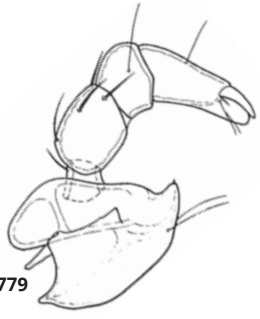
2776



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2774 *Bleptomundamella wenona* Cook, genital field male (after Cook 2001)
2775 *Bleptomundamella wenona* Cook, palp female (after Cook 2001)
2776 *Bleptomundamella wenona* Cook, III-leg-4-6 male (after Cook 2001)
2777 *Bleptomundamella wenona* Cook, IV-leg-4-6 male (after Cook 2001)
2778 *Chelohydracarus navarrensis* I.M. Smith, palp male (after I.M. Smith 1998)
2779 *Chelomideopsis besselingi* (Cook), gnathosoma + palp female (after Cook 1974)

DIAGNOSIS: Idiosoma nearly circular to elliptical in outline and moderately flattened. Coxae fused with ventral shield. Cx-I fused medially without a suture line. Cx-II, Cx-III and Cx-IV separated medially but lying closely adpressed; suture lines of these coxae distinct. Medial margin of Cx-IV either distinct or reduced to angles. Male gonopore field with 30-50 pairs of acetabula in 3-5 irregular rows (Figs. 2747, 2768). Female genital field with 30-50 pairs of acetabula on genital plates in several irregular rows, genital plates not fused with ventral shield (Fig. 2748). Legs not modified or III-leg-4 and III-leg-6 of male slightly thickened and bowed.

HABITAT: Springs, streams.

DISTRIBUTION: One species known from Europe and six species from North America (I.M. Smith 1992a).

[1]. *Chelomideopsis* was published on page 85 and not page 5 as erroneously cited by K. Viets (1956b).

Genus *Mundamella* Viets, 1913

(Figs. 71, 2756, 2780-2782)

1913 *Mundamella* Viets, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 21: 401.

Type species: *Mundamella germanica* K. Viets, 1913

DIAGNOSIS: Male: Genital field with numerous acetabula lying in the gonopore field, the latter tapering posteriorly, anteriorly with up to three rows of acetabula, posteriorly with one row (Fig. 2756). Posterior to gonopore a concavity with a row of small setae along its border, and in the centre 3-4 pairs of long, thickened whip-like setae extending over the posterior idiosoma margin (Fig. 2780). Females: Genital field with several rows of acetabula on genital plates which are fused with the ventral shield (Fig. 2781).

HABITAT: Lowland streams, lakes, springs.

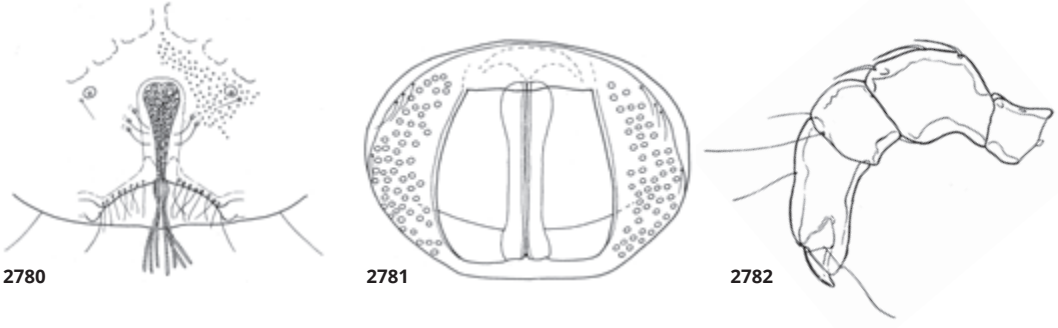
DISTRIBUTION: One species known from Europe.

Genus *Penemundamella* Cook, 2001

(Figs. 2758, 2783-2785)

2001 *Penemundamella* Cook, Acarologia 42: 237.

Type species: *Penemundamella renona* Cook, 2001



2780 *Mundamella germanica* K. Viets, genital field male (after Cook 1974)

2781 *Mundamella germanica* K. Viets, genital field female (after Cook 1974)

2782 *Mundamella germanica* K. Viets, palp male (after Cook 1974)

DIAGNOSIS: Posterior suture lines of Cx-IV indistinct, no ridges extending posteriorly from insertion of fourth legs. Male gonopore with a single row of acetabula on each side; a shallow medial concavity extending anteriorly of the gonopore, flanked by a row of small setae on each side. Males with tufts of seta-like integumental extensions near posterior end of ventral shield (Figs. 2758, 2783). Female gonopore field relatively large, flanked by distinct genital plates which are fused with the ventral shield, with numerous acetabula, mostly in two rows (Fig. 2784). Palp and legs without sexual dimorphism. Legs with a few swimming setae on the third and fourth legs.

HABITAT: Streams.

DISTRIBUTION: Three species known from South Africa (Cook 2001).

Genus *Phreatohydracarus* Tanasachi & Orghidan, 1955

(Figs. 2764, 2765, 2776)

1955 *Phreatohydracarus* Tanasachi & Orghidan, Buletin Ştiinţif, Secţiunea Ştiinţe Biologice, Agronomice, Geologice şi Geografice 7: 372.

Type species: *Phreatohydracarus mosticus* Tanasachi & Orghidan, 1955

DIAGNOSIS: No pronounced ridges on each side extending anterolaterally from insertion of fourth legs. Male gonopore field with nine pairs of acetabula in two rows, oval and not decidedly narrowed posteriorly, no concavity or spine-like seta posterior to the gonopore (Fig. 2764). Female genital field with nine pairs of acetabula on narrow genital plates, in a single row on each side (Fig. 2765); genital plates not fused with ventral shield.

HABITAT: Interstitial.

DISTRIBUTION: One species known from Europe.

Genus *Platyhydracarus* I.M. Smith, 1989

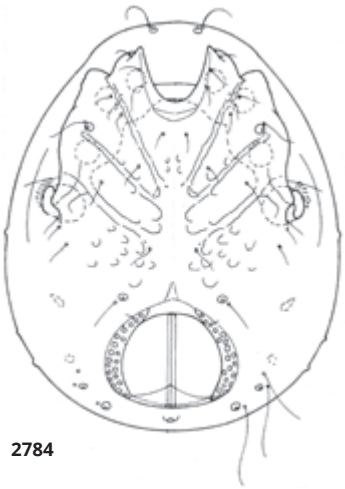
(Figs. 2760, 2761, 2787, 2788)

1989 *Platyhydracarus* I.M. Smith, The Canadian Entomologist 121: 709.

Type species: *Platyhydracarus juliani* I.M. Smith, 1989



2783



2784



2785

2783 *Penemundamella renona* Cook, genital field male (after Cook 2001)

2784 *Penemundamella renona* Cook, venter female (after Cook 2001)

2785 *Penemundamella renona* Cook, gnathosoma + palp female (after Cook 2001)

DIAGNOSIS: Lateral eyes reduced. Cx-I fused medially, without a suture line. Cx-II and Cx-III separated medially. Cx-IV with distinct medial margins, posterior margins obliterated. Anterior to male genital field 8-12 pairs of thickened setae. Gonopore of male bearing 10-20 pairs of acetabula in 2-3 irregular rows, in addition 15-60 pairs of acetabula in several irregular rows on genital plates not fused with ventral shield (Figs. 2760, 2787). Genital field of female with numerous acetabula in several irregular rows on genital plates, not fused with ventral shield (Fig. 2761).

HABITAT: Interstitial, streams, springs.

DISTRIBUTION: Two species known from western North America (I.M. Smith 1989c).

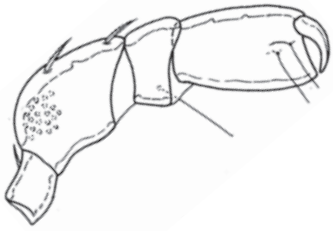
Genus *Stygohydracarus* K. Viets, 1932

(Figs. 2762, 2763, 2789-2791)

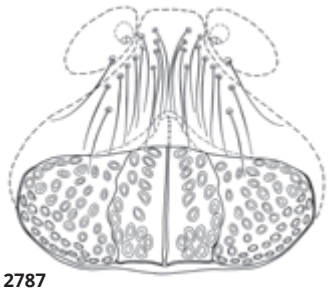
1932 *Stygohydracarus* K. Viets, Archiv für Hydrobiologie,23: 677.

Type species: *Stygohydracarus troglobius* K. Viets, 1932

DIAGNOSIS: Medial coxal suture lines may or may not be obliterated. Male gonopore field either narrowed (Fig. 2762) or widened (Fig. 2789) posteriorly, acetabula in 1-2 rows on each side in the gonopore. Female genital field with 1-2 rows of acetabula on each side, on genital plates which are fused with the ventral shield (Fig. 2763).



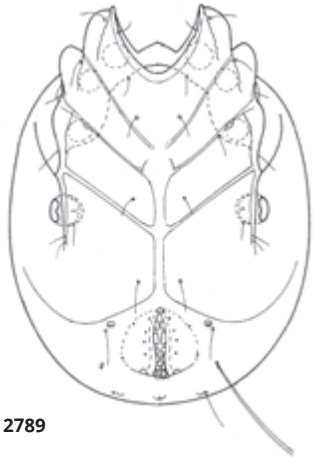
2786



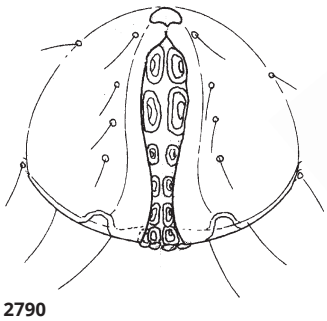
2787



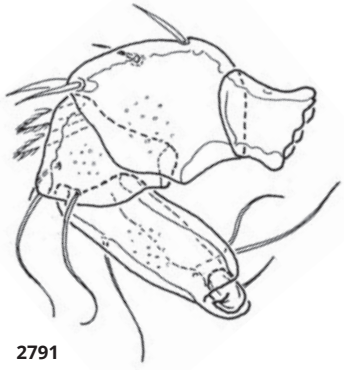
2788



2789



2790



2791

2786 *Phreatohydracarus mosticus* Tanasachi & Orghidan, palp female (after Cook 1974)

2787 *Platyhydracarus juliani* I.M. Smith, genital field male (after I.M. Smith 1989c)

2788 *Platyhydracarus juliani* I.M. Smith, palp male (after I.M. Smith 1989c)

2789 *Stygohydracarus* (*Vicinihydracarus*) *amalus* Cook, venter male (after Cook 2001)

2790 *Stygohydracarus* (*Vicinihydracarus*) *amalus* Cook, genital field male (after Cook 2001)

2791 *Stygohydracarus* (*Stygohydracarus*) *subterraneus* Walter, palp male (after Gerecke et al. 2016)

KEY TO THE SUBGENERA (FEMALES NOT DISTINGUISHABLE AT SUBGENUS LEVEL)

1 Male gonopore field narrowed posteriorly, no setae flanking the gonopore field (Fig. 2762) Subgenus *Stygohydracarus* s.s.

- Male gonopore field widened posteriorly, four pairs of small setae flanking the gonopore (Figs. 2789, 2790) Subgenus *Vicinihydracarus*

Subgenus *Stygohydracarus* s.s.

(Figs. 2762, 2763, 2791)

DIAGNOSIS: Male genital field without flanking setae, narrowed posteriorly.

HABITAT: Interstitial, springs.

DISTRIBUTION: Three species known from Europe.

Subgenus *Vicinihydracarus* Cook, 2001

(Figs. 2789, 2790)

2001 *Vicinihydracarus* Cook, Acarologia 42: 236.

Type species: *Stygohydracarus amalus* Cook, 2001

DIAGNOSIS: (Male only) Male genital field with four pairs of setae flanking the gonopore field; gonopore field widened and open posteriorly (Figs. 2789, 2790).

HABITAT: Streams.

DISTRIBUTION: One species known from South Africa.

Subfamily Notomundamellinae Cook, 1986

1986 Notomundamellinae Cook, Memoirs of the American Entomological Institute 40: 303.

DIAGNOSIS: Acetabula of the male located either both in the gonopore field and on genital plates or only in the gonopore field. Acetabula of the female lying either in the gonopore field and not on genital plates or in the gonopore field and on the ventral shield. Male third and fourth legs exhibiting a pronounced sexual dimorphism.

KEY TO THE GENERA

1 Acetabula of both sexes lying only in the gonopore field (Figs. 2792, 2793) Genus *Davecookia*

- Acetabula of male lying both in the gonopore field and on genital plates 2

2 Genital field with numerous (> 10) acetabula on the genital plates (Figs. 2749, 2750) Genus *Notomundamella*

- Genital field with less than 10 pairs of acetabula on plates or on the ventral shield 3

3 Acetabula not lying on genital plates but on the ventral shield flanking the gonopore field, nine pairs in the male (Fig. 2794) and 5-7 in the female (Fig. 2795) Genus *Mellamunda*

- Acetabula lying on genital plates flanking the gonopore field (Fig. 2796) Genus *Janszoonia*

Genus *Davecookia* Harvey, 2003

(Figs. 2792, 2793, 2797-2799)

2003 *Davecookia* Harvey, Tribute to David R. Cook: 151.

Type species: *Davecookia peramica* Harvey, 2003

DIAGNOSIS: Lateral eyes absent. Idiosoma not extremely flattened. Dorsal shield entire. Coxae fused with ventral shield. Cx-I fused medially without a suture line. Cx-II separated medially, Cx-II and Cx-IV adpressed medially (Fig. 2797). Openings of fourth legs without associated projections. Genital field with five pairs of small acetabula, situated in a single row in the gonopore field; no acetabula on genital plates (Figs. 2792, 2793). Palp rotated (Fig. 2798). Male III-leg-4 with a large anteroventral extension with a large seta (Fig. 2799).

HABITAT: Interstitial.

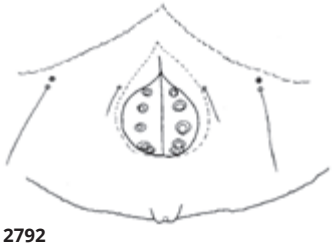
DISTRIBUTION: One species known from eastern Australia.

Genus *Janszoonia* Smit, 2007

(Figs. 2796, 2800, 2801)

2007 *Janszoonia* Smit, Records of the Australian Museum 59: 112.

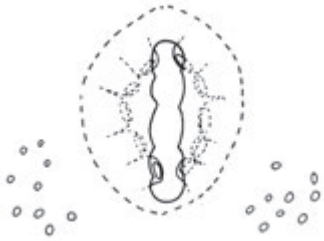
Type species: *Janszoonia difficilis* Smit, 2007



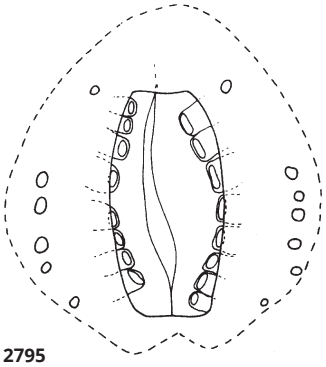
2792



2793



2794



2795



2796



2797

2792 *Davecookia peramica* Harvey, genital field male (after Harvey 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

2793 *Davecookia peramica* Harvey, genital field female (after Harvey 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

2794 *Mellamunda acares* Harvey, genital field male (after Harvey 1988a)

2795 *Mellamunda acares* Harvey, genital field female (after Harvey 1988a)

2796 *Janszoonia difficilis* Smit, venter female (after Smit 2007a)

2797 *Davecookia peramica* Harvey, venter male (after Harvey 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

DIAGNOSIS: (Female only) Lateral eyes absent (Fig. 2800). Eight pairs of acetabula on three small platelets lying in the gonopore field and four pairs on genital plates (Fig. 2796). Palp rotated (Fig. 2801).

HABITAT: Interstitial.

DISTRIBUTION: One species known from eastern Australia.

Genus *Mellamunda* Harvey, 1988

(Figs. 2794, 2795, 2802-2805)

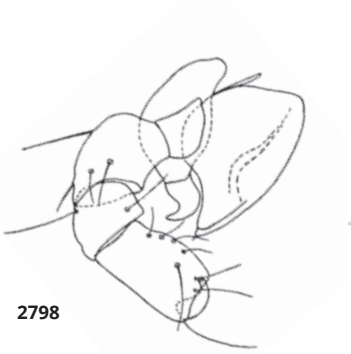
1988 *Mellamunda* Harvey, Memoirs of the Museum of Victoria 49: 359.

Type species: *Mellamunda acares* Harvey, 1988

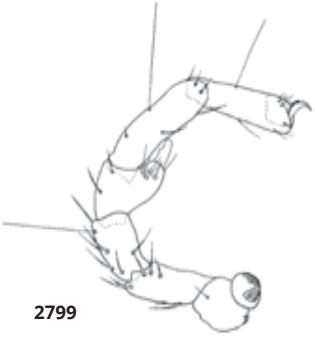
DIAGNOSIS: Palp rotated, P4 greatly expanded. Fourth leg not modified. Males: Gonopore field with 5-6 pairs of acetabula, inner margin crenulate. Ventral shield with 3-9 pairs of acetabula (Figs. 2794, 2802). III-leg-4 with a large lobed anteroventral extension (Fig. 2805). Females: Gonopore field with eight pairs of acetabula. Ventral shield with 5-7 pairs of acetabula (Figs. 2795, 2803).

HABITAT: Possibly interstitial.

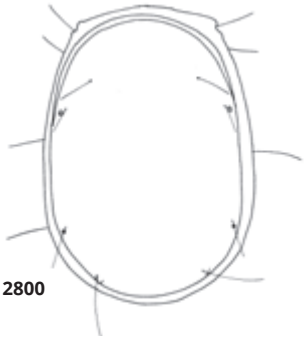
DISTRIBUTION: Two species known from Victoria and Tasmania, Australia (Harvey 1988a, Smit 2013a).



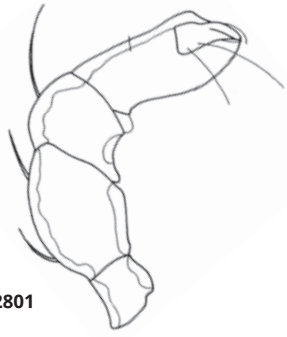
2798



2799



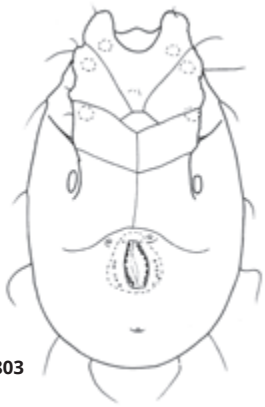
2800



2801



2802



2803

2798 *Davecookia peramica* Harvey, gnathosoma + palp male (after Harvey 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

2799 *Davecookia peramica* Harvey, third leg male (after Harvey 2003) Reproduced with permission from Vikram Prasad, Indira Publishing House, West Bloomfield, MI, USA.

2800 *Janszoonia difficilis* Smit, dorsum female (after Smit 2007a)

2801 *Janszoonia difficilis* Smit, palp female (after Smit 2007a)

2802 *Mellamunda acares* Harvey, venter male (after Harvey 1988a)

2803 *Mellamunda acares* Harvey, venter female (after Harvey 1988a)

Genus *Notomundamella* Cook, 1986

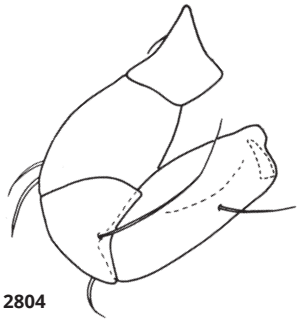
(Figs. 2749, 2750, 2806-2810)

1986 *Notomundamella* Cook, Memoirs of the American Entomological Institute 40: 303.
Type species: *Notomundamella harveyi* Cook, 1986

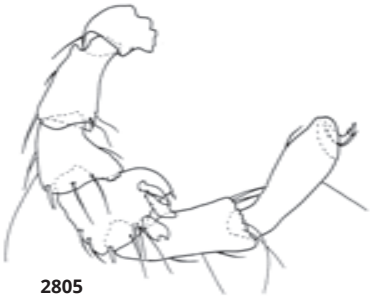
DIAGNOSIS: Dorsal shield bearing the postocularia and three pairs of glandularia. A pair of prominent apophyses somewhat medial to Dgl-1. Anterior tips of Cx-I extending beyond the frontal idiosoma margin. Genital field of male with 15-16 pairs of acetabula on each side lying along the posterior edge of the genital plates and with four pairs of acetabula lying in the gonopore field (Figs. 2749, 2806). Female genital field with numerous acetabula on lobed, thickened integument in the gonopore (Fig. 2750). Male III-leg-4 with a large distoventral extension (Fig. 2809), IV-leg-3 with a large, IV-leg-4 with a slight ventral expansion, IV-leg-5 very short with a large curved extension, IV-leg-6 swollen (Fig. 2810), legs of female not modified

HABITAT: Interstitial.

DISTRIBUTION: One species known from Australia.



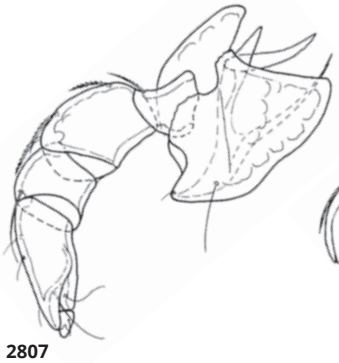
2804



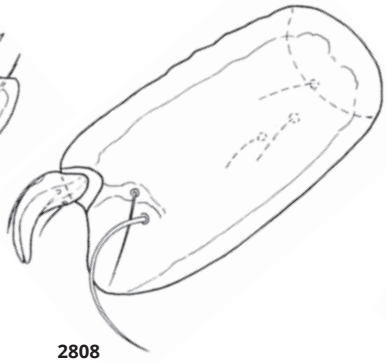
2805



2806



2807



2808



2809

2804 *Mellamunda acares* Harvey, palp male (after Harvey 1988a)

2805 *Mellamunda acares* Harvey, third leg male (after Harvey 1988a)

2806 *Notomundamella harveyi* Cook, genital field male (after Cook 1986)

2807 *Notomundamella harveyi* Cook, gnathosoma + palp female (after Cook 1986)

2808 *Notomundamella harveyi* Cook, P4-5 female (after Cook 1986)

2809 *Notomundamella harveyi* Cook, III-leg-4-6 male (after Cook 1986)

Subfamily Stygameracarinae I.M. Smith, 1990

1990 Stygameracarinae I.M. Smith, The Canadian Entomologist 122: 182.

DIAGNOSIS: Lateral eyes reduced. Idiosoma flattened dorsoventrally and longer than wide. Dorsal shield with moderately developed ridges medial to a row of glandularia. Gnathosoma tapering anteriorly to a broadly rounded tip with a pair of short setae anterodorsally and a pair of long setae anteroventrally. Coxae fused with ventral shield. Cx-I and Cx-II fused medially without suture lines. Cx-III and Cx-IV adpressed medially, with distinct suture lines. Cx-IV not triangular but with an extensive medial margin. Small projections associated with at insertions of fourth legs. Male genital field with gonopore elongate, widened posteriorly, with 4-7 pairs of acetabula in a single row which extends anteriorly till somewhat posterior to midlength, and with six or seven pairs of acetabula in 1-2 rows on small posterior platelets that are not fused with the ventral shield (Figs. 2743, 2811). Female genital field with a large, oval shaped gonopore field with 10 pairs of acetabula in a single row on lateral platelets that are not fused with the ventral shield (Fig. 2744). Palp rotated, P3 and P4 flattened with a triangular ventral extension (Fig. 2742); P5 slender and curved. Legs without sexual dimorphism. Monotypic.

Genus *Stygameracarus* I.M. Smith, 1990

(Figs. 2742-2744, 2811, 2812)

1990 *Stygameracarus* I.M. Smith, The Canadian Entomologist 122: 182.

Type species: *Stygameracarus cooki* I.M. Smith, 1990

DIAGNOSIS: As for subfamily.

HABITAT: Interstitial.

DISTRIBUTION: Two species known from North America (I.M. Smith 1990a).

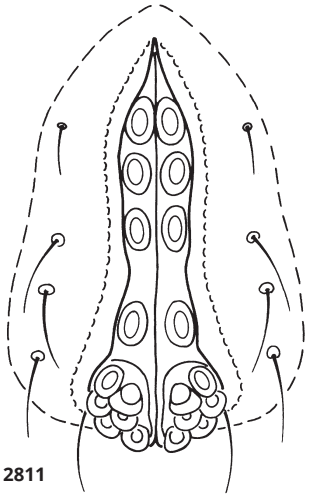
Family Bogatiidae Motaș & Tanasachi, 1948

1948 Bogatiidae Motaș & Tanasachi, Annales Scientifiques de l'Université de Jassy 31: 150.

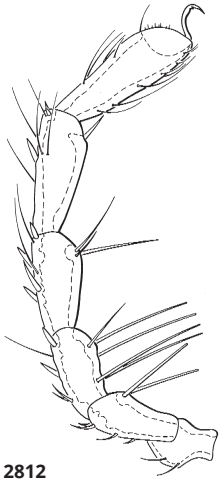
1956 Horreolanidae Habeeb, Leaflets of Acadian Biology 11: 2 – Cook (1974).



2810



2811



2812

2810 *Notomundamella harveyi* Cook, IV-leg-4-6 male (after Cook 1986)

2811 *Stygameracarus cooki* I.M. Smith, genital field male (after I.M. Smith 1990a)

2812 *Stygameracarus cooki* I.M. Smith, first leg male (after I.M. Smith 1990a)

DIAGNOSIS: Dorsal and ventral shields present, these bearing large pores. Dorsal shield with three pairs of glandularia and the postocularia (Fig. 2818). Gnathosomal bay shallow. Gnathosoma broadened anteriorly (Figs. 2817, 2820) but appearing pointed when viewed laterally (Fig. 2819). Chelicera separated medially and somewhat stylet-like (Fig. 2821). Coxae in three groups, medial margins of Cx-IV moderately developed. Insertions of fourth legs with associated projections. Male genital field with four to numerous acetabula in a single row on each side in the gonopore. Female genital field with the acetabula lying either free in the gonopore field or on genital plates which are separate from the ventral shield. Genital field flanked by a pair of glandularia. Palp three or four-segmented and rotated. P1 and P2 fused but fusion area indicated. P2 with 2-4 thickened setae. P3 and P4 greatly shortened and apparently fused with each other. Legs without swimming setae and not exhibiting sexual dimorphism.

KEY TO THE SUBFAMILIES

1 Genital field with four pairs of acetabula (Fig. 2813); palp with three free segments (Fig. 2814) Subfamily Horreolaninae

- Genital field with numerous acetabula (Fig. 2815); palp with four free segments (Fig. 2816) Subfamily Bogatiinae

Subfamily Bogatiinae Motaş & Tanasachi, 1948

1948 Bogatiidae Motaş & Tanasachi, Annales Scientifiques de l'Universite de Jassy 31: 150.

DIAGNOSIS: Genital field with six to seven pairs of acetabula lying free in the gonopore field in male (Fig. 54), but more numerous acetabula on genital plates in female (Fig. 2815). Palp with four movable segments; P1 and P2 fused, rotated, flattened and expanded distally. P5 flattened and foliate in shape (Fig. 2816). Monotypic.

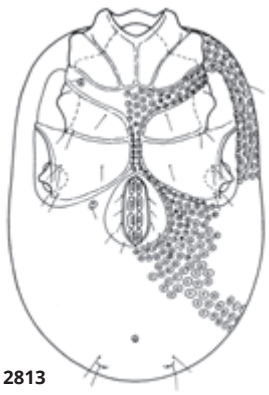
Genus *Bogatia* Motaş & Tanasachi, 1948

(Figs. 54, 55, 2815-2817)

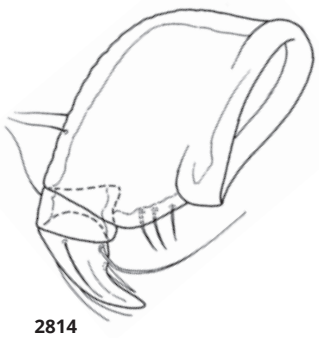
1948 *Bogatia* Motaş & Tanasachi, Annales Scientifiques de l'Universite de Jassy 31: 149.

1956 *Jugohydracarus* Georgiev, Folia Balcanica 1: 19.

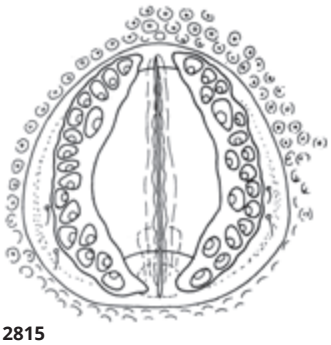
Type species: *Bogatia maxillaris* Motaş & Tanasachi, 1948



2813



2814



2815

2813 *Horreolanus orphanus* Mitchell, venter male (after Cook 1974)

2814 *Horreolanus orphanus* Mitchell, ventral view palp male (after Cook 1974)

2815 *Bogatia maxillaris* Motaş & Tanasachi, genital field female (after Cook 1974)

DIAGNOSIS: As for subfamily.

HABITAT: Interstitial.

DISTRIBUTION: Two species known, one from Europe and one from North America (I.M. Smith & MacKenzie 2009).

Subfamily Horreolaninae Habeeb, 1956

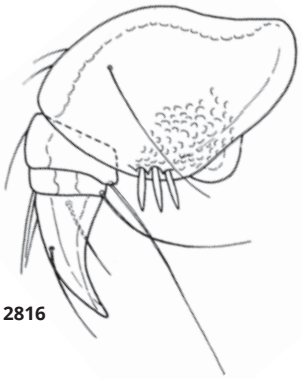
1956 Horreolaninae Habeeb, Leaflets of Acadian Biology 11: 2.

DIAGNOSIS: Genital field with four pairs of acetabula in both sexes (Figs. 2813, 2822), but occasionally specimens with five pairs of acetabula on one side can be found. Acetabula lying free in the gonopore field. Palp with three movable segments, P1 and P2 fused, and P3 and P4 fused (Fig. 2814). Monotypic.

Genus *Horreolanus* Mitchell, 1955

(Figs. 2813, 2814, 2818-2822)

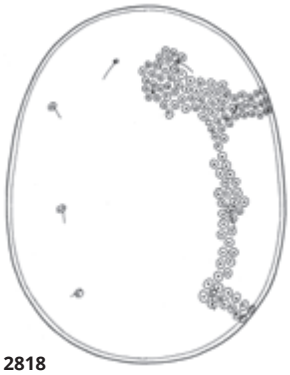
1955 *Horreolanus* Mitchell, Transactions of the American Microscopical Society 74: 334.
Type species: *Horreolanus orphanus* Mitchell, 1955



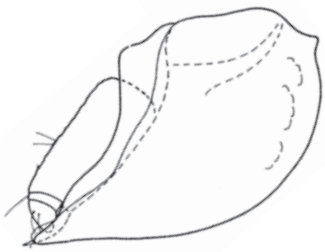
2816



2817



2818



2819



2820



2821

2816 *Bogatia maxillaris* Motaş & Tanasachi, dorsal view palp male (after Cook 1974)

2817 *Bogatia maxillaris* Motaş & Tanasachi, dorsal view gnathosoma + palp female (after Cook 1974)

2818 *Horreolanus orphanus* Mitchell, dorsum male (after Cook 1974)

2819 *Horreolanus orphanus* Mitchell, lateral view gnathosoma + palp male (after Cook 1974)

2820 *Horreolanus orphanus* Mitchell, dorsal view gnathosoma + palps male (after Cook 1974)

2821 *Horreolanus orphanus* Mitchell, chelicera male (after Cook 1974)

DIAGNOSIS: As for subfamily.

HABITAT: Interstitial? The species was taken from a field drainage tile.

DISTRIBUTION: One species known from Illinois, USA.

Family Chappuisididae Motaș & Tanasachi, 1946

1946 Chappuisididae Motaș & Tanasachi, Notatationes Biologicae, Bucarest 4: 52.

1956 Uchidastygacaridae Imamura, Premier Congrès International de Spéléologie, Paris 1953: 209 – I.M. Smith (1992b).

DIAGNOSIS: Dorsal and ventral shields present. Dorsal shield bearing four pairs of glandularia. Gnathosoma separated from the coxae and anteriorly broad. Chelicera separated medially. Gnathosoma bay well-developed. Tips of Cx-I extending beyond frontal idiosoma margin. Median margins of Cx-IV not reduced to angles; a well-developed genital bay present. Insertions of fourth legs with associated projections. Genital field with three or four pairs of acetabula in the gonopore field in both sexes. Genital field may be flanked by a pair of large glandularia, or the homologous glandularia shifted far forward to a position near medial suture lines Cx-III/Cx-IV. Palp five-segmented, either uncate and somewhat rotated or not uncate. P2 with two or three heavy setae. Legs usually with a few swimming setae, legs not exhibiting sexual dimorphism. Claws of fourth legs either well-developed or strongly reduced.

KEY TO THE SUBFAMILIES

1 Cgl-4 shifted far forward to a position close together near suture lines Cx-III/Cx-IV (Fig. 2823); P4 greatly expanded and flattened (Fig. 2824); fourth leg with claws Subfamily Chappuisidinae

\- Cxgl-4 posterior to Cx-IV (Fig. 2825); P4 cylindrical or greatly expanded; fourth leg with or without claws 2

2 P4 and P5 separated, the latter segment with two long setae (Fig. 2826); fourth legs without claws or claws greatly reduced (Fig. 2827) 3

\- P5 partly or completely fused with P4, lacking long setae (Fig. 2828), fourth leg with claws Subfamily Morimotacarinae

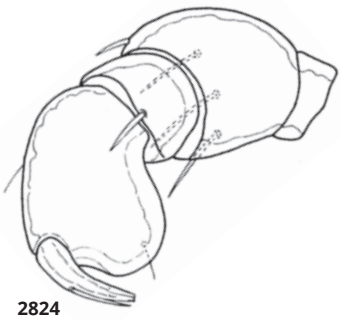
3 Palp with nearly cylindrical segments (Fig. 2826); Cx-I forming a well-defined gnathosomal bay; acetabula of female lying in the gonopore (Fig. 2829) Subfamily Tsushimacarinae



2822



2823



2824

2822 *Horreolanus orphanus* Mitchell, genital field female (after Cook 1974)

2823 *Chappuisides eremitus* Cook, venter male (after Cook 1974)

2824 *Chappuisides eremitus* Cook, palp male (after Cook 1974)

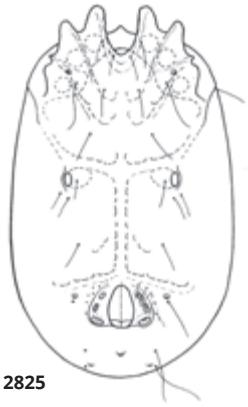
- Palp with P4 expanded (Fig. 2830); Cx-I not forming a gnathosomal bay; acetabula of female lying on the ventral shield flanking the gonopore (Fig. 2831)

Subfamily Uchidastygacarinae

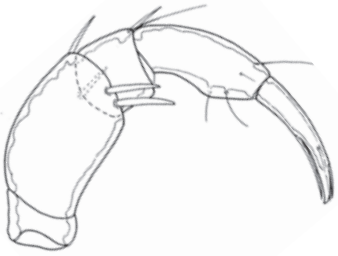
Subfamily Chappuisidinae Motaș & Tanasachi, 1946

1946 Chappuisididae Motaș & Tanasachi, Notationes Biologicae, Bucarest 4: 52.

DIAGNOSIS: Idiosoma elongate and ellipsoidal in outline, slightly convex dorsally and ventrally (Fig. 74). Gnathosomal bay relatively well-developed. Cx-I extending to, or beyond, frontal idiosoma margin. Cx-IV with a distinct medial margin. Insertions of fourth legs with associated projections. Cxgl-4 located far forward, close together near medial suture line Cx-III/Cx-IV (Figs. 75, 2823). A pair of ridges extending anterolaterally from insertion of fourth legs. Genital field with three or four pairs of acetabula lying in the gonopore field in both sexes. Palp uncate, five-segmented and rotated. P2 nearly cylindrical, with a group of medial stout setae. P4 expanded, P5 relatively short (Fig. 2824). Fourth legs with claws. Two pairs of long setae very close to each other lying at the posterior end of ventral shield. Monotypic.



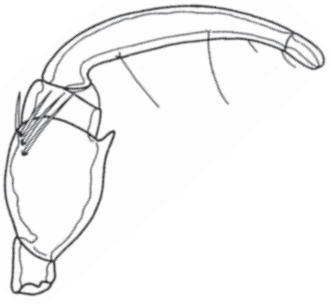
2825



2826



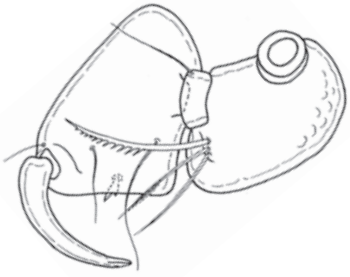
2827



2828



2829



2830

2825 *Yachatsia mideopsoides* Cook, venter female (after Cook 1974)
2826 *Tsushimacarus uenoi* Imamura, palp female (after Cook 1974)
2827 *Tsushimacarus uenoi* Imamura, IV-leg-5-6 female (after Cook 1974)
2828 *Morimotacarus wadayamensis* Imamura, palp male (after Cook 1974)
2829 *Tsushimacarus uenoi* Imamura, venter female (after Cook 1974)
2830 *Uchidastygacarus* (*Uchidastygacarus*) *imamurai* Cook, palp male (after Cook 1974)

Genus *Chappuisides* Szalay, 1943

(Figs. 74, 75, 2823, 2824)

1943 *Chappuisides* Szalay, Zoologischer Anzeiger 142: 45.

1979 *Neochappuisides* Imamura, Annotationes zoologicae Japonensis 52: 258 – I.M. Smith (1992b).

Type species: *Chappuisides hungaricus* Szalay, 1943

DIAGNOSIS: As for subfamily.

HABITAT: Interstitial.

DISTRIBUTION: The genus has a Holarctic distribution, with eight species known from North America (I.M. Smith 1992b), one from Central America (Mexico, Cramer & Smith 1991), two from Europe (Motaş 1959), one from Japan (Imamura 1979) and one from Siberia (Semenchenko 2016).

Subfamily Morimotacarinae Imamura, 1962

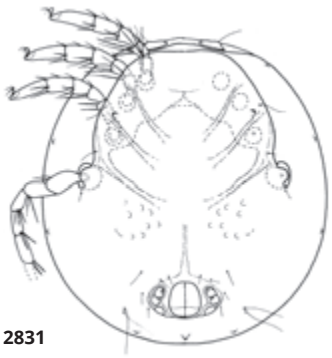
1962 Morimotacarinae Imamura, Zoologischer Anzeiger 168: 259 – Cook (1974).

DIAGNOSIS: Idiosoma elongate and ellipsoidal in outline, slightly convex dorsally and ventrally. A well-developed gnathosomal bay present. Anterior tips of Cx-I extending beyond frontal idiosoma margin. A pair of ridges extending anterolaterally from insertions of fourth legs. Insertions of fourth legs with or without associated projections. Cxgl-4 located posterior to Cx-IV (Fig. 2825). Genital field with three pairs of acetabula, in male in the gonopore field, in female lying either in the gonopore field or embedded in the ventral shield flanking the gonopore. Palp not uncate or rotated, either five-segmented with P4 and P5 partially fused or four-segmented with P4 and P5 completely fused. Fourth legs with claws.

KEY TO THE GENERA

1 Acetabula lying in the gonopore field in both sexes (Figs. 2832-2834); P4 and P5 partially fused (Fig. 2828) Genus *Morimotacarus*

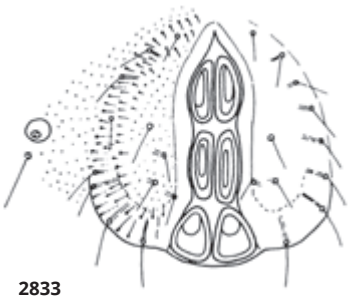
- Acetabula of female lying on the ventral shield flanking the gonopore (Fig. 2825), acetabula of male in the gonopore field, posterior pair partially covered by sclerites flanking gonopore field (Fig. 2836); P4 and P5 completely fused (Fig. 2838) Genus *Yachatsia*



2831



2832



2833

2831 *Uchidastygacarus* (*Imamurastygacarus*) *ovalis* Cook, venter female (after Cook 1974)

2832 *Morimotacarus wadayamensis* Imamura, venter male (after Cook 1974)

2833 *Morimotacarus wadayamensis* Imamura, genital field male (after Cook 1974)

Genus *Morimotacarus* Imamura, 1962

(Figs. 2828, 2832-2834)

1962 *Morimotacarus* Imamura, Zoologischer Anzeiger 168: 260.

Type species: *Morimotacarus wadayamensis* Imamura, 1962

DIAGNOSIS: Insertions of fourth legs with or without associated projections. Acetabula of both sexes lying in the gonopore field (Figs. 2832, 2833-2834). Palp five-segmented, with P4 and P5 partially fused (Fig. 2828).

HABITAT: Interstitial, streams.

DISTRIBUTION: Two species known, one from Japan and one from North America (I.M. Smith 1992b).

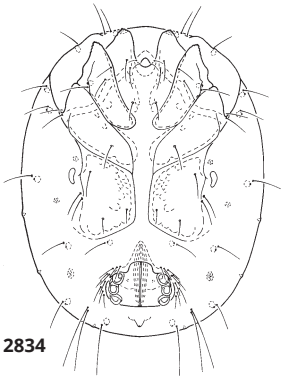
Genus *Yachatsia* Cook, 1963

(Figs. 2825, 2835-2838)

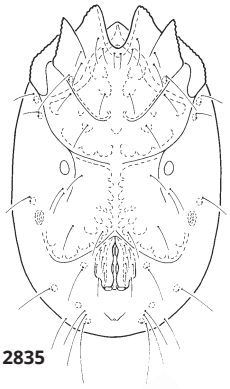
1963 *Yachatsia* Cook, Entomological. News 74: 63.

1986 *Ussuriaxona* Tuzovskij, Zoologiceskij Zurnal 55: 936 – Abé (2019).

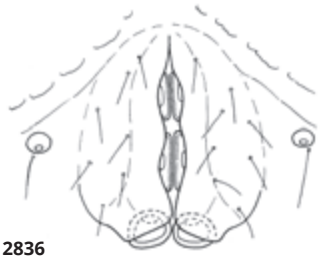
Type species: *Yachatsia mideopsoides* Cook, 1963



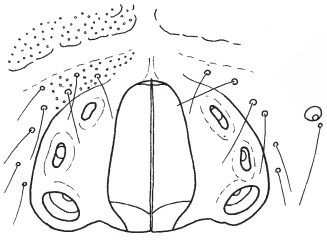
2834



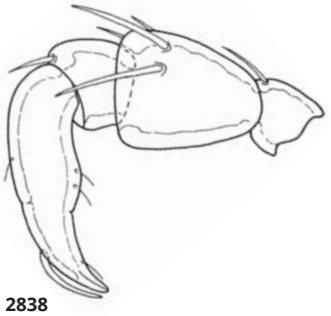
2835



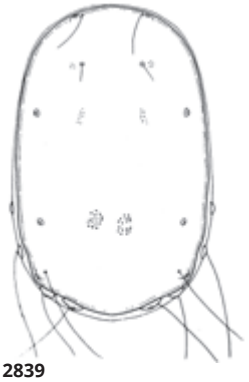
2836



2837



2838



2839

2834 *Morimotacarus nearcticus* I.M. Smith, venter female (after I.M. Smith 1992b)

2835 *Yachatsia mideopsoides* Cook, venter male (after I.M. Smith 1992b)

2836 *Yachatsia mideopsoides* Cook, genital field male (after Cook 1974)

2837 *Yachatsia mideopsoides* Cook, genital field female (after Cook 1974)

2838 *Yachatsia mideopsoides* Cook, palp male (after Cook 1974)

2839 *Tsushimacarus uenoi* Imamura, dorsum female (after Cook 1974)

DIAGNOSIS: Insertions of fourth legs without associated projections. Acetabula of female lying on the ventral shield flanking the gonopore field (Figs. 2825, 2837), acetabula of male lying in the gonopore field, posterior pair partially covered by sclerites flanking gonopore field (Figs. 2835, 2836). Palp four-segmented with P4 and P5 completely fused; P2 with or without (Fig. 2838) an anteroventral extension.

HABITAT: Interstitial, springs.

DISTRIBUTION: One species known from North America (I.M. Smith 1992b) and one from the Russian Far East and Japan (Tuzovskij 1986b, Abé 2019).

Subfamily Tsushimacarinae Cook, 1974

1974 Tsushimacarinae Cook, Memoirs of the American Entomological Institute 21: 394.

DIAGNOSIS: (Female only) Idiosoma elongate and elliptical in outline, slightly convex dorsally and ventrally (Fig. 2839). A well-developed gnathosomal bay present (Fig. 2829). Anterior tips of Cx-I extending beyond frontal idiosoma margin. Cxgl-4 posterior to Cx-IV. A ridge present on each side extending anterolaterally from insertions of fourth legs. Insertions of fourth legs with associated projections. Genital field with three pairs of acetabula, in the gonopore field in the female. No long setae present at posterior end of ventral shield. Palp five-segmented, not uncate and not rotated. P2 with two stout setae, ventral margin of P4 slightly bulging, P5 as long as P4 (Fig. 2826). Claws and claw sockets of first leg large, but greatly reduced in fourth legs (Fig. 2827). Monotypic.

Genus *Tsushimacarus* Imamura, 1970

(Figs. 2826, 2827, 2829, 2839)

1970 *Tsushimacarus* Imamura, Bulletin of the National Science Museum, Tokyo 13: 256.

Type species: *Tsushimacarus uenoi* Imamura, 1970

DIAGNOSIS: As for subfamily.

HABITAT: Interstitial.

DISTRIBUTION: One species known from Japan.

Subfamily Uchidastygacarinae Imamura, 1956

1956 Uchidastygacaridae Imamura, Compte Rendue Premier Congrès International de Spéléologie, Paris 3: 209.

DIAGNOSIS: Lateral eye pigment reduced or absent. Idiosoma nearly circular in outline and flattened. Gnathosoma separated from coxae, gnathosomal bay absent (Fig. 2831). Chelicera separated medially. Tips of Cx-I not extending beyond frontal idiosoma margin, lateral margins of coxae smooth. Median margins of Cx-IV not greatly reduced but occasionally somewhat obliterated. Insertions of fourth legs with associated projections. No ridges anterolaterally of region of insertion of fourth legs. Cxgl-4 posterior to Cx-IV but gland portion reduced (Fig. 2844). Genital field with three pairs of acetabula in the gonopore field in the male but on genital plates fused with the ventral shield in the female. Palp five-segmented, rotated. P2 expanded with a group of medial setae, P4 greatly expanded (Figs. 2830, 2843). Fourth legs without claws. Monotypic.

Genus *Uchidastygacarus* Imamura, 1956

(Figs. 2830, 2831, 2840-2844)

1956 *Uchidastygacarus* Imamura, Compte Rendu Premier Congrès International de Spéléologie, Paris 3: 209.

Type species: *Uchidastygacarus rotundus* Imamura, 1956

DIAGNOSIS: As for subfamily.

KEY TO THE SUBGENERA

1 Dorsal shield nearly covering dorsum but surrounded by dorsal furrow (Fig. 2840); diameter of P3 about equal to diameter of P2 and P4; P4 only moderately expanded and bearing a stout, peg-like seta (Fig. 2841) Subgenus *Imamurastygacarus*

- Dorsal shield completely covering dorsum and overlapping dorsal furrow (Fig. 2842); diameter of P3 much smaller than diameter of P2 and P4; P4 greatly expanded and bearing a stout seta that is aristate, furcate or palmate (Fig. 2843) Subgenus *Uchidastygacarus*

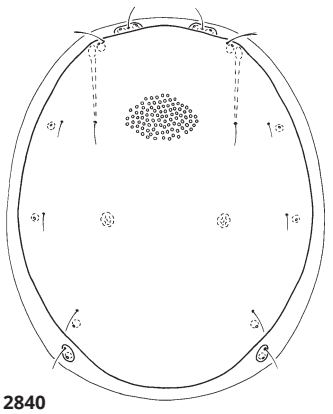
Subgenus *Uchidastygacarus* s.s.

(Figs. 2830, 2842-2844)

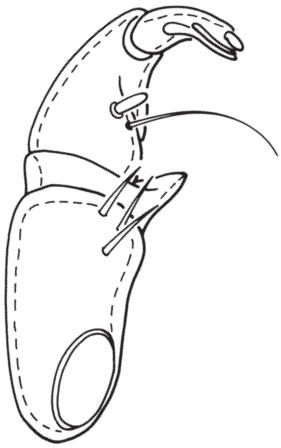
DIAGNOSIS: Dorsal shield completely covering dorsum (Fig. 2842). P3 noticeably smaller in diameter than P2 and P4. P4 greatly expanded and bearing a stout seta which is aristate, furcate or palmate (Fig. 2830).

HABITAT: Interstitial.

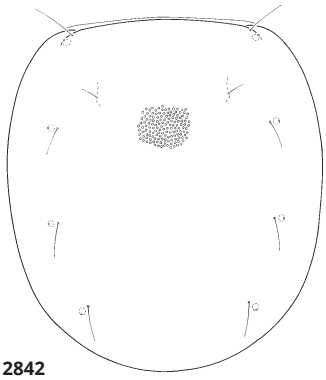
DISTRIBUTION: Almost a dozen species known from Japan, North America (I.M. Smith 1992b) and Siberia (Semenchenko 2010a).



2840



2841



2842

2840 *Uchidastygacarus* (*Imamurastygacarus*) *ovalis* Cook, dorsum male (after I.M. Smith 1992b)

2841 *Uchidastygacarus* (*Imamurastygacarus*) *ovalis* Cook, palp male (after I.M. Smith 1992b)

2842 *Uchidastygacarus* (*Uchidastygacarus*) *magnificus* I.M. Smith, dorsum male (after I.M. Smith 1992b)

Subgenus *Imamurastygacarus* Cook, 1974

(Figs. 2831, 2840, 2841)

1974 *Imamurastygacarus* Cook, Memoirs of the American Entomological Institute 21: 385.
Type species: *Imamurastygacarus ovalis* Cook, 1974

DIAGNOSIS: Dorsal shield nearly covering dorsum but surrounded by a dorsal furrow (Fig. 2840). P3 about equal in diameter to P2 and P4. P4 moderately expanded, with a short, thick peg-like seta (Fig. 2841).

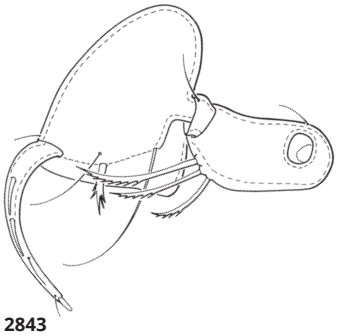
HABITAT: Interstitial.

DISTRIBUTION: One species known from Japan (Imamura 1956) and one from North Carolina, USA (Cook 1974).

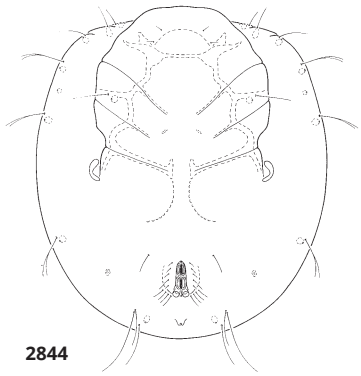
Family Harpagopalpidae K. Viets, 1924

1924 Harpagopalpidae K. Viets, Zoologischer Anzeiger 58: 106.

DIAGNOSIS: Lateral eyes in lateral position, not in capsules. Idiosoma circular in dorsal view, with dorsal and ventral shields, males of some species with a truncated posterior margin; idiosoma extending dorsocaudally, elevated in anterior part but flattened caudally. Dorsal furrow complete in females, either complete (Fig. 2848) or dorsal shield fused with ventral shield (Fig. 2847) in males. Petiole present (Fig. 2849) or absent. Gnathosomal bay narrow; chelicera of unusual shape, with a stout basal part, as high as long and with a finger-like distal extension; claws with a double line of fine denticles (Fig. 2850). Suture lines of coxae distinct, coxae in three groups, Cx-I+II fused medially. Separation of Cx-II/III may be well developed and with porosity, or only little developed and smooth; Cx-IV shifted laterally. Between Cx-IV and genital field two pairs of glandularia. Insertions of IV-leg shifted anteriorly to level of Cx-III, ventrally covered by a rounded extension. Genital field may be located in a genital bay, broadly embraced by mediocaudal extensions of Cx-IV. Acetabula numerous, indistinct, on genital fields difficult to distinguish from idiosoma pores, extending to lateral part of venter and there bent anteriorly. Besides these acetabula, additional acetabula present in gonopore field, 1-4 pairs in males and four pairs in females, flanking the gonopore in males, but lying more laterally on a narrow sclerite in females (Fig. 68). Palp uncate, P2-4 distally enlarged, P4 with a ventrodistal extension, P5 pointed (Fig. 69). Legs without sexual dimorphism, with numerous setae, claws simple. Monotypic.



2843



2844



2845

2843 *Uchidastygacarus* (*Uchidastygacarus*) *magnificus* I.M. Smith, palp male (after I.M. Smith 1992b)

2844 *Uchidastygacarus* (*Uchidastygacarus*) *magnificus* I.M. Smith, venter male (after I.M. Smith 1992b)

2845 *Harpagopalpus* (*Harpagopalpus*) *octoporus* K. Viets, venter male (after Gerecke 2006)

Genus *Harpagopalpus* K. Viets, 1924

(Figs. 68-70, 2845-2850)

1924 *Harpagopalpus* K. Viets, Zoologischer Anzeiger 58: 106.
Type species: *Harpagopalpus octoporus* K. Viets, 1924

DIAGNOSIS: As for family.

KEY TO THE SUBGENERA (MALES ONLY)

1 Gonopore field not in a genital bay; male with four pairs of acetabula lying in the gonopore (Fig. 2845) Subgenus *Harpagopalpus* s.s.

- Gonopore field in a genital bay; male with two pairs of acetabula lying in the gonopore field (Fig. 2846) Subgenus *Harpagopalpellus*



2846



2847



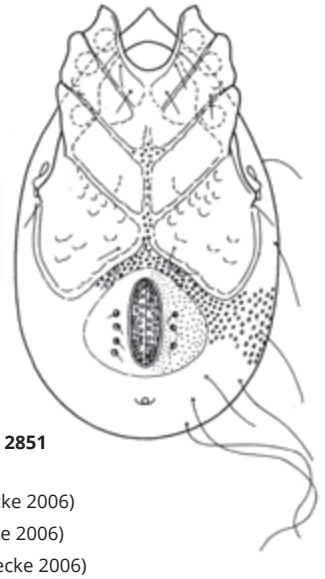
2848



2849



2850



2851

2846 *Harpagopalpus* (*Harpagopalpellus*) *tetraporus* K. Viets, venter male (after Gerecke 2006)
2847 *Harpagopalpus* (*Harpagopalpus*) *octoporus* K. Viets, dorsum male (after Gerecke 2006)
2848 *Harpagopalpus* (*Harpagopalpellus*) *tetraporus* K. Viets, dorsum male (after Gerecke 2006)
2849 *Harpagopalpus* (*Harpagopalpus*) *zebu* Gerecke, dorsum male (after Gerecke 2006)
2850 *Harpagopalpus* (*Harpagopalpus*) *zebu* Gerecke, gnathosoma + palp male (after Gerecke 2006)
2851 *Hungarohydracarus szalayi* Cook, venter male (after Cook 1974)

Subgenus *Harpagopalpus* s.s.

(Figs. 2845, 2847, 2849, 2850)

DIAGNOSIS: Genital field not lying in a genital bay (Fig. 2845); male dorsal furrow incomplete, dorsal shield with the posterior pair of glandularia closer to each other than anterior pair, fused posteriorly to ventral shield (Fig. 2847); 1-4 pairs of acetabula in gonopore field.

HABITAT: Streams.

DISTRIBUTION: Confined to Afrotropical region, with two species known from Cameroon and three species from Madagascar (Gerecke 2006).

Subgenus *Harpagopalpellus* Lundblad, 1941

(Figs. 2846, 2848)

1941 *Harpagopalpellus* Lundblad, Zoologiska bidrag från Uppsala 20: 370.

Type species: *Harpagopalpus tetraporus* K. Viets, 1924

DIAGNOSIS: Genital field lying in a genital bay (Fig. 2846); male dorsal furrow complete, dorsal shield with the posterior pair of glandularia further away from each other than anterior pair, not fused posteriorly to ventral shield (Fig. 2848); two pairs of acetabula in gonopore field.

HABITAT: Streams.

DISTRIBUTION: Known from one species from Cameroon (Gerecke 2006).

Family Hungarohydracaridae Motaş & Tanasachi, 1959

1959 Hungarohydracaridae Motaş & Tanasachi, Universitatea "Al. I. Cruza" Iaşi, Lucrările Sesiunii Ştiinţifice (15-17 Septembrie 1956), Staţiunii Zoologice Marine "Prof. Ioan Borcea" Agigea: 431.

DIAGNOSIS: Lateral eyes lying beneath the integument, pigment often reduced. Dorsal and ventral shields present. Idiosoma usually somewhat elongated and not flattened. Gnathosoma separated from the coxae. Coxae in three groups and fused with the ventral shield. Medial margins of Cx-IV usually more or less reduced to angles but occasionally more developed. Idiosoma pores may or may not be present between the coxae. Cxgl-4 located between genital field and Cx-IV or shifted onto Cx-IV. Insertions of fourth legs may or may not have shifted far forward, with a moderately developed projection partially covering the openings. A ridge extending anteriorly from insertion of fourth legs. Males without a cauda development. Genital field of male with seven to many acetabula located in the gonopore field. Gonopore of male flanked by few to many small setae located on large setal bases (and these might be confused with acetabula). (Exception: Males of *Balcanohydracarus* have short genital plates flanking the gonopore). Females with the acetabula on narrow to moderately wide genital plates flanking the gonopore. Palp rotated, five-segmented and uncate. P2 with two stout ventral or proximomedial setae. Legs with or without swimming setae. Legs may or may not have a slight sexual dimorphism.

KEY TO THE SUBFAMILIES (MALES ONLY)

1 Males with the acetabula only in the gonopore field (but large setal bases might be confused with acetabula) (Fig. 2851) Subfamily Hungarohydracarinae

\- Males with the acetabula in the gonopore field and on genital plates 2

2 Cx-IV with a pair of glandularia (Cxgl-4) in both sexes (Fig. 2852) Subfamily Cubanohydracarinae

\- Cx-IV without glandularia (Fig. 2853) Subfamily Balcanohydracarinae

Subfamily Hungarohydracarinae Motaş & Tanasachi, 1959

1959 Hungarohydracaridae Motaş & Tanasachi, Universitatea "Al. I. Cruza" Iaşi, Lucrările Sesiunii Ştiinţifice (15-17 Septembrie 1956), Staţiunii Zoologice Marine "Prof. Ioan Borcea" Agigea: 431.

DIAGNOSIS: Cx-IV with or without glandularia. Acetabula of male confined to the gonopore field (Fig. 2851).

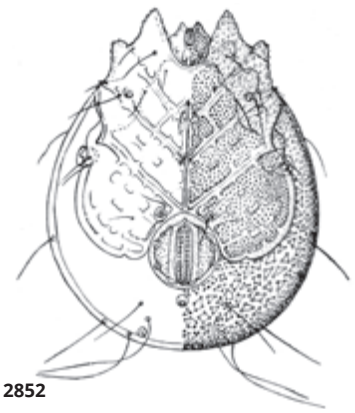
KEY TO THE GENERA

1 Dorsum with ridges (Fig. 2854); no pores between the coxae (Fig. 2855) Genus *Stygarrenurus*

- Dorsum without ridges; pores present between the coxae (Fig. 2851) 2

2 P4 greatly expanded ventrally and bearing a peg-like seta (Fig. 2856); idiosoma narrowed anteriorly (Fig. 2851) Genus *Hungarohydracarus*

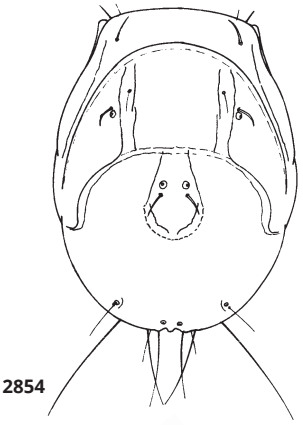
- P4 not greatly expanded ventrally and not bearing a peg-like seta (Fig. 2857); idiosoma more or less truncated anteriorly (Fig. 2858) Genus *Bharatohydracarus*



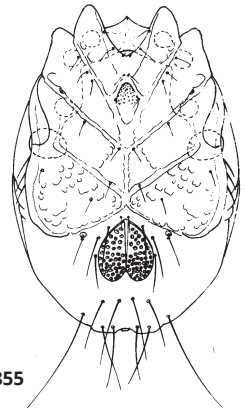
2852



2853



2854



2855



2856



2857

2852 *Cubanohydracarus elegans* Orghidan & Gruia, venter male (after Orghidan & Gruia 1980a)

2853 *Balcanohydracarus alveolatus* Motaş & Tanasachi, venter male (after Gerecke et al. 2016)

2854 *Stygarrenurus armoniensis* Cramer & Cook, dorsum male (after Cramer & Cook 1996)

2855 *Stygarrenurus armoniensis* Cramer & Cook, venter male (after Cramer & Cook 1996)

2856 *Hungarohydracarus szalayi* Cook, palp male (after Cook 1974)

2857 *Bharatohydracarus phreaticus* Cook, palp female (after Cook 1974)

Genus *Bharatohydracarus* Cook, 1967

(Figs. 84-86, 2857-2860) hier alleen 2859, 2860

1967 *Bharatohydracarus* Cook, Memoirs of the American Entomological Institute 9: 200.

Type species: *Bharatohydracarus phreaticus* Cook, 1967

DIAGNOSIS: Idiosoma more or less truncated anteriorly (Fig. 2858), pores present between the coxae. P4 not greatly expanded ventrally with a hair-like antagonistic bristle. P2 with two stout proximomedial setae (Figs. 86, 2857). Legs with swimming setae, with or without sexual dimorphism. Segments of anterior legs not greatly expanded.

HABITAT: Interstitial.

DISTRIBUTION: Several species known from India (Cook 1967), Java, Indonesia (Lundblad 1971), Oman (Gerecke 2004) and Ghana (Smit 2014a).

Genus *Hungarohydracarus* Szalay, 1943

(Figs. 2851, 2856, 2861, 2862)

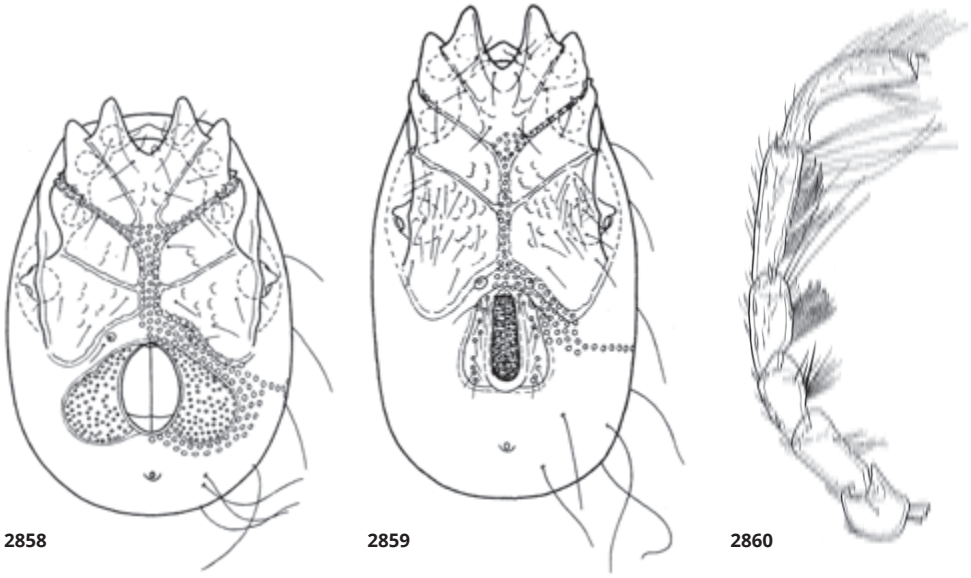
1943 *Hungarohydracarus* Szalay, Annales historico-naturales Musei nationalis hungarici 36: 43.

Type species: *Hungarohydracarus subterraneus* Szalay, 1943

DIAGNOSIS: Idiosoma narrowed anteriorly, pores present between the coxae (Fig. 2851). P2 with two stout medial setae, P4 with a peg-like antagonistic bristle (Fig. 2856). Legs without swimming setae and without sexual dimorphism. Segments of anterior legs greatly expanded (Fig. 2862).

HABITAT: Interstitial.

DISTRIBUTION: One species known from Europe and North Africa and two species known from India (Cook 1967).



2858 **2859** **2860**

2858 *Bharatohydracarus imamurai* Cook, venter female (after Cook 1974)

2859 *Bharatohydracarus phreaticus* Cook, venter male (after Cook 1974)

2860 *Bharatohydracarus phreaticus* Cook, fourth leg male (after Cook 1974)

Genus *Stygarrenurus* Cook, 1980

(Figs. 2854, 2855, 2863-2865)

1980 *Stygarrenurus* Cook, Memoirs of the American Entomological Institute 31: 326 - Cramer & Cook (1996).

Type species: *Arrenurus golfitensis* Cook, 1980

DIAGNOSIS: Dorsal shield incomplete in male, the dorsal furrow ending near middle of idiosoma, complete in female (Fig. 2863), with a series of longitudinal, in males also with semi-circular ridges (Fig. 2854). Anterior tip of Cx-I extending beyond frontal idiosoma margin. No idiosoma pores present between the coxae (Figs. 2855, 2864). Insertion of fourth legs shifted well forward. Males with a ventral depression posterior to where the anterior coxae meet. Female genital field with a pair of thick integument on gonopore. P2 with a group of anteromedial setae (Fig. 2865). Legs with swimming setae, without a pronounced sexual dimorphism.

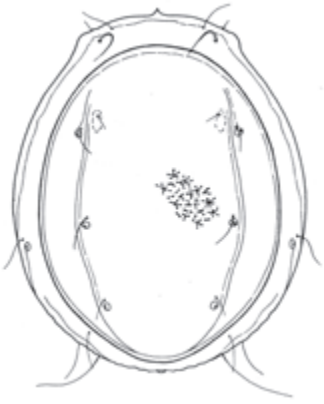
HABITAT: Interstitial.



2861



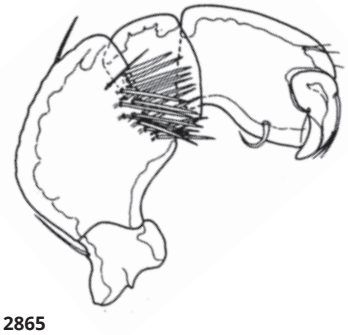
2862



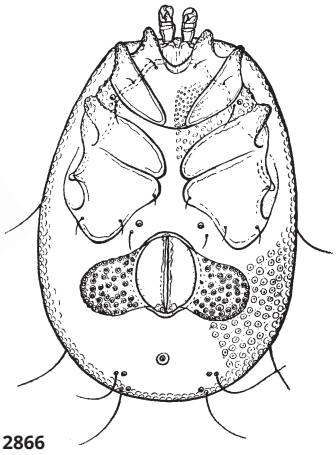
2863



2864



2865



2866

2861 *Hungarohydracarus szalayi* Cook, venter female (after Cook 1974)

2862 *Hungarohydracarus szalayi* Cook, I-leg-4-6 male (after Cook 1974)

2863 *Stygarrenurus golfitensis* (Cook), dorsum female (after Cook 1980)

2864 *Stygarrenurus golfitensis* (Cook), venter female (after Cook 1980)

2865 *Stygarrenurus golfitensis* (Cook), palp female (after Cook 1980)

2866 *Balcanohydracarus alveolatus* Motaş & Tanasachi, venter male (after Motaş et al. 1959)

DISTRIBUTION: Two species known from Central America (Costa Rica, Cook 1980; Mexico, Cramer & Cook 1996).

Subfamily Balcanohydracarinae Cook, 1967

1967 Balcanohydracarinae Cook, Memoirs of the American Entomological Institute 9: 197.

DIAGNOSIS: Acetabula of males both in the gonopore field and on wing-like genital plates (Fig. 2853). Acetabula of female on genital plates, which are as long as wide (Fig. 2866). Monotypic.

Genus *Balcanohydracarus* Motaş & Tanasachi, 1948

(Figs. 2853, 2866)

1948 *Balcanohydracarus* Motaş & Tanasachi, Bulletin de la Section Scientifique de l'Académie Roumaine 30: 358.

Type species: *Balcanohydracarus alveolatus* Motaş & Tanasachi, 1948

DIAGNOSIS: As for subfamily.

HABITAT: One species known from Europe.

Subfamily Cubanohydracarinae Orghidan & Gruia, 1980

1980 Cubanohydracarinae Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 19: 138.

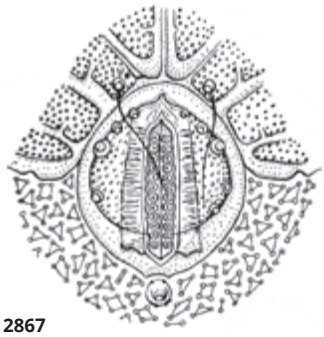
DIAGNOSIS: Cx-IV with a pair of glandularia (Fig. 2852). Most of the numerous acetabula of the male in one row in the gonopore field, and 4-5 pairs on genital plates flanking the gonopore field (Fig. 2867). The numerous acetabula of female on genital plates flanking the gonopore field (Fig. 2868). Legs with swimming setae, without sexual dimorphism. Monotypic.

Genus *Cubanohydracarus* Orghidan & Gruia, 1980

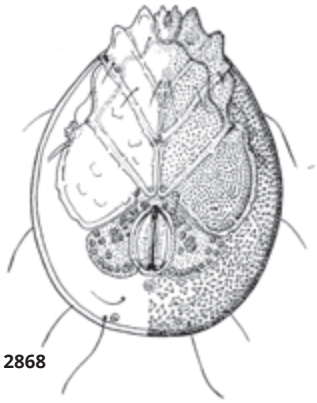
(Figs. 2852, 2867-2869)

1980 *Cubanohydracarus* Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 19: 138.

Type species: *Cubanohydracarus elegans* Orghidan & Gruia, 1980



2867



2868



2869

2867 *Cubanohydracarus elegans* Orghidan & Gruia, genital field male (after Orghidan & Gruia 1980a)

2868 *Cubanohydracarus elegans* Orghidan & Gruia, venter female (after Orghidan & Gruia 1980a)

2869 *Cubanohydracarus elegans* Orghidan & Gruia, gnathosoma + palp male (after Orghidan & Gruia 1980a)

DIAGNOSIS: As for subfamily.

HABITAT: Interstitial.

DISTRIBUTION: One species known from Cuba.

Family Kantacaridae Imamura, 1959

1959 Kantacaridae Imamura, Acarologia 1: 440.

DIAGNOSIS: (Female only) Lateral eyes absent. Idiosoma somewhat flattened. Dorsal and ventral shields present, dorsal shield with six pairs of glandularia lying posterior to the postocularia (Fig. 88). Gnathosoma separated from the coxae. Anterior tip of Cx-I extending beyond frontal idiosoma margin. Cx-II and Cx-IV separated medially. Projections associated with insertions of fourth legs very large (Fig. 87). Genital field with three pairs of acetabula on genital plates partially fused with the ventral shield (Fig. 2870). Palp five-segmented, all segments stocky; palp appearing somewhat uncate (Fig. 2871). Legs without swimming setae, fourth legs with claws. Monotypic.

Genus *Kantacarus* Imamura, 1959

(Figs. 87, 88, 2870, 2871)

1959 *Kantacarus* Imamura, Acarologia 1: 440.

Type species: *Kantacarus matsumotoi* Imamura, 1959

DIAGNOSIS: As for family.

HABITAT: Interstitial.

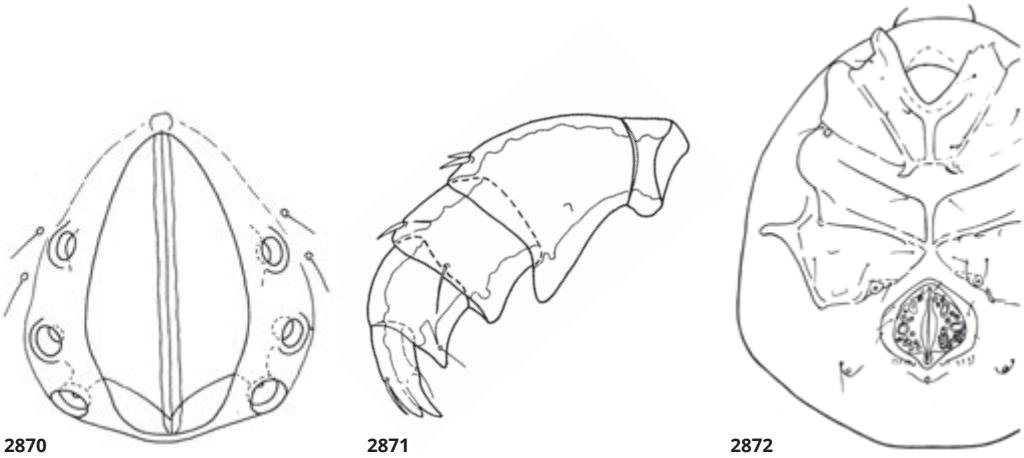
DISTRIBUTION: One species known from Japan.

Family Krendowskiidae K. Viets, 1926

1909 Arrenurellinae Koenike, Die Süsswasserfauna Deutschlands 12: 147.

1926 Krendowskiidae K. Viets, Zoologischer Anzeiger 69: 198.

1931 Roqueellinae K. Viets, Zoologischer Anzeiger 93: 47.



2870 **2871** **2872**

2870 *Kantacarus matsumotoi* Imamura, genital field female (after Cook 1974)

2871 *Kantacarus matsumotoi* Imamura, palp female (after Cook 1974)

2872 *Allokrendowskia dentipes continentalis* K.O. Viets, venter male (part.) (after Cook 1974)

DIAGNOSIS: Idiosoma not flattened. Dorsal and ventral shields with relatively large pores. Dorsal shield with three pairs of glandularia and the postocularia. Gnathosoma may or may not be attached to a protrusable tube of soft integument. Chelicera separated medially. Gnathosomal bay varying from shallow to moderately deep. Coxae in three groups. Median margins of Cx-IV reduced to median angles. Cxgl-4 lying anterior or anterolaterally to the genital field and usually appearing to be incorporated into Cx-IV. Insertions of fourth legs lateral, shifted near middle of idiosoma and with well-developed associated projections. Genital field lying in deep genital bay, with three to numerous acetabula, lying in the gonopore field in both sexes, gonopore field narrow with acetabula occupying most of the surface in males, enlarged in females, flanked by setae-bearing sclerites which are fused with the ventral shield. Palp five-segmented and uncate. P4 with an antagonistic bristle (Figs. 2867, 2868), medial surface of P2 typically with two, occasionally three long setae but these may be reduced. Legs with swimming setae; all legs with claws. Occasionally legs with sexual dimorphism.

KEY TO THE GENERA

1	Acetabula arranged in more than one row on each side of the gonopore; excretory pore immediately posterior to genital field (Figs. 2872, 2873)	Genus *Allokrendowskia*
-	Acetabula arranged in a single row on each side of the gonopore; excretory pore well posterior to the genital field (Fig. 2874)	2
2	Gnathosoma not attached to a protrusable tube of soft integument; proximal end of gnathosoma with two well-developed projections (Fig. 2875)	Genus *Krendowskia*
-	Gnathosoma attached to a protrusable tube of soft integument; proximal end of gnathosoma without projections (Fig. 2876)	3
3	Antagonistic bristle short to long but only slightly thickened (Fig. 2877)	Genus *Geayia*
-	Antagonistic bristle short and thickened, and somewhat pectinate (Fig. 2878)	Genus *Roqueella*

Genus *Allokrendowskia* Lundblad, 1941

(Figs. 2872, 2873, 2879)

1941 *Allokrendowskia* Lundblad, Entomologisk Tidskrift 62: 120.

Type species: *Allokrendowskia dentipes* Lundblad, 1941



2873



2874



2875

2873 *Allokrendowskia dentipes continentalis* K.O. Viets, genital field male (after Cook 1974)

2874 *Krendowskia* (*Krendowskia*) *dorsolineata* Lundblad, venter male (after Cook 1974)

2875 *Krendowskia* (*Krendowskia*) *dorsolineata* Lundblad, dorsal view gnathosoma female (after Cook 1974)

DIAGNOSIS: (Male only) Gnathosoma with two proximal projections and not attached to a protrusable tube. Gnathosomal bay relatively deep. Projections associated with openings of fourth legs relatively narrow and extending far laterally (Fig. 2872). Genital field with numerous acetabula, these lying in more than one row on each side (Fig. 2873). Palp somewhat rotated and with a long, slightly thickened antagonistic bristle. P2 with three proximomedial setae, but these may be lacking (Fig. 2879). Legs with swimming setae. IV-leg-5, enlarged, ventrally with numerous small, setae, IV-leg-6 bowed, ventrally with numerous small setae and several hair-like setae. Excretory pore lying immediately posterior to the genital field.

HABITAT: Standing waters.

DISTRIBUTION: One species known from the Afrotropical region (Madagascar, South Africa).

Genus *Geayia* Thor, 1897

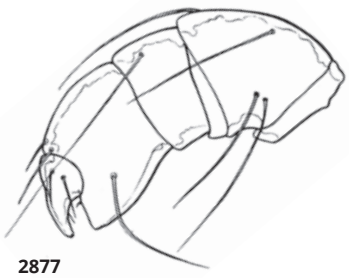
(Figs. 2876, 2877, 2880-2889)

1897 *Geayia* Thor, Bulletin du Muséum national d'Histoire naturelle 3: 10.

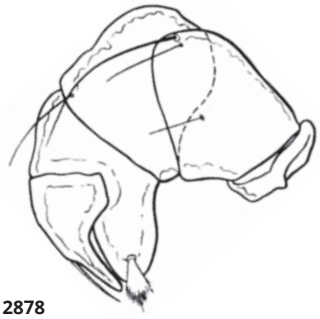
Type species: *Geayia venezuelae* Thor, 1897



2876



2877



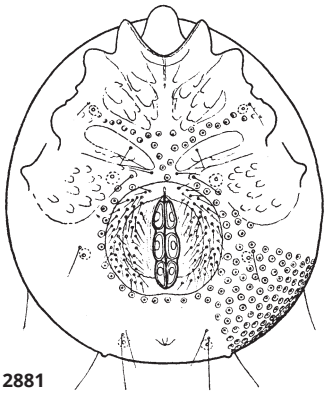
2878



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2880



2881

2876 *Geayia* (*Geayella*) *catharinensis* Lundblad, dorsal view gnathosoma male (after Cook 1974)

2877 *Geayia* (*Pirapama*) *schubarti* K. Viets, palp male (after Cook 1974)

2878 *Roqueella* (*Pararoqueella*) *maculata* Lundblad, palp male (after Cook 1974)

2879 *Allokrendowskia dentipes continentalis* K.O. Viets, palp male (after Cook 1974)

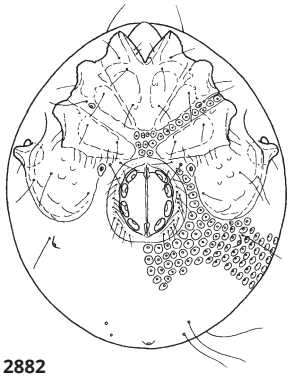
2880 *Geayia* (*Geayella*) *catharinensis* Lundblad, IV-leg-3-4 male (after Cook 1974)

2881 *Geayia* (*Geayidea*) *coeruleocruciata* Lundblad, venter male (after Lundblad 1943)

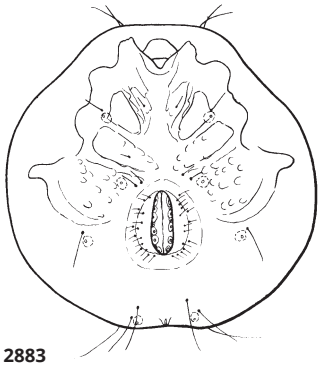
DIAGNOSIS: Gnathosoma attached to a protrusable tube of soft integument, with very short or no projections, comparatively narrow (Fig. 2876). Gnathosomal bay usually shallow. Projections associated with insertions of fourth legs rounded, not extending far laterally. Genital field with three to nine pairs of acetabula arranged in a single row on each side if the gonopore. Palp may be somewhat rotated. Antagonistic bristle somewhat thickened, but hair-like. P2 typically with two median setae (Figs. 2877, 2886, 2888). Legs may or may not exhibit a slight sexual dimorphism. Excretory pore located well posterior to the genital field.

KEY TO THE SUBGENERA

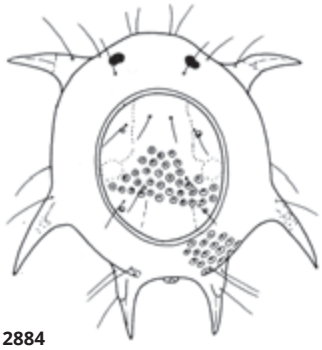
1	IV-leg-3 and IV-leg-4 of male anteriorly with several stout setae (Fig. 2880)	Subgenus *Geayella*
-	Fourth leg of male without stout setae	2
2	Genital field with three pairs of acetabula (Fig. 2881)	Subgenus *Geayidea*
-	Genital field with more than three pairs of acetabula	3
3	Genital field with 4-5 pairs of acetabula (Fig. 2882)	Subgenus *Geayia* s.s.
-	Genital field with seven or more pairs of acetabula (Fig. 2883)	Subgenus *Pirapama*



2882



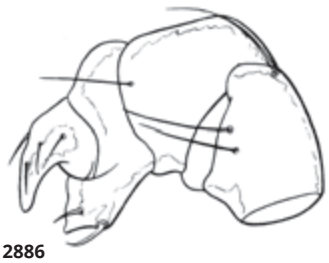
2883



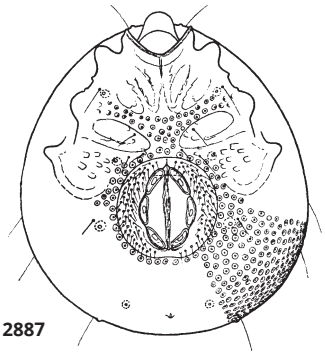
2884



2885



2886



2887

2882 *Geayia* (*Geayia*) *ovata* (Wolcott), venter female (after Cook 1974)
2883 *Geayia* (*Pirapama*) *schubarti* K. Viets, venter male (after Cook 1974)
2884 *Geayia* (*Geayia*) *sexcornuta* K. Viets, dorsum male (after Cook 1974)
2885 *Geayia* (*Geayella*) *catharinensis* Lundblad, venter female (after Cook 1974)
2886 *Geayia* (*Geayella*) *catharinensis* Lundblad, P2-5 male (after Cook 1974)
2887 *Geayia* (*Geayidea*) *coeruleocruciata* Lundblad, venter female (after Lundblad 1943)

Subgenus *Geayia* s.s.

(Figs. 2882, 2884)

DIAGNOSIS: Genital field with 4-5 pairs of acetabula (Fig. 2882). Legs without sexual dimorphism (One species, *G. sexcornuta* Viets, 1959 has three pairs of large glandularia tubercles, Fig. 2884).

HABITAT: Standing waters, streams.

DISTRIBUTION: Two species known from South America (Brazil, K. Viets 1959a; Venezuela), three species from Central America (Costa Rica, Mexico, Cook 1980) and one species from North America (I.M. Smith 1983b).

Subgenus *Geayella* Lundblad, 1936

(Figs. 2876, 2880, 2885, 2886)

1936 *Geayella* Lundblad, Zoologischer Anzeiger 115: 48.

Type species: *Geayia catharinensis* Lundblad, 1936

DIAGNOSIS: Genital field with 3-4 pairs of acetabula (Fig. 2885). IV-leg-3 and IV-leg-4 anteriorly with several stout setae (Fig. 2880).

HABITAT: Streams.

DISTRIBUTION: Three species known from South America (Brazil, Paraguay, Argentina) and two species from Central America (Costa Rica, Cook 1980).

REMARKS: Cook (1980) proposed to include all species with thickened setae on IV-leg-3 and IV-leg-4, regardless of whether there are three or four pairs of acetabula.

Subgenus *Geayidea* Lundblad, 1941

(Figs. 2881, 2887, 2888)

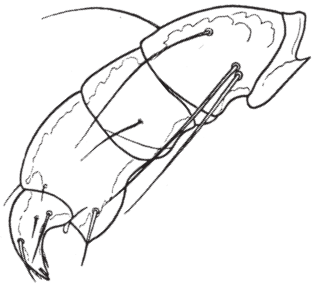
1941 *Geayidea* Lundblad, Zoologiska bidrag från Uppsala 20: 370.

Type species: *Geayia coeruleocruciata* Lundblad, 1936

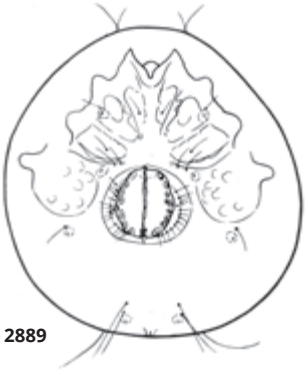
DIAGNOSIS: Genital field with three pairs of acetabula (Figs. 2881, 2887). Legs without sexual dimorphism.

HABITAT: Standing waters, streams.

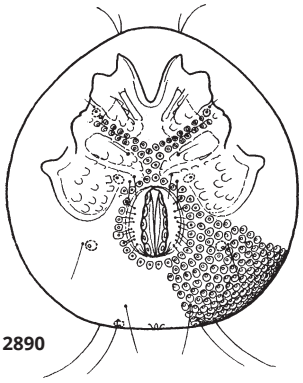
DISTRIBUTION: Several species known from South America (Brazil, K. Viets 1959a; Paraguay) and two species from Central America (Costa Rica, Cook 1980).



2888



2889



2890

2888 *Geayia* (*Geayidea*) *coeruleocruciata* Lundblad, palp female (after Lundblad 1943)

2889 *Geayia* (*Pirapama*) *schubarti* K. Viets, venter female (after Cook 1974)

2890 *Krendowskia* (*Neokrendowskia*) *quadripustulata* Lundblad, venter male (after Lundblad 1943)

Subgenus *Pirapama* K. Viets, 1935

(Figs. 2877, 2883, 2889)

1935 *Pirapama* K. Viets, Zoologischer Anzeiger 112: 282.

Type species: *Geayia schubarti* K. Viets, 1935

DIAGNOSIS: Genital field with seven or more pairs of acetabula (Figs. 2883, 2889). Antagonistic bristle elongated (Fig. 2877). Legs without sexual dimorphism.

HABITAT: Standing waters, streams.

DISTRIBUTION: One species known from South America (Brazil, Paraguay).

Genus *Krendowskia* Piersig, 1895

(Figs. 92, 93, 2874, 2875, 2890, 2891)

1895 *Krendowskia* Piersig, Zoologischer Anzeiger 18: 147.

1902 *Arrenurella* Ribaga, Zoologischer Anzeiger 25: 504.

Type species: *Krendowskia latissima* Piersig, 1895

DIAGNOSIS: Gnathosoma not attached to a protrusable tube of soft integument, with proximal projections (Fig. 2875). Gnathosomal bay relatively deep. Projections associated with insertions of fourth legs rounded and not extending far laterally. Genital field with 3-5 pairs of acetabula arranged in a single row on each side if the gonopore (Figs. 92, 2874). Palp may be slightly rotated. Antagonistic bristle somewhat thickened but simple. P2 with two medial setae (Fig. 93). Excretory pore located well posterior to the genital field. Legs without sexual dimorphism.

KEY TO THE SUBGENERA

1	Genital field with 3-4 pairs of acetabula (Fig. 2874)	Subgenus *Krendowskia* s.s.
-	Genital field with five pairs of acetabula (Fig. 2890)	Subgenus *Neokrendowskia*

Subgenus *Krendowskia* s.s.

(Figs. 92, 93, 2874, 2875, 2891)

1931 *Krendowskiella* K. Viets, Zoologischer Anzeiger 93: 36 – new syn.

DIAGNOSIS: Genital field with three or four pairs of acetabula (Figs. 92, 2864).

HABITAT: Standing waters, streams.

DISTRIBUTION: Several species known from South America (Brazil, Paraguay, Chile, Argentina) and Central America (Mexico, Cook, 1980), one species from North America, two species from Europe, Israel (Smit 1997b) and Iran (Pesic & Saboori 2007) and one from the Oriental region (Burma, Lundblad 1969; Cambodia, Pešić & Smit 2016).

REMARKS: The difference between three or four pairs of acetabula has no taxonomic significance. Hence, *Krendowskiella* is synonymized with *Krendowskia*.

Subgenus *Neokrendowskia* Lundblad, 1941

(Fig. 2890)

1941 *Neokrendowskia* Lundblad, Entomologisk Tidskrift 62: 125.

Type species: *Krendowskia quadripustulata* Lundblad, 1930

DIAGNOSIS: Genital field with five pairs of acetabula (Fig. 2890).

HABITAT: Streams.

DISTRIBUTION: Two species known, one from Paraguay and one from Brazil (K. Viets 1959a).

Genus *Roqueella* Lundblad, 1930

(Figs. 2878, 2892-2894)

1930 *Roqueella* Lundblad, Zoologiska bidrag från Uppsala 13: 58.

Type species: *Roqueella flabellifera* Lundblad, 1930

DIAGNOSIS: Gnathosoma attached to a protrusable tube of soft integument, with short or no projections at proximal end, comparatively narrow. Gnathosomal bay relatively shallow. Projections associated with insertions of fourth legs not extending far laterally. Genital field with 3-8 pairs of acetabula arranged in a single row on each side of the gonopore. Palp may be somewhat rotated. Antagonistic bristle short, thickened and palmately-branched at distal end (Fig. 2878). Legs without sexual dimorphism. Excretory pore located well posterior to the genital field.

KEY TO THE SUBGENERA

1	Genital field with three pairs or four of acetabula (Fig. 2892)	Subgenus *Pararoqueella*
-	Genital field with more than three pairs of acetabula (Fig. 2893)	Subgenus *Roqueella* s.s.

Subgenus *Roqueella* s.s.

(Figs. 2893, 2894)

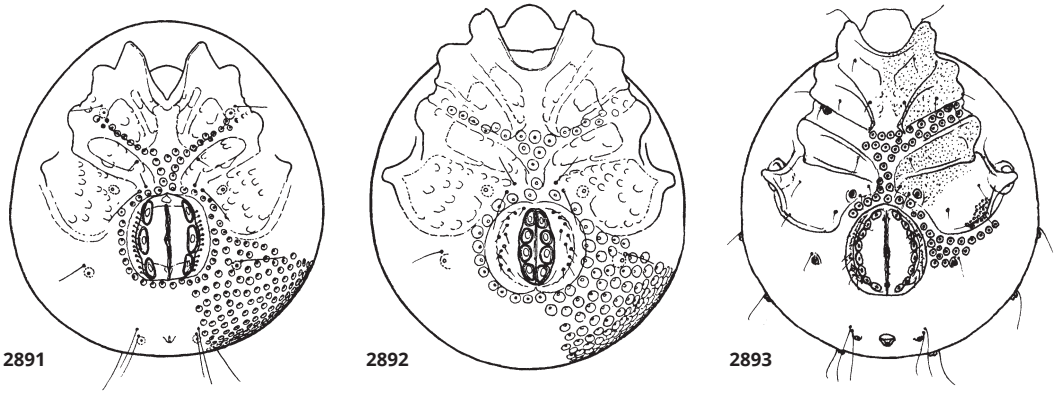
1954 *Decaroqueella* K. Viets, Archiv für Hydrobiologie 49: 150 – new syn.

1959 *Hexaroqueella* K. Viets, Archiv für Hydrobiologie 56: 149 – new syn.

DIAGNOSIS: Genital field with five pairs or more of acetabula.

HABITAT: Streams.

DISTRIBUTION: Four species known from South America (Brazil, Peru).



2891 **2892** **2893**

2891 *Krendowskia* (*Krendowskia*) *dorsolineata* Lundblad, venter female (after Lundblad 1943)

2892 *Roqueella* (*Pararoqueella*) *maculata* Lundblad, venter male (after Lundblad 1943)

2893 *Roqueella* (*Roqueella*) *lenzi* (K. Viets), venter female (after K. Viets 1954)

REMARKS: In my opinion, the differences between species with five, six or eight pairs of acetabula do not have a taxonomic significance and do not warrant the erection of several subgenera. Therefore, they are synonymized with the nominate subgenus.

Subgenus *Pararoqueella* Lundblad, 1937

(Figs. 2878, 2892)

1937 *Pararoqueella* Lundblad, Zoologischer Anzeiger 118: 262.

1937 *Neoroqeella* Lundblad, Zoologischer Anzeiger 118: 262 – new syn.
Type species: *Roqueella striata* Lundblad, 1937

DIAGNOSIS: Genital field with three or four pairs of acetabula (Figs. 2892).

HABITAT: Streams.

DISTRIBUTION: Several species known from Brazil and one species from Costa Rica (Cook 1980).

REMARKS: The difference between three or four pairs of acetabula has no taxonomic significance. Hence, *Neoroqueela* is synonymized with *Pararoqueela*.

Family Laversiidae Cook, 1955

1955 Laversiidae Cook, American Midland Naturalist 53: 415.

DIAGNOSIS: Lateral eyes lying beneath the integument. Idiosoma not flattened. Dorsal and ventral shields present. Dorsal shield with three pairs of glandularia and the postocularia, with prominent muscle scars. Coxae more or less in a single group. All suture lines between the coxae well developed. Cxgl-4 lying between Cx-IV and the genital field. Median margins of Cx-IV reduced to median angles. Cx-IV (and Cx-III in males) separated by the anteriorly projecting genital field (Fig. 81). Insertions of fourth legs lateral in position and with large associated projections. A well-developed ridge present on each side extending anteriorly and posteriorly from area of insertion of fourth legs. Males without cauda development. Genital field of male with an irregular number of acetabula (two to six) on each side located in a narrow gonopore field, located between Cx-III; well-developed genital plates present with numerous acetabula extending posteriorly and somewhat laterally; with a prominent apodeme located near middle (Fig. 82). Female gonopore field without acetabula, genital plates relatively short, extending laterally and with numerous acetabula (Fig. 83). Palp five-segmented and not uncate. P2 without ventral setae, P4 with a small thickened seta near middle of ventral side (Fig. 2895). Legs without swimming setae and not exhibiting sexual dimorphism. Monotypic.

Genus *Laversia* Cook, 1955

(Figs. 81-83, 2895)

1955 *Laversia* Cook, American Midland Naturalist 53: 415.
Type species: *Laversia berulophila* Cook, 1955

DIAGNOSIS: As for family.

HABITAT: Springs.

DISTRIBUTION: One species known from USA (Michigan, Wyoming).

Family Mideidae Thor, 1911

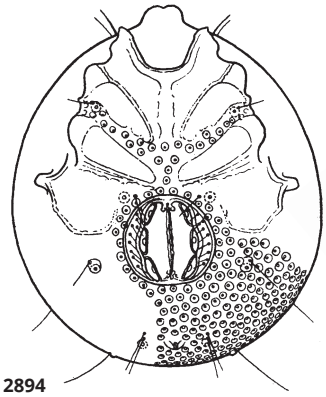
1911 Mideidae Thor, Zoologischer Anzeiger 37: 394.

DIAGNOSIS: Lateral eyes lying beneath the integument. Idiosoma domed, dorsal and ventral shields present. Gnathosoma separate from the coxae. Coxae fused with ventral shield, Cx-I medially fused. Cxgl-1 shifted to a position near the suture line Cx-I/Cx-II. Medial margins of Cx-IV reduced to median angles and widely separated by the genital field (Fig. 79). Two pairs of glandularia lying between the gonopore field and Cx-IV and with numerous (9-16) pairs of acetabula. Male genital field with paired weakly (Fig. 2898) to strongly (Fig. 80) developed wing-like lateral extensions. Female genital field with the acetabula in 1-3 rows on lunate genital plates. Insertion of fourth legs in anterior half of idiosoma. Palp not uncate, P4 without setal tubercles (Fig. 2302). Legs with swimming setae, with or without sexual dimorphism.

KEY TO THE GENERA

1 III-leg-6 bowed (Fig. 2896); male genital field with paired wing-like lateral projections (Fig. 80) Genus *Midea*

- III-leg-6 not bowed (Fig. 2897); male genital field without projections or with blunt, paired posterior projections (Fig. 2898) Genus *Eumidea*



2894



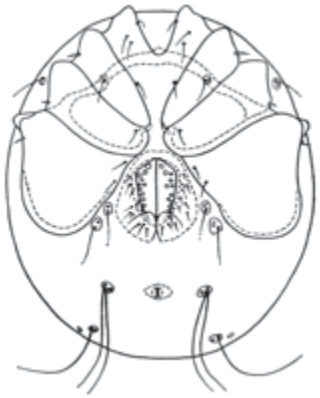
2895



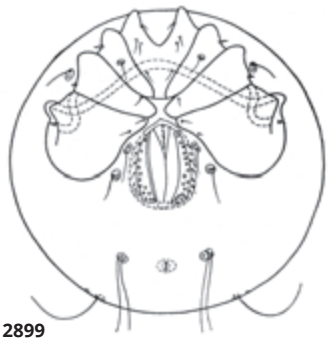
2896



2897



2898



2899

2894 *Roqueella* (*Roqueella*) *striata* Lundblad, venter female (after Lundblad 1943)

2895 *Laversia berulophila* Cook, palp female (after Cook 1974)

2896 *Midea orbiculata* (Müller), III-leg-5-6 male (after Cook 1974)

2897 *Eumidea paludosa* Tuzovskij, III-leg-5-6 male (after Tuzovskij 1982c)

2898 *Eumidea paludosa* Tuzovskij, venter male (after Tuzovskij 1982c)

2899 *Eumidea paludosa* Tuzovskij, venter female (after Tuzovskij 1982c)

Genus *Eumidea* Tuzovskij, 1982

(Figs. 2897-2901)

1982 *Eumidea* Tuzovskij, Zoologiceskij Zurnal 61: 199.

Type species: *Eumidea paludosa* Tuzovskij, 1982

DIAGNOSIS: Idiosoma slightly flattened. Genital field with 7-18 pairs of acetabula (Fig. 2899). Male genital field without projections (Fig. 2898); if paired projections developed, these blunt, not wing-like (Figs. 2900, 2901). III-Leg-5/6 of male unmodified (Fig. 2897).

HABITAT: Standing waters (pools, bogs).

DISTRIBUTION: Two species known from the Far-east of Russia (Tuzovsky 1982c).

Genus *Midea* Bruzelius, 1854

(Figs. 79, 80, 2896, 2902)

1854 *Midea* Bruzelius, Beskrifning öfver Hydrachnider, som förekomma Skåne: 35.

1885 *Asperia* Haller, Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich 30: 88.

Type species: *Hydrachna orbiculata* Müller, 1776

DIAGNOSIS: Paired projections of male genital field directed laterally, wing-shaped, at their base separating on each side anterolateral acetabula from more numerous medial acetabula (Fig. 80). III-leg-5 distally enlarged, III-leg-6 shortened and strongly curved with several stout setae (Fig. 2896). The two claws of fourth leg differing strongly in size and shape.

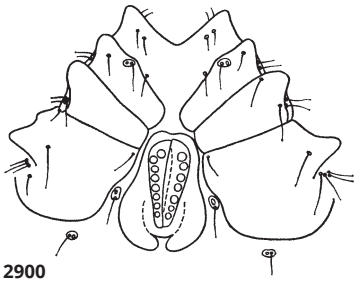
HABITAT: Standing waters and slowly flowing streams.

DISTRIBUTION: Holarctic, with three species known from North America (Young 1968) and one species from Europe.

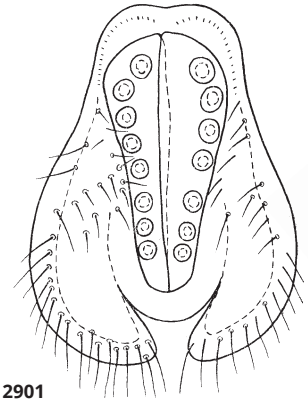
Family Mideopsidae Koenike, 1910

1910 Mideopsidae Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 130.

1937 Mideopsellinae Lundblad, Zoologischer Anzeiger 118: 258 - Pešić et al. (2013).



2900



2901



2902

2900 *Eumidea tundrosum* Tuzovskij, venter male (after Tuzovskij 1982c)

2901 *Eumidea tundrosum* Tuzovskij, genital field male (after Tuzovskij 1982c)

2902 *Midea expansa* Marshall, palp female (after Cook 1974)

1986 Phreatomideopsinae Schwoerbel, Archiv für Hydrobiologie 106: 75 - Pešić et al. (2013).

DIAGNOSIS: Lateral eyes lying below integument. Idiosoma flattened. Dorsal and ventral shield present, usually separated, rarely fused anteriorly, surface varying from smooth to some development of sculpturing or ridges. Gnathosoma separated from the coxae, chelicera not fused medially. Cx-IV usually triangular in shape with the medial margins reduced to medial angles but occasionally with moderate development of median margins. Generally, Cxgl-2 (and in one genus a second pair of glandularia) lying immediately posterior to Cx-IV, but occasionally lateral to the genital field. Projections associated with insertions of fourth legs variously developed or actually absent. Genital field completely surrounded by ventral shield in both sexes. Gonopore field narrow in males, varying from slightly to much wider in females. Three (the typical number) to numerous pairs of acetabula located in one or more rows on each side, in males in the gonopore field, in females lying either in the gonopore field or on genital plates flanking the gonopore. Females with the acetabula flanked laterally by setae-bearing sclerites which may be separate but are most often fused with the ventral shield. Palp five-segmented with various intermediate states between uncate and not uncate. Legs with or without swimming setae. Sexual dimorphism generally involves only the genital field, but occasionally also idiosoma, legs and palp.

KEY TO THE SUBFAMILIES

1 Genital field with more than seven pairs of acetabula (Figs. 2903, 2904) 2

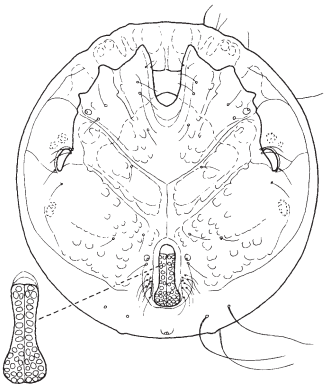
- Genital field with three to seven (occasionally eight) pairs of acetabula (Fig. 2905) 3

2 P4 ventrally with a large, tooth-like seta (Fig. 2906); IV-leg-4 of male with one or more stout, curved setae (Fig. 2907) Subfamily Gretacarinae

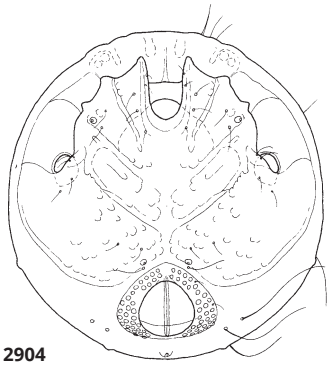
- P4 without a large, tooth-like seta (Fig. 2908); male fourth leg not modified Subfamily Plaumanniinae

3(1) Acetabula of females located on the ventral shield flanking the gonopore (Fig. 2905); males with two pairs of acetabula in the gonopore field, the posterior third pair partially covered by sclerites (Figs. 2909, 2910) Subfamily Guineaxonopsinae

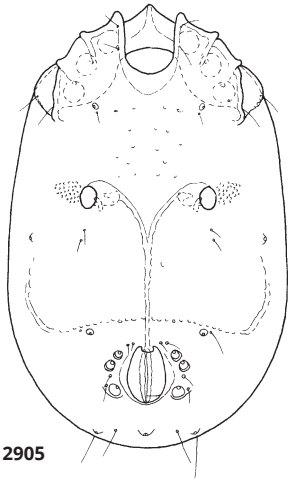
- Acetabula of males and females in the gonopore field (Figs. 2911, 2912) Subfamily Mideopsinae



2903



2904



2905

2903 *Gretacarus australicus* K.O. Viets, venter male (after Cook 1986)

2904 *Gretacarus australicus* K.O. Viets, venter female (after Cook 1986)

2905 *Guineaxonopsis australica* Cook, venter female (after Cook 1986)

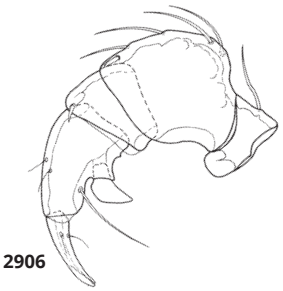
Subfamily Mideopsinae Koenike, 1910

1910 Mideopsidae Koenike, Abhandlungen herausgegeben vom naturwissenschaftlichen Verein zu Bremen 20: 130.

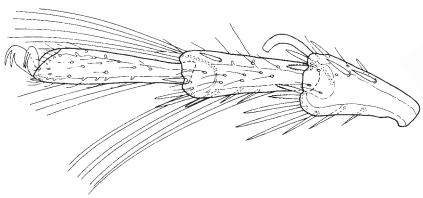
DIAGNOSIS: Genital field with 3-7 pairs of acetabula. Acetabula of female lying in the gonopore. Palp uncate or not uncate, P2 without a serrated flange, P4 with or without tooth-like seta. Legs with or without swimming setae and with or without sexual dimorphism.

KEY TO THE GENERA

1	Palp uncate (Fig. 2913)	2
-	Palp not uncate (Fig. 2914)	5
2	Genital field with three pairs of acetabula (Fig. 2915)	Genus *Mideopsella*
-	Genital field with four or more pairs of acetabula (Fig. 2916)	3
3	Genital field located well posterior to Cx-IV (Fig. 2917)	4
-	Genital field extending between Cx-IV (Fig. 2916)	Genus *Tiramideopsis*
4	Acetabula lying in the gonopore field in both mle and female; Cx-IV without a medial suture line (Fig. 2917); legs with swimming setae	Genus *Mideopsellides*
-	Acetabula lying in the gonopore field in the male, in sclerotized areas flanking the gonopore field in the female; Cx-IV with a medial suture line (Fig. 2918); legs without swimming setae	Genus *Tillia*



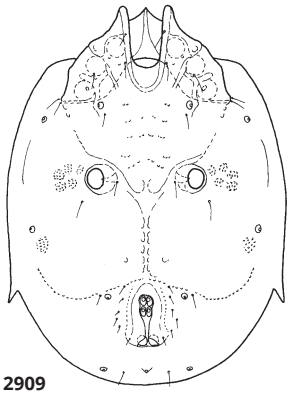
2906



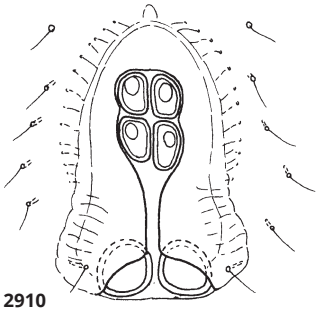
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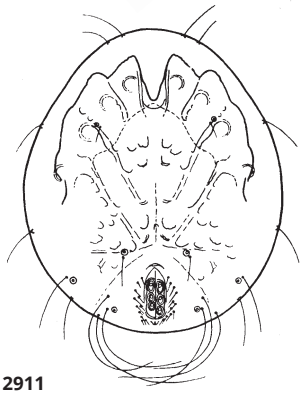
2908



2909



2910



2911

2906 *Gretacarus australicus* K.O. Viets, palp male (after Cook 1986)
2907 *Gretacarus australicus* K.O. Viets, IV-leg-4-6 male (after Cook 1986)
2908 *Plaumannia arrenuripalpis* Lundblad, palp male (after Cook 1974)
2909 *Guineaxonopsis serratipalpis* (Cook), venter male (after Cook 1983)
2910 *Guineaxonopsis serratipalpis* (Cook), genital field male (after Cook 1983)
2911 *Mideopsis* (*Mideopsis*) *ovum* Lundblad, venter male (after Lundblad 1943)

5(1) Genital field with three pairs of acetabula (Fig. 2919) 6

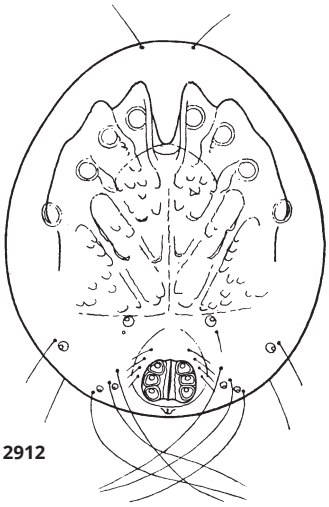
- Genital field with four or five pairs of acetabula (Fig. 2920) 11

6 Ventral margin of P4 without projection or setae (Fig. 2921); swimming setae absent
Genus *Phreatomideopsis*

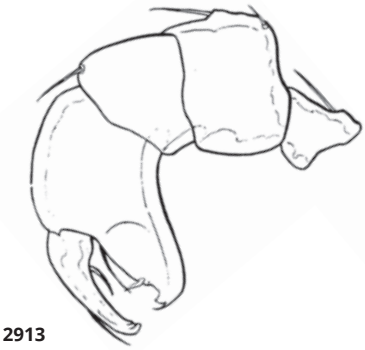
- Ventral margin of P4 usually with a projection and always with a pair of small setae (Fig. 2922); swimming setae usually present but if absent, then P4 with a large ventral projection (Fig. 2923) 7

7 Ridges extending anterolaterally from region of insertion of fourth legs (Fig. 2924); the two ventral setae of P4 usually on a projection and located near middle of segment (Fig. 2923) 8

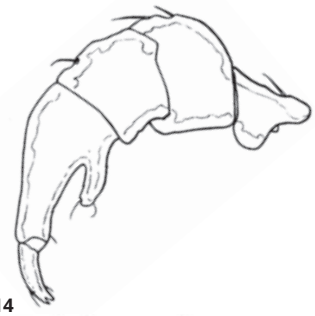
- No ridges extending anterolaterally from insertion of fourth legs (Fig. 2925); the pair of setae on the ventral margin of P4 inserted at extreme proximal end of segment (Fig. 2922)
Genus *Mideopsides*



2912



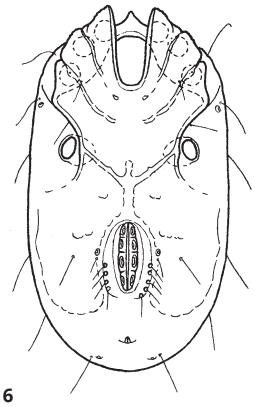
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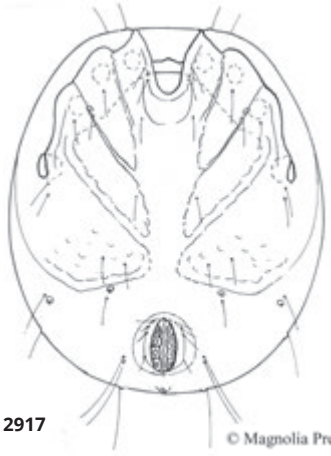
2914



2915



2916



2917

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2912 *Mideopsis* (*Mideopsis*) *ovum* Lundblad, venter female (after Lundblad 1943)

2913 *Mideopsella forficipalpis* Lundblad, palp male (after Cook 1974)

2914 *Mideopsis* (*Mideopsis*) *longidens* Lundblad, palp male (after Cook 1974)

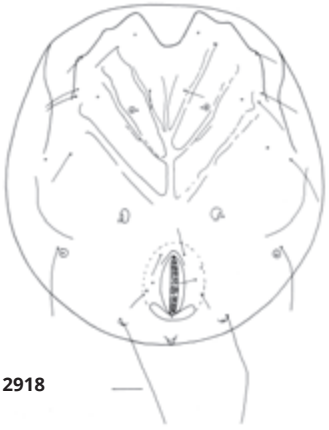
2915 *Mideopsella forficipalpis* Lundblad, venter male (after Cook 1974)

2916 *Tiramideopsis* (*Tiramideopsis*) *ovalis* Cook, venter male (after Cook 1974)

2917 *Mideopsellides geae* K.O. Viets, venter male (after Pešić et al. 2013) Reproduced with permission from copyright holder

8 Cxgl-4 located at same level as, or slightly anterior to, first pair of acetabula (Fig. 2924); swimming setae typically absent 9

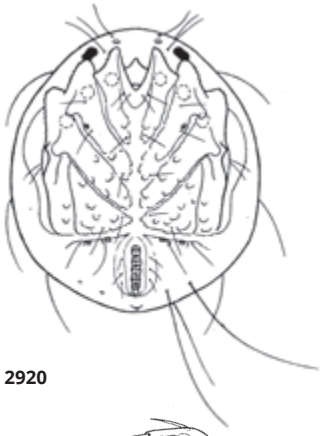
- Cxgl-4 located well anterior to genital field (Fig. 2926); swimming setae present 10



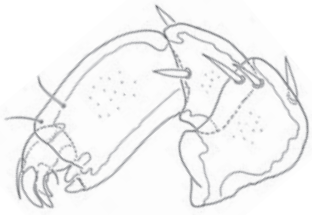
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2919



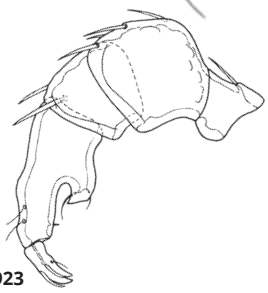
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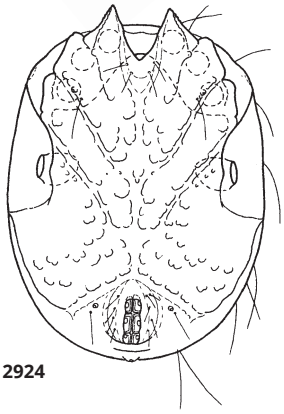
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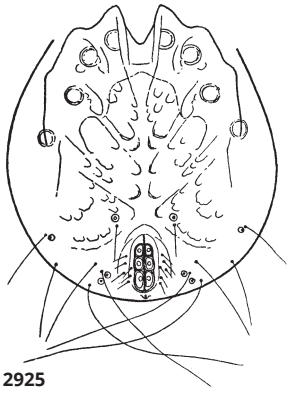
2922



2923



2924



2925



2926

2918 *Tillia davisae* Harvey, venter male. Scale bar = 50 µm.

2919 *Phreatomideopsis arrenuripalpis* Schwoerbel, venter female (after Pešić et al. 2013) Reproduced with permission from copyright holder

2920 *Djeboa compressa* K. Viets, venter male (after Cook 1974)

2921 *Phreatomideopsis arrenuripalpis* Schwoerbel, P2-5 female (after Pešić et al. 2013) Reproduced with permission from copyright holder

2922 *Mideopsides gibberipalpis* (Lundblad), palp female (after Cook 1974)

2923 *Xystonotus* (*Xystonotus*) *mexicanus* (Cook), palp female (after Cook 1980)

2924 *Xystonotus* (*Xystonotus*) *asper* Wolcott, venter male (after Cook 1974)

2925 *Mideopsides gibberipalpis* (Lundblad), venter male (after Lundblad 1943)

2926 *Neoxystonotus reelfootensis* (Hoff), venter female (after Cook 1974)

9 P4 with a ventral projection with two small setae (Fig. 2923) Genus *Xystonotus*

- P4 with a ventral projection with a tooth-like seta (Fig. 2927) Genus *Penemideopsis*

10(8) Gonopore flanked by two or three pairs of small setae (Fig. 2926); P4 with a well-developed ventral projection (Fig. 2928); male with a pronounced elongation and curvature of IV-leg-5 (Fig. 2929); dgl-2 and dgl-3 often grouped together medially at posterior end of dorsal shield (Fig. 2930) Genus *Neoxystonotus*

- Gonopore flanked by six to numerous pairs of small setae (Fig. 2931); projections of ventral side of P4 varying from slightly (Fig. 2932) to well-developed (Fig. 2933); legs without sexual dimorphism or position of the dorsal glandularia Genus *Mideopsis*

11(5) Genital field with four pairs of acetabula; swimming setae absent Genus *Octomideopsis*

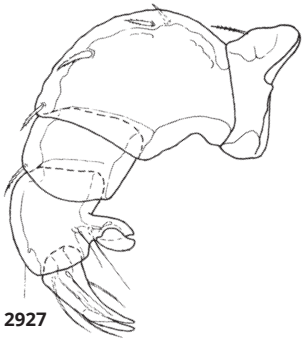
- Genital field with five pairs of acetabula (Fig. 2920); swimming setae present Genus *Djeboa*

Genus *Djeboa* K. Viets, 1911

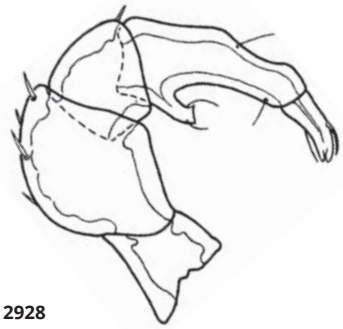
(Figs. 2920, 2934, 2935)

1911 *Djeboa* K. Viets, Zoologischer Anzeiger 38: 494 – Pešić et al. (2013).

Type species: *Djeboa multidentata* K. Viets, 1911



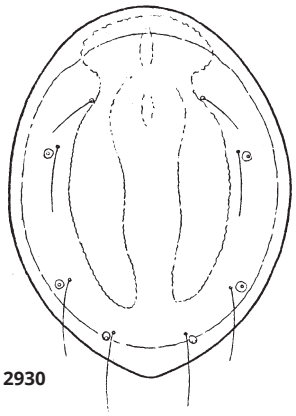
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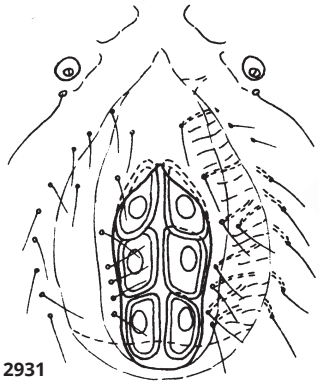
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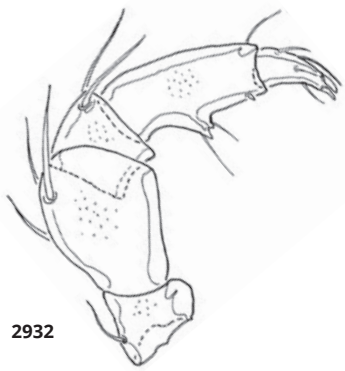
2929



2930



2931



2932

2927 *Penemideopsis phreatica* Cook, palp male (after Cook 1986)

2928 *Neoxystonotus reelfootensis* (Hoff), palp female (after Cook 1974)

2929 *Neoxystonotus reelfootensis* (Hoff), fourth leg female (after Cook 1974)

2930 *Neoxystonotus genitalis* (Lundblad), dorsum male (after Lundblad 1943)

2931 *Mideopsis* (*Mideopsis*) *magna*, genital field male (after Cook 1980)

2932 *Mideopsis* (*Mideopsis*) *orbicularis* (Müller), palp female (Gerecke et al. 2016)

DIAGNOSIS: Surface of dorsal shield either smooth or (more often) with a central depression surrounded by lateral ridges. Idiosoma pores outside the ridges relatively large, those inside the ridges very small. Medial margins of Cx-IV reduced to median angles. Posterior suture lines of Cx-IV tending to extend more or less at right angles to longitudinal axis of ventral shield (Figs. 2920, 2934). No ridges extending anterolaterally from insertion of fourth legs. Cxgl-4 and an additional pair of glandularia located immediately posterior to posterior margin of Cx-IV. Genital field with five pairs of acetabula. P4 lacking ventral projections (Fig. 2935). Legs with swimming setae, without sexual dimorphism.

HABITAT: Streams, springs, standing waters (ponds).

DISTRIBUTION: Numerous species known the Afrotropical region (Pešić et al. 2013).

Genus *Mideopsella* Lundblad, 1937

(Figs. 2913, 2915, 2936)

1937 *Mideopsella* Lundblad, Zoologischer Anzeiger 118: 258.

Type species: *Mideopsella forficipalpis* Lundblad, 1937

DIAGNOSIS: Surface of dorsal shield smooth. Medial margins of Cx-IV reduced to median angles. Suture lines of Cx-IV indistinct. No ridges extending anterolaterally from insertion of fourth legs. Cxgl-4 located well anterior to genital field on posterior margin of Cx-IV (Fig. 2936). Genital field with three pairs of acetabula. Posterolateral of male genital field a group of small setae on each side (Fig. 2915). Palp uncate and with an antagonistic bristle (Fig. 2913). Legs with swimming setae and without sexual dimorphism.

HABITAT: Streams.

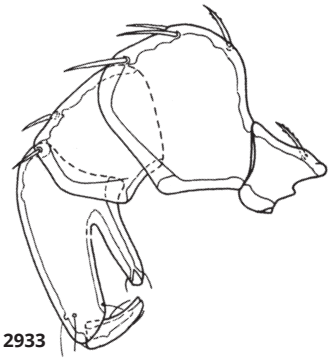
DISTRIBUTION: One species known from South America (Brazil, Paraguay).

Genus *Mideopsellides* K.O. Viets, 1962

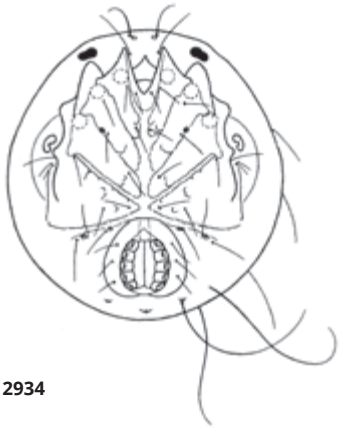
(Figs. 2917, 2937-2939)

1962 *Mideopsellides* K.O. Viets, Zoologischer Anzeiger 168: 365.

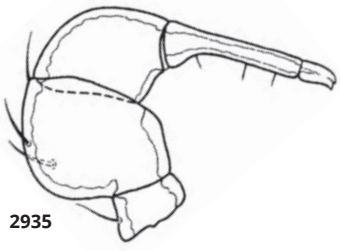
Type species: *Mideopsellides geae* K.O. Viets, 1962



2933



2934



2935

2933 *Mideopsis* (*Mideopsis*) *choconensis* Cook, palp female (after Cook 1980)

2934 *Djeboa compressa* K. Viets, venter female (after Cook 1974)

2935 *Djeboa expansipalpis* (Cook), palp female (after Cook 1974)

DIAGNOSIS: Surface of dorsal shield smooth. Suture lines of Cx-IV distinct and extending only slightly posterolaterally. Coxae well separated laterally. No ridges extending anterolaterally from insertion of fourth legs. Cxgl-4 located far anterior to genital field. Insertions of fourth legs partially covered by projections of Cx-IV. Genital field with four pairs of acetabula in the gonopore field, touching but separated in male (Fig. 2917), located on lateral platelets in female (Fig. 2937). Gonopore field of female noticeably wider than long. Four pairs of setae associated with the genital field, these in the sclerotization flanking the gonopore field in male but lying on the genital plates in female. Palp uncate, lacking ventral tubercles and pointed distoventrally (Fig. 2938). Legs with swimming setae and with sexual dimorphism, IV-leg-5 of male enlarged, ventral margin with several short setae (Fig. 2939).

HABITAT: Streams.

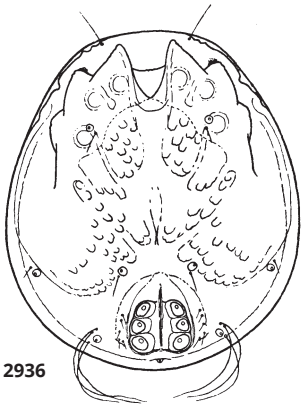
DISTRIBUTION: One species known from South Africa.

Genus *Mideopsides* Lundblad, 1943

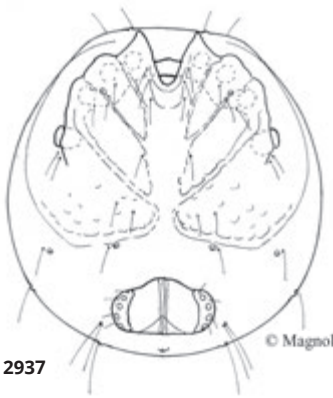
(Figs. 2922, 2925, 2940-2942)

1943 *Mideopsides* Lundblad, Kongliga Svenska vetenskaps-akademiens handlingar, (serie 3) 20: 120 – Pešić et al. (2013).

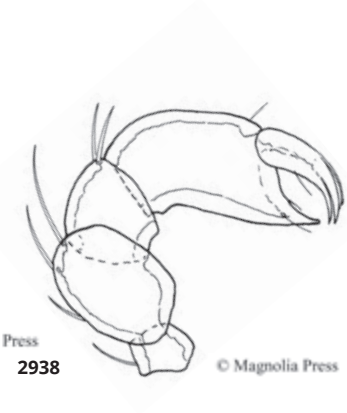
Type species: *Mideopsis gibberipalpis* Lundblad, 1943



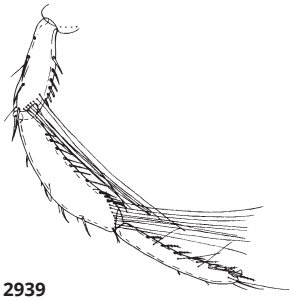
2936



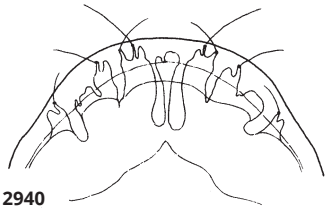
2937



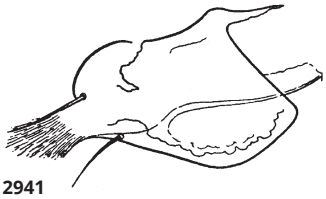
2938



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2936 *Mideopsella forficipalpis* Lundblad, venter female (after Lundblad 1943)

2937 *Mideopsellides geae* K.O. Viets, venter female (after Pešić et al. 2013) Reproduced with permission from copyright holder

2938 *Mideopsellides geae* K.O. Viets, palp male (after Pešić et al. 2013) Reproduced with permission from copyright holder

2939 *Mideopsellides geae* K.O. Viets, IV-leg-4-6 male (after Cook 1974)

2940 *Mideopsides beta* (Cook), anterior part of venter female (after Cook 1980)

2941 *Mideopsides gibberipalpis* (Lundblad), gnathosoma female (after Lundblad 1943)

DIAGNOSIS: Dorsal and ventral shields may or may not be fused anteriorly. Surface of dorsal shield varying from smooth to various ornamentations and ridges. Gnathosoma with the dorsal setae somewhat enlarged, with a fringe of setae around the mouth opening (Fig. 2941). Anterior portion of ventral shield with lobed, posteriorly-directed apodemes (Fig. 2940). Posterior suture line of Cx-IV poorly developed. Medial margins of Cx-IV reduced to median angles. No ridges extending anterolaterally from insertion of fourth legs (Figs. 2925, 2942). Cxgl-4 lying anterior to genital field, with the gland portion occasionally missing. Large projections of Cx-IV nearly completely covering the insertions of fourth legs. Genital field with three pairs of acetabula. One to two pairs of glandularia with long associated setae at posterior end of ventral shield. Palp not uncate; the typical two pairs of small setae of P4 at the extreme proximal end may be located on a very small projection (Fig. 2922). Legs with swimming setae, without sexual dimorphism.

HABITAT: Streams.

DISTRIBUTION: Five species known from South America (Brazil, Peru) and Central America (Costa Rica, Mexico, Cook 1980).

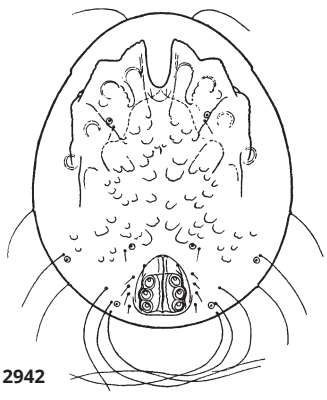
Genus *Mideopsis* Neuman, 1880

(Figs. 99, 100, 2911, 2912, 2914, 2931-2933, 2943, 2944)

1880 *Mideopsis* Neuman, Kongliga Svenska vetenskaps-akademiens handlingar 17: 67.

Type species: *Mideopsis depressa* Neuman, 1880 = *Mideopsis orbicularis* (Müller, 1776)

DIAGNOSIS: Idiosoma with or without sexual dimorphism. Surface of dorsal shield varying from smooth to various ornamentations and ridges. Posterior suture lines of Cx-IV indistinct and not closely surrounding genital field. Medial margins of Cx-IV reduced to median angles (Figs. 99-100). A short ridge extending anterolaterally from middle of Cx-III. Cxgl-4 usually located well anterior to genital field (Figs. 2911, 2912). Small projections of Cx-IV associated with insertions of fourth legs. Genital field with three pairs of acetabula, flanked by setae-bearing sclerites (Fig. 2931) which are typically fused with ventral shield but separate in some species. Typically, the glandularia with long associated setae at posterior end of ventral shield lacking the associated glands, but in one species glandularia developed. Palp not uncate, palp morphology various. P4 with two small setae near middle of segment which lie either directly on surface or on variously developed tubercles (Figs. 2932, 2933). Legs with swimming setae, without sexual dimorphism.



2942



2943



2944

2942 *Mideopsides gibberipalpis* (Lundblad), venter female (after Lundblad 1943)

2943 *Mideopsis* (*Wattleopsis*) *goldbergi* Wiles, venter male (after Wiles 1999) Reproduced with permission from Lee Kong Chian Natural History Museum

2944 *Mideopsis* (*Wattleopsis*) *goldbergi* Wiles, dorsum male (after Wiles 1999) Reproduced with permission from Lee Kong Chian Natural History Museum

KEY TO THE SUBGENERA (FEMALES NOT DISTINGUISHABLE AT SUBGENUS LEVEL)

1 Posterior idiosoma margin without indentation; excretory pore not on a bulbous projection (Figs. 99, 2911) Subgenus *Mideopsis* s.s.

- Posterior idiosoma margin indented; excretory pore on a bulbous projection (Fig. 2943) Subgenus *Wattleopsis*

Subgenus *Mideopsis* s.s.

(Figs. 99, 100, 2911, 2912, 2914, 2931-2933)

DIAGNOSIS: Idiosoma without posterior indentation, excretory pore not on a bulbous projection (Figs. 99, 2911).

HABITAT: Standing waters, streams, interstitial.

DISTRIBUTION: Numerous species described from the Holarctic and Neotropical regions. From the Oriental region only four species are known (Wiles 1999, 2004).

Subgenus *Wattleopsis* Wiles, 1999

(Figs. 2943, 2944)

1999 *Wattleopsis* Wiles, The Raffles Bulletin of Zoology 47: 422.

Type species: *Wattleopsis goldbergi* Wiles, 1999

DIAGNOSIS: A ridge extending anterolaterally from area posterior to insertion of fourth legs. Posterior idiosoma exhibiting sexual dimorphism, males have a concave posterior margin and the excretory pore on a bulbous projection (Fig. 2943).

HABITAT: Streams.

DISTRIBUTION: One species known from Sulawesi, Indonesia.

Genus *Neoxystonotus* Lundblad, 1927

(Figs. 2926, 2928-2930, 2945)

1927 *Neoxystonotus* Lundblad, Zoologiska bidrag från Uppsala 11: 475 – Pešić et al. (2013).

Type species: *Xystonotus torrei* Marshall, 1927

DIAGNOSIS: Dorsal shield with various development of ridges. In males there is a tendency for shifting the dorsal glandularia posteriorly, often ending with two pairs of glandularia in a group at posterior end (Fig. 2930). In females, dorsal glandularia equally distributed over dorsal shield. Posterior margin of Cx-IV indistinct. Coxae well separated medially. Short ridges extending anterolaterally from Cx-III. Cxgl-4 located anterolateral to genital field (Figs. 2926, 2945). Small projections associated with insertions of fourth legs. Genital field with three pairs of acetabula and 3-5 pairs of setae flanking the gonopore field. Two pairs of glandularia with long associated setae located at posterior end of ventral shield. Palp not uncate. P4 proximally with a well-developed tubercle with two small setae (Fig. 2928). Legs with swimming setae. IV-leg-5 of males enlarged and bowed, ventral margin with numerous setae (Fig. 2929).

HABITAT: Streams, standing waters (lakes, ponds).

DISTRIBUTION: More than a dozen species known from South America (Brazil, Paraguay), Central America (Mexico, Costa Rica, Cook 1980), North America (Tennessee, Florida, Cook 1976b) and Cuba.

Genus *Octomideopsis* K. Viets, 1931

(Not illustrated)

1931 *Octomideopsis* K. Viets, Zoologischer Anzeiger 93: 47 – Pešić et al. (2013).

Type species: *Mideopsis minuta* Soar, 1910

DIAGNOSIS: Genital field with four pairs of acetabula. Legs without swimming setae.

HABITAT: Lakes.

DISTRIBUTION: One species known from Lake Tanganyika in East Africa.

REMARKS: An inadequately described species, with nothing more known than the number of acetabula and legs with swimming setae.

Genus *Penemideopsis* Cook, 1986

(Figs. 2927, 2946, 2947)

1986 *Penemideopsis* Cook, Memoirs of the American Entomological Institute 40: 300.

Type species: *Penemideopsis phreatica* Cook, 1986

DIAGNOSIS: (Male only) A ridge extending anterolaterally from insertions of fourth legs. Projections associated with insertion of fourth legs either greatly enlarged or small. Genital field with three pairs of acetabula; gonopore field narrow, bulging outwards in the region of the first two pairs of acetabula (Fig. 2947. Palp not uncate. P4 with a greatly enlarged, tooth-like seta on a large tubercle (Fig. 2927). Legs without swimming setae, without sexual dimorphism.

HABITAT: Interstitial.

DISTRIBUTION: Three species known from south-eastern and south-western Australia (Cook 1986, Harvey 1996c).

Genus *Phreatomideopsis* Schwoerbel, 1986

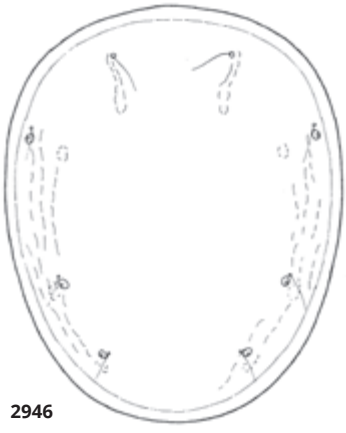
(Figs. 2919, 2921, 2948)

1986 *Phreatomideopsis* Schwoerbel, Archiv für Hydrobiologie 106: 76.

Type species: *Phreatomideopsis arrenuripalpis* Schwoerbel, 1986



2945



2946



2947

2945 *Neoxystonotus reelfootensis* (Hoff), venter male (after Cook 1974)

2946 *Penemideopsis phreatica* Cook, dorsum male (after Cook 1986)

2947 *Penemideopsis phreatica* Cook, venter male (after Cook 1986)

DIAGNOSIS: (Female only) Dorsal shield smooth and without ornamentation but with two very distinct apodemes medially from dgl-1 (Fig. 2948). Most suture lines of coxae well developed, but medial parts of suture lines Cx-I/Cx-II indistinct. Cxgl-1 at posterolateral margin of Cx-II. Cxgl-4 lateral to anterior margin of gonopore field (Fig. 2919). Insertions of fourth coxae without associated projections. Genital field with three pairs of acetabula, the latter flanked by a sclerite embracing the first pair of acetabula; this sclerite with 3-5 setae on each side. Palp lacking ventral projections (Fig. 2921). P4 distally with a peg-like seta, P5 distally with three stout, separated claw-like setae. Legs without swimming setae.

HABITAT: Interstitial.

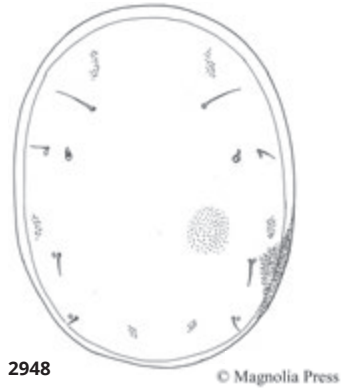
DISTRIBUTION: One species known from Chile.

Genus *Tillia* Harvey, 1990

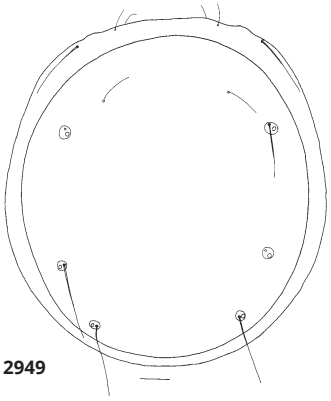
(Figs. 2918, 2949-2952)

1990 *Tillia*, Harvey, Memoirs of the Museum of Victoria 50: 344.

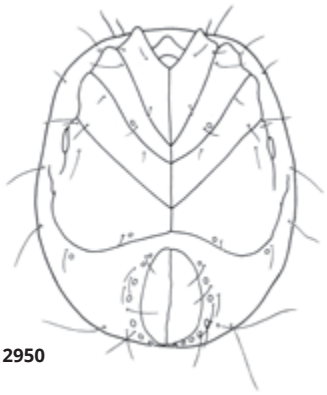
Type species: *Tillia davisae* Harvey, 1990


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2948



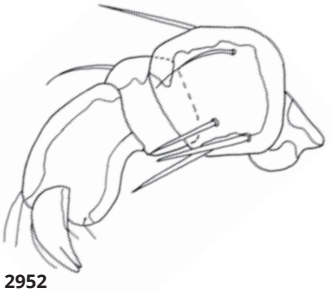
2949



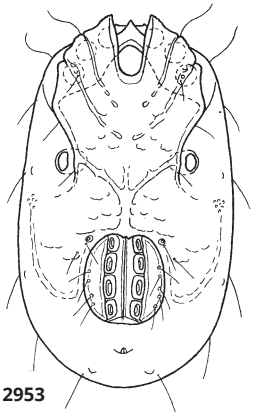
2950



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2952



2953

2948 *Phreatomideopsis arrenuripalpis* Schwoerbel, dorsum female (after Pešić et al. 2013) Reproduced with permission from copyright holder

2949 *Tillia davisae* Harvey, dorsum male. Scale bar = 50 µm.

2950 *Tillia davisae* Harvey, venter female (after Harvey 1990d)

2951 *Tillia davisae* Harvey, palp female (after Harvey 1990d)

2952 *Tillia davisae* Harvey, palp male. Scale bar = 50 µm.

2953 *Tiramideopsis* (*Tiramideopsis*) *ovalis* Cook, venter female (after Cook 1974)

DIAGNOSIS: Venter with a ridge anterior to insertions of fourth legs in the male, this ridge absent in the female. Coxal suture lines distinct. Coxae medially adpressed, Cx-IV with a short medial margin. Insertions of fourth legs without associated projections. Cxgl-4 located on Cx-IV (Fig. 2918), posterior and medial margin of Cx-IV lacking in the male, posterior margin of Cx-IV indistinct and medial margin short in the female. Genital field with 7-8 pairs of acetabula lying in the gonopore field in the male, on plates fused with the ventral shield in the female (Fig. 2950). Palp uncate and not rotated (Fig. 2951). Legs without swimming setae.

HABITAT: Streams.

DISTRIBUTION: One species known from Western Australia, Australia.

REMARKS: Thus far, the male was unknown. A description is given below.

Material examined. One male, Beedelup Brook downstream of falls, Beedelup National Park, Western Australia, Australia, 34° 25.107 S 115° 52.071 E, altitude 103 m above sea level, 10-ii-2019, leg. H. Smit.

Description: Male. Idiosoma ventrally 567 µm long, dorsally 583 µm long and 535 µm wide. Dorsum with three pairs of glandularia and a pair of postocularia (Fig. 2949). Dorsal shield 535 µm long and 463 µm wide. Venter with a ridge anterior to insertions of fourth legs. Suture lines of coxae distinct, posterior and medial margin of Cx-IV lacking (Fig. 2918). Cxgl-4 located on Cx-IV. Genital field with eight pairs of acetabula lying in the gonopore field. Genital field with a large postgenital sclerite; gonopore 100 µm long. P2 with three setae near ventral margin and one setae more dorsally (Fig. 2952); dorsal margin length of P1-5: 20, 48, 26, 52, 32 µm. Dorsal margin length of I-leg-4-6: 88, 108, 128 µm. Dorsal margin length of IV-leg-4-6: 130, 160, 150 µm. Legs as in female.

REMARKS: Harvey (1990d) illustrated the female with a distinct posterior margin of Cx-IV. However, a re-examination of several females revealed that the posterior margin is indistinct (Mark Harvey pers. comm.).

Genus *Tiramideopsis* Cook, 1967

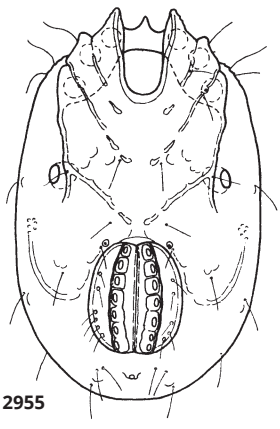
(Figs. 2916, 2953-2959)

1967 *Tiramideopsis* Cook, Memoirs of the American Entomological Institute 9: 190.

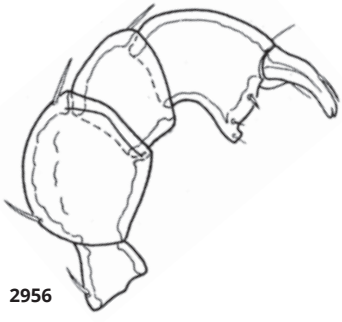
Type species: *Tiramideopsis ovalis* Cook, 1967



2954



2955



2956

2954 *Tiramideopsis* (*Tiramideopsis*) *ovalis* Cook, IV-leg-1-4 male (after Cook 1974)

2955 *Tiramideopsis* (*Navamideopsis*) *expansipes* Cook, venter female (after Cook 1974)

2956 *Tiramideopsis* (*Tiramideopsis*) *ovalis* Cook, palp male (after Cook 1974)

DIAGNOSIS: Idiosoma noticeably elongated. Surface of dorsal shield with a U-shaped ridge. Posterior suture line of Cx-IV indistinct and closely flanking the genital field. A ridge extending anterolaterally from insertion of fourth legs. Cxgl-4 closely flanking either middle or anterior end of genital field. Insertions of fourth legs without associated projections. Genital field lying in the genital bay formed by Cx-IV, with 4-7 pairs of acetabula in the gonopore field. Small setae flanking the acetabula on separate platelets in female, in male these setae with enlarged setal bases and lying on ventral shield. Palp uncate but without a well-developed antagonistic bristle (Fig. 2956). Legs without swimming setae. Palp and fourth leg may or may not exhibit sexual dimorphism.

KEY TO THE SUBGENERA

1 Genital field with four pairs of acetabula (Fig. 2953), IV-leg-3 and -4 of male anteroventrally with 1-2 stout setae (Fig. 2954) Subgenus *Tiramideopsis*

- Genital field with 6-7 pairs of acetabula (Fig. 2955); fourth legs without stout setae Subgenus *Navamideopsis*

Subgenus *Tiramideopsis* s.s.

(Figs. 2916, 2953, 2954, 2956)

DIAGNOSIS: Genital field with four pairs of acetabula (Figs. 2916, 2953). Male palp and coxae not exhibiting sexual dimorphism. Male IV-leg-3 and -4 anteroventrally with 1-2 stout setae (Fig. 2954). A single row of setae with large setal bases present on each side of the male genital field (Fig. 2916).

HABITAT: Interstitial.

DISTRIBUTION: Three species known from India (Cook 1967) and Oman (Gerecke 2004b) and one from Western Australia (Harvey 1998b).

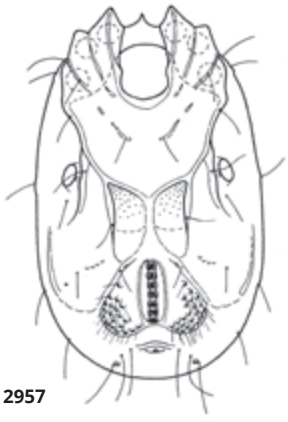
Subgenus *Navamideopsis* Cook, 1967

(Figs. 2955, 2957-2959)

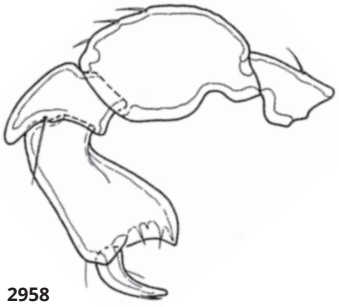
1967 *Navamideopsis* Cook, Memoirs of the American Entomological Institute 9: 195.

1975 *Mamideopsis* Habeeb, Leaflets of Acadian Biology 64: 3 – new syn.

Type species: *Tiramideopsis expansipes* Cook, 1967



2957



2958



2959

2957 *Tiramideopsis* (*Navamideopsis*) *expansipes* Cook, venter male (after Cook 1974)

2958 *Tiramideopsis* (*Navamideopsis*) *expansipes* Cook, palp male (after Cook 1974)

2959 *Tiramideopsis* (*Navamideopsis*) *expansipes* Cook, I-leg-5-6 female (after Cook 1974)

DIAGNOSIS: Medial of Cx-IV a pairs of deep concavities in male. Genital field with 6-7 pairs of acetabula (Fig. 2955). Several rows of setae with large setal bases present on each side of male genital field (Fig. 2957). Male P2 with an indentation in ventral margin, P3 with a dorsodistal extension and P4 of male (Fig. 2958) more expanded ventrally compared to female; palp of female not modified. Legs without sexual dimorphism. I-leg-6 greatly expanded (Fig. 2959).

HABITAT: Interstitial.

DISTRIBUTION: One species known from Maharashtra State, India.

REMARKS: Habeeb (1975a) gave the subgenus *Navamideopsis* rank of a genus, but here Cook (1967) is followed. Moreover, Habeeb (1975) erected the subgenus *Mamideopsis* for the female of *T. expansipes*, stating that it has four pairs of acetabula instead of 6-7. However, this female has 6-7 pairs of acetabula also, and a new subgenus is unnecessary. Therefore, I propose to synonymize *Mamideopsis* with *Navamideopsis*.

Genus *Xystonotus* Wolcott, 1900

(Figs. 2923, 2924, 2960-2963)

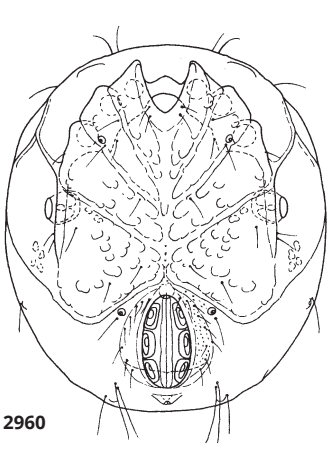
1900 *Xystonotus* Wolcott, Transactions of the American Microscopical Society 21: 185 – Pešić et al. (2013).

1936 *Paraxystonotus* Lundblad, Zoologischer Anzeiger 115: 51.

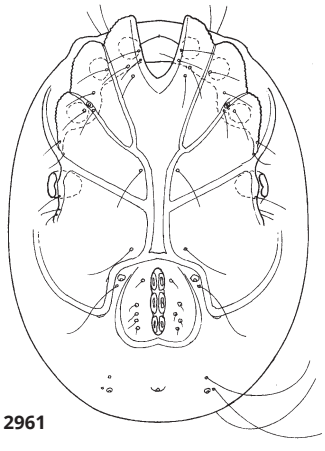
1975 *Herbsmideopsis* Habeeb, Leaflets of Acadian Biology 64: 3 – Cook (1976b).

Type species: *Xystonotus asper* Wolcott, 1900

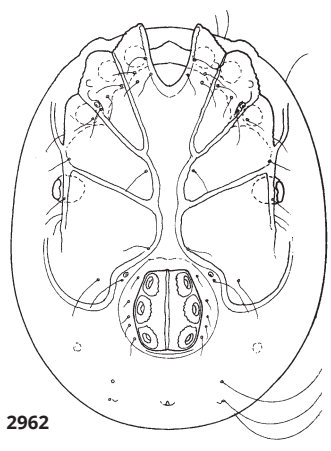
DIAGNOSIS: Dorsal shield with a pronounced V- or U-shaped ridge. Posterior suture lines of Cx-IV well developed. A ridge extending anterolaterally from the suture line Cx-III/Cx-IV (Figs. 2924, 2960). Median margins of Cx-IV often reduced to a median angle. Cxgl-4 located in a line with, or slightly anterior, to anterior end of gonopore, the gland portion occasionally absent. Insertions of fourth legs with associated projections. Genital field with three pairs of acetabula. Palp not uncate, with an enlarged, forward-directed tubercle bearing two small setae (Figs. 2923, 2963). Legs rarely with swimming setae, without sexual dimorphism.



2960



2961



2962

2960 *Xystonotus* (*Xystonotus*) *mexicanus* Cook, venter female (after Cook 1980)

2961 *Xystonotus* (*Mixomideopsis*) *sandola* (Cook), venter male (after Cook 2001)

2962 *Xystonotus* (*Mixomideopsis*) *sandola* (Cook), venter female (after Cook 2001)

KEY TO THE SUBGENERA

1 Swimming setae absent or present; suture lines of coxae indistinct, medially adpressed (Fig. 2960) Subgenus *Xystonotus* s.s.

- Swimming setae present; suture lines of coxae distinct, medially well separated (Fig. 2961) Subgenus *Mixomideopsis*

Subgenus *Xystonotus* s.s.

(Figs. 2923, 2924, 2960)

DIAGNOSIS: Swimming setae absent. Suture lines of coxae indistinct, medially adpressed (Figs. 2924, 2960).

HABITAT: Springs, streams, interstitial, standing waters (lakes).

DISTRIBUTION: A dozen species known from North America. Furthermore, one species known from Europe, one from Central America (Mexico, Cook 1980), one from Iran (Asadi & Pešić 2010) and one from Madagascar (see below).

Subgenus *Mixomideopsis* Cook, 2001

(Figs. 2961-2963)

2001 *Mixomideopsis* Cook, Acarologia 42: 234 - Pešić et al. (2013).

Type species: *Mideopsis sandola* Cook, 2001

DIAGNOSIS: Suture lines of coxae distinct and all suture lines medially well separated (Fig. 2961). A short ridge extending anterolaterally from the suture lines Cx-III/IV. Swimming setae present.

HABITAT: Streams.

DISTRIBUTION: One species known from South Africa (Cook 2001). Pešić et al. (2013) assigned a species from Madagascar to this subgenus, but in my opinion this species belongs in *Xystonotus* s.s. (coxae medially adpressed, suture lines indistinct).

Subfamily Gretacarinae K.O. Viets, 1978

1978 Gretacaridae K.O. Viets, Australian Journal of Marine and Freshwater Research 29: 89 – Cook (1986).

DIAGNOSIS: Dorsal and ventral shields present. Median margins of Cx-IV reduced to a median angle. No ridges extending anterolaterally from insertion of fourth legs. Occasionally a pair of ridges at median margin of Cx-III + Cx-IV. Cxgl-4 located anterolateral or slightly anterior to anterior end of genital field. Cx-IV partially, occasionally completely enclosing genital field in male, but only slightly if at all enclosing genital field in female. Genital field with numerous pairs of acetabula typically in several rows, in the gonopore field in male (Fig. 2903), on a plate nearly completely surrounding the gonopore field in female (Fig. 2904). Genital field of male narrow, occasionally with numerous small setae lateral to gonopore field (Fig. 2964). Genital field of female broad, with arc-like genital plates fused with the ventral shield. Palp not uncate. P4 of male with a large ventral tubercle with a tooth-like setae (Fig. 2906). Legs with swimming setae. Male IV-leg-4 with one or more large, stout, curved setae (Fig. 2907). Monotypic.

Genus *Gretacarus* K.O. Viets, 1978

(Figs. 2903, 2904, 2906, 2907, 2964)

1978 *Gretacarus* K.O. Viets, Australian Journal of Marine and Freshwater Research 29: 89.
Type species: *Gretacarus australicus* K.O. Viets, 1978

DIAGNOSIS: As for subfamily.

HABITAT: Streams, pools in streams.

DISTRIBUTION: Numerous species known from Australia (Cook 1986, Smit 1998c, 2016c), two species known from New Guinea (Wiles 1997c).

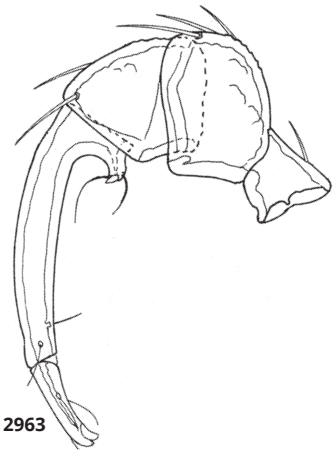
Subfamily Guineaxonopsinae Imamura, 1983

1983 Guineaxonopsinae Imamura, Proceedings of the Japanese Society of Systematic Zoology 26: 15.

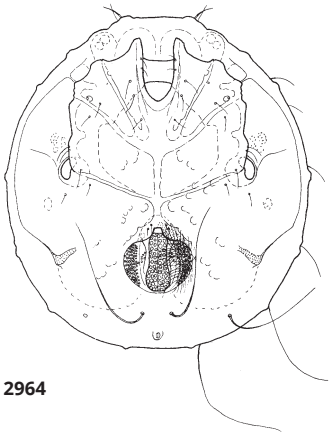
DIAGNOSIS: Lateral eye pigment reduced. Dorsal and ventral shields present. Idiosoma with or without pointed posterolateral extensions of the ventral shield. Suture lines of coxae obliterated. Insertions of fourth legs relatively close together and without projections (Fig. 2909). Genital field with three pairs of acetabula, in male anterior two pairs lying in the gonopore field, well-separated from posterior pair, posterior pair in male partially covered by fixed sclerites flanking the gonopore field (Figs. 2910, 2970, 2971). Acetabula of female located on the ventral shield flanking the gonopore field (Figs. 2905, 2972). Palp not uncate, either five-segmented (Fig. 2966) or appearing four segmented due to a partial fusion of P4 and P5. P2 and occasionally P3 with a broad, serrated hyaline flange, or P2 with a large, triangular extension. P4 with or without a ventral tubercle with only one small seta. Legs without swimming setae, IV-leg-1 longer than IV-leg-6.

KEY TO THE GENERA

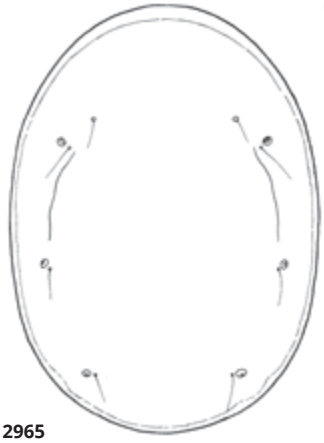
1 Dorsal shield with the gland portion of the glandularia present (Fig. 2965); palp five-segmented; P2 with a hyaline, serrated flange (Fig. 2966) or with a small triangular extension Genus *Guineaxonopsis*



2963



2964



2965

2963 *Xystonotus* (*Mixomideopsis*) *sandola* (Cook), palp female (after Cook 2001)

2964 *Gretacarus kyphopalpis* Cook, venter male (after Cook 1986)

2965 *Guineaxonopsis australica* Cook, dorsum female (after Cook 1986)

- Dorsal shield without the gland portion of the glandularia (Fig. 2967); palp appearing four-segmented due to partial fusion of P4+P5, P2 with a large triangular extension (Fig. 2968)
Genus *Kuschelacarus*

Genus *Guineaxonopsis* Imamura, 1983

(Figs. 2905, 2909, 2910, 2965, 2966, 2969)

1983 *Guineaxonopsis* Imamura, Proceedings of the Japanese Society of Systematic Zoology 26: 15.

1983 *Austramideopsoides* Cook, Contributions of the American Entomological Institute 21: 120 - Cook (1986).

Type species: *Guineaxonopsis cooki* Imamura, 1983

DIAGNOSIS: Dorsal shield with the gland portion of the glandularia present (Fig. 2965). Palp five-segmented. P2 with either a broad serrated, hyaline flange (Fig. 2966) or with a triangular extension (Fig. 2969), P3 with (Fig. 2969) or without (Fig. 2966) a ventral extension.

HABITAT: Interstitial.

DISTRIBUTION: Three species known from New Zealand (Cook 1983, Schwoerbel 1994), two from Australia (Cook 1986, Pesic & Smit 2009b) and one from New Guinea (Imamura 1983).

Genus *Kuschelacarus* Cook, 1992

(Figs. 2967, 2968, 2970-2972)

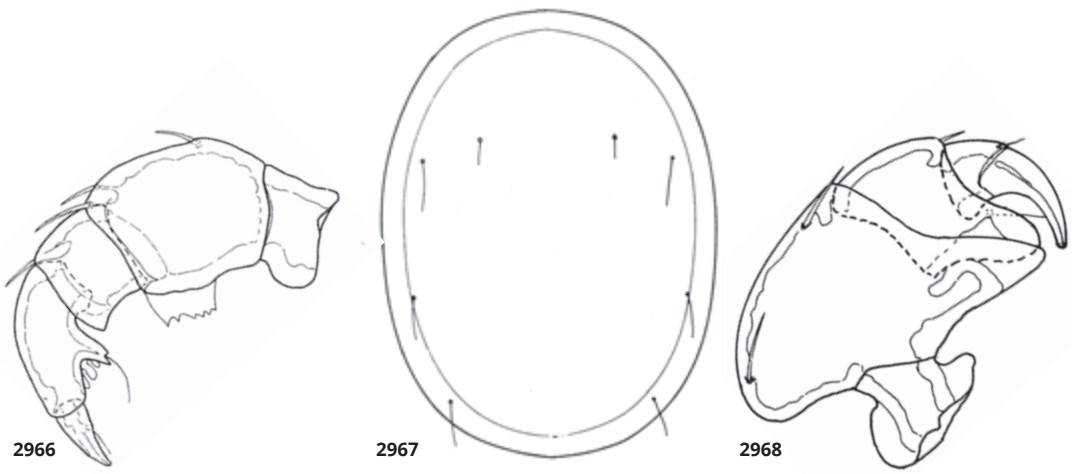
1992 *Kuschelacarus* Cook, Stygologia 7: 58.

Type species: *Kuschelacarus ovalis* Cook, 1992

DIAGNOSIS: Glandularia of dorsal shield without the gland bearing portion (Fig. 2967). Palp appearing four-segmented due to a partial fusion of P4 and P5; P4 extremely stocky. P2 with a large triangular extension (Fig. 2968).

HABITAT: Deep wells.

DISTRIBUTION: One species known from South Island, New Zealand.



2966 **2967** **2968**

2966 *Guineaxonopsis australica* Cook, palp female (after Cook 1986)

2967 *Kuschelacarus ovalis* Cook, dorsum male (after Cook 1992)

2968 *Kuschelacarus ovalis* Cook, palp male (after Cook 1992)

Subfamily Plaumanniinae Lundblad, 1936

1936 Plaumanniinae Lundblad, Zoologischer Anzeiger 115: 30 – Cook (1986).

DIAGNOSIS: Dorsal shield with a V-shaped ridge. Gnathosoma narrowed anteriorly and lacking long setae (Fig. 72). Suture lines of coxae indistinct. Cxgl-4 lying anterior to anterior end of genital field. Genital field with numerous acetabula in several rows, lying in the gonopore field in males (Figs. 2973, 2974), but on genital plates fused with the ventral shield in females (Fig. 2975). Palp uncate and not rotated. P2 without ventral projection, P4 distally with a stout, peg-like seta (Fig. 2908). Legs with swimming setae. Monotypic.

Genus *Plaumannia* Lundblad, 1936

(Figs. 72, 2908, 2973-2975)

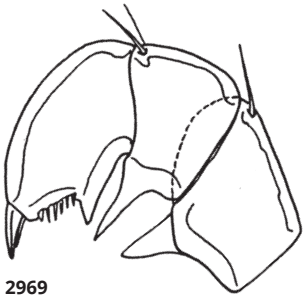
1936 *Plaumannia* Lundblad, Zoologischer Anzeiger 115: 30.

Type species: *Plaumannia arrenuripalpis* Lundblad, 1936

DIAGNOSIS: As for subfamily.

HABITAT: Streams.

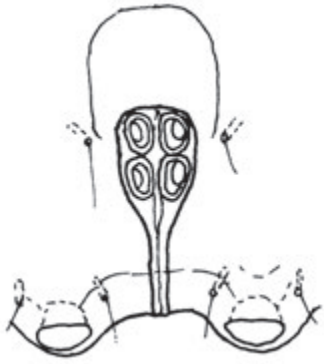
DISTRIBUTION: Two species known from South America (Brazil, Paraguay).



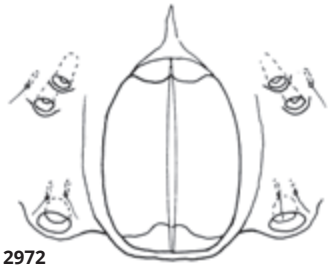
2969



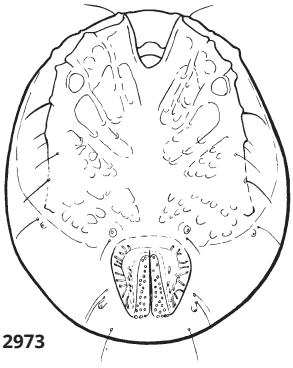
2970



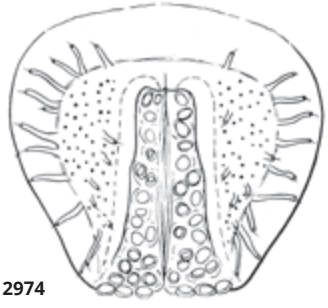
2971



2972



2973



2974

2969 *Guineaxonopsis confusus* (Schwoerbel), palp male (after Schwoerbel 1984)

2970 *Kuschelacarus ovalis* Cook, venter male (after Cook 1992)

2971 *Kuschelacarus ovalis* Cook, genital field male (after Cook 1992)

2972 *Kuschelacarus ovalis* Cook, genital field female (after Cook 1992)

2973 *Plaumannia arrenuripalpis* Lundblad, venter male (after Cook 1974)

2974 *Plaumannia arrenuripalpis* Lundblad, genital field male (after Cook 1974)

Family Momoniidae K. Viets, 1926

1926 Momoniidae K. Viets, Zoologischer Anzeiger 69: 195.

DIAGNOSIS: Idiosoma varying from soft to heavily sclerotized with dorsal and ventral shields. Dorsal shield entire or consisting of anterior and posterior plates. Gnathosoma separated from the coxae. Cx-I and Cx-II may be separated from the remaining of the ventral shield. Cxgl-1 either free or associated with Cx-III. Genital field with three or four pairs of acetabula, these may be subdivided into numerous smaller acetabula. Acetabula in males either free in the gonopore field or on plates incorporated in the ventral shield, in females on separate platelets. Palp five-segmented, not uncate. P4 with one or two ventral setae (Figs. 2996, 2999, 3006), if two setae are present either one or both thickened. Legs with or without swimming setae. Terminal segments of I-leg-5 highly modified, typically thickened and elongated, claw and claw socket enlarged (Figs. 2985, 3000, 3006, 3014). Occasionally first leg with a slight sexual dimorphism.

KEY TO THE SUBFAMILIES

1 Dorsal muscle attachments and glandularia plates irregular, often stellate (Fig. 3006); genital field on each side with numerous small acetabula arranged in three distinct groups (Fig. 2977) Subfamily Momonidinae

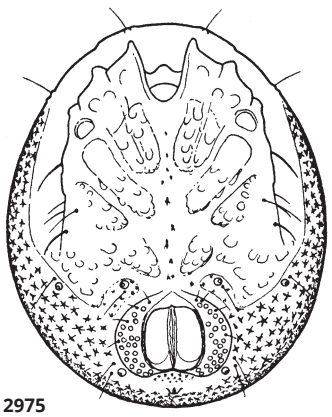
\- Dorsum soft, entire or with a divided shield, without star-shaped sclerites; genital field with three pairs of acetabula 2

2 Dorsum with one large plate surrounded by numerous smaller plates in two rings (Fig. 2978) Subfamily Cyclomomoniinae

\- Dorsal plate either entire or bipartite 3

3 Male acetabula free in the gonopore field (Fig. 2979); idiosoma sclerotization various; if female postgenital sclerite enlarged, then dorsal and ventral shields absent Subfamily Momoniinae

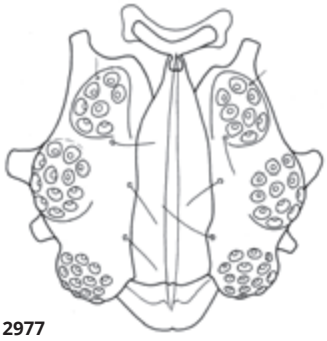
\- Male acetabula on plates incorporated into the ventral shield (Fig. 2980); female postgenital sclerite extremely enlarged; dorsal and ventral shields present Subfamily Stygomomoniinae



2975



2976



2977

2975 *Plaumannia arrenuripalpis* Lundblad, venter female (after Lundblad 1943)

2976 *Momonides trabecularis* Lundblad, dorsum + venter female (after Cook 1974)

2977 *Momonides trabecularis* Lundblad, genital field female (after Cook 1974)

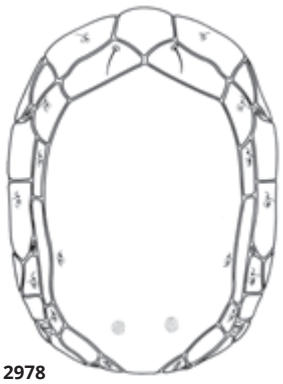
Subfamily Momoniinae K. Viets, 1926

1926 Momoniidae K. Viets, Zoologischer Anzeiger 69: 195.

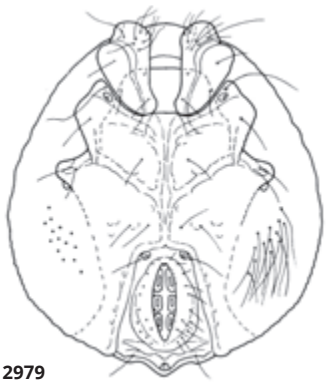
DIAGNOSIS: Idiosoma varying from soft to heavily sclerotized. Genital field with three pairs of acetabula, located in the gonopore field in males (Fig. 2989), on separate genital plates in females.

KEY TO THE GENERA

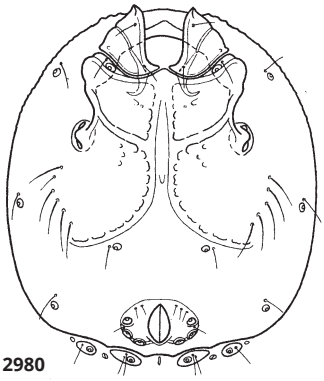
1	Anterior coxal group separated from the remainder of the ventral shield (Fig. 2981)	2
-	Anterior coxal group incorporated into the ventral shield (Fig. 2982)	3
2	Projection of I-leg-6 longer than half the length of I-leg-5 (Fig. 2983); Cx-IV without a group of setae (Fig. 2984)	Genus *Momonisia*
-	Projection of I-leg-6 less than one-third the length of I-leg-5 (Fig. 2985); Cx-IV with a group of posterior or posterolateral setae (Fig. 2979)	Genus *Momonia*
3	Dorsal shield entire (Fig. 2986)	Genus *Momoniella*
-	Dorsal shield divided (Fig. 2987)	4



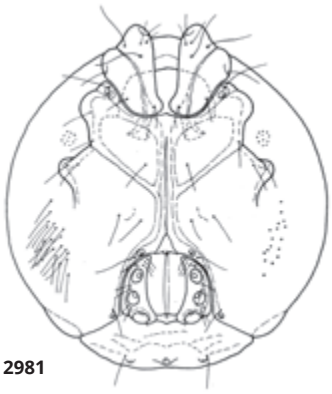
2978



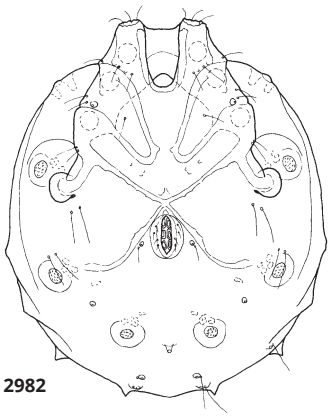
2979



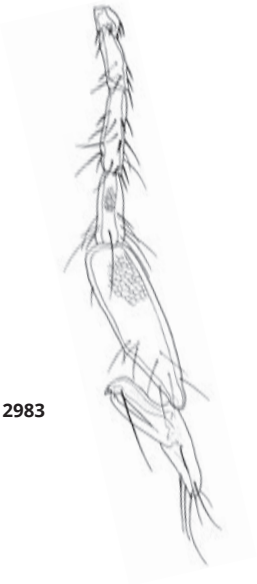
2980



2981



2982



2983

2978 *Cyclomomonia andrewi* I.M. Smith, dorsum male (after I.M. Smith 1989a)

2979 *Momonia* (*Momonia*) *falcipalpis* Halbert, venter male (after Cook 1974)

2980 *Stygomomonia* (*Stygomomonia*) *separata* Cook, venter male (after Cook 1974)

2981 *Momonia* (*Momonia*) *projecta* Cook, venter female (after Cook 1974)

2982 *Momoniella parva* Cook, venter male (after Cook 1986)

2983 *Momonisia phreatica* Petrova, first leg female (after Petrova 1974)

4 Dorsal shield consisting of many smaller platelets (Fig. 2987) Genus *Partidomomonia*

- Dorsal shield consisting of two large and several smaller platelets (Fig. 2988) 5

5 Anterior and posterior dorsal plate more or less equal in size (Fig. 2988), arrangement of female acetabula various 6

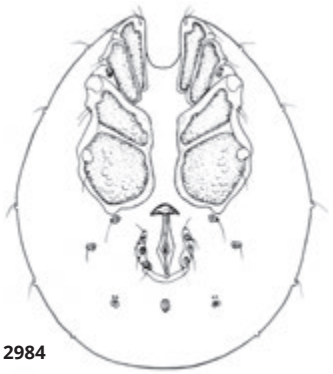
- Anterior dorsal plate distinctly smaller than posterior plate (Fig. 2989); acetabula of female located on genital plates (Fig. 2990) 7

6 Acetabula of female located in the gonopore field (Fig. 2991); dorsoglandularia lacking the gland bearing portion (Fig. 2988); venter without a posterior platelet or pair of platelets Genus *Hesperomomonia*

- Acetabula of female located on genital plates (Fig. 2992); dorsoglandularia with glands (Fig. 2993); venter posteriorly with a platelet or pair of platelets Genus *Notomomonia*

7 Cx-IV with three short setae (Fig. 2990); Lgl-3 located on ventral shield, Lgl-5 located on dorsal shield (Fig. 2989), Vgl-3 located on separate posterolateral platelet Genus *Austromomonia*

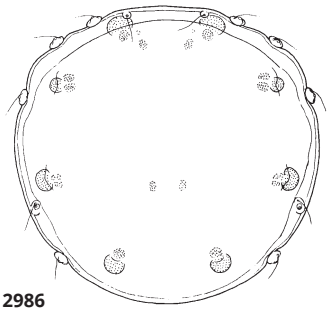
- Cx-IV with a group of long setae, or with a group of only five setae moderate in length (Fig. 2994); Lgl-3 and Lgl-5 located in the dorsal furrow (Fig. 2995), Vgl-3 located on the ventral shield Genus *Neomomonia*



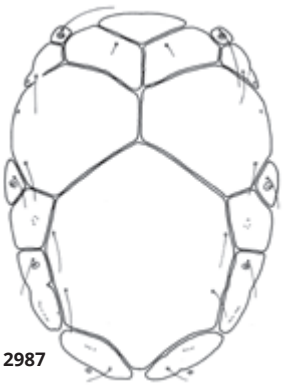
2984



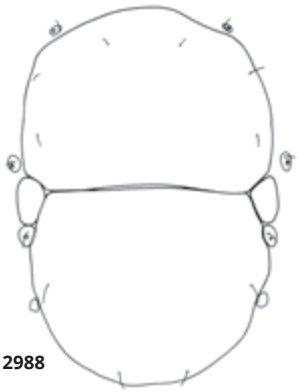
2985



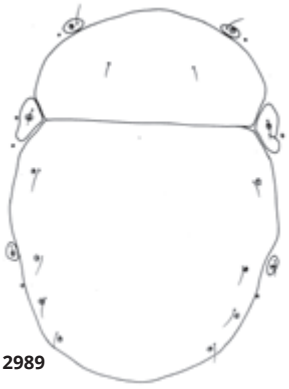
2986



2987



2988



2989

2984 *Momonisia phreatica* Petrova, venter female (after Petrova 1974)

2985 *Momonia* (*Kondia*) *karelica* (Sokolow), l-leg-4-6 female (after Cook 1974)

2986 *Momoniella australica* Cook, dorsum female (after Cook 1986)

2987 *Partidomomonia polyplacophora* Cook, dorsum male (after Cook 1983)

2988 *Hesperomomonia humphreysi* Harvey, dorsum male (after Harvey 1998b)

2989 *Austromomonia grownsae* Harvey, dorsum female (after Harvey 1998b)

Genus *Austromomonia* Harvey, 1998

(Figs. 2989, 2990, 2996, 2997)

1998 *Austromomonia* Harvey, Records of the Western Australian Museum 19: 101.

Type species: *Austromomonia grownsae* Harvey, 1998

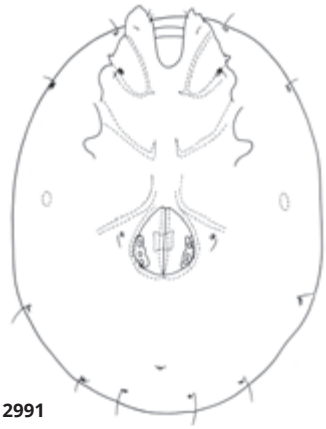
DIAGNOSIS: (Female only) Lateral eyes present. Dorsum with a large posterior plate and a distinctly smaller anterior plate, the latter with only the postocularia. Near suture line between anterior and posterior dorsal plate a pair of small platelets (Fig. 2989). Ventral shield divided, posterior to genital field a platelet with two pairs of glandularia, a pair of small posterolateral platelet with Vgl-3. Coxal suture lines obliterated. Cx-IV with a group of three small setae. Vgl-4 located on Cx-IV near posterior margin. Opening of fourth legs covered by ventral lobes. Acetabula of female located on genital plates (Fig. 2990). Legs without swimming setae. I-leg-5 elongated (Fig. 2997).

HABITAT: Interstitial.

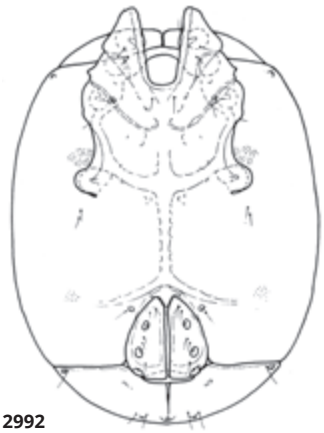
DISTRIBUTION: One species known from eastern Australia.



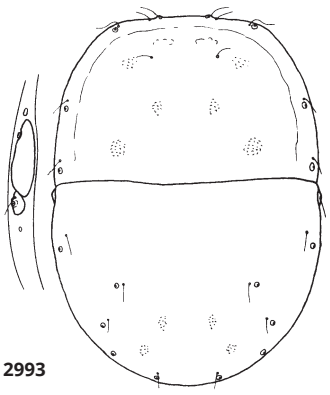
2990



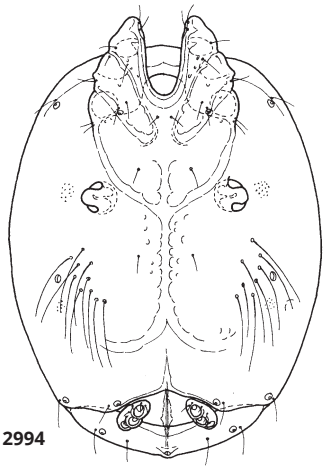
2991



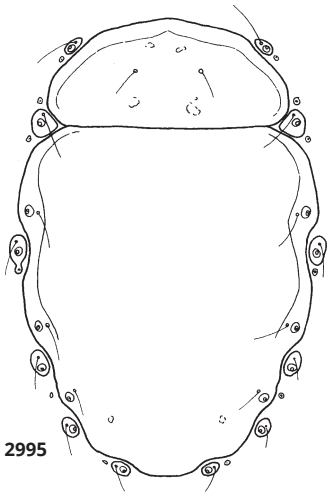
2992



2993



2994



2995

2990 *Austromomonia grownsae* Harvey, venter female (after Harvey 1998b)

2991 *Hesperomomonia humphreysi* Harvey, venter female (after Harvey 1998b)

2992 *Notomomonia anchista* Cook, venter female (after Cook 1988)

2993 *Notomomonia alza* Cook, dorsum female (after Cook 1988)

2994 *Neomomonia torquipes* (Hopkins), venter female (after Cook 1983)

2995 *Neomomonia torquipes* (Hopkins), dorsum male (after Cook 1983)

Genus *Hesperomomonia* Harvey, 1998

(Figs. 2988, 2991, 2998-3000)

1998 *Hesperomomonia* Harvey, Records of the Western Australian Museum 19: 97.
Type species: *Hesperomomonia humphreysi* Harvey, 1998

DIAGNOSIS: Lateral eye pigment reduced. Dorsum with two large plates more or less equal in size. Dorsoglandularia lacking the gland bearing portion. Near suture line between anterior and posterior dorsal plate a small platelet without glandularia (Fig. 2988). Coxal suture lines obliterated. Ventral shield undivided. Acetabula of male lying in the gonopore field (Fig. 2998), acetabula of female on a pair of small platelets (Fig. 2991). I-leg-5 elongated, I-leg-6 with a long terminal fine seta (Fig. 3000).

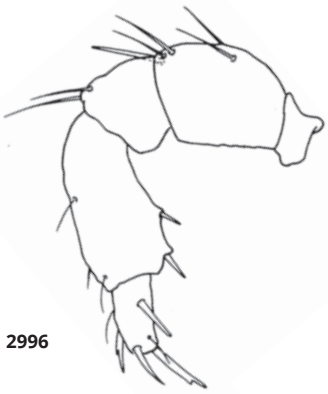
HABITAT: Interstitial.

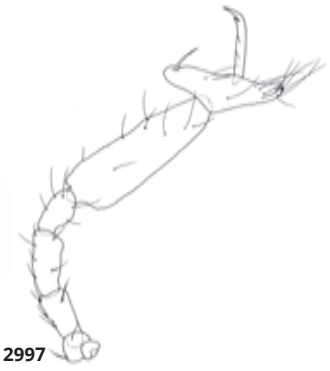
DISTRIBUTION: Two species known from western and eastern Australia (Harvey 1998b, Smit 2007a).

Genus *Momonia* Halbert, 1906

(Figs. 2979, 2981, 2985, 3001-3017)

1906 *Momonia* Halbert, Annals and Magazine of Natural History, London 18: 5.
Type species: *Momonia falcipalpis* Halbert, 1906

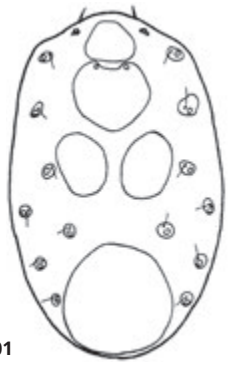

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2999


3000


3001

2996 *Austromomonia grownsae* Harvey, palp female (after Harvey 1998b)
2997 *Austromomonia grownsae* Harvey, first leg female (after Harvey 1998b)
2998 *Hesperomomonia humphreysi* Harvey, venter male (after Harvey 1998b)
2999 *Hesperomomonia humphreysi* Harvey, palp male (after Harvey 1998b)
3000 *Hesperomomonia humphreysi* Harvey, I-leg-5-6 male (after Harvey 1998b)
3001 *Momonia* (*Zelandomomonia*) *hopkinsi* Schwoerbel, dorsum male (after Schwoerbel 1984)

DIAGNOSIS: Dorsum either soft or with several paired or unpaired plates. Ventral shield present or absent; anterior coxae separated from remainder of venter. Cx-IV with numerous posterolateral setae (Fig. 2979) and a concave medial suture line, forming more or less a genital bay. Legs with swimming setae.

KEY TO THE SUBGENERA

1	Dorsal and ventral shields absent (Figs. 3001, 3002)	2
-	Dorsal and ventral shields present	3
2	Dorsum with three unpaired and one paired platelet (Figs. 3001); legs without swimming setae	Subgenus *Zelandomomonia*
-	Dorsum without large platelets, legs with swimming setae	Subgenus *Kondia*
3(1)	Dorsal shield entire (Fig. 3003)	Subgenus *Paramomonia*
-	Dorsal shield divided	4
4	Dorsal shield composed of a large posterior plate and a smaller anterior plate both surrounded by smaller platelets (Fig. 3004)	Subgenus *Orientmomonia*
-	Dorsal shield with a large posterior plate and a smaller anterior plate (Fig. 3005)	Subgenus *Momonia* s.s.

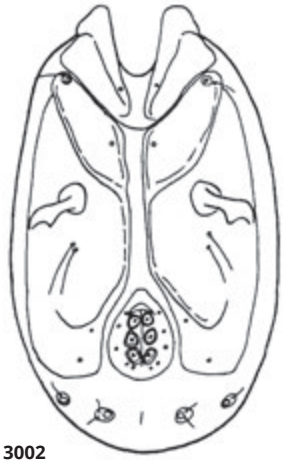
Subgenus *Momonia* s.s.

(Figs. 2979, 2981, 3005-3007)

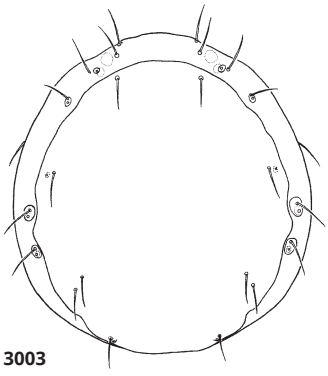
DIAGNOSIS: Lateral eyes located in the area between the upwardly bent ventral plate and the anterodorsal plate. Both venter and dorsum heavily sclerotized. Dorsum with a smaller anterior plate with the postocularia, and a larger posterior plate (Fig. 3005). Ventral shield in frontal area bent dorsally and here including dgl-1 and dgl-2. First leg with or without sexual dimorphism.

HABITAT: Streams, spring-fed ponds, lakes.

DISTRIBUTION: One species known from Europe and three species known from North America (I.M. Smith 1989a).



3002



3003



3004

3002 *Momonia* (*Zelandomomonia*) *hopkinsi* Schwoerbel, venter male (after Schwoerbel 1984)

3003 *Momonia* (*Paramomonia*) *fuscina* Yi & Jin, dorsum female (after Yi & Jin 2012)

3004 *Momonia* (*Orientmomonia*) *koreana* Pešić, dorsum male (after Pešić 2014)

Subgenus *Kondia* Sokolow, 1926

(Figs. 2985, 3008)

1926 *Kondia* Sokolow, Zoologischer Anzeiger 66: 32.

Type species: *Kondia karelica* Sokolow, 1926

DIAGNOSIS: (Female only) Idiosoma soft, except for coxae and genital field and one or two small, rounded dorsal muscle attachments. Coxae in four groups, medially widely separated. Cx-IV posterolaterally with numerous setae (Fig. 3008). I-leg-5 elongated, I-leg-6 stout (Fig. 2985). II-leg-4-5, III-leg-4-5 and IV-leg-4-5 with swimming setae.

HABITAT: Lakes.

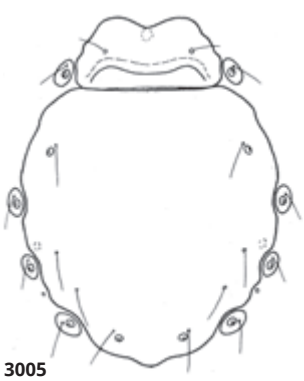
DISTRIBUTION: One species known from Russia and Sweden (Gerecke et al. 2016).

Subgenus *Orientmomonia* Pešić, 2014

(Figs. 3004, 3009-3011)

2014 *Orientmomonia* Pešić, Ecologica Montenegrina 1: 223.

Type species: *Momonia koreana* Pešić, 2014



3005



3006



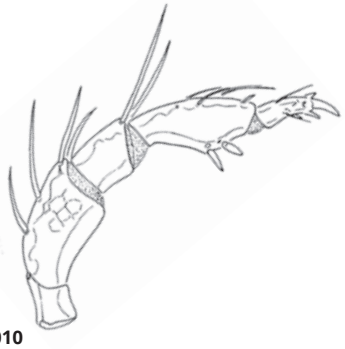
3007



3008



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3010

3005 *Momonia* (*Momonia*) *falcipalpis* Halbert, dorsum male (after Cook 1974)

3006 *Momonia* (*Momonia*) *projecta* Cook, palp male (after Cook 1974)

3007 *Momonia* (*Momonia*) *falcipalpis* Halbert, I-leg-5-6 male (after Gerecke et al. 2016)

3008 *Momonia* (*Kondia*) *karelica* (Sokolow), venter female (after Cook 1974)

3009 *Momonia* (*Orientmomonia*) *koreana* Pešić, venter male (after Pešić 2014)

3010 *Momonia* (*Orientmomonia*) *koreana* Pešić, palp male (after Pešić 2014)

DIAGNOSIS: (Male only) Dorsal shield composed of a smaller anterior and a larger posterior dorsal plate surrounded by seven pairs of smaller platelets (Fig. 3004). Cx-IV with a group of setae along lateral margin (Fig. 3009).

HABITAT: Streams.

DISTRIBUTION: One species known from South Korea.

Subgenus *Paramomonia* Yi & Jin, 2012

(Figs. 3003, 3012-3014)

2012 *Paramomonia* Yi & Jin, International Journal of Acarology 38: 297.

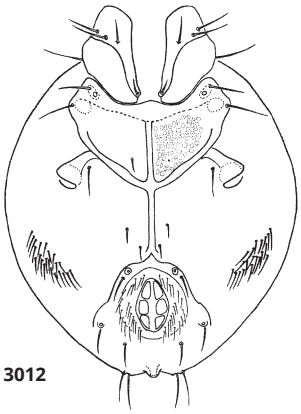
Type species: *Momonia fuscina* Yi & Jin, 2012

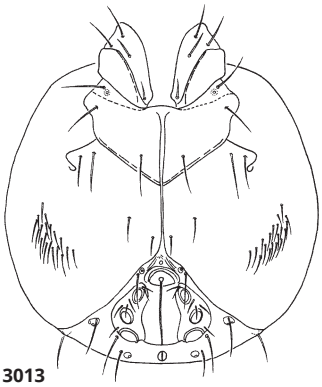
DIAGNOSIS: Dorsal shield entire and bearing the postocularia and four pairs of glandularia, but gland bearing portion of Dgl-2 and Dgl-3 lacking (Fig. 3003). Male without a posterior suture line of Cx-IV (Fig. 3012). I-leg-5 elongated, I-leg-6 stocky (Fig. 3014).

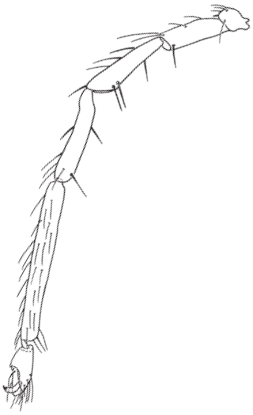
HABITAT: Streams.

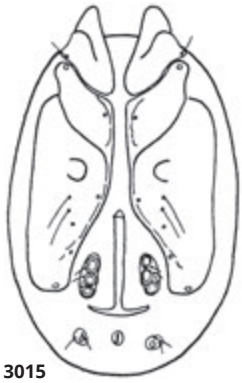
DISTRIBUTION: One species known from Guizhou Province, China.













3011 *Momonia* (*Orientmomonia*) *koreana* Pešić, I-leg-4-6 male (after Pešić 2014)

3012 *Momonia* (*Paramomonia*) *fuscina* Yi & Jin, venter male (after Yi & Jin 2012)

3013 *Momonia* (*Paramomonia*) *fuscina* Yi & Jin, venter female (after Yi & Jin 2012)

3014 *Momonia* (*Paramomonia*) *fuscina* Yi & Jin, first leg male (after Yi & Jin 2012)

3015 *Momonia* (*Zelandomomonia*) *hopkinsi* Schwoerbel, venter female (after Schwoerbel 1984)

3016 *Momonia* (*Zelandomomonia*) *hopkinsi* Schwoerbel, palp female (after Schwoerbel 1984)

Subgenus *Zelandomomonia* Smit, 2019

(Figs. 3001, 3002, 3015-3017)

2019 *Zelandomomonia* Smit, Acarologia 59: 372.

Type species: *Momonia hopkinsi* Schwoerbel, 1984

DIAGNOSIS: Lateral eyes present. Dorsum with one pair of platelets and three large unpaired plates (Fig. 3001). Venter soft, Cx-I+II separated from Cx-III+IV. Cx-IV long, with a slightly concave posteromedial margin, forming a genital bay; Cx-IV without a group of long setae near posterolateral margin, but three moderate large setae posterior to insertion of fourth legs. Insertions of fourth legs located far distanced from lateral idiosoma margin. Genital field with three pairs of acetabula located on a pair of genital plates in female, in the gonopore field in the male (Fig. 3002). Gonopore field of female much longer than genital plates, pregenital sclerite very small, postgenital sclerite moderately long and somewhat curved. P4 ventrally with one stout and one hair-like seta, P5 not tapering distally, with two stout claws. Legs without swimming setae. I-leg-5 elongated, I-leg-6 stocky with an elongated claw (Fig. 3017).

HABITAT: Interstitial.

DISTRIBUTION: One species known from New Zealand.

REMARKS: Due to the absence of swimming setae, the presence of large dorsal platelets and the atypical palp the species from New Zealand cannot be assigned to *Kondia* as proposed by Schwoerbel (1984).

Genus *Momoniella* K. Viets, 1929

(Fig. 59, 2982, 2986, 3018)

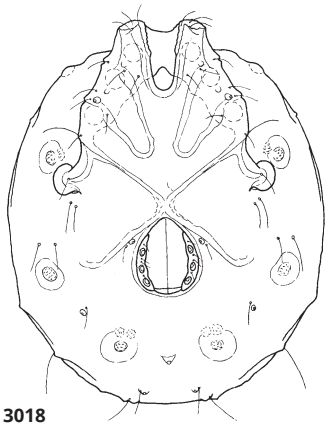
1929 *Momoniella* K. Viets, Zoologischer Anzeiger 83: 236.

Type species: *Momoniella sumatrensis* K. Viets, 1929

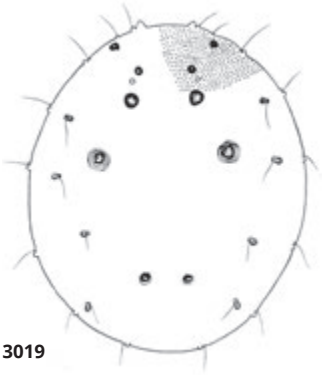
DIAGNOSIS: Dorsal and ventral shield present. Dorsal shield entire, muscle scars pronounced and located near periphery of dorsal and ventral shield (Fig. 2986). A series of glandularia lying in the dorsal furrow. Anterodorsal part of ventral shield extending well beyond the frontal idiosoma margin. Cx-IV with angular medial margins. Lobe-like projections covering the insertions of the fourth legs (Fig. 2982). Short but prominent ridges extending posteriorly from insertions of fourth



3017



3018



3019

3017 *Momonia* (*Zelandomomonia*) *hopkinsi* Schwoerbel, I-leg-3-6 female (after Schwoerbel 1984)

3018 *Momoniella parva* Cook, venter female (after Cook 1986)

3019 *Momonisia phreatica* Petrova, dorsum female (after Petrova 1974)

legs. Genital field with three pairs of acetabula, lying between Cx-IV. Acetabula in males lying in the gonopore field, occupying most of the space; in females on a pair of sclerites, occupying a small part of the gonopore field (Fig. 3018). P4 ventrally either with two stout setae or with one stout and one hair-like seta. Legs without swimming setae. I-leg-5 elongated and I-leg-6 stocky, with a curved claw; I-leg-6 proximally with a 2-3 pointed extensions (Fig. 59).

HABITAT: Streams.

DISTRIBUTION: One species known from Sumatra, Indonesia, one from Liberia (Cook 1966), two from Australia (Cook 1986) and one from South Africa (Cook 2001). Furthermore, an undescribed species reported from New Zealand known only in the deutonymphal stage (Cook 1983).

Genus *Momonisia* Petrova, 1974

(Figs. 2983, 2984, 3019, 3020)

1974 *Momonisia* Petrova, International Journal of Speleology 6: 181.

Type species: *Momonisia phreatica* Petrova, 1974

DIAGNOSIS: Dorsal and ventral shields absent. Dorsum with four pairs of small muscle attachments (Fig. 3019). Coxae medially well separated. Posteromedial margin of Cx-IV rounded, not forming a genital bay. Cx-IV without a group of long setae (Fig. 2984). Genital field with three pairs of acetabula, on paired genital plates in females, on a sclerotized ring surrounding the gonopore in males. Post-genital sclerite of female much larger than pre-genital sclerite. P4 with a stout anteroventral seta, P5 with a large distal seta (Fig. 3020). Legs without swimming setae. Projection of I-leg-6 longer than half the length of I-leg-5 (Fig. 2983).

HABITAT: Interstitial.

DISTRIBUTION: One species known from Bulgaria and Corsica, France (Gerecke 1994).

Genus *Neomomonia* Cook, 1968

(Figs. 2994, 2995, 3021-3023)

1968 *Neomomonia* Cook, Proceedings of the Entomological Society of Washington 70: 211 – Cook (1983).

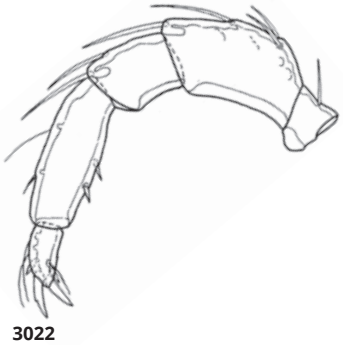
Type species: *Stygomomonia torquipes* Hopkins, 1966



3020



3021



3022

3020 *Momonisia phreatica* Petrova, palp female (after Petrova 1974)

3021 *Neomomonia torquipes* (Hopkins), venter male (after Cook 1983)

3022 *Neomomonia torquipes* (Hopkins), palp female (after Cook 1983)

DIAGNOSIS: Lateral eye pigment either reduced or developed. Dorsal and ventral shields present. Dorsal shield with a smaller anterior plate and a larger posterior plate (Fig. 2995). Coxae fused with ventral shield, all coxal suture lines obliterated. Cx-IV with a group of long setae (Fig. 2994), but occasionally only five setae of moderate length present. Genital field with three pairs of acetabula, in males fused with the ventral shield and with the acetabula in the gonopore field (Fig. 3021), in females lying free in the integument. Posterior to genital field a platelet with the excretory pore and two pairs of glandularia. P4 with two stout ventral setae of equal length (Fig. 3022). Legs without swimming setae. I-leg-6 slightly to strongly tapering distally (Fig. 3023).

HABITAT: Interstitial, streams.

DISTRIBUTION: Five species known from New Zealand (Schwoerbel 1984, Cook 1983, 1992).

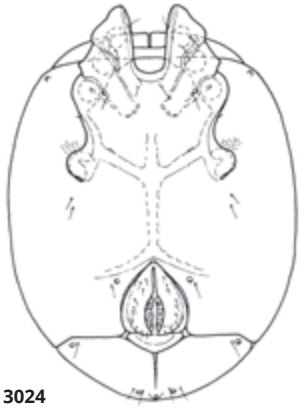
Genus *Notomomonia* Cook, 1988

(Figs. 2992, 2993, 3024-3028)

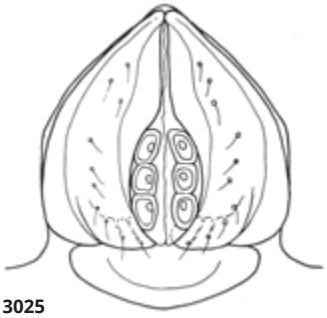
1988 *Notomomonia* Cook, Memoirs of the American Entomological Institute 42: 182.
Type species: *Notomomonia anchista* Cook, 1988



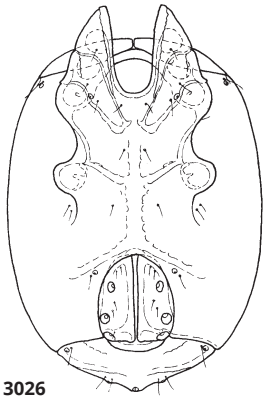
3023



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3028

3023 *Neomomonia torquipes* (Hopkins), I-leg-4-6 female (after Cook 1983)
3024 *Notomomonia anchista* Cook, venter male (after Cook 1988)
3025 *Notomomonia alza* Cook, genital field male (after Cook 1988)
3026 *Notomomonia crassipes* Cook, venter female (after Cook 1988)
3027 *Notomomonia anchista* Cook, palp female (after Cook 1988)
3028 *Notomomonia anchista* Cook, I-leg-4-6 female (after Cook 1988)

DIAGNOSIS: Dorsal shield with two unpaired plates more or less equal in size. Anterior dorsal plate with the postocularia and four pairs of glandularia. Posterior plate with five pairs of glandularia, but gland portion of the posterior most pair may be absent (Fig. 2993). Dorsal furrow lateral in position and bearing a moderately sized sclerite and glandularia more or less on the level of the suture line between the anterior and posterior dorsal plate. All coxae fused to form the ventral shield, a pair of free platelets at anterior end of venter. Posterior to the genital field one platelet (Fig. 3026), or a pair of platelets (Fig. 3024), with two pairs of glandularia. Genital field with three pairs of acetabula, lying in the gonopore in the male (Fig. 3025) but on large genital plates in the female (Fig. 2992). Sclerites flanking gonopore field of male not fused with the ventral shield. A pair of small setae located posterior to insertion of fourth legs. P4 with two stout, ventral setae (Fig. 3027).

HABITAT: Streams.

DISTRIBUTION: Three species known from Chile (Cook 1988).

Genus *Partidomomonia* Cook, 1983

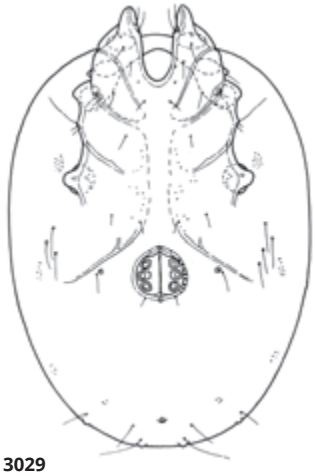
(Figs. 2987, 3029-3032)

1983 *Partidomomonia* Cook, Contributions of the American Entomological Institute 21: 117.
Type species: *Partidomomonia polyplacophora* Cook, 1983

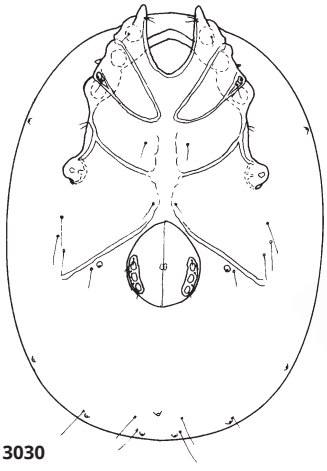
DIAGNOSIS: Lateral eye pigment reduced. Dorsal shield composed of a series of closely fitting platelets. Many of the dorsal glandularia missing the gland bearing portion (Fig. 2987). Ventral shield not divided, coxae fused with the ventral shield. Coxal suture lines obliterated. A group of 3-4 short posterolateral setae on Cx-IV. Genital field with three pairs of acetabula, lying free in the gonopore field (Fig. 3029), on a pair of sclerites lying in the gonopore field in females (Fig. 3030). P4 with two ventral setae, one hair-like, the other stout. P5 with one claw much longer than others (Fig. 3031). I-leg-6 with the dorsal projection elongated (Fig. 3032).

HABITAT:

DISTRIBUTION: Two species known from New Zealand (Cook 1992) and four species known from Australia (Harvey 1990b, Smit 2007a, 2013a).



3029



3030



3031

3029 *Partidomomonia polyplacophora* Cook, venter male (after Cook 1983)

3030 *Partidomomonia ramsayi* Cook, venter female (after Cook 1992)

3031 *Partidomomonia polyplacophora* Cook, palp male (after Cook 1983)

Subfamily Cyclomomoniinae I.M. Smith, 1989

1989 Cyclomomoniinae I.M. Smith, The Canadian Entomologist 121: 544.

DIAGNOSIS: Dorsal shield with one large plate surrounded by two rings of smaller platelets. Inner ring consisting of seven pairs of platelets, one pair bearing the postocularia (Fig. 2978). Ventral shield composed of a large plate incorporating the coxae and associated structures, separated from two unpaired plates with the genital field and excretory pore, respectively, and three paired platelets. Coxae-I-III fused medially, with obliterated suture lines. Cx-IV separated medially with a broad medial margin visible as vestigial suture lines. Genital field with three pairs of acetabula, in males on a separate platelet (Fig. 2033), in females on paired plates not fused with ventral shield (Fig. 3034). P4 with an anteroventral stout setae, P5 with three stout setae (Fig. 3035). I-leg-4 and -5 expanded. I-leg-6 stocky, claws of first leg stocky (Fig. 3036). Monotypic.

Genus *Cyclomomonia* I.M. Smith, 1989

(Figs. 2978, 3033-3036)

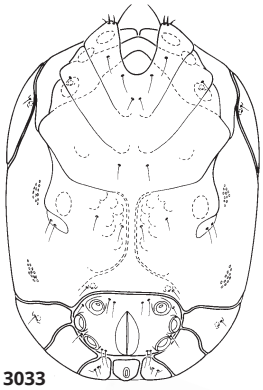
1989 *Cyclomomonia* I.M. Smith, The Canadian Entomologist 121: 544.

Type species: *Cyclomomonia andrewi* I.M. Smith, 1989

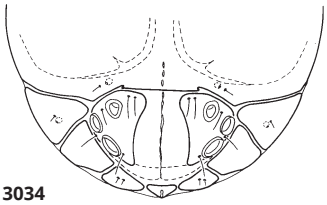
DIAGNOSIS: As for subfamily.



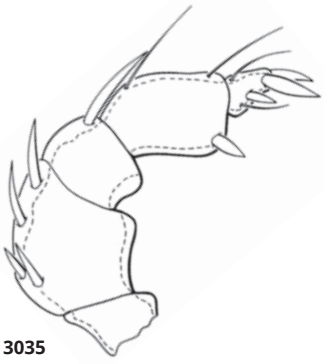
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3032 *Partidomomonia polyplacophora* Cook, I-leg-4-6 male (after Cook 1983)

3033 *Cyclomomonia andrewi* I.M. Smith, venter male (after I.M. Smith 1989a)

3034 *Cyclomomonia andrewi* I.M. Smith, venter female (part.) (after I.M. Smith 1989a)

3035 *Cyclomomonia andrewi* I.M. Smith, palp male (after I.M. Smith 1989a)

3036 *Cyclomomonia andrewi* I.M. Smith, first leg male (after I.M. Smith 1989a)

3037 *Momonides landbergi* Lundblad, genital field male (after Cook 1974)

HABITAT: Streams.

DISTRIBUTION: One species known from western North America (British Columbia, Oregon, Nevada).

Subfamily Momonidinae Lundblad, 1941

1941 Momonidinae Lundblad, Entomologisk Tidskrift 62: 97.

DIAGNOSIS: Both dorsum and venter with closely fitting, lobed, often stellate glandularia and muscle attachment platelets (Fig. 2976). A true dorsal and ventral shield is absent. Genital field with numerous acetabula lying in three distinct groups, on separate genital plates in females (Fig. 2977), in the gonopore field in males (Fig. 3037). Monotypic.

Genus *Momonides* Lundblad, 1941

(Figs. 2976, 2977, 3037-3039)

1941 *Momonides* Lundblad, Entomologisk Tidskrift 62: 97.

Type species: *Momonides trabecularis* Lundblad, 1941

DIAGNOSIS: As for subfamily.

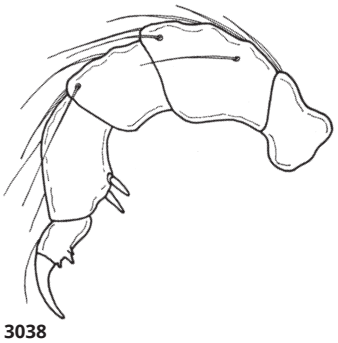
HABITAT: Streams, interstitial.

DISTRIBUTION: Two species known from the Oriental region (Java, Indonesia, Lundblad 1971; India, Pešić et al. 2012b, Japan, Morimoto & Abé 2019), one from Sardinia and Corsica (Santucci 1970) and one from Ghana (Smit 2012b).

Subfamily Stygomomoniinae Motaș & Tanasachi, 1946

1946 Stygomomoniinae Motaș & Tanasachi, Notatationes Biologicae, Bucharest 4: 43.

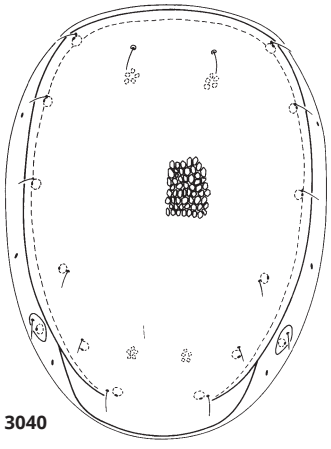
DIAGNOSIS: Dorsal and ventral shields present, the dorsal shield entire or divided into anterior and posterior plates, all glandularia lying near lateral margin. Dorsal furrow with or without glandularia. Genital field with 3-4 pairs of acetabula, on separate genital plates in females. Genital field of male with acetabula on genital plates which are incorporated into ventral shield (Fig. 2980). P4 ventrally with two stout setae, the distal one larger than the proximal one (Fig. 3047). I-leg-5 elongated, I-leg-6 stocky.



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3038 *Momonides landbergi* Lundblad, palp male (after Lundblad 1971)

3039 *Momonides landbergi* Lundblad, I-leg-5-6 male (after Lundblad 1971)

3040 *Stygomomonia* (*Stygomomonia*) *pallida* Cook, dorsum male (after I.M. Smith 1991b)

KEY TO THE GENERA

1 Dorsal shield entire; dorsal furrow with a pair of glandularia (Fig. 3040) Genus *Stygomomonia*

- Dorsal shield divided into an anterior and posterior plate; dorsal furrow without glandularia (Fig. 3041) Genus *Xenomomonia*

Genus *Stygomomonia* Szalay, 1943

(Figs. 2980, 3040, 3042-3048)

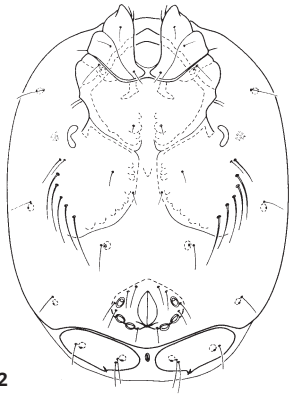
1943 *Stygomomonia* Szalay, Fragmenta Faunistica Hungarica 6: 58.

Type species: *Stygomomonia latipes* Szalay, 1943

DIAGNOSIS: Dorsal shield entire (Fig. 3040). Dorsal furrow with a pair of glandularia. Anterior coxal plate either separated or fused with rest of coxae. Cx-IV with a group of long setae posterolateral to insertions of fourth legs. Genital field with three or four pairs of acetabula, incorporated into the ventral shield in males (Fig. 2980) but separate with a very large postgenital sclerite in females (Fig. 3046). Posterior to the genital field a pair of platelets each with two glandularia, or with two pairs of platelets each with one gland.



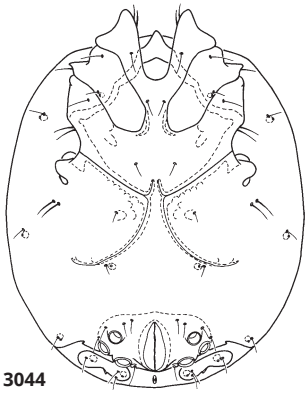
3041



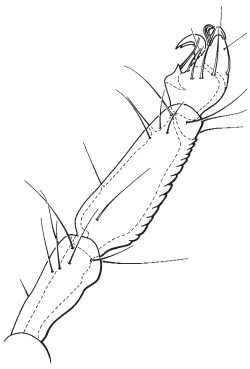
3042



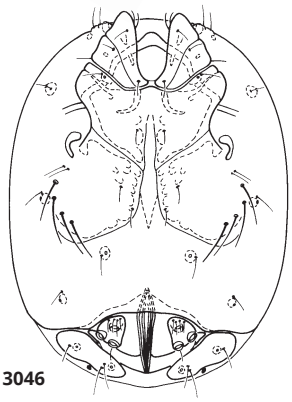
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3041 *Xenomomonia subcentrata* Orghidan, Gruia, Georgesco & Viña Bayés, dorsum male (after Orghidan et al. 1977)

3042 *Stygomomonia* (*Stygomomonia*) *plana* Cook, venter male (after I.M. Smith 1991b)

3043 *Stygomomonia* (*Stygomomonia*) *separata* Cook, I-leg-4-6 male (after I.M. Smith 1991b)

3044 *Stygomomonia* (*Allomomonia*) *moodyi* Mitchell, venter male (after I.M. Smith 1989d)

3045 *Stygomomonia* (*Allomomonia*) *moodyi* Mitchell, I-leg-4-6 male (after I.M. Smith 1989d)

3046 *Stygomomonia* (*Stygomomonia*) *occidentalis* Cook, venter female (after I.M. Smith 1991b)

KEY TO THE SUBGENERA

1 Male genital field located subterminal (Fig. 3042), claws of I-leg-6 nearly straight in both sexes (Fig. 3043) Subgenus *Stygomomonia* s.s.

- Male genital field located terminal (Fig. 3044), claws of I-leg-6 strongly curved in both sexes (Fig. 3045) Subgenus *Allomomomia*

Subgenus *Stygomomonia* s.s.

(Figs. 2980, 3040, 3042, 3043, 3046, 3047)

DIAGNOSIS: Anterior coxae separated from remainder of ventral shield (Fig. 2980). Genital field with three or four pairs of acetabula, located subterminally on ventral shield in male (Fig. 3042). Claws of I-leg-6 straight or slightly curved (Fig. 3043).

HABITAT: Interstitial.

DISTRIBUTION: The subgenus has a Holarctic distribution, with a dozen species known from North America (I.M. Smith 1991), one from Europe and two species from Japan (Imamura 1959).

Subgenus *Allomomonia* Cook, 1968

(Figs. 3044, 3045, 3048)

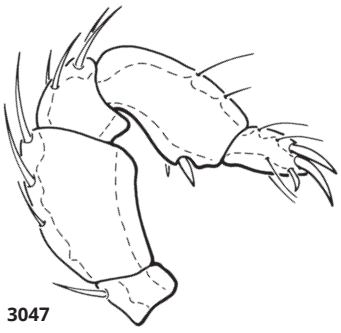
1968 *Allomomonia* Cook, Proceedings of the Entomological Society of Washington 70: 211.

Type species: *Stygomomonia moodyi* Mitchell, 1959

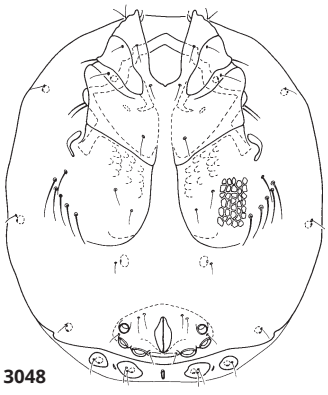
DIAGNOSIS: Anterior coxae either separated from (Fig. 3044), or fused with (Fig. 3048), the remainder of ventral shield. Genital field with three pairs of acetabula. Male genital field located terminally (Fig. 3044). Claws of I-leg-6 strongly curved (Fig. 3045).

HABITAT: Interstitial.

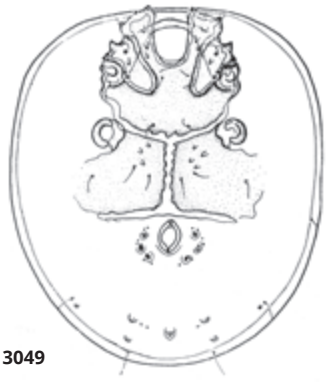
DISTRIBUTION: The subgenus has a Holarctic distribution, with five species known from North America (I.M. Smith 1989c) and one from Japan (Imamura 1959).



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3047 *Stygomomonia* (*Stygomomonia*) *occidentalis* Cook, palp male (after I.M. Smith 1991b)

3048 *Stygomomonia* (*Allomomonia*) *atnarkicola* I.M. Smith, venter male (after I.M. Smith 1989d)

3049 *Xenomomonia subcentrata* Orghidan, Gruia, Georgesco & Viña Bayés, venter male (after Orghidan et al. 1977)

Genus *Xenomomonia* Orghidan, Gruia, Georgesco & Viña Bayés, 1977

(Figs. 3041, 3049-3053)

1977 *Xenomomonia* Orghidan, Gruia, Georgesco & Viña Bayés, Résultats des expéditions biospéologiques cubano-roumaines à Cuba 2: 222.

Type species: *Xenomomonia subcentrata* Orghidan, Gruia, Georgesco & Viña Bayés, 1977

DIAGNOSIS: Lateral eye pigment reduced. Dorsal shield divided into an anterior and a somewhat larger posterior plate. Dorsal furrow without glandularia (Fig. 3041). Cx-IV without a group of long setae. Male ventral shield not divided, female ventral shield with (Fig. 3040) or without a separate posterior platelet with two pairs of glandularia. Genital field well distanced from the posterior idiosoma margin, with three pairs of acetabula. Acetabula of male incorporated in the ventral shield (Fig. 3049), acetabula of female lying on a pair of plates flanking the gonopore. P4 ventrally with two stout setae, P5 with three large claws (Fig. 3051). I-leg-6 stocky, ventrally with a large, stout seta (Fig. 3053).

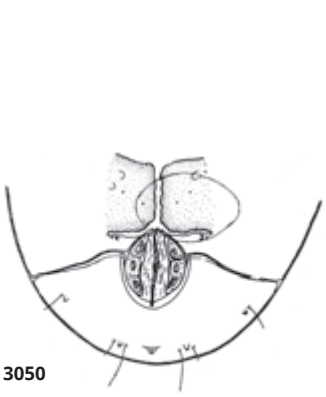
HABITAT: Interstitial.

DISTRIBUTION: One species known from Cuba.

Family Neoacaridae Motaș & Tanasachi, 1947

1947 Neoacaridae Motaș & Tanasachi, Bulletin de la Section Scientifique de l'Académie Roumaine 29: 512.

DIAGNOSIS: Idiosoma not greatly flattened. Dorsal and ventral shields present. Dorsal shield with three pairs of glandularia posterior to the postocularia. Chelicera separated medially. Cx-I fused medially, median margins of Cx-IV reduced to median angles and widely separated medially by the genital field. A deep genital bay present in male which extends far anteriorly and almost completely separating Cx-III medially (Fig. 3059); genital bay of female less deep (Fig. 3060). Insertion of fourth legs somewhat lateral in position and with moderately developed associated projections. Genital field in males typically with three, occasionally 5-6 pairs of acetabula in the gonopore field, in females with 6-7 (rarely 4-9) pairs of acetabula on genital plates flanking the gonopore (Fig. 73). Genital field closely flanked by a pair of glandularia. Palp five-segmented and uncate (Fig. 3056). Legs with or without swimming setae, third legs with more or less distinct sexual dimorphism.



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3050 *Xenomomonia subcentrata* Orghidan, Gruia, Georgesco & Viña Bayés, venter female (part.) (after Orghidan et al. 1977)

3051 *Xenomomonia subcentrata* Orghidan, Gruia, Georgesco & Viña Bayés, palp male (after Orghidan et al. 1977)

3052 *Xenomomonia subcentrata* Orghidan, Gruia, Georgesco & Viña Bayés, first leg male (after Orghidan et al. 1977)

KEY TO THE GENERA

1 Distoventral portion of P4 extending far beyond insertion of P5 (Fig. 3054); III-leg-5 not enlarged (Fig. 3055) Genus *Volsellacarus*

- Distoventral portion of P4 not extending beyond insertion of P5 (Fig. 3056); III-leg-5 greatly enlarged (Fig. 3057) Genus *Neoacarus*

Genus *Neoacarus* Halbert, 1944

(Figs. 73, 3056-3058)

1944 *Neoacarus* Halbert, Proceedings of the Royal Irish Academy, Section B, Biological, Geological, and Chemical Science 50: 91.

1947 *Orcophilus* Walter, Verhandlungen der Naturforschenden Gesellschaft in Basel 58: 233.

1947 *Persephonacarus* Motaş & Tanasachi, Bulletin de la Section Scientifique de l'Académie Roumaine 29: 304.

Type species: *Neocarus hibernicus* Halbert, 1944

DIAGNOSIS: Palp with ventral projection directed ventrally and not extending beyond insertion of P5, P1-3 relatively stocky (Fig. 3056). Male III-leg-5 greatly, III-leg-4 slightly enlarged with numerous long and/or stout setae (Fig. 3057).

HABITAT: Interstitial, streams, lakes.

DISTRIBUTION: One species described from Europe, a dozen species from North America (Cook 1963b, 1968, I.M. Smith 1976b), one from Mexico (Cramer & Smith 1991) and one from Japan (Abé 2011).

Genus *Volsellacarus* Cook, 1963

(Figs. 3054, 3055, 3059, 3060)

1963 *Volsellacarus* Cook, Annals of the Entomological Society of America 56: 487.

Type species: *Volsellacarus ovalis* Cook, 1963

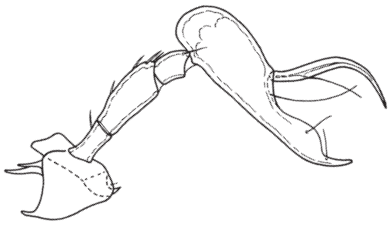
DIAGNOSIS: Palp with ventral projection very long and extending distally. P1-3 comparatively narrow (Fig. 3054). III-leg-5 of male not enlarged, and may bear extra hair-like setae or thickened setae.

HABITAT: Interstitial.

DISTRIBUTION: Two species known from North America (Missouri, Ohio, Virginia, Cook 1963b, 1968).



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3053 *Xenomomonia subcentrata* Orghidan, Gruia, Georgesco & Viña Bayés, I-leg-6 male (after Orghidan et al. 1977)

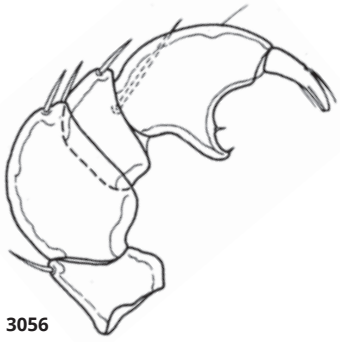
3054 *Volsellacarus sabulonus* Cook, gnathosoma + palp female (after Cook 1974)

3055 *Volsellacarus sabulonus* Cook, III-leg-5-6 male (after Cook 1974)

Family Nipponacaridae Imamura, 1959

1959 Nipponacaridae Imamura, Acarologia 1: 442.

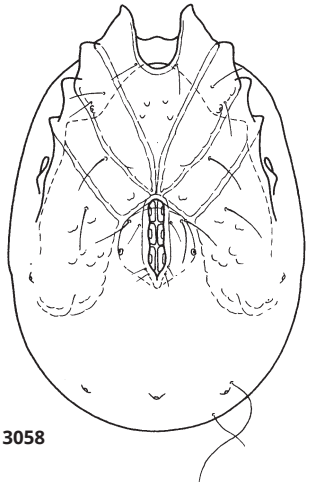
DIAGNOSIS: Lateral eye pigment reduced. Dorsal and ventral shields present. Dorsal shield with three pairs of glandularia posterior to the postocularia, posteriorly narrowed and flanked by a pair of enlarged glandularia (Fig. 3061). Gnathosoma separated from coxae and with a well-developed rostrum; gnathosomal bay absent. Chelicera separated medially and somewhat stylet-like. Tips of Cx-I-III slightly indicated. Coxae separated medially, medial margin of Cx-IV reduced to a medial angle. Insertion of fourth legs with well-developed associated projections. A pair of enlarged glandularia lying in indentations at posterior end of ventral shield (Fig. 53). Genital field with three or four pairs of acetabula, in the gonopore field in male (Fig. 3062) but on genital plates fused with the ventral shield in female (Fig. 3063). Palp five-segmented, but P4 and P5 functionally fused. P2 with two or three stout ventral setae, P3 short but relatively high. P5 narrow, pointed and much longer than P4, both segments about equal in height (Fig. 50). Legs without swimming setae and without sexual dimorphism. All legs with claws. Monotypic.



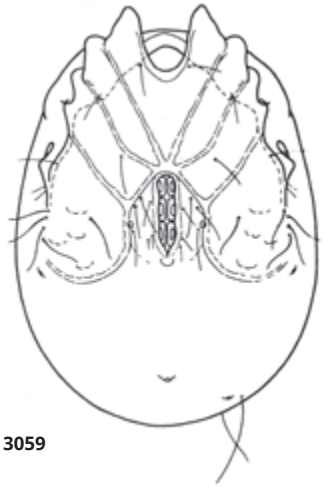
3056



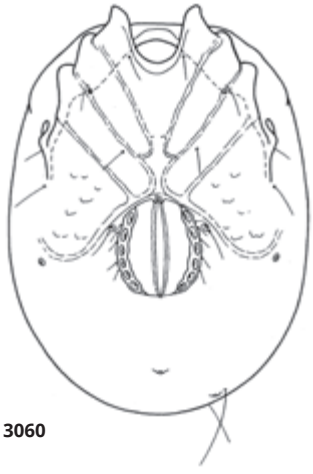
3057



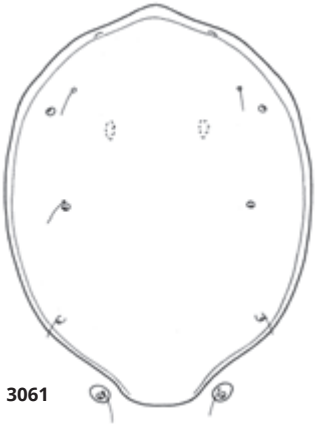
3058



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3056 *Neoacarus minimus* Cook, palp female (after Cook 1974)

3057 *Neoacarus minimus* Cook, III-leg-4-6 female (after Cook 1974)

3058 *Neoacarus occidentalis* Cook, venter male (after Cook 1974)

3059 *Volsellacarus sabulonus* Cook, venter male (after Cook 1974)

3060 *Volsellacarus sabulonus* Cook, venter female (after Cook 1974)

3061 *Nipponacarus matsumotoi* Imamura, dorsum male (after Cook 1974)

Genus *Nipponacarus* Imamura, 1957

(Figs. 50, 53, 3061-3063)

1957 *Nipponacarus* Imamura, Archiv für Hydrobiologie 53: 378.

1959 *Hexanipponacarus* Imamura, Acarologia 1: 444 – new syn.

Type species: *Nipponacarus miurai* Imamura, 1957

DIAGNOSIS: As for family.

HABITAT: Interstitial.

DISTRIBUTION: Three species known from Japan (Imamura 1959).

REMARKS: The difference between three or four pairs of acetabula has no taxonomic significance. Hence, I propose to synonymize *Hexanipponacarus* with the nominate taxon.

Family Nudomideopsidae I.M. Smith, 1990

1990 Nudomideopsidae I.M. Smith. The Canadian Entomologist 122: 229.

DIAGNOSIS: Idiosoma nearly round, elongate or oval, convex or flattened dorsally. Dorsal and ventral shields entire and separated from each other. Dorsal shield with three pairs of glandularia and the postocularia. Ventral shield incorporating coxae. Suture lines Cx-III/Cx-IV ending proximally at medial margins. Posterior margin of Cx-IV well defined or obliterated. Insertions of fourth legs with small, well developed associated projections. Cxgl-1 located anteriorly in Cx-II, Cxgl-4 located between Cx-IV and genital field. Genital field with 3 to numerous pairs of acetabula lying free in the gonopore field in both sexes or on plates fused to the ventral shield flanking the gonopore field (some females only). Gonopore field of females relatively large. Palp not uncate, P4 slightly expanded ventrally and with two ventral setae. Legs without sexual dimorphism.

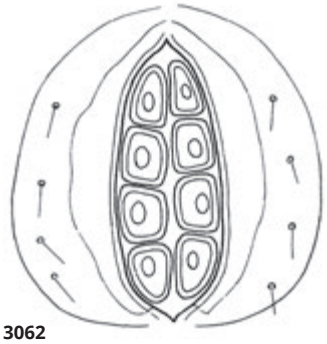
KEY TO THE GENERA

1 Genital field with 3-7 pairs of acetabula in a single row (Fig. 3064) 2

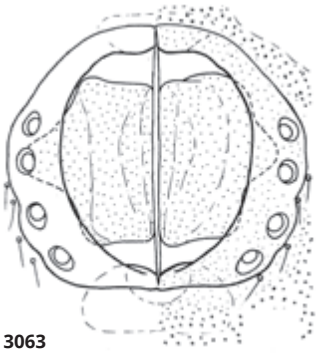
- Genital field with 17-23 pairs of acetabula in more than one row (Fig. 3065) Genus *Neomideopsis*

2 Genital field with 5-7 pairs of acetabula (Fig. 3064) Genus *Paramideopsis*

- Genital field with three pairs of acetabula (Fig. 3066) 3



3062



3063



3064

3062 *Nipponacarus matsumotoi* Imamura, genital field male (after Cook 1974)

3063 *Nipponacarus miurai* Imamura, genital field female (after Cook 1974)

3064 *Paramideopsis susanae* I.M. Smith, venter female (after I.M. Smith 1983f)

3 Idiosoma oval in shape, posterior margin of Cx-IV distinct (Fig. 3066); acetabula of female lying free in the gonopore (Fig. 3067) Genus *Nudomideopsis*

- Idiosoma elongate, posterior margin of Cx-IV obliterated (Fig. 3068); acetabula of female lying on plates fused to ventral shield flanking the gonopore (Fig. 3069) Genus *Allomideopsis*

Genus *Allomideopsis* I.M. Smith, 1990

(Figs. 78, 3068-3070)

1990 *Allomideopsis* I.M. Smith, The Canadian Entomologist 122: 241 – I.M. Smith et al. (2015).

Type species: *Nudomideopsis wichitaensis* I.M. Smith, 1990

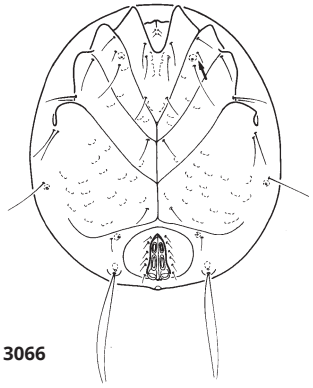
DIAGNOSIS: Idiosoma elongate oval in shape. Cx-IV with an extensive medial margin and with a small projection that completely covers insertion of fourth legs. Genital field with three pairs of acetabula, lying free in the gonopore field in males (Fig. 3068), on plates fused to ventral shield in females (Fig. 3069). P4 stocky and slightly expanded ventrally, with two ventral setae (Fig. 3070).

HABITAT: Interstitial.

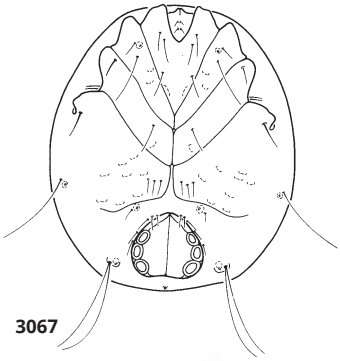
DISTRIBUTION: One species known from Oklahoma, USA (I.M. Smith 1990b).



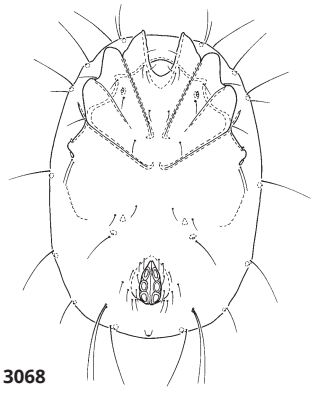
3065



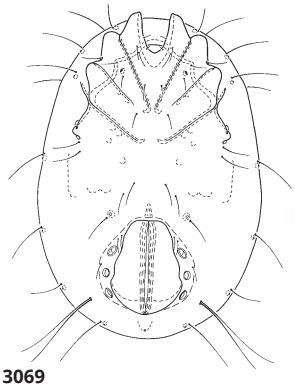
3066



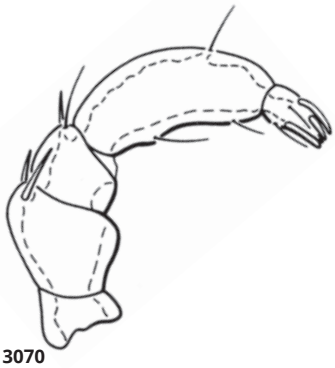
3067



3068



3069



3070

3065 *Neomideopsis siuslawensis* I.M. Smith, venter female (after I.M. Smith 1983e)

3066 *Nudomideopsis magnacetabula* (I.M. Smith), venter male (after I.M. Smith 1990b)

3067 *Nudomideopsis magnacetabula* (I.M. Smith), venter female (after I.M. Smith 1990b)

3068 *Allomideopsis wichitaensis* (I.M. Smith), venter male (after I.M. Smith 1990b)

3069 *Allomideopsis wichitaensis* (I.M. Smith), venter female (after I.M. Smith 1990b)

3070 *Allomideopsis wichitaensis* (I.M. Smith), palp male (after I.M. Smith 1990b)

Genus *Neomideopsis* I.M. Smith, 1983

(Figs. 3065, 3071, 3072)

1983 *Neomideopsis* I.M. Smith, The Canadian Entomologist 115: 417.

Type species: *Neomideopsis siuslawensis* I.M. Smith, 1983

DIAGNOSIS: Idiosoma nearly round in shape, flattened dorsally, convex ventrally. Dorsal shield with slightly elevated ridges. Cx-IV with posteromedial angles but without median margins. Cx-IV with a small projection that partially or completely covers insertions of fourth legs. Posterior margin of Cx-IV distinct. Gonopore flanked by paired plates with 17-23 acetabula (Fig. 3065). Male genital field with a triangular anterior extension (Fig. 3071). P4 relatively elongate and constricted proximally, bearing two ventral setae near basal constriction (Fig. 3072).

HABITAT: Springs.

DISTRIBUTION: One species known from Oregon, USA.

Genus *Nudomideopsis* Szalay, 1945

(Figs. 76, 77, 3066, 3067, 3073, 3074)

1945 *Nudomideopsis* Szalay, Annales historico-naturales Musei nationalis hungarici 38: 49 – I.M. Smith (1983a).

1955 *Stygomideopsis* Tanasachi & Orghidan, Buletin Ştiinţif, Secţiunea Ştiinţe Biologice, Agronomice, Geologice şi Geografice 7: 370.

1956 *Miuracarus* Imamura, Compte Rendue Premier Congrès International de Spéléologie, Paris 3: 212.

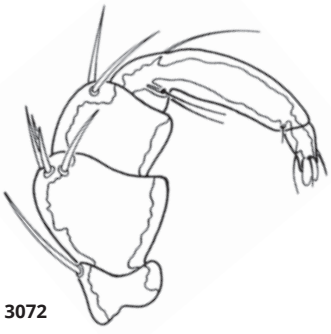
Type species: *Mideopsis longipalpis* Szalay, 1945

DIAGNOSIS: Idiosoma nearly round in shape, dorsally convex. Cx-IV with an extensive medial margin and a small projection completely covering insertion of fourth legs. Posterior margin of Cx-IV distinct. Genital field with three pairs of acetabula, lying free in the gonopore in both sexes (Figs. 76, 3066, 3067). P4 stocky (Fig. 3073) or slender (Fig. 3074) and slightly expanded ventrally with two slender ventral setae in proximal half of segment.

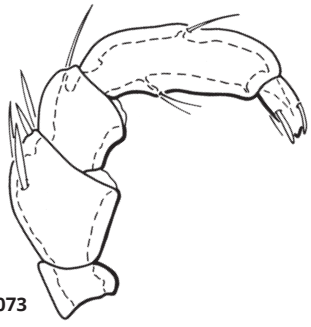
HABITAT: Streams, springs, interstitial.



3071



3072



3073

3071 *Neomideopsis siuslawensis* I.M. Smith, venter male (after I.M. Smith 1983e)

3072 *Neomideopsis siuslawensis* I.M. Smith, palp male (after I.M. Smith 1983e)

3073 *Nudomideopsis magnacetabula* (I.M. Smith), palp female (after I.M. Smith 1990b)

DISTRIBUTION: Many species known from the Holarctic, Japan, New Zealand (Cook 1983, 1992) and New Caledonia (Smit 2009a, assigned to *Allomideopsis*, but probably a *Nudomideopsis* s.s.).

Genus *Paramideopsis* I.M. Smith, 1983

(Figs. 3064, 3075, 3076)

1983 *Paramideopsis* I.M. Smith, The Canadian Entomologist 115: 529.

Type species: *Paramideopsis susanae* I.M. Smith, 1983

DIAGNOSIS: Idiosoma nearly round in shape, dorsally convex. Cx-IV with a short medial margin and with a small projection that partially covers insertion of fourth legs, posterior margin of Cx-IV moderate distinct. Genital field with 5-7 pairs of acetabula, lying free in the gonopore in both sexes (Figs. 3064, 3075). P4 stocky and slightly expanded ventrally, with two slender setae in proximal half of segment (Fig. 3076).

HABITAT: Springs, spring-fed pools, streams, interstitial.

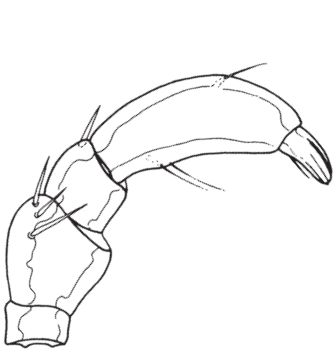
DISTRIBUTION: One species known from western North America (I.M. Smith 1990b) and two species from New Zealand (Cook 1992, Cook & Hopkins 1998).

Taxa of uncertain systematic position

Family Cladomomoniidae Orghidan & Gruia, 1980 – nov. stat.

1980 Cladomomoniinae Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 19: 145.

DIAGNOSIS: Dorsal and ventral shields present, dorsal shield entire (Figs. 3077, 3079). Posterior margin of Cx-IV absent in male but distinct in female. Genital field with three pairs of acetabula, in male acetabula on plates fused with the ventral shield (Fig. 3078), in female on separate plates (Fig. 3080). Palp with sexual dimorphism. P3 with a short medial projection in male (Fig. 3081), P3 of female with a long ventral projection and a medial projection (Fig. 3082). P4 with a large distal seta in both sexes, located more distally in male; male with one setal tubercle, female with two setal tubercles. P5 elongated in both sexes with three large claws, one of these with a serrated ventral margin. Legs with swimming setae. I-leg-5 not longer than other segments of first leg. Claw of first leg bifurcated and extremely elongated (Fig. 3083). Monotypic.



3074



3075



3076

3074 *Nudomideopsis motasi* Petrova, palp male (after Cook 1974)

3075 *Paramideopsis susanae* I.M. Smith, venter male (after I.M. Smith 1983f)

3076 *Paramideopsis susanae* I.M. Smith, palp male (after I.M. Smith 1983f)

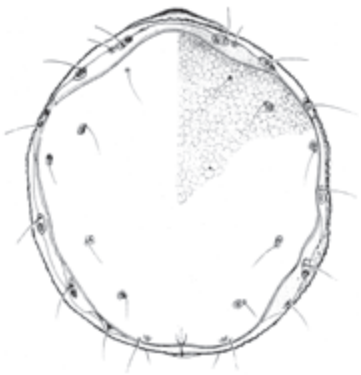
REMARKS: Both I.M. Smith (1989a) and Harvey (1990b) stated that the Cladomomoniidae do not belong to the Momoniidae as initially proposed by Orghidan & Gruia (1980b). However, it is not clear what their closest relatives are and given the presence of several unique characters, I propose to raise the subfamily to family rank.

Genus *Cladomomonia* Orghidan & Gruia, 1980

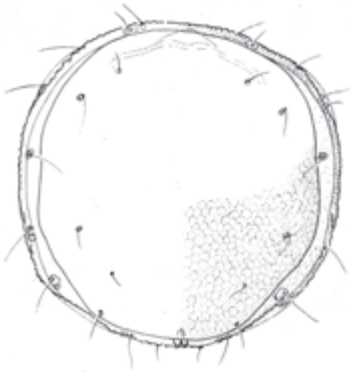
(Figs. 3077-3084)

1980 *Cladomomonia* Orghidan & Gruia, Travaux de l'Institut de Spéologie "Emile Racovitza" 19: 146.

Type species: *Cladomomonia mirifica* Orghidan & Gruia, 1980



3077



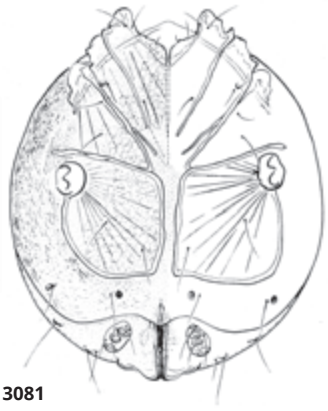
3078



3079



3080



3081



3082

3077 *Cladomomonia mirifica* Orghidan & Gruia, dorsum female (after Orghidan & Gruia 1983b)

3078 *Cladomomonia mirifica* Orghidan & Gruia, dorsum male (after Orghidan & Gruia 1983b)

3079 *Cladomomonia mirifica* Orghidan & Gruia, venter male (after Orghidan & Gruia 1983b)

3080 *Cladomomonia mirifica* Orghidan & Gruia, first leg male (after Orghidan & Gruia 1983b)

3081 *Cladomomonia mirifica* Orghidan & Gruia, venter female (after Orghidan & Gruia 1983b)

3082 *Cladomomonia mirifica* Orghidan & Gruia, palp male (after Orghidan & Gruia 1983b)

DIAGNOSIS: As for subfamily.

HABITAT: Interstitial.

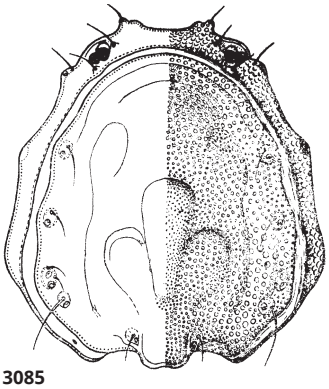
DISTRIBUTION: One species known from Cuba.



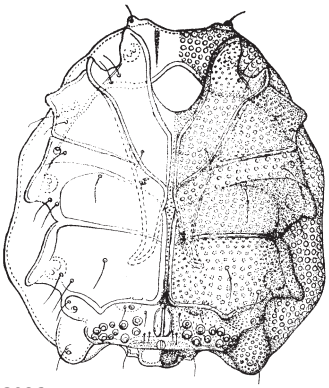
3083



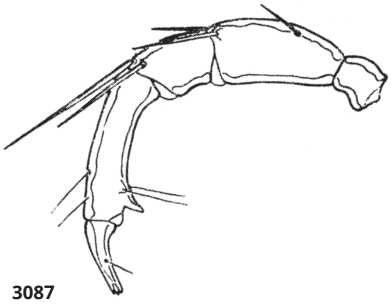
3084



3085



3086



3087

3083 *Cladomomonia mirifica* Orghidan & Gruia, palp female male (after Orghidan & Gruia 1983b)

3084 *Cladomomonia mirifica* Orghidan & Gruia, IV-leg-5-6 female (after Orghidan & Gruia 1983b)

3085 *Koenikea (Neumanikea) coenotica* (Orghidan & Gruia), dorsum male (after Orghidan & Gruia 1980a)

3086 *Koenikea (Neumanikea) coenotica* (Orghidan & Gruia), venter male (after Orghidan & Gruia 1980a)

3087 *Koenikea (Neumanikea) coenotica* (Orghidan & Gruia), palp male (after Orghidan & Gruia 1980a)

PROPOSED TAXONOMICAL CHANGES

The following taxonomical changes are proposed in the previous chapters:

Edsvolzia Habeeb, 1975 as a synonym of *Bharatavolzia* Cook, 1967

Tetralimnesia Thor, 1922 as a synonym of *Limnesia* C.L. Koch, 1836

Vietsclio Pešić & Smit, 2014 as an objective junior homonym of *Monatractides* K. Viets, 1926

Humboldtaxonopsella Orghidan & Gruia, 1981 as a synonym of *Axonopsella* Lundblad, 1930

Zelandopsinae Imamura, 1977 as a synonym of Notoaturinae Besch, 1964

Rhynchaturinae Schwoerbel, 1986 as a synonym of Hygrobatidae C.L. Koch, 1842

Paratetrahygrobatella Tuzovskij & Stolbov, 2016 as a synonym of *Andesobates* Smit, 2002

Corticacarides Lundblad, 1941 as a synonym of *Corticacarus* Lundblad, 1936

Megabates K. Viets, 1924 as a synonym of *Atractides* C.L. Koch, 1837

Tetracorticacarellus Lundblad, 1941 as a synonym of *Corticacarellus* Lundblad, 1937

Dekabates Thor, 1922 as a synonym of *Rivobates* Thor, 1897

Tamboella Lundblad, 1954 as a synonym of *Koenikea* Wolcott, 1900

Neokoenikea Lundblad, 1936 as a synonym of *Notomideopsis* Wolcott, 1905

Pentatax Thor, 1922, *Hexatax* Thor, 1926, *Polyatax* K. Viets, 1933, *Unionicolides* Lundblad, 1937, *Atacella* Lundblad, 1937, *Neoatax* Lundblad, 1941, *Polyatacides* Lundblad, 1941, *Atacellides* Lundblad, 1941, *Heteratax* Lundblad, 1941, *Unionicolella* Lundblad, 1941, *Parasitatax* K. Viets, 1949, *Bassatax* Cook, 1966, *Giselatax* K.O. Viets, 1975, *Unionicolopsis* K.O. Viets, 1980, *Armatax* Bader, 1981, *Fulleratax* Vidrine, 1984, *Ampullariatax* Vidrine, 1985, *Anodontinax* Vidrine, 1986, *Berezatax* Vidrine, 1986, *Australatax* Vidrine, 1986, *Kovietsatax* Vidrine, 1986, *Cookatax* Vidrine, 1986, *Baderatax* Vidrine, 1988, *Heversatax* Vidrine, 1988, *Lundbladatax* Vidrine, 1988, *Ferradasatax* Vidrine, 1988, *Crameratax* Vidrine, 1988, *Dimockatax* Vidrine, 1992, *Wolcottatax* Vidrine, 1992, *Prasadatax* Vidrine, 1992, *Mitchellatax* Vidrine, 1992, *Everittatax* Vidrine, 1992, *Poundsatax* Vidrine, 1992, *Wilsonatax* Vidrine, 1992, *Bakeratax* Vidrine, 1992, *Gledhillatax* Vidrine, 1992, *Davidsatax* Vidrine, 1992, *Downesatax* Vidrine, 1992, *Lasalleatax* Vidrine, 1992, *Smithatax* Vidrine, 1992, *Conroyatax* Vidrine, 1992, *Curryatax* Vidrine, 1992, *Edwardsatax* Vidrine, 1992, *Crowellatax* Vidrine, 1992, *Australionicola* Smit, 1992, *Majumderatax* Vidrine, 1993, *Imamuratax* Vidrine, 1994, *Causeyatax* Vidrine, 1994, *Breaudatax* Vidrine, 1994, *Clarkatax* Vidrine, 1994, *Mutelicola* Gledhill & Vidrine, 2002, *Chambardicola* Vidrine, Borsari & Bastian-Stanford, 2005, *Iridinicola* Vidrine, Lötter, Van As, Bastian-Stanford & Hazelton-Robichaux, 2006, *Hyricola* Vidrine, Bogan & Hazelton-Robichaux, 2007, *Coelaturicola* Vidrine, Lötter, Van As, Bogan & Bastian-Stanford, 2007, *Vidrineatax* Smit, 2008, *Geikienicola* Smit, 2008 and *Vidrinatax* Wen, Hu & Zhu, 2009 as a synonym of *Unionicola* Haldeman, 1842

Krendowskiella K. Viets, 1931 as a synonym of *Krendowskia* Piersig, 1895

Decaroqueella K. Viets, 1954 as a synonym of *Roqueella* Lundblad, 1930

Hexaroqueella K. Viets, 1959 as a synonym of *Roqueella* Lundblad, 1930

Neoroqeella Lundblad, 1937 as a synonym of *Pararoqueella* Lundblad, 1937

Mamideopsis Habeeb, 1975 as a synonym of *Navamideopsis* Cook, 1967

Hexanipponacarus Imamura, 1959 as a synonym of *Nipponacarus* Imamura, 1959

Orientilimnesia Yi & Jin, 2009 lowered in ranking to a subgenus of *Limnesia* C.L. Koch, 1836
Tubomixdea Cook, 1981 transferred from *Mixdea* Orghidan & Gruia, 1980
Neumanikea Orghidan & Gruia, 1980 lowered in ranking to a subgenus of *Koenikea* Wolcott, 1900
Tanaognathus Wolcott, 1900 transferred from *Koenikea* Wolcott, 1900
Rhomborificias Jin & Li, 1993 lowered in ranking to a subgenus of *Arrenurus* Dugès, 1834
Xenthoracaphorus Cook, 1988 transferred from *Thoracophoracarus* K. Viets, 1914
Cladomomoniidae Orghidan & Gruia, 1980 transferred from the Momoniidae K, Viets, 1926

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I am very much indebted to Reinhard Gerecke (Tübingen) for his review of the manuscript. Henk Siepel (Radboud University) acted as the final editor. I had the privilege to discuss a number of taxonomical issues with Dave Cook (Paradise Valley). Reinhard Gerecke (Tübingen), Arne Panesar (Freiburg), Vladimir Pešić (Podgorica) and Tom Goldschmidt (Vienna, München) send me many original figures. Ian Smith (Ottawa) send me a specimen of *Debsacarus* and Martín Ramírez (Buenos Aires) the type of *Axonopsella misionum*.

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MORPHOLOGICAL TERMS

Figures 1-3 illustrate the majority of the morphological terms used in the keys and the diagnosis.

Acetabula. Special cup-like structures associated with the genital field. Function not known with certainty, but studies indicate they might be either secretory or sensory. Acetabula usually lie on genital plates but may also lie in the membranous integument flanking the gonopore, or may be scattered in the integument surrounding the gonopore or lie on the coxae. Occasionally the acetabula are stalked and then prominent but usually they are sessile.

Anchoral process. Posteriorly directed apodemes of the gnathosoma.

Antagonistic bristle. A usually thickened seta located on the distoventral portion of P4 of an uncate palp.

Apodeme. Internal extension of the sclerotized cuticle.

Apophyses. An internal projection from the idiosoma wall, often a site of muscle attachment.

Camerostome. An area of heavy sclerotization which more or less surrounds the gnathosoma. There may be heavy sclerotization ventral to the gnathosoma in species without a camerostome. If a true camerostome is present, there must be heavy sclerotization dorsal and lateral to the gnathosoma to form a tube, and the gnathosomal bay should be shallow or absent.

Cauda. A posterior extension of the idiosoma which is more or less distinctly set off from the remainder of the idiosoma. It is typical of males in the Arrenuridae, but is occasionally present in other taxa.

Chelate. A palp in which the dorsodistal end of the fourth segment extends beyond the insertion of the fifth segment. The fifth segment is able to fold against this extension to form a pincher-like appendage.

Chelicera. The most anterior of the appendages. It is typically two-segmented but occasionally there is a fusion of these segments. The chelicerae are surrounded by the gnathosoma in water mite deutonymphs and adults.

Cheliceral claw. The pointed, terminal segment of the chelicera. Occasionally the cheliceral claw is stylet-like.

Clawlet. Subdivisions of the claws. Claws without clawlets are called simple.

Condyles. The heavily sclerotized points of articulation between the leg coxae and trochanters in the area of the insertion of the fourth leg.

Coxa. The most proximal of the leg segments. In water mites it is greatly expanded to take over the function of an idiosoma sclerite. The coxae may be so expanded as to occupy most of the area of the idiosoma.

Coxal group. In general, Cx-I and Cx-II (anterior coxal group) and Cx-III and Cx-IV (posterior coxal group) are fused on their respective sides. When the coxae are separated medially there are four coxal groups. Occasionally, the anterior coxal groups may be fused medially to give three coxal groups, or all may be fused into a single group.

Dorsalia. Dorsal sclerites which lack associated setae or glandularia. Their main function is to provide a firm attachment site for the dorsoventral muscles. In common usage, the term platelet is used interchangeably.

Dorsal furrow. The narrow area (usually circular) of soft integument separating the dorsal and ventral shields. It may be so narrow as to appear as a line, or may be much wider. As the name would suggest, this area of thin membrane is usually dorsal or dorsolateral. However, occasionally it is definitely lateral and cannot be seen in dorsal view or, as in the case of some Arrenuridae males, part of the dorsal furrow may be dorsal and part may be ventral.

Dorsal shield. A single large dorsal sclerite or two or more smaller (but closely fitting) sclerites originating from fusion of dorsal plates.

Dorsocentralia. Paired dorsalia or platelets which are located relatively near the midline. These are especially important in the classification of certain hydryphantid genera.

Dorsolateralia. Paired dorsalia or platelets which are more lateral in position than the dorsocentralia.

Ejaculatory complex. Complex of internal sclerites and associated structures forming the terminal part of the male reproductive system.

Excretory pore. Terminal opening of the digestive system, also called anal pore. However, as the hindgut of water mites has lost its digestive function and is now strictly an excretory organ, the first term is preferable.

Eye capsule. Sclerites which harbour the lateral eyes.

Eye plate. Sclerites bearing the eye or eyes. Unless there is some further designation such as lateral eye plate, it refers to the frontal plate (median eye plate).

Frontal plate. A median, unpaired plate located near anterior end of the dorsum. It gets its name because it usually bears the median eye (frontal eye), but the name is also applied to a sclerite in this position even if the median eye is absent.

Genital plate. Sclerite flanking the gonopore which bear the acetabula. These are usually immovable but in the Limnesiidae may function as do the genital flaps of the more primitive water mites.

Genital bay. Area between the posterior coxal group into which the genital field projects.

Genital field. Term used for the entire genital area. It includes not only the gonopore, but also the area covered by the acetabula. Usually the genital field is well delineated by the genital plates, but when the latter are absent it may be a rather diffuse area.

Genital flaps. Paired sclerites which are movable (at least primitively) and cover the gonopore when closed. In most cases the genital flaps do not bear acetabula but actually cover the acetabula (which lie associated with the gonopore) when closed. Within certain families the flaps have become somewhat reduced in size so as to only partially cover the gonopore and acetabula or may become further reduced to small immovable sclerites. In the Limnesiidae, flap-like genital plates which also cover the gonopore when closed may be also called genital flaps. In certain Hydryphantoidea there are all intermediate stages from non-acetabula bearing to acetabula bearing flaps.

Genital pit. Depressed area associated with the male gonopore.

Genital valves. Genital flaps which do not bear acetabula and in general are well developed.

Glandularia. Special glands with an associated seta. Usually the gland and seta share a common sclerotized base, but gland and seta are on separate sclerites in the Hydrovolziidae.

Gnathosoma. A complex sclerite of multiple origin to which are attached the mouthparts, chelicerae and palp.

Gnathosomal bay. The U-shaped or V-shaped area between Cx-I in which the gnathosoma lies.

Gonopore. Opening of the reproductive system. Often used for the membranous area flanking the actual gonopore.

Pores. Small circular areas of thin integument (of varying dimensions) in heavily sclerotized water mites. Their function is to facilitate gas exchange.

Lateral eyes. The two pairs of eyes typically located anterolaterally. The lateral eyes may be in capsules, the lenses may be associated with the integument and sessile, or the lenses may be located beneath the integument. The eyes may have completely disappeared in some of the interstitial water mites. In members of the Eylaoidea, the lateral eyes have shifted medially and lie on a common sclerite.

Median eye. The single unpaired eye occasionally present mostly in early derivative water mites. It may or may not contain pigment and it may or may not lie on a frontal plate. Also called a "frontal organ".

Palp. Sometimes also called pedipalp, is the second pair of gnathosomal appendages.

Petiole. A small projecting sclerite located at posterior end of idiosoma in males of certain water mites. It is especially common among males of the Arrenuridae.

Pharynx. Anterior, dilatable part of the digestive tract, located in the gnathosoma.

Plate (platelet). A general term for sclerites of various types and sizes. It may refer to the dorsalia or ventralia or may be applied to expanded setal bases or glandularia bases. There is no clear-cut distinction between a plate and a platelet. In general, a plate is a large sclerite and a platelet is a small sclerite, but the intermediate condition would be hard to define.

Postfrontalia. The posterior of the two pairs of dorsalia located in the frontal area. The postfrontalia and the prefrontalia are often expanded and fused to form the frontal plate.

Postgenital sclerite. A median sclerite located at the posterior end of the gonopore. It is often fused with the genital plates in males. In mites with a terminal gonopore, the postgenital sclerite will be dorsal in position.

Postocularia. The posterior of two pairs of setae with their associated setal bases, located in the anterior portion of the dorsum. There are no glandularia associated with the postocularia.

Prefrontalia. The anterior of the two pairs of dorsalia located in the frontal area.

Pregenital sclerite. A median sclerite located at the anterior end of the gonopore. It is often fused with the genital plates in males. In mites with a terminal gonopore, the pregenital sclerite will be ventral in position.

Preocularia. The anterior of two pairs of setae with their associated setal bases located at the anterior end of the dorsum. There are no glandularia associated with the preocularia.

Pygal lobes. Posterolateral extensions of the male cauda in members of *Arrenurus* s.s.

Rostrum. A narrowed projection at the anterior end of the gnathosoma.

Secondary sclerotization. Idiosoma sclerotization other than primary sclerites of the coxae, gnathosoma, genital field and glandularia bases. Secondary sclerotization is growing and extending with increasing age, in general along margins of primary sclerites.

Swimming setae. Long hair-like setae attached to the distal segments of the legs which aid in swimming.

Uncate. In water mites, referring to a condition of the palp in which the ventral portion of the fourth segment is greatly expanded and the fifth segment is able to fold against the expanded portion.

Ventralia. The ventral equivalent of the dorsalia (see definition of the latter).

Ventral shield. The heavily sclerotized venter in which the coxae and genital field variously fused with the secondary sclerotization to form a single ventral sclerite or a series of closely fitting plates.

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