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TAXONOMIC AND FAUNISTIC STUDY OF ORIBATIDA AND MESOSTIGMATA (ACARI) FROM BEECH AND OAK FOREST SOILS OF THE NORTH-EAST OF THE IBERIAN PENINSULA

Tesis Doctoral

IÑAKI BALANZATEGUI GUIJARRO

Bajo la dirección de los doctores

Juan Carlos Iturrondobeitia Bilbao
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"*Natura nusquam magis est tota Quam in minimis*"

Plinio el Viejo

[Nature is to be found in her entirety nowhere more than in her smallest creatures]

[En ningún lugar se encuentra la naturaleza en su totalidad tanto como en sus más pequeñas criaturas]

Resumen

El medio edáfico es un complejo sistema ecológico con gran diversidad de especies que interactúan entre sí. Los microartrópodos presentes en la mesofauna, son principalmente fungívoros, barteriófagos o saprófagos. De entre ellos, los ácaros son el grupo encontrado con mayor frecuencia, importantes en la regulación de la descomposición y el ciclo de los nutrientes, y que influyen en la dinámica de poblaciones de otros organismos.

Los ácaros Oribatida, junto a los colémbolos, son por lo general el grupo dominante de la fauna artrópoda del suelo. A nivel mundial hay descritas más de 10.800 especies pertenecientes a 164 familias, y en la actualidad, el la región Ibero-Balear hay registradas 991 especies. Los Oribatida son se alimentan de materia orgánica particulada así como de algas, hongos y líquenes, pero también pueden depredar ocasionalmente nemátodos o carroñear artrópodos muertos.

Por otro lado, los ácaros Mesostigmata son principalmente depredadores de vida libre e importantes reguladores de las comunidades edáficas de la micro- y mesofauna, teniendo una elevada importancia en la mineralización del nitrógeno en ecosistemas naturales. Hay descritas 1800 especies a nivel mundial, de las cuales 102, representando 24 familias, están presentes en la Península Ibérica.

Se ha sugerido el papel bioindicador medioambiental de los ácaros edáficos con frecuencia. Los factores principales que determinan las comunidades de ácaros Oribatida en bosques son, la temperatura media anual, la precipitación y la altitud, así como el ratio C:N y la textura, el Ph y el tipo de humus del suelo. En el caso de los ácaros Mesostigmata, éstos son sensibles a la humedad del suelo, al tipo de humus y a la contaminación aérea.

En España, el estudio de los ácaros edáficos es muy extenso. Así, los ácaros Oribatida son el orden más estudiado, destacando los trabajos realizados por el Dr. Carlos Pérez-Íñigo, el Dr. Luis S. Subías y el Dr. J. Carlos Iturrondobeitia. Parte del trabajo de éstos se sintetizó en los volúmenes de "Fauna Ibérica", que a día de hoy son de gran importancia taxonómica. En los Mesostigmata ocurre todo lo contrario. La información está muy fragmentada y la identificación resulta compleja. Existen dos claves para la fauna centro-europea que permiten la identificación a nivel de especie, que a día de hoy resultan ser bastante incompletas. En la Península Ibérica y la región Macaronésica destacan los trabajos de la Dra. M. Lourdes Moraza, muchos de ellos enfocados en el estudio de las comunidades y las especies de la provincia de Navarra.

La presente tesis se ha llevado en el nordeste de la Península Ibérica, abarcando la Comunidad Autónoma del País Vasco (CAPV) y el norte de Navarra. Se han estudiado dos tipos de bosques

presentes en la zona de estudio, los hayedos (*Fagus sylvatica*) y robledales (*Quercus robur*) con los objetivos de 1) identificar la comunidad de ácaro Oribatida de diferentes hayedos y robledales, principalmente de la CAPV, 2) llevar a cabo el primer estudio de los ácaros Mesostigmata de la CAPV identificando las comunidades de los mismos hayedos y robledales y 3) establecer la capacidad de cada uno de los grupos para diferenciar el tipo de ecosistema y las características ambientales presentes a lo largo de los puntos de muestreo.

Con los objetivos establecidos, se muestrearon un total de cinco hayedos de las localidades de Artikutza en Navarra, Añarbe en Gipuzkoa, Altube, Arriano y Peñacerrada (Pto. de Osluna) en Araba, así como un total de cuatro robledales de las localidades de Añarbe, Urduliz en Bizkaia, Izarra en Araba y Peñacerrada.

Los bosques se diferenciaron en base a la serie de vegetación que representaban. Por un lado, los tres hayedos de la vertiente cantábrica son hayedos acidófilos de la serie *Saxifrago hirsutae-Fagetum sylvaticae*, mientras que los dos hayedos de la vertiente mediterránea son hayedos neutro-basófilos pertenecientes a la serie *Epipactido helleborines-Fagetum sylvaticae*. Por el otro lado, los dos robledales de la vertiente cantábrica son robledales acidófilos de la serie *Hyperico pulchri-Quercetum roboris*, mientras que los dos robledales de la vertiente mediterránea pertenecen a la serie *Crataego laevigatae-Quercetum roboris*.

Con datos de temperatura y precipitación para cada uno de los puntos de muestreo disponibles en Euskalmet (Agencia Vasca de Meteorología) se calcularon diversos índices para la clasificaciónn bioclimática de los mismos. De esta manera diferenciamos tres tipos de bioclima (Templado oceánico, Templado oceánico variante sub-mediterránea y Mediterráneo pluviestacional óseanico), 4 tipos de Termotipos (Termo-templado, Meso-templado, Supra-templado y Supra-medterráneo) y 2 tipos de Ombrotipos (Húmedo e Hiper-húmedo).

La toma de muestras se realizó a finales de primavera - principios de verano de 2008, 2009 y 2010. En 2088, una muestra de los primeros 5 cm del suelo, compuesta de 3 sub-muestras de un litro cada, fue recogida con la ayuda de una pala de jardinería. Cada sub-muestra fue guardada independientemente en una bolsa de plástico para su transporte. En 2009 y 2010, se recogió una muestra de los primeros 5 centímetros de suelo, compuesta por 8 sub-muestras de 250 cc cada una, con la ayuda de un *corer* de 8 cm de diámetro. Cada sub-muestra fue guardada en botes de plástico con tapa.

Las muestras fueron transportadas al laboratorio de Artrópodos del Departamento de Zoología y Biología Celular Animal (UPV-EHU) para la extracción de la mesofauna mediante el método de

embudos Berlese-Tullgren. La mesofauna extraída fue almacenada para su posterior separación e identificación en etanol al 70%.

Se separaron los ácaros Oribatida y Mesostigmata adultos de cada muestra bajo la lupa binocular (50x) y tras su aclaro en ácido láctico o solución Nesbit, se identificaron a nivel de especie con la ayuda del microscopio (400x), equipado con contraste de interferencia diferencial, y claves dicotómicas al uso. Una vez identificados, algunos de los ejemplares se montaron en medio Hoyer sobre portaobjetos. Las especies identificadas fueron fotografiadas con la ayuda de una cámara web acopada al microscopio y en determinados casos, se procedió a la realización de composiciones fotográficas con un programa 3D-combine.

Todas las especies han sido depositadas en el Laboratorio de Artrópodos del Departamento de Zoología y Biología Celular Animal (UPV-EHU).

Para ambos grupos de ácaros, se ha redactado el listado sistemático correspondiente y se cotejado la distribución de cada especie en la Península Ibérica con la ayuda de listados existente o mediante una búsqueda bibliográfica extensa.

Se han comparado mediante análisis estadísticos (programa R) las comunidades de los ácaros Oribatida y Mesostigmata de los diferentes bosques. Se empleó la transformación de Hellinger en las matrices de datos de abundancias (Oribatida, Mesostigmata y Oribatida junto Mesostigmata) y éstas fueron enfrentadas a dos matrices de variables ambientales.

En total se han identificado 16.792 individuos de ácaros Oribatida pertenecientes a 200 especies y 51 familias. Se citan por primera vez en la Península Ibérica *Damaeus (D.) firmus* Kunst, 1957, *Liacarus (L.) xylariae* (Schrank, 1803) y *Eupelops hygrophilus* (Knülle). Se ha ampliado la distribución conocida en las provincias estudiadas de 99 especies: 64 en Araba, 46 en Gipuzkoa y 6 en Navarra.

Se han descrito brevemente las especies no encontradas con anterioridad en el área de estudio: *Autogneta (A.) parva* Forsslund, 1947, *Belba (B.) patelloides* (Michael, 1888), *Berniniella (B.) conjuncta* (Strenzke, 1951), *Berniniella (B.) serratirostris hauseri* (Mahunka, 1974), *Camisia (C.) segnis* (Hermann, 1804), *Carabodes (C.) arduinii* Valle, 1955, *Carabodes (C.) areolatus* Berlese, 1916, *Carabodes (C.) labyrinthicus* (Michael, 1879), *Carabodes (Klapperiches) similis translamellatus* Pérez-Íñigo jr., 1990, *Cepheus tuberculosus* Strenzke, 1951, *Ceratozetes (C.) gemmula* Pérez-Íñigo jr., 1990, *Ctenobelba (C.) pseudomahnerti* Subías & Shtanchaeva, 2013, *Galumna (G.) lanceata* (Oudemans, 1900), *Gehypochthonius rhadamanthus* Jacot, 1936, *Heminothrus (H.) targionii* (Berlese, 1885), *Hermanniella septentrionalis* Berlese, 1910, *Liacarus (L.) brevilamellatus* Mihelčič, 1957, *Liochthonius (L.) horridus* (Sellnick, 1928), *Nanhermannia (N.) sellnicki* Forsslund, 1958, *Nothrus cf. borussicus*

Sellnick, 1928, *Ommatocepheus ocellatus* (Michael, 1882), *Parachipteria punctata* (Nicolet, 1855), *Punctoribates (P.) punctum* (Koch, 1839), *Rhinoppia (R.) cf. minidentata* (Subías & Rodríguez, 1988), *Rhinoppia (R.) ordunensis* (Iturrondobeitia & Saloña, 1988), *Sellnickochthonius cricoides* (Weis-Fogh, 1948), *Sellnickochthonius furcatus* (Weis-Fogh, 1948), *Sellnickochthonius rostratus hungaricus* (Balogh, 1943), *Sellnickochthonius suecicus* (Forsslund, 1942), *Steganacarus (S.) michaeli* Bernini & Avanzati, 1987, *Subiasella (Lalmoppia) quadrimaculata* (Evans, 1952), *Suctobelba granulata* Hammen, 1952, *Synchthonius crenulatus* (Jacot, 1938), *Tritegeus bisulcatus* Grandjean, 1953 y *Xenillus (X.) discrepans s. str.* Grandjean, 1936.

Especies como *Neotrichoppia (N.) pseudoconfinis* Subías & Iturrondobeitia, 1980, *Oribatula (O.) tibialis* (Nicolet, 1855), *Rhinoppia (R.) media* (Mihelcic, 1956), *R. (R.) tridentata* (Subías & Mínguez, 1985) y *R. (R.) vera* (Mihelcic, 1956) se han separado en varios morfotipos atendiendo a caracteres morfológicos. Posiblemente, *Oppiella (Perspicuoppia)* sp., *Parachipteria* sp., *Ramusella (cf. Insculptoppia)* sp. y *Rhinoppia (cf. Rhinoppia)* sp. sean especies nuevas para la ciencia.

En total se han identificado 1.288 individuos de ácaros Mesostigmata pertenecientes a 94 especies y 14 familias. Se citan por primera ven en la Península Ibérica once especies: *Zercon (Z.) cf. gurensis* Mihelcic, 1962, *Parasitus evertsi* Oudemans, 1902, *Parasitus cf. lunulatus* (Müller, 1859), *Parasitus nolli* (Karg, 1965), *Eugamasus berlesei* (Willmann, 1935), *Macrocheles (M.) dentatus s. str.* Evans & Browning, 1956, *Pachylaelaps (L.) cf. dubius* Hirschmann & Krauss, 1965, *Cheiroseius viduus* Koch, 1839, *Iphidozercon gibbus* (Berlese, 1903), *Leioseius elongatus* Evans, 1958 y *Dinychus (D.) arcuatus* (Trägardh, 1943). Se ha ampliado la distribución conocida, en las provincias estudiadas, de 92 especies: 68 en Araba, 30 en Bizkaia, 28 en Gipuzkoa y 9 en Navarra.

Se han descrito brevemente las especies no encontradas con anterioridad en el área de estudio: *Cheiroseius viduus* Koch, 1839, *Cilliba cassidioidea* (Hirschmann & Z.-Nicol, 1964), *Cilliba insularis* Willmann, 1939, *Eugamasus maguliaris* (Athias-Henriot, 1978), *Eugamasus parvulus* (Athias-Henriot, 1978), *Geholaspis (G.) aeneus* Krauss, 1970, *Macrocheles (Macrholaspis) opacus* Koch, 1839, *Onchodellus regularis* (Berlese, 1920), *Paragamasus cishispanus* Athias-Henriot, 1967, *Paragamasus pertrematus* Athias-Henriot, 1967, *Paragamasus trichinulus* Athias-Henriot, 1967, *Podocinum pacificum* Berlese, 1895, *Prozercon (P.) cf. aristatus* Athias-Henriot, 1961 y *Prozercon (P.) cf. fimbriatus* (Koch, 1839).

Especies como *Amblygamasus* sp., *Epicrius* sp., *Holoparasitus* sp., *Paragamasus* sp., *Veigaia* sp., *Macrocheles (Macrholaspis)* sp., *Pachylaelaps (Longipachylaelaps)* sp., tres especies del género *Neodiscopoma*, *Phaulodinychus* sp. y *Uroovobella (Fuscuropoda)* sp. son posiblemente nuevas para la ciencia.

Con respecto al análisis estadístico de los datos de las comunidades de ácaros, el robledal RO03 resultó ser, de alguna manera, diferente a otros bosques basado métodos de clasificación (UPGMA) y ordenación (NMDS). Esto significa que la comunidad de ácaros de este bosque difiere de otros. La explicación más plausible es que se encuentra en una zona ombroclimática húmeda donde se produce un balance hídrico favorable del suelo en verano debido a su peculiar topografía y textura del suelo, por lo que pueden producirse eventos hidromórficos.

Los resultados obtenidos al utilizar el total de datos, Oribatida y Mesostigmata juntos, son similares a los datos de Oribatida cuando se usan solos. Las especies de este grupo presentan mayores abundancias en comparación con Mesostigmata, y por lo tanto, cuando se usan ambos datos juntos, las especies de Mesostigmata son infravaloradas.

La contribución de los ácaros Mesostigmata a la varianza total explicada es pequeña cuando se utiliza junto con Oribatida, y por lo tanto, el esfuerzo de identificación de ambos grupos en estudios sinecológicos parece ser innecesario. La abundancia y diversidad de ácaros no varió con el tipo de bosque, lo que coincide con estudios previos sobre Oribatida.

Aunque las diferencias en cobertura de vegetación y tipo de hojarasca influyen en la comunidad de ácaros Oribatida, ambos tipos de bosque, hayedo y robledal, no afectaron a la composición de la comunidad de ácaros, lo que sugiere que proporcionan nichos similares para ambos, Oribatida y Mesostigmata.

Las comunidades de ácaros difieren significativamente con las variables Bioclima y Termotipo, lo que explica una gran fracción de varianza. Esto señala la importancia de factores regionales, como por ejemplo la temperatura, como fuerzas estructurantes de las comunidades de ácaros. Sin embargo existe otra gran varianza no explicada, que puede estar relacionada con variables ambientales relacionadas con el suelo, como el pH, la cantidad de hojarasca, etc., que son importantes para la fauna del suelo y que contribuyen a estructurar las comunidades de ácaros del suelo.

1. Introduction

Soil is a complex ecological system extremely rich in species diversity that includes a huge variety of interactions. It has been shown that the composition and diversity of soil fauna communities influence soil processes (Swift *et al*. 2004; Wall 2004) and Schneider *et al*. 2004 suggested that trophic niche differentiation within taxonomic groups contributes to the high diversity of soil animal taxa.

Among the mesofauna, most microarthropods are fungivores, bacterivores, or saprophages. Soil mites are often the most frequently recorded group among soil biota (Walter & Proctor 1999), occurring in 94% of all soil samples (Black *et al*. 2003), and have a significant role in regulating decomposition and nutrient cycling, influencing the population dynamic of other organisms (Koehler 1999).

Although there are few predatory species among Oribatida mites and Collembola, the majority of predator species are among Prostigmata and Mesostigmata mites (Ruf & Beck 2005; Krantz & Walter 2009).

Most oribatid mites inhabit the soil-litter system and, together with Collembola, they are the dominant arthropod group in highly organic soils of temperate forests (Norton & Behan-Pelletier 2009). They are abundant in forests, reaching densities between 20,000 and 200,000 individuals/m^2 in bases rich and acidic forests respectively (Maraun & Scheu 2000). Worldwide, there are more than 10,800 described Oribatid species representing 164 families (Subías 2004) and at present, 991 species are in the Ibero-Balearic region (Subías *et al*. 2013).

Oribatida mites are decomposers feeding on dead organic material and fungi, but also feed on lichens and opportunistic predation on nematodes and scavenging on dead arthropods may happen (Schneider *et al*. 2004; Erdmann *et al*. 2007; Norton & Behan-Pelletier 2009; Maraun *et al*. 2011; Heidemann *et al*. 2011). They are classified into two major groups, Macropylina and Brachypylina, the latter subdivided into Gymnonota and Poronota depending on the presence of pteromorphs and glands on the notogaster such as porose organs, saccules or pori (Norton & Behan-Pelletier 2009).

Predatory soil mites are top predators of other microarthropods, nematodes, enchytraeids and insect larvae and eggs, being important regulators of soil meso- and microfauna in the mesotrophic system (Heal & Dighton 1985) and play a major role in mineralization of nitrogen in natural ecosystems like forests (Berg *et al*. 2001).

Mesostigmatid mites are mainly free-living predators and outnumber other soil dwelling predatory mite groups in species number, abundance and biomass under temperate climate conditions (Persson & Lohm 1977; Luxton 1982). There are described more than 1,800 Mesostigmata species worldwide, and 102 species representing 24 families are present in the Iberian Peninsula (Moraza & Balanzategui 2015).

At a given site rarely are recorded more than 60 species (Ruf & Beck 2005) and their abundance lies between 4,000 and 10,000 ind./m2 (Römbke *et al*. 1997), being the most abundant species often found to be randomly dispersed (Usher 1971; Tousignant & Coderre 1992).

Mesostigmata are usually represented by Gamasina and Uropodina. Most Gamasina are free-living predators of soil dwelling invertebrates, including other mites such as weakly sclerotized Actinedida, Acaridida and Oribatida juvenile stages (Koehler 1999). Uropodina are primarily fungivores (Werner & Dindal 1990) but can also prey, mainly on Nematoda (Koehler 1999).

Soil mites had been proposed as bioindicators of environmental quality (van Straalen 1998; Behan-Pelletier 1999; Maraun & Scheu 2000; Arroyo *et al*. 2003; Behan-Pelletier 2003; Iturrondobeitia *et al*. 2005; Ruf & Beck 2005; Beaulieu & Weeks 2007; Gulvik 2007; Gergócs & Hufnagel 2009) or as forensic indicators, providing information about the environment where a corpse has been exposed to as well as other applied aspects of forensic entomology (Saloña-Bordas & Perotti 2015).

In addition, Ruf (1998) proposed the Madurity Index, a system of soil quality classification based on ranking Mesostigmata according to their life-history traits on an r/K scale, and seems to be a sensitive bioindication tool and a good indicator of environmental quality in forest soils (Ruf *et al*. 2003).

The most important factors determining the Oribatida community in forests are annual mean temperature, precipitation, and elevation; secondly were C:N ratio and soil texture, and in third place

were pH and humus form (Beck *et al*. 2001). On the other hand, species composition of Mesostigmata mites in forests depends on the different tree species and environmental conditions (Skorupski *et al*. 2003; Parisi *et al*. 2005; Gulvik 2007; Bedano & Ruf 2007), being the most sensitive soil fauna group to soil moisture, humus form and airborne pollution (Ruf 2000; Ruf *et al*. 2000).

The identification of all the adult mites is not possible because of their incomplete taxonomy or the degree of complexity of the taxonomic identification at species-level. Thus, in many case studies specimens were determined to morphospecies, to family- or genera-level, to higher taxonomic levels or even not identified (eg. Andrew *et al*. 2003; Minor & Cianciolo 2007; Frouz *et al*. 2008; O'Neill *et al*. 2010; Erdmann *et al*. 2012; Nielsen *et al*. 2012; Minor & Ermilov 2015).

In Spain, the study of soil mites is very extended. Grandjean (1928) was first to deal with Iberian Oridabita but it was not until de mid 50's when Dr. Franz Mihelcic started the identification and description of both Oribatida and Mesostigmata species. Up to date, for Oribatida should be noted the studies carried out by Dr. Carlos Pérez-Íñigo, Dr. Luis S. Subías and Dr. J. Carlos Iturrondobeitia. All together, several hundreds of studies had been published in the matter, being taxonomically the most important the "Fauna Ibérica" volumes (Pérez-Íñigo 1993, 1997; Subías & Arillo 2001)

On the contrary, information about Mesostigmata is dispersed. Many publications are available for the identification of free-living Mesostigmata but they are scattered and generally incomplete (Beaulieu & Weeks 2007). In general, Karg (1989, 1993) and Gilyarov & Bregetova (1977) are possibly the most complete keys for European soil dwelling species identification, although at present, several species have been synonymised or rearranged in a different genera or even family. At Iberian Peninsula and Macaronesian region levels, might be emphasised the works of Dr. M. Lourdes Moraza, many of them focusing in the Spanish province of Navarre.

The present study had been carried out in the north-east of the Iberian Peninsula, comprising the Autonomous Community of The Basque Country and Navarre. Beech (*Fagus sylvatica*) and oak (*Quercus robur*) forests are the most represented forest types in the studied region, accounting about the 25% of the total forest surface of the Basque Country (Gobierno de España 2013). Both are deciduous forests present in the majority of the bioclimatic regions of the studied area (Loidi *et al*. 2009).

When exposed to the same environmental conditions during degradation, the nutrients ratio of litter of both forest types converged with time (Liu *et al*. 2016), so it might be expected minimum differences among the mite community for both forest types. However, the presence of different climatic regimes might influence on the mite communities.

So, the aims of the present study are:

1) Identify the Oribatida community of different beech and oak forests, mainly of the Autonomous Community of The Basque Country.

2) Carry out the first study of the Mesostigmata mites in the Basque Country, identifying the community of the same beech and oak forests.

3) Establish the capability of each mite group to differentiate the ecosystem type and environmental characteristics across sampling sites.

2. Materials and Methodology

2.1. Study Area

Sampling was conducted in late spring to early summer of 2008, 2009 and 2010 in five beech (*Fagus sylvatica*) and four oak (*Quercus robur*) forests in the north-east of the Iberian Peninsula (Figure 1). All sample points are in the Autonomous community of the Basque Country except one, which is in the North of Navarre province very close to Gipuzkoa province. Geographical details and ecosystemic characterization are in Table 1.

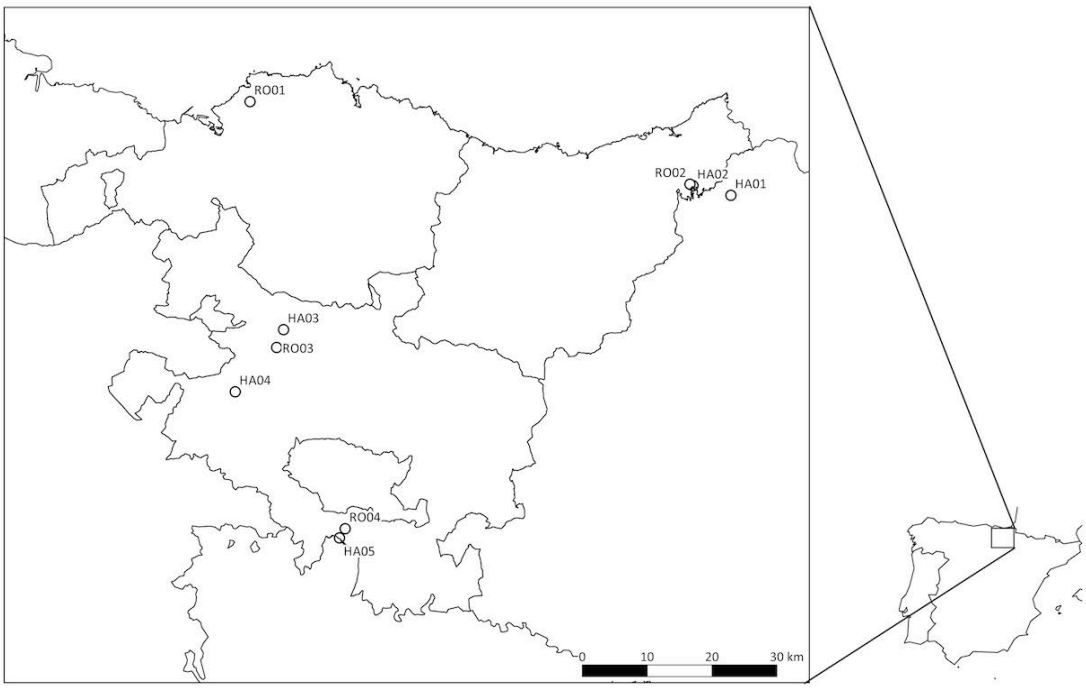

Figure 1. Study area and sampling sites.

Table 1. Sampling sites characterization. (*Sh_Fs: Saxifrago hirsutae-Fagetum sylvaticae, Eh_Fs: Epipactido helleborines-Fagetum sylvaticae, Hp_Qr: Hyperico pulchri-Quercetum roboris, Cl_Qr: Crataego laevigatae-Quercetum roboris*).

Code	Site	Province	UTM (datum WGS84) 30T		Elevation (m)	Ecosystem	Vegetation series
			X	Y			
HA01	Artikutza	Navarre	598725	4785430	382	*F. sylvatica*	*Sh_Fs*
HA02	Añarbe	Gipuzkoa	590369	4788047	362	*F. sylvatica*	*Sh_Fs*
HA03	Altube	Araba	511000	4759205	600	*F. sylvatica*	*Sh_Fs*
HA04	Arriano	Araba	501522	4747071	822	*F. sylvatica*	*Eh_Fs*
HA05	Pto. de Osluna	Araba	521963	4718540	938	*F. sylvatica*	*Eh_Fs*
RO01	Urduliz	Biscay	504430	4803719	40	*Q. robur*	*Hp_Qr*
RO02	Añarbe	Gipuzkoa	590429	4787869	320	*Q. robur*	*Hp_Qr*
RO03	Izarra	Araba	509647	4755733	620	*Q. robur*	*Cl_Qr*
RO04	Peñacerrada	Araba	523083	4720337	769	*Q. robur*	*Cl_Qr*

2.1.1. Vegetation

Ecosystems and vegetation series were defined using the application FTP-GEOEUSKADI (Eusko Jaurlaritza-Gobierno Vasco, 2009).

The acidophilous beech forest series (*Saxifrago hirsutae-Fagetum sylvaticae* Br.-Bl. 1967) is dominated by *Fagus sylvatica* L. trees with a continuous leaf litter on the ground and a poorly developed shrub and herbaceous layer, defined by the presence of e.g. *Saxifraga hirsuta* L., *Blechnum spicant* (L.) and *Oxalis acetosella* L.. It develops above 500-600 m elevation, but due to the high rainfall present in the region of Artikutza (HA01) and Añarbe (HA02), it descends to 300-400 m elevation (Loidi *et al.* 2009).

The neutro-basophilous beech forest series (*Epipactido helleborines-Fagetum sylvaticae* (Rivas-Martínez 1962)) is thermophilic and develop in low precipitation regions (Rivas-Martínez *et al.* 1991a). The shrub layer is more developed, with presence of e.g. *Buxus sempervirens* L., *Corylus avellana* L., *Crataegus* sp. and *Ilex aquifolium* L., while the herbaceous layer is defined by e.g. *Hedera helix* L., *Helleborus foetidus* L. and *Hepatica nobilis* Schreber.

The acidophilous oak forest series (*Hyperico pulchri-Quercetum roboris* Rivas Mart., Báscones, T. E. Díaz, F. Fernández-González *et* Loidi 1991) develops in acidic soils (Rivas-Martínez *et al.* 1991b). It is dominated by *Quercus robur* L. trees but other tree species can be found coexisting, e.g. *Ilex aquifolium* and *Crataegus monogyna* Jacq.. In the shrub layer *Erica* sp., *Ulex* sp. and *Vaccinium myrtilus* L. might be present, and the herbaceous layer is defined by *Hypericum pulchrum* L., *Oxalis acetosella*, *Euphorbia* sp., and pteridophytes e.g. *Blechnum spicant* and *Pteridium aquilinum* (L.).

The mesophitic oak forest series (*Crataego laevigatae-Quercetum roboris* Rivas-Martínez & Loidi 1988) develops in deep soils of valley bottoms and plains located on the watershed between the Cantabrian and the Mediterranean basins (Rivas-Martínez & Loidi 1988; Rivas-Martínez *et al.* 1991b). It is dominated by *Quercus robur* trees with presence of e.g. *Acer campestre* L. and *Prunus spinosa* L.. The presence of *Crataegus laevigata* (Poiret) in the shrub layer defines the vegetation series (Rivas-Martínez & Loidi 1988), and other species e.g. *Cornus sanguinea* L. and *Ligustrum vulgare* L. might be present. *Hedera helix*, *Smilax aspera* L., *Arum italicum* Miller, *Pulmonaria longifolia* (Bast.), *Primulla* sp., *Asplenium scolopendrium* L. and *Polystichum* sp. are some of the species present in the herbaceous layer. The holotype of this vegetation series is RO03 (Rivas-Martínez & Loidi 1988) and the most southerly forest is RO04 (Uribe-Echebarría 2010).

2.1.2. Bioclimatic classification

Temperature and precipitation data of 2009-2010 were obtained from the Basque Meteorology Agency (Euskalmet). Bioclimatic classification was defined calculating the ombrothermic index (Io), the continentality/oceanity index (Ic) and the compensated thermicity index (Itc) (López-Fernández & López-F. 2008) (Table 2).

Table 2. Bioclimatic characterization of sampling sites (Pp: annual accumulated precipitation; T: mean annual temperature; Teoc: Temperate-oceanic, Teoc-Sbm: Sub-Mediterranean Temperate-oceanic, Mepo: Mediterranean pluvi-seasonal; Mte: Meso-temperate, Tte: Thermo-temperate, Ste: Supra-temperate, Sme: Supra-Mediterranean; Hhu: Hiper-humid, Hum: Humid)

Code		HA01	HA02	HA03	HA04	HA05	RO01	RO02	RO03	RO04
Pp (mm)	**2009**	2297.9	2265	957	676.8	680.2	1013.2	2265	923.7	788.1
	2010	1964.2	1956.5	1013.6	562.1	608.6	1102.6	1956.5	924.7	684.2
T (ºC)	**2009**	12.2	12.3	10.5	12.1	8.3	14.5	12.3	10.8	11
	2010	11.4	11.6	9.7	11.5	7.2	14.3	11.6	10.1	9.8
Io	**2009**	15.7	15.4	7.6	4.7	6.8	5.8	15.4	7.1	5.9
	2010	14.3	14	8.7	4.1	7.1	6.4	14	7.6	5.8
Ic	**2009**	14.7	13.3	13.9	16	15.9	12.2	13.3	13.9	16.9
	2010	14	13.3	14.6	16.6	16.3	11	13.3	14.1	17
Tp	**2009**	1462	1474	1260	1452	996	1739	1335	1293	1327
	2010	1374	1394	1165	1379	862	1715	1394	1213	1175
itc	**2009**	213.8	234.8	177	207	83	321	234.8	179.7	168
	2010	212.1	218	153	191	74	325	218	167	140
Bioclimate		Teoc	Teoc	Teoc_Sbm	Teoc_Sbm	Mepo	Teoc_Sbm	Teoc	Teoc_Sbm	Mepo
Thermotype		Mte	Mte	Ste	Ste	Sme	Tte	Mte	Mte	Sme
Ombrotype		Hhu	Hhu	Hum	Hum	Hum	Hum	Hhu	Hum	Hum

In order to corroborate the classification obtained, geo-referenced bioclimate, thermotype and ombrotype maps (López-Fernández *et al.* 2008, Piñas *et al.* 2008a, Piñas *et al.* 2008b) were obtained with QGIS 2.14 ESSEN program (Figure 2).

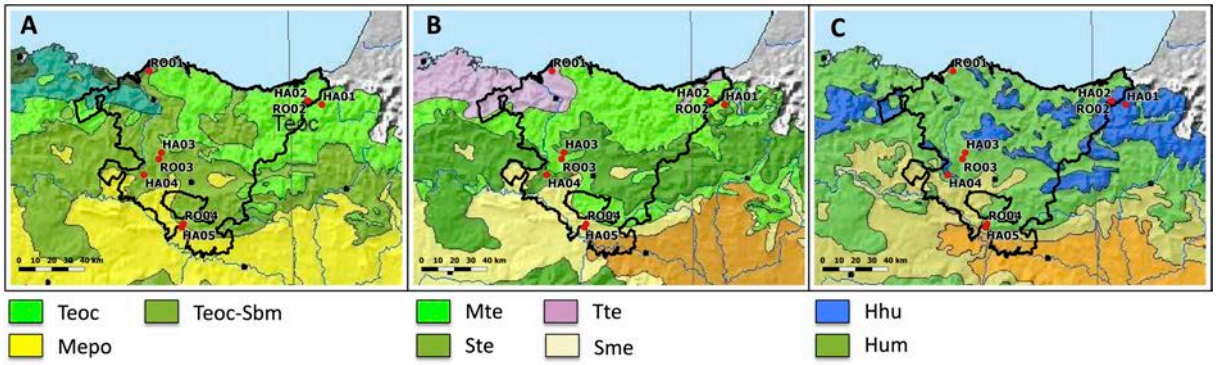

Figure 2. Bioclimate (A), Thermotype (B) and Ombrotype (C) maps of the sampling sites. (Teoc: Temperate-oceanic, Teoc-Sbm: Sub-Mediterranean Temperate-oceanic, Mepo: Mediterranean pluvi-seasonal; Mte: Meso-temperate, Tte: Thermo-temperate, Ste: Supra-temperate, Sme: Supra-Mediterranean; Hhu: Hiper-humid, Hum: Humid).

2.2. Soil sampling and fauna extraction

Sampling was performed at each location in late spring of 2008, 2009 and 2010. In 2008, a 5 cm depth soil sample was extracted from the ground using a small garden-shovel. Each sample was composed by 3 sub-samples of one litre each; each sub-sample was stored and transported to the laboratory in a plastic bag. In 2009 and 2010, a composite soil sample consisting of 8 sub-samples of 250 cc each was collected with a corer (8 cm in diameter and 5 cm depth); each sub-sample was stored and transported in a plastic pot with a lid.

The soil fauna was extracted using Berlese-Tullgren funnels (Coineau, 1974) with an approximately 1 mm mesh size. In 2008, each sub-sample (1 litre) was placed on a funnel, while in 2009 and 2010 two sub-samples (500 cc) per funnel were placed. Funnels were placed under the light and heat source for 2 hours light and 4 hours darkness. The fauna was extracted and stored until determination in 70% ethanol.

2.3. Soil fauna separation and mite identification

Oribatida and Mesostigmata adult mites were separated under the binocular loupe (50x) and identified to species level under the microscope (400x). Differential-interference contrast equipment at the microscope helped in identifying specially fine and poorly sclerotized morphological characters.

The Oribatida were previously cleared with lactic acid and identified using dichotomous keys (Balogh & Mahunka 1983; Pérez-Íñigo 1993, 1997; Subías & Arillo 2001; Weigmann 2006). Specimens were preserved in 70% ethanol or mounted in semi-permanent Hoyer's medium on microscope slides.

Mesostigmata mites were previously cleared with Nesbitt's solution and mounted in permanent Hoyer's medium on microscope slides. An artificial key to females of the major families of non-parasitic Mesostigmata (freely modified from Krantz 1978) was used prior to species level identification. General identification keys (Gilyarov & Bregetova 1977; Evans & Till 1979; Krantz & Ainscough 1990; Karg 1993) and family, genera or species level keys were used for identification (Evans 1955a; Evans & Browning 1956; Johnston 1961; Athias-Henriot 1967a, 1967b, 1967c, 1978, 1979; Micherdzinski 1969; Hyatt 1980; Hyatt & Emberson 1988; Ainscough 1981; Karg 1989; Halliday *et al.* 1998; Juvara-Bals 2002; Mašán 2003, 2007, 2008; Mašán *et al.* 2008, 2016; Mašán & Halliday 2014; Moraza 2005, 2006a; Stachowiak *et al*. 2008).

Once identified, specimens were photographed under the microscope with webcam. Photography composition was held using a 3D-combine program.

Only Mesostigmata immature stages were separated from the mesofauna, counted and mounted in permanent Hoyer's medium on microscope slides, and identified to family level for further investigations.

All the specimens were deposited at the Laboratory of Arthropods (Zoology and Animal Cell Biology Department, UPV-EHU).

2.4. Taxonomical classification and distribution

The systematic checklist of the order Oribatida had been prepared according to the checklist of the World's oribatid mites (Subías 2004) and new distribution data to the Iberian Peninsula had been compared with Subías *et al.* (2013).

There is not an official taxonomical classification of Mesostigmata species, so the systematic checklist had been prepared according to Krantz & Walter (2009) and Beaulieu *et al*. (2011) for the families and Hallan (2005) for the genera and species. There is neither a review of the distribution of this order in the Iberian Peninsula, so it had been necessary to review previous works that recorded species at the studied area.

Chaetotaxy was named after Norton & Behan-Pelletier (2009) and Lindquist *et al.* (2009) (Figure 3)

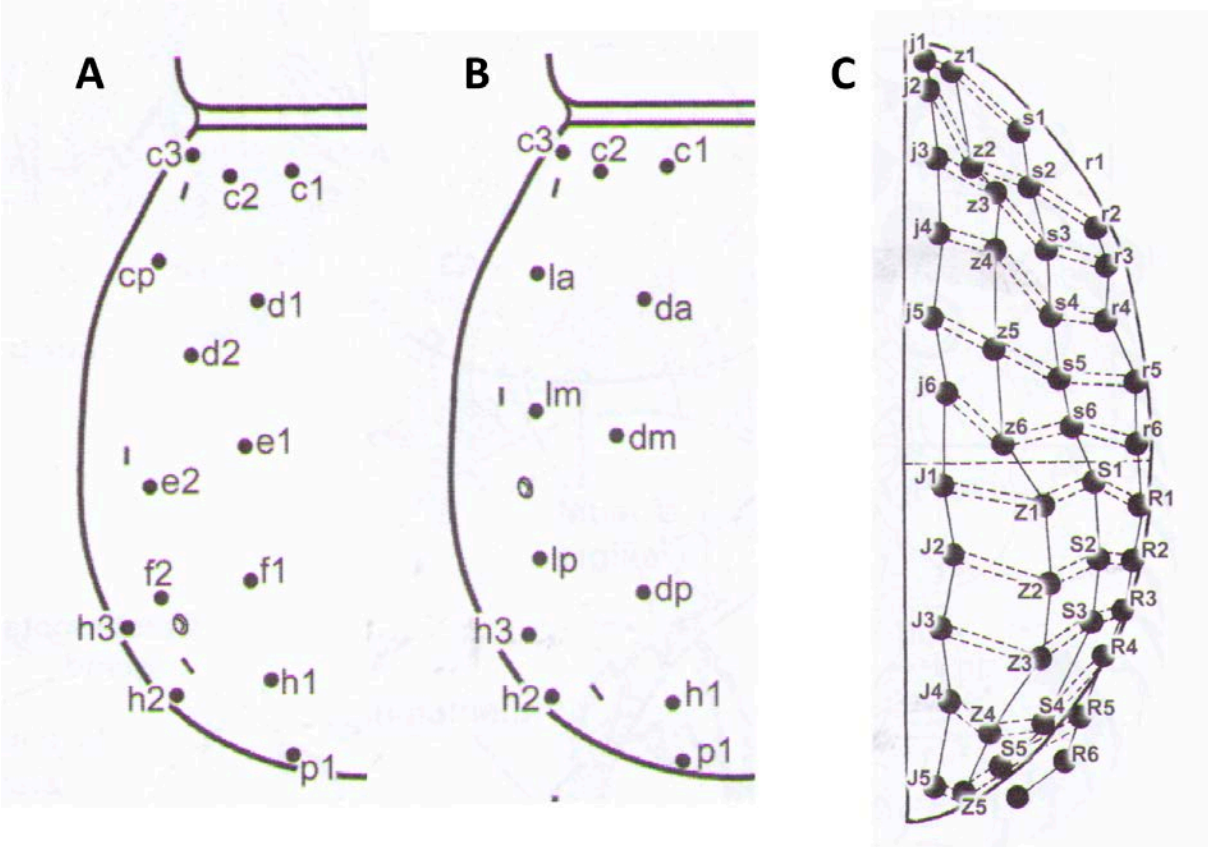

Figure 3. Chaetotaxy of Oribatida (A, B) and Mesostigmata (C) (After Norton & Behan-Peletier 2009, Linquist *et al*. 2009)

2.5. Statistical analysis

Since two different sampling and fauna extraction methodologies were used, only 2009 and 2010 data were used. Statistical analyses were performed with *R* language (R version 3.3.1) through *vegan* package, following Borcard *et al*. (2011).

Two year sampling of each experimental unit (site) deals with temporal pseudoreplication (Hurlbert 1984) and therefore each site year-data were pooled. Three data matrix were studied separately, namely Oribatida, Mesostigmata and Mites (Oribatida and Mesostigmata abundances altogether).

Focused on the community, diversity was described as observed species richness, the Shannon diversity index and Pielou's evenness, calculated from raw data with the function *diversity*. Statistical

differences were tested via one-way Anova (function *anova*). For any further analyses as the data matrix had many zeros, Hellinger transformation (Legendre & Gallagher 2001) was applied to species abundance data by *decostand* function (argument *hellinger*).

Classification was performed using Unweighted Pair-Group (UPGMA) clustering method (function *hclust*, method *average* on Euclidean distances) and ordination plot of unconstrained Nonmetric Multidimensional Scaling (NMDS) (function *metaMDS* on Euclidean distances) were computed.

Variation partitioning based on partial Redundancy analysis (RDA) (function *rda*) was performed to partial out spatial and environmental components (Borcard et al. 1992; Borcard & Legendre 1994). Spatial explanatory variables were obtained with Principal Coodinates of Neighbour Matrices (PCNM) (function *pcnm*) of the geographic distances among sites, calculated from site-coordinates XY (function *dist*, method *euclidean*), and posterior forward selection of the PCNM variables (function *ordistep*) (Borcard & Legendre 2002). Furthermore, forward selection of environmental variables (Elevation, Ecosystem, Vegetation series, Bioclimate, Thermotype and Ombrotype) was performed.

3. Results

3.1. Order ORIBATIDA Dugès, 1834

A total of 16,792 specimens belonging to 200 species of 51 families were identified. *Damaeus (D.) firmus* Kunst, 1957 and *Eupelops hygrophilus* (Knüll, 1954) are recorded for the first time in the Iberian Peninsula, and the known distribution area of 99 species is extended to Spanish provinces of Araba, Bizkaia, Gipuzkoa and / or Navarra.

3.1.1. Taxonomical checklist of Oribatida

This section presents the systematic checklist of the Oribatida species occurring in the study area, according to the checklist of the world's Oribatida mites (Subías 2004). There is a brief description for those species non-cited before in the study area, following the distribution data to the Iberian Peninsula (Subías *et al*. 2013), or revision of those species with taxonomical problems.

Suborder PARHYPOSOMATA Balogh & Mahunka, 1979

Parhypochthonioidea Grandjean, 1932

Gehypochthoniidae Strenzke, 1963

Gehypochthonius Jacot, 1936

• ***Gehypochthonius rhadamanthus*** Jacot, 1936 (Figures 4 - 6)

Dimensions (n= 1) 260 x 100 µm, weakly pigmented. Prodorsum quadrangular in shape, with a small median projection on its anterior margin. Mouthparts well visible in superior view. Rostral setae situated on *naso*, close each other, straight, directed anterolaterad. Lamellar

setae longer than rostral setae, directed upwards. Interlamellar setae longer than lamellar setae, at least twice its length. Exobothridial anterior setae visible, as long as rostral setae. Sensillus fusiform with short cilia, directed laterad.

Notogaster with one furrow, and thus divided transversally into two shields. 15 pairs of notogastral setae, simple, setiform, all subequal in length: six pairs (series *c* and *d*) on anterior shield, being *d2* the longest. Oil glands on surface of notogaster, conspicuous but without a tubiform opening. *An:* 2, *Ad:* 3, *G:* 9, *Ag:* 2. Coxisternal setal formula: 3-2-3-4. Legs heterotridactylous.

Suborder ENARTHRONOTA Grandjean, 1947

Brachychthonioidea Thor, 1934

Brachychthoniidae Thor, 1934

Liochthonius s. str. Hammen, 1959

• *Liochthonius (L.) brevis* (Michael, 1888)

• ***Liochthonius (L.) horridus*** (Sellnick, 1928) (Figure 7)

Dimensions (n=1) 175 x 100 µm, weakly pigmented. Rostrum wide, rounded. Interlamellar region with four pairs of spots. Interlamellar setae narrow, originating near to each other, far from bothridia. Sensillus short, clavus small, slightly asymmetrical.

Notogaster divided by 2 furrows into 3 shields. Notogastral setae smooth, uniformly widened, resembling a blade, marginally serrate. *An:* 2, *Ad:* 3, *G:* 7, *Ag:* 1. Coxisternal setal formula: 3-1-3-4. Legs monodactylous.

• *Liochthonius (L.) hystricinus* (Forsslund, 1942)

• *Liochthonius (L.) leptaleus* Moritz, 1976

• *Liochthonius (L.) muscorum* Forsslund, 1964

• *Liochthonius (L.) sellnicki* (Thor, 1930)

• *Liochthonius (L.) simplex* (Forsslund, 1942)

• *Liochthonius (L.) strenzkei* Forsslund, 1963

Poecilochthonius Balogh, 1943

• *Poecilochthonius spiciger* (Berlese, 1910)

Sellnickochthonius Krivolutsky, 1964

• ***Sellnickochthonius cricoides*** (Weis-Fogh, 1948) (Figures 8-9)

Dimensions (n= 1) 140 x 75 µm, with discernible prodorsal and notogastral pattern. Rostral anterior margin minutely dentate. Prodorsal field-pair 3 behind lamellar setae narrower than the other ones. Sensillus fusiform and narrow, with thin and spiniform cilia.

Notogastral setae thin, simple and smooth, not reaching their respective points of

insertion. Borders of all notogastral fields smooth and straight. Notogastral anterior shield with roundish sclerotized ring and two field-groups on midline, being field-pair 1 and 5 fused. *An:* 2, *Ad:* 3, *G:* 7, *Ag:* 1. Coxisternal setal formula: 3-1-3-4. Legs monodactylous.

The only difference is that, according to Balogh & Mahunka (1983), the sensilli are capitate and wide.

• ***Sellnickochthonius furcatus*** (Weis-Fogh, 1948) (Figures 10-11)

Dimensions (n= 1) 150 x 85 µm, with discernible prodorsal and notogastral pattern. Rostral anterior margin minutely dentate. Prodorsal field-pair 3 behind lamellar setae quadrangular. Sensillus fusiform and wide, with thin and spiniform cilia.

Notogastral setae with long cilia, not reaching their respective points of insertion. Midline of notogastral anterior shield with adjacent field-pairs distinctly separated in the middle, therefore, six pairs of fields present. Ring-spot of notogaster elliptical, surrounded by few fields. Fields near setae *c1* weakly developed. *An:* 2, *Ad:* 3, *G:* 7, *Ag:* 1. Coxisternal setal formula: 3-1-3-4. Legs monodactylous.

• *Sellnickochthonius immaculatus* (Forsslund, 1942)

• *Sellnickochthonius jacoti* (Evans, 1952)

• ***Sellnickochthonius rostratus hungaricus*** (Balogh, 1943) (Figures 12-13)

Dimensions (n= 9) 170 - 185 (177.8 ± 4.4) x 100 - 115 (103.8 ± 5.8) µm. Prodorsum with anterior deep lateral incisions. All prodorsal setae very short. Sensillus thin and fusiform.

Notogastral setae thin, simple and smooth, not reaching their respective points of insertion. Midline of anterior notogastral shield with well separated and punctate rounded fields; anterior half of the shield with two pairs of rounded fields and last pair adjacent or fused, but transverse suture discernible. Medial fields of notogastral medial shield also paired. *An:* 2, *Ad:* 3, *G:* 7, *Ag:* 1. Coxisternal setal formula: 3-1-3-4. Legs monodactylous.

• ***Sellnickochthonius suecicus*** (Forsslund, 1942) (Figures 14-15)

Dimensions (n= 15) 155 - 168 (160.3 ± 3.8) x 85 - 93 (90 ± 2.2) µm, with prodorsal and notogastral pattern punctate and sinuous margins. Rostral anterior margin minutely dentate. Prodorsal field-pair 3 behind lamellar setae quadrangular. Sensillus fusiform with thin and spiniform cilia.

Notogastral setae smooth, not reaching the subsequent setae insertion points. Midline of notogastral anterior shield with adjacent field-pairs separated in the middle. Ring-spot of notogaster elliptical, surrounded by fields but not as complete rosette-like field. Fields near setae *c1* weakly differentiated. *An:* 2, *Ad:* 3, *G:* 7, *Ag:* 1. Coxisternal setal formula: 3-1-3-4. Legs monodactylous.

• *Sellnickochthonius zelawaiensis* (Sellnick, 1928)

Synchthonius Hammen, 1952

• ***Synchthonius crenulatus*** (Jacot, 1938) (Figures 16-17)

Dimensions (n=3) 180 - 185 (183.3 ± 2.9) x 115 - 125 (121.7 ± 5.8) µm, weakly pigmented but prodorsum and notogaster with irregular ornamentation. Rostral anterior and lateral margin dentate. Clavus of sensillus long, narrow and ciliated.

Notogastral setae simple and short; setae *c1* as long as half distance to *d1 and* setae *d2* not in marginal position. Medial zone of notogastral anterior shield with four unconnected field-groups. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Coxisternal setal formula: 3-1-3-4. Legs monodactylous.

Our specimens fit the description given by Balogh & Mahunka (1983) but are smaller (195 - 206 x 112 - 125 µm).

Hypochthonioidea Berlese, 1910

Eniochthoniidae Grandjean, 1947

Hypochthoniella Berlese, 1910

• *Hypochthoniella minutissima* (Berlese, 1904)

Suborder MIXONOMATA Grandjean, 1969

Infraorder DICHOSOMATA Balogh & Mahunka, 1979

Perlohmannioidea Grandjean, 1954

Perlohmaniidae Grandjean, 1954

Perlohmannia s. str. Berlese, 1916

• *Perlohmannia (P.) dissimilis* (Hewitt, 1908)

Infraorder EUPTYCTIMA Grandjean, 1967

Euphthiracaroidea Jacot, 1930

Euphthiracaridae Jacot, 1930

Acrotritia Jacot, 1923

• *Acrotritia ardua s. str.* (Koch, 1841)

• *Acrotritia duplicata* (Grandjean, 1953)

Euphthiracarus s. str. Ewing, 1917

• *Euphthiracarus (E.) monodactylus* (Willmann, 1919)

Microtritia Märkel, 1964

• *Microtritia minima* (Berlese, 1904)

Phthiracaroidea Perty, 1841

Phthiracaridae Perty, 1841

Atropacarus Ewing, 1917

• *Atropacarus wandae* (Niedbała, 1981)

Phthiracarus s. str. Perty, 1841

• *Phthiracarus (P.) ferrugineus* (Koch, 1841)

• *Phthiracarus (P.) laevigatus* (Koch, 1841)

Phthiracarus (Archiphthiracarus) Balogh & Mahunka, 1979

• *Phthiracarus (A.) anonymus* Grandjean, 1933

• *Phthiracarus (A.) globosus* (Koch, 1841)

• *Phthiracarus (A.) montanus* Pérez-Íñigo, 1969

• *Phthiracarus (A.) piger* (Scopoli, 1763)

Rhacaplacarus s. str. Niedbała, 1986

• *Rhacaplacarus (R.) ortizi* (Pérez-Íñigo, 1970)

Steganacarus s. str. Ewing, 1917

• *Steganacarus (S.) herculeanus* Willmann, 1953

• *Steganacarus (S.) magnus s. str.* (Nicolet, 1855)

• *Steganacarus (S.) magnus anomalus* (Berlese, 1883)

• ***Steganacarus (S.) michaeli*** Bernini & Avanzati, 1987 (Figures 18-19)

Ptychoid and laterally compressed; notogaster length (n= 18 females, 16 undetermined) 725 - 1250 (999.3 ± 128.7) µm; aspis length 400 - 600 (501.5 ± 55.4) µm. Rostral setae inserted on anterior end of longitudinal keel of aspis. Lamellar and interlamellar setae long, being *le* pair one-third shorter than *in* pair. Sensilli thin and long, apically tapered with serrate margin.

Notogastral surface areolated. Anterior notogastral tectum absent. 15 pairs of notogastral setae, being *c1, c2, d1, e1, h1, h2, p1* and *p2* pair long, thick, rigid and erect; remaining setae slender and slightly procumbent. *An:* 4, *Ad:* 1, *G:* 9, *Ag:* 1. Coxisternal setal formula: 1-0-1-1. Legs monodactylous.

This species had been previously misidentified as *Steganacarus magnus s. str.* (Figures 20 - 21), but *S. magnus* presents a small anterior notogastral tectum and setae *h2* and *p2* are procumbent (Bernini & Avanzati 1987).

Suborder HOLOSOMATA Grandjean, 1969

Crotonioidea Thorell, 1876

Malaconothridae Berlese, 1916

Malaconothrus s. str. Berlese, 1904

• *Malaconothrus (M.) monodactylus* (Michael, 1888)

Nothridae Berlese, 1896

Nothrus Koch, 1836

• ***Nothrus cf. borussicus*** Sellnick, 1928 (Figures 22-24)

Dimensions (n=1) 830 µm long, well sclerotized and dark-brown. Prodorsal surface covered with regular, small and oval foveolae. Rostral setae thin and smooth; lamellar setae longer and stronger, placed on small apophyses; interlamellar setae distally broadened and branched. Sensilli setiform, long and sharpened.

Notogaster broadened posteriorly and covered with oval and slightly angular foveolae, with 16 pairs of notogastral setae. Setae *c1, d1, d2, e1* and *f1* rod-shaped, similar in length (50 µm aproximately) and inserted longitudinally in central area. Setae *c2* shorter (half the length of *c1*) set closer to *c1* than *c3*. Distal setae broadened distally and covered in sheath; setae *h2* longer than *p1* and *h1* (120, 85 and 75 µm respectively), and *p2-3* much shorter. *An:* 2, *Ad:* 3, *G:* 9, *Ag:* 0. Coxisternal setal formula: 7-5-6-6. Legs monodactylous.

The specimen found in RO04 differs from the descriptions given for this species in the number of claws (*N. borussicus* is tridactylous) and the smaller body size (925 - 1000 µm) (Sellnick 1928, Sellnick & Forsslund 1955, Balogh & Mahunka 1983, Olszanowski 1996). Although Balogh & Mahunka (1983) pointed that setae *h2* are considerably longer than *p1*, according to Olszanowski (1996) both setae are almost the same length.

• *Nothrus palustris s. str.* Koch, 1839

• *Nothrus silvestris s. str.* Nicolet, 1855

Crotoniidae Thorell, 1876

Camisia s. str. Heyden, 1826

• ***Camisia (C.) segnis*** (Hermann, 1804) (Figures 25-27)

Dimensions (n= 1 female) 740 x 370 µm, well sclerotized. Cuticle usually producing a secretion to which soil grains and detritus adhere. Prodorsum with long chitinous lamellar apophyses carrying lamellar setae, extending beyond rostrum. Interlamellar setae as long as distance between their insertion points, also originating on chitinous appendages. Sensillus short and clavate.

Notogaster rectangular in shape with more or less parallel margins, but slightly concave at its end, between pair *h2*. 16 notogastral setae, simple; pairs *p1, h2* and *p3* on short chitinous. Setae *h2* and *p3* approximately equal in length. *An:* 3, *Ad:* 3, *G:* 9, *Ag:* 2. Coxisternal setal formula 3-1-3-3. Legs tridactylous.

Although the original description did not give any measurement (Hermann 1804), specimens from the same region (Strasbourg, France) are 750 - 830 µm long (Grandjean 1936), while bigger specimens had been recorded in Sweden, 900 x 468 µm (Sellnick & Forsslund 1955), and Poland, 830 - 900 x 420 - 250 µm (Olszanowski 1996).

• *Camisia (C.) spinifer* (Koch, 1835)

Heminothrus s. str. Berlese, 1913

• ***Heminothrus (H.) targionii*** (Berlese, 1885) (Figures 28-31)

Dimensions (n= 2 females) 860 - 890 x 410 - 440 µm, dorsoventrally flattened and heavily sclerotized. Prodorsum with small apophyses bearing lamellar and interlamellar setae, both thick and ciliated. Sensillus setiform, as long as interlamellar seta.

Notogaster rectangular, laterally slightly broadened. 16 notogastral setae, different in shape and length: setae *c1-2, d1-2 and e1* short and ciliated; setae *c3, d3, e2* and *f2* longer, but not reaching the insertion points of subsequent pair. Pair *d1* closer than pair *e1.* Posteromarginal setae *p1* and *h2* set on long chitinous appendages. *An:* 2, *Ad:* 3, *G:* 23, *Ag:* 2. Coxisternal setal formula: 3-1-3-3. Legs monodactylous.

Berlese (1885) established a length of 800 µm from a specimen from Italy, but Hammen (1959), after reviewing Berlese's collection, corrected it to 860 µm. Although different measurements had been recorded from European specimens, 830 x 460 µm (Britain: Michael 1888), 880 - 900 x 450 - 460 µm (Germany: Sellnick 1928, Willmann 1931), 936 - 972 x 505 µm (Sweden: Sellnick & Forsslund 1955) and 870 - 950 x 450 - 500 µm (Poland: Olszanowski 1996); specimens recorded from Huesca (Spain) are 960 x 500 µm (Pérez-Íñigo 1974), larger than our ones.

Heminothrus (Platynothrus) Berlese, 1913

• *Heminothrus (P.) peltifer s. str.* (Koch, 1839)

Suborder BRACHYPYLINA Hull, 1918

Infraorder PYCNONOTICAE Grandjean, 1954

Nanhermannioidea Sellnick, 1928

Nanhermanniidae Sellnick, 1928

Nanhermannia s. str. Berlese, 1913

• *Nanhermannia (N.) nana* (Nicolet, 1855)

• ***Nanhermannia (N.) sellnicki*** Forsslund, 1958 (Figures 22-33)

Dimensions (n= 3 females) 560 - 580 (570 ± 10) x 240 - 250 (243.3 ± 5.8) µm, nearly elliptical and heavily sclerotized. Prodorsal surface without foveolae but finely punctate and laterally rugulose. Lamellar setae originating far from rostrum, not reaching anterior margin of body. Posterior margin of prodorsum with condyles directed posteriorad, not projecting above notogaster, lath-like, narrow, with 3-4 rounded teeth directed towards notogaster.

Notogaster sculpture with elliptical areolae. 15 pairs of notogastral setae, simple and setiform, extending beyond insertion points of subsequent pair. *An:* 2, *Ad:* 3, *G:* 9, *Ag:* 2. Coxisternal setal formula: 3-1-3-3. Legs monodactylous.

Hermannioidea Sellnick, 1928

Hermanniidae Sellnick, 1928

Hermannia s. str. Nicolet, 1855

• *Hermannia (H.) gibba* (Koch, 1839)

Hermannielloidea Grandjean, 1934

Hermanniellidae Grandjean, 1934

Hermanniella Berlese, 1908

• *Hermanniella dolosa* Grandjean, 1931

• *Hermanniella granulata* (Nicolet, 1855)

• ***Hermanniella septentrionalis*** Berlese, 1910 (Figure 34)

Sexual dimorphism on length detected: female (n= 1) 620 µm and males (n= 2) 530 - 540 µm long. Prodorsum with longitudinal carenae extending forward laterally. Prodorsal surface with fossae and finely punctated. Rostrum wide and rounded. Rostral setae smooth. Lamellar setae long and barbed, curved forwards. Interlamellar setae longer, straight and directed forward. Bothridia situated close to prodorsal lateral margins. Sensilli as long as *in*, slightly flattened on apex.

Notogaster covered with remains of tritonymphal exuviae. Lateral tube-like opening of the opisthonotal gland present. Notogastral sculpture with irregularly distributed and line-connected small and oval fossae with a central pore. 10 pairs of notogastral setae present, being *h1, h2, p1, p2* and *p3* pairs longer and barbed. *An:* 2, *Ad:* 3, *G:* 7, *Ag:* 1. Coxisternal setal formula: 3-1-3-2. Legs monodactylous.

Hermanniella granulata (Nicolet, 1855) is a similar species, but it is larger, 630 - 785 µm (Pérez-Íñigo 1997) and presents 1 to 3 pores on notogastral fossae (Figure 35). *H. septentrionalis* was recorded before in Navarra as *Hermanniella barbata* (Moraza, 1990).

Neoliodoidea Sellnick, 1928

Neoliodidae Sellnick, 1928

Neoliodes Berlese, 1888

• *Neoliodes theleproctus* (Hermann, 1804)

Poroliodes Grandjean, 1934

• *Poroliodes farinosus* (Koch, 1839)

Gymnodamaeoidea Grandjean, 1954

Gymnodamaeidae Grandjean, 1954

Arthrodamaeus Grandjean, 1954

• *Arthrodamaeus reticulatus* (Berlese, 1910)

Damaeoidea Berlese, 1896

Damaeidae Berlese, 1896

Belba s. str. Heyden, 1826

• ***Belba (B.) patelloides*** (Michael, 1888) (Figures 36-37)

Dimensions (n= 2 females, 1 male) 780 - 890 (820 ± 60.8) x 450 - 500 (475 ± 35.4) µm. Prodorsal tubercles *D* and apophyses *P* absent but *Ba* well developed. Rostrum rounded and rostral setae smooth and curved. Lamellar setae barbed and thick, similar in length to *ro*, and interlamellar setae shorter. Sensilli twice longer than *ro* and *le*, setiform with minute barbules on distal end.

Nimphal exuviae present. Notogaster, in lateral view, conical with rounded vertex. Cuticular surface granulated. Spinae adnatae absent. Eleven notogastral setae, as long as *in* and straight, not differing on length or shape from each other; 8 pairs arranged into 2 longitudinal rows and 3 pairs in posteromarginal position. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Coxisternal setal formula: 3-1-4-4. Setal formula of trochanter I-IV: 1-1-2-1; setal formula of genu I-IV: 4-4-3-3. Solenidia of tibiae II-IV and genu I-III with associated seta *d*. Legs monodactylous.

In *Belba corynopus* Hermann, 1804, setae *c1* and *c2* are shorter. Specimens of *B. patelloides* recorded in Spain are larger, 850 - 930 µm (Pérez-Íñigo 1997), while specimens from Czech Republic are smaller, 663 - 758 x 464 - 490 (Winkler 1957). *B. patelloides* has been recorded in Navarra as *B. pseudocorynopus* (Moraza *et al*. 1980).

Damaeus s. str. Koch, 1835

• *Damaeus (D.) auritus* Koch, 1835

• *Damaeus (D.) maximus* Mihelčič, 1957

• ***Damaeus (D.) firmus*** Kunst, 1957 (Figures 38-39)

Dimensions (n= 6 females) 820 - 880 (843.3 ± 27.3) x 550 - 580 (566 ± 15.2) µm, well sclerotized with very long legs and widened articulations. Body covered by granular cerotegument. Rostrum with arched transverse translamellar line posterior to insertion of rostral setae. Rostral and lamellar setae setiform, smooth; rostral setae (114.5 ± 18.1 µm) shorter than lamellar (157.5 ± 9.6 µm); interlamellar setae comparatively shorter (78.7 ± 15.9 µm), about half length of sensillus (286 ± 13.4 µm), simple, setiform, smooth and attenuated. Apophysis *P* well developed, long and acute anteriorly. Parastigmatic apophyses *Sa* and *Sp* well developed, both visible in dorsal view, being *Sa* larger than *Sp*. Prodorsal tubercles *Ba, Bp* and *Da* well developed.

Spinae adnatae spiniform, short and slightly convergent. Eleven notogastral setae, well developed (187.5 ± 13.6 µm), setiform, quite strong, attenuated distally. All setae pointing anteriad or anteriolaterad, except *h1* and *p1-3* pointed posterolaterad or laterad. *An:* 2, *Ad:* 3,

G: 6, *Ag:* 1. Coxisternal setal formula: 3-1-4-4. Setal formula of trochanter I-IV: 1-1-2-1; setal formula of genu I-IV: 4-4-3-3. Seta *d* absent on all tibia and genu I-III solenidia with associated seta *d*. Femur and genu IV with a very long *d* seta, 400 - 550 µm, subequal in length and form. Legs monodactylous.

Our specimens are smaller compared to those of Kunst (1957) (879 - 1084 x 540 - 703 µm) and Miko (2015) (920 - 950 x 635 - 710 µm). This species was described and recorded from the mountains of southwest Bulgaria (Kunst 1957) and Romania (Feider *et al*. 1969), being this the first record for the Iberian Peninsula.

Damaeus (Adamaeus) Norton, 1977

• *Damaeus (A.) onustus* Koch, 1841

Damaeus (Epidamaeus) Bulanova-Zachvatkina, 1957

• *Damaeus (E.) pyrenaicus* (Pérez-Íñigo jr., 1991)

Damaeus (Paradamaeus) Bulanova-Zachvatkina, 1957

• *Damaeus (P.) clavipes* (Hermann, 1804)

Dameobelba Sellnick, 1928

• *Dameobelba minutissima* (Sellnick, 1929)

Metabelba s. str. Grandjean, 1936

• *Metabelba (M.) papillipes* (Nicolet, 1855)

Porobelba Grandjean, 1936

• *Porobelba spinosa* (Sellnick, 1920)

Eutegaeoidea Balogh, 1965

Compactozetidae Luxton, 1988

Cepheus Koch, 1835

• ***Cepheus tuberculosus*** Strenzke, 1951 (Figures 40-41)

Dimensions (n= 2) 680 - 730 x 500 - 510 µm, well sclerotized, almost circular and dark. Prodorsum with well separated and narrow lamellae, connected anteriorly by a curved band. Lamellar cusps well separated so rostrum is visible in dorsal view. Lamellar setae strong and smooth, set on a shallow indentation at the distal end of the lamella. Interlamellar setae long and smooth, originating on interlamellar area far from dorsosejugal suture about midway on prodorsum. Sensillus short with the distal end slightly thickened and provided with a few small spines.

Notogaster with small obtuse tubercle as humeral process. Central area of notogaster ornamentation with small (10 µm approximately) and irregularly distributed protuberances. Marginal ridge without tubercles but present a series of short but closely connected swellings. Ten pairs of long notogastral setae, 7 of them arranged on marginal ridge. *An:* 2, *Ad:* 3, *G:* 6,

Ag: 1. Legs monodactylous.

Strenzke (1951) specimen (holotype) from Germany was lager (745 x 520 µm), but Moraza *et al*. (1980) collected in Navarra (Spain) smaller specimens (639 x 482 µm).

Conoppia Berlese, 1908

• *Conoppia palmicincta* (Michael, 1880)

Ommatocepheus Berlese, 1913

• ***Ommatocepheus ocellatus*** (Michael, 1882) (Figure 42)

Dimensions 610 x 410 µm (n=1), oval and well sclerotized. Rostrum rounded. Rostral setae short, curved and smooth, inserted in small tubercles. Lamellae converging with sharp cusps. Lamellar setae longer, thick and curved inwards, inserted posterior to lamellar cusps. Sensilli globular with extremely short stalk, situated within bothridium.

Notogaster with moderately long triangular humeral process. Notogastral surface foveolated, with nine pairs of notogastral setae, short, smooth and slightly thick; seven of them are situated dorsally in notogastral margin and 2 pairs ventrally on posterior margin. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs tridactylous.

The specimen found in the beech forest HA01 is an exoskeleton. It is an arboreal species not recorded before in Navarra.

Tritegeus Berlese, 1913

• ***Tritegeus bisulcatus*** Grandjean, 1953 (Figures 43-45)

Dimensions (n=2) 820 - 850 x 600 - 650 µm and well sclerotized. Rostrum pointed. Rostral setae long, thin and ciliated on its external edge. Lamellae well developed, converging and broadly separated, without long cusps projecting beyond rostrum. Lamellar cusps with two small teeth, between which lamellar setae are inserted. Lamellar setae slightly longer than *ro*, barbed on its base and curved distally. Interlamellar setae longer twice the length and thicker than *le* setae, straight and barbed distally. Prodorsal surface practically smooth except lamellar surface, with rounded fossae. Sensilli long, setiform and slightly barbed.

Notogaster with well developed but short triangular humeral process and anterior border straight. Ten pairs of long and slightly barbed notogastral setae; six of then, similar in length to *in*, set on central area of notogaster and the other four, shorter, half the length of *in*, situated on posterior margin. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs tridactylous.

Gustavioidea Oudemans, 1900

Astegistidae Balogh, 1961

Cultroribula Berlese, 1908

• *Cultroribula bicultrata* (Berlese, 1905)

Ceratoppiidae Kunst, 1971

Ceratoppia Berlese, 1908

• *Ceratoppia bipilis* (Hermann, 1804)

Gustaviidae Oudemans, 1900

Gustavia Kramer, 1879

• *Gustavia maior* (Berlese, 1904)

• *Gustavia microcephala* (Nicolet, 1855)

Liacaridae Sellnick, 1928

Adoristes s. str. Hull, 1916

• *Adoristes (A.) ovatus poppei* (Oudemans, 1906)

Liacarus s. str. Michael, 1898

• ***Liacarus (L.) brevilamellatus*** (Mihelčič, 1955) (Figure 46)

Dimensions (n= 1 male) 740 x 450 µm, ovoid and dark-brown, glossy. Rostrum incised, central lobe slightly concave and directed downwards. Rostral setae barbed, straight and directed downward. Tutoria dark, striated and well developed, reaching the insertion of *ro* setae. Lamellae broad and well separated, without mucro or translamella. Lamellar cusps present an inner tooth, wide at its base, and an external tooth much smaller. Lamellar setae long, twice *ro* setae, straight and rough in appearance, slightly barbed, is inserted in a small depression between both teeth. Interlamellar setae longer than *le* setae, oriented upward and slightly to the side. Sensilli long, spindle-shaped with its distal apex barbed and as long as the wide part.

Eleven pair of short but well discernible smooth setae, being p_1 and h_1 pair the longest and directed downward. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, *Ag:* 1. Legs heterotridactylous.

The descriptions given by Mihelčič (1955) and Pérez-Íñigo (1971) for *L. brevilamellatus* lack of the description referring to the notogaster. This poor description was also noticed by Bernini (1973) who added that the shape of the lamellar cusps could not be considered as a good character of systematic value. Lectotypes of this species, preserved at the Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria (MIH 3-100; see Totsching 2001) and specimens studied (from Mountains of Cazorla and Despeñaperros (Jaén), Sierra Nevada (Granada) lent by Dr. Luis Santos Subías; collection of the Museo Nacional de Ciencias Naturales: MNCN_20.02/336 (Valsain, Segovia), /2723, /2810, /2878, /2879, /2885, /2886 (Llafrac, Girona), /2880 – 2884 (Tamariu, Girona), /7013, /7020 (Piedralaves, Ávila)), fit with the description given.

• *Liacarus (L.) coracinus s. str.* (Koch, 1841)

• *Liacarus (L.) subterraneus* (Koch, 1844)

• ***Liacarus (L.) xylariae*** (Schrank, 1803) (Figure 47)

Dimensions (n= 1 male) 870 x 520 µm, ovoid and dark-brown, glossy. Rostral apex deeply incised forming 3 lobes, being the central one straight. Rostral setae long and barbed. Tutoria dark, striated and well developed, reaching the insertion of *ro* setae. Lamellae dark and broad, joining in the anterior part without showing fusion-line. Lamellar cusps cylindrical, without teeth, not much wider than the insertion of *le* seta. Area between lamellar cusps slightly inclined downwards, what in lateral view resembles a small tooth-shaped protuberance. Inner margin of lamellae darker than the rest of the structure. Lamellar setae long, straight and slightly barbed. Interlamellar setae longer than *le*, oriented upward and slightly to the outside. Sensilli as long as *le*, spindle-shaped, with the distal apex ciliated and as long as, or slightly shorter than the wide part.

Eleven pairs of notogastral setae, short and slightly curved downwards, but *p1* and *h1* pair longer. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs heterotridactylous.

Although the holotype of this species is currently unknown, a preparation with two specimens is preserved at the Tiroler Landesmuseum Ferdinandeum, Innsbruck, Austria labelled as *L. xylariae* (MIH 5-85, see Totschnig 2001). Our specimens fit to the description of Sellnick (1928), Pschorn-Walcher (1951), Mihelčič (1954), Willmann (1954), Schuster (1956), Kunst (1957), Sellnick (1960), Beck and Woas (1991), Borcard (1992) and Weigmann (2006). They all agree that the major characteristics of *L. xylariae* are, firstly, the prodorsum dominated by fused lamellae with narrow, rounded and parallel cusps, and secondly, the posterior part of the notogaster with long hairs. None of our specimens present any tooth-like extension neither under the cusps nor in the translamellar area as it has been described by Pschorn-Walcher (1951) or Schuster (1956).

According to this revision, the specimens cited by Moraza & Jornada (1983) as *L. inermis* might belong to *L. xylariae*, and probably the specimens cited as *Liacarus* cf. *cuspidatus* by Bernini *et al*. (1995) belong to *L. xylariae* because followed the description of Mihelčič (1954, 1958). The erroneous description given by Willmann in 1931 has been followed by several authors (Pérez-Iñigo 1971; Moraza *et al.* 1980) causing misidentifications that had lead to confuse other species with *L. xylariae* in the Iberian Peninsula. Thus, this would be the first record of *L. xylariae* for the Iberian Peninsula.

Planoristes Iturrondobeitia & Subías, 1978

• *Planoristes acuspidatus* Iturrondobeitia & Subías, 1978

Xenillidae Woolley & Higgins, 1966

Xenillus s. str. Robineau-Desvoidy, 1839

• *Xenillus (X.) clypeator* Robineau-Desvoidy, 1839

• ***Xenillus (X.) discrepans s. str.*** Grandjean, 1936 (Figures 48-49)

Dimensions (1 female) 1140 x 780 µm, (1 male) 840 x 560 µm, brown and well sclerotized. Rostrum not incised. Lamellae thick, touching apically; its cusps with blunt teeth. Lamellar setae shorter than lamellar width and curved inwards. Rostral setae shorter than *le*. Interlamellar setae long. Sensilli short and broadened distally.

Notogastral surface covered by pits. Eleven notogastral setae, relatively thick and long, slightly barbed. Humeral region with *c1* and *c2* near each other. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, *Ag:* 1. Legs tridactylous.

• *Xenillus (X.) tegeocranus* (Hermann, 1804)

Eremaeoidea Oudemans, 1900

Eremaeidae Oudemans, 1900

Eremaeus Koch, 1835

• *Eremaeus hepaticus cordiformis* Grandjean, 1934

Eueremaeus Mihelčič, 1963

• *Eueremaeus oblongus s. str.* (Koch, 1835)

Ameroidea Bulanova-Zachvatkina, 1957

Ctenobelbidae Grandjean, 1965

Ctenobelba s. str. Balogh, 1943

• ***Ctenobelba (C.) pseudomahnerti*** Subías & Shtanchaeva, 2013 (Figures 50-51)

Dimensions (n= 8 females, 7 undetermined) 570 - 650 (603.3 ± 27.2) x 280 - 330 (303.3 ± 19.7) µm, dark brown. Rostrum directed downwards with lateral teeth. Rostral setae as long as lamellar setae and slightly barbed. Prodorsal costulae present, long and arranged in parallel, and connected distally by a translamellar line. Interlamellar setae, longer than *le* and slightly barbed, sat on prodorsal costulae bases. Exobothridial setae long, thin and smooth. Sensilli pectinated with 5-6 bristles.

Notogastral surface covered by granulated. Ten pairs of notogastral setae, long, smooth and distally flagelliform. Lyrifissures *im* short but well discernible. Lyrifissure *iad* paraanal, located near to anal plates. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 3. Legs monodactylous.

According to Subías & Shtanchaeva (2013), this species had been previously recorded in the Iberian Peninsula, erroneously, as *Ctenobelba mahnerti* Mahunka, 1974, but the latter species presents a reticulate pattern on the notogastral cerotegument. Our specimens are larger to those recorded from Pontevedra or Andalusia (Spain), 475 - 525 x 245 - 270 µm (Subías & Shtanchaeva 2013) and 425 - 512 x 250 - 300 µm (Kahwash *et al*. 1991) respectively.

• *Ctenobelba (C.) perezinigoi* Moraza, 1985

Mongaillardia Grandjean, 1961

• *Mongaillardia eveana* Grandjean, 1961

Damaeolidae Grandjean, 1965

Damaeolus Paoli, 1908

• *Damaeolus ornatissimus* Csiszár, 1962

Fosseremus Grandjean, 1954

• *Fosseremus laciniatus* (Berlese, 1905)

Ameridae Bulanova-Zachvatkina, 1957

Amerus s. str. Berlese, 1896

• *Amerus (A.) polonicus* Kulczynski, 1902

Oppioidea Sellnick, 1937

Autognetidae Grandjean, 1960

Autogneta s. str. Hull, 1916

• ***Autogneta (A.) parva*** Forsslund, 1947 (Figure 52)

Dimensions (n= 2 females) 280 - 290 µm long. Rostrum with a medial incision. Prodorsal costulae narrow, converging at their basis, then more or less parallel, extending to the rostral region. Lamellar setae simple. Prodorsal surface without granulation. Sensillus markedly shorter than the costulae, distally fusiform and slightly pilose.

Anterior part of notogaster without crista or parallel lines. Ten notogastral setae, setiform, smooth and short, approximately of the same length as the diameter of bothridium. Tectopedium II well marked. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, *Ag:* 1. Setae *ad1* in postanal position. Legs monodactylous.

Thyrisomidae Grandjean, 1953

Banksinoma Oudemans, 1930

• *Banksinoma lanceolata* (Michael, 1885)

Oppiidae Sellnick, 1937

Oppiinae Sellnick, 1937

Oppia Koch, 1836

• *Oppia denticulata* (G. & R. Canestrini, 1882)

Multioppiinae Balogh, 1983

Multioppia s. str. Hammer, 1961

• *Multioppia (M.) neglecta* Pérez-Íñigo, 1969

Ramusella s. str. Hammer, 1962

• *Ramusella (R.) puertomonttensis* Hammer, 1962

Ramusella (Insculptoppia) Subías, 1980

• *Ramusella (I.) elliptica* (Berlese, 1908)

• *Ramusella (I.) furcata* (Willmann, 1928)

• *Ramusella (I.) insculpta* (Paoli, 1908)

• ***Ramusella* (cf. *Insculptoppia*) sp.** (Figures 53-55)

Dimensions (n= 4 females, 3 males) 420 - 460 (445.7 ± 16.2) x 190 - 210 (200 ± 10) µm. Rostrum entire, rounded. Prodorsal setae similar in length (20 - 25 µm), interlamellar setae longer (35 µm). Rostral setae arched, lamellar setae straight and directed forwards and interlamellar setae straight and directed upwards. Lamellar and interlamellar lines present: lamellar line between *le* and *in* setae, not reaching its insertion points. Central area of prodorsum, between setae *in* and *le*, with 4 pairs of sub-rectangular light spots. Sensilli pectinated, unilaterally ciliated with 5 - 6 branches, being the 2 - 3 central longer.

Notogaster elliptical, proportionally long: 270 - 310 (295 ± 17.6) µm. Nine pairs of notogastral setae, 35 - 40 µm long; *c2* setae absent and its insertion is not discernible; *la* and *lm* pair placed at same level. Discidium well developed, broadly triangular, well visible in dorsal view. Lyrifissure *iad* paraanal, placed near to anal plates. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, *Ag:* 1. Legs monodactylous.

The studied specimens fit the description given for the subgenus *Insculptoppia* (Subías 1980) except by its big size and the 4 pairs of light spots in prodorsal surface. These features make hard to include it in the subgenus.

Medioppiinae Subías & Mínguez, 1985

Microppia Balogh, 1983

• *Microppia minus s. str.* (Paoli, 1908)

Rhinoppia s. str. Balogh, 1983

• ***Rhinoppia (R.) media*** (Mihelčič, 1956) (Figures 56-59)

Small to medium sized, light brown. Tapered prodorsum with median small tooth on broadly rounded rostrum. Rostral setae inserted near the edge of rostrum, near each other, straight and smooth, directed forward. Prodorsum without lamellae or lamellar lines. Lamellar setae set on centre of prodorsum, halfway between rostral and interlamellar setae, smooth, slightly shorter than rostral setae. Interlamellar setae smooth, as long as lamellar setae, inserted on small corniculi, anterior to line connecting bothridia. Sensilli long and fusiform, with 5-6 bristles unequal in length, being the proximal ones the largest.

Notogaster oval, smooth. Notogastral crista present, truncated, protruding over the prodorsum, but not reaching bothridia. 10 pairs of notogastral setae (*c2* pair present), smooth and small, similar in length to interlamellar setae. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:*

3, *G:* 6, *Ag:* 1. Legs monodactylous.

Since the original description, posterior authors have added and changed different characteristics, such as the size (Pérez-Íñigo 1965, 1971, 1988, Subías & Rodríguez 1988). Thus, the description given for this species fits with two discernible morphotypes present in the study. First, the description given by Mihelčič (1956) points out large animals (442 x 238 µm) that fit with those specimens present in the oak forest in Urduliz (RO01): 430 - 480 (453.3 ± 14.6) x 210 - 250 (226.7 ± 10.5) µm (n= 6 females, 12 males). This morphotype can also fit the description given by Pérez-Íñigo (1965, 1971), although the given length is smaller (350 - 400 µm long) and the rostral tooth is not as prominent as described by Mihelčič. Sensilli are similar in shape, with proximal long bristle (28 µm in Pérez-Íñigo 1971), but longer in our morphotype: 37 - 53 (42.9 ± 4.8) µm.

The second morphotype fits the description given by Subías & Rodríguez (1988), although our specimens are slightly smaller, 280 - 320 (297.6 ± 10.9) x 140 - 200 (161.2 ± 14.6) µm (n= 9 females, 10 males), compared to given measurements: the most frequent measures is 306 - 318 (min. 287, max. 349) x 167 - 179 (min. 156, max.) µm. On the other side, the length of the proximal bristle of sensilli of our specimens, 25 - 30 (27.5 ± 1.6) µm, fits the size given in Pérez-Íñigo (1971).

• ***Rhinoppia (R.)* cf. *minidentata*** (Subías & Rodríguez, 1988) (Figures 60-61)

Species morphologically similar to *Rhinoppia (R.) media* that differs in size, the most frequent value is 293 - 311 (min. 279, max. 330) x 147 - 160 (min. 128, max. 173) µm, in the shape of sensilli, with 7-9 short bristles, being the proximal slightly shorter than the next one, and setae *ad3* are set close to aggenital setae level (Subías & Rodríguez 1988).

Our specimens are smaller, 240 - 290 (258 ± 10.2) x 110 - 150 (123.7 ± 9.5) µm (n= 22 females, 18 males), and *ad3* setae are set in normal position. The shape of sensilli is similar, being the second proximal bristle 12 - 20 (14.8 ± 2.2) µm long.

There are, however, similarities with *Rhinoppia (R.) minimedia* (Arillo & Subías, 1990) in size, 241 - 265 x 129 - 152 µm, and in the number of bristles of the sensilli (6-8, being typically 7). Our specimens differ in the lack of the two pairs of big and light spots in the prodorsum, between the interlamellar setae, and the notogastral crista margins are not serrated laterally.

• *Rhinoppia (R.) obsoleta s. str.* (Paoli, 1908)

• ***Rhinoppia (R.) ordunensis*** (Iturrondobeitia & Saloña, 1988) (Figures 62-63)

Dimensions (n= 8 females, 4 males) 260 - 290 (279.2 ± 10) x 150 - 170 (156.5 ± 6.7) µm. Rostrum tridentate, being the central tooth the most developed. Lamellar costulae very thin, almost absent. Rostral and interlamellar setae smooth and similar in length, as long as the distance between *in*; lamellar setae shorter, *¼ in* length. Strong chitinous tubercles present at

posterior margin of prodorsum, behind interlamellar setae and surrounding their insertion points. Sensilli long and thin with a distally rounded, widened and barbed portion.

Notogaster mostly ellipsoidal, with presence of truncated notogastral crista. 10 pairs of well discernible and smooth notogastral setae, as long as half the distance between their insertion points, but seta *c2* shorter. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, *Ag:* 1. Legs monodactylous.

The specimens collected fit Iturrondobeitia & Saloña (1988) but are smaller to those recorded by Pérez-Íñigo jr. (1989) as *Oppiella acutirostris*, 288 - 312 x 168 - 184 µm.

• *Rhinoppia (R.) subpectinata* (Oudemans, 1900)

• ***Rhinoppia (R.) cf. tridentata*** (Subías & Mínguez, 1985) (Figures 64-69)

Small sized, light brown. Rostrum tridentate. Rostral setae inserted near the edge of rostrum, smooth and directed forward. Prodorsum without lamellae or lamellar lines. Lamellar setae smooth and shorter than rostral setae. Interlamellar setae smooth inserted on small corniculi, anterior to line connecting bothridia. Sensilli long and fusiform, with bristles varying in number and length.

Notogaster oval, smooth. Notogastral crista present, truncated, protruding over the prodorsum, but not reaching bothridia. 10 pairs of notogastral setae, short and smooth. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs monodactylous.

According to this description, our specimens can be grouped in three morphotypes. The first morphotype (A), present in HA01 and RO02, is 230 - 255 (242.4 ± 6.4) x 110 - 140 (119.5 ± 6.8) µm (n= 14 females, 9 males). The rostrum is tridentate, being the central tooth equilateral in shape, protruding over lateral teeth. Above rostrum set the rostral, 12 - 17 (14.6 ± 1.2) µm long; lamellar setae are shorter, 6 - 10 (8.6 ± 1.4) µm long, and interlamellar setae similar in length, 12 - 17 (14.3 ± 1.4) µm. Sensilli with 7 - 9 bristles, being the proximal the longest, 15 - 23 (19.1 ± 2.6) µm. Notogastral setae are similar in length, 12 - 17 (14.2 ± 1.5) µm.

The second morphotype (B), present in HA01, HA02 and RO02, is 240 - 290 (260 ± 11.8) x 125 - 140 (132.5 ± 5.2) µm (n= 21 females, 11 males). The rostrum is tridentate, being the central tooth long, almost isosceles in shape. Rostral setae are 15 - 22 (17.6 ± 1.8) µm long; lamellar setae are shorter, 8 - 17 (12.1 ± 2) µm, and interlamellar setae slightly longer, 14 - 25 (21.2 ± 2.8) µm, usually reaching each other tips. Sensilli with 5 - 7 bristles (usually with 6), being the proximal ones the longest, 27 - 38 (32.3 ± 2.6) µm, although 6 specimens (2 females, 4 males) present shorter bristles, 17 - 23 (19.7 ± 2.2) µm. Notogastral setae are 15 - 22 (18 ± 2) µm long.

The third morphotype (C), present in HA03 and HA04, is 240 - 285 (267.2 ± 11.8) x 120 - 152 (134.9 ± 9.1) µm (n= 16 females, 18 males). The rostrum is tridentate, but the central

tooth is small, no exceeding lateral teeth. Rostral setae are 15 - 22 (18.1 ± 1.9) µm long; lamellar setae are shorter, 7 - 15 (11.5 ± 1.9) µm, and interlamellar setae 15 - 20 (15.4 ± 2.1) µm long. Sensilli with 6 - 10 bristles (usually with 7 - 8), being the proximal ones the longest, 15 - 20 (16.8 ± 1.7) µm. Notogastral setae are 15 - 23 (18.2 ± 1.9) µm long.

• *Rhinoppia (R.) truncata* (Iturrondobeitia & Saloña, 1988)

• ***Rhinoppia (R.) cf. vera*** (Mihelčič, 1956) (Figures 70-75)

Small sized, light brown. Rostrum tridentate, which central teeth is equilateral. Rostral setae smooth and directed forward, inserted laterally to central teeth. Prodorsum without lamellae or lamellar lines. Lamellar setae shorter than *ro* and smooth. Interlamellar setae similar to *ro* in length and smooth, inserted on small chitinous protuberances, anterior to line connecting bothridia. Sensilli long and fusiform, with 7 - 9 bristles.

Notogaster oval and smooth, with truncated notogastral crista protruding over the prodorsum, but not reaching bothridia. 10 pairs of notogastral setae, smooth. First epimeral area granulated. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs monodactylous.

According to this description, in our specimens two morphotypes can be distinguished; the first morpohotype (A), present in HA01, HA02 and RO02, is 230 - 277 (254.2 ± 11.3) x 105 - 137 (122.6 ± 8.1) µm (n= 13 females, 9 males). Rostral setae are 11 - 20 (14.8 ± 2) µm, lamellar setae 6 - 12 (8.6 ± 1.6) µm and interlamellar setae 8 - 15 (11.7 ± 2) µm long. Sensilli with 7 - 9 bristles, being the proximal ones the longest, 17 - 23 (19.7 ± 2.1) µm long. Notogastral setae smooth, 12 -15 (14 ± 1.3) µm long. The granulation of the first epimeral area is circular and the base of femur I present ventrally a longitudinal crest.

The second morphotype (B), present in RO01, is 220 - 270 (238.5 ± 12.3) x 100 - 123 (109.6 ± 7.6) µm (n= 10 females, 11 males). Rostral setae are 12 - 15 (14.2 ± 1.3) µm, lamellar setae 7 - 13 (9.8 ± 1.3) µm and interlamellar setae 10 - 15 (11.9 ± 1.7) µm long. Sensilli with 7 - 8 bristles, being the proximal ones the longest, 15 - 20 (17.5 ± 1.5) µm long. Notogastral setae smooth, 12 - 18 (14.2 ± 1.7) µm long. The epimeral granulation is much more elongated, resembling the fusion of several circles, and the base of femur I presents ventrally a triangular spur.

Descriptions given of *R. vera* coincide with our specimens but the epimeral area is fully granulated (Pérez-Íñigo 1965, 1971; Arillo & Subías 1996; Subías & Arillo 2001); furthermore, the presence of a crest or spur on femur I has not been observed before.

• ***Rhinoppia (cf. Rhinoppia)*** **sp.** (Figures 76 - 77)

Dimensions (n= 1 female) 290 x 160 µm, light brown. Broad and rounded rostrum with median minute tooth. Rostral setae 20 µm long, straight and smooth, directed forward and

inserted on the edge of rostrum. Prodorsum without either lamellae or lamellar lines or interlamellar chitinous protuberances. Lamellar setae 15 µm long and smooth, sat halfway between *ro* and *in* setae. Interlamellar setae as long as *ro* setae and smooth, inserted laterally to 2 pairs of light spots on interlamellar area. Sensilli long and pectinated, with 4 bristles unequal in length, being the proximal ones the largest.

Notogaster rounded and smooth. Notogastral crista present, rounded, protruding over the prodorsum. 10 pairs of notogastral setae (*c2* pair present), 15 µm long and smooth. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs monodactylous.

According to Subías & Balogh (1989) this species could be included in the genera *Medioppia* Subías & Minguez, 1985, synonym of *Rhinoppia*. Within this genus, the closest species is *Rhinoppia mikoi* (Mahunka, 2007), but this species is larger, 389 - 402 x 194 - 208 µm, and has only one pair of punctate areas on the arch of basal laths.

Serratoppia Subías & Mínguez, 1985

• *Serratoppia intermedia* Subías & Rodríguez, 1988

• *Serratoppia serrata* (Mihelčič, 1956)

Oppiellinae Seniczak, 1975

Berniniella s. str. Balogh, 1983

• ***Berniniella (B.) conjuncta*** (Strenzke, 1951) (Figures 78 - 79)

Dimensions (n= 6 females, 4 males) 187 - 218 (203.7 ± 10.3) x 77 - 100 (91.8 ± 7.7) µm. Rostrum tridentate, which central tooth is bigger, wider and blunt. Prodorsal setae smooth and short, but lamellar setae the shortest. Lamellar costulae present, slightly arched with its anterior margin reaching the insertion of lamellar setae. Sensilli with very short stem and globose head with reduced cilia.

Notogaster almost elliptical, with a well discernible straight crista. 10 notogastral setae short and smooth. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 4, *Ag:* 1. Legs monodactylous.

• *Berniniella (B.) inornata* (Mihelčič, 1957)

• *Berniniella (B.) serratirostris s. str.* (Golosova, 1970)

• ***Berniniella (B.) serratirostris hauseri*** (Mahunka, 1974) (Figures 80 - 81)

Dimensions (n= 13 females, 27 males) 200 - 237 (216.4 ± 8.3) x 90 - 108 (100.8 ± 4.2) µm. Rostrum tridentate, which central tooth is also tridentate and as long as lateral ones. Rostral setae comparatively long to other prodorsal setae, being interlamellar setae the shortest. Lamellar costulae slightly arched with a sclerotized area in this portion.

Notogaster almost elliptical, which anterior edge is directed toward prodorsal costulae. 10 pairs of notogastral setae, well developed and smooth. Coxisternal setal formula: 3-1-3-3.

An: 2, *Ad:* 3, *G:* 4, *Ag:* 1. Legs monodactylous.

The measurements given in the description of the species, from Greece, are larger, 235 - 270 x 110 - 124 (Mahunka 1974), while those given by Caballero *et al*. (1999) from specimens collected in Navarra fit to ours (190 - 260 (mean 223) x 80 - 140 (mean 106) µm).

• *Berniniella (B.) setilonga* Iturrondobeitia & Saloña, 1988

Dissorhina Hull, 1916

• *Dissorhina ornata s. str.* (Oudemans, 1900)

Moritzoppia s. str. Subías & Rodríguez, 1988

• *Moritzoppia (M.) unicarinata s. str.* (Paoli, 1908)

Neotrichoppia s. str. Subías & Iturrondobeitia, 1980

• ***Neotrichoppia (N.) pseudoconfinis*** Subías & Iturrondobeitia, 1980 (Figures 82 - 84)

Dimensions (n= 43 females, 42 males) 240 - 310 (274.3 ± 20.8) x 120 - 180 (142.4 ± 14.7) µm. Rostrum rounded with a protrusion on apex; rostral setae 15 - 20 µm long, barbed. Prodorsum with well developed "X"-shaped lamellar costulae. Lamellar setae 15 - 20 µm long, inserted in costulae distal end; interlamellar setae 25 - 40 µm long, set on costulae proximal end. Sensilli thin and long, pectinated, with its distal half slightly broadened and unilaterally ciliated.

Notogaster rounded with 10 pairs of notogastral setae present, 27 - 53 µm long, smooth. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, Aggenital neotrichy present, frequently with different number of setae on each side. Legs monodactylous.

Subías & Iturrondobeitia (1980) gave a smaller range of length (247 - 271 µm x 138 - 154 µm), although the most common lengths on our specimens are between 260 -290 µm (quartiles 1 - 3). Regarding aggenital neotrichy, 17 - 20 pairs of setae are present (Subías & Iturrondobeitia 1980); thus, our specimens can be divided into 3 morphotypes: the first morphotype (A) found in RO01 present 14 - 27 pairs of *Ag* setae, being the most common 18 - 19 pairs (quartiles 1 - 3); the second morphotype (B), in HA04, presents 8 - 15 pairs of *Ag* setae, being the most common 10 - 11 pairs (quartiles 1 - 3); on the third morphotype (C), *Ag* number is reduced in the specimens of HA03, HA05 and RO04, to 2 - 8 pairs, being the most common 4 - 5 pairs (quartiles 1 - 3).

Specimens with reduced aggenital setae were collected before in Gipuzkoa, Orense and North of Portugal (Subías & Arillo 2001); this reduction on aggenital setae number is probably determined by the ombrothermic conditions, thus, the three differentiated morphotypes can be ecophenotypes.

Neotrichoppia (Ancestroppia) Subías & Rodríguez, 1986

• *Neotrichoppia (A.) berninii* Subías & Rodríguez, 1986

Neotrichoppia (Confinoppia) Subías & Rodríguez, 1986

• *Neotrichoppia (C.) confinis tenuiseta* Subías & Rodríguez, 1986

• *Neotrichoppia (C.) variabilis* Iturrondobeitia & Subías, 1981

Oppiella s. str. Jacot, 1937

• *Oppiella (O.) nova s. str.* (Oudemans, 1902)

Oppiella (Perspicuoppia) Pérez-Íñigo, 1971

• ***Oppiella (P.)* sp.** (Figure 85)

Dimensions (n= 31 females) 240 - 270 (255.1 ± 8.6) x 112 - 130 (123.1 ± 6.2) µm. Rostrum rounded with a protrusion. Rostral setae 20 - 25 (23.1 ± 1.8) µm long, slightly barbed and inserted laterally to rostral protrusion. Lamellar setae 12 - 15 (14 ± 1.4) µm long, sat on anterior margin of lamellar costulae which posterior margin end close to interbothridial tubercles. Interlamellar setae 15 - 23 (18.6 ± 3.4) µm long, sat on Interlamellar tubercles developed obliquely in antiaxial position to *in*, facing notogastral crista angles. Bothridial tubercles well developed, broad and triangular directed backwards. Sensilli fusiform unilaterally ciliated, with 7-8 bristles, being the proximal one 10 - 13 (12 ± 1.1) µm long.

Notogastral crista broad and slightly concave, with lateral rounded angles facing interbothridial tubercles. Notogaster with well developed and rounded humeral processes, opposite to bothridial tubercles. Notogaster with 10 pairs of smooth setae, being *c2* setae as long as other notogastral setae, 17 - 28 (24.1 ± 3.6) µm long. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, *Ag:* 1. Legs monodactylous.

Until now, four species of the subgenus *Oppiella (Perspicuoppia)* have been described (Subías 2004). In *Oppiella (Perspicuoppia) rara* Ivan & Vasiliu, 1997 the rostrum is incised, sensilli are pectinate and notogastral anterior chitinous apophyses are spur-like; *Oppiella (Perspicuoppia) turcica* Toluk & Ayyildiz, 2009 has a nasute rostrum and lobed crista; *Oppiella (Perspicuoppia) perspicua* (Mihelčič, 1956) is a bigger species (250-300 x 130-150 µm) and notogastral anterior chitinous apophyses are triangular (Pérez-Íñigo 1971). *Oppiella (Perspicuoppia) minidentata* (Subías, 1977) is the most similar species by its length (235-255 x 120-130 µm) but the small apophyses in the crista make it different from our specimens.

Oxyoppiinae Subías, 1989

Subiasella (Lalmoppia) Subías & Rodríguez, 1986

• ***Subiasella (L.) quadrimaculata*** (Evans, 1952) (Figures 86 - 87)

Dimensions (n= 4 females, 2 males) 240 - 290 (256.7 ± 17.8) x 105 - 115 (111.7 ± 5.8) µm, being the notogastral length 2/3 of total length. Rostrum broadly rounded and rostral setae are long, thin and slightly arched and barbed. Prodorsal costulae absent, but with lamellar lines connected by a translamellar line. Lamellar setae inserted at anterior end of lamellar

lines. Two pairs of clear spots between interlamellar setae. Sensilli short and rounded with small cilia.

Notogaster elliptical in shape, 170 - 200 (179.5 ± 11.2) µm long , with rudimentary crista and vestigial lateral protuberances. Nine notogastral setae, 10 - 15 µm long, but *c2* setae absent and only their alveoli present; *la* pair situated in a forward position, far from *lm* pair. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, *Ag:* 1. Legs monodactylous.

The specimens collected are larger than those recorded in Spain (215 - 219 x 105 -111 µm; Subías & Rodríguez 1986), Britain (235 x 100 µm; Evans 1952), Sweden (196 - 233 x 86 - 105 µm; Forsslund 1953) and Germany (200 - 235 µm; Weigmann 2006).

Machuellidae Balogh, 1983

Machuella Hammer, 1961

• *Machuella draconis* Hammer, 1961

Quadroppiidae Balogh, 1983

Quadroppia s. str. Jacot, 1939

• *Quadroppia (Q.) hammerae* Mínguez, Ruíz & Subías, 1985

• *Quadroppia (Q.) maritalis* Lions, 1982

• *Quadroppia (Q.) quadricarinata* (Michael, 1885)

Quadroppia (Coronoquadroppia) Ohkubo, 1995

• *Quadroppia (C.) monstruosa* Hammer, 1979

• *Quadroppia (C.) pseudocircumita* Mínguez, Ruíz & Subías, 1985

Trizetoidea Ewing, 1917

Suctobelbidae Jacot, 1938

Suctobelba Paoli, 1908

• ***Suctobelba granulata*** Hammen, 1952 (Figure 88)

Dimensions (n= 10) 190 - 215 (207.7 ± 7.9) x 103 - 115 (110.7 ± 4.4) µm. Rostrum rounded, with two small lateral teeth well discernible on lateral view. Rostral setae closely inserted, straight and slightly barbed, divergent and directed downwards. Anterior region of prodorsum granulated, but laterally without striation (present in *Suctobelba trigona* (Michael, 1888)). Sensillus clavate, smooth and longer than distance between bothridia.

Anterior margin of notogaster without crista, two small lateral tubercles present in front of postbothridial tubercles. 10 pairs of notogastral setae, long, S-shaped. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 5, *Ag:* 1. Legs monodactylous.

The size of our specimens is slightly smaller to that given for this species: 222 - 260 µm (Subías & Arillo 2001) or 220 - 250 µm (Weigmann 2006).

• *Suctobelba regia* Moritz, 1970

• *Suctobelba trigona* (Michael, 1888)

Suctobelbella s. str. Jacot, 1937

• *Suctobelbella (S.) acutidens s. str.*

• *Suctobelbella (S.) acutidens sarekensis* (Forsslund, 1941)

• *Suctobelbella (S.) longicuspis s. str.* Jacot, 1937

• *Suctobelbella (S.) perforata* (Strenzke, 1950)

• *Suctobelbella (S.) similis* (Forsslund, 1941)

• *Suctobelbella (S.) subcornigera s. str.* (Forsslund, 1941)

Suctobelbella (Flagrosuctobelba) Hammer, 1979

• *Suctobelbella (F.) alloenasuta* Moritz, 1971

• *Suctobelbella (F.) forsslundi s. str.* (Strenzke, 1950)

• *Suctobelbella (F.) subtrigona* (Oudemans, 1900)

Carabodoidea Koch, 1837

Carabodidae Koch, 1837

Carabodes s. str. Koch, 1835

• ***Carabodes (C.) arduinii*** Valle, 1955 (Figure 89)

Sexual dimorphism present in body size: female (n= 6) 700 - 810 (750 ± 48.6) x 500 - 570 (522.5 ± 32) µm, male (n=2) 620 - 670 x 400 - 420 µm; dark and highly schlerotized. Rostral setae thick and rugose, relatively slender. Lamellae areolated. Lamellar setae phylliform, slightly enlarged at distal end and heavily barbed on upper surface. Interlamellar setae long, foliaceus with ciliate margins. Sensilli long, medially curved with externally ciliated and sharp-ended head.

Notogaster and dorso-sejugal region without deep excavation. Notogastral sculpture tuberculated, disposed regularly in longitudinal pattern. Ten pairs of notogastral setae, which 6 pairs disposed centrally and 4 pairs marginally. Central notogastral setae long, spoon-shaped and marginally barbed; marginal setae similar in length and shape but slightly shorter and strongly curved inwards. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 4, *Ag:* 1. Legs monodactylous.

• ***Carabodes (C.) areolatus*** Berlese, 1916 (Figure 90 - 91)

Sexual dimorphism present in body size: female (n= 2) 460 - 470 x 250 - 260 µm, male (n= 1) 410 x 220 µm. Rostrum rounded. Rostral setae long and thin directed forwards. Lamellar surface with oval fossae. Lamellar setae thick, shorter than *ro*, curved inwards. Interlamellar setae longer than *le*, slightly barbed and directed forwards. Posterior part of prodorsum with chitinous thickening and deep fossae. Sensilli long and thin, with fusiform distal end with spines.

Notogaster and dorso-sejugal region without deep excavation. Notogastral surface with polygonal fossae. Ten notogastral setae, all same in shape and length, as long as *ro* setae, distally thickened and sharp. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 4, *Ag:* 1. Legs monodactylous.

Our specimens fit the length given by Berlese (1916) and Willmann (1931), from specimens recorded from Italy (440 µm) and Germany (470 µm), respectively; but larger measurements had been recorded in Sweden, 612 µm (Sellnick & Forsslund 1953) and Spain (Pyrenees of Lérida), 600 µm (Subías & Gil-Martín 1995). Although Beck & Woas (1991) recorded specimens from Germany with a wide range in length (485 - 610 µm), mid-term measurements, 505 - 580 µm, were recorded from specimens from Sierra de Guadarrama (Madrid) and Zamora (Subías & Gil-Martín 1995).

• *Carabodes (C.) coriaceus* Koch, 1835

• ***Carabodes (C.) labyrinthicus*** (Michael, 1879) (Figures 92 - 93)

Dimensions (n= 2 females, 1 male) 480 - 550 (506.7 ± 37.9) x 260 - 300 (280 ± 20) µm. Rostrum rounded. Rostral setae thin, smooth and short, directed inwards. Lamellae long. Lamellar setae smooth, thick, convergent and curved upwards. Interlamellar setae, smooth, straight and sharp. Interlamellar surface sculpture of tubercles and fossae. Sensilli short, with distal thickened and pyriform end slightly ciliated.

Notogaster and dorso-sejugal region without deep excavation. Notogaster surface with rounded and confluent tubercles, arranged on irregular pattern. Ten notogastral setae, thin and smooth. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 4, *Ag:* 1. Legs monodactylous.

• *Carabodes (C.) palmifer* Berlese, 1904

• *Carabodes (C.) perezinigoi* Salinas, 1971

Carabodes (Klapperiches) Mahunka, 1979

• ***Carabodes (K.) similis translamellatus*** Pérez-Íñigo jr., 1990 (Figures 94 - 95)

Dimensions (n= 6 females, 2 males) 350 - 380 (365 ± 10.7) x 170 - 190 (180 ± 8.2) µm. Prodorsal surface with fossae. Rostrum rounded. Wide lamella united distally by a straight translamella. Lamellar setae thick and arched. Interlamellar setae broadened distally, ended on a sharp point. Sensilli apically broadened, cup-like shaped and fringed.

Notogaster and dorso-sejugal region without deep excavation. Notogastral surface with small polygonal tubercles disposed on pentagonal pattern. Ten pairs of notogastral setae, which 6 central pairs moderately short, distally broadened and slightly ciliated; 4 marginal pairs shorter, smooth and curved. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 4, *Ag:* 1. Legs monodactylous.

Odontocepheus s. str. Berlese, 1913

• *Odontocepheus (O.) elongatus* (Michael, 1879)

• *Odontocepheus (O.) espatulatus* Saloña & Iturrondobeitia, 1989

Tectocepheoidea Grandjean, 1954

Tectocepheidae Grandjean, 1954

Tectocepheus Berlese, 1896

• *Tectocepheus alatus* Berlese, 1913

• *Tectocepheus minor* Berlese, 1903

• *Tectocepheus velatus s. str.* (Michael, 1880)

Cymbaeremaeoidea Sellnick, 1928

Cymbaeremaeidae Sellnick, 1928

Cymbaeremaeus Berlese, 1896

• *Cymbaeremaeus cymba* (Nicolet, 1855)

Infraorder PORONOTICAE Grandjean, 1954

Licneremaeoidea Grandjean, 1931

Micreremidae Grandjean, 1954

Micreremus Berlese, 1908

• *Micreremus brevipes* (Michael, 1888)

Lamellareidae Balogh, 1972

Tenuelamellarea Subías & Iturrondobeitia, 1978

• *Tenuelamellarea hispanica* Subías & Iturrondobeitia, 1978

Phenopelopoidea Petrunkevitch, 1955

Phenopelopidae Petrunkevitch, 1955

Eupelops Ewing, 1917

• *Eupelops acromios s. str.* (Hermann, 1804)

• ***Eupelops hygrophilus*** (Knüll, 1954) (Figures 96 - 97)

Dimensions (n=1) 550 x 440 µm, dark-brown with well developed and irregular cerotegument. Chelicerae styliform (pelopsiform). Rostrum narrow, sharp. Tutoria present, blade-like. Rostral setae long, barbed; lamellar setae shorter; interlamellar setae long and narrow, spatulated, almost covering the prodorsum. Lamellae narrow, blade-like, connected medially by rounded translamella. Sensilli clavate, with small spikes.

Notogaster rounded with oval lenticulus, poorly circumscribed. Notogaster with large and hinged movable pteromorphae, not extending forwards. Notogastral anterior margin projected forward as tectum, with two lateral lobes and straight medially. Ten pairs of

notogastral setae, barbed and short (25 - 30 µm), being *h1* and *p1* slightly longer (35 µm) and *p2* and *p3* the smallest (10 µm) and smooth; *lp* and *h3* setae widely separated. Octotaxic system represented by 4 pairs of small porose areas (*Aa*: 13 µm; *A1*: 5 µm); Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs tridactylous.

South-Central European species (Subías 2004), cited in Germany (Knülle 1954; Weigmann & Kratz 1982), Romania (Vasiliu & Ivan 1992), Poland (Niedbala & Olszanowski 2008; Seniczak 2011), Italy (Fischer & Schatz 2010), Netherlands (Geel *et al*. 2010) and the Caucasus (Shtanchaeva & Subías 2010). This is the first record of *E. hygrophilus* for the Iberian Peninsula.

• *Eupelops major s. str.* (Hull, 1914)

• *Eupelops plicatus* (Koch, 1835)

Peloptulus Berlese, 1908

• *Peloptulus montanus* Hull, 1914

Microzetoidea Grandjean, 1936

Microzetidae Grandjean, 1936

Amiracarus Miko, 2013

• *Amiracarus similis* (Subías & Iturrondobeitia, 1978)

Achipterioidea Thor, 1929

Achipteriidae Thor, 1929

Achipteria s. str. Berlese, 1885

• *Achipteria (A.) coleoptrata* (Linnaeus, 1758)

• *Achipteria (A.) nitens* (Nicolet, 1855)

Cerachipteria Grandjean, 1935

• *Cerachipteria digita jugata* Mihelčič, 1956

Parachipteria Hammen, 1952

• *Parachipteria magna* (Sellnick, 1928)

• ***Parachipteria punctata*** (Nicolet, 1855) (Figures 98 - 99)

Dimensions (n= 1 female) 540 x 340 µm, dark brown and glossy. Lamellae broad covering almost the whole prodorsum, fused medially but with separated cusps. A triangular part of interlamellar region uncovered. Tutorium with converging distal ends.

Pteromorphs immovable, not hinged, with anterolateral sharp prolongation. Notogaster with octotaxic system expressed as 4 pairs of small and rounded porose areas. Ten pairs of notogastral setae. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs tridactylous.

• ***Parachipteria* sp.** (Figures 100 - 101)

Dimensions (n= 10 females, 8 males) 950 - 1040 (991.3 ± 25.3) x 670 - 700 (684 ± 8.4) µm, well schlerotized, dark brown, almost black, and glossy. Prodorsum covered by lamellae, coalesced, fused into squama without suture, covering almost the whole prodorsum; fusion line does not exceed the half length of lamellae. Lamellar setae inserted on inferior face of lamellae. Interlamellar setae long, sat medially on squama, and reaching beyond lamellar cusps. Tutoria with long and anteriorly free tips. Sensilli fusiform and flattened.

Notogastral surface finely punctated. Large but not hinged pteromorphs, with an elongated anterolateral edge directed forwards. Ten pairs of notogastral setae; *c2* and *la* 50 - 70 (59.7 ± 6.9) µm long and remaining setae shorter, 30 - 50 (38.5 ± 6.4) µm. Gymnonotic notogaster, without observable octotaxic system; an apparent vestigial porose area *A1* between setae *lp* and *h3*. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs tridactylous.

Within the genera and according to their description, four species have gymnonotic notogaster: *Parachipteria agenjoi* (Pérez-Íñigo, 1976), *Parachipteria floresiana* (Pérez-Íñigo, 1992), *Parachipteria insularis* (Pérez-Íñigo, 1992) and *Parachipteria magna* (Sellnick, 1928). Our specimens are clearly larger than these species and the vestigial organ had been recorded only in some populations of *P. magna* (Norton & Alberti 1997).

Oribatelloidea Jacot, 1925

Oribatellidae Jacot, 1925

Ophidiotrichus Grandjean, 1953

• *Ophidiotrichus tectus* (Michael, 1884)

Oribatella s. str. Banks, 1895

• *Oribatella (O.) quadricornuta* (Michael, 1880)

Ceratozetoidea Jacot, 1925

Ceratozetidae Jacot, 1925

Ceratozetes s. str. Berlese, 1908

• *Ceratozetes (C.) armatus* Mihelčič, 1956

• ***Ceratozetes (C.) gemmula*** Pérez-Íñigo jr., 1990 (Figure 102)

Dimensions (n= 1 female) 540 x 350 µm. Rostrum with a marked central groove and two lateral teeth. Tutorium narrow, lamelliform, lying parallel to dorsal contour of prodorsum in lateral aspect, with pointed but very short free distal cusp. Lamellae slightly convergent, with narrow and short cusps bearing lamellar setae. Distance between cusps larger than twice cusp length. Lamellar setae smooth but distally slightly barbed. Interlamellar setae long. Sensilli narrow, blade-like shaped, bilaterally barbed.

Pteromorphs large and long, curved ventrally and its anterolateral angle directed anteriorly. Ten pairs of vestigial notogastral setae, their alveoli discernable. Notogaster with octotaxic system expressed as 4 pairs of porose areas. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Genua I-IV without ventral spurs. Legs tridactylous.

• *Ceratozetes (C.) mediocris* Berlese, 1908

• *Ceratozetes (C.) peritus* Grandjean, 1951

• *Ceratozetes (C.) simulator* Pérez-Íñigo, 1970

Hispanozetes Subías & Shtanchaeva, 2012

• *Hispanozetes striatus* Subías y Shtanchaeva, 2012

Chamobatidae Thor, 1937

Chamobates s. str. Hull, 1916

• *Chamobates (C.) cuspidatus* (Michael, 1884)

• *Chamobates (C.) pusillus* (Berlese, 1895)

Humerobatidae Grandjean, 1970

Humerobates s. str. Sellnick, 1928

• *Humerobates (H.) rostrolamellatus guadarramicus* Pérez-Íñigo, 1972

Punctoribatidae Thor, 1937

Minunthozetes s. str. Hull, 1916

• *Minunthozetes (M.) semirufus* (Koch, 1841)

Minunthozetes (Inigozetes) Subías, 2000

• *Minunthozetes (I.) reticulatus* Pérez-Íñigo, 1969

Punctoribates s. str. Berlese, 1908

• ***Punctoribates (P.) punctum*** (Koch, 1839) (Figure 103)

Dimensions (n= 16 females, 2 males) 380 - 410 (389.4 ± 11.1) x 270 - 300 (282.8 ± 8.3) µm, brown and globose. Rostrum rounded and smooth. Prodorsal setae slightly barbed, being interlamellar setae longer than lamellar and rostral setae. Lamellae developed but not well visible, connected by transverse translamella. Tutoria blade-like. Sensilli long, fusiform with clavate head, directed forwards.

Notogaster with short and hinged pteromorphs. Anterior median edge of notogaster protruding over prodorsum, covering bothridia and insertion point of interlamellar setae. Notogaster with ten pairs of setae alveoli. Four pairs of porose areas present, being the *Aa* pair the largest. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs tridactylous.

Oripodoidea Jacot, 1925

Oribatulidae Thor, 1929

Oribatula s. str. Berlese, 1896

• ***Oribatula (O.) tibialis*** (Nicolet, 1855) (Figures 104 - 109)

Medium sized, brown and ovoid species. Prodorsum with broad, well developed lamellae, without cusps, wider in anterior part. Rostrum rounded and smooth. Prodorsal setae robust, barbed and directed forwards; interlamellar pair slightly longer than lamellar setae, and rostral setae the shortest. Sensilli fusiform-clavate, barbed distally.

Notogaster cuticle smooth, with 13 pairs of simple and short setae. Octotaxic system represented by 4 pairs of rounded porose areas. Coxisternal setal formula: 3-1-3-3. *An:* 2, *Ad:* 3, *G:* 4, *Ag:* 1. Legs tridactylous.

According to body and adalar porose area (*Aa*) size, our specimens can be divided into three morphotypes. The first morphotype, 390 - 480 (432.11 ± 24.62) µm long (n= 36 females, 24 males) with all porose areas small and similar in length, 7 - 14 (10.74 ± 1.63) µm, fits the description given by Seniczak & Seniczak (2012) based on specimens from Catalonia (Spain).

The second morphotype is larger, 490 - 530 (508.75 ± 15) µm long (n= 5 females, 11 males), with big *Aa* porose areas, 24 - 36 (27.5 ± 3.43) µm long, while other porose areas are 17 - 23 (20 ± 1.91) µm long. This morphotype fits the description given by Wunderle *et al.* (1990) based on specimens from Germany, although the notogastral setae in our specimens are bigger, 32 - 45 (37 ± 3.19) µm.

Only a female corresponding to a third morphotype that fits the *dentata* form (Pérez-Íñigo 1974) was found in RO03. Body size (480 µm long), porose areas equal in size (20 µm), notogastral setae size (22 µm) and the presence of a small tooth in the external side of lamellar cusps, might differentiate this third morphotype.

A considerable size variability has been observed from one population to another (Ivan 2013); for instance Kahwash *et al*. (1991) recorded 437 - 525 µm long on specimens from several countries of Andalusia (Spain).

Oribatula (Zygoribatula) Berlese, 1916

• *Oribatula (Z.) exilis s. str.* (Nicolet, 1855)

Phauloppia Berlese, 1908

• *Phauloppia lucorum* (Koch, 1841)

Hemileiidae J. & P. Balogh, 1984

Dometorina s. str. Grandjean, 1951

• *Dometorina (D.) plantivaga s. str.* (Berlese, 1895)

Hemileius s. str. Berlese, 1916

• *Hemileius (H.) initialis* (Berlese, 1908)

Liebstadiidae J. & P. Balogh, 1984

Liebstadia s. str. Oudemans, 1906

• *Liebstadia (L.) longior* (Berlese, 1908)

Scheloribatidae Grandjean, 1933

Scheloribates s. str. Berlese, 1908

• *Scheloribates (S.) laevigatus s. str.* (Koch, 1835)

Protoribatidae J. & P. Balogh, 1984

Protoribates s. str. Berlese, 1908

• *Protoribates (P.) capucinus s. str.* Berlese, 1908

Galumnoidea Jacot, 1925

Galumnidae Jacot, 1925

Acrogalumna Grandjean, 1956

• *Acrogalumna longipluma s. str.* (Berlese, 1904)

Galumna s. str. Heyden, 1826

• ***Galumna (G.) lanceata*** (Oudemans, 1900) (Figures 110 - 111)

Dimensions (n= 5 females, 5 undetermined) 560 - 630 (595 ± 24.2) x 380 - 470 (424.4 ± 31.3) µm, brown coloured species. Rostrum widely rounded. Lamellar and sublamellar lines distinct, parallel, curving backwards; lamellar lines do not reach *in* insertion point. Prodorsal setae well developed, setiform, unilaterally barbed; lamellar setae shorter than interlamellar setae. Sensilli longer than *in* setae, setiform, distally widened, lanceolate.

Notogaster with large and hinged pteromorphs. Notogastral anterior margin indistinctly visible. Ten pairs of notogastral setae reduced to its alveoli. Four pairs of porose areas present, being *Aa* triangular with its apex directed inwards, and other porose areas smaller and oval. Median pore present, located between *A1* porose areas. Coxisternal setal formula: 2-1-2-2. *An:* 2, *Ad:* 3, *G:* 6, *Ag:* 1. Legs tridactylous.

3.1.2. Oribatida figures

For each described Oribatida species, photographs of detailed areas are presented.

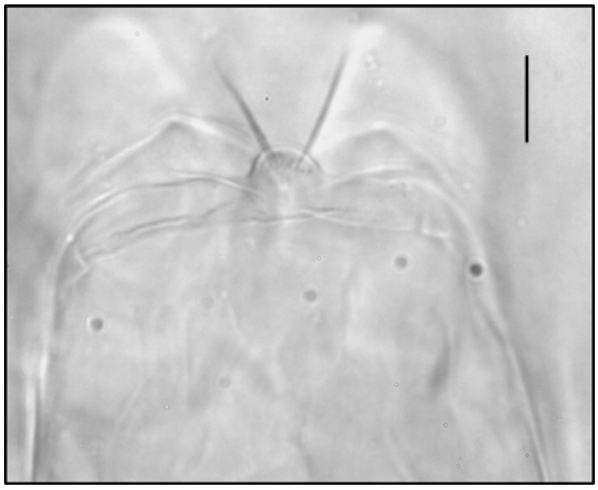

Figure 4. *Gehypochthonius rhadamantus*, prodorsum. (Scale bar: 10 µm)

Figure 5. *Gehypochthonius rhadamantus*, sensillus. (Scale bar: 10 µm)

Figure 6. *Gehypochthonius rhadamantus*, notogaster; arrows: oil glands (Scale bar: 50 µm)

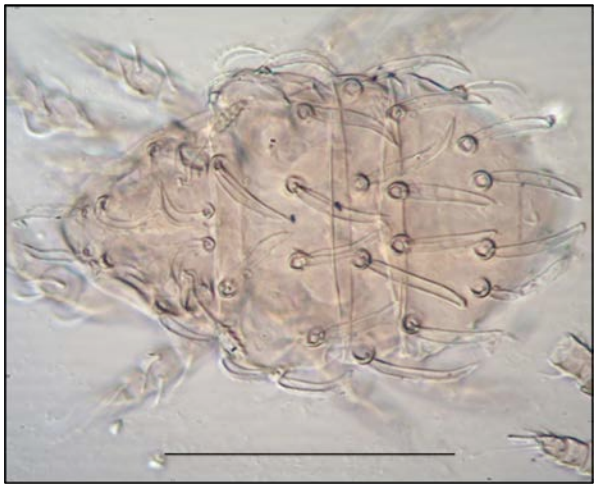

Figure 7. *Liochthonius horridus*, dorsal. (Scale bar: 100 µm)

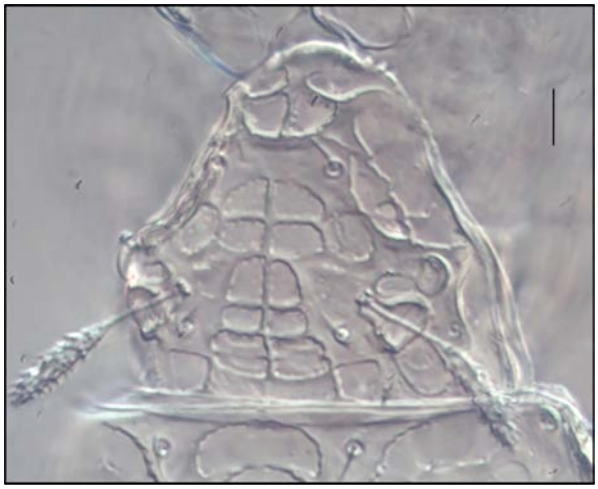

Figure 8. *Sellnickochthonius cricoides*, prodorsum. (Scale bar: 10 µm)

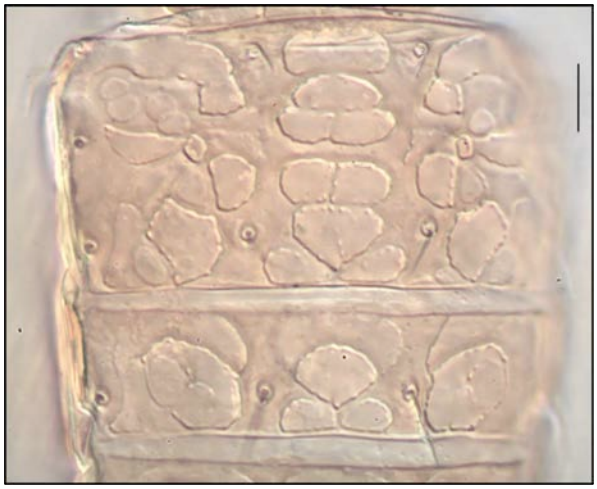

Figure 9. *Sellnickochthonius cricoides*, notogastral shields *Na* and *Nm*. (Scale bar: 10 µm)

Figure 10. *Sellnickochthonius furcatus*, prodorsum. (Scale bar: 10 µm)

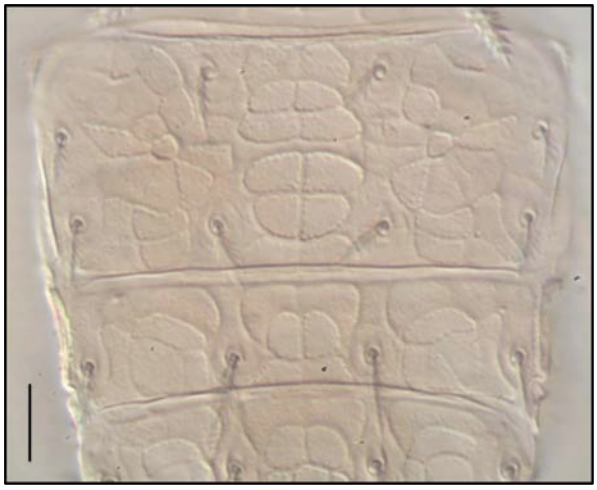

Figure 11. *Sellnickochthonius furcatus*, notogastral shields *Na* and *Nm*. (Scale bar: 10 µm)

Figure 12. *Sellnickochthonius rostratus hungaricus*, prodorsum. (Scale bar: 10 µm)

Figure 13. *Sellnickochthonius rostratus hungaricus*, notogastral shields *Na* and *Nm*. (Scale bar: 10 µm)

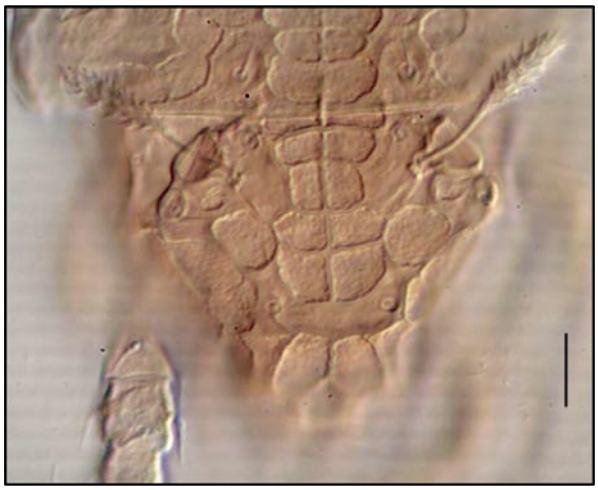

Figure 14. *Sellnickochthonius suecicus*, prodorsum. (Scale bar: 10 µm)

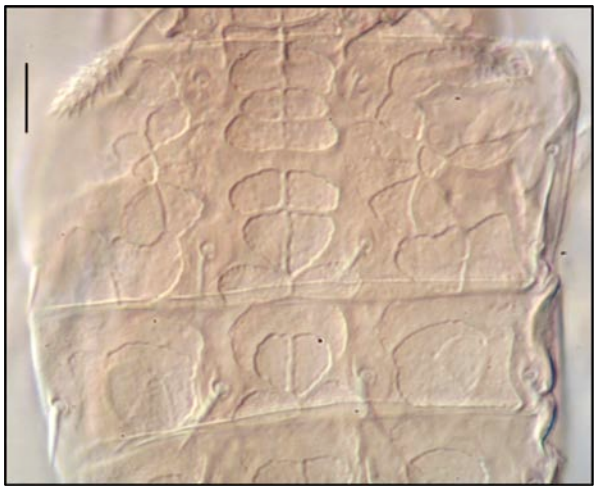

Figure 15. *Sellnickochthonius suecicus*, notogastral shields *Na* and *Nm*. (Scale bar: 10 µm)

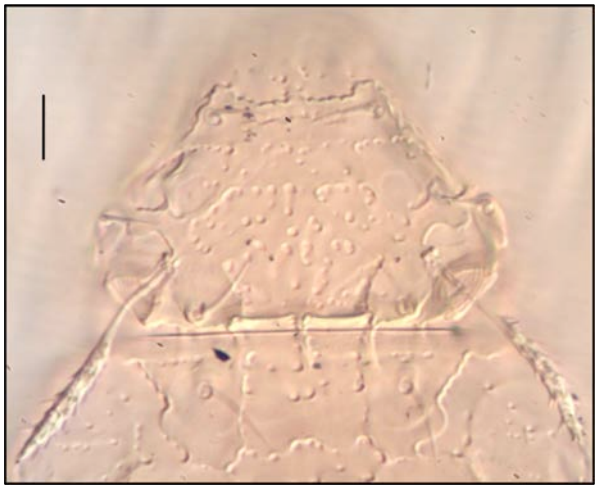

Figure 16. *Synchthonius crenulatus*, prodorsum. (Scale bar: 10 µm)

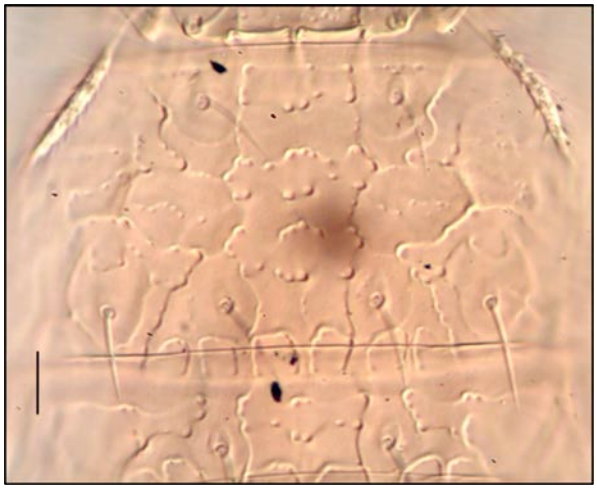

Figure 17. *Synchthonius crenulatus*, notogastral shields *Na* and *Nm*. (Scale bar: 10 µm)

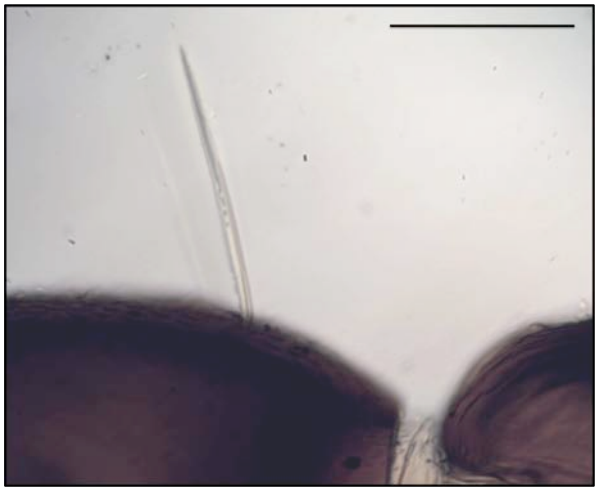

Figure 18. *Steganacarus michaeli*, notogastral seta *c1*, lateral view. (Scale bar: 100 µm)

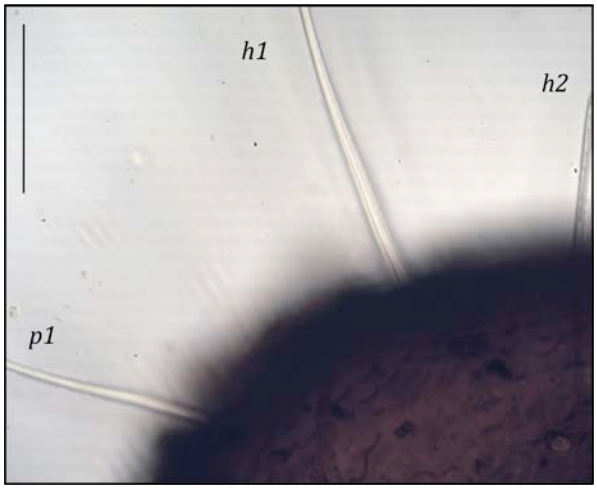

Figure 19. *Steganacarus michaeli*, notogastral setae *h1*, *h2*, *p1*, lateral view. (Scale bar: 100 µm)

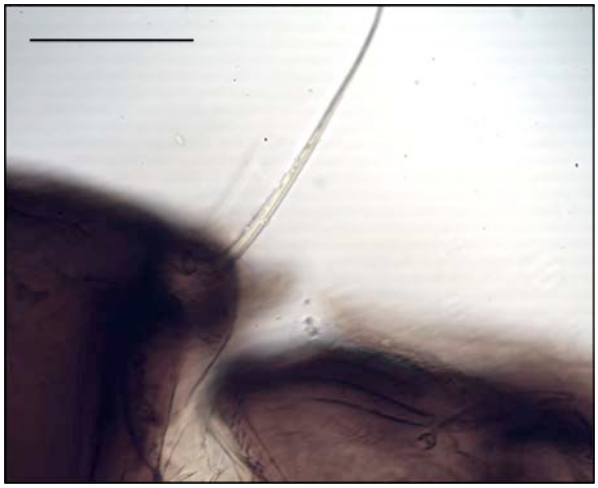

Figure 20. *Steganacarus magnus s. str.*, notogastral seta *c1*, lateral view. (Scale bar: 100 µm)

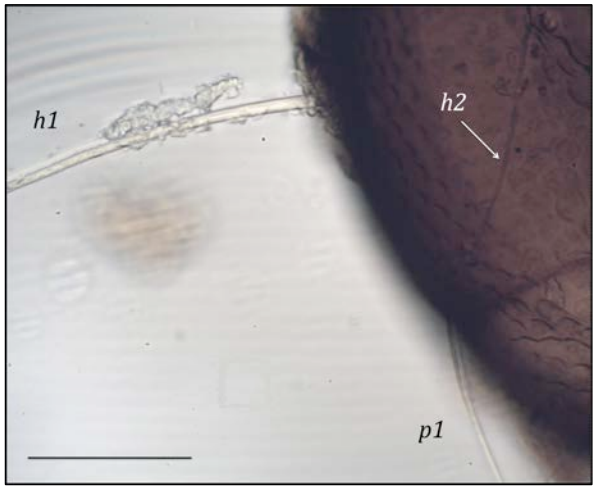

Figure 21. *Steganacarus magnus s. str.*, notogastral setae *h1*, *h2*, *p1*, lateral view. (Scale bar: 100 µm)

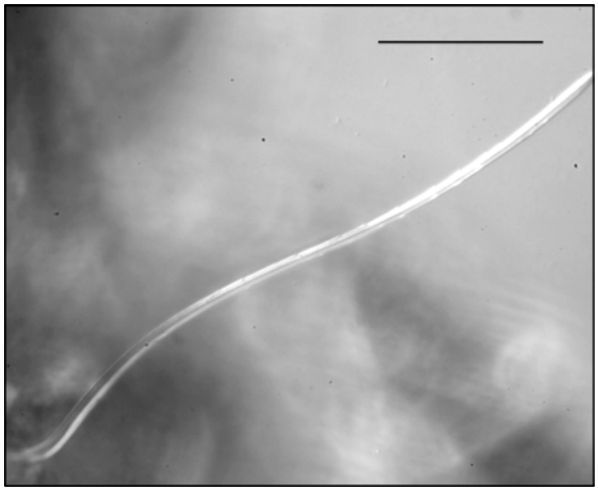

Figure 22. *Nothrus cf. borussicus*, sensillus. (Scale bar: 50 µm)

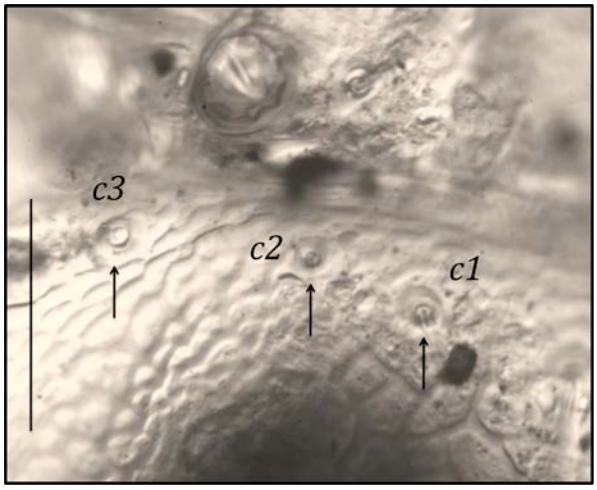

Figure 23. *Nothrus cf. borussicus*, insertion points of setae *c1-c3*. (Scale bar: 50 µm)

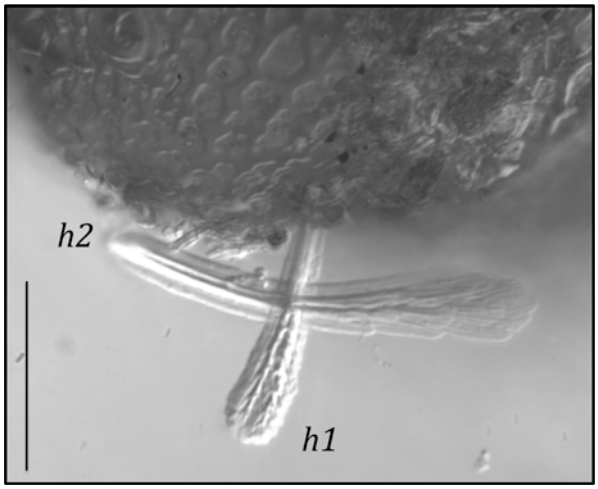

Figure 24. *Nothrus cf. borussicus*, notogastral setae *h1* and *h2.* (Scale bar: 50 µm)

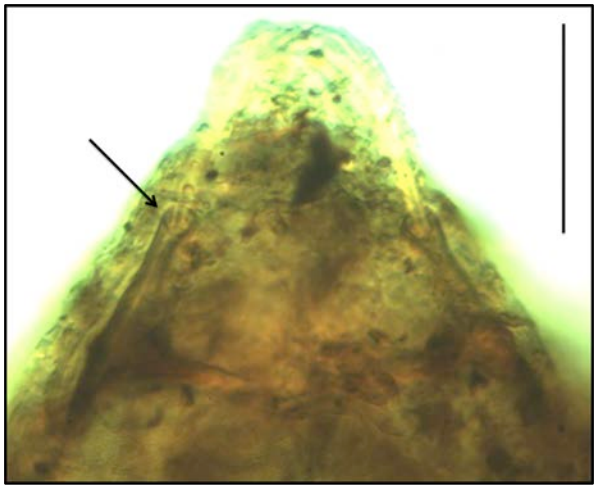

Figure 25. *Camisia segnis*, chitinous lamellar apophyses. (Scale bar: 50 µm)

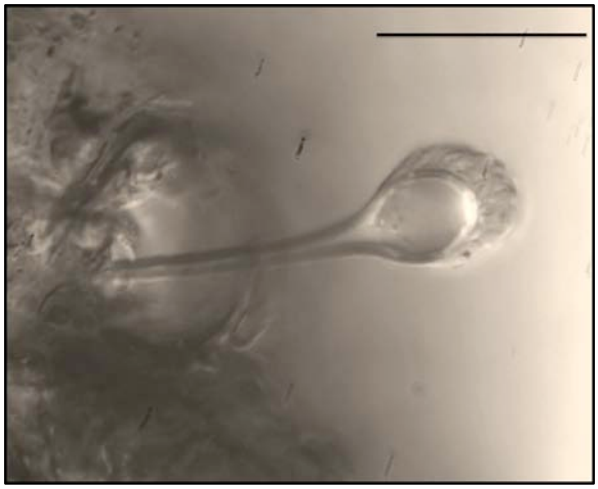

Figure 26. *Camisia segnis*, sensillus. (Scale bar: 25 µm)

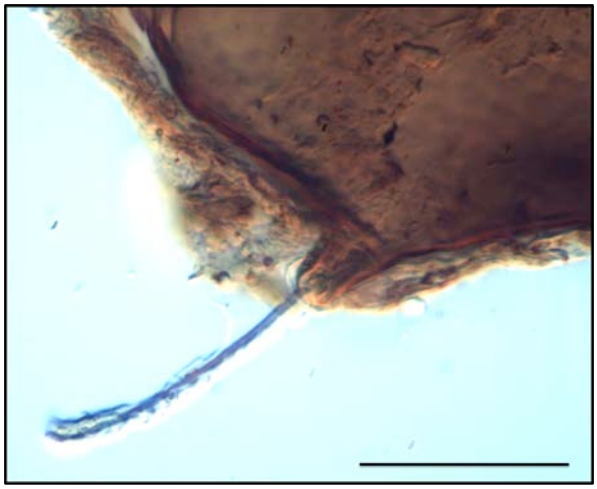

Figure 27. *Camisia segnis*, seta *h2*. (Scale bar: 50 µm)

Figure 28. *Heminothrus targionii*, lamellar setae. (Scale bar: 50 µm)

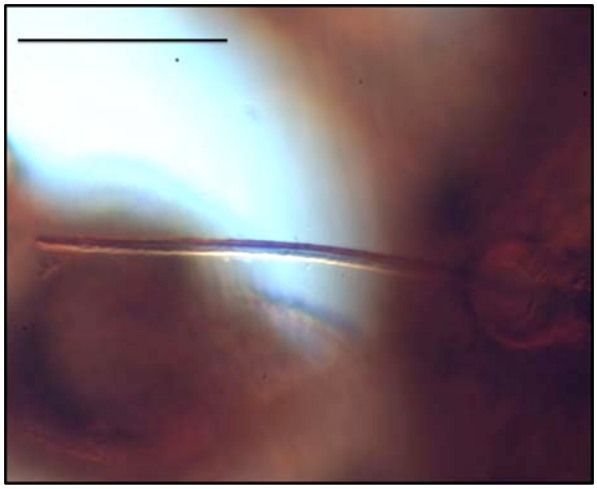

Figure 29. *Heminothrus targionii*, sensillus. (Scale bar: 50 µm)

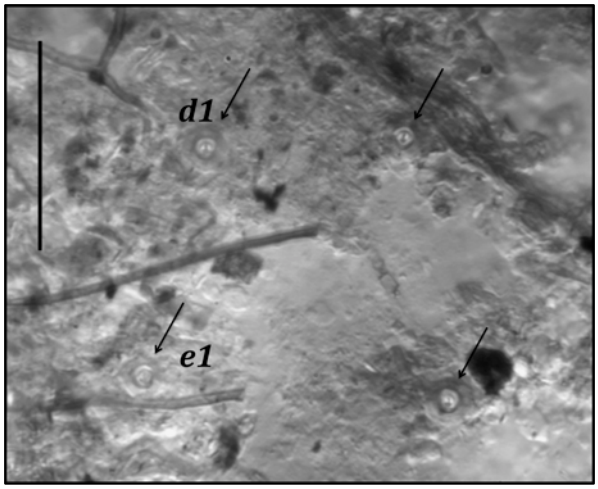

Figure 30. *Heminothrus targionii*, insertion points of notogastral setae *d1* and *e1*. (Scale bar: 50 µm)

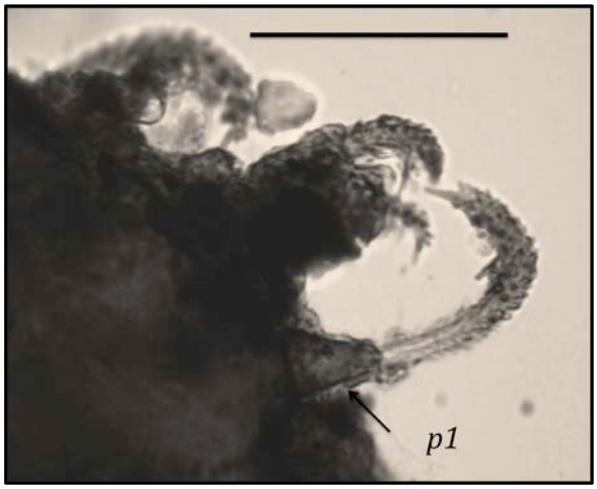

Figure 31. *Heminothrus targionii*, notogastral seta *p1* sat on apophyses. (Scale bar: 50 µm)

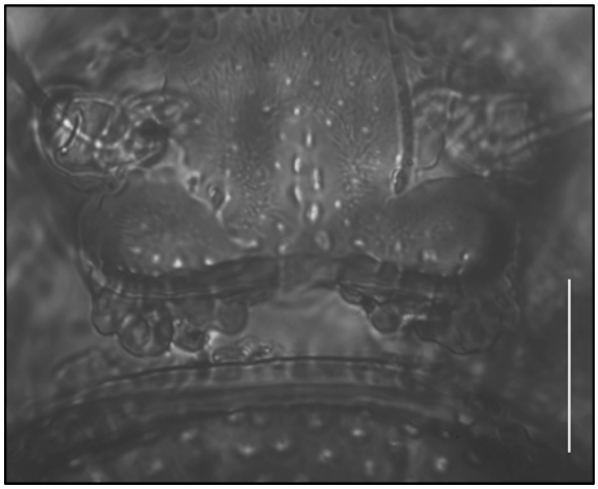

Figure 32. *Nanhermannia sellnicki*, prodorsal condyles. (Scale bar: 50 µm)

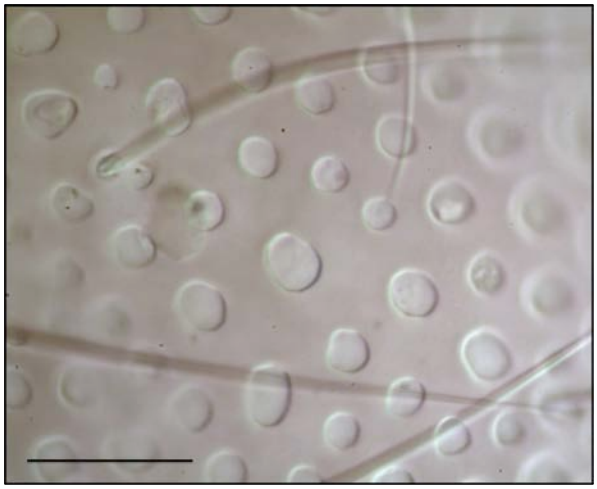

Figure 33. *Nanhermannia sellnicki*, notogastral sculpture. (Scale bar: 25 µm)

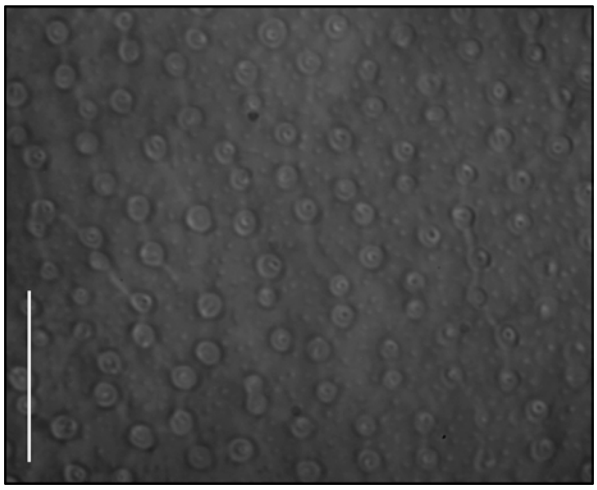

Figure 34. *Hermanniella septentrionalis*, notogastral sculpture. (Scale bar: 25 µm)

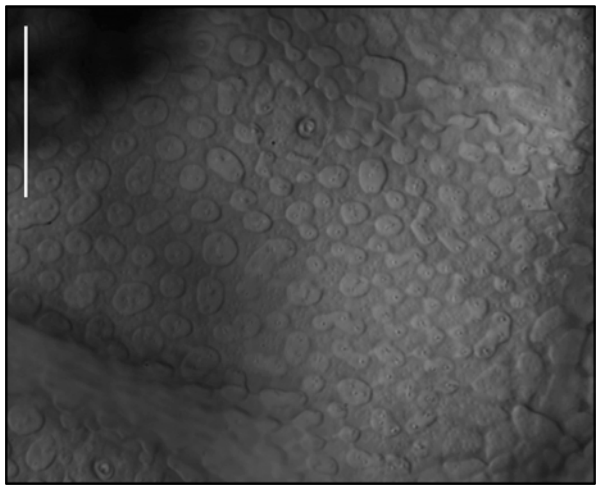

Figure 35. *Hermanniella granulta*, notogastral sculpture. (Scale bar: 50 µm)

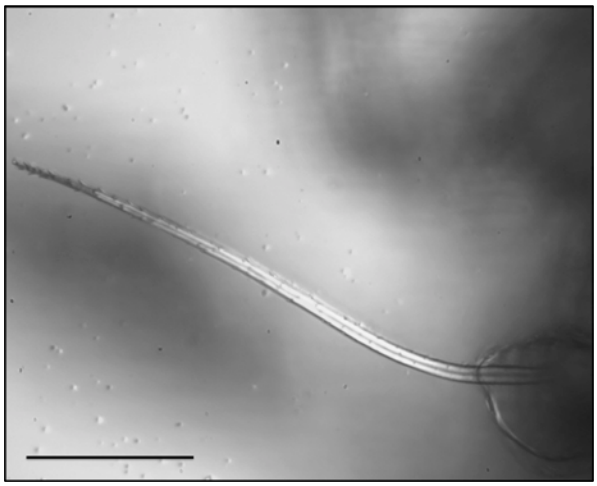

Figure 36. *Belba patelloides*, sensillus. (Scale bar: 50 µm)

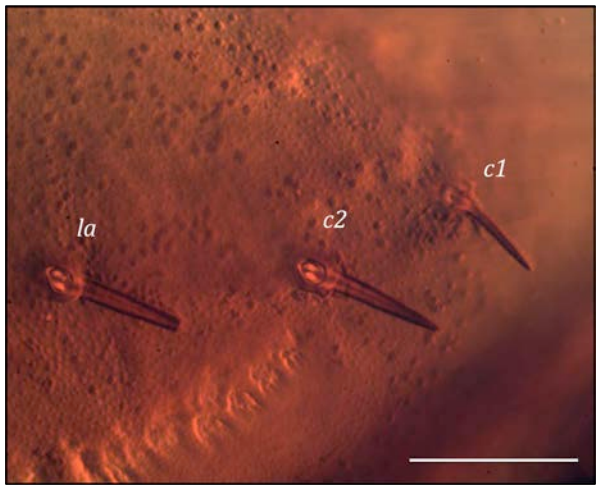

Figure 37. *Belba patelloides*, anterior notogastral setae. (Scale bar: 50 µm)

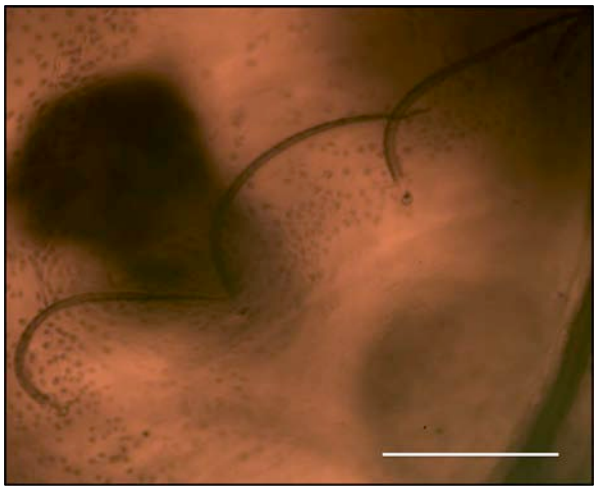

Figure 38. *Damaeus firmus*, notogastral setae. (Scale bar: 100 µm)

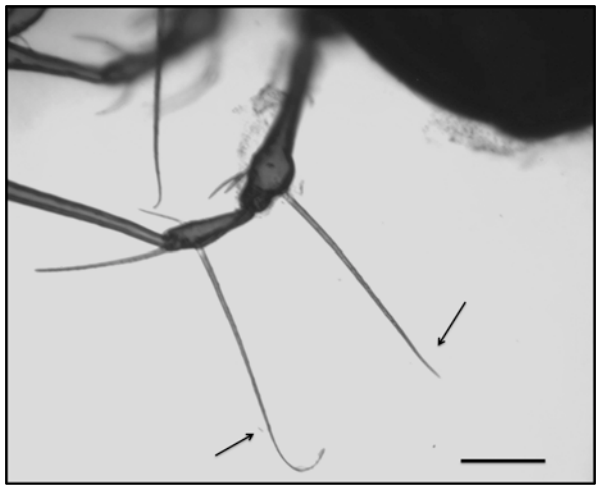

Figure 39. *Damaeus firmus*, *d* setae of femur and genu of leg IV. (Scale bar: 100 µm)

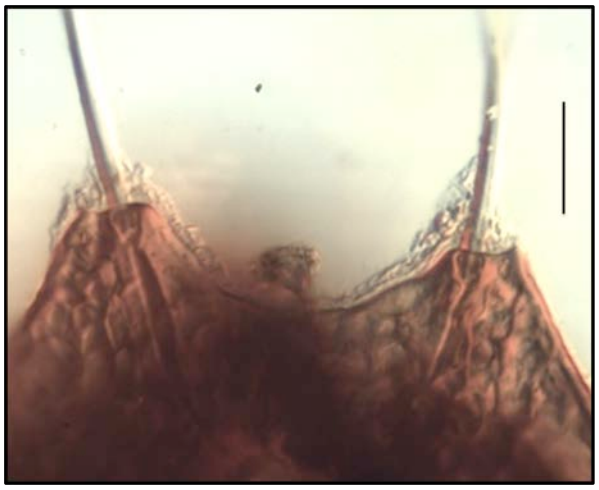

Figure 40. *Cepheus tuberculosus*, lamellar cusps. (Scale bar: 25 µm)

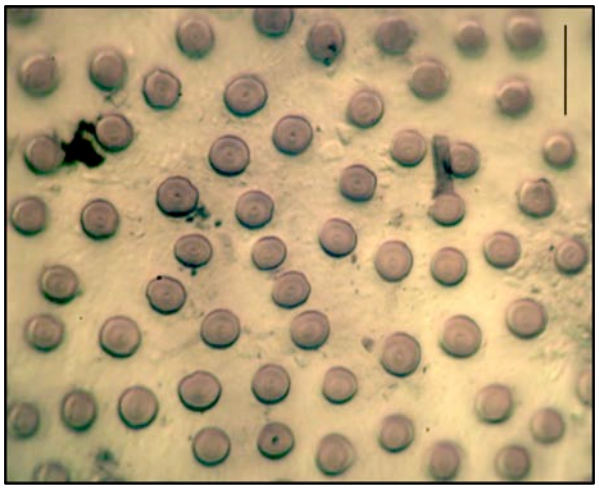

Figure 41. *Cepheus tuberculosus*, notogastral sculpture. (Scale bar: 25 µm)

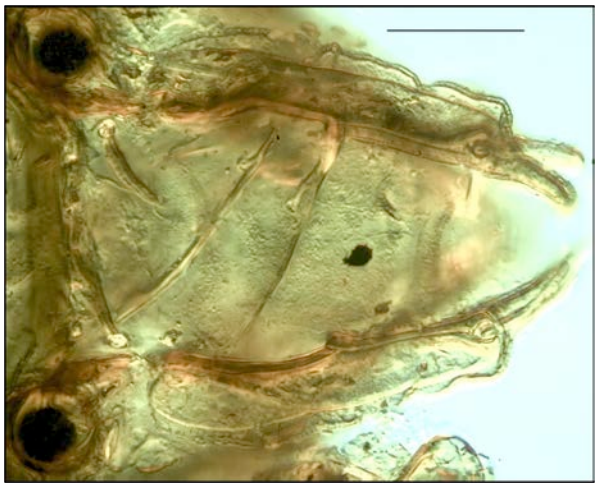

Figure 42. *Ommatocepheus bisulcatus*, prodorsum. (Scale bar: 50 µm)

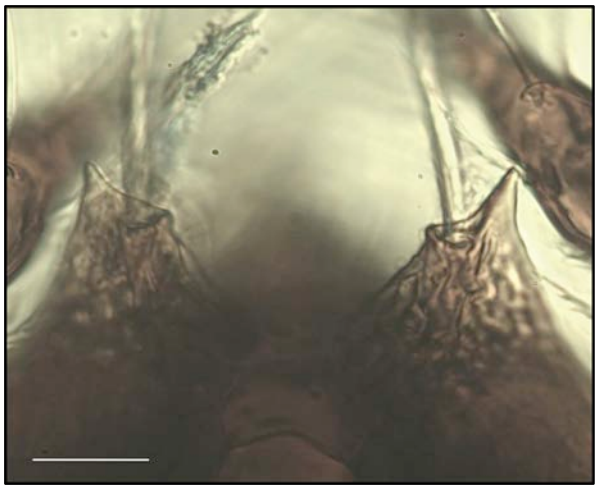

Figure 43. *Tritegeus bisulcatus*, lamellar cusps. (Scale bar 25 µm)

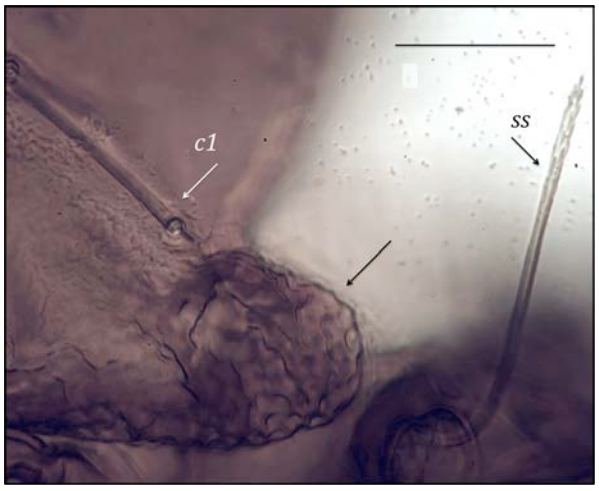

Figure 44. *Tritegeus bisulcatus*, humeral process and sensillus (*ss*), lateral view. (Scale bar: 50 µm)

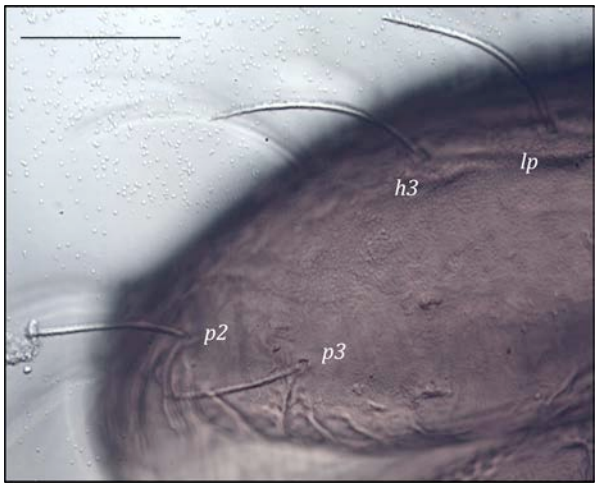

Figure 45. *Tritegeus bisulcatus*, notogastral setae, lateral view. (Scale bar: 100 µm)

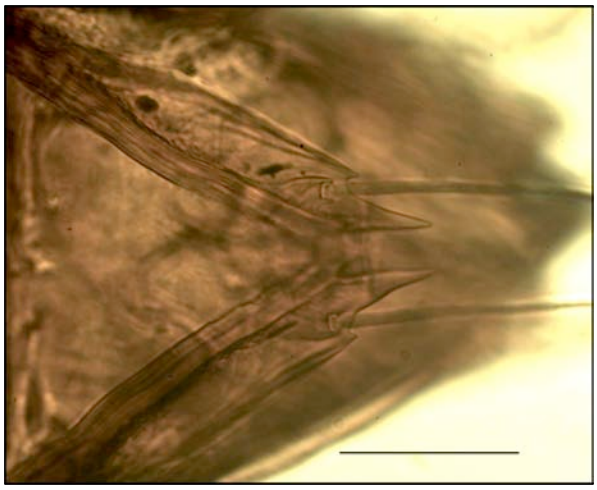

Figure 46. *Liacarus brevilamellatus*, lamellae. (Scale bar: 50 µm)

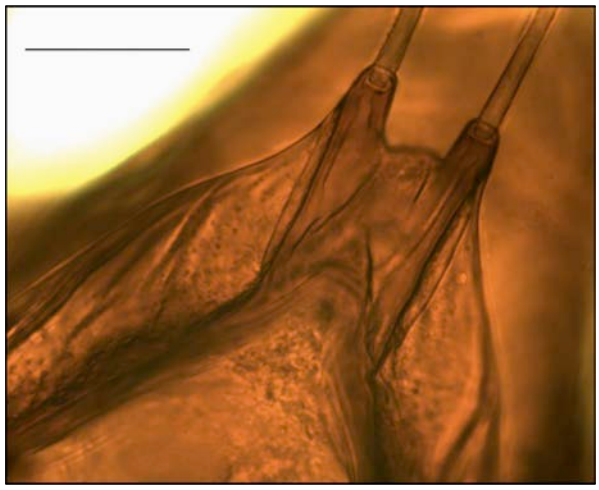

Figure 47. *Liacarus xylariae*, lamellae. (Scale bar: 50 µm)

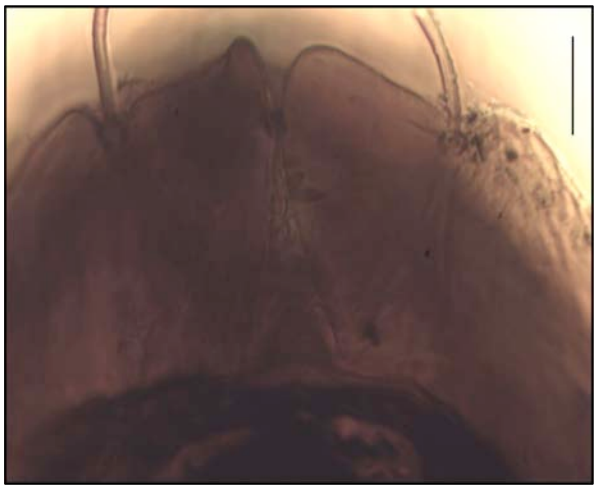

Figure 48. *Xenillus discrepans*, lamellar cusps. (Scale bar: 25 µm)

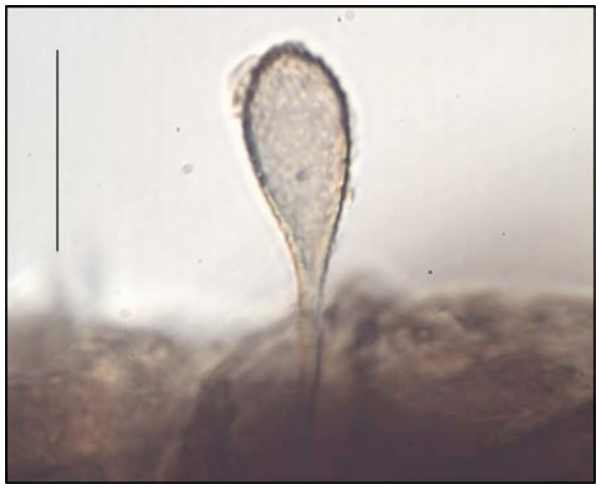

Figure 49. *Xenillus discrepans*, Sensillus. (Scale bar: 25 µm)

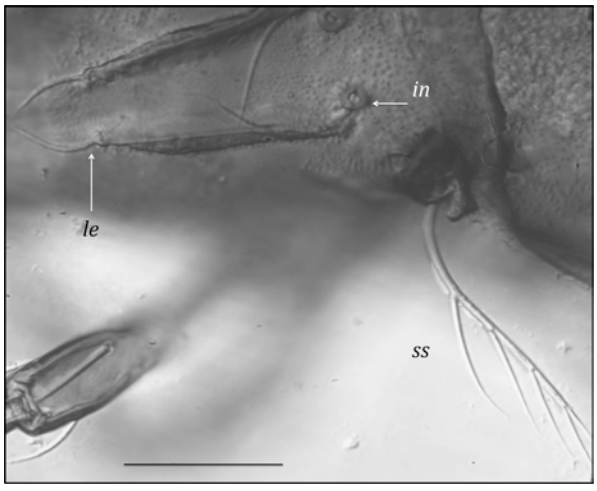

Figure 50. *Ctenobelba pseudomahnerti*, prodorsum. (Scale bar: 50 µm)

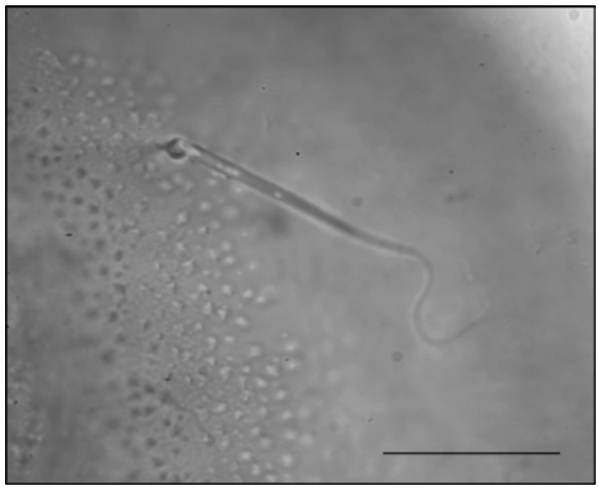

Figure 51. *Ctenobelba pseudomahnerti*, notogastral seta *lp*. (Scale bar: 25 µm)

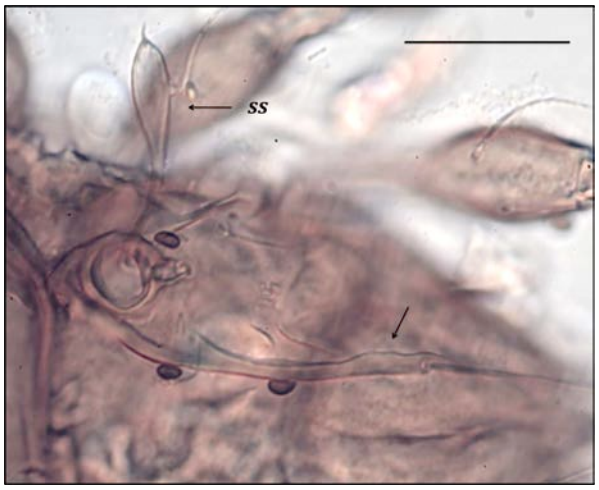

Figure 52. *Autogneta parva*, lamella and sensillus. (Scale bar: 25 µm)

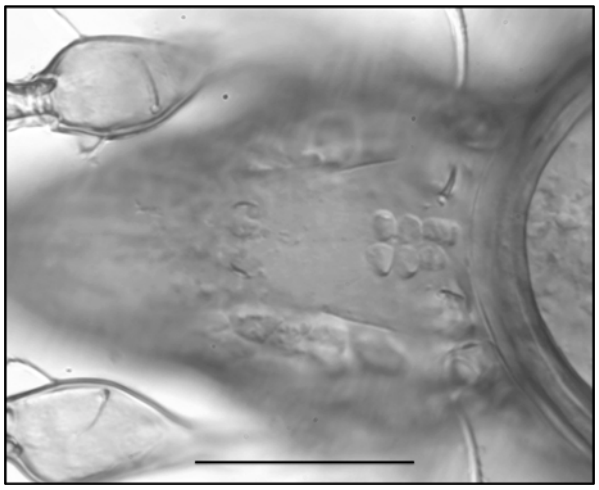

Figure 53. *Ramusella* sp., prodorsum. (Scale bar: 50 µm)

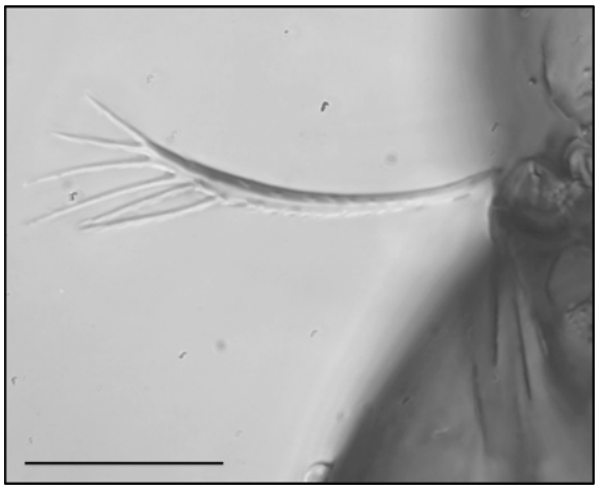

Figure 54. *Ramusella* sp., sensillus, lateral view. (Scale bar: 25 µm)

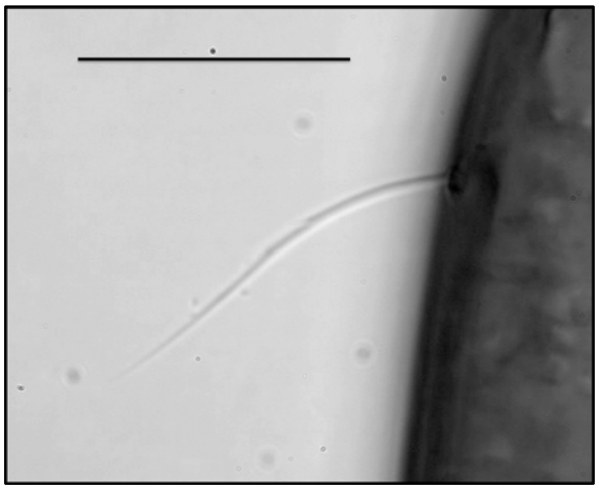

Figure 55. *Ramusella* sp., notogastral seta *la*, lateral view. (Scale bar: 25 µm)

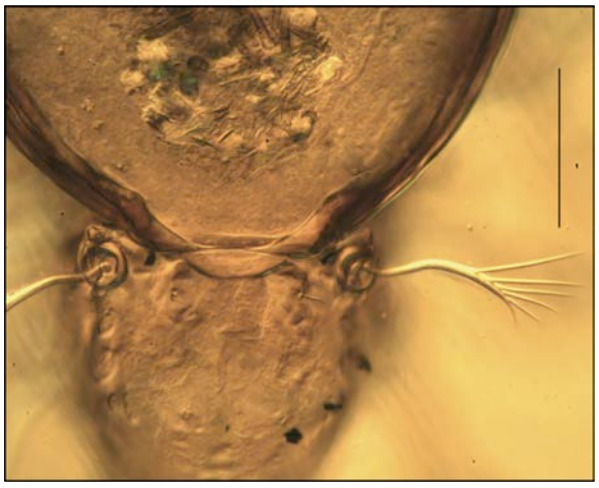

Figure 56. *Rhinoppia media* (*sensu* Mihelcic, 1956), prodorsum, notogastral crest and sensillus. (Scale bar: 50 µm)

Figure 57. *Rhinoppia media* (*sensu* Mihelcic, 1956), rostrum. (Scale bar: 25 µm)

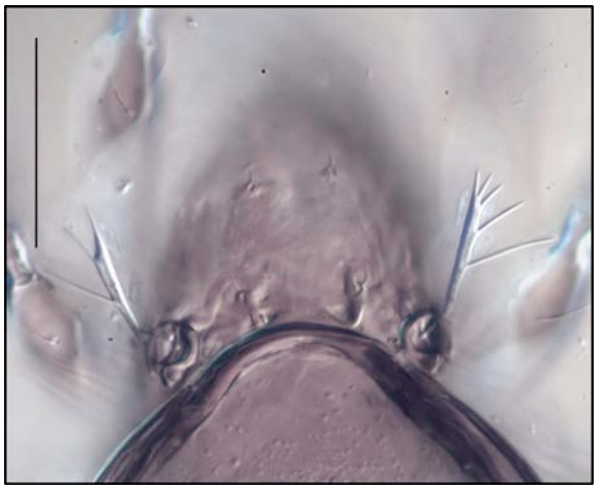

Figure 58. *Rhinoppia media* (*sensu* Subías & Rodríguez, 1988), prodorsum, notogastral crest and sensilli. (Scale bar: 50 µm)

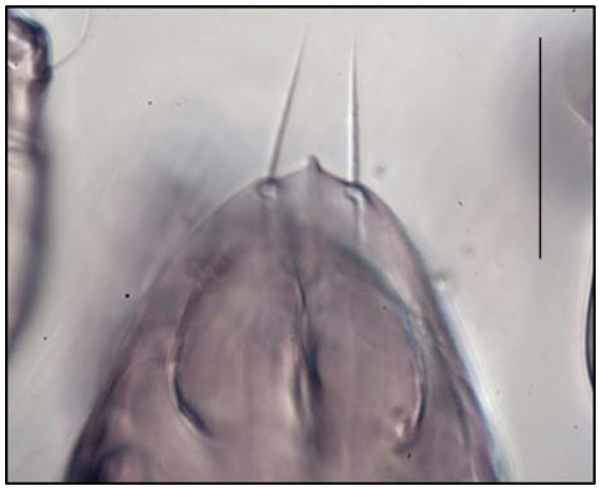

Figure 59. *Rhinoppia media* (*sensu* Subías & Rodríguez, 1988), rostrum (Scale bar: 25 µm)

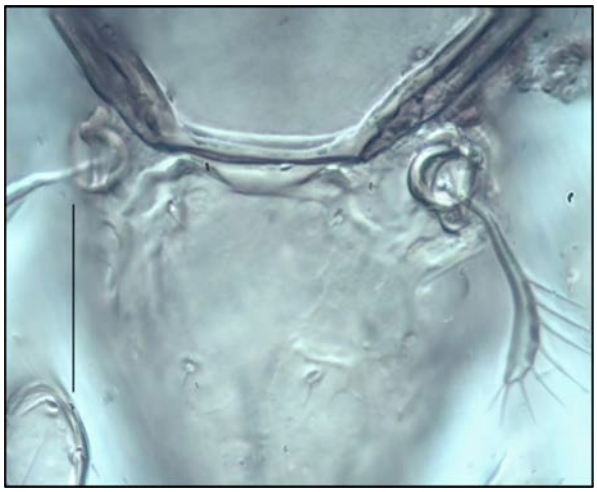

Figure 60. *Rhinoppia cf. minidentata*, prodorsum, notogastral crest and sensillus. (Scale bar: 25 µm)

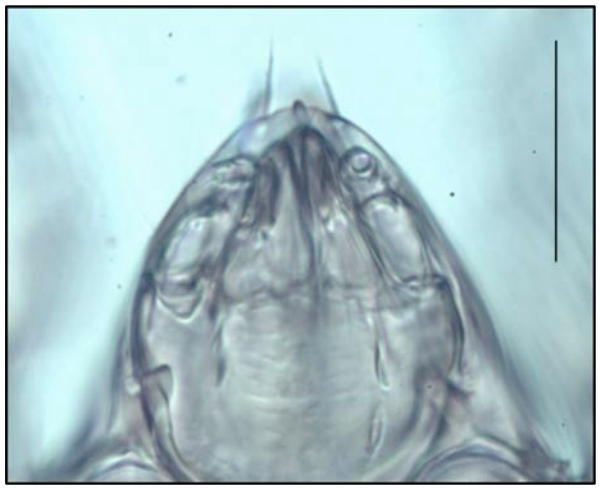

Figure 61. *Rhinoppia cf. minidentata*, rostrum (Scale bar: 25 µm)

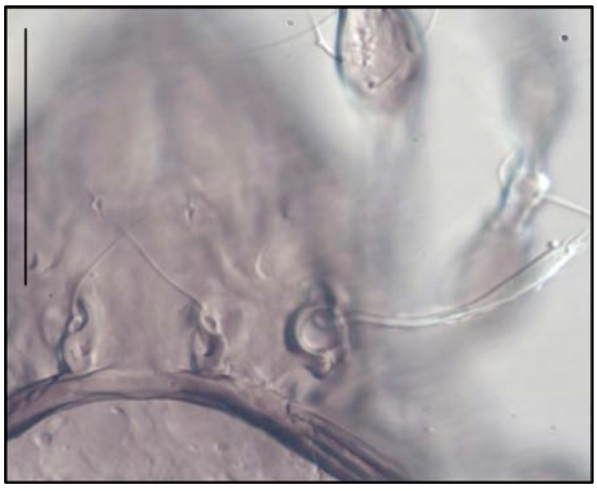

Figure 62. *Rhinoppia ordunensis*, prodorsum, notogastral crest and sensillus. (Scale bar: 50 µm)

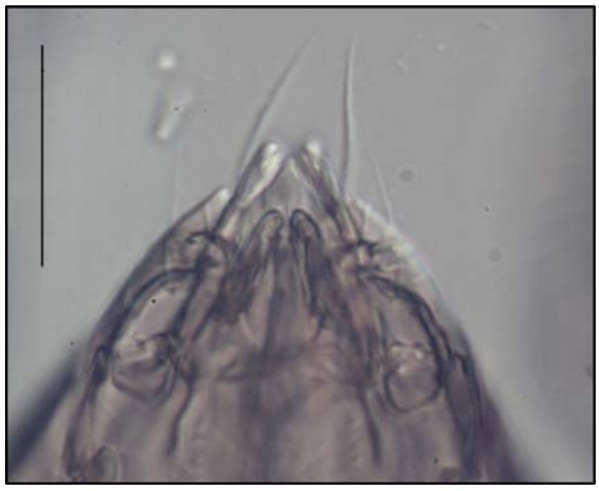

Figure 63. *Rhinoppia ordunensis*, rostrum (Scale bar: 25 µm)

Figure 64. *Rhinoppia cf. tridentata*, morphotype A, prodorsum, notogastral crest and sensilli. (Scale bar: 50 µm)

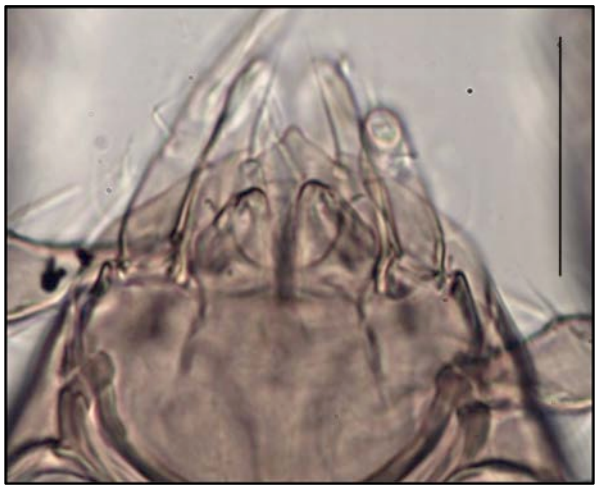

Figure 65. *Rhinoppia cf. tridentata*,morphotype A, rostrum. (Scale bar: 25 µm)

Figure 66. *Rhinoppia cf. tridentata*, morphotype B, prodorsum, notogastral crest and sensilli. (Scale bar: 50 µm)

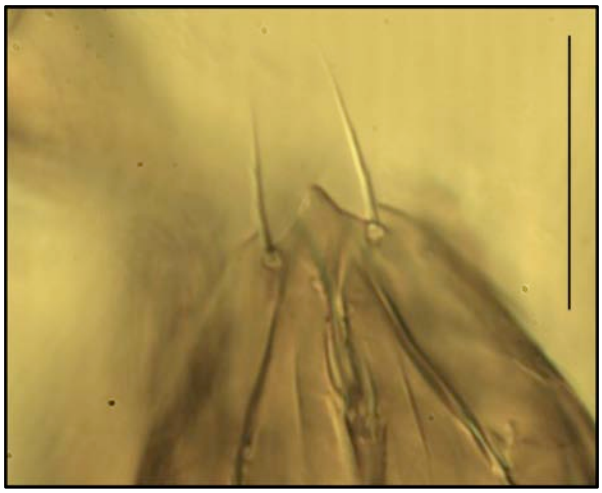

Figure 67. *Rhinoppia cf. tridentata*,morphotype B, rostrum. (Scale bar: 25 µm)

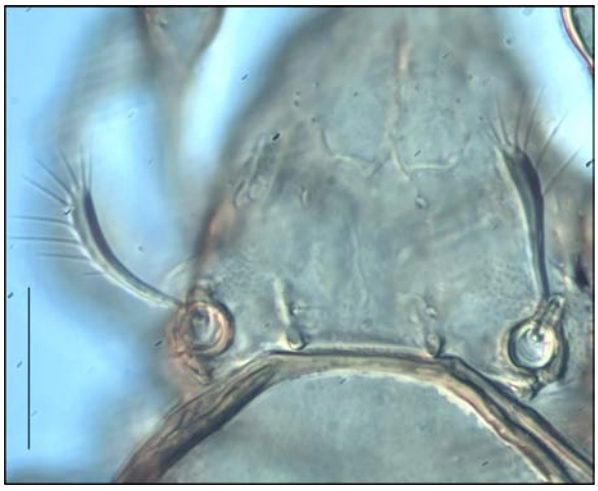

Figure 68. *Rhinoppia cf. tridentata*, morphotype C, prodorsum, notogastral crest and sensilli. (Scale bar: 25 µm)

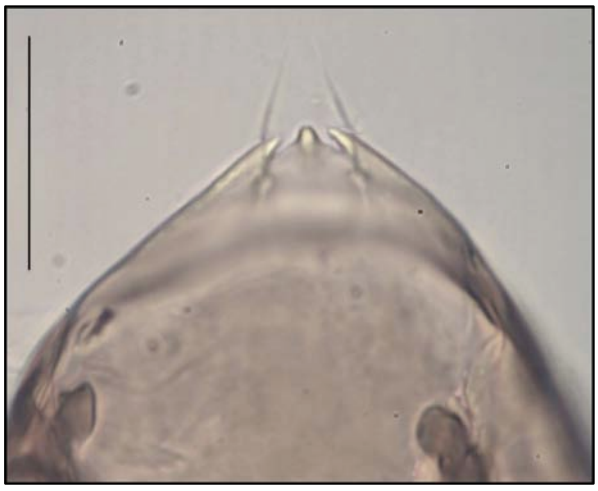

Figure 69. *Rhinoppia cf. tridentata*, morphotype C, rostrum. (Scale bar: 25 µm)

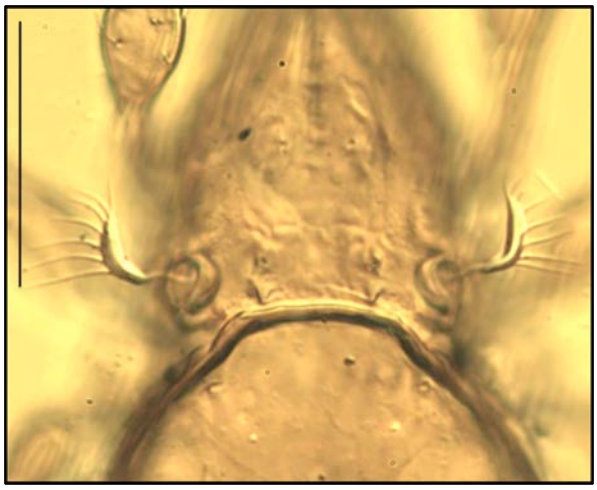

Figure 70. *Rhinoppia cf. vera*, morphotype A, prodorsum, notogastral crest and sensilli. (Scale bar: 50 µm)

Figure 71. *Rhinoppia cf. vera*, morphotype A, epimeral region. (Scale bar: 25 µm)

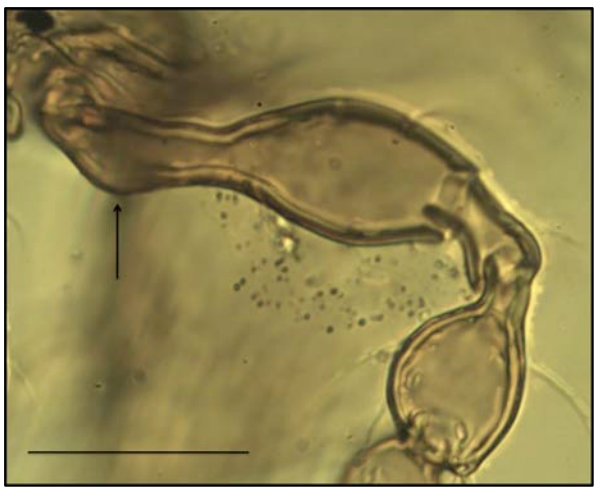

Figure 72. *Rhinoppia cf. vera*, morphotype A, leg I, lateral view; arrow: longitudinal crest in base of femur. (Scale bar: 25 µm)

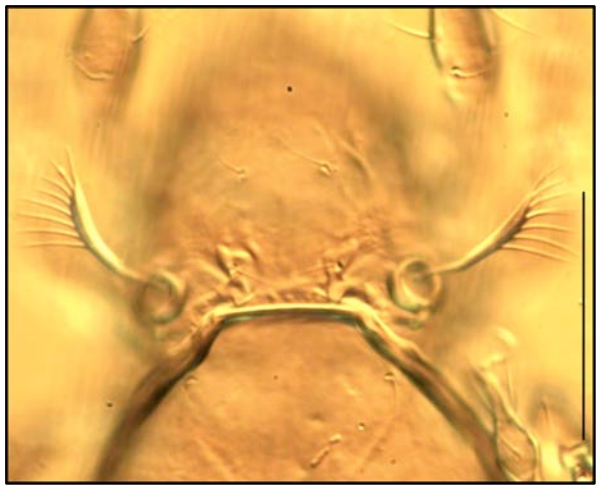

Figure 73. *Rhinoppia cf. vera*, morphotype B, prodorsum, notogastral crest and sensilli. (Scale bar: 50 µm)

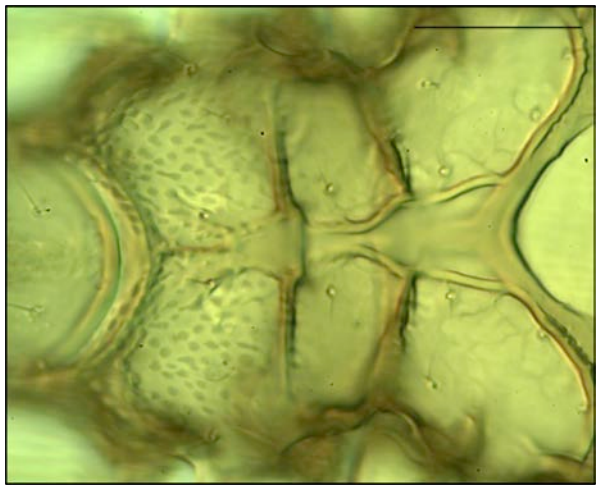

Figure 74. *Rhinoppia cf. vera*, morphotype B, epimeral region. (Scale bar: 25 µm)

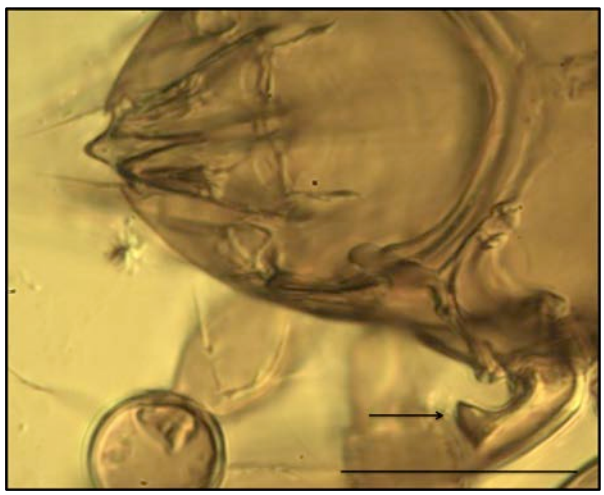

Figure 75. *Rhinoppia cf. vera*, morphotype B, rostrum and leg I; arrow: spur in base of femur. (Scale bar: 25 µm)

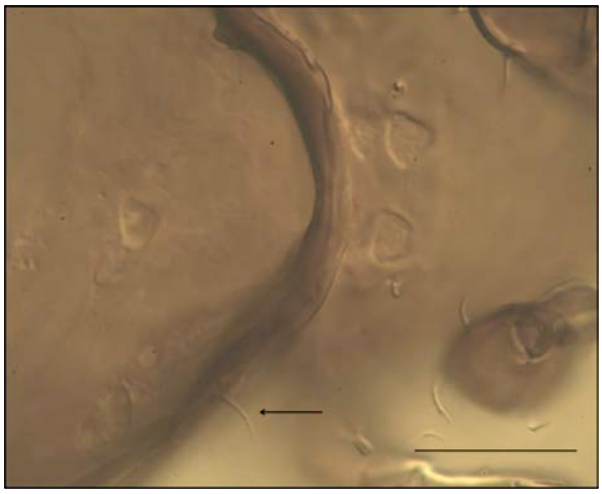

Figure 76. *Rhinoppia* sp., prodorsum and notogastral crest; arrow: seta *c2*. (Scale bar: 25 µm)

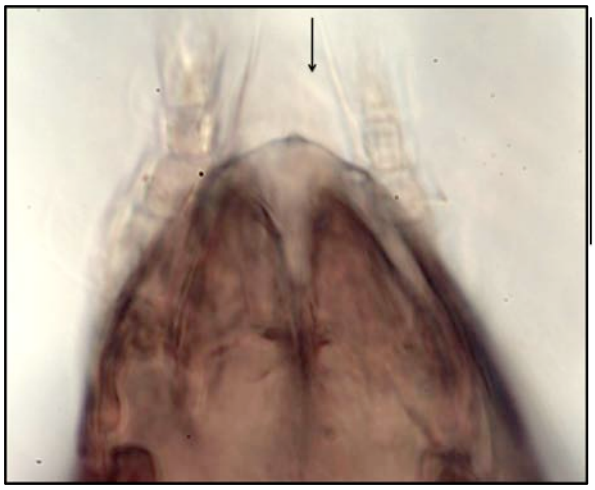

Figure 77. *Rhinoppia* sp., rostrum; arrow: rostral teeth. (Scale bar: 25 µm)

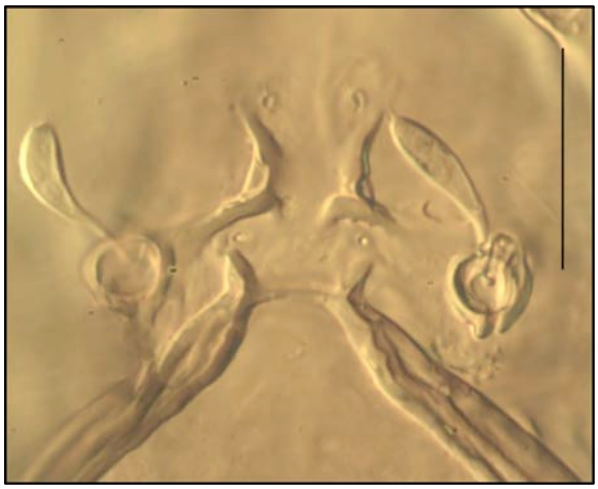

Figure 78. *Berniniella conjuncta*, prodorsum, notogastral crest and sensilli. (Scale bar: 25 µm)

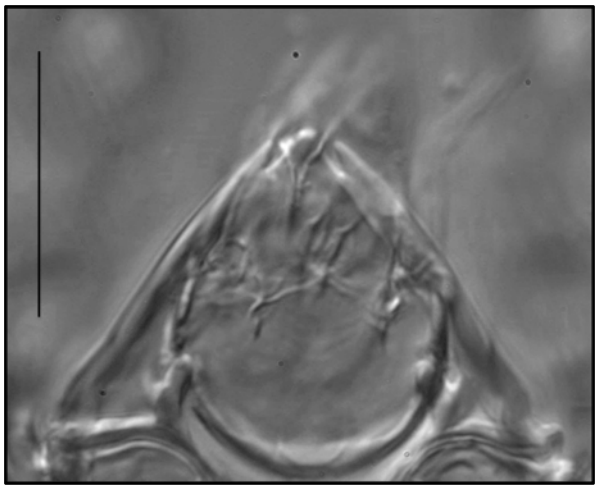

Figure 79. *Berniniella conjuncta*, rostrum. (Scale bar: 25 µm)

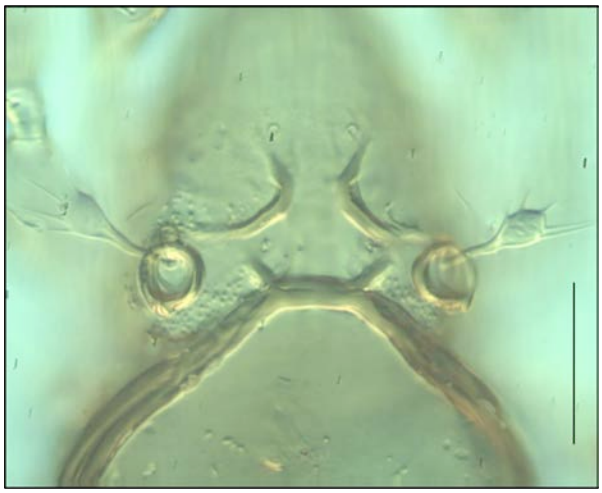

Figure 80. *Berniniella serratirostris hauseri*, prodorsum, notogastral crest and sensilli. (Scale bar: 25 µm)

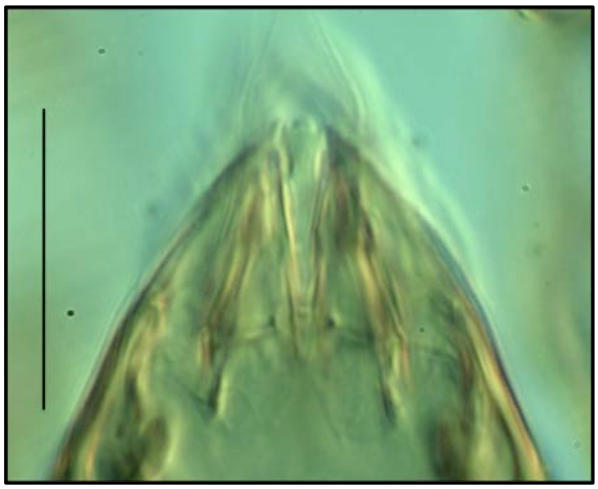

Figure 81. *Berniniella serratirostris hauseri*, rostrum. (Scale bar: 25 µm)

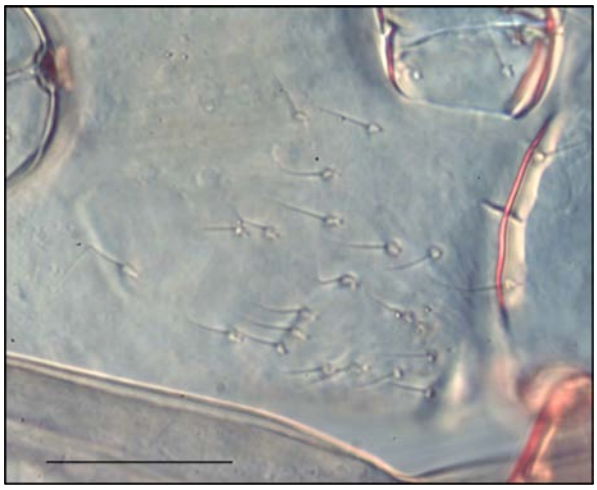

Figure 82. *Neotrichoppia pseudoconfinis*, morphotype A, aggenital setae. (Scale bar: 25 µm)

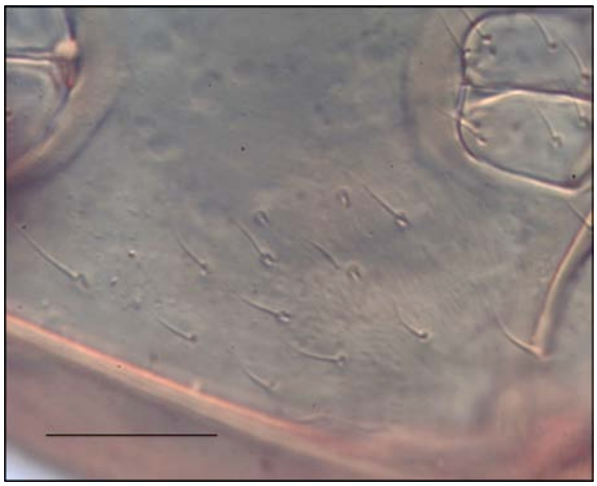

Figure 83. *Neotrichoppia pseudoconfinis*, morphotype B, aggenital setae. (Scale bar: 25 µm)

Figure 84. *Neotrichoppia pseudoconfinis*, morphotype C, aggenital setae. (Scale bar: 25 µm)

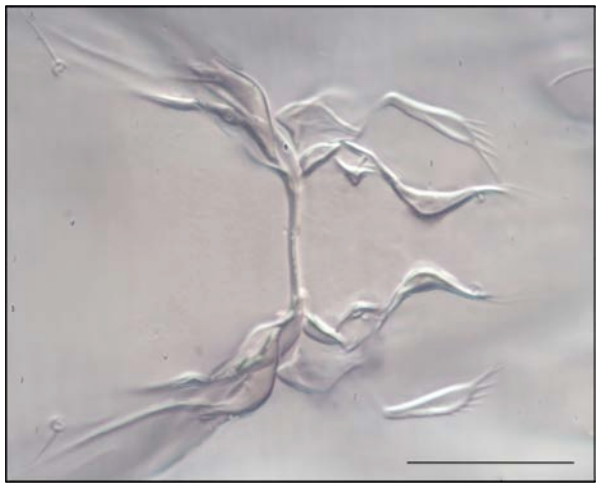

Figure 85. *Oppiella* sp., prodorsum, notogastral crest and sensilli. (Scale bar: 25 µm)

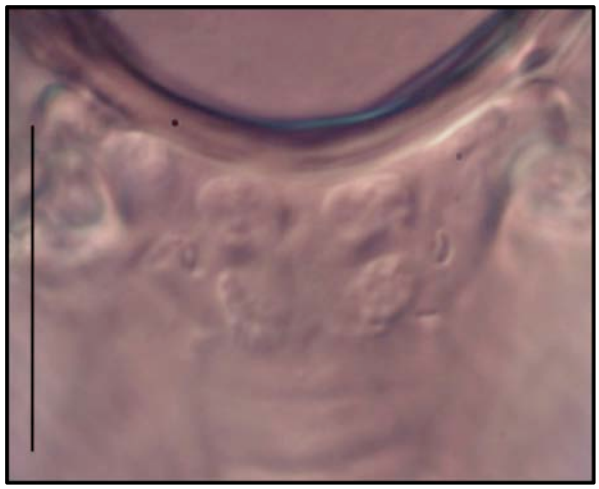

Figure 86. *Subiasella quadrimaculata*, prodorsum and notogastral crest. (Scale bar: 25 µm)

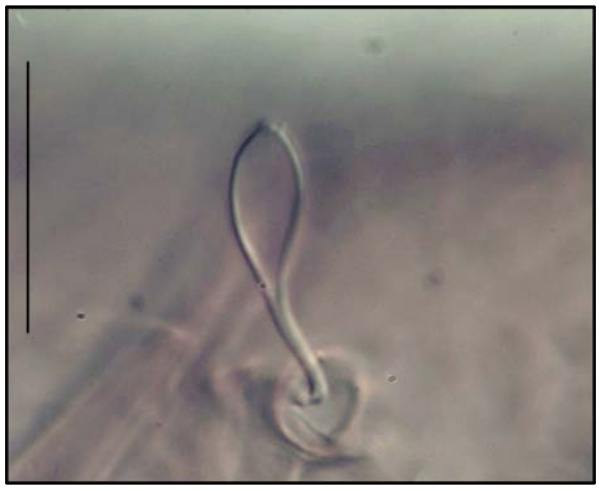

Figure 87. *Subiasella quadrimaculata*, sensillus, lateral view. (Scale bar: 25 µm)

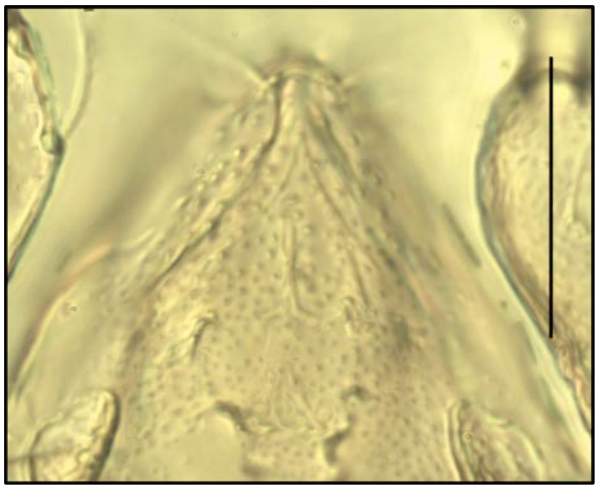

Figure 88. *Suctobelba granulata*, prodorsal surface. (Scale bar: 25 µm)

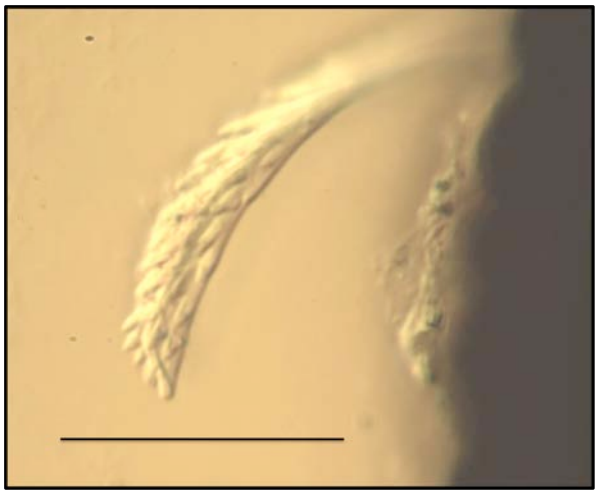

Figure 89. *Carabodes arduinii*, seta *p1* (Scale bar: 25 µm)

Figure 90. *Carabodes areolatus*, prodorsum. (Scale bar: 50 µm)

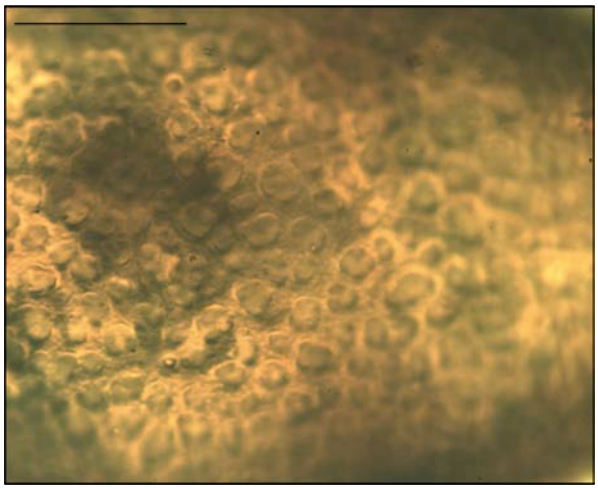

Figure 91. *Carabodes areolatus*, prodorsum. (Scale bar: 50 µm)

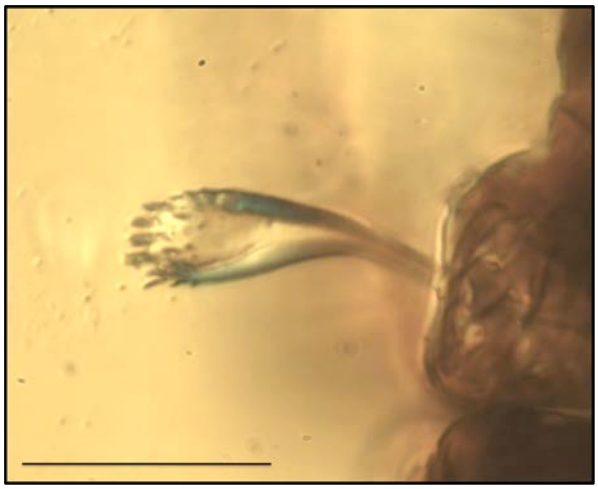

Figure 92. *Carabodes labyrinthicus*, sensillus. (Scale bar: 25 µm)

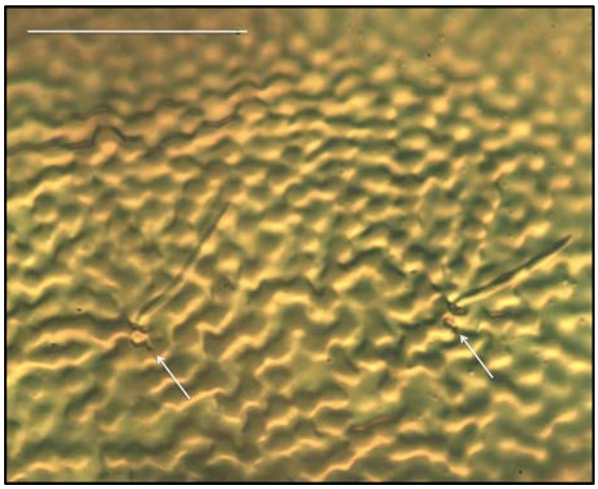

Figure 93. *Carabodes labyrinthicus*, notogastral sculpture and setae *lm*. (Scale bar: 50 µm)

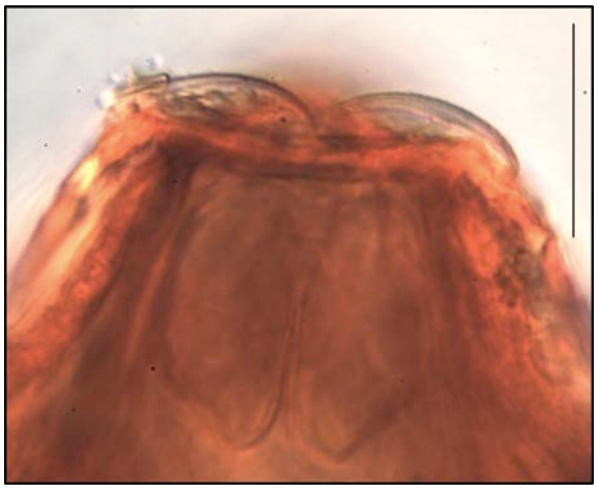

Figure 94. *Carabodes similis translamellatus*, translamella. (Scale bar: 25 µm)

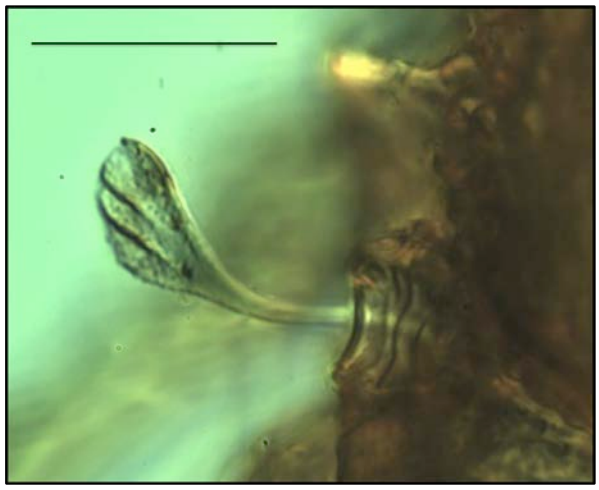

Figure 95. *Carabodes similis translamellatus*, sensillus. (Scale bar: 25 µm)

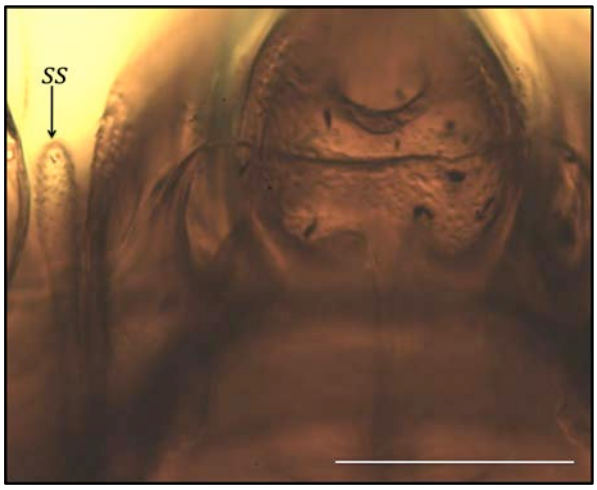

Figure 96. *Eupelops hygrophilus*, sensillus (*ss*), translamella and notogastral anterior margin. (Scale bar: 50 µm)

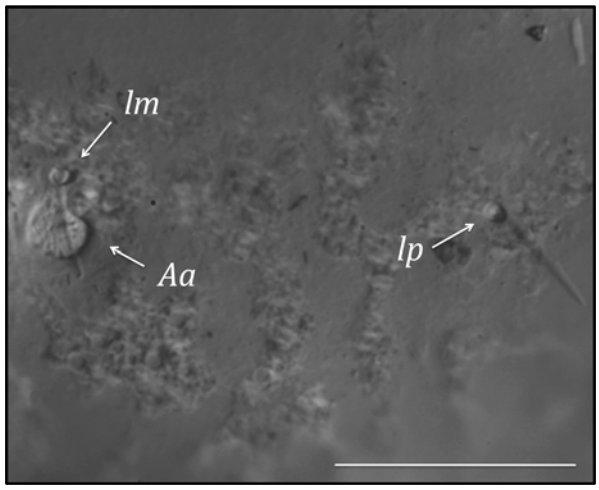

Figure 97. *Eupelops hygrophilus*, adalar porose area (*Aa*) and notogastral setae. (Scale bar: 50 µm)

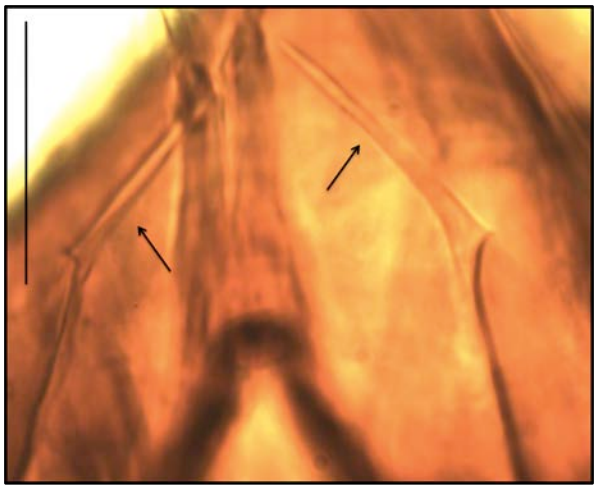

Figure 98. *Parachipteria punctata*, tutoria. (Scale bar: 50 µm)

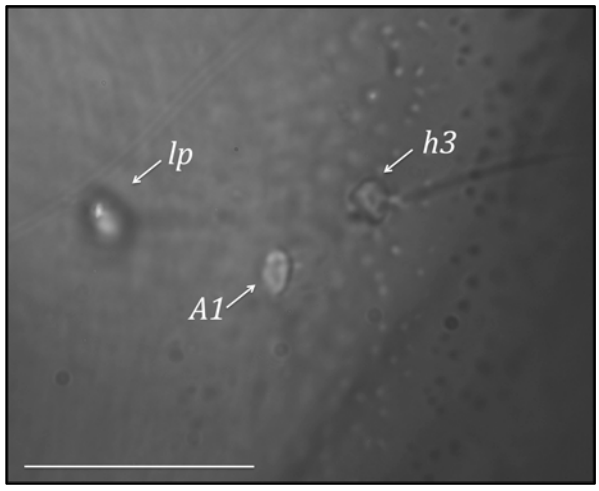

Figure 99. *Parachipteria punctata*, porose area and notogastral setae. (Scale bar: 25 µm)

Figure 100. *Parachipteria* sp., prodorsum. (Scale bar: 100 µm)

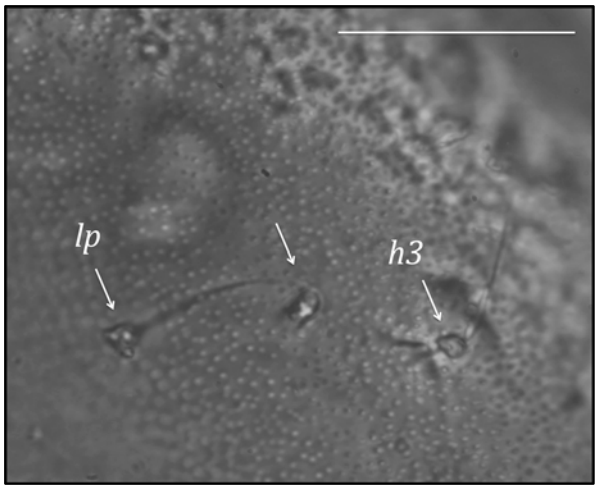

Figure 101. *Parachipteria* sp., vestigial pore and notogastral setae. (Scale bar: 50 µm)

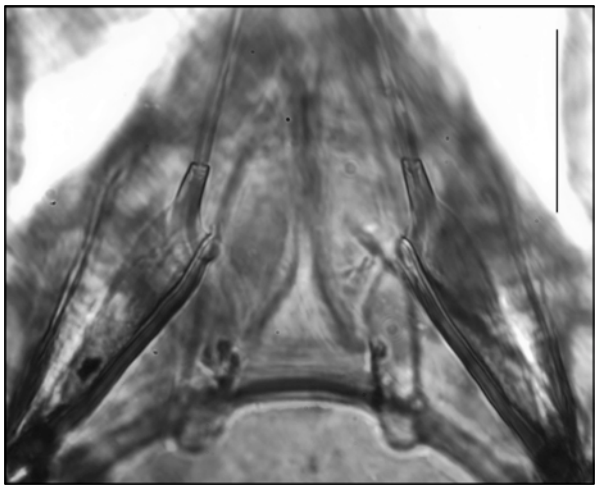

Figure 102. *Ceratozetes gemmula*, lamellae and interlamellar setae. (Scale bar: 50 µm)

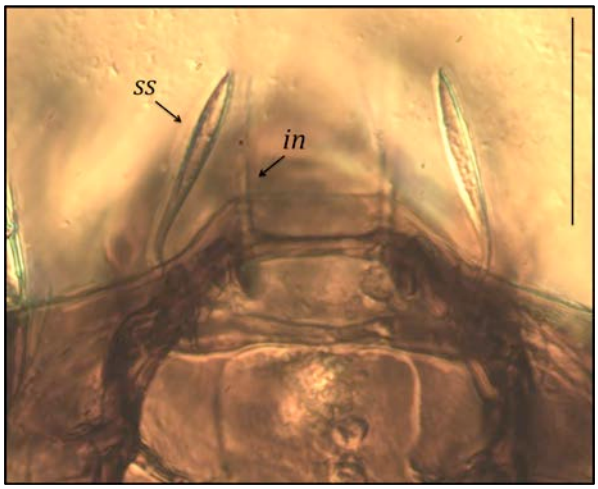

Figure 103. *Punctoribates punctum*, anterior median edge of notogaster, sensilli (*ss*) and interlamellar setae (*in*). (Scale bar: 50 µm)

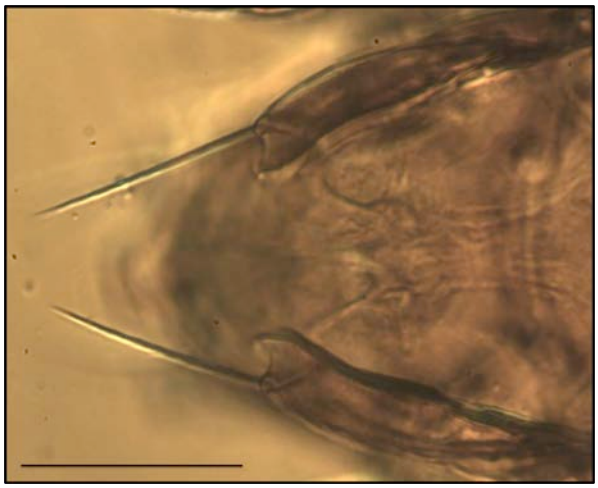

Figure 104. *Oribatula tibialis* type A, lamellae and interlamellar setae. (Scale bar: 50 µm)

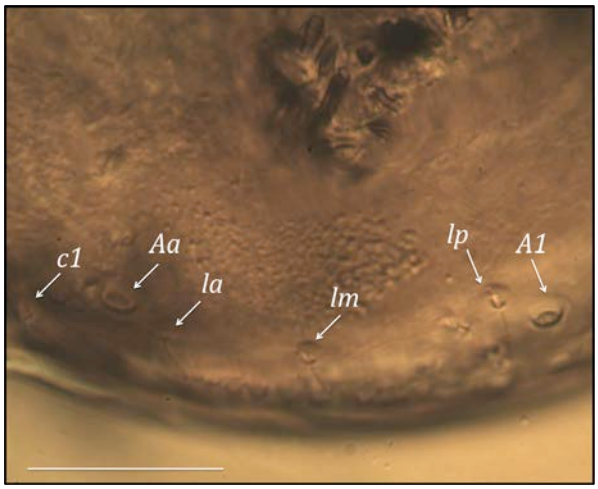

Figure 105. *Oribatula tibialis* type A, notogastral setae and porose areas. (Scale bar: 50 µm)

Figure 106. *Oribatula tibialis* type B, lamellae and interlamellar setae. (Scale bar: 50 µm)

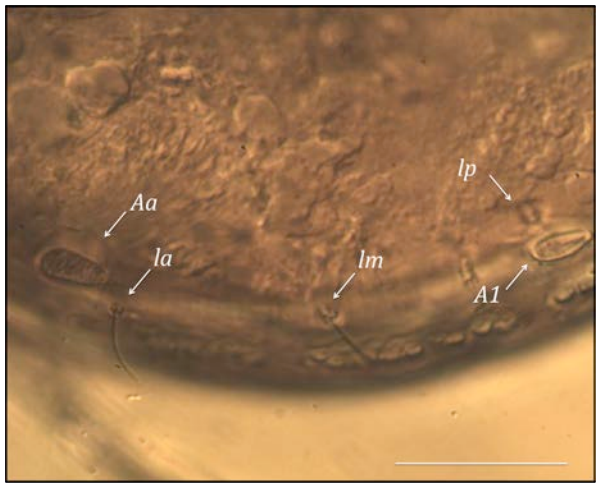

Figure 107. *Oribatula tibialis* type B, notogastral setae and porose areas. (Scale bar: 50 µm)

Figure 108. *Oribatula tibialis* type C, lamellae and interlamellar setae. (Scale bar: 50 µm)

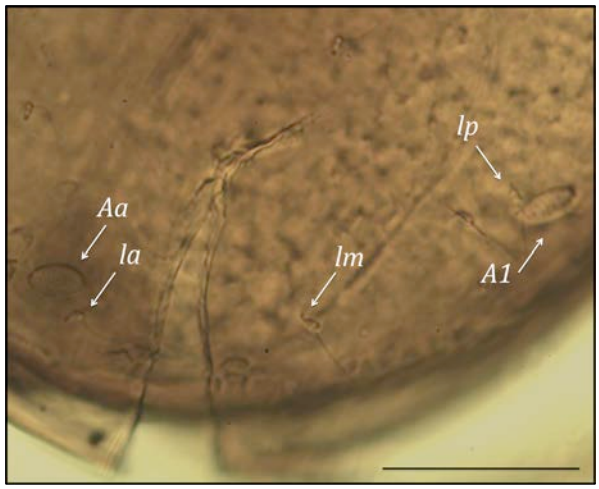

Figure 109. *Oribatula tibialis* type C, notogastral setae and porose areas. (Scale bar: 50 µm)

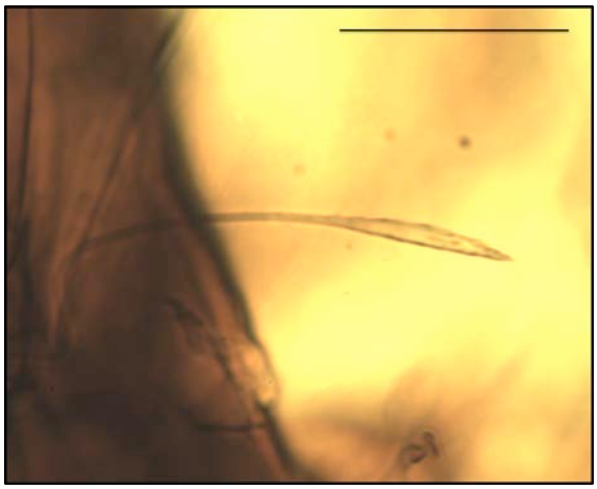

Figure 110. *Galumna lanceata*, sensillus. (Scale bar: 50 µm)

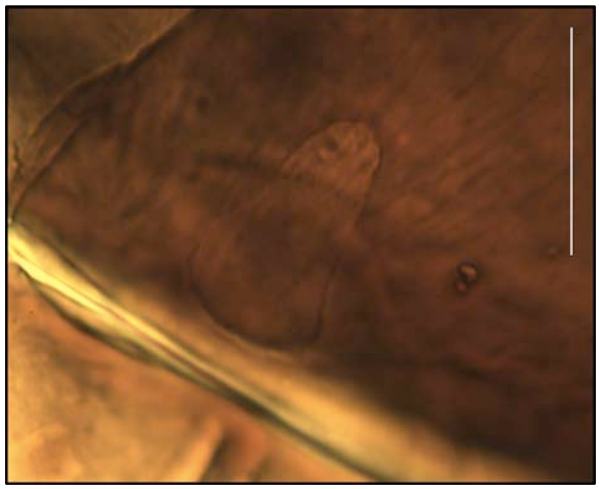

Figure 111. *Galumna lanceata*, adalar porose area. (Scale bar: 50 µm)

3.1.3. Faunistic revision of Oribatida

For each species, distribution data in the four studied Spanish provinces and two ecosystems is presented (Table 3). Compared to Subías *et al*. (2013), the known distribution area in the Iberian Peninsula of 99 species have been extended: 64 species for Araba, 0 for Bizkaia, 46 species for Gipuzkoa and 6 species for Navarra.

Table 3. Species distribution in provinces (A: Araba, B: BIzkaia, *G:* Gipuzkoa, N: Navarra) and forests (Fs: *Fagus sylvatica*, Qr: *Quercus robur*); •: presence, 1st: first time cited in this province.

SPECIES	A	B	G	N	Fs	Qr
Achipteria (A.) coleoptrata (Linnaeus, 1758)	•	•	1st		•	•
Achipteria (A.) nitens (Nicolet, 1855)	•					•
Acrogalumna longipluma s. str. (Berlese, 1904)	1st	•	1st		•	•
Acrotritia ardua ardua (Koch, 1841)	•					•
Acrotritia duplicata (Grandjean, 1953)	1st				•	•
Adoristes (A.) ovatus poppei (Oudemans, 1906)	1st					•
Amerus (A.) polonicus Kulczynski, 1902	1st	•	1st	•	•	•
Amiracarus similis (Subías & Iturrondobeitia, 1978)			•	•	•	•
Arthrodamaeus reticulatus (Berlese, 1910)	1st		•	•	•	•
Atropacarus wandae (Niedbała, 1981)	•	•			•	•
***Autogneta (A.) parva* Forsslund, 1947**	1st				•	
Banksinoma lanceolata (Michael, 1885)	1st	•			•	•
***Belba (B.) patelloides* (Michael, 1888)**	1st				•	•
***Berniniella (B.) conjuncta* (Strenzke, 1951)**	1st			•	•	•
Berniniella (B.) inornata (Mihelčič, 1957)	•	•		•	•	•
***Berniniella (B.) serratirostris hauseri* (Mahunka, 1974)**	1st			•	•	•
Berniniella (B.) serratirostris s. str. (Golosova, 1970)	•	•		•	•	•
Berniniella (B.) setilonga Iturrondobeitia & Saloña, 1988	1st				•	
***Camisia (C.) segnis* (Hermann, 1804**)	1st		1st			•
Camisia (C.) spinifer (Koch, 1835)	•					•
***Carabodes (C.) arduinii* Valle, 1955**	1st				•	•
***Carabodes (C.) areolatus* Berlese, 1916**				1st	•	
Carabodes (C.) coriaceus Koch, 1835	•	•			•	•
***Carabodes (C.) labyrinthicus* (Michael, 1879)**	1st					•
Carabodes (C.) palmifer Berlese, 1904			1st			•
Carabodes (C.) perezinigoi Salinas, 1971	•		1st	1st	•	•
***Carabodes (K.) similis translamellatus* Pérez-Íñigo jr., 1990**	1st				•	
***Cepheus tuberculosus* Strenzke, 1951**	1st					•
Cerachipteria digita jugata Mihelčič, 1956	•	•	•	•	•	•
Ceratoppia bipilis (Hermann, 1804)	1st		•		•	•
Ceratozetes (C.) armatus Mihelčič, 1956	•	•			•	•
***Ceratozetes (C.) gemmula* Pérez-Íñigo jr., 1990**	1st				•	
Ceratozetes (C.) mediocris Berlese, 1908		•				•
Ceratozetes (C.) peritus Grandjean, 1951	•	•	•	•	•	•
Ceratozetes (C.) simulator Pérez-Íñigo, 1970		•	•		•	•
Chamobates (C.) cuspidatus (Michael, 1884)	1st				•	
Chamobates (C.) pusillus (Berlese, 1895)	•	•	•		•	•
Conoppia palmicincta (Michael, 1880)			•	•	•	•
Ctenobelba (C.) perezinigoi Moraza, 1985			1st			•
***Ctenobelba (C.) pseudomahnerti* Subías & Shtanchaeva, 2013**			1st	•	•	

SPECIES	A	B	G	N	Fs	Qr
Cultroribula bicultrata (Berlese, 1905)	•	•			•	•
Cymbaeremaeus cymba (Nicolet, 1855)	1st				•	
Damaeolus ornatissimus Csiszár, 1962	1st				•	
Damaeus (A.) onustus Koch, 1841	1st	•			•	•
Damaeus (D.) auritus Koch, 1835		•	1st		•	•
***Damaeus (D.) firmus* Kunst, 1957**	1st				•	•
Damaeus (D.) maximus Mihelčič, 1957	1st	•			•	•
Damaeus (E.) pyrenaicus (Pérez-Íñigo jr., 1991)	1st				•	
Damaeus (P.) clavipes (Hermann, 1804)	•	•	1st	•	•	•
Dameobelba minutissima (Sellnick, 1929)			•		•	
Dissorhina ornata (Oudemans, 1900)	•	•	•	•	•	•
Dometorina (D.) plantivaga s. str. (Berlese, 1895)	1st				•	
Eremaeus hepaticus cordiformis Grandjean, 1934	•		•	•	•	•
Eueremaeus oblongus s. str. (Koch, 1835)	•	•				•
Eupelops acromios s. str. (Hermann, 1804)	1st	•		•	•	•
***Eupelops hygrophilus* (Knülle, 1954)**			1st		•	
Eupelops major s. str. (Hull, 1914)	•				•	•
Eupelops plicatus (Koch, 1835)	•					•
Euphthiracarus (E.) monodactylus (Willmann, 1919)		•	1st	•	•	•
Fosseremus laciniatus (Berlese, 1905)	•				•	
***Galumna (G.) lanceata* (Oudemans, 1900)**	1st				•	•
***Gehypochthonius rhadamanthus* Jacot, 1936**			1st	•	•	•
Gustavia maior (Berlese, 1904)		•		•	•	•
Gustavia microcephala (Nicolet, 1855)	1st				•	•
Hemileius (H.) initialis (Berlese, 1908)	•				•	•
***Heminothrus (H.) targionii* (Berlese, 1885)**	1st					•
Heminothrus (P.) peltifer s. str. (Koch, 1839)	•	•	•			•
Hermannia (H.) gibba (Koch, 1839)		•		•	•	
Hermanniella dolosa Grandjean, 1931	•	•			•	•
Hermanniella granulata (Nicolet, 1855)	•	•	1st	•	•	•
***Hermanniella septentrionalis* Berlese, 1910**	1st			•	•	•
Hispanozetes striatus Subías & Shtanchaeva, 2012	•				•	
Humerobates (H.) rostrolam. guadarramicus Pérez-Íñigo, 1972	•					•
Hypochthoniella minutissima (Berlese, 1904)	1st					•
***Liacarus (L.) brevilamellatus* Mihelčič, 1957**	1st					•
Liacarus (L.) coracinus s. str. (Koch, 1841)	•	•	•	•	•	•
Liacarus (L.) subterraneus (Koch, 1844)	•	•	1st	•	•	•
***Liacarus (L.) xylariae* (Schrank, 1803)**	1st				•	
Liebstadia (L.) longior (Berlese, 1908)	•		1st		•	•
Liochthonius (L.) brevis (Michael, 1888)	•	•	•		•	•
***Liochthonius (L.) horridus* (Sellnick, 1928)**	1st				•	
Liochthonius (L.) hystricinus (Forsslund, 1942)	•	•	1st	•	•	•
Liochthonius (L.) leptaleus Moritz, 1976	1st				•	•
Liochthonius (L.) muscorum Forsslund, 1964	•	•	1st	•	•	•
Liochthonius (L.) sellnicki (Thor, 1930)		•	1st			•
Liochthonius (L.) simplex (Forsslund, 1942)				•	•	
Liochthonius (L.) strenzkei Forsslund, 1963	•			•	•	
Machuella draconis Hammer, 1961	•	•	•	•	•	•
Malaconothrus (M.) monodactylus (Michael, 1888)		•	1st	•	•	•
Metabelba (M.) papillipes (Nicolet, 1855)	•		•		•	•
Micreremus brevipes (Michael, 1888)	•			•	•	•
Microppia minus s. str. (Paoli, 1908)	•	•	•	•	•	•

SPECIES	A	B	G	N	Fs	Qr
Microtritia minima (Berlese, 1904)			•		•	
Minunthozetes (I.) reticulatus Pérez-Íñigo, 1969	•				•	•
Minunthozetes (M.) semirufus (Koch, 1841)	•	•			•	•
Mongaillardia eveana Grandjean, 1961	•		1st	•	•	•
Moritzoppia (M.) unicarinata s. str. (Paoli, 1908)			•	•	•	•
Multioppia (M.) neglecta Pérez-Íñigo, 1969	1st		1st	•	•	•
Nanhermannia (N.) nana (Nicolet, 1855)	•	•	1st		•	•
***Nanhermannia (N.) sellnicki* Forsslund, 1958**			1st		•	
Neoliodes theleproctus (Hermann, 1804)	•					•
Neotrichoppia (A.) berninii Subías & Rodríguez, 1986	•	•			•	•
Neotrichoppia (C.) confinis tenuiseta Subías & Rodríguez, 1986			•	•	•	•
Neotrichoppia (C.) variabilis Iturrondobeitia & Subías, 1981	•	•	•	•	•	•
***Neotrichoppia (N.) pseudoconfinis* Subías & Iturr., 1980 type A**		•				•
***Neotrichoppia (N.) pseudoconfinis* Subías & Iturr., 1980 type B**	•				•	
***Neotrichoppia (N.) pseudoconfinis* Subías & Iturr., 1980 type C**	•				•	•
***Nothrus cf. borussicus* Sellnick, 1928**	1st					•
Nothrus palustris s. str. Koch, 1839	1st	•	1st			•
Nothrus silvestris s. str. Nicolet, 1855	1st	•	•		•	•
Odontocepheus (O.) elongatus (Michael, 1879)	•	•	1st	•	•	•
Odontocepheus (O.) espatulatus Saloña & Iturrondobeitia, 1989			•	•	•	•
***Ommatocepheus ocellatus* (Michael, 1882)**				1st	•	
Ophidiotrichus tectus (Michael, 1884)	•	•	•		•	•
Oppia denticulata (G. & R. Canestrini, 1882)		•	1st		•	
Oppiella (O.) nova s. str. (Oudemans, 1902)	•	•	•	•	•	•
***Oppiella (Perspicuoppia)* sp.**	•				•	
Oribatella (O.) quadricornuta (Michael, 1880)	•					•
***Oribatula (O.) tibialis* (Nic., 1855) f. *dentata* Pérez-Iñigo 1974**	•					•
***Oribatula (O.) tibialis* (Nic., 1855) *s.* Senickzak & Senickzak 2012**	•		•	•	•	•
***Oribatula (O.) tibialis* (Nic., 1855) *s.* Wunderle *et al*. 1990**			•		•	•
Oribatula (Z.) exilis s. str. (Nicolet, 1855)				•	•	
Parachipteria magna (Sellnick, 1928)	•		•			•
***Parachipteria punctata* (Nicolet, 1855)**	1st		1st		•	•
***Parachipteria* sp.**	•					•
Peloptulus montanus Hull, 1914	•					•
Perlohmannia (P.) dissimilis (Hewitt, 1908)			•		•	•
Phauloppia lucorum (Koch, 1841)	•	•				•
Phthiracarus (A.) anonymus Grandjean, 1933	•	•	1st		•	•
Phthiracarus (A.) globosus (Koch, 1841)	•	•	1st	•	•	•
Phthiracarus (A.) montanus Pérez-Íñigo, 1969	1st			•	•	•
Phthiracarus (A.) piger (Scopoli, 1763)	•		1st	1st	•	•
Phthiracarus (P.) ferrugineus (Koch, 1841)	1st	•	1st	•	•	•
Phthiracarus (P.) laevigatus (Koch, 1841)	•	•	•	•	•	•
Planoristes acuspidatus Iturrondobeitia & Subías, 1978	1st		1st		•	•
Poecilochthonius spiciger (Berlese, 1910)	•	•	1st		•	•
Porobelba spinosa (Sellnick, 1920)	1st		1st	•	•	•
Poroliodes farinosus (Koch, 1839)	•				•	•
Protoribates (P.) capucinus s. str. Berlese, 1908		•				•
***Punctoribates (P.) punctum* (Koch, 1839)**	1st				•	•
Quadroppia (C.) monstruosa Hammer, 1979	•				•	
Quadroppia (C.) pseudocircumita Mínguez, Ruiz & Subías, 1985	•	•			•	•
Quadroppia (Q.) hammerae Mínguez, Ruiz & Subías, 1985		•				•
Quadroppia (Q.) maritalis Lions, 1982	•	•	•	•	•	•

SPECIES	A	B	G	N	Fs	Qr
Quadroppia (Q.) quadricarinata (Michael, 1885)	1st				•	
Ramusella (I.) elliptica (Berlese, 1908)	•	•			•	•
Ramusella (I.) furcata (Willmann, 1928)	1st					•
Ramusella (I.) insculpta (Paoli, 1908)	•	•		•	•	•
***Ramusella (cf. Insculptoppia)* sp.**	•				•	•
Ramusella (R.) puertomonttensis Hammer, 1962	•					•
Rhacaplacarus (R.) ortizi (Pérez-Íñigo, 1970)	•	•	1st	•	•	•
***Rhinoppia (R.) media* (Mihelčič, 1956) s. Mihelčič 1956**		•				•
***Rhinoppia (R.) media* (Mihelčič, 1956) s. Subías & Rodríguez 1988**	•				•	•
***Rhinoppia (R.) cf. minidentata* (Subías & Rodríguez, 1988)**	•	•			•	•
Rhinoppia (R.) obsoleta s. str. (Paoli, 1908)	•	•	•	•	•	•
***Rhinoppia (R.) ordunensis* (Iturrondobeitia & Saloña, 1988)**	1st				•	
Rhinoppia (R.) subpectinata (Oudemans, 1900)	•	•	•	•	•	•
***Rhinoppia (R.) tridentata* (Subías & Mínguez, 1985) type A**			•	•	•	•
***Rhinoppia (R.) tridentata* (Subías & Mínguez, 1985) type B**			•	•	•	•
***Rhinoppia (R.) tridentata* (Subías & Mínguez, 1985) type C**	•				•	
Rhinoppia (R.) truncata (Iturrondobeitia & Saloña, 1988)	•				•	
***Rhinoppia (R.) cf. vera* (Mihelčič, 1956) type A**			•	•	•	•
***Rhinoppia (R.) cf. vera* (Mihelčič, 1956) type B**		•				•
***Rhinoppia (cf. Rhinoppia)* sp.**	•				•	
Scheloribates (S.) laevigatus s. str. (Koch, 1835)	•	•	1st	•	•	•
***Sellnickochthonius cricoides* (Weis-Fogh, 1948)**			1st			•
***Sellnickochthonius furcatus* (Weis-Fogh, 1948)**	1st				•	•
Sellnickochthonius immaculatus (Forsslund, 1942*)*	•	•		•	•	•
Sellnickochthonius jacoti (Evans, 1952)	1st		1st	•	•	•
***Sellnickochthonius rostratus hungaricus* (Balogh, 1943)**	1st	•			•	•
***Sellnickochthonius suecicus* (Forsslund, 1942)**	1st				•	•
Sellnickochthonius zelawaiensis (Sellnick, 1928)	1st		1st		•	•
Serratoppia intermedia Subías & Rodríguez, 1988	•	•	•	•	•	•
Serratoppia serrata (Mihelčič, 1956)	•	•			•	•
Steganacarus (S.) herculeanus Willmann, 1953	1st		1st	•	•	•
Steganacarus (S.) magnus s. str. (Nicolet, 1855)	•	•				•
Steganacarus (S.) magnus anomalus (Berlese, 1883)	1st				•	
***Steganacarus (S.) michaeli* Bernini & Avanzati, 1987**	1st	•	•	1st	•	•
***Subiasella (L.) quadrimaculata* (Evans, 1952)**			1st		•	•
***Suctobelba granulata* Hammen, 1952**			1st		•	
Suctobelba regia Moritz, 1970	1st		1st		•	•
Suctobelba trigona (Michael, 1888)	•	•	•	•	•	•
Suctobelbella (F.) alloenasuta Moritz, 1971	•				•	•
Suctobelbella (F.) forsslundi s. str. (Strenzke, 1950)	•	•	•	•	•	•
Suctobelbella (F.) subtrigona (Oudemans, 1900)	•				•	•
Suctobelbella (S.) acutidens s. str. (Forsslund, 1941)	•	•	•	•	•	•
Suctobelbella (S.) acutidens sarekensis (Forsslund, 1941)	•	•	•	•	•	•
Suctobelbella (S.) longicuspis s. str. Jacot, 1937	1st	•	•	•	•	•
Suctobelbella (S.) perforata (Strenzke, 1950)	1st	•	•	1st	•	•
Suctobelbella (S.) similis (Forsslund, 1941)			•		•	
Suctobelbella (S.) subcornigera s. str. (Forsslund, 1941)	•	•	•	•	•	•
***Synchthonius crenulatus* (Jacot, 1938)**			1st			•
Tectocepheus alatus Berlese, 1913	1st				•	•
Tectocepheus minor Berlese, 1903	•	•	•	•	•	•
Tectocepheus velatus s. str. (Michael, 1880)	1st		•	•	•	•
Tenuelamellarea hispanica Subías & Iturrondobeitia, 1978			1st		•	

SPECIES	A	B	G	N	Fs	Qr
***Tritegeus bisulcatus* Grandjean, 1953**	1st				•	•
Xenillus (X.) clypeator Robineau-Desvoidy, 1839	•	•			•	•
***Xenillus (X.) discrepans s. str.* Grandjean, 1936**	1st	•				•
Xenillus (X.) tegeocranus (Hermann, 1804)	•	•	•	•	•	•

3.2. Order MESOSTIGMATA Canestrini, 1891

A total of 1,288 specimens belonging to 94 species of 14 families were identified. 11 species are recorded for the first time in the Iberian Peninsula and the known distribution area of 92 species is extended to Spanish provinces of Araba, Bizkaia, Gipuzkoa and / or Navarra.

3.2.1. Taxonomical checklist of Mesostigmata

This section presents the systematic checklist of the Mesostigmata species occurring in the study area, according to the taxonomic classification of the order Mesostigmata (Beaulieu *et al*. 2011). Species and genera classification had been classified according Hallan (2005). There is a brief description for those species non-cited before in the Iberian Peninsula or revision of those species with taxonomical problems.

Suborder MONOGYNASPIDA Camin & Gorirossi, 1955

Infraorder GAMASINA Kramer, 1881

Epicrioidea Berlese, 1885

Epicriidae Berlese, 1885

Berlesiana Turk, 1943

• *Berlesiana beunzana* Moraza, 2006

Epicrius s.str. Canestrini & Fanzago, 1877

• *Epicrius (E.) johnstoni* Moraza, 2005

• ***Epicrius (E.)* sp.** (Figures 112-115)

Description based on adult males. Dimensions (n=5) 430 - 470 (450 ± 15.8) x 330 - 360 (346 ± 11.4) µm. Dorsal shield extended laterally and ventrally, completely fused with peritrematic, exopodal and anal shields. Dorsal ornamentation with bi- and trifurcate tubercles, forming a polygonal network, with usually one seta in each reticule. Dorsal chaetotaxy with 32 pairs of large, stout, curly and slightly barbed setae, extending beyond the level of insertion point of the subsequent pair, but *s1*-*s3* and *r* pairs shorter; *s6* and *S3* on the

same reticule along with pustular complex *gdz6* and lyrifissures *ids6* and *idz6*, with sclerotized rings on a conspicuous protuberance.

Sternogenital shield, with four pairs of setae (*st2*-*st5*) and lyrifissures *iv3* and *iv5*, reaches the posterior margin of coxae I; *st1* on small and poorly sclerotized separate jugular shields. Genital opening with two valves; *gv2* simple, conic in shape. Nine pairs of opisthogastric setae and three pairs of lyrifissures; setae *Zv1* on large, elliptical and smooth ventral scutellum; other opisthogastric setae on sclerotized ventral shield. Anal shield completely fused to dorsal shield; paranal setae longer than postanal seta.

This species differs from *Epicrius johnstonni* in the size of the idiosoma, 635 - 722 µm, and the length of podonotal setae, which do not reach the level of insertion point of the subsequent setae (Moraza 2005).

Zerconoidea G. Canestrini, 1891

Zerconidae Berlese, 1892

Prozercon s.str. Sellnick, 1943

• ***Prozercon (P.) cf. aristatus*** **Athias-Henriot, 1961** (Figures 116-119)

Female. Dimensions (n=15) 330 - 360 (344.7 ± 8.3) x 250 - 280 (262.7 ± 9.6) µm. Podonotal shield with a reticulate pattern and 22 pairs of setae: *j2*-*j6*, *z2*, *z4*-*z6*, *s1* and *s4* smooth, short and needle-like; *s2* and *r2* pilose; *j1*, *z3*, *s3*, *s6* and *r4*-*r5* strongly barbed, plumose. Glands *gds1* between *j3*-*s1*, *gdj4* between *j4*-*z4* and *gds4* between *s4*-*s5*.

Opisthonotal shield with distinct small pits and 33 pairs of setae: *Z1*-*Z2* and *S2* smooth, needle-like and short, do not reach the insertion point of subsequent setae; marginal setae *S1*, *R1*-*R7* smooth, short and thickened; *J1*-*J5* and *Z3* slightly longer and pilose; *Z4*-*Z5* and marginal setae *S3*-*S5* longer and plumose, brush-like. Setae *J3*-*J4* parallel, sat on protuberances, on the line connecting *J3*-*Z4*; *J5* below line connecting *J3*-*J4,* at the same level as *J5*; distance between setae *Z1* and *S2* as long as setae length. Glands *gdz6* above and paraxial to *Z1*; *gdZ1* between *Z2*-*S2*; *gdZ3* antiaxial to the line connecting *Z3*-*Z4*; *gdS4* paraxial and close to *S5*. Two pairs of dorsal fossae equal in size.

Peritrematal shields with posterolateral edge elongated, extending beyond *R2*. Ventrianal shield with 8 pairs of opisthogastric setae; Zv2-Zv4 smooth, short and thickened; Jv1-Jv4 longer, needle-like; *Jv1*, located in the anterior margin of the shield; *Jv5* similar in shape to *S3*-*S5*, located in the dorsal shield between *S5*-*Z5*. One pair of paranal setae and one postanal seta pilose and longer than other ventral setae.

Male. Dimensions (n=15) 280 - 300 (290.7 ± 5.9) x 210 - 240 (228.7 ± 9.2) µm. Dorsal shields similar to female. Peritrematal shield with posterolateral tips reaching setae *R7* and fused with ventrianal shield. Sternogenital shield unsclerotized between setae *st1* and *st2*, but

sometimes small sclerotized areas may be present; posterior region, at level of endopodals IV, almost separate from the rest of the shield; setae *st5* absent. Ventrianal shield similar to female.

In *P. aristatus*, *s2* and *J2* are smooth and *Z2* and *S2* barbed. This species was previously recorded from Spanish provinces of Orense and Pontevedra (Athias-Henriot, 1961).

• *Prozercon (P.) davidi* Moraza, 2006

• ***Prozercon (P.) cf. fimbriatus*** **(Koch, 1839)** (Figures 120-123)

Female. Dimensions (n= 15) 310 - 330 (318 ± 6.8) x 240 - 260 (250 ± 6.5) µm. Podonotal shield with a reticulate pattern and 22 pairs of setae: *j2-j6*, *z2*, *z4-z6*, *s1* and *s4-s5* smooth, short and needle-like; *s2* and *r2* pilose; *j1*, *z3*, *s3*, *s6* and *r4-r5* strongly barbed, plumose. Glands *gds1* close and posterior to *s1*, *gdj4* between *j4-z4* and *gds4* paraxial to the line connecting *s4-s5*.

Opisthonotal shield with small pits and 33 pairs of setae: *J1-J2* and *Z1* pilose and short, half the length of distance to the insertion of subsequent seta*; Z2* as *Z1*, but reaching insertion of *Z3*; *S2* smooth and needle-like, as long as *Z1*; *J3-J5* and *Z3-Z4* pilose and reaching the insertion point of subsequent setae; marginal setae *S1*, *R1-R7* smooth, short and thickened; *S3-S5* and *Z5* long and brush-like, reaching over de margin. Distance between setae *Z1* and *S2* as long as setae length. Glands *gdz6* above to *Z1*; *gdZ1* between *S2-Z2*; *gdZ3* antiaxial to *Z3*; *gdS4* paraxial and close to S5. Two pairs of dorsal fossae equal in size.

Peritrematal shields with posterolateral edge elongated, extending beyond *R4*. Ventrianal shield with 8 pairs of opisthogastric setae; *Zv2-Zv4* smooth, short and thickened; *Jv1-Jv4* longer, needle-like; *Jv1*, located in the anterior margin of the shield; *Jv5* similar in shape to *S3-S5*, located in the dorsal shield between *S5-Z5*. One pair of paranal setae and one postanal seta pilose and longer than other ventral setae.

Male. Dimensions (n=20) 260 - 280 (268.5 ± 6.4) x 190 - 220 (209.5 ± 10). Dorsal shields similar to female. Peritrematal shield with posterolateral tips reaching setae *R7* and fused with ventrianal shield. Sternogenital shield unsclerotized between setae *st1* and *st2*; posterior region, at level of coxa IV, separate from the rest of the shield; setae *st5* absent. Ventrianal shield similar to female.

Our specimens are slightly smaller to those recorded by Halaskova (1963), 345 - 360 µm long. In addition, *P. fimbriatus*, podonotal setae *s5* and *z6* are pilose, opisthonotal setae series *J* and *Z* are long, reaching insertions of subsequent setae, and *S2* is very short, approximately one third of *Z1* (Halaskova 1963; Karg 1993). In Sellnick (1958), Halaskova (1963) and Ujvari (2009) many specimens with a seta inserted between *J4* were recorded, but none of our

specimens presented this character. This species had been previously recorded from the Spanish provinces of Zaragoza (Athias-Henriot 1961) and Navarra (Moraza 1988).

• *Prozercon (P.) tellecheai* Moraza, 1990

Zercon s.str. Koch, 1836

• ***Zercon (Z.) cf. gurensis* Mihelcic, 1962** (Figures 124-125)

Only one female found. Dimensions 460 x 350 µm. Podonotal shield with reticulate pattern and 21 pairs of setae: *j2-j6*, *z2-z6*, *r1*, *s2* and *s4-s5* smooth and short, extending half the distance to the subsequent setae; *j1*, *r2*, *r4-r5*, *s3* and *s6* longer, needle-like with pilose tips; *r3* the longest setae, straight, barbed and inserted ventrally. Glands *gdj2* situated near *j2*; *gds4* posteroparaxial to insertion of setae *s4*.

Anterior part of opisthonotal shield with reticulate pattern and smooth in the posterior part; 21 pairs of setae: *J1-J2, Z1-Z2* and *S2* smooth and short, needle-like, extending half the distance to subsequent setae; *J3-J5*, *Z3-Z4* and *S3-S4* long, distally flattened and barbed; *J3, Z3* and *S3* extending 1/4 of its length beyond *S4* setae and remaining setae longer, extending at least 1/3 of its length beyond next seta; *Z5* and *S5* the longest opisthonotal setae, acute and smooth. Marginal setae *S1* and *R* smooth and reaching beyond bases of subsequent marginal setae. Glands *gdz6* on the line connecting setae *z6* and *Z1*, glands *gdZ2* antiaxial to the line connecting setae *Z2* and *Z3*; glands *gdJ4* on line connecting setae *J5* and *Z4* (closer to setae Z4), and *gdS5* behind *S5*. Two pairs of dorsal fossae equal in size.

Peritrematal shields with posterolateral edge fused with endopodal elements beyond coxa IV. Sternal shield with 3 pairs of setae (*st1-st3*); *st4* on soft cuticle. Genital shield ovoid, tructated posteriorly and bearing pair *st5*. Glands *gv2* with three openings on free platelets. Ventrianal shield with reticulate cuticle, bearing 9 pairs of opisthogastric setae; *Jv1-Jv3* and *Zv1-Zv4* smooth and short, do not reach half the distance to subsequent setae; *Jv4-Jv5* longer, similar to *R* setae; *Jv1* and *Zv1* located on anterior margin; One pair of paranal setae and one postanal seta as long as *Jv4* or *Jv5*.

In *Zercon gurensis S3* do not reach *S4* insertion, but variability on the length of opisthonotal setae were recorded in Czech Republic (Halaskova 1970). Many other species fit the description given, but show small differences. Thus, in *Zercon encarpatus* Athias-Henriot, 1961, *Z2* and *J2* are long, reaching insertion of next setae (Athias-Henriot 1961); in *Zercon tergestinus* Mihelcic, 1964, *Z2* reach insertion of *Z3*; in *Z. baloghi* Sellnick, 1958, *Z3* are smooth, not flattened distally and short, reaching *Z4* insertion, and *J3-J5* are smooth and long, extending half their distance above next seta (Halaskova 1970); in *Zercon triangularis* Koch, 1836, *J3-J5* and *S3-S4* are smooth, without flattened tips, *Z3* are long, extending beyond the insertion of *Z4*, and *J3* extend one half their length beyond the insertion of *J4* (Halaskova 1970,

Moraza 2006a); in *Z. flagelicola* Halaskova, 1970, only a pair of setae are present on anterior margin of ventrianal shield, and *S3* are smooth and short, extending half distance to insertion of *S4*.

The length of the idiosoma in our female is bigger than the given by Mihelcic (1962), 414 - 416 µm, but agrees with Blaszak *et al*. (2007), 440 - 480 µm.

Recorded before in Austria (Mihelcic 1962, Schmolzer 1993, Schmolzer 1998), Czech Republic (Halaskova 1970), Poland (Niedbala 1982, Bloszyk et al 1994, Gabrys et al 2008, Skorupski et al 2008), Croatia (Ujvari 2008) and Germany (Wegener & Alberti 2009), this might be the first record in the Iberian Peninsula.

• *Zercon (Z.) navarrensis* Moraza, 1989

• *Zercon (Z.) subguttulatus* Moraza, 2006

Parasitoidea Oudemans, 1901

Parasitidae Oudemans, 1901

Parasitinae Oudemans, 1901

Parasitus Latreille, 1795

• ***Parasitus evertsi* Oudemans, 1902** (Figures 126-130)

Female. Length (n=4) 820 - 870 (842.5 ± 26.3). Podonotal and opistonotal shields reticulated, separate by an oblique division. Tectum trispinate. Setae *al1* and *al2* of palp-genu entire and spatulate; seta *al* of palp-femur spatulate, with distinct slender processes. Corniculi short, not extending to anterior margin of palp-femur. Podonotal shield with a pair of large posterolateral pores and 21 pairs of setae; *j1, j4, z5* and *r3* stout and finely pilose, longer than other podonotal setae; opisthonotal shield with 20 pairs of setae, stouter and more pilose posteriorly.

Peritreme extends anteriorly to coxa I. Presternal shields small. Sterno-genital setae simple; *st1* on unsclerotized cuticle anterior to lyrifissure *iv1*; *st2*-*st3* and associated lyrifissures *iv2*-*iv3* on sternal shield; *st4* and *iv4* on metasternal shields. Epigynal shield subtriangular in outline, strongly acuminate, bearing *st5* setae posteriorly. Endogynal sac elliptical with circular striations. Opisthogastric shield with seven pairs of simple setae, but paranal pair and postanal pilose.

Male. Length (n=8) 640 - 800 µm. Holodorsal shield present but with a dividing transverse notch. Genital opening located apically to holoventral shield and close to base of tritosternum. Cheliceral spermatodactyl with spermatotreme coalesced with movable digit. Leg II thickened with ventral apophyses; femur apophysis with double and angular edges; genu and tibia with single and small apophysis.

Recorded in France (Oudemans 1902), England, Wales (Hyatt 1980), Ireland (Hyatt 1980, Luxton 1998) and Turkey (Erman et al 2007), this is the first record for the Iberian Peninsula.

• ***Parasitus cf. lunulatus*** **(Müller, 1859)** (Figures 131-135)

Female. Length (n=1) 1030 µm. Podonotal and opisthonotal shields reticulated. Tectum broad and trispinate. Setae *al1* and *al2* of palp-genu entire and spatulate; seta *al* of palp-femur spatulate, with distinct slender processes; corniculi short, not extending to anterior margin of palp-femur.

Podonotal shield with 18 pairs of setae; *j1*, *j3-j4*, *j6*, *z4-z5*, *s4-s5* and *r3* stout, long and finely pilose; *j2*, *j5*, *z1*, *z3*, *z6*, *s3*, *s6*, *r2* and *r5*, shorter; *r6* on cuticle; *z2*, *s1-s2*, *r1* and *r4* absent. A pair of large posterolateral pores present between *r5* and *s5-s6*. Opisthonotal shield with 19 pairs of setae; *J1-J3* and *Z3* stout and long, but do not reach insertion point of subsequent setae; *J4*, *Z1-Z2*, *Z4-Z5* and *S1-S3* longer, stouter and more pilose posteriorly; *R1-R7* smooth and long, reaching insertion point of subsequent setae.

Tritosternum with a narrow base and pilose laciniae, flanked by a pair of small presternal shields; sternal setae *st1* on weakly sclerotized anterior portion of sternal shield. Metasternal shields obliquely narrowed. Genital shield broad and long, extending to level of coxae II, with acute apex. Opisthogastric shield with 8 pairs of setae, long and simple, but *Jv1* and *Zv1* minute. Surrounding membrane with 7 pairs of setae. One pair of paranal setae and a postanal seta.

Male. Length (n=1) 850 µm. Holodorsal shield with a transverse suture. Podonotal region with 21 pairs of setae, similar to those on female; *z2* and *s1* present; *r6* on the shield. Posterolateral pores smaller than in female. Chelicerae asymmetrical in shape; right chelicera with digitiform protuberance on the spermatodactyl. Corniculi short and notched on the inner margins. Genital opening on anterior region of the seternogenital shield. Ventrianal region with 14 pairs of short setae; one pair of paranal setae and a postanal seta. Leg II thickened with ventral apophyses; femur apophysis with double and pointed edges; genu and tibia with single but sharp apophysis.

Our female specimen fits the description given by Micherdzinski (1969), but in Hyatt (1980) podonotal *j2* pair is as long as other *j* series setae and *z2* and *s1* are present. Furthermore, the genital apex is trispinate (Micherdzinski 1969; Hyatt 1980; Hennessey & Farrier 1989), although Hyatt (1980) noted sometimes is missing. Concerning male, our specimen fits the description given by Hyatt (1980), but in Micherdzinski (1969) *z2* and *s1* are absent.

Previously recorded in several European countries (see Hyatt 1980), this might be the first record for the Iberian Peninsula.

• ***Parasitus cf. nolli*** **(Karg, 1965)** (Figures 136-137)

Two males found. Length 410 - 420 µm. Holodorsal shield with a transverse suture. Tectum trispinate. Podonotal region with 21 pairs of setae, being *j1*, *j4*, *z5*, *s4*, *s5* and *r3* stout, pilose and longer than remaining setae. Circular pores reduced. Opisthonotal region with 30 pairs of setae.

Setae *al1* and *al2* of palp genu entire and spatulate. Corniculi short and entire. Spermatodactyl symmetrical in shape on both chelicerae. Tritosternum with a narrow base and pilose laciniae, flanked by a pair of presternal shields. Genital opening on anterior edge of the seternogenital shield. Sternogenital setae simple. Ventrianal region with 14 pairs of short setae; one pair of paranal setae and a postanal seta. Leg II thickened with ventral apophyses, small and rounded; a pair on femur and genu and tibia with similar shape single apophyses.

Recorded in Germany (Micherdzinski 1969), Finland (Huhta et al 1979, as *Parasitus cf. nolli*) and Hungary (Athias-Henriot 1980), this might be the first record for the Iberian Peninsula.

Eugamasus Berlese, 1893

• ***Eugamasus berlesei*** **(Willmann, 1935)** (Figures 138-141)

Only one female found. Length 1430 µm. Tectum trispinate. Peritreme extending to coxa I. Podonotal shield reticulated, with 23 pairs of setae, simple and slender, reaching the insertion of subsequent seta, but *z1* the shortest and *r3* the longest. Opisthonotal shield reticulated with 50 pairs of setae, simple and reaching the insertion of next seta.

Palp genu setae *al1* and *al2* bifid. Coxa I with small and conical dorsal spur. Tritosternum with narrow base and pilose laciniae. Presternal shields subtriangular with horn-like lateral protrusion. Sternal shield reticulated, with 3 pairs of setae, simple. Genital shield triangular and pointed anteriorly, with a pair of genital setae. Opisthogastric shield with 11-12 pairs of setae, a pair of paranal setae and a single postanal seta, simple.

Previously recorded in several European countries (see Hyatt 1980), this might be the first record for the Iberian Peninsula.

• *Eugamasus exiguus* Athias-Henriot, 1978

• *Eugamasus femoralis* Athias-Henriot, 1978

• ***Eugamasus maguliaris*** **Athias-Henriot, 1978** (Figures 142-145)

Female. Length (n=2) 710 - 760 µm. Tectum broad with three small and thin branches, needle-like. Setae *al1* and *al2* of palp-genu bifurcate; seta *al* of palp-femur trispinate, with distinct slender processes; corniculi short, not extending to anterior margin of palp-femur.

Podonotal shield with 20 pairs of setae; *j1-j6*, *z3-z4*, *z6* and *s3-s6* smooth and long, reaching insertion point of subsequent setae; *z5* slightly stouter; *z1*, *r2* and *r5* shorter, similar

in length; *s1-s2* minute; *r3* the longest setae, stout and finely pilose; *r6* on cuticle; *z2*, *r1* and *r4* absent. A pair of large posterolateral pores present between *r5* and *s5-s6*. Opisthonotal shield with 20 pairs of setae; *J1-J3*, *Z1-Z3*, *S1-S2* smooth and long, reaching insertion point of subsequent setae; *J4-J5*, *Z4-Z5*, *S3* and *R1-R7* stouter and more pilose.

Tritosternum with a narrow base and pilose laciniae, flanked by a pair of small presternal shields; sternal setae *st1* on weakly sclerotized anterior portion of sternal shield. Genital shield longer than broad, with acute apex. Opisthogastric shield with 10 pairs of setae, long and smooth; one pair of paranal setae and a postanal seta; 7 pairs of setae on membrane.

Only one male found. Length 700µm. Tectum broad with a single central needle-like spine. Holodorsal shield with a transverse suture. Podonotal region with 21 pairs of setae, similar to those on female; *r6* on the shield. Posterolateral pores smaller than in female. Cheliceral fixed digit apically elongated, extending beyond mobile digit 1/3 of its length. Corniculi short. Genital opening on anterior region of the seternogenital shield. Ventrianal region with 14 pairs of short setae; one pair of paranal setae and a postanal seta. Leg II thickened with ventral apophyses; femur apophysis big and broad; genu and tibia with single and rounded apophysis; tarsus with a thick seta, sat on a tubercle and directed forwards parallel to tarsus.

This species was described and recorded previously from the Spanish province of La Rioja (Athias-Henriot 1978).

• ***Eugamasus parvulus*** **Athias-Henriot, 1978** (Figures 146-147)

Only males found. Length (n=3) 600 - 620 µm. Corniculi short but broad. Cheliceral mobile digit unidentate. Tectum broad with three sub-equal and thin branches, needle-like. Holodorsal shield reticulated with a transverse suture. Podonotal region with 21 pairs of setae; *j1-j6*, *z3-z4*, *z6* and *s3-s6* smooth and long, reaching insertion point of subsequent setae; *z5* slightly stouter; *z1*, *r2* and *r5* shorter, similar in length; *s1-s2* minute; *r3* the longest setae, stout and finely pilose; *z2*, *r1* and *r4* absent; *r6* on the shield. Posterolateral pores small, between *r5* and *s5-s6*. Opisthonotal region with 20 pairs of setae; *J1-J3*, *Z1-Z3*, *S1-S2* smooth and long, reaching insertion point of subsequent setae; *J4-J5*, *Z4-Z5*, *S3* and *R1-R7* stouter and more pilose. Genital opening on anterior region of the seternogenital shield. Ventrianal region with 14 pairs of short setae; one pair of paranal setae and a postanal seta.

Setae *al1* and *al2* of palp-genu bifurcate; seta *al* of palp-femur trispinate, with distinct slender processes. Leg II thickened with ventral apophyses, small and simple; femur with two apophysis, the largest without section line; genu and tibia with single and small apophysis.

This species is very similar to *Parasitus (E.) exiguus*, but differ on the cheliceral mobile digit, which is bidentate, and the large apophysis on femur II with a section line (Athias-Henriot

1978). This species had been described and recorded previously from the Spanish province of La Rioja.

Vulgarogamasus Tichomirov, 1969

• *Vulgarogamasus kraepelini* (Berlese, 1905)

Pergamasinae Juvara-Bals, 1976

Amblygamasus Berlese, 1903

• *Amblygamasus odontopus* (Athias-Henriot, 1967)

• ***Amblygamasus* sp.** (Figures 148-151)

Only one female found. Dimensions 1075 x 760 µm. Tectum trispinate, being the central projection stouter and larger. Cheliceral movable digit tridentate; fixed digit with 3 teeth and a crest-like extension on its base; denticulation between median and posterior teeth, and posterior tooth and basal crest. Palp-genual setae *al1* and *al2* fringed. Dorsal and peritrematal shields united anteriorly but free posteriorly. Podonotal region with 30 pairs of setae; opisthonotal region hypertrichous, with more than 50 pairs of setae; opisthogastric shield with 22 pairs of setae; 40 pairs of setae on soft cuticle.

Presternal sclerites sub-rectangular, contiguous. Sternal shield with 3 pairs of setae (*st1-st3*) and 3 pairs of lyrifissures (*iv1-iv3*); metasternal shield bearing *st4*; epigynal shield with central prong broad and elongated, elliptical in outline; endogynium sac-like, with a marked dentition on its exterior edge.

Holoparasitus Oudemans, 1936

• *Holoparasitus inornatus* (Berlese, 1906)

• *Holoparasitus stramenti* Karg, 1971

• ***Holoparasitus* sp.** (Figures 152-156)

Female. Length (n=4) 630 - 690 (665 ± 30). Holodorsal shiels with short setae. Tectum trispinate. Palpcoxal setae finely pectinate. Cheliceral fixed digit with 2-3 denticles in front and two behind pilus dentilis; movable digit with three teeth. Pedipalp trochanter with seta *v1* simple and *v2* barbed distally; seta al on pedipalp femur with pectinate posterior margin; setae *al1* and *al2* on genu spatulate.

Corniculi short and conical. Presternal shield thin and elongated. Sternal shield reticulated; pores *gv1* in sternal shield near its posterior margin. Metagynial sclerite arcuate and narrow. Epigynial shield with elongated and broad central prong. Endogynial sac elliptical with a sclerotized ring. Gland pores *gv2* are located on the surface of the flat cuticle. Opisthogaster with eight pairs of ventral setae.

Male. Length (n=4) 570 - 600 µm. Dorsal shield as in female. Corniculi elongated, blade-like. Cheliceral fixed digit with three denticles near pilus dentilis; movable digit with three

teeth. Presternal plates small and triangular. Genital opening cylindrical, located on the anterior margin of sternal shield. Sternogenital shield reticulated, with setae *st1*-*st4*, and two pairs of small tubercles. Opisthogaster with eight pairs of ventral setae. Leg II thickened with ventral apophyses; the main spur of femur II elongated, finger-like, and the axillary process flattened, low in lateral view; spur of genu II rounded; spur on tibia II long and broad, low in lateral view and ending before the distal margin.

Similar species is *Holoparasitus siculus* (Berlese, 1906), but it differs on the shape of epigynial shield of the female, with the central prong narrower and not so elongated, and the shape of leg II of males.

Ologamasiphis Holzmann, 1969

• *Ologamasiphis rothamstedensis* (Bhattacharyya, 1963)

Paragamasus Hull 1918

• ***Paragamasus cishispanus* (Athias-Henriot, 1967)** (Figures 157-161)

Only one female found. Dimensions 670 x 440 µm. Tectum trispinate. Setae *al1* and *al2* of palp-genu entire, spatulate. Dorsal shield reticulated. Podonotal region with 22 pairs of setae, short and smooth; *r3* longer than other setae and *z1* the shortest; *s1* and *r1* absent. Opisthonotal region with 24 pairs of setae, similar to those of podonotal region.

Corniculi short, horn-like. Tritosternum with a narrow base and pilose laciniae, flanked by a pair of triangular presternal shields and a pair of transverse accessorial platelets. Cheliceral movable digit tridentate. Opisthogastric shield (or region in males) with 10 pairs of setae, long and smooth; one pair of paranal setae and a postanal seta.

Peritremal shield posteriorly free; peritreme long, reaching beyond level seta *s2*. Sternal shield with polygonal reticulation, three pairs of setae (*st1*-*st3*) and three pairs of lyrifissures (*iv1*-*iv3*); *iv3* in antiaxial position. Metasternal shields bearing setae *st4* and lyrifissures *iv4*. Epigynial shield sub-triangular, bearing setae *st5*; metagynal sclerites present, horn-like; endogynium absent.

Only one male found. Dimensions 610 x 380 µm. Holodorsal shield with dorsal suture. Cheliceral movable digit bidentate, truncated apically. Genital opening and sternogenital shield characteristic of the genus. Leg II with ventral apophyses; apophysis of femur large, finger-like, and axilar process conical; apophysis of genu rounded, elliptical; apophysis of tibia triangular, teeth-like.

This species had been previously recorded in the Spanish provinces of Asturias and Cantabria (Athias-Henriot, 1967a).

• *Paragamasus crinitus* Willmann, 1939

• *Paragamasus navarrensis* (Athias-Henriot, 1967)

• ***Paragamasus pertrematus*** **(Athias-Henriot, 1967)** (Figures 162-167)

Female. Dimensions (n=42) 370 - 400 (387.6 ± 8.5) x 200 - 240 (216.6 ± 12.4). Tectum trispinate with irregular spines. Setae *al1* and *al2* of palp-genu entire, spatulate. Dorsal shield reticulated; podonotal region with 22 pairs of setae, short and smooth; *r3* longer than other setae and *z1* the shortest; *s1* and *r1* absent. Opisthonotal region with 24 pairs of setae, similar to those of podonotal region.

Corniculi short, horn-like. Cheliceral movable digit tridentate. Tritosternum with a narrow base and pilose laciniae, flanked by a pair of triangular presternal shields, distant from each other; a thin and transverse accessorial platelet present, which sometimes is fused with presternal shields. Sternal shield with polygonal reticulation, with a fissure on its posterior half; 3 pairs of setae (*st1-st3*) and 3 pairs of lyrifissures (*iv1-iv3*); *iv3* in paraxial position. Metasternal shields bearing setae *st4* and lyrifissures *iv4*. Epigynial shield sub-triangular, bearing setae *st5*; metagynal sclerites present, horn-like but with rounded apical portion; endogynium sac-like with small and triangular sclerites. Opisthogastric shield with 10 pairs of setae, long and smooth; one pair of paranal setae and a postanal seta. Peritremal shield posteriorly free; peritreme short, hardly reaching level of seta *r4*.

Male. Dimensions (n=26) 340 - 370 (353.5 ± 8.5) x 180 - 200 (193.6 ± 5.7) µm. Holodorsal shield with dorsal suture. Cheliceral movable digit bidentate; fixed digit with small denticles. Genital opening and sternogenital shield characteristic of the genus. Leg II with ventral apophyses; apophysis of femur large, finger-like, with transversal striation; axilar process elliptical; apophysis of genu rounded, elliptical; apophysis of tibia elongated.

This species had been previously recorded in the Spanish provinces of Pontevedra, A Coruña, Ourense and Huesca (Athias-Henriot, 1967a).

• *Paragamasus robustus* (Oudemans, 1902)

• ***Paragamasus trichinulus*** **(Athias-Henriot, 1967)** (Figures 168-171)

Only one female found. Dimensions 420 x 250 µm. Tectum trispinate with central spine slightly longer than lateral. Setae *al1* and *al2* of palp-genu entire, spatulate. Dorsal shield reticulated; podonotal region with 22 pairs of setae, short and smooth; *r3* longer than other setae and *z1* the shortest; *s1* and *r1* absent. Opisthonotal region with 24 pairs of setae, similar to those of podonotal region.

Cheliceral movable digits tridentate. Corniculi short, horn-like. Tritosternum with a narrow base and pilose laciniae, flanked by a pair of very close poligonal presternal shields, and several accessorial platelets above principal shields. Sternal shield with polygonal reticulation, with a fissure on its posterior half that do not reach half the distance between setae *st2-st3*; three pairs of setae (*st1-st3*) and three pairs of lyrifissures (*iv1-iv3*); *iv3* medially

positioned. Metasternal shields bearing setae *st4* and lyrifissures *iv4*. Epigynial shield sub-triangular, apically convex with central prong laterally rounded; setae *st5* on posterior part of the shield; metagynal sclerites present, horn-like; endogynium sac-like with a pair of tridentate sclerites. Peritremal shields posteriorly free; peritreme short, hardly reaching level of seta *r4*. Opisthogastric shield (or region in males) with 10 pairs of setae, long and smooth; one pair of paranal setae and a postanal seta.

Only one male found. Dimensions 410 x 210 µm. Holodorsal shield with dorsal suture. Corniculi slightly concave apically. Cheliceral movable digit bidentate; fixed digit with small denticles. Genital opening and sternogenital shield characteristic of the genus. Leg II with ventral apophyses; apophysis of femur very large, finger-like, with an apical notch; femoral axilar process and apophysis of genu and tibia elliptical, longitudinal to leg segment.

This species was described from the Spanish province of Ourense and also recorded from Pontevedra (Athias-Henriot, 1967a).

• ***Paragamasus* sp.** (Figures 172-175)

Female. Dimensions (n=27) 400 - 420 (411.9 ± 8.3) x 220 - 240 (231.5 ± 6). Tectum trispinate. Setae *al1* and *al2* of palp-genu entire, spatulate. Dorsal shield reticulated; podonotal region with 22 pairs of setae, short and smooth; *r3* longer than other setae and *z1* the shortest; *s1* and *r1* absent. Opisthonotal region with 24 pairs of setae, similar to those of podonotal region.

Cheliceral movable digit tridentate. Corniculi short, horn-like. Tritosternum with a narrow base and pilose laciniae, flanked by a pair of triangular presternal shields, distant from each other, but fused to a transverse accessorial platelet; Sternal shield with polygonal reticulation, with a fissure on its posterior half that do not extend half the distance between setae *st2*-*st3*; three pairs of setae (*st1*-*st3*) and three pairs of lyrifissures (*iv1*-*iv3*); *iv3* in paraxial position. Metasternal shields bearing setae *st4* and lyrifissures *iv4*. Epigynial shield sub-triangular, with central prong laterally rounded and internally keyhole-like; setae *st5* on posterior part of the shield; metagynal sclerites present, horn-like; endogynium sac-like with a pair of thin bidentate sclerites. Peritremal shield posteriorly free; peritreme short, hardly reaching level of seta *r4*. Opisthogastric shield (or region in males) with 10 pairs of setae, long and smooth; one pair of paranal setae and a postanal seta.

Male. Dimensions (n= 8) 390 - 420 (403.8 ± 10.6) x 210 - 230 (225 ± 7.6) µm. Holodorsal shield with dorsal suture. Cheliceral movable digit bidentate; fixed digit bidentate. Genital opening and sternogenital shield characteristic of the genus. Leg II with ventral apophyses; apophysis of femur swollen; femoral axilar process and apophysis of genu elliptical and

longitudinal to leg segment; tibia with ventral rounded projection on its base and a dorsal apophysis of tibia triangular, arrow-like.

Pergamasus Berlese, 1903

• *Pergamasus crassipes* (Linnaeus, 1758)

• *Pergamasus longicornis* (Berlese, 1906)

• *Pergamasus quisquiliarum* (Canestrini & Canestrini, 1882)

Veigaioidea Oudemans, 1939

Veigaiidae Oudemans, 1939

Veigaia Oudemans, 1905

• *Veigaia bouvieri* (Berlese, 1916)

• *Veigaia cerva* (Kramer, 1876)

• *Veigaia decurtata* Athias-Henriot, 1961

• *Veigaia exigua* (Berlese, 1916)

• *Veigaia garraldensis* Athias-Henriot, 1961

• *Veigaia nemorensis* (Koch, 1839)

• *Veigaia perinsolita* Athias-Henriot, 1961

• *Veigaia planicola* (Berlese, 1892)

• *Veigaia sanmamedi* Athias-Henriot, 1961

• ***Veigaia* sp.** (Figures 176-181)

Female. Dimensions (n= 6) 640 - 670 (653.3 ± 12.1) x 380 - 410 (398.3 ± 9.8) µm. Tectum with narrow central projection, distally bifid with long lacinia; basal part with subrectangular structure, triangular apically; lateral projections broad, tridentate. Palp-genu setae *al1* spatulate; *al2* distally widened. Dorsal shield reticulate, with lateral incisions reaching almost setae *J1* (schizodorsal shield); podonotal region with 21 pairs of setae, smooth and subequal in length; *j1*, *j4*, *j6*, *z5* and *r3* longer, stout and slightly pilose; *s1-s2* and *z1-z2* the shortest; setae *r6* on soft cuticle; *gdj2* opening antiaxial to *j2*. Opisthonotal region with 19 pairs smooth setae, similar to those of podonotal region; widely rounded laterally, posterior margin concave.

Corniculi with broad bases and dorsal crest. Cheliceral digits with only a distal tooth. Tritosternum with large and narrow base and a pair of long lacinia. Presternal sclerites trapezoidal, separated or fused. Sternal shield with three pairs of subequal setae and two pairs of lyrifissures; *st2-st3* stouter than *st1.* Metasternal plate fused with endopodal sclerite, bearing seta *st4* and a lyrifissure, separated from sternal shield. Genital shield subtriangular and reticulate, with two pairs of setae (*st5* and *Jv1*), fused with ventral shield in metapodal regions.

Ventral shield sub-trapezoidal and reticulate, posteriorly concave, with anterolateral corners free and four pairs of setae; *Jv2-Jv3* very long and *Zv2-Zv3* very short. Anterior margin of podonotum connected with peritremes; peritremes broad, apically reaching the bases of setae *j1-z1*; posterior ends of peritremata shields free, slightly widened and rounded, with poststigmatic setae situated outside peritrematal shields. Punctiform organs in metapodal regions of genitiventral shield each with 10 pores. Anal shield suboval with three circum-anal setae. Dorsolateral and ventrolateral membranous cuticle with 7-8 pairs of simple and smooth setae. Spermathecal structures poorly developed, associated with coxae IV. Femur, genu and tibia of legs II-IV with thick ventral setae.

Male. Dimensions (n= 7) 580 - 600 (595.7 ± 7.9) x 360 - 400 (377.1 ± 17) µm. Holodorsal shield with dorsal fissure. Tectum trispinate, fork-like; bifid central projection absent. Cheliceral digits with a distal tooth; spermatodactyl thick and long, 3-4 times longer than cheliceral fixed digit, distally curved. Corniculi long and curved, horn-like. Genital opening on anterior margin of genito-sternal shield, between presternal plates. Tritosternum base absent, only laciniae present. Leg II with ventral apophyses; femur with elliptical apophysis and stout ventral seta; genual apophysis elliptical; tibial apophysis elliptical, elongated and distally sharp; tarsus with ventral thickened seta, directed forwards.

A female from RO02 presents gynandromorphy, with the same apophyses on leg II as on males.

Our female specimens are close to *Veigaia transisalae* (Oudemans, 1902) but they differ on the shape of the tectum, triangular on *V. transisalae* (Oudemans 1902a; Evans 1955; Athias-Henriot 1961; Till 1988; Mašán *et al.* 2008; Ács & Kontschán 2015). Furthermore, Athias-Henriot (1961) points that post-stigmatic seta is on peritrematal shield. On the other hand, our male specimens totally differ the description given by Willmann (1938a) for specimens from Hungary, or Athias-Henriot (1961) for specimens from Huesca, on the tectum, spermatodactyl and leg II apophyses.

Rhodacaroidea Oudemans, 1902

Digamasellidae Evans, 1957

Dendroseius Karg, 1965

• *Dendroseius reticulatus* (Sheals, 1956)

Rhodacaridae Oudemans, 1902

Rhodacarellinae Shcherbak, 1980

Rhodacarellus Willmann, 1935

• *Rhodacarellus silesiacus* Willmann, 1935

Rhodacarinae Oudemans, 1902

Rhodacarus s.str. Oudemans, 1902

• *Rhodacarus (R.) coronatus* Berlese, 1920

• *Rhodacarus (R.) mandibularis* Berlese, 1920

Eviphidoidea Karg 1965

Macrochelidae Vitzthum, 1930

Geholaspis s.str. Berlese, 1918

• ***Geholaspis (G.) aeneus* Krauss, 1970** (Figures 182-185)

Only a female found. Dimensions 1030 x 750 µm. Tectum subtriangular, with elongate median process, laterally dentate. Corniculi very long. Cheliceral fixed digit tridentate and movable digit bidentate. Dorsal shield finely granular, with 28 pairs of setae and 22 dorsal conspicuous pore-like structures; podonotal region reticulate towards the lateral margins; *j1* short and plumose; *j2-j5*, *z1-z4*, *s2*, *s4-s5* and *r2-r4* long and distally pilose; *j6*, *z1*, *z5-z6* and *s5* smooth; opisthonotal region covered by a finely regular reticulated pattern; *Z2*, *Z4-Z5*, *S1-S2* and *S4-S5* long and distally pilose; *J2*, *J5* and *Z1* smooth.

Tritosternum bifid, with short base and a pair of long lacinia. Sternal shield reticulate, with three pairs of setae (*st1-st3*) and three pairs of lyrifissures; metasternal plates free bearing *st4*. Genital shied reticulate, apically rounded and truncated posteriorly, bearing a pair of genital setae (st5). Ventrianal shield reticulate, wider than long, with inguinal pores on anterolateral corners, five pairs of simple and smooth setae (*Jv1-Jv3* and *Zv1-Zv2*), a pair of paranal setae and the postanal seta.

This species was described from protonymph, deutonymph and females stages collected at the Spanish province of Lugo (Krauss 1970 in Hyatt & Emberson 1988).

• *Geholaspis (G.) longispinosus* (Kramer, 1876)

Geholaspis (Longicheles) Valle, 1953

• *Geholaspis (L.) mandibularis* (Berlese, 1904)

Macrocheles s.str. Latreille, 1829

• *Macrocheles (M.) montanus* (Willmann, 1951)

Macrocheles (Macrholaspis) Oudemans, 1931

• ***Macrocheles (M.) dentatus s. str.* Evans & Browning, 1956** (Figures 186-191)

Female. Dimensions (n= 7) 800 - 1100 (895.7 ± 102.8) x 430 - 540 (494.3 ± 43.5) µm. Tectum with reduced lateral elements. Dorsal shield attenuated posteriorly, reticulate over entire surface; podonotal region with 18 pairs of pilose setae, but *j1* short and plumose and *z1* longer and distally pilose; opisthonotal region with lateral margins serrate with sharp pointed spicules; 10 pairs of pilose setae and three unpaired setae between *j6* and *J3*.

Chelicerae with movable digit bidentate and fixed digit monodentate, close to *pilus dentilis*. Sternal shield reticulate, with three pairs of simple setae (*st1-st3*) and two pairs of lyrifissures. Metasternal shields small and free, bearing *st4* setae, simple, and a poroid. Genital shield strongly ornamented, bearing a pair of plumose setae; interscutal membrane between genital and ventrianal shields with three pairs of postgenital platelets and four pairs of plumose setae arranged around ventrianal shield. Ventrianal shield reticulate, larger than wide, with two pairs of plumose preanal setae, one pair of conspicuous poroids, one pair of paranal setae, long and simple, and the postanal seta, short and plumose.

Male. Dimensions (n=5) 870 - 940 (900 ± 30.8) x 510 - 580 (542 ± 28.6) µm. Chelicerae with fixed digit monodenate, big and posterior to *pilus dentilis*; movable digit bidentate; posterior teeth big, where emerges the spermatodactyl, rounded on its base and ending in a thin tube. Presternal area granulated. Sternogenital shield with genital opening on anterior edge; five pairs of setae on the shield. Ventrianal shield similar to femle, with two pairs of preanal setae. Leg II with ventral apophyses; femur with two apophyses: proximal elongate finger-like and distal small and rounded; genu and tibia apophyses similar in shape, cylindrical and apically rounded.

This species differs from the subspecies *Macrocheles (M.) dentatus franzii* Krauss, 1970 on the number of preanal setae, with only one pair on the latter. As far as we know, there is not a description of the male of this species. Originally described from specimens found in Wales (Evans & Browning 1956) and cited in Poland (Skorupski *et al*. 2000), this is the first record for the Iberian Peninsula.

• *Macrocheles (M.) dentatus franzii* Krauss, 1970

• ***Macrocheles (M.) opacus* Koch, 1839** (Figures 192-195)

Only one female found. Dimensions 770 x 450 µm. Dorsal shield attenuated posteriorly with polygonal network of minute spines ornamentation in its anterior third; lateral margins of the shield with small rounded serration; 28 pairs of plumose setae; marginal dorsal setae are of the same form.

Both digits of the chelicerae bidentate; pilus dentilis long and stout. Sternal shield punctate with three pairs of simple setae (*st1-st3*) and two lyrifissures; metasternal shields free with a pair of simple setae (*st4*) and poroid lyrifissure *iv3*. Genital shield punctate with network ornamentation; one pair of genital setae, plumose. Interscutal membrane between genital and ventrianal with three pairs of platelets and a pair of plumose setae. Ventrianal shield oval and striate, with two pairs of plumose preanal setae, a pair of long and simple paranal setae, and a plumose postanal seta.

There are contradictions on the descriptions given for this species; on one hand, Evans & Browning (1956) and Hyatt & Emberson (1988) pointed the presence of two pairs of preanal setae. On the other hand, on the species determination key of Karg (1993) two pairs of preanal setae were pointed for *Macrocheles (Macrholaspis) opacus aciculatus* Berlese, 1918 and three pairs for *M. opacus*, but on the figure of the latter species only two pairs were represented. However, both species were synonimized (Evans & Browning 1956).

This species had been recorded in France (Berlese 1918), the British Isles (Evans & Browning 1956, Hyatt & Emberson 1988, Hyatt 1990, Skorupski & Luxton 1998, Arroyo *et al*. 2015), Germany (Krantz 1972, Karg 1993, Wegener & Alberti 2009), Austria (Schmölzer 1995), Poland (Skorupski *et al*. 2000, 2009) and Madeira Islands (Willmann 1939). According to Hyatt & Emberson (1988), was also recorded in Spain by Athias-Henriot (1968), but it has not be possible to verify it.

• ***Macrocheles (M.)* sp.** (Figures 196-201)

Female. Dimensions (n= 3) 560 - 600 (576.7 ± 20.8) x 300 - 320 (310 ± 10) µm. Tectum with reduced lateral elements. Dorsal shield attenuated posteriorly, reticulate; podonotal region with 18 pairs of pilose setae, but *j1* and *z1* short and plumose; opisthonotal region with smooth lateral margins; ten pairs of pilose setae and two unpaired setae between *j6* and *J3*.

Chelicerae with movable digit bidentate and fixed digit monodentate, close to *pilus dentilis*. Sternal shield reticulate, with three pairs of simple setae (*st1*-*st3*) and two pairs of lyrifissures. Metasternal shields small and free, bearing *st4* setae, simple, and *iv3*. Genital shield strongly ornamented, bearing a pair of plumose setae; interscutal membrane between genital and ventrianal shields with three pairs of postgenital platelets and four pairs of plumose setae arranged around ventrianal shield. Ventrianal shield reticulate, larger than wide, with two pairs of plumose preanal setae, one pair of conspicuous poroids, one pair of paranal setae, long and simple, and the postanal seta, short and plumose.

Male. Dimensions (n= 7) 480 - 550 (514.3 ± 23.7) x 300 - 360 (320 ± 28.3) µm. Chelicerae with fixed digit monodenate, big and posterior to *pilus dentilis*; movable digit bidentate; posterior teeth big, where emerges the spermatodactyl, rounded on its base and ending in two short tubes. Presternal area smooth. Sternogenital shield with genital opening on anterior edge; five pairs of setae on the shield. Ventrianal shield similar to female, with two pairs of preanal setae. Leg II with ventral apophyses; femur with a proximal elongate finger-like apophysis; genu and tibia apophyses similar in shape, cylindrical and apically rounded.

This species is similar to *M. dentatus*, but differs on size, number of unpaired setae on the dorsal shield and its lateral margins, and on the number of apophyses on leg II of males.

Pachylaelapidae Berlese, 1913

Pachylaelapinae Berlese, 1913

Onchodellus Berlese, 1904

• ***Onchodellus regularis* (Berlese, 1920)** (Figures 202-207)

Female. Dimensions (n= 3) 510 - 560 (536.7 ± 25.2) x 270 - 300 (283.3 ± 15.3) µm. Tarsus II with only *pl1* setae spur-like and with attenuate distal apophysis. Tectum elongated with distal part widened and notched, with short points. Dorsal shield elongated with parallel lateral margins; opisthonotal region with 12 pairs of setae and podonotal region with 18 pairs; setae short, not reaching the insertion points of subsequent setae; setae *J5* and *J4* similar in length; 12 pairs of setae on soft cuticle.

Fixed digit of chelicerae bidentate and movable digit tridentate. Corniculi short with a weakly sclerotized widened base. Sternal shield reticulate, fused to endopodal sclerites, bearing four pairs of setae (*st1-st4*) and three pairs of lyrifissures. Genitoventral shield widened with two pairs of setae (*st5* and *Zv1*). Peritrematal shields fused with exopodal shields. Spermatheca opening on coxa III; spermatheca long and filiform, extending backwards. Peritremes extend to dorsal shield, but do not reach insertion point of *z1* setae.

Only one male found. Dimensions 560 x 310 µm. Holoventral shield. Spermatodactyl long and broad, with four grooves. Leg II with ventral apophyses; femur with a finger-like apophysis and two apophyses triangular, tooth-like; genu and tibia with a small distal apophysis. Basifemur of leg IV with an elongated and wide spur-like setae.

In Spain, this species were recorded before in the Canary Islands (La Gomera, Moraza & Peña 2005a; Tenerife, Moraza & Pena 2005b) and in the Iberian Peninsula in Madrid (Kautz *et al*. 2006).

Pachylaelaps (Longipachylaelaps) Mašán, 2007

• ***Pachylaelaps (L.) cf. dubius* Hirschmann & Krauss, 1965** (Figures 208-213)

Female. Dimensions (n= 16) 680 - 780 (727.5 ± 28.4) x 370 - 520 (436.9 ± 33.5) µm. Tectum with subtriangular base, laterally serrate, and an elongate central section with distal margin widened with short points. Tarsus II *pl1* and *pl2* setae spur-like and with attenuate distal apophysis. Dorsal shield sub-oval with 30 pairs of subequal setae; 12 pairs on opisthonotal region and 18 pairs on podonotal region; setae *J4* equal in length to *J5* (45 - 60 µm).

Cheliceral fixed and movable digits monodentate; *pilus dentilis* hypertrophied and directed backwads. Corniculi elongate, horn-like. Sternal shield reticulated and fused to endopodal sclerites, bearing four pairs of setae (*st1-st4*) and three pairs of lyrifissures. Peritrematal shields fused with exopodal shields; peritremes extend to dorsal shield, but do

not reach insertion point of z1 setae. Genitoventral shield widened with two pairs of setae (*st5* and *Zv1*). Spermatheca opening on coxa IV with triangular and well sclerotized base and weakly sclerotized distally. Seven pairs of setae on lateral soft cuticle and nine pairs on opisthogastric region. Anal shield free from genitoventral shield, subtriangular.

Male. Dimensions (n= 9) 610 - 680 (651.1 ± 23.7) x 350 - 450 (400 ± 44). Holodorsal shield. Spermatodactyl long, about two times as long as movable digit. Palp-tibia with two lamellar outgrowths with divergent continuous margins; larger outgrowth subrectangular; smaller outgrowth rounded distally. Leg II with ventral apophyses; femur with ventrally wide but laterally flat apophysis; genu and tibia with a small distal apophysis.

Due to inadequate original description of spermatheca and palp-tibial outgrowths, *Pachylaelaps (L.) dubius* is not included in recent identification keys (Mašán 2007; Mašán *et al.* 2016), but attending to dorsal setation our specimens fit this species (Hirschmann & Krauss 1965; Gilyarov & Bregetova 1977, Karg 1993).

Pachylaelaps (L.) dubius had been recorded in Germany (Hirschmann & Krauss 1965), Italy (Bernini *et al*. 1995) and Latvia (Salmane 2001). This might be the first record for the Iberian Peninsula.

• ***Pachylaelaps (L.)* sp.** (Figures 214-217)

Female. Dimensions (n= 5) 700 - 790 (740 ± 32.4) x 420 - 480 (446 ± 24.1) µm. Tectum with subtriangular base, laterally serrate, and an elongate central section with distal margin widened with short points. Dorsal shield suboval with 30 pairs of subequal setae; 12 pairs on opisthonotal region and 18 pairs on podonotal region; setae *J4* (90 - 100 µm) twice longer than *J5* (40 - 50 µm).

Cheliceral fixed and movable digits monodentate; *pilus dentilis* small. Corniculi elongate, horn-like. Sternal shield reticulate and fused to endopodal sclerites, bearing four pairs of setae (*st1-st4*) and three pairs of lyrifissures. Peritrematal shields fused with exopodal shields. Peritremes extend to dorsal shield, but do not reach insertion point of *z1* setae. Tarsus II *pl1* and *pl2* setae spur-like and with attenuate distal apophysis.

Genitoventral shield widened with two pairs of setae (*st5* and *Zv1*). Spermatheca opening on coxa IV, sclerotized and curved on its proximal part and weakly sclerotized distally. Seven pairs of setae on lateral soft cuticle and nine pairs on opisthogastric region. Anal shield free from genitoventral shield, subtriangular.

Male. Dimensions (n= 8) 640 - 690 (677.5 ± 16.7) x 380 - 440 (403.8 ± 21.3) µm. Holoventral shield. Spermatodactyl long, about 2.5 times as long as movable digit. Palp-tibia with two lamellar outgrowths with divergent continuous margins; larger outgrowth

subrectangular; smaller outgrowth rounded distally. Leg II with ventral apophyses; femur with ventrally wide but laterally flat apophysis; genu and tibia with a small distal apophysis.

These specimens are related to *Pachylaelaps (L.) carpathicus* Mašán, 2007 and *Pachylaelaps (L.) longulus* Willmann, 1938 but differ on the spermatheca and on the outgrowths on the palp-tibia of the male (Mašán 2007; Mašán *et al.* 2016).

Pachyseiinae Karg, 1971

Pachyseius Berlese, 1910

• *Pachyseius iraola* Moraza, 1993

• *Pachyseius morenoi* Moraza, 1993

Pachyseiulinae Mašán, 2007

Pachyseiulus M. L. Moraza & D. E. Johnston, 1990

• *Pachyseiulus singularis* (Schweizer, 1961)

Ascoidea Karg 1965

Ascidae Oudemans, 1905

Arctoseius s.str Thor, 1930

• *Arctoseius (A.) minutus* (Halbert, 1915)

• *Arctoseius (A.) venustulus* (Berlese, 1916)

Asca s.str. von Heyden, 1826

• *Asca (A.) aphidioides* (Linnaeus, 1758)

Cheiroseius Berlese, 1916

• ***Cheiroseius viduus* Koch, 1839** (Figures 218-221)

Only one female found. Dimensions 520 x 360 µm. Tarsus of leg I without ambulacrum. Tectum three-pronged, and distally dentate. Cheliceral movable digit bidentate; fixed digit monodentate with posterior serration. Dorsal shield entire, with strong net-shaped pattern; lateral margins irregularly serrate. Dorsal setae simple, slightly lanceolate and curved, sitting on small protuberances. Podonotal region with 21 pairs of setae, being vertical setae very prominent, well separated, and directed apically; setae *j1* twice longer than *j2*. Opisthonotal region with 15 pairs of setae; *J1-J5* setae the shortest.

Tritosternum with a pair of pilose laciniae. Sternal shield with net pattern and with three pairs of setae; metasternal shields free. Genital shield with parallel lateral margins and slightly convex posteriorly, bearing a pair of setae. Two pairs of small and elongate post-genital platelets in line. Ventrianal shield broader than long, with four pairs of setae and anal seta. Peritrematal shields reach beyond the posterior margin of coxa IV and stigma is placed between coxae III and IV.

This species was described from specimens from Germany (Evans & Hyatt 1960) and had been recorded in Hungary (Willmann 1938), Italy (Bernini *et al*. 1995), Austria (Schmölzer 1995), Latvia (Salmane 2001), Slovakia (Kalúz & Fend'a 2005) and Iran (Kazemi & Rajaei 2013). This is the first record for the Iberian Peninsula.

Gamasellodes Athias-Henriot, 1961

• *Gamasellodes bicolor* (Berlese, 1918)

• ***Gamasellodes major* Athias-Henriot, 1961** (Figures 222-225)

Only females found. Dimensions (n= 3) 360 - 370 (366.7 ± 5.8) x 160 - 180 (170 ± 10) µm. Leg I with pretarsus and claws. Tectum tridentate. Corniculi entire, horn like. Both digits of chelicera bidentate; *pilus dentilis* setiform. Two subequal dorsal shields with setae of variable lengths. Podonotal shield with 17 pairs of setae; seta *s1* in soft cuticle; *j2* displaced anteriorly so setae *j1*-*j2* and *z1* are in transverse row at anterior margin of shield; humeral seta *r3* twice longer than *r2*. Opisthonotal shield with 15 pairs of setae; *J1*-*J5*, *Z1*-*Z3* and *S1*-*S3* short, hardly reach the insertion point of subsequent seta; *Z4* and *S4*-*S5* setae longer, and *Z5* the longest; two pairs of large postero-lateral glands. *R1*-*R6* setae and a submarginal seta in soft cuticle, flanking the shield. Peritrematal shields narrow and peritreme extend to level of coxa I.

Sternal shield with three pairs of setae and three pairs of lyrifissures; *st1* on weakly sclerotized region; *st4* in soft cuticle. Genital shield truncate posteriorly; spermathecal system unsclerotized. Ventrianal shield large and rounded anteriorly, with four pairs of ventral setae (*JV2*-*JV5*) and three circumanal setae; setae *JV1*, *ZV1*-*ZV2* on soft cuticle.

This species was described based on specimens from Portugal and the Spanish province of Pontevedra (Athias-Henriot 1961). Since Forest *et al*. (1982) synonymised this species with *Gamasellodes bicolor* (Berlese, 1918) but Walter (2003) provided a key differentiating both species, some records of *G. bicolor* might be erroneous.

Iphidozercon Berlese, 1903

• ***Iphidozercon gibbus* (Berlese, 1903)** (Figures 226-229)

Only females found. Dimensions (n= 21) 340 - 390 (365.7 ± 13.3) x 190 - 230 (208.8 ± 11.2) µm. Tectum tridentate with serrate lateral margins. Dorsal shield entire with the vertex directed downwards; podonotal region with scaly reticulation and opisthonotal region with areolate sculpture. All dorsal setae smooth and short, do not reach half the distance to insertion point of subsequent setae; podonotal region with 18 pairs of setae; setae *j1* on the vertex, usually not visible dorsally; opisthonotal region with 14 pairs of setae.

Anterior end of peritremes recurved ventrally. Sternal shield with three pairs of setae and three pairs of lyrifissures; metasternal setae st4 in soft cuticle. Genital shield with rounded anterior and posterior edges; lateral margins almost parallel; genital setae in soft cuticle,

lateral to the shield. Ventral region with 13 pairs of setae and two pairs of metapodal platelets. Anal shield with one pair of paranal setae and the postanal seta.

This species was described from Italy (Berlese 1904) and had been recorded in Switzerland (Schweizer 1949 in Moraes *et al*. 2016), Alger (Athias-Henriot 1961), the British Isles (Fain *et al*. 1991), Poland (Bloszyk *et al*. 1994), Latvia (Salmane 2001), the Canary Islands (Moraza & Peña 2005a, 2005b), Rusia (Makarova 2009), Finland (Huhta *et al*. 2010) and Iran (Nemati *et al*. 2012). This is the first record in the Iberian Peninsula.

Leioseius Berlese, 1916

• ***Leioseius elongatus*** **Evans, 1958** (Figures 230-233)

Only females found. Dimensions (n= 4) 380 - 400 (395 ± 10) x 160 - 170 (163.3 ± 5.8) µm. Tectum with three prongs, widened distally. Cheliceral fixed digit bidentate, *pilus dentilis* setiform and small denticulations distally; movable digit bidentate. Dorsal shield entire but medial lateral incisions present; podonotal region with setae *j1-j6*, *z1-z6* and *s2-s5* on shield and *r1-r5* on soft cuticle; opisthonotal region with setae *J1-J5*, *Z1-Z5* and *S1-S5* on shield and *R1-R6* on soft cuticle.

Sternal shield with three pairs of sternal setae (*st1-st3*) and three pairs of lyrifissures; the third pair poroid-like, sat on postero-lateral corners of sternal-shield; metasternal setae *st4* on soft cuticle. Genital shield beraing genital setae on lateral margins; rounded anterior edge and truncate posteriorly; lateral margins almost parallel. Five pairs of setae and two pairs of metapodal platelets between genital and ventrianal shield. Ventrianal shield with three pairs of ventral setae, a pair of paranal setae and the postanal seta.

This species had been recorded in Poland (Niedbala 1982), Germany (Karg 1993), Italy (Bernini *et al*. 1995), Slovakia (Kalúz & Fend'a 2005) and Finland (Huhta *et al*. 2010). This is the first record in the Iberian Peninsula.

Proctolaelaps s.str. Berlese, 1923

• ***Proctolaelaps (P.) pygmaeus*** **(Müller, 1859)** (Figures 234-238)

Only one female found. Dimensions 290 x 180 µm. Tectum convex with serrate margins and two apical prongs. Cheliceral fixed digit tridentate, with membranous lobe replacing *pilus dentilis*; movable digit tridentate and with a ventral spine near base. Dorsal shield entire and reticulate; setae aciculate, smooth and long, reaching the insertion points of subsequent setae; podonotal region with 23 pairs of setae (*j1–j6*, *z1–z6*, *s1–s6* and *r2–r6*); opisthonotal region reticulation elongated at level of *Z* series; 20 pairs of setae on the shield (*J1–J5*, *Z1–Z5*, *S1–S5* and *R1–R5*); *R6* on soft cuticle; lyrifissure (*Rp*) between *R3-R4*; ventro-lateral cuticle with four pairs of setae (*UR1* and *UR3-UR5*).

Presternal region transversely striate; sternal shield fused with anterior portion of endopodal plates, with three pairs of setae (*st1-st3*) and two pairs of lyrifissures; metasternal shields present, bearing metasternal setae (*st4*) and lyrifissure (*iv3*). Endopodal shields free between coxae III-IV. Genital shield smooth and long, with almost parallel lateral margins, bearing genital setae (*st5*); hyaline and rounded distal edge. Spermatheca slightly sclerotized and elongate, associated to coxae IV. Peritrematal shields connected to exopodal plate beside coxa IV; peritreme extend to level of *z1*. Unsclerotised cuticle between genital and anal shield with two pairs of metapodal platelets and 10 pairs of setae (*JV1–JV5* and *ZV1–ZV5*). Anal shield rounded, with a pair of paranal setae and the post anal seta.

This species had been previously recorded in the Canary Islands (Moraza & Peña 2005b) and the Balearic Islands (Athias-Henriot 1961). In the Iberian Peninsula it had been recorded in the Spanish province of Madrid (Athias-Henriot 1961).

Zercoseius Berlese, 1916

• *Zercoseius spathuliger* (Leonardi, 1899)

Phytoseioidea Berlese, 1916

Podocinidae Berlese, 1913

Podocinum Berlese, 1882

• ***Podocinum pacificum* Berlese, 1895** (Figures 239-241)

Only one female found. Dimensions 410 x 300 µm. Legs I very long, almost three times as long as the idiosoma; tarsus I elongate without claws but with two whip-like setae apically. Tectum with three subequal prongs distally dentate. Both cheliceral digits tridentate. Holodorsal shield with polygonal network of small tubercles; podonotal region with 10 pairs of setae (*j1-j6*, *z5-z6* and *s2-s3*); *j1* setae short and close each other; *j2* the longest setae, 105 µm, stout and slightly pilose; opisthonotal region with six pairs of long and pilose setae; *J2* and *J4*, similar in length, 75 - 80 µm; *Z1* the shortest; *Z2* and *Z4-Z5* the longest (110 - 175 µm). One pair of gland openings between *Z2-Z4*.

Sternal shield with three pairs of setae (*st1-st3*) and two pairs of lyrifissures; metasternal shields present bearing metasternal setae *st4* and lyrifissure (*iv3*). Endopodal shields free between coxae III-IV. Genital shield with broad basal edge and hyaline and rounded distal edge; genital setae (*st5*) on lateral margins of the shield. Peritrematal shields narrow, joining podonotal shield anteriorly; peritreme extend to level of coxae I. Ventrianal shield broad, bearing four pairs of ventral setae (*JV1-JV2* and *ZV2-ZV3*), a pair of paranal setae and the post anal seta.

This species had been previously recorded in the Canary Islands (Moraza & Peña 2005b) and the Balearic Islands (Athias-Henriot 1961). In the Iberian Peninsula it had been recorded in the Spanish province of Cantabria (Athias-Henriot 1961).

Dermanyssoidea Kolenati 1859

Laelapidae Berlese, 1892

Hypoaspidinae Vitzthum, 1941

Hypoaspis (Cosmolaelaps) Berlese, 1903

• *Hypoaspis (C.) vacuus* (Michael, 1891)

Pseudoparasitus (Pseudopachys) Berlese, 1916

• *Pseudoparasitus (Pseudopachys) parasitizans* Berlese, 1916

Pseudolaelapinae Vitzthum, 1941

Pseudolaelaps Berlese, 1916

• *Pseudolaelaps doderoi* (Berlese, 1910)

Infraorder UROPODINA Kramer, 1881

Uropodoidea Kramer, 1881

Cillibidae Trägårdh, 1944

Cilliba von Heyden, 1826

• *Cilliba cassidea* (Hermann, 1804)

• ***Cilliba cassidoidea* (Hirschmann & Zirngiebl-Nicol, 1964)** (Figures 242-245)

Only one female found. Dimensions 930 x 820 µm. Tectum elongated and laterally serrated. Dorsal shield subcircular, with circular pits over its whole surface and completely separated from marginal shield. Dorsal, submarginal and marginal setae numerous and long.

Tritosternum with a broad base and three pairs of finely serrated laciniae. Palp trochanter ventral seta *pv1* robust and distally serrated. Cheliceral fixed digit with globular tip and small denticles. Endopodal, sternal and anterior part of opisthogaster with small pits. Sternal setae *st1* close to anterior edge of genital shield; *st2–st4* setae surrounding the shield and *st5* pair located behind the shield. Genital shield tongue-shaped with small pits. Peritremal opening at level of coxa III, and peritreme runs through the leg fossae to its anterior edge. Five pairs of ventral setae, simple; two paranal setae, being the anterior twice longer than the posterior, and the anal seta present surrounding a small anal opening.

This species was recorded from Spain (Stachowiak *et al*. 2008) but it has not been possible to state the province.

• ***Cilliba insularis* Willmann, 1938** (Figures 246-251)

Female. Dimensions (n= 9) 830 - 930 (865.6 ± 29.2) x 810 - 870 (838.9 ± 16.2) µm. Tectum elongated, laterally serrated and sometimes bifid distally. Ventral setae *pv1* of palp trochanter thick. Dorsal shield subcircular with circular pits in the posterior half. Marginal shield fused with dorsal shield at anteriorly. Dorsal setae numerous, thick and simple; submarginal and marginal setae numerous and short.

Base of tritosternum broad, with anterolateral elongations; three pairs of finely serrated laciniae. Fixed digit of chelicera with anterior globular tip. Sternal shield smooth with five pairs of setae; *st1* close to anterior edge of genital shield; *st2–st4* surrounding the shield and st5 behind the shield. Genital shield tongue-shaped with small pits in the central part. Anterior part of opisthogaster with small pits. Peritremal opening at level of coxa III; peritreme runs through the leg fossae to its anterior edge, curved on its anterior end. Five pairs of ventral setae, simple; two paranal setae, being the anterior twice longer than the posterior, and the anal seta present surrounding the small anal opening.

Male. Dimensions (n= 9) 840 - 910 (884.4 ± 26.5) x 810 - 870 (846.7 ± 19.4) µm. Similar to females. Sterno-genital area between coxae II–IV with small circular pits. Genital opening located between coxae IV. Trochanter of leg III with a robust ventral spine.

This species was described from Madeira (Willmann 1939) and recorded in the Iberian Peninsula in Spain (Stachowiak *et al*. 2008), but it has not been possible to state the province.

• *Cilliba sellnicki* (Hirschmann & Zirngiebl-Nicol, 1964)

Dinychidae Berlese, 1916

Dinychus s.str. Kramer, 1886

• ***Dinychus (D.) arcuatus* (Trägårdh, 1943)** (Figures 252-255)

Female. Dimensions (n= 8) 620 - 660 (642.5 ± 12.8) x 300 - 360 (331.3 ± 22.9) µm. Tectum elongate, serrate laterally. Idiosoma oblong with a frontal rounded vertex; marginal shield fused anteriorly with the dorsal shield; ornamentation of shields alveolar. Setae on dorsal, marginal, and holoventral setae smooth and needle-like, similar in length; setae *J4* robust and longer than other dorsal setae; *J5* and *Z5* setae short, stout and pilose, placed on a posterior platelet.

Corniculi horn-like. Chelicerae with an articular platelet; cheliceral fixed digit longer than movable digit, monodentate; movable digit monodentate. Tritosternum with narrow basis with four pubescent laciniae. Sternal and ventral region ornamentation with alveolar pits; ventral region posterior to *JV1* with smaller pits. Sternal (*st1-st5*) and ventri-anal setae short and smooth. Genital shield placed between coxae III and IV; wide, ellipsoidal, with oval pits and small teeth on anterior margin; *st1* setae at level of central region of coxae II, *st2-st4* setae

flanking the genital shield and genital setae (*st5*) posterior to the shield. Peritremes with post-stigmal outgrowth reaching coxae IV, slightly curved.

Male. Dimensions (n= 5) 640 - 680 (660 ± 15.8) x 310 - 360 (342 ± 21.7) µm. Similar to female. Genital shield oval and smooth, placed at central region between coxae III; *st1-st2* setae at level of coxae II, *st3-st4* setae flanking the genital shield and genital setae (*st5*) posterior to the shield.

Described from Sweden, this species had been recorded in Rusia (Makarova 2004), Romania (Kontschán & Ujvári 2008), Albania (Dhora 2009), Finland (Huhta *et al*. 2010) and Poland (Gwiazdowicz *et al*. 2011). This is the first record in the Iberian Peninsula.

• *Dinychus (D.) hispanicus* Hirschmann & Zirngiebl-Nicol, 1969

Polyaspinidae Trägårdh, 1941

Polyaspinus Berlese, 1916

• *Polyaspinus cylindricus* Berlese, 1916

Trachytidae Trägårdh, 1938

Trachytes Michael, 1894

• *Trachytes eustructura* Hirschmann & Zirngiebl-Nicol, 1969

• *Trachytes pauperior* Berlese, 1914

• *Trachytes welbourni* Moraza, 1989

Uropodidae Kramer, 1881

Neodiscopoma Vitzthum, 1943

• ***Neodiscopoma* sp.1** (Figures 256-260)

Female. Dimensions (n= 2) 550 - 580 x 400 - 410 µm. Tectum narrow laterally serrated. Dorsal shield ovoid, extending downwards on a vertex, not visible dorsally; ornamentation with deep and almost circular pits over its anterior and central surface; posterior third smooth. Dorsal setae numerous and long, but do not reach the insertion point of subsequent setae. Marginal shield fused anteriorly to dorsal shield and bearing numerous smooth setae.

Base of tritosternum broad with three pairs of finely serrated laciniae. Ventral setae *pv1* of palp trochanter thick and asymmetrically V-shaped. Fixed digit of chelicera with anterior globular tip. Opisthosoma ornamented with small oval pits, except for smooth areas on sternal shield, posterior half of genital shield, and area of opisthosoma between coxae IV. Sternal setae short; *st1-st3* anterior to anterior edge of genital shield and *st4-st5* lateral to the shield. Genital shield tongue-shaped, shifted posterior to coxae IV. Five pairs of smooth ventral setae, two pairs of adanal setae and the anal seta present. Peritrematal opening in coxae IV and peritremes run through the leg fossae to its anterior edge, curved on its anterior end.

Male. Dimensions (n= 2) 560 - 580 x 420 - 430 µm. Similar to female. Sternal region and anterior part of opisthosoma smooth but slightly ornamented with circular pits. Sternal setae short; *st1–st4* anterior to and *st5* lateral to genital opening. Operculum oval, located between coxae IV, with a pair of short eugenital setae.

• ***Neodiscopoma*** **sp.2** (Figures 261-265)

Female. Dimensions (n=3) 540 - 560 (550 ± 10) x 390 - 400 (396.7 ± 5.8) µm. Tectum narrow laterally serrated. Dorsal shield ovoid, extending downwards on a vertex, not visible dorsally; ornamentation with polygonal pits over its anterior and central surface; posterior third smooth. Dorsal setae numerous, thick and long, almost reaching the insertion point of subsequent setae. Marginal shield fused anteriorly to dorsal shield and bearing numerous smooth and thick setae.

Base of tritosternum broad with three pairs of finely serrated laciniae. Ventral setae *pv1* of palp trochanter thick and asymmetrically V-shaped. Fixed digit of chelicera with anterior globular tips. Opisthosoma ornamented with circular and polygonal pits; , except for smooth areas on sternal shield and the area of opisthosoma between coxae IV. Sternal setae short; *st1-st3* anterior to anterior edge of genital shield and *st4-st5* lateral to the shield. Genital shield tongue-shaped, shifted posterior to coxae IV. Five pairs of smooth ventral setae, two pairs of adanal setae and the anal seta present. Peritrematal opening in coxae IV and peritremes run through the leg fossae to its anterior edge, curved on its anterior end.

Only one male found. Dimensions 560 x 400 µm. Similar to female. Sternal region and anterior part of opisthosoma ornamented with circular pits. Sternal setae short; *st1–st4* anterior to and *st5* lateral to genital opening. Operculum oval, located between coxae IV, with a pair of short eugenital setae. Tarsus of leg II with a small and triangular prolongation.

This species resembles the anterior (*Neodiscopoma* sp.1) but major differences are found in the ornamentation and setation of dorsal and genital shields of females.

• ***Neodiscopoma*** **sp.3** (Figures 266-269)

Only one female found. Dimensions 830 x 610 µm. Tectum narrow laterally serrated. Dorsal shield ovoid, extending downwards on a vertex, not visible dorsally; ornamentation with circular pits over its anterior and central surface; posterior third smooth. Dorsal setae numerous, smooth and long, almost reaching the insertion point of subsequent setae. Marginal shield fused anteriorly to dorsal shield and bearing numerous smooth and thick setae.

Base of tritosternum broad with three pairs of finely serrated laciniae. Ventral setae *pv1* of palp trochanter thick and asymmetrically V-shaped. Fixed digit of chelicera with anterior globular tips. Ventral surface ornamented with small circular pits, except for smooth areas on

sternal shield and posterior half of genital shield. Sternal setae short; *st1-st3* anterior to anterior edge of genital shield and *st4-st5* lateral to the shield. Genital shield tongue-shaped, located between coxae III and IV. Opisthosoma with five pairs of smooth ventral setae, two pairs of adanal setae and the anal seta. Peritrematal opening in coxae IV and peritremes run through the leg fossae to its anterior edge; distal end bifurcated, T-shaped.

This species resembles *Neodiscopoma* sp.1 but they clearly differ on the ornamentation and location of the sterno-genital area.

Phaulodinychus Berlese, 1903

• ***Phaulodinychus sp.*** (Figures 270-273)

Only two males found. Dimensions 730 - 740 x 550 - 560 µm. Tectum narrow laterally serrated. Dorsal shield ovoid, extending downwards on a vertex, not visible dorsally; ornamentation with small pits all over its surface. Dorsal setae numerous, smooth and short, not reaching the insertion point of subsequent setae. Marginal shield weakly sclerotized, fused anteriorly to dorsal shield; marginal setae short and smooth, associated to a pair of lyrifissures, all sat on small sclerotized shields.

Base of tritosternum narrow, with three pairs of finely serrated laciniae. Fixed digit of chelicera with pointed tips, extending beyond the movable chelicerae. . Ventral surface with polygonal ornamentation, except for the smooth area on sterno-genital shield. Sternal setae short; *st1-st4* anterior to anterior edge of genital shield and *st5* lateral to the shield. Genital opening circular, located between coxae IV, without eugenital setae.

Opisthosoma with five pairs of smooth ventral setae, two pairs of adanal setae and the anal seta. Peritrematal opening in leg fossae of coxae III; peritremes run through the leg fossae to its anterior edge and distally to marginal shield, S-shaped.

Trichouropoda Berlese, 1916

• *Trichouropoda ovalis* (Koch, 1839)

Uroobovella (Fuscuropoda) Vitzthum, 1924

• ***Uroobovella (F.) sp.*** (Figures 274-277)

Only one male found. Dimensions 700 x 400 µm. Idiosoma elliptical and smooth, with a fine polygonal reticulation; holodorsal shield extending anteriorly on a triangular vertex, but not visible dorsally. Dorsal setae numerous, smooth and short, not reaching the insertion point of subsequent setae.

Base of tritosternum narrow, with two pairs of finely serrated laciniae. Fixed digit of chelicera normally developed. Ventral surface with polygonal ornamentation, including on sterno-genital area. Eight pairs of sternal setae, short; four pairs anterior to genital shield and another four pairs surrounding the shield. Genital opening circular and smooth, located

between coxae III and IV, without eugenital setae. Opisthosoma with five pairs of smooth ventral setae, two pairs of adanal setae and the anal seta.

Peritrematal opening in leg fossae of coxae III; peritremes run through the leg fossae to its anterior edge, meandering on apical surface between legs II and III, and distally down to leg II fossae.

Uropoda Latreille, 1806

• *Uropoda minima* Kramer 1882

3.2.2. Mesostigmata figures

For each described Oribatida species, photographs of detailed areas are presented.

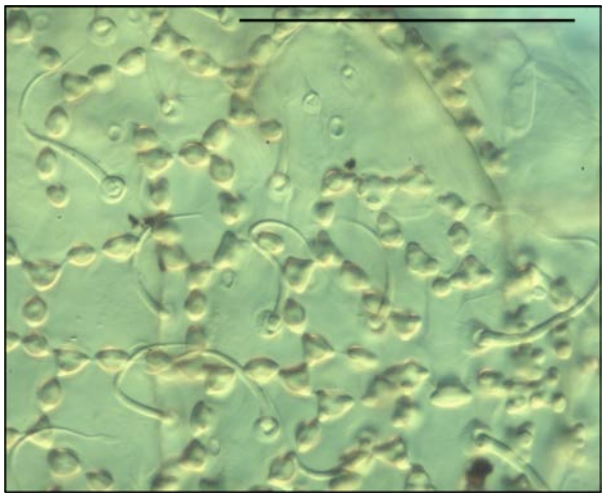

Figure 112. *Epicrius* sp., male. Dorsal ornamentation. Scale bar: 100µm.

Figure 113. *Epicrius* sp., male. Dorsal gland. Scale bar: 50 µm.

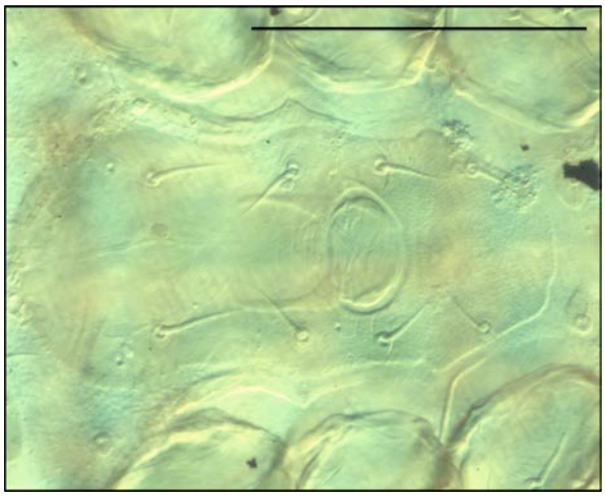

Figure 114. *Epicrius* sp., male. Sterno-genital shield. Scale bar: 100 µm.

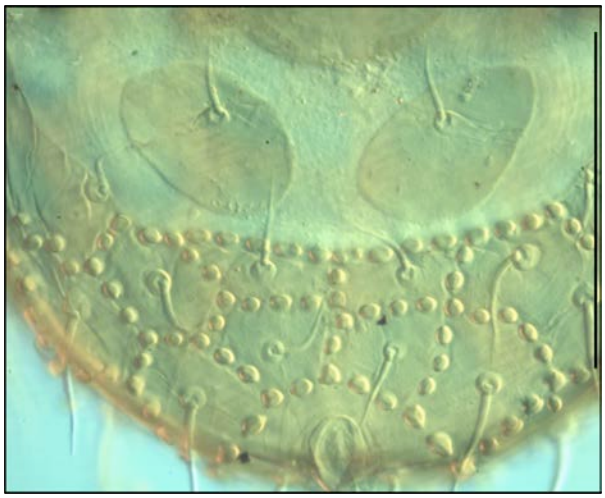

Figure 115. *Epicrius* sp., male. Opisthogaster. Scale bar: 100 µm.

Figure 116. *Prozercon (P.) cf. aristatus*, female. Opisthonotal shield. Scale bar: 100 µm.

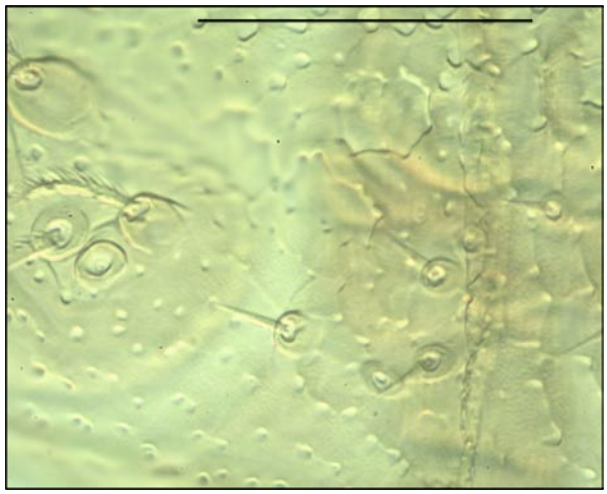

Figure 117. *Prozercon (P.) cf. aristatus*, female. Opisthonotal setae *Z1* and *S1*. Scale bar: 50 µm.

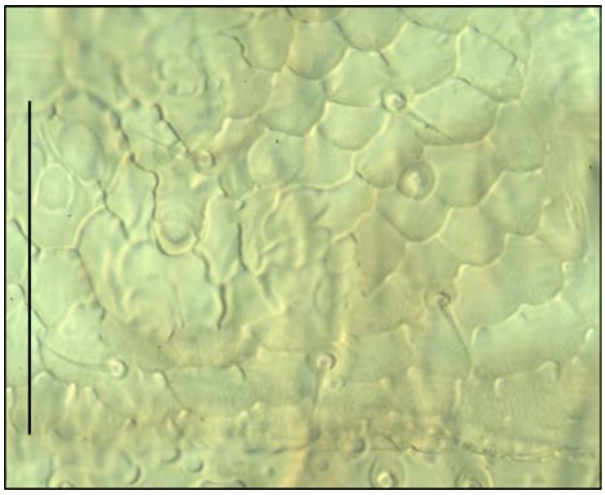

Figure 118. *Prozercon (P.) cf. aristatus*, female. Podonotal setae. Scale bar: 50 µm.

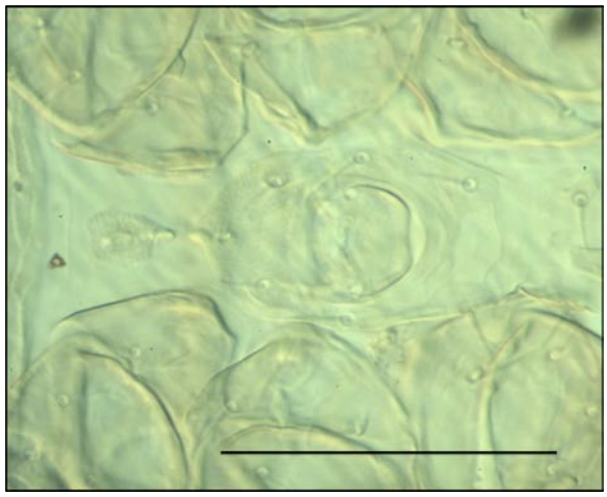

Figure 119. *Prozercon (P.) cf. aristatus*, male. Sterno-genital shield. Scale bar: 50 µm.

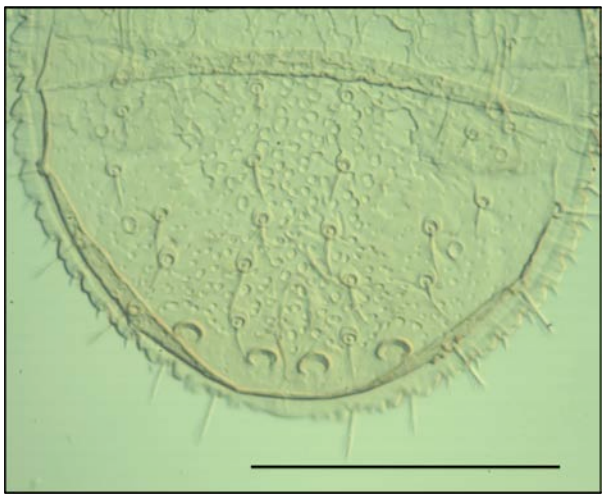

Figure 120. *Prozercon (P.) cf. fimbriatus*, male. Opisthonotal shield. Scale bar: 100 µm.

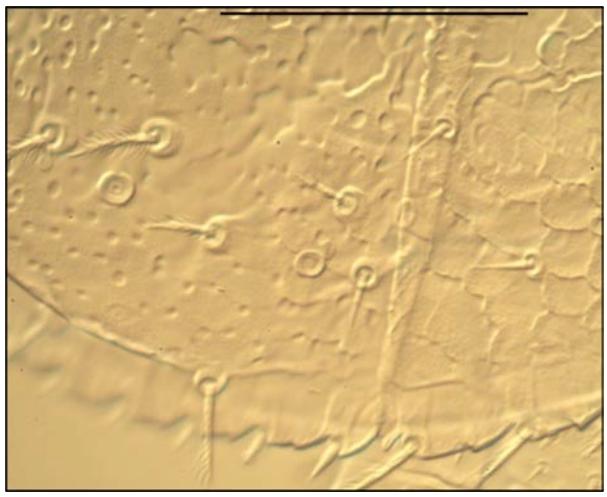

Figure 121. *Prozercon (P.) cf. fimbriatus*, male. Opisthonotal setae. Scale bar: 50 µm.

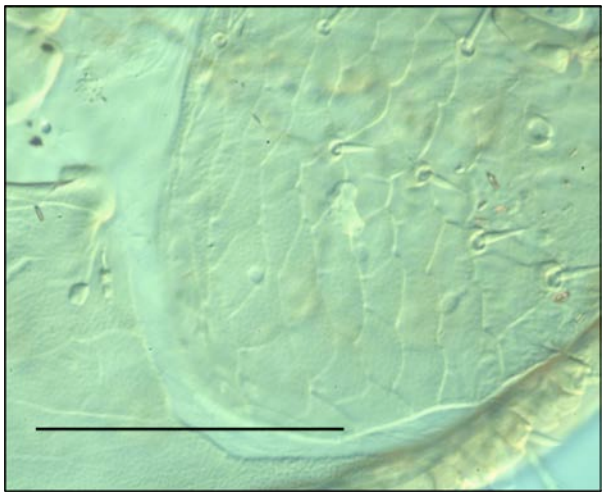

Figure 122. *Prozercon (P.) cf. fimbriatus*, female. Opisthogaster. Scale bar: 50 µm.

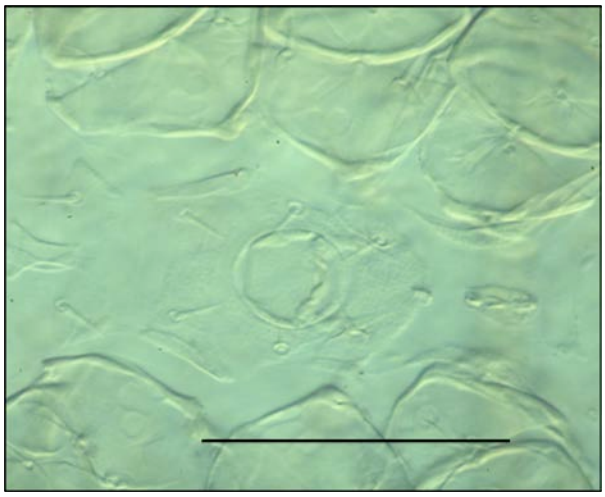

Figure 123. *Prozercon (P.) cf. fimbriatus*, male. Sterno-genital shield. Scale bar: 50 µm.

Figure 124. *Zercon (Z.) cf. gurensis*, female. Opisthogaster. Scale bar: 100 µm.

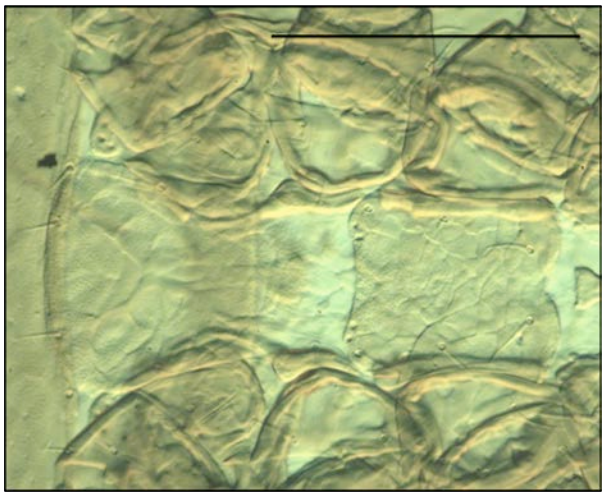

Figure 125. *Zercon (Z.) cf. gurensis*, female. Sternal and genital shields. Scale bar: 100 µm.

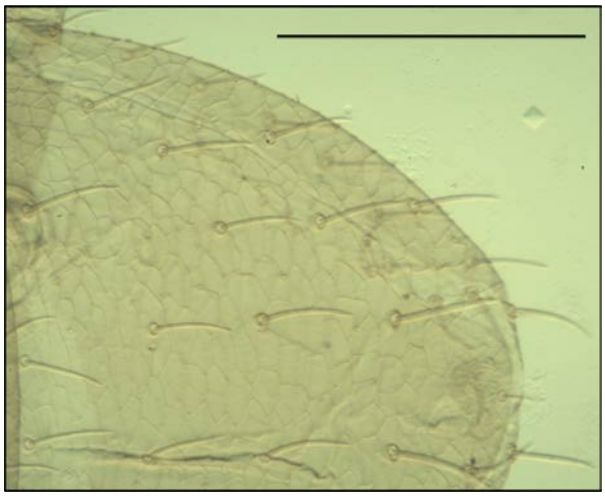

Figure 126. *Parasitus evertsi*, female. Opisthonotal shield. Scale bar: 200 µm.

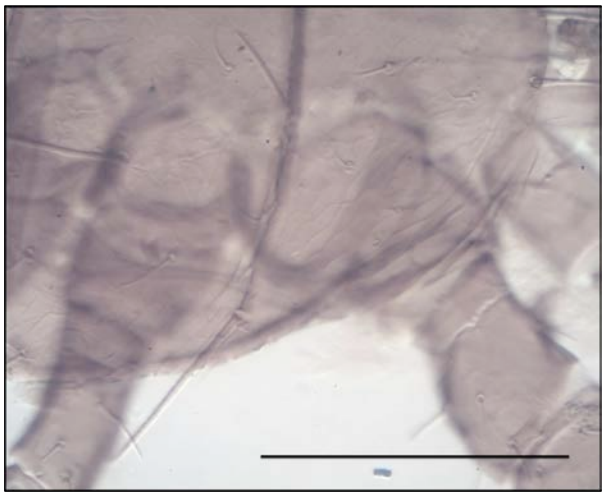

Figure 127. *Parasitus evertsi*, male. Podonotal shield. Scale bar: 200 µm.

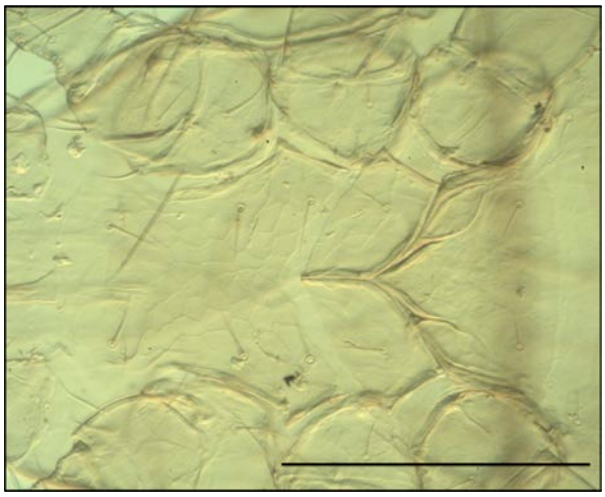

Figure 128. *Parasitus evertsi*, female. Sternal and genital shields. Scale bar: 200 µm.

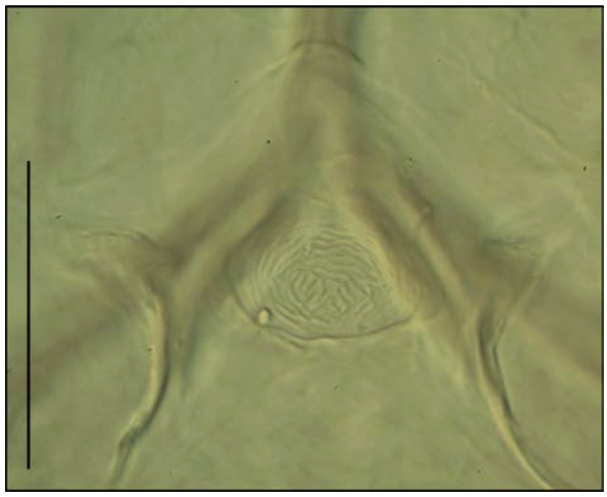

Figure 129. *Parasitus evertsi*, female. Endogynal sac. Scale bar: 50 µm.

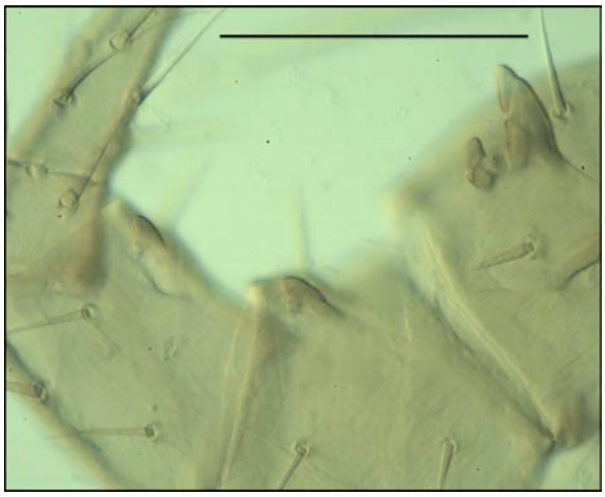

Figure 130. *Parasitus evertsi*, male. Leg II apophyses. Scale bar: 100 µm.

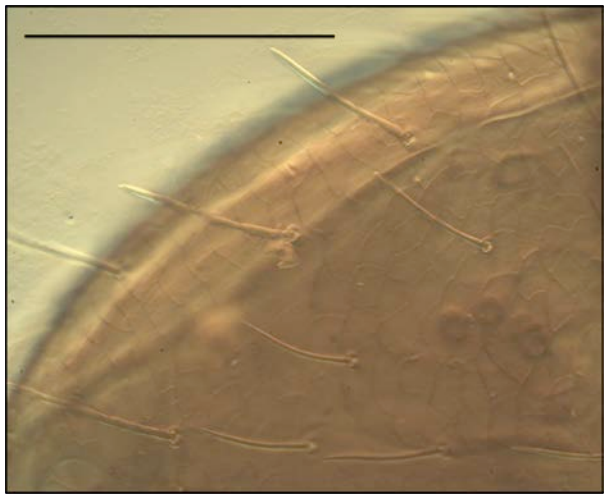

Figure 131. *Parasitus cf. lunulatus*, female. Opisthonoto. Scale bar: 200 µm.

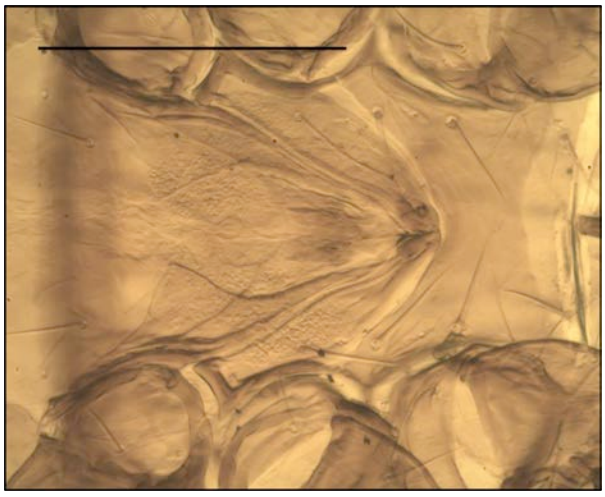

Figure 132. *Parasitus cf. lunulatus*, female. Sternal and genital shields. Scale bar: 200 µm.

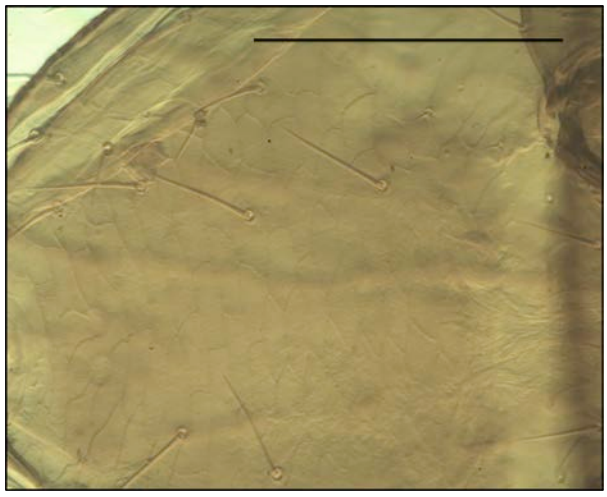

Figure 133. *Parasitus cf. lunulatus*, female. Opisthodaster. Scale bar: 200 µm.

Figure 134. *Parasitus cf. lunulatus*, male. Chelicerae. Scale bar: 100 µm.

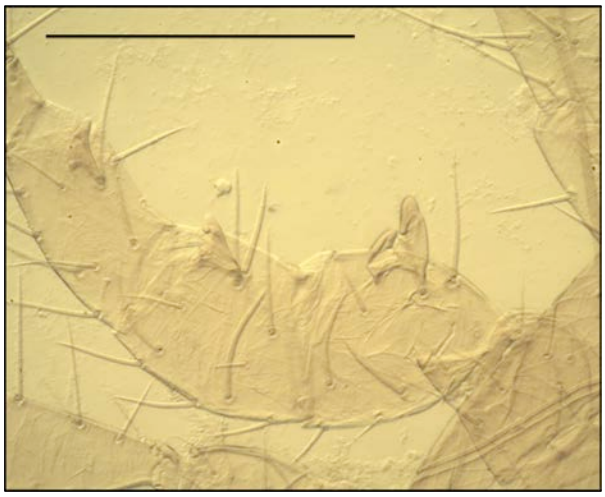

Figure 135. *Parasitus cf. lunulatus*, male. Leg II apophyses. Scale bar: 200 µm.

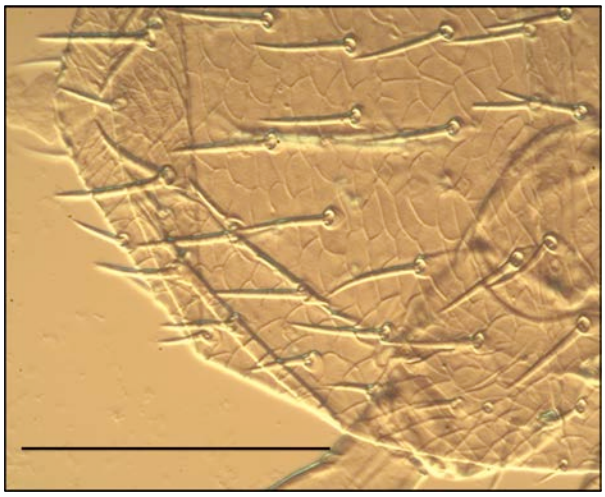

Figure 136. *Parasitus cf. nolli*, male. Opisthonoto. Scale bar: 100 µm.

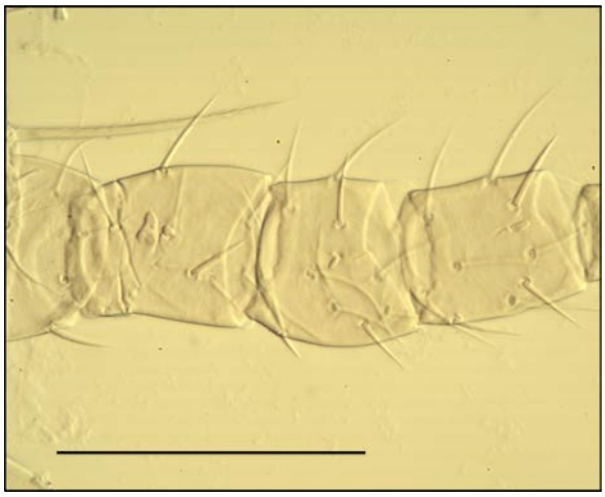

Figure 137. *Parasitus cf. nolli*, male. Leg II apophyses. Scale bar: 100 µm.

Figure 138. *Eugamasus berlesei*, female. Opisthonoto. Scale bar: 500 µm.

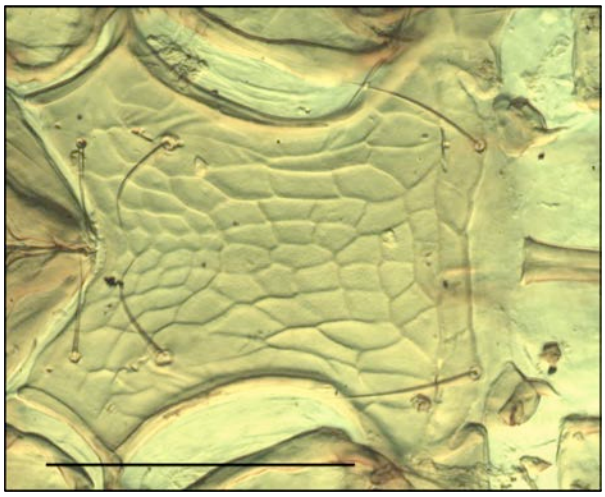

Figure 139. *Eugamasus berlesei*, female. Sternal shield. Scale bar: 200 µm.

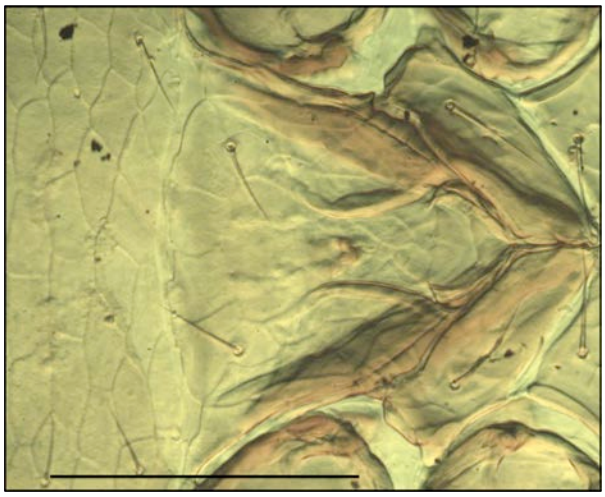

Figure 140. *Eugamasus berlesei*, female. Genital shield. Scale bar: 200 µm.

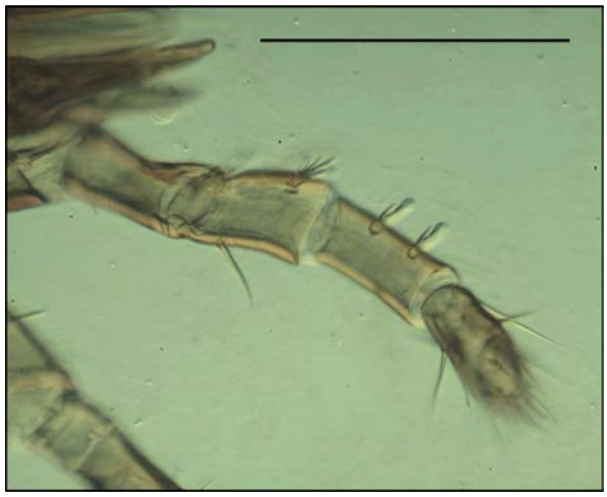

Figure 141. *Eugamasus berlesei*, female. Palp. Scale bar: 200 µm.

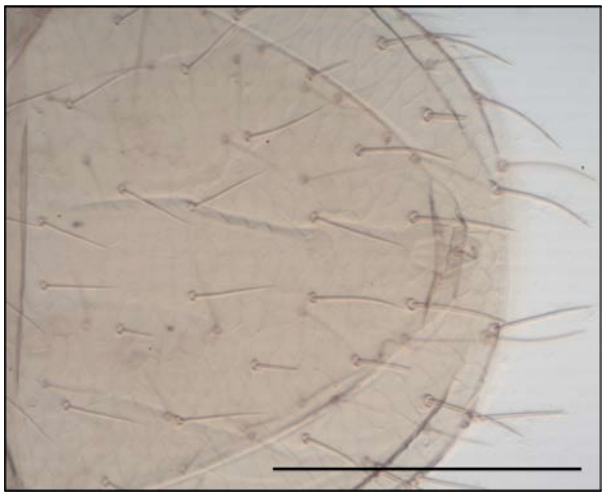

Figure 142. *Eugamasus maguliaris*, female. Opisthonoto. Scale bar: 200 µm.

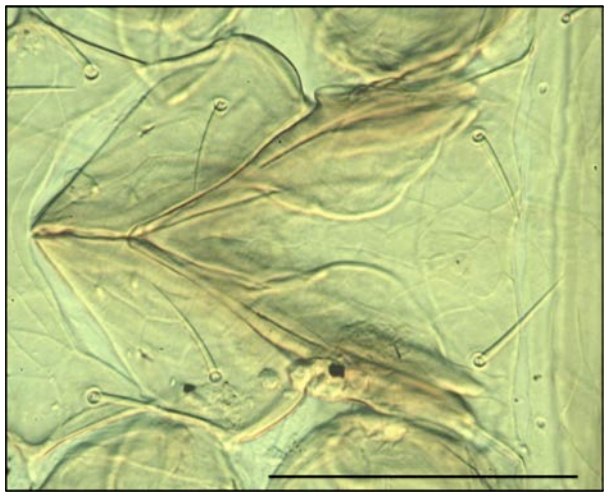

Figure 143. *Eugamasus maguliaris*, female. Genital shield. Scale bar: 100 µm.

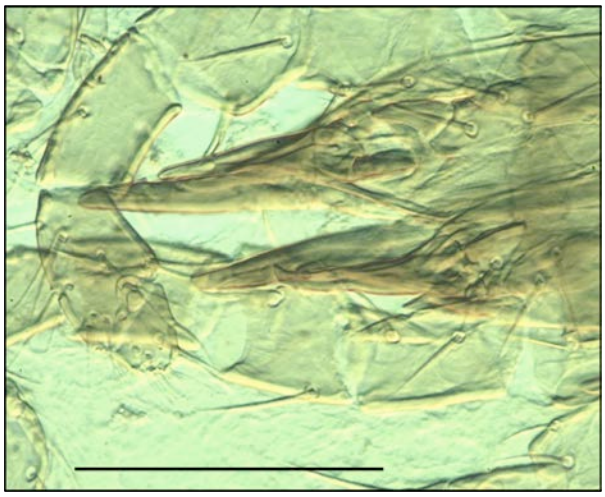

Figure 144. *Eugamasus maguliaris*, male. Chelicerae. Scale bar: 100 µm.

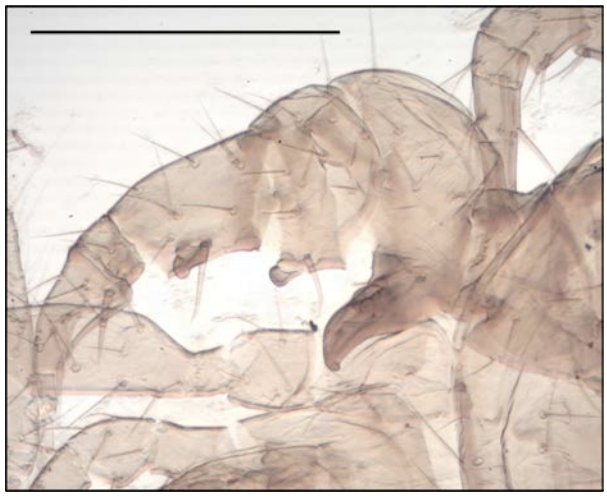

Figure 145. *Eugamasus maguliaris*, male. Leg II. Scale bar: 200 µm.

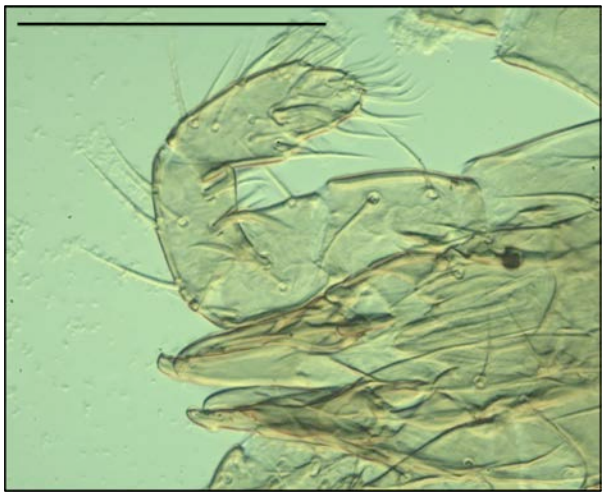

Figure 146. *Eugamasus parvulus*, male. Chelicerae. Scale bar: 100 µm.

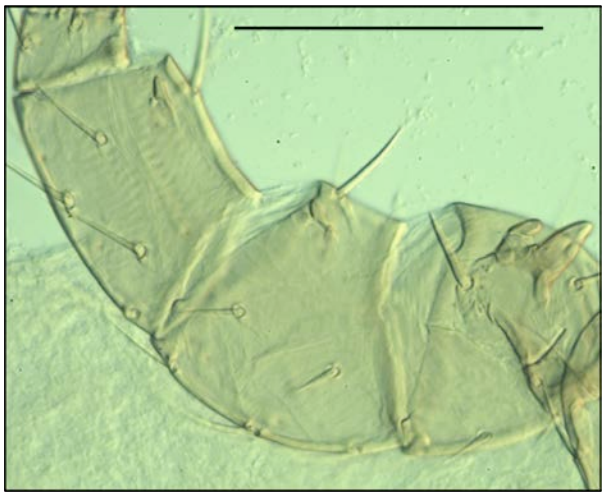

Figure 147. *Eugamasus parvulus*, male. Leg II. Scale bar: 100 µm.

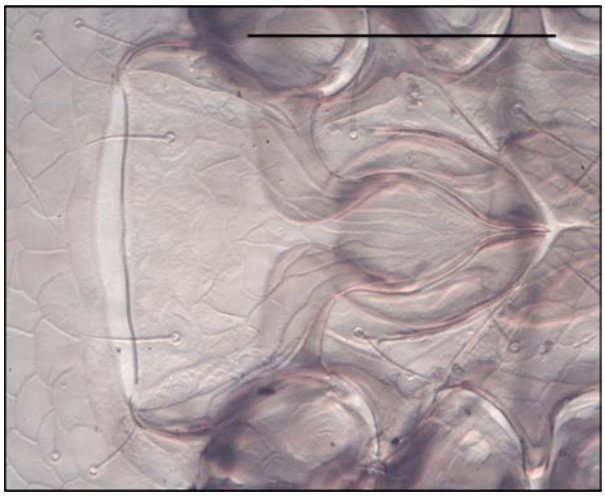

Figure 148. *Amblygamasus* sp., female. Genital shield. Scale bar: 200 µm.

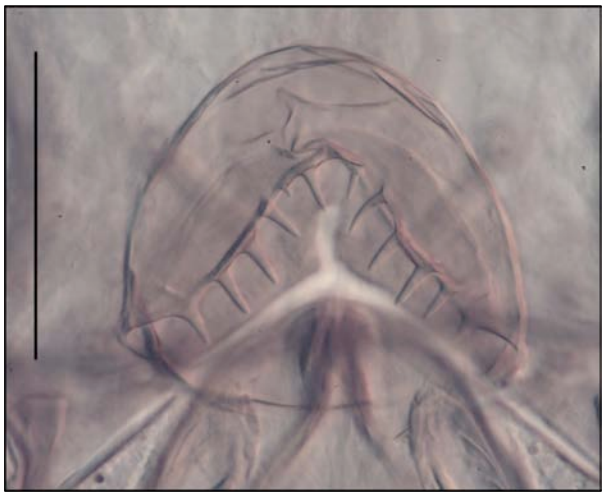

Figure 149. *Amblygamasus* sp., female. Engogynal sac. Scale bar: 100 µm.

Figure 150. *Amblygamasus* sp., female. Chelicerae. Scale bar: 200 µm.

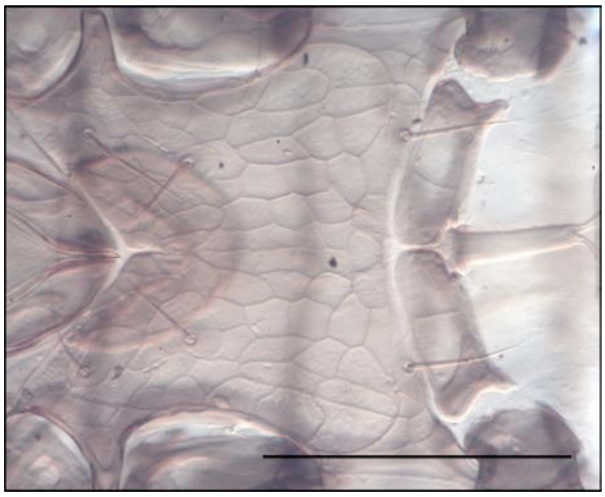

Figure 151. *Amblygamasus* sp., female. Sternal shield. Scale bar: 200 µm.

Figure 152. *Holoparasitus* sp., female. Genital shield. Scale bar: 100 µm.

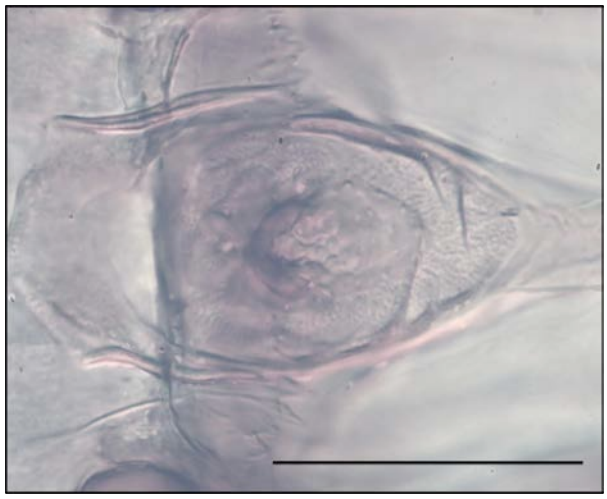

Figure 153. *Holoparasitus* sp., female. Endogynal sac. Scale bar: 50 µm.

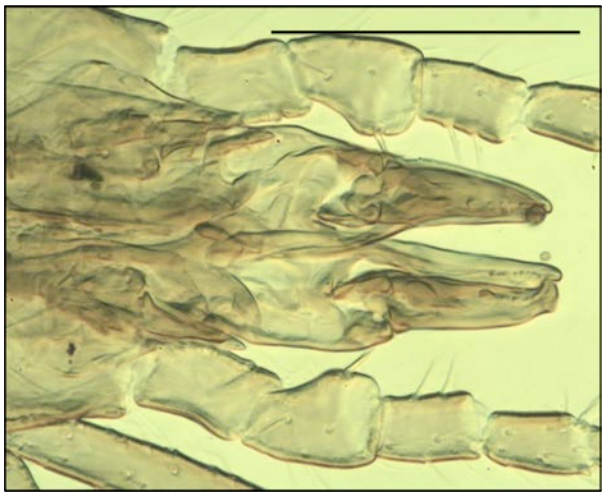

Figure 154. *Holoparasitus* sp., male. Chelicerae. Scale bar: 100 µm.

Figure 155. *Holoparasitus* sp., male. Leg II, lateral view. Scale bar: 100 µm.

Figure 156. *Holoparasitus* sp., male. Leg II, ventral view. Scale bar: 100 µm.

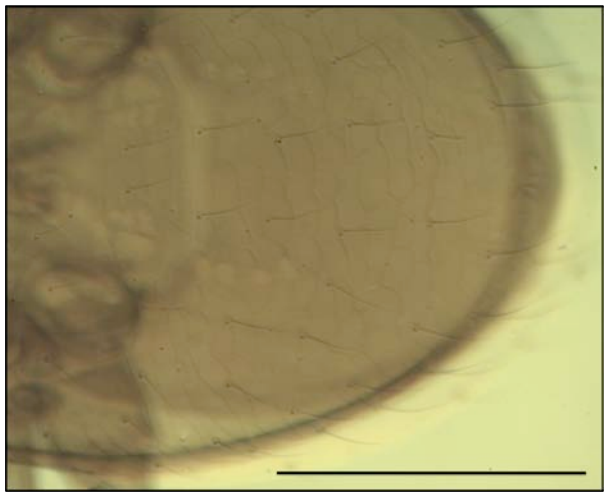

Figure 157. *Paragamasus cishispanus*, female. Opisthonoto. Scale bar 200 µm.

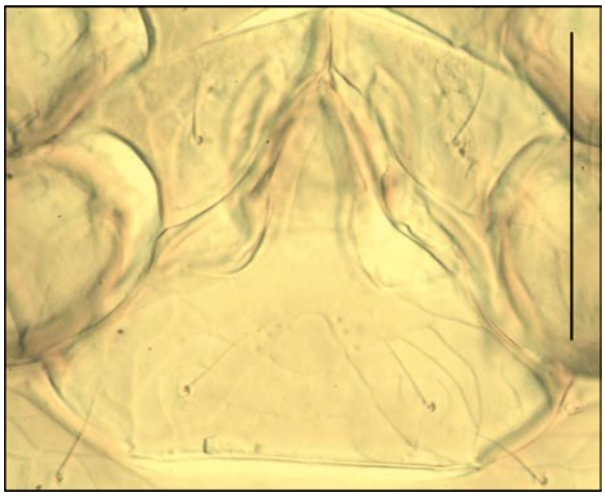

Figure 158. *Paragamasus cishispanus*, female. Genital shield. Scale bar 100 µm.

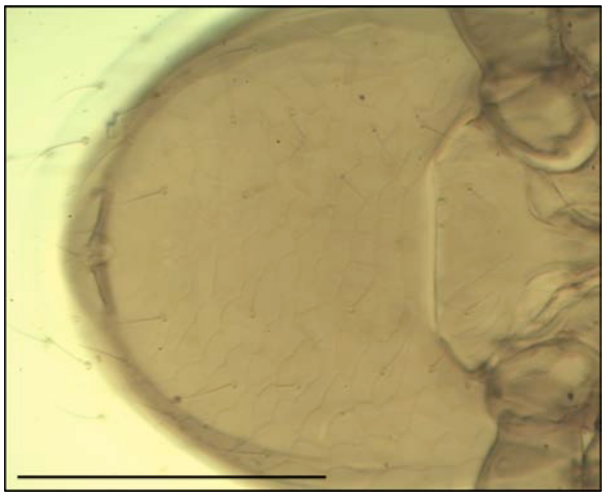

Figure 159. *Paragamasus cishispanus*, female. Opisthogaster. Scale bar 200 µm.

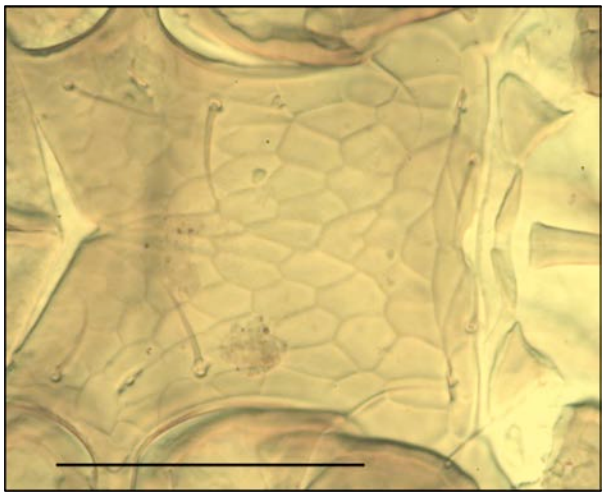

Figure 160. *Paragamasus cishispanus*, female. Sternal shield. Scale bar 100 µm.

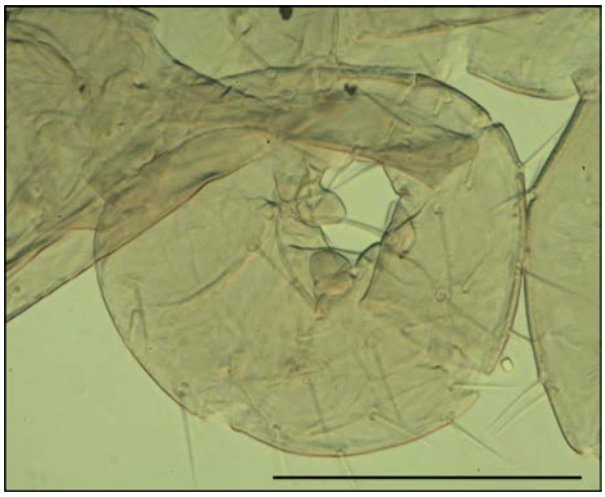

Figure 161. *Paragamasus cishispanus*, male. Leg II, lateral view. Scale bar 100 µm.

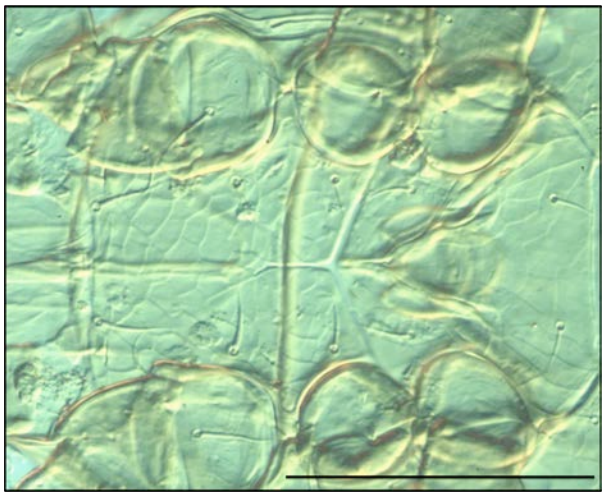

Figure 162. *Paragamasus pertrematus*, female. Sternal and genital shields. Scale bar: 100 µm.

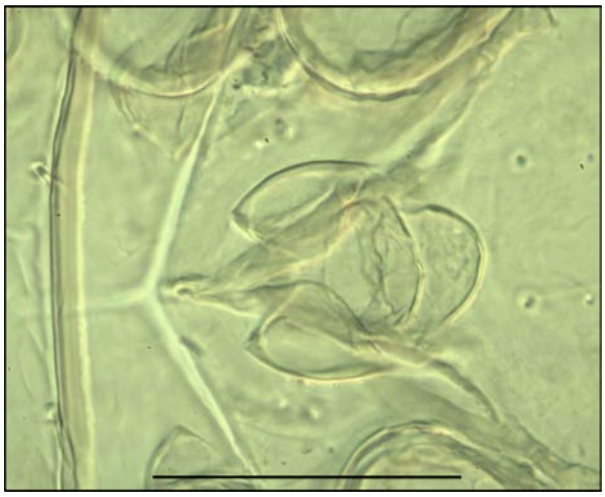

Figure 163. *Paragamasus pertrematus*, female. Endogynial sac. Scale bar: 50 µm.

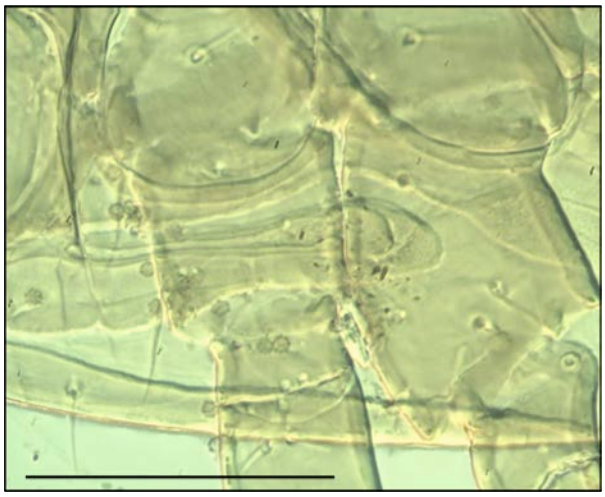

Figure 164. *Paragamasus pertrematus*, female. Peritreme. Scale bar: 50 µm.

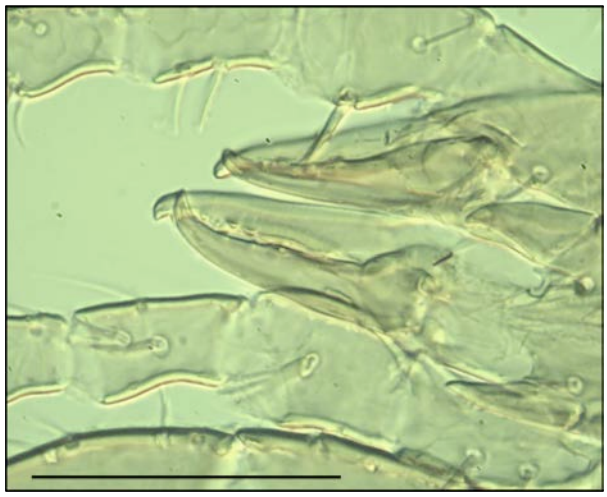

Figure 165. *Paragamasus pertrematus*, female. Chelicerae. Scale bar: 50 µm.

Figure 166. *Paragamasus pertrematus*, male. Chelicerae. Scale bar: 50 µm.

Figure 167. *Paragamasus pertrematus*, male. Leg II, lateral view. Scale bar: 50 µm.

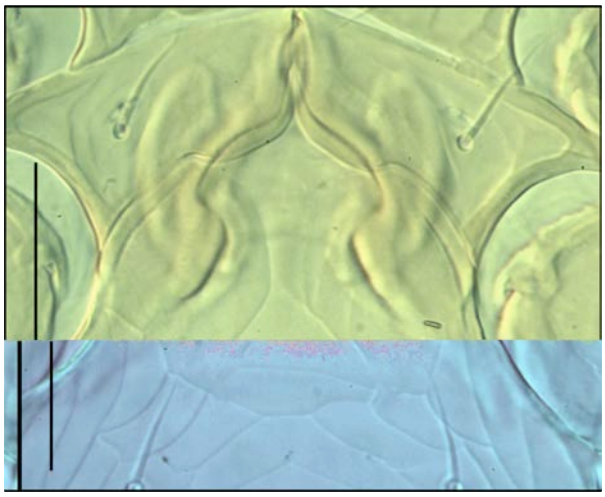

Figure 168. *Paragamasus trichinulus*, female. Genital shield. Scale bar: 50 µm.

Figure 169. *Paragamasus trichinulus*, female. Endogynial sac. Scale bar: 50 µm.

Figure 170. *Paragamasus trichinulus*, male. Chelicerae. Scale bar: 50 µm.

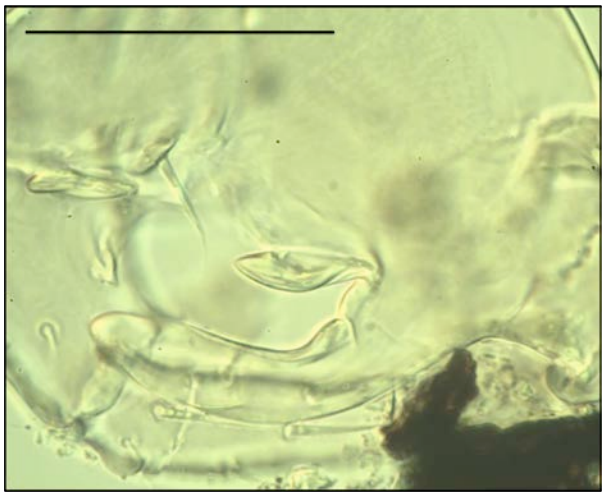

Figure 171. *Paragamasus trichinulus*, male. Leg II, lateral view. Scale bar: 50 µm.

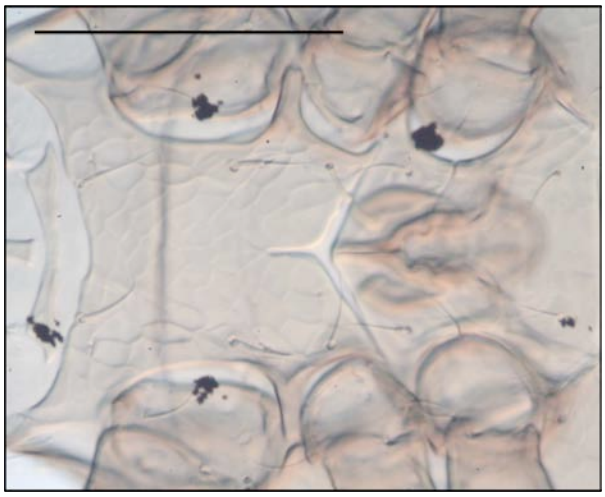

Figure 172. *Paragamasus* sp., female. Sternal and genital shields. Scale bar: 100 µm.

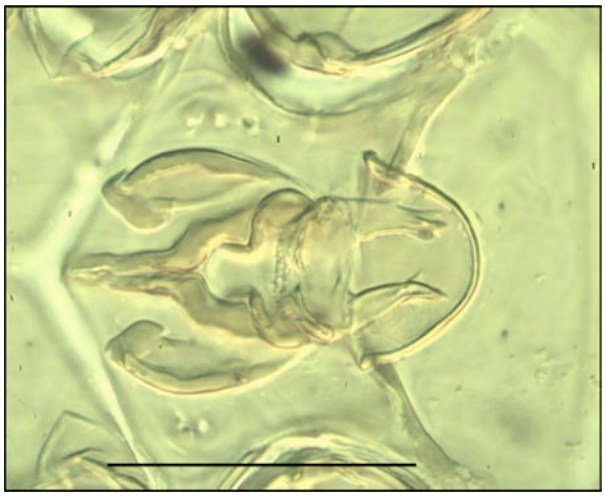

Figure 173. *Paragamasus* sp., female. Endogynial sac. Scale bar: 50 µm.

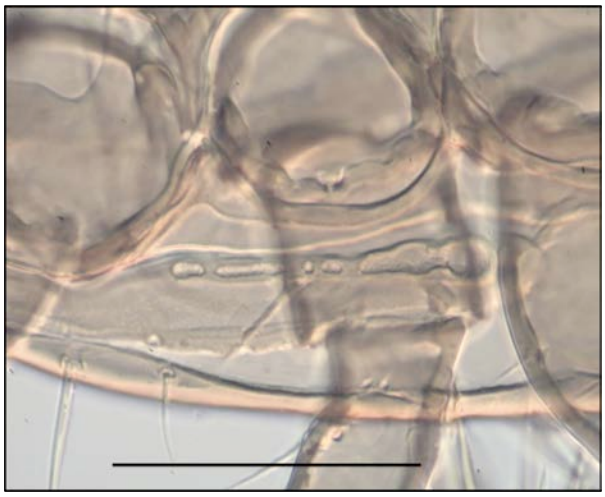

Figure 174. *Paragamasus* sp., female. Peritreme. Scale bar: 50 µm.

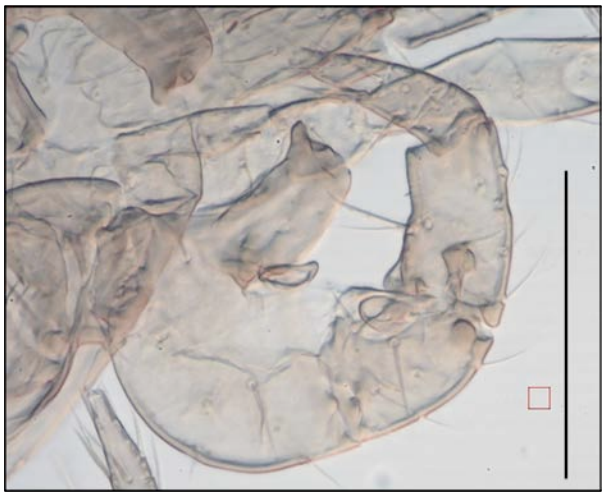

Figure 175. *Paragamasus* sp., male. Leg II, lateral view. Scale bar: 100 µm.

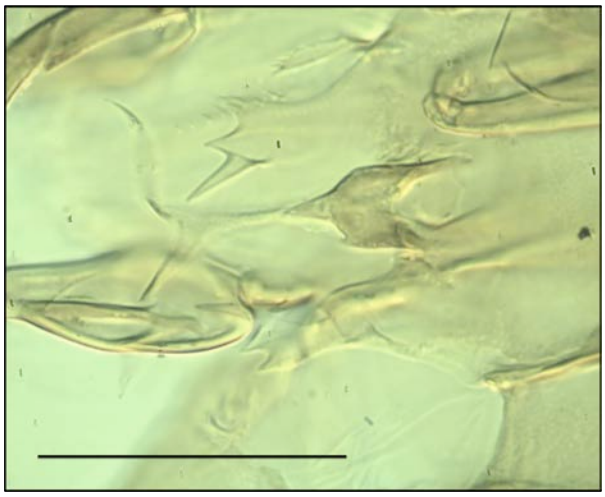

Figure 176. *Veigaia* sp., female. Tectum. Scale bar: 50 µm.

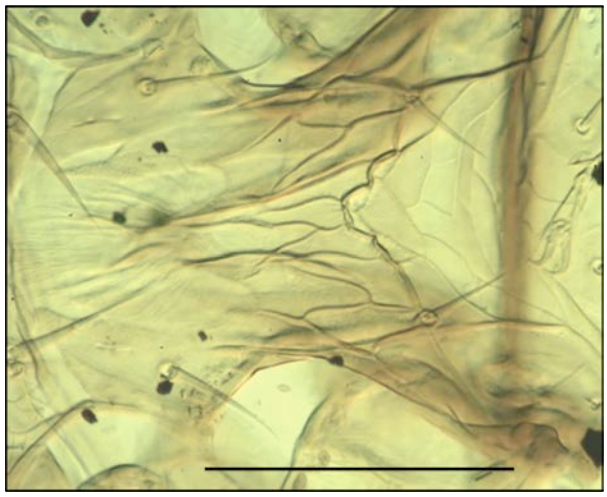

Figure 177. *Veigaia* sp., female. Genital shield. Scale bar: 100 µm.

Figure 178. *Veigaia* sp., female. Porose organ. Scale bar: 50 µm.

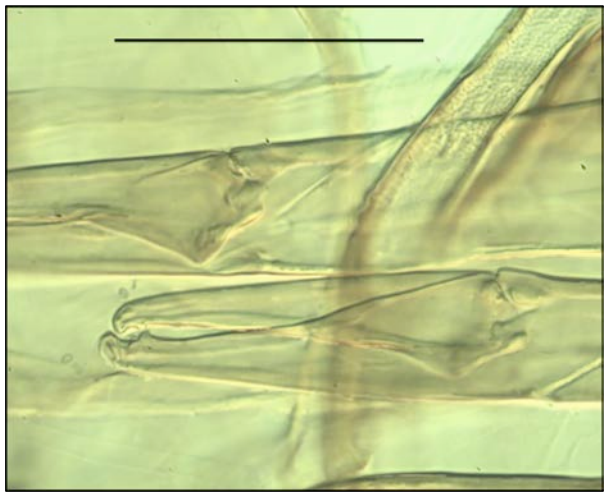

Figure 179. *Veigaia* sp., female. Chelicerae. Scale bar: 50 µm.

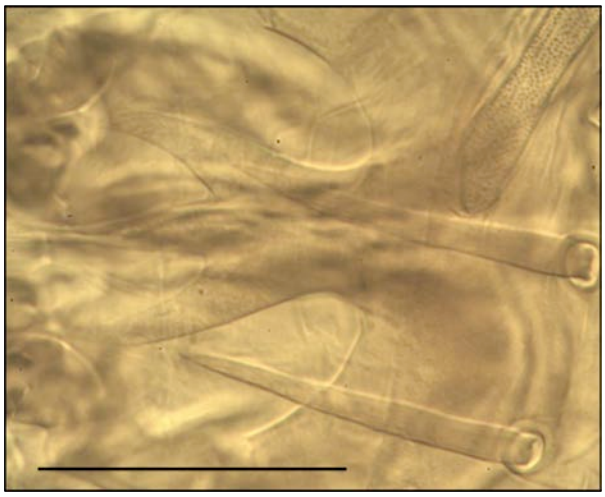

Figure 180. *Veigaia* sp., male. Tectum. Scale bar: 50 µm.

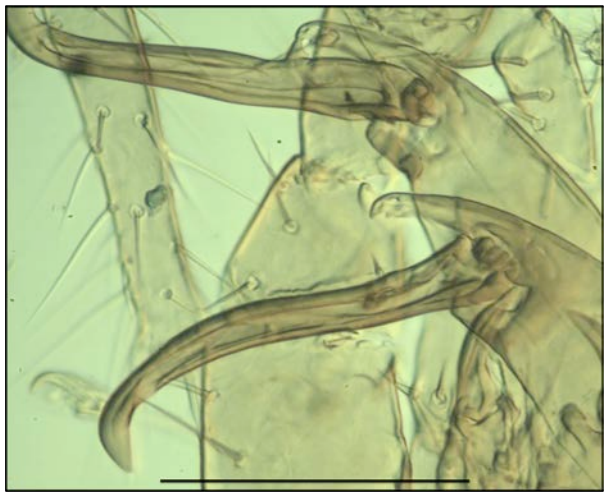

Figure 181. *Veigaia* sp., male. Chelicerae, lateral view. Scale bar: 100 µm.

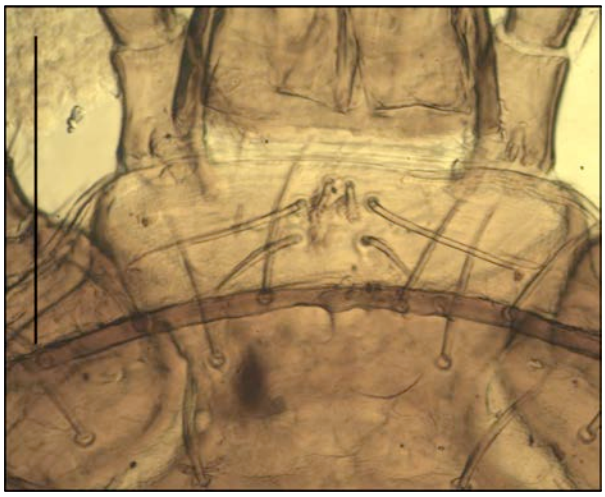

Figure 182. *Geholaspis aeneus*, female. Podonotal anterior region. Scale bar: 200 µm.

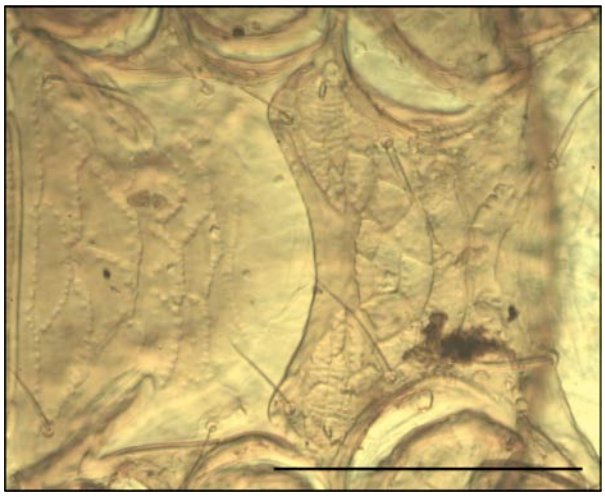

Figure 183. *Geholaspis aeneus*, female. Sternal and genital shields. Scale bar: 200 µm.

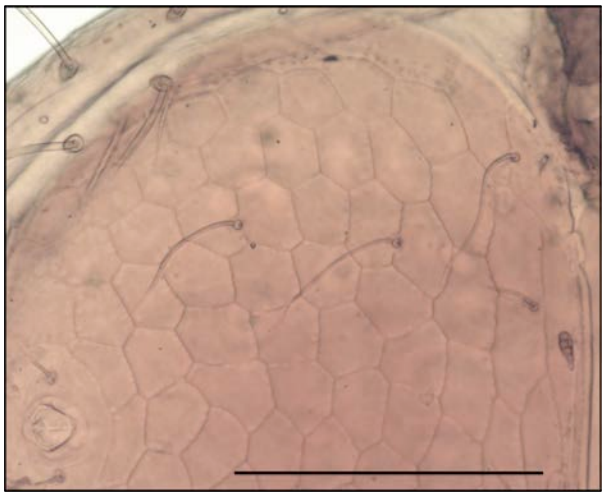

Figure 184. *Geholaspis aeneus*, female. Ventrianal shield. Scale bar: 200 µm.

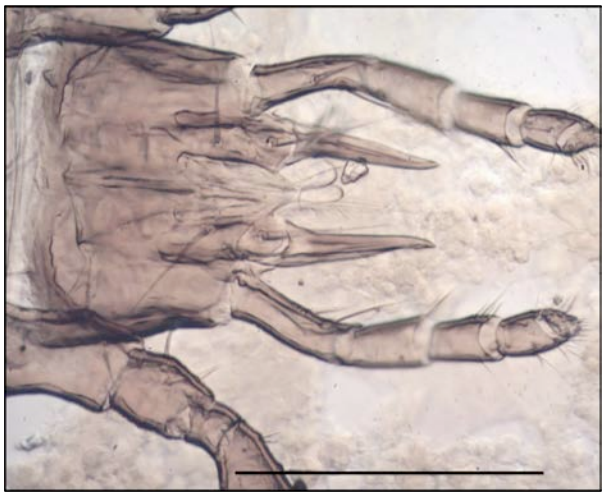

Figure 185. *Geholaspis aeneus*, female. Gnathosoma. Scale bar: 200 µm.

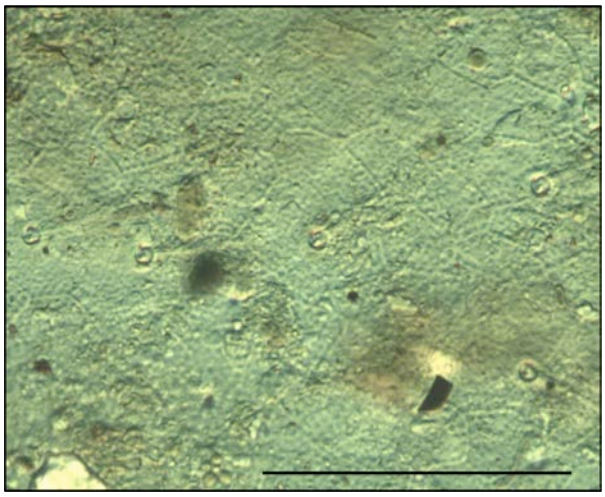

Figure 186. *Macrocheles (M.) dentatus*, female. Podonotal setae. Scale bar: 100 µm.

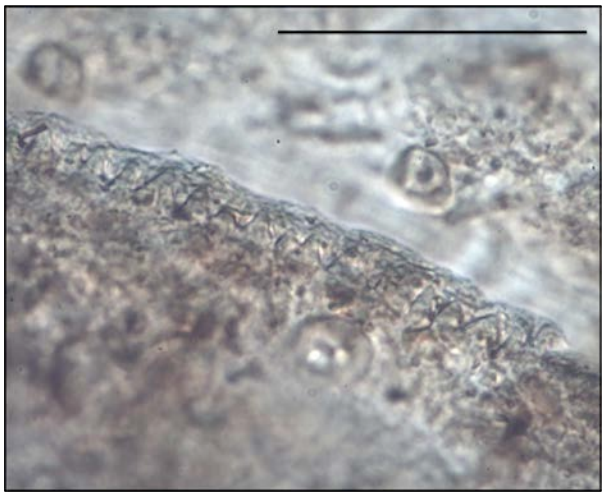

Figure 187. *Macrocheles (M.) dentatus*, female. Dorsal shield, marginal serration. Scale bar: 50 µm.

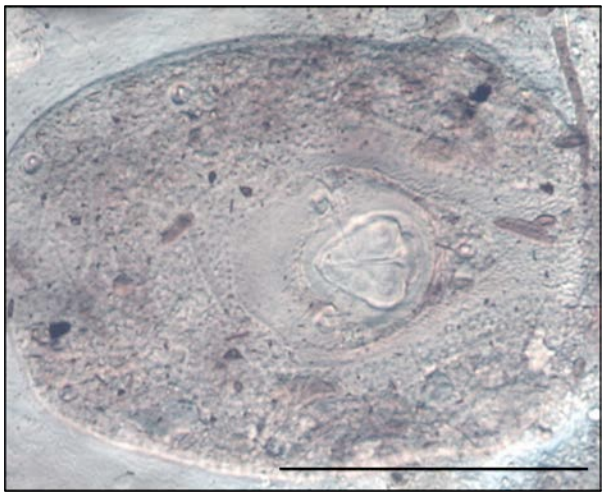

Figure 188. *Macrocheles (M.) dentatus*, female. Ventrianal shield. Scale bar: 100 µm.

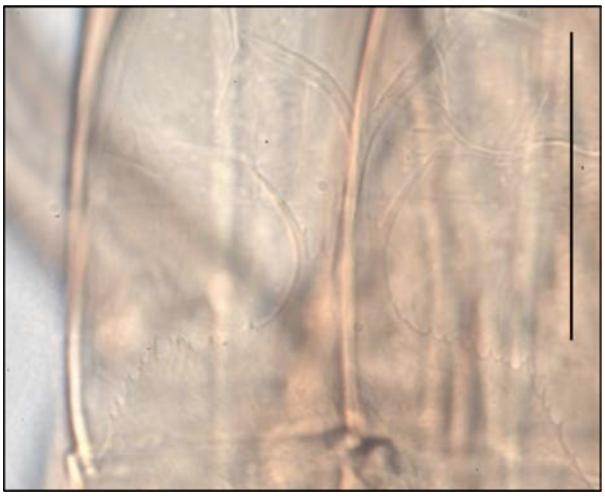

Figure 189. *Macrocheles (M.) dentatus*, female. Tectum. Scale bar: 50 µm.

Figure 190. *Macrocheles (M.) dentatus*, male. Chelicerae. Scale bar: 100 µm.

Figure 191. *Macrocheles (M.) dentatus*, male. Leg II, lateral view. Scale bar: 200 µm.

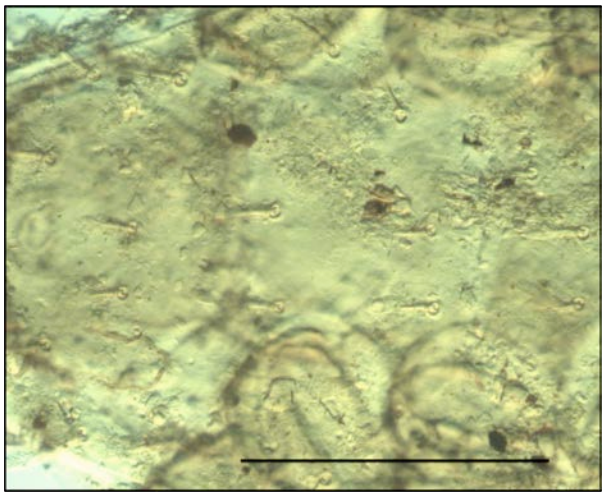

Figure 192. *Macrocheles (M.) opacus*, female. Opistonotho. Scale bar: 200 µm.

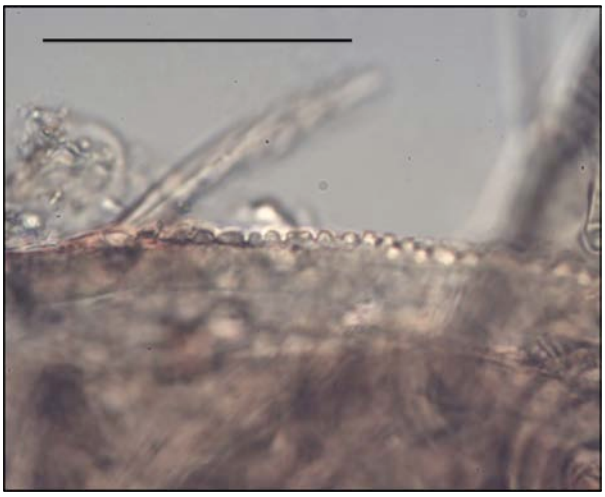

Figure 193. *Macrocheles (M.) opacus*, female. Dorsal shield, marginal serration. Scale bar: 50 µm.

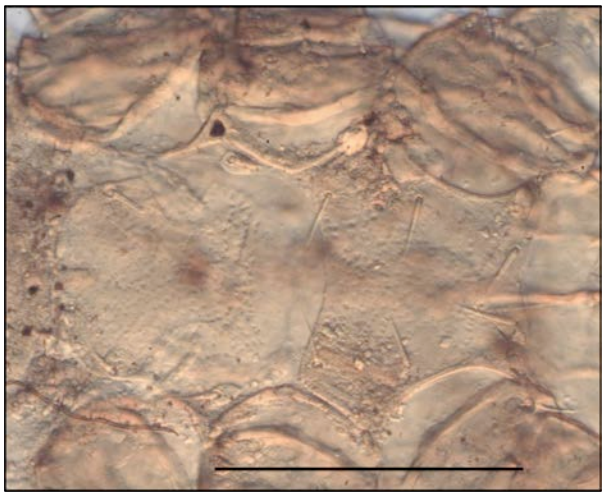

Figure 194. *Macrocheles (M.) opacus*, female. Sternal and genital shields. Scale bar: 200 µm.

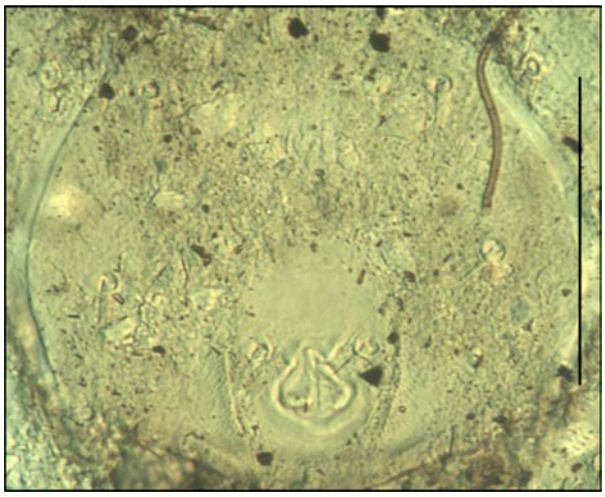

Figure 195. *Macrocheles (M.) opacus*, female. Ventrianal shield. Scale bar: 100 µm.

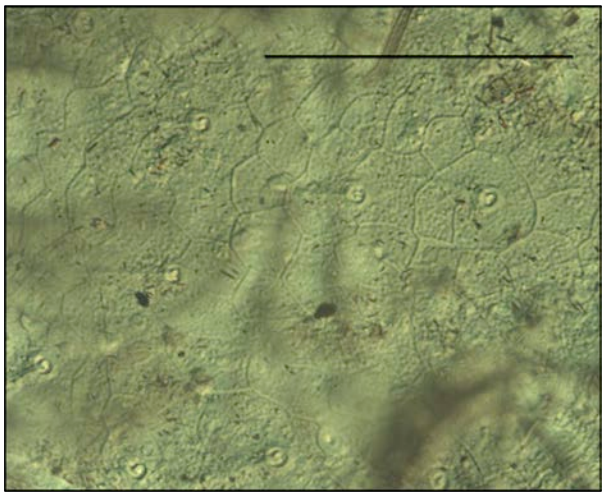

Figure 196. *Macrocheles (M.)* sp., female. Podonotal setae. Scale bar: 100 µm.

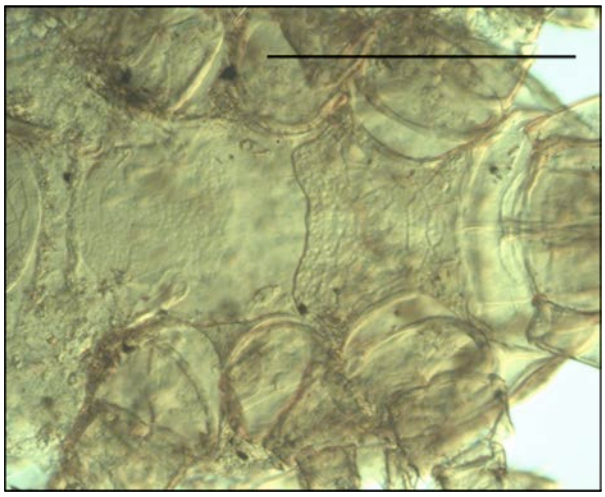

Figure 197. *Macrocheles (M.)* sp., female. Sternal and genital shields. Scale bar: 200 µm.

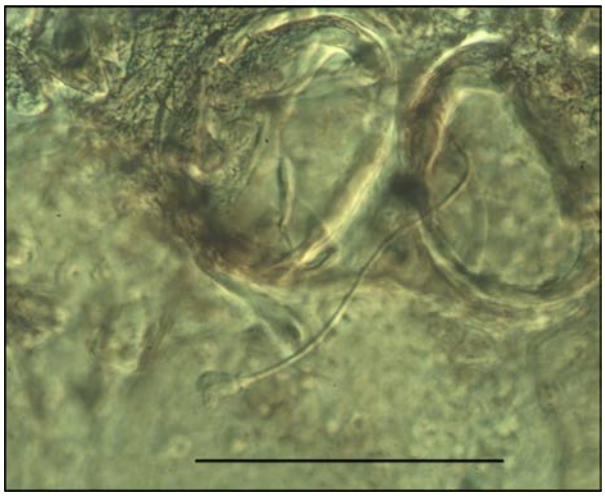

Figure 198. *Macrocheles (M.)* sp., female. Spermatheca. Scale bar: 100 µm.

Figure 199. *Macrocheles (M.)* sp., female. Ventrianal shield. Scale bar: 100 µm.

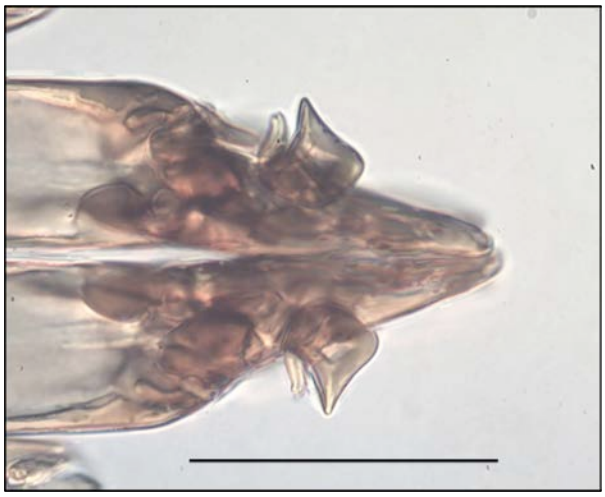

Figure 200. *Macrocheles (M.)* sp., male. Chelicera. Scale bar: 50 µm.

Figure 201. *Macrocheles (M.)* sp., male. Leg II, lateral view. Scale bar: 100 µm.

Figure 202. *Onchodellus regularis*, female. Opisthonoto. Scale bar: 200 µm.

Figure 203. *Onchodellus regularis*, female. Sternal and genital shields. Scale bar: 200 µm.

Figure 204. *Onchodellus regularis*, female. Leg II, lateral view. Scale bar: 100 µm.

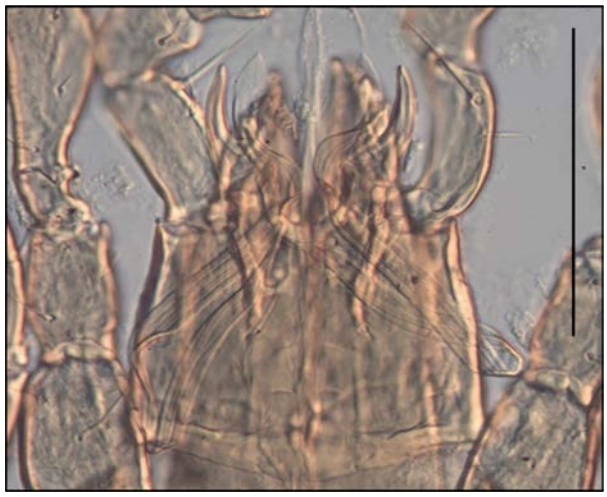

Figure 205. *Onchodellus regularis*, male. Spermathodactyl. Scale bar: 100 µm.

Figure 206. *Onchodellus regularis*, male. Leg II, lateral view. Scale bar: 100 µm.

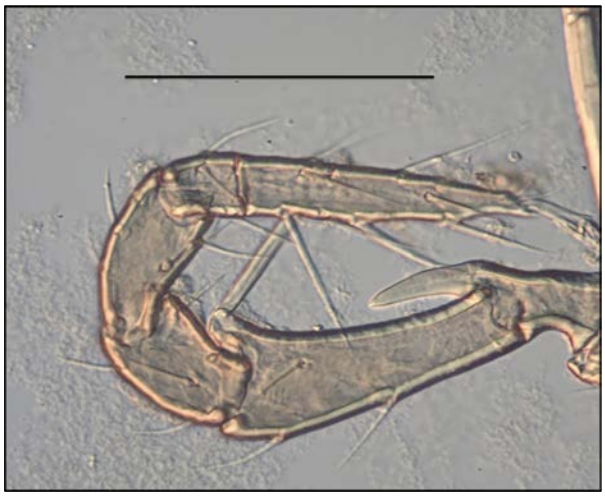

Figure 207. *Onchodellus regularis*, male. Leg IV, lateral view. Scale bar: 100 µm.

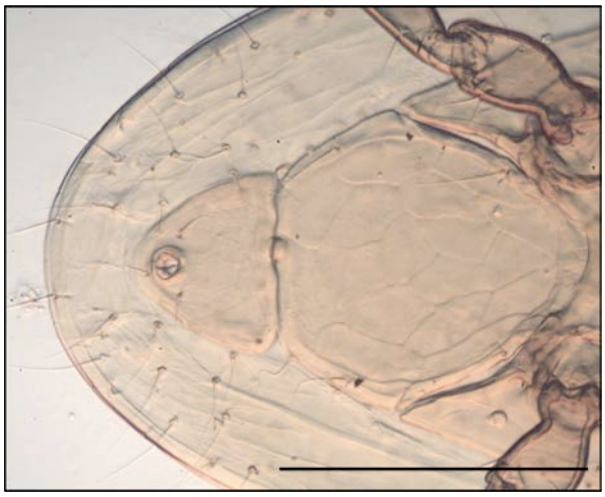

Figure 208. *Pachylaelaps (L.) cf. dubius*, female. Genital and anal shields. Scale bar: 200 µm.

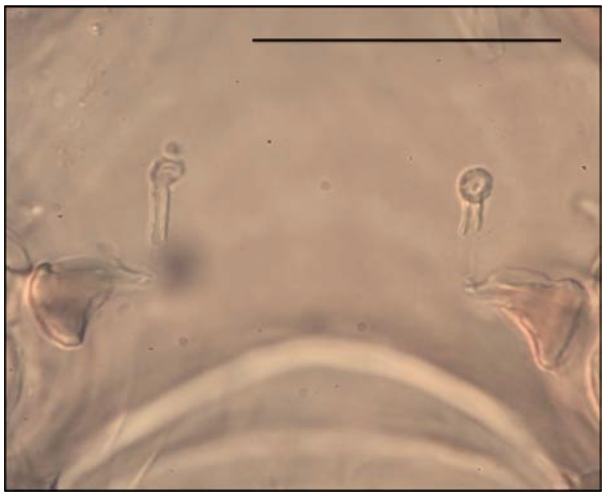

Figure 209. *Pachylaelaps (L.) cf. dubius*, female. Spermatheca. Scale bar: 50 µm.

Figure 210. *Pachylaelaps (L.) cf. dubius*, female. Leg II, lateral view. Scale bar: 100 µm.

Figure 211. *Pachylaelaps (L.) cf. dubius*, male. Chelicerae. Scale bar: 100 µm.

Figure 212. *Pachylaelaps (L.) cf. dubius*, male. Leg II, lateral view. Scale bar: 100 µm.

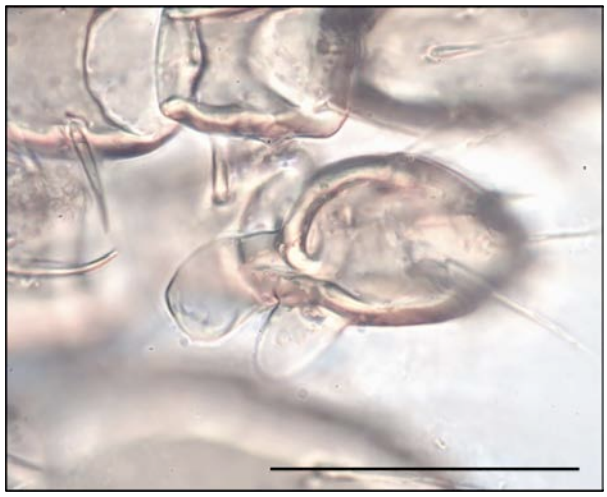

Figure 213. *Pachylaelaps (L.) cf. dubius*, male. Palp-tibial processes. Scale bar: 50 µm.

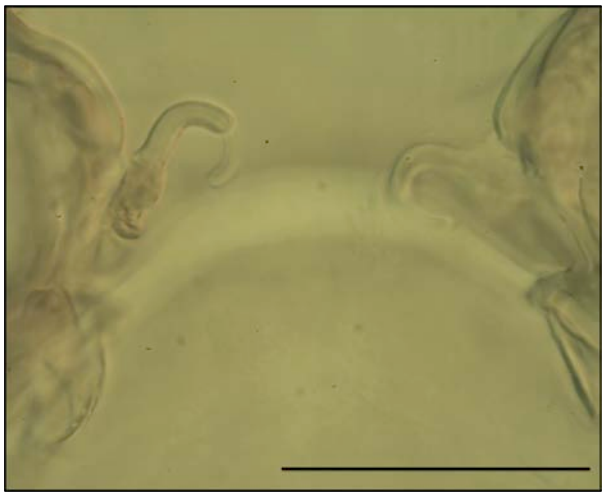

Figure 214. *Pachylaelaps (L.)* sp., female. Spermatheca. Scale bar: 50 µm.

Figure 215. *Pachylaelaps (L.)* sp., male. Leg II, lateral view. Scale bar: 100 µm.

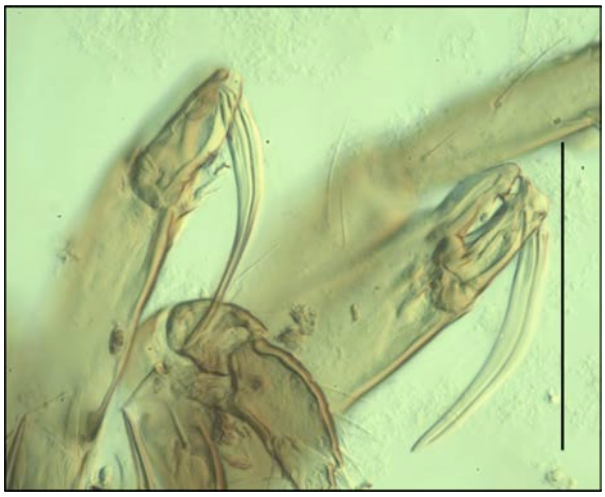

Figure 216. *Pachylaelaps (L.)* sp., male. Chelicerae. Scale bar: 100 µm.

Figure 217. *Pachylaelaps (L.)* sp., male. Palp-tibial processes. Scale bar: 50 µm.

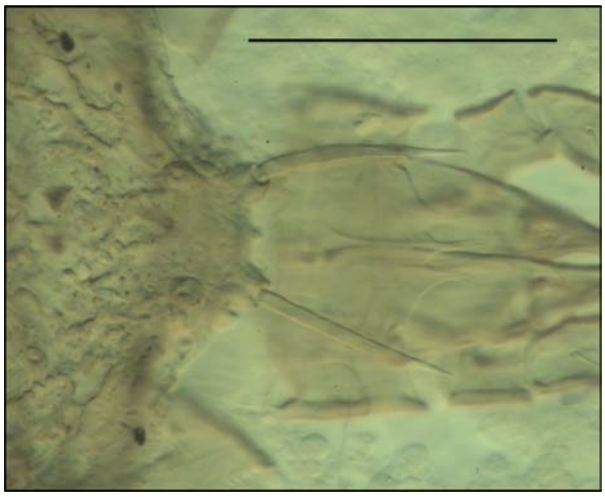

Figure 218. *Cheiroseius viduus*, female. Dorsal setae *j1*. Scale bar: 100 µm.

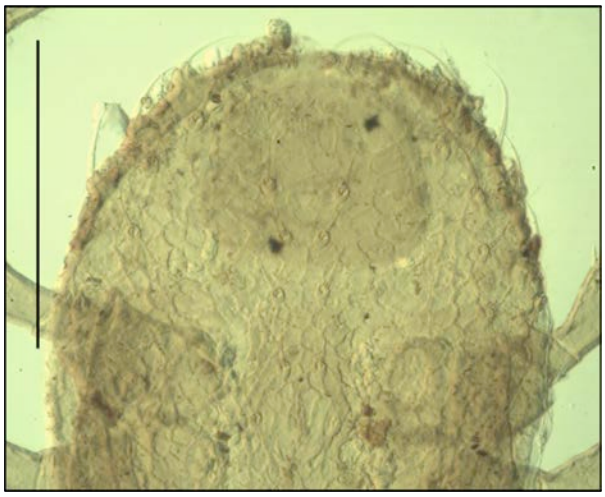

Figure 219. *Cheiroseius viduus*, female. Opisthonoto. Scale bar: 200 µm.

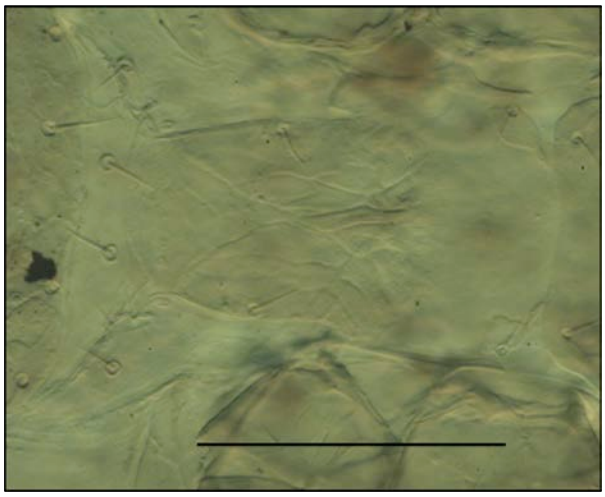

Figure 220. *Cheiroseius viduus*, female. Genital shield. Scale bar: 100 µm.

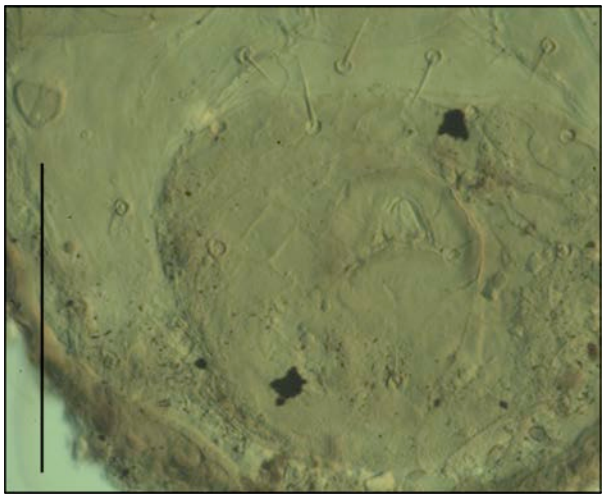

Figure 221. *Cheiroseius viduus*, female. Ventrianal shield. Scale bar: 100 µm.

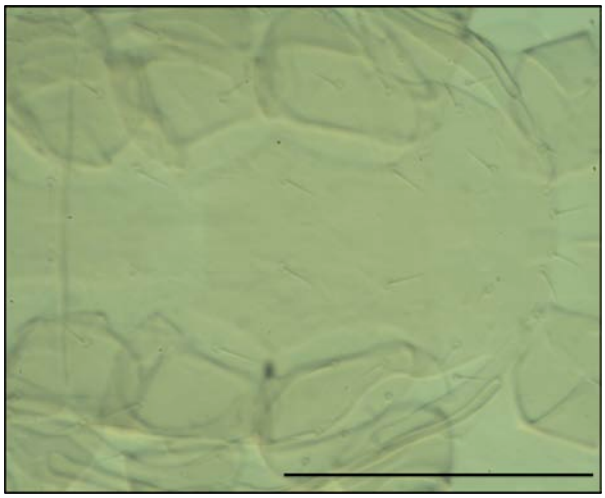

Figure 222. *Gamasellodes major*, female. Podonotum. Scale bar: 100 µm.

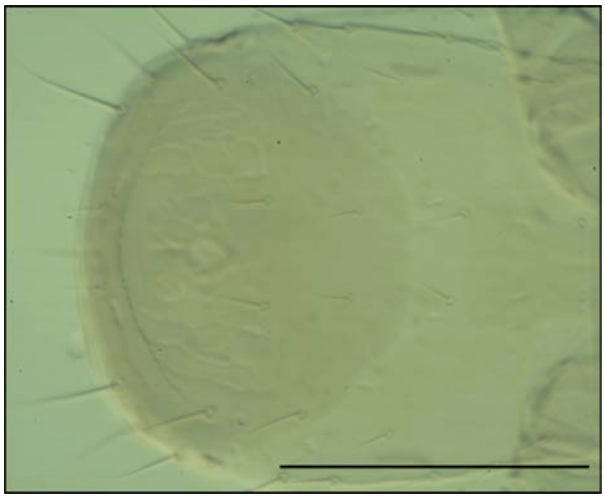

Figure 223. *Gamasellodes major*, female. Opisthonotum. Scale bar: 100 µm.

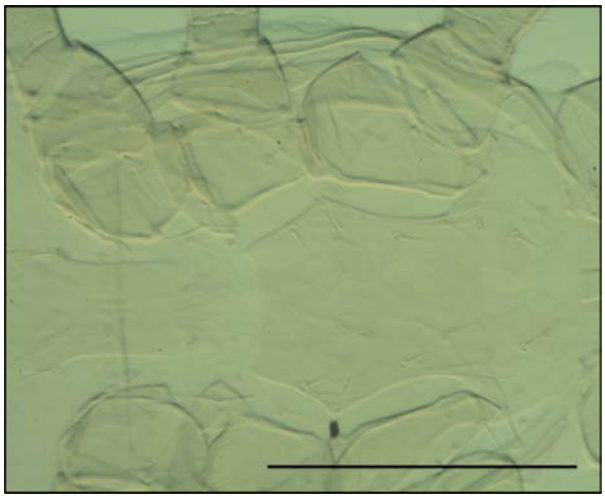

Figure 224. *Gamasellodes major*, female. Sternal and genital shields. Scale bar: 100 µm

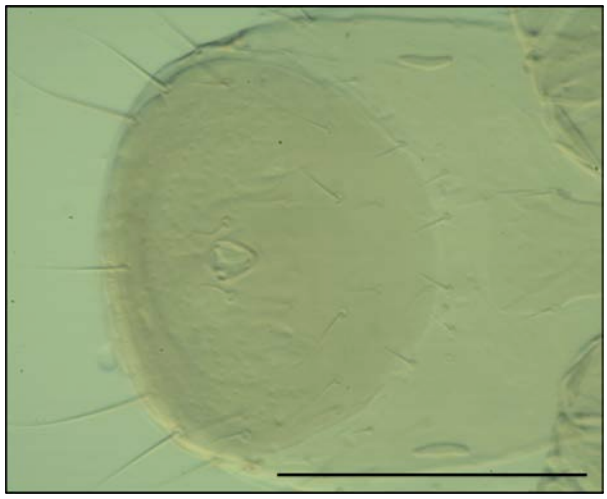

Figure 225. *Gamasellodes major*, female. Ventrianal shield. Scale bar: 100 µm

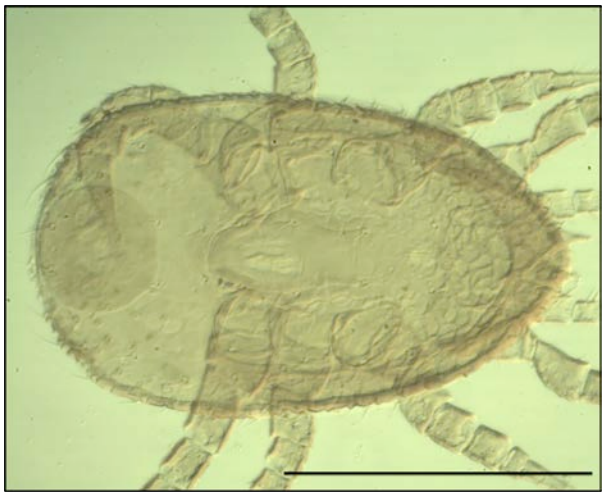

Figure 226. *Iphidozercon gibbus*, female. Dorsal view. Scale bar: 200 µm.

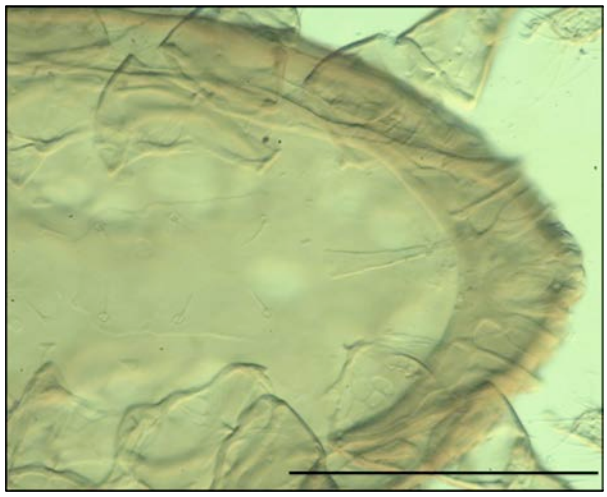

Figure 227. *Iphidozercon gibbus*, female. Dorsal shield, anterior edge, ventral view.
Scale bar: 100 µm.

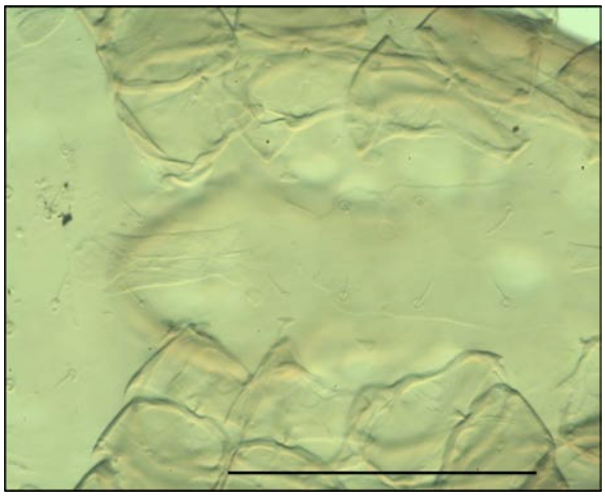

Figure 228. *Iphidozercon gibbus*, female. Sternal and genital shields. Scale bar: 100 µm.

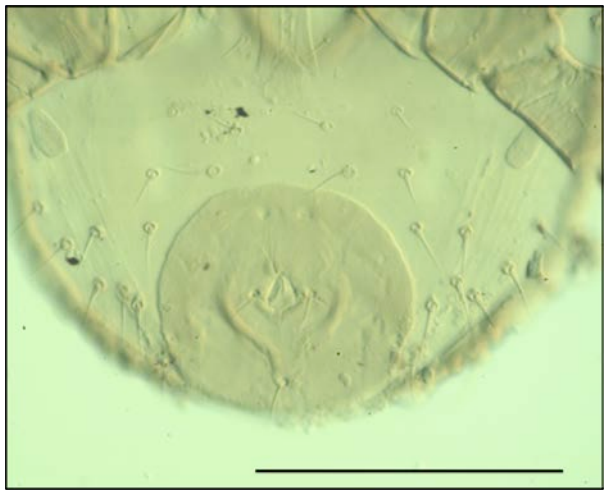

Figure 229. *Iphidozercon gibbus*, female. Ventrianal shield. Scale bar: 100 µm.

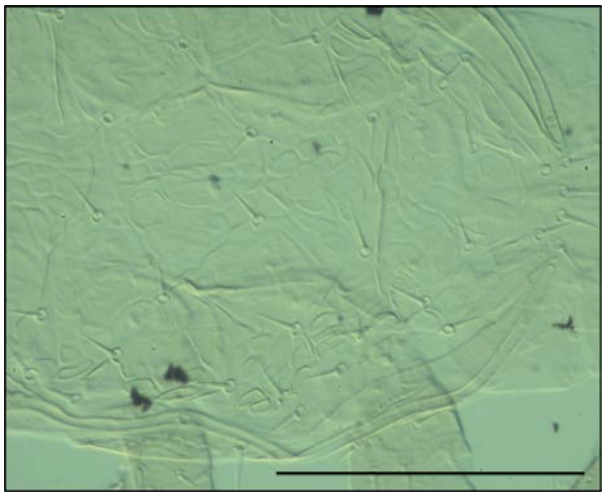

Figure 230. *Leioseius elongatus*, female. Podonotum. Scale bar: 100 µm.

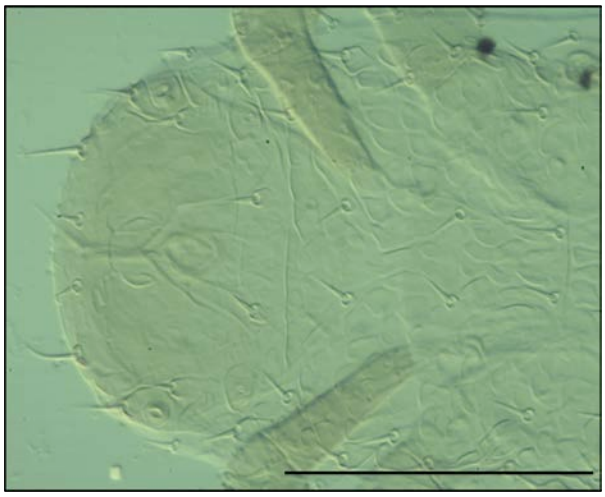

Figure 231. *Leioseius elongatus*, female. Opisthonotum. Scale bar: 100 µm.

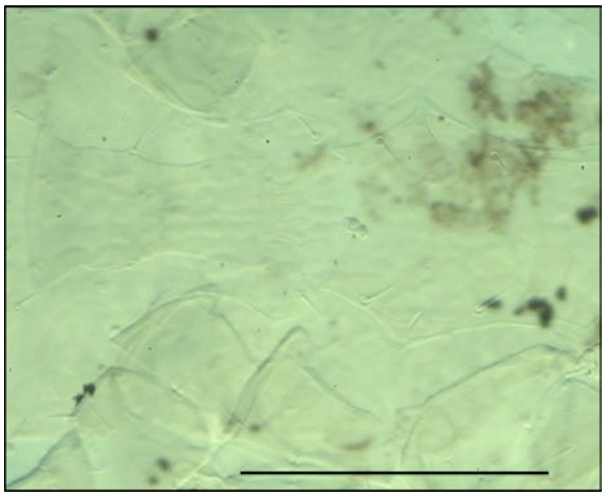

Figure 232. *Leioseius elongatus*, female. Sternal and genital shields. Scale bar: 100 µm.

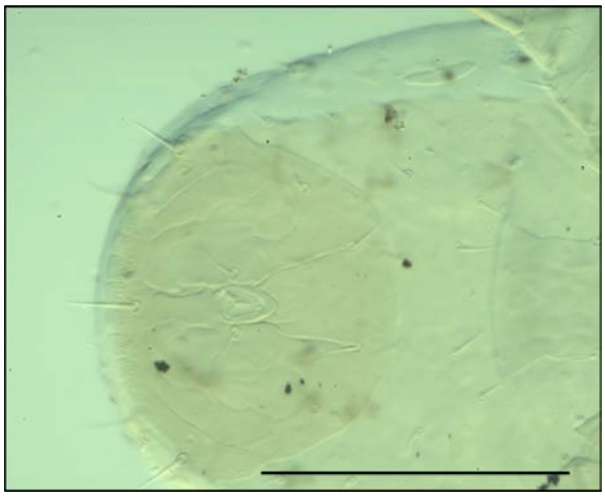

Figure 233. *Leioseius elongatus*, female. Ventrianal shield. Scale bar: 100 µm.

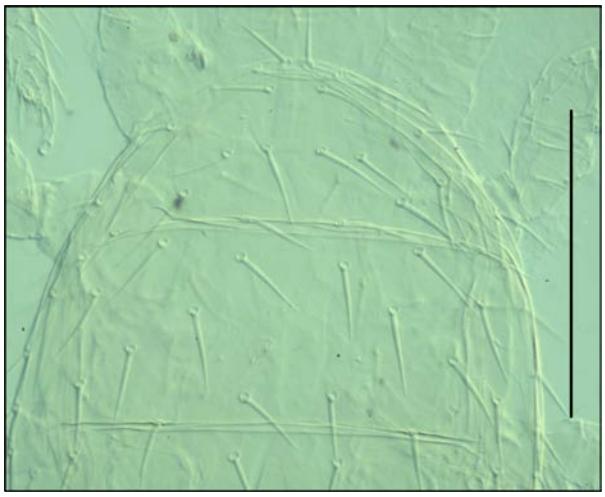

Figure 234. *Proctolaelaps (P.) pygmaeus*, female. Podonotum. Scale bar: 100 µm.

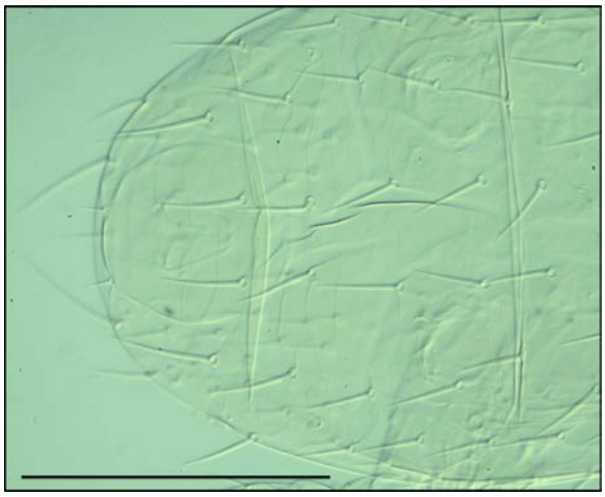

Figure 235. *Proctolaelaps (P.) pygmaeus*, female. Opisthonotum. Scale bar: 100 µm.

Figure 236. *Proctolaelaps (P.) pygmaeus*, female. Sternal and genital shields. Scale bar: 100 µm.

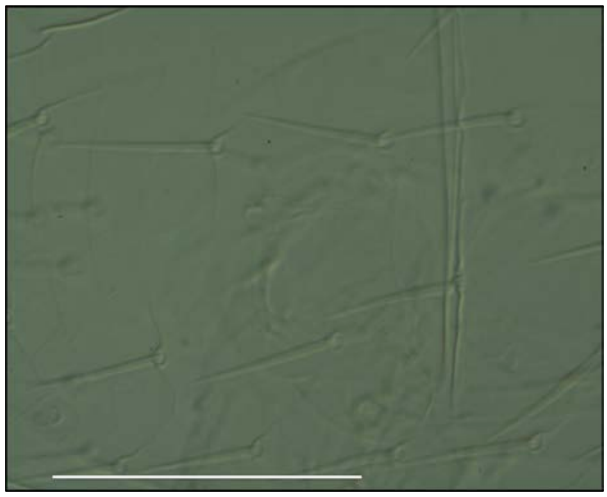

Figure 237. *Proctolaelaps (P.) pygmaeus*, female. Spermatheca. Scale bar: 50 µm.

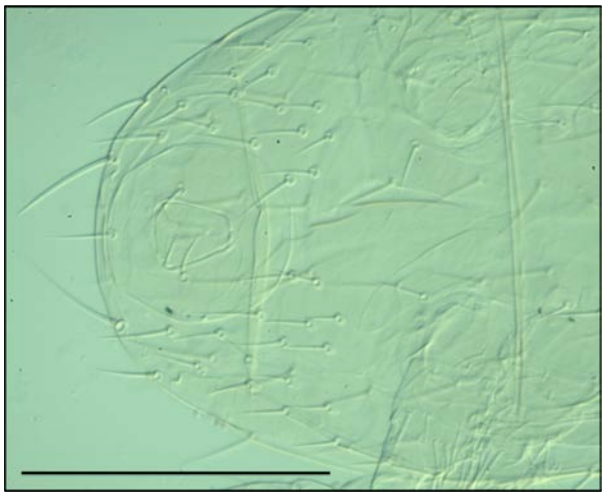

Figure 238. *Proctolaelaps (P.) pygmaeus*, female. Opisthogaster. Scale bar: 100 µm.

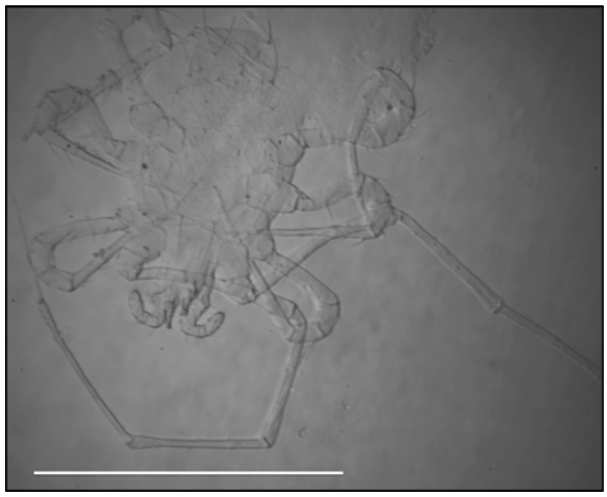

Figure 239. *Podocinum pacificum*, female. Habitus. Scale bar: 500 µm.

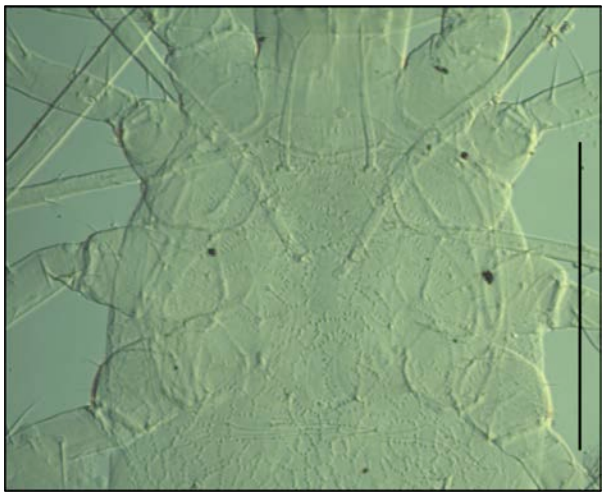

Figure 240. *Podocinum pacificum*, female. Podonotum. Scale bar: 200 µm.

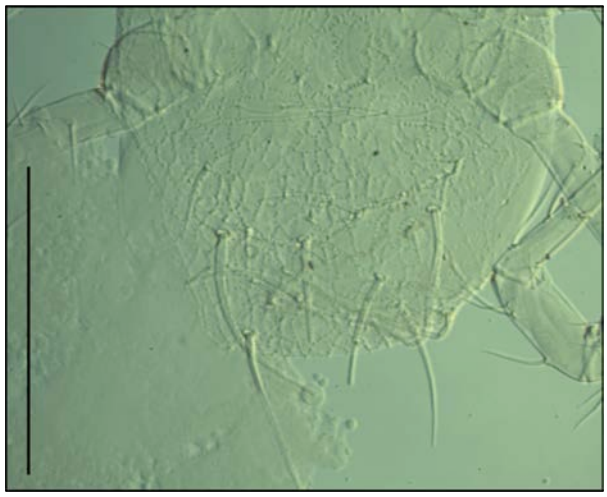

Figure 241. *Podocinum pacificum*, female. Opisthonotum. Scale bar: 200 µm.

Figure 242. *Cilliba cassidoidea*, female. Habitus. Scale bar: 500 µm.

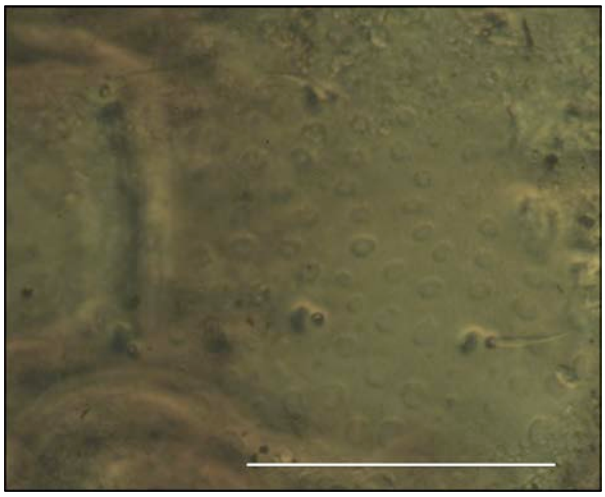

Figure 243. *Cilliba cassidoidea*, female. Dorsal ornamentation and setae. Scale bar: 100 µm.

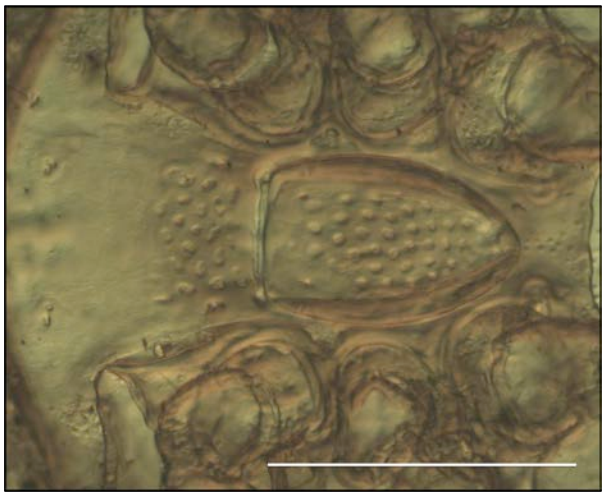

Figure 244. *Cilliba cassidoidea*, female. Genital shield. Scale bar: 200 µm.

Figure 245. *Cilliba cassidoidea*, female. Palp. Scale bar: 100 µm.

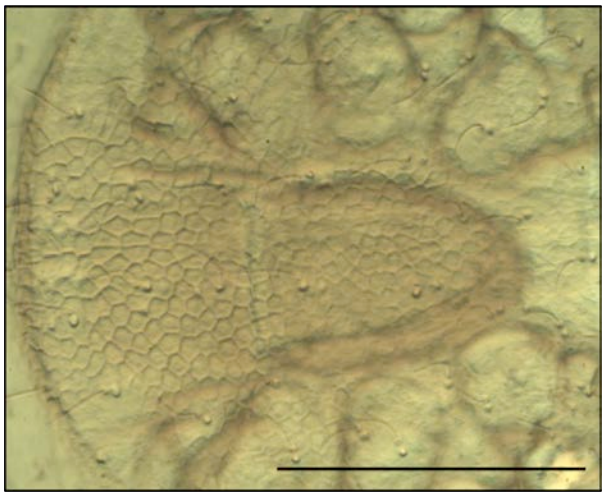

Figure 246. *Cilliba insularis*, female. Dorsal ornamentation and setae. Scale bar: 200 µm.

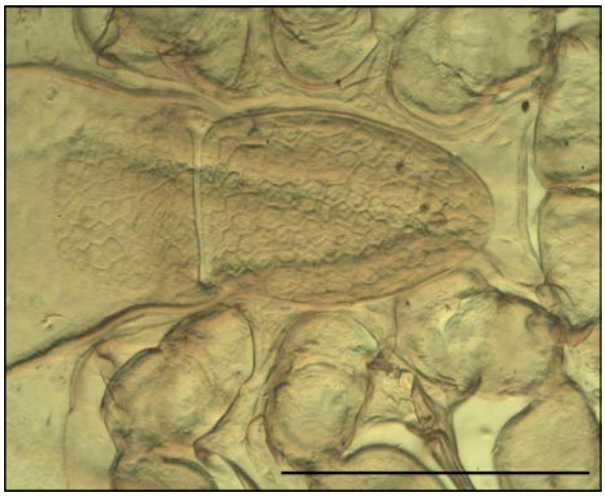

Figure 247. *Cilliba insularis*, female. Genital shield. Scale bar: 200 µm.

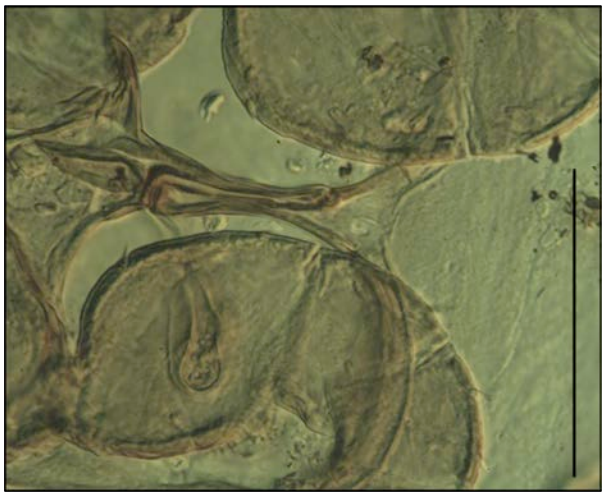

Figure 248. *Cilliba insularis*, female. Peritreme. Scale bar: 100 µm.

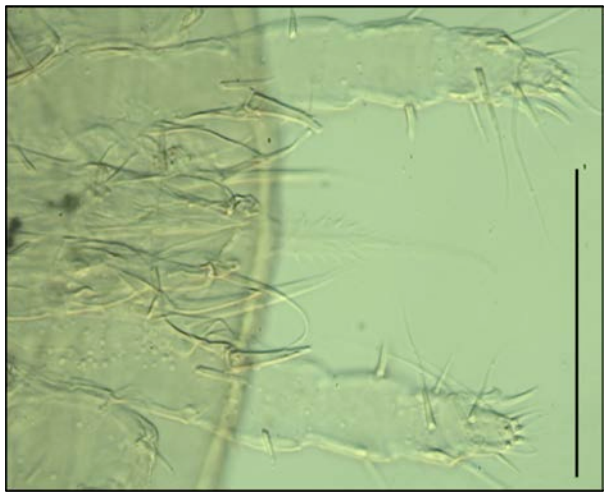

Figure 249. *Cilliba insularis*, female. Palps. Scale bar: 100 µm.

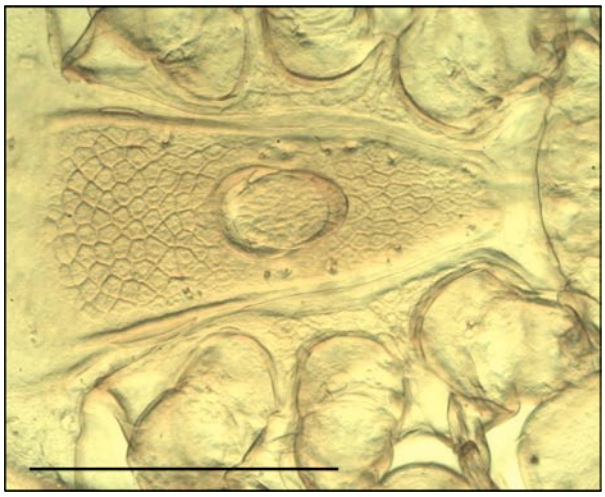

Figure 250. *Cilliba insularis*, male. Sterno-genital shield. Scale bar: 200 µm.

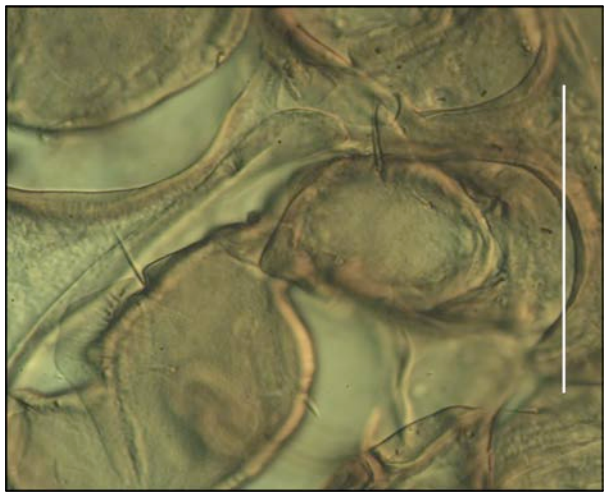

Figure 251. *Cilliba insularis*, male. Leg III, trochanter. Scale bar: 100 µm.

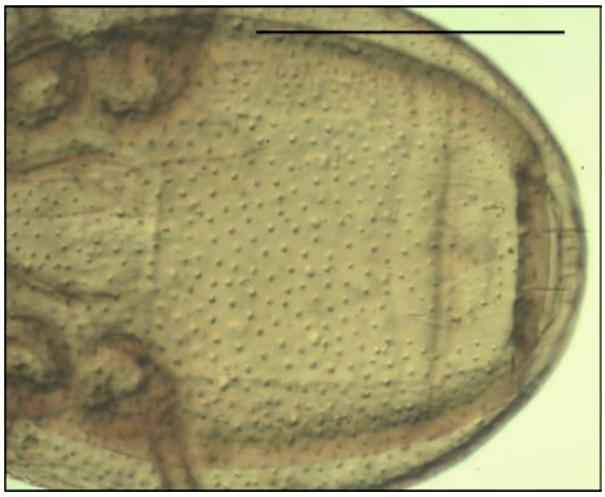

Figure 252. *Dinychus arcuatus*, female. Opisthonotum. Scale bar: 200 µm

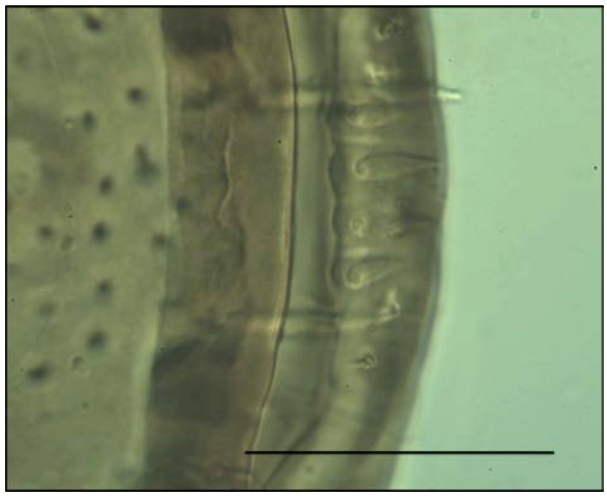

Figure 253. *Dinychus arcuatus*, female. Dorsal setae *J4-J5, Z5*. Scale bar: 50 µm

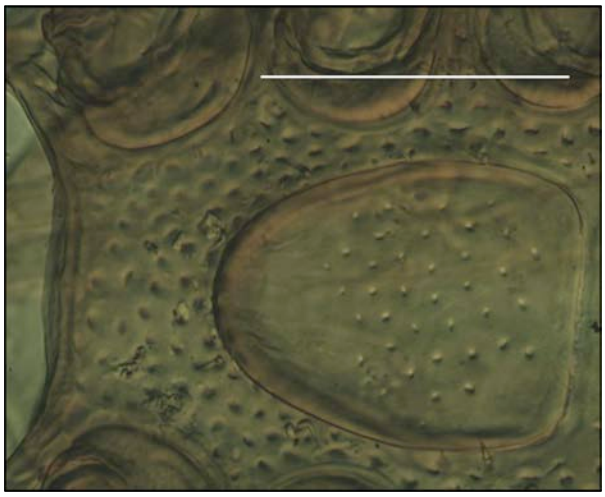

Figure 254. *Dinychus arcuatus*, female. Genital shield. Scale bar: 100 µm

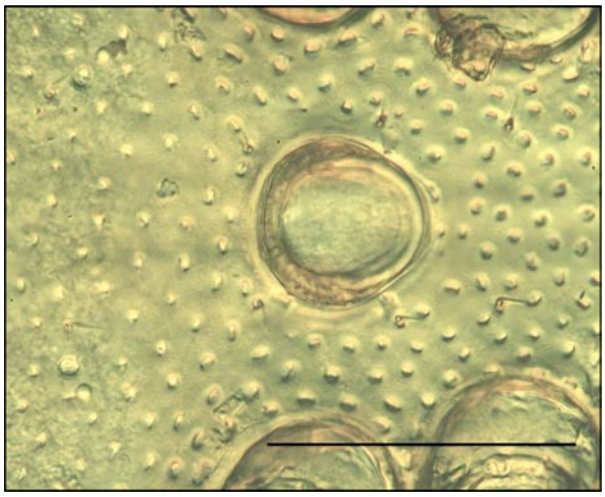

Figure 255. *Dinychus arcuatus*, male. Sterno-genital shield. Scale bar: 100 µm

Figure 256. *Neodiscopoma* sp.1, female. Podonotal region. Scale bar: 200 µm.

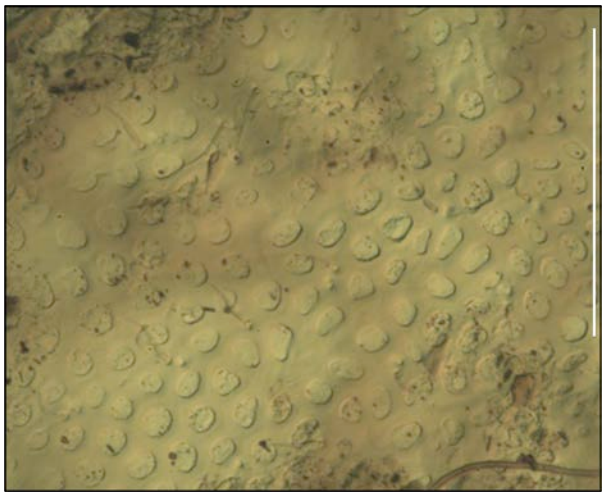

Figure 257. *Neodiscopoma* sp.1, female. Dorsal ornamentation. Scale bar: 100 µm.

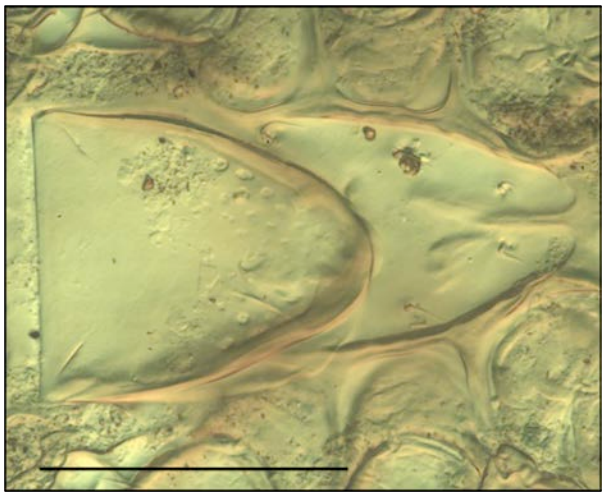

Figure 258. *Neodiscopoma* sp.1, female. Genital shield. Scale bar: 100 µm.

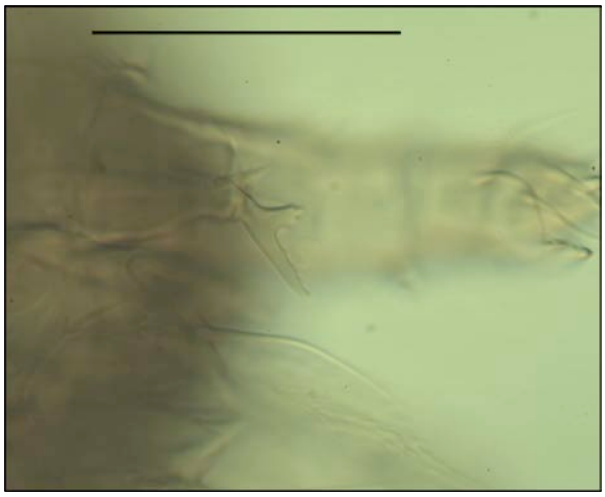

Figure 259. *Neodiscopoma* sp.1, female. Palp-trochanter *pv1* seta. Scale bar: 50 µm.

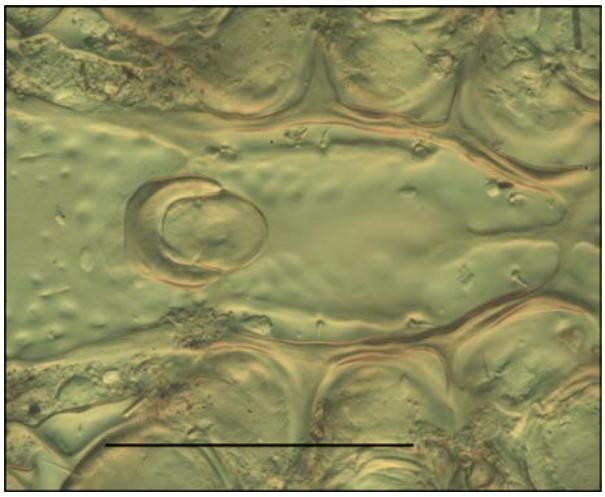

Figure 260. *Neodiscopoma* sp.1, male. Sternogenital shield. Scale bar: 100 µm.

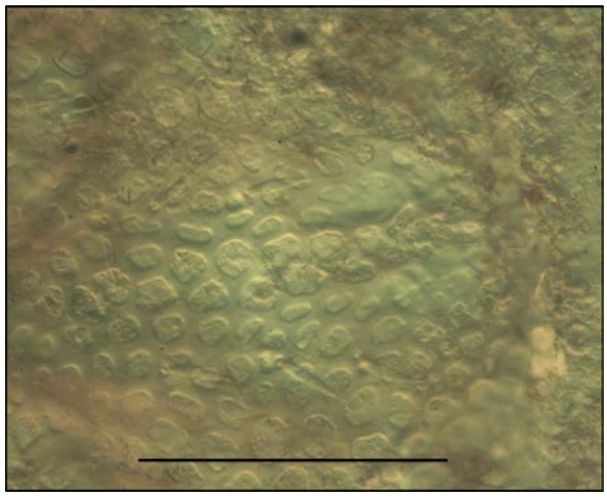

Figure 261. *Neodiscopoma* sp.2, female. Dorsal ornamentation. Scale bar: 100 µm.

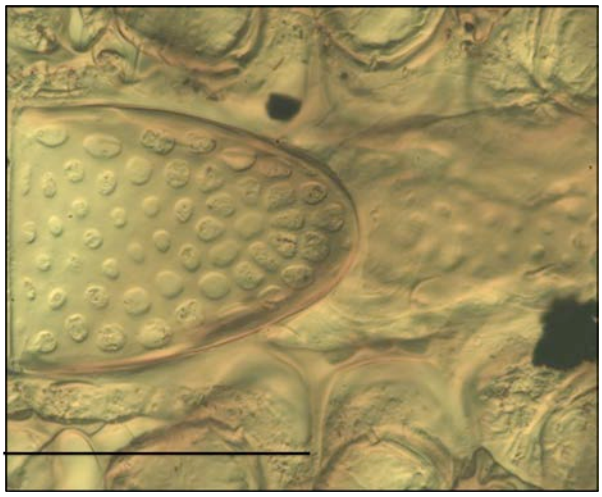

Figure 262. *Neodiscopoma* sp.2, female. Genital shield. Scale bar: 100 µm.

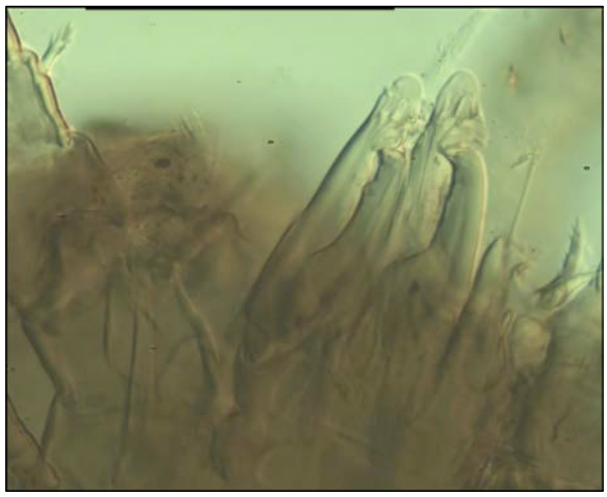

Figure 263. *Neodiscopoma* sp.2, female. Chelicerae. Scale bar: 50 µm.

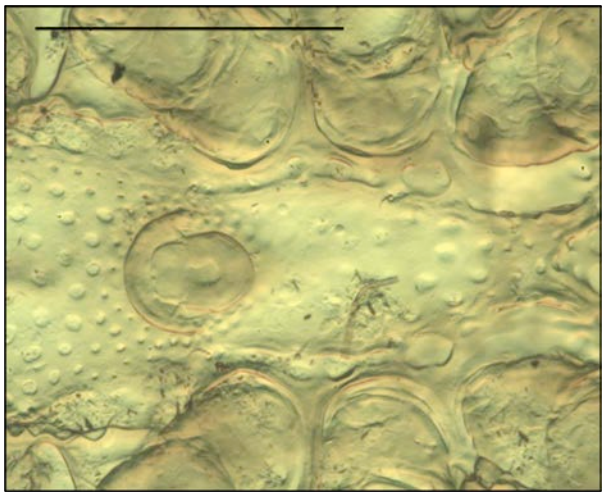

Figure 264. *Neodiscopoma* sp.2, male. Sternogenital shield. Scale bar: 100 µm.

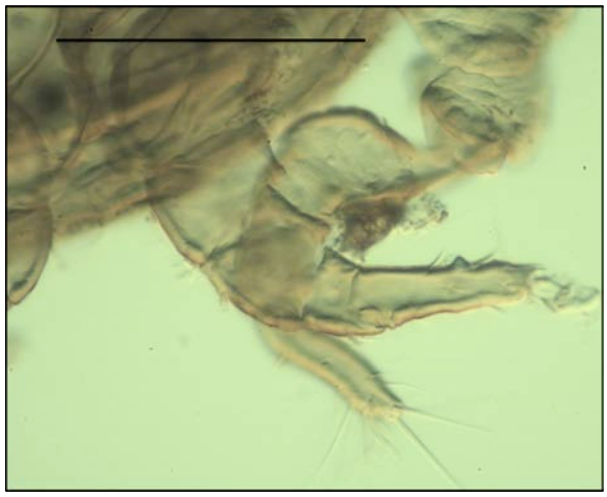

Figure 265. *Neodiscopoma* sp.2, male. Leg II. Scale bar: 100 µm.

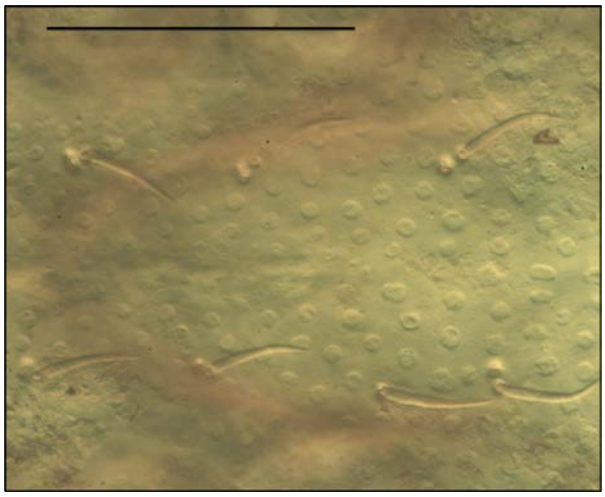

Figure 266. *Neodiscopoma* sp.3, female. Dorsal ornamentation. Scale bar: 100 µm.

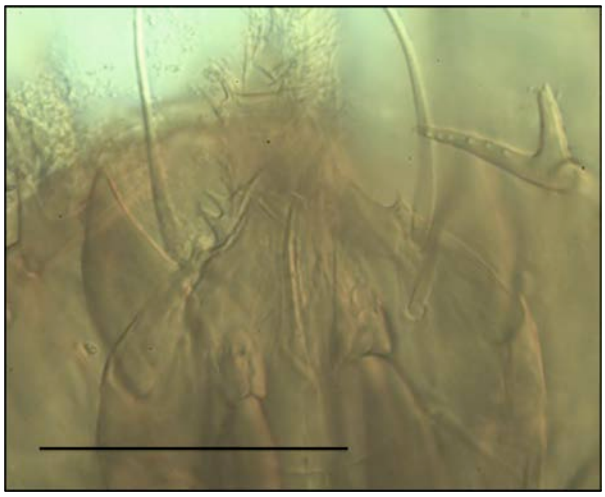

Figure 267. *Neodiscopoma* sp.3, female. Hipostoma and palp-trochanter *pv1* setae. Scale bar: 50 µm.

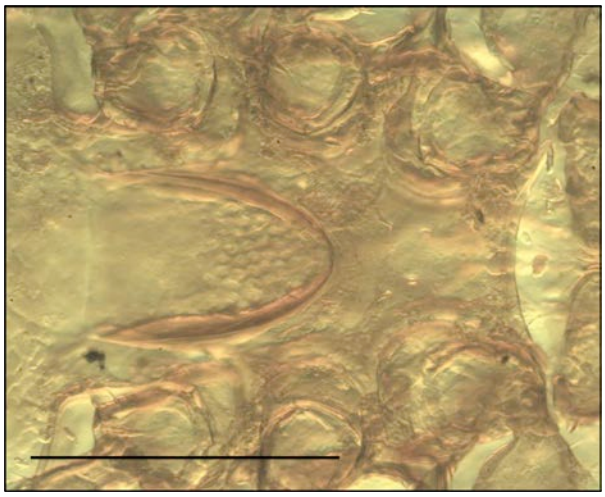

Figure 268. *Neodiscopoma* sp.3, female. Sternogenital. Scale bar: 200 µm.

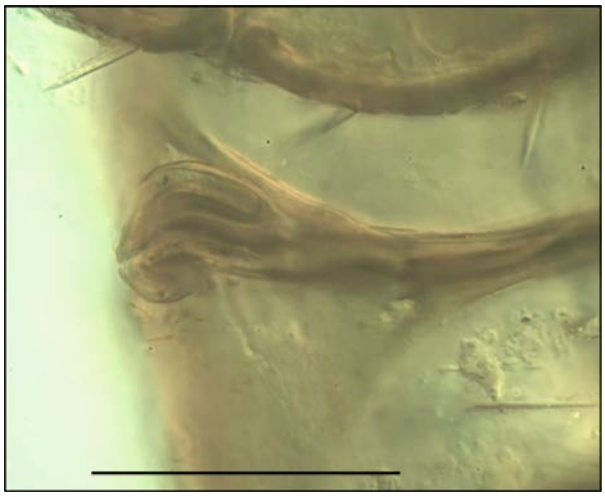

Figure 269. *Neodiscopoma* sp.3, female. Peritreme. Scale bar: 50 µm.

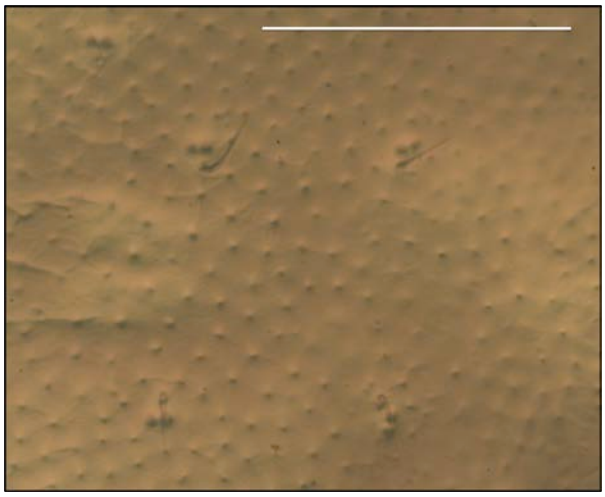

Figure 270. *Phaulodinychus* sp., male. Dorsal ornamentation. Scale bar: 100 µm.

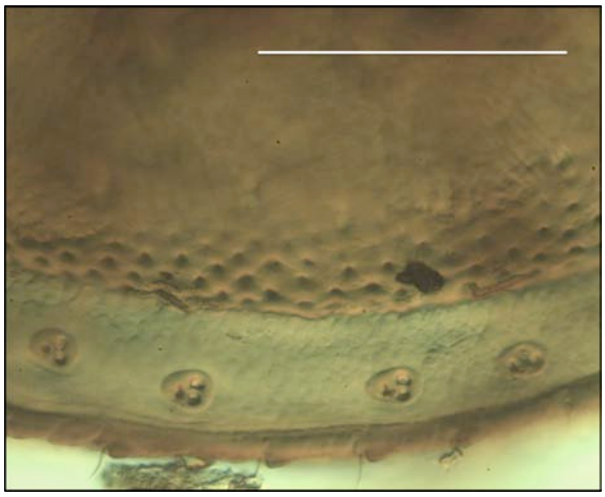

Figure 271. *Phaulodinychus* sp., male. Marginal shield. Scale bar: 100 µm.

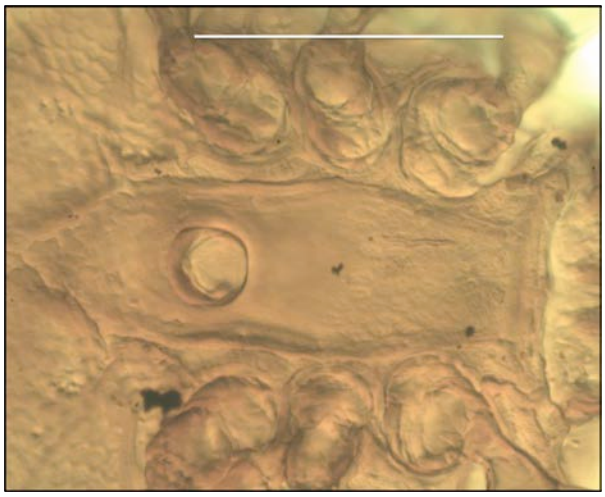

Figure 272. *Phaulodinychus* sp., male. Sterno-genital region. Scale bar: 200 µm.

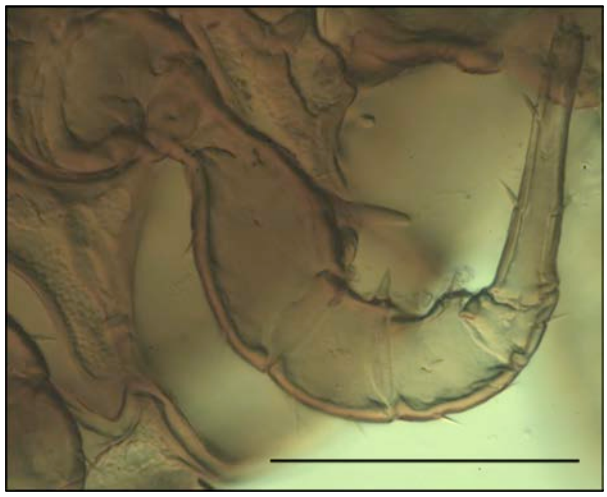

Figure 273. *Phaulodinychus* sp., male. Leg II. Scale bar: 100 µm.

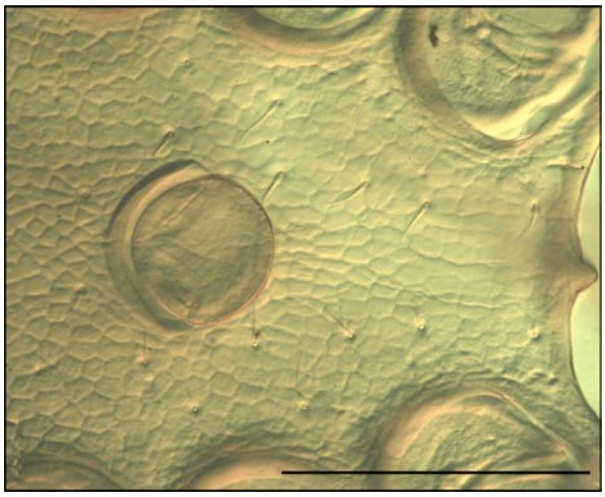

Figure 274. *Uroobovella (Fuscuropoda)* sp., male. Sterno-genital area. Scale bar: 100 µm.

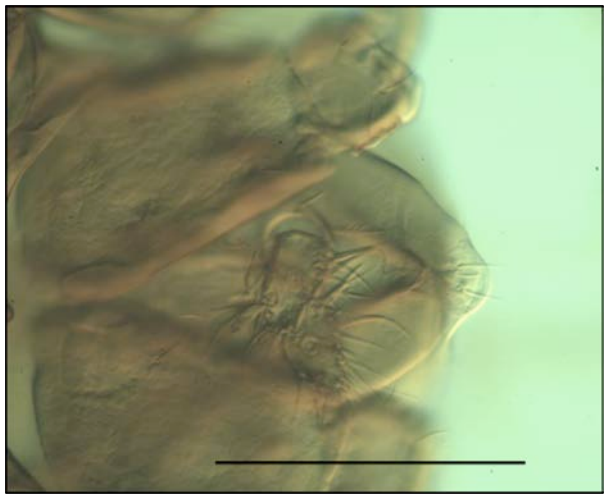

Figure 275. *Uroobovella (Fuscuropoda)* sp., male. Hipostoma. Scale bar: 100 µm.

Figure 276. *Uroobovella (Fuscuropoda)* sp., male. Leg I. Scale bar: 100 µm.

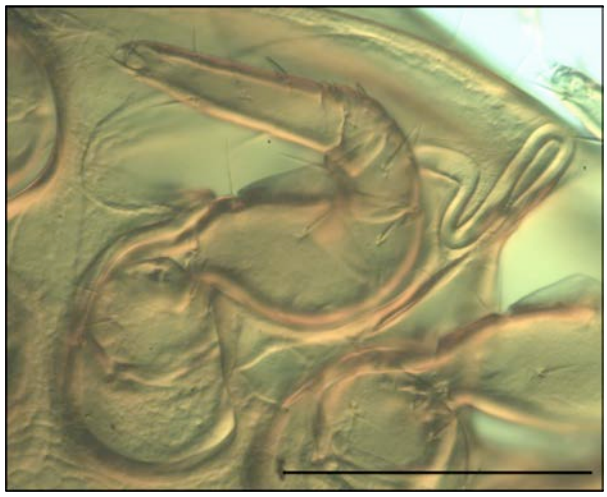

Figure 277. *Uroobovella (Fuscuropoda)* sp., male. Leg III and peritreme. Scale bar: 100 µm.

3.2.3. Faunistic revision of Mesostigmata

For each species, distribution data in the four studied Spanish provinces and two ecosystems is presented (Table 4). The known distribution area in the Iberian Peninsula of 92 species has been extended: 68 species for Araba, 30 species for Biscay, 28 species for Gipuzkoa and 9 species for Navarre.

Table 4. Species distribution in provinces (A: Araba, B: BIzkaia, *G:* Gipuzkoa, N: Navarra) and forests (Fs: *Fagus sylvatica*, Qr: *Quercus robur*); •: presence, 1st: first time cited in this province.

SPECIES	A	B	G	N	Fs	Qr
Amblygamasus odontopus Athias-Henriot, 1967				1st	•	
***Amblygamasus* sp..**	**1st**				•	
Arctoseius (A.) minutus (Halbert, 1915)	1st				•	•
Arctoseius (A.) venustulus (Berlese, 1916)	1st				•	•
Asca (A.) aphidioides (Linnaeus, 1758)	1st	1st	•		•	•
Berlesiana beunzana Moraza, 2006			1st			•
***Cheiroseius viduus* Koch, 1839**	1st					•
Cilliba cassidea (Hermann, 1804)	1st	1st	•	•	•	•
***Cilliba cassidioidea* (Hirschmann & Z.-Nicol, 1964)**	1st				•	
***Cilliba insularis* Willmann, 1939**	1st				•	
Cilliba sellnicki (Hirschmann & Z.-Nicol, 1964)	1st				•	
Dendroseius reticulatus (Sheals, 1956)	1st				•	
***Dinychus (D.) arcuatus* (Trägårdh, 1943)**	1st		1st	1st	•	•
Dinychus (D.) hispanicus Hirschmann & Z.-Nicol, 1969	1st				•	•
Epicrius (E.) johnstoni Moraza, 2005			•			•
***Epicrius (E.)* sp.**	1st	1st	1st		•	•
***Eugamasus berlesei* (Willmann, 1935)**	1st					•
Eugamasus exiguus (Athias-Henriot, 1978)				1st	•	
Eugamasus femoralis (Athias-Henriot, 1978)				1st	•	
***Eugamasus maguliaris* (Athias-Henriot, 1978)**	1st				•	
***Eugamasus parvulus* (Athias-Henriot, 1978)**	1st				•	•
Gamasellodes bicolor (Berlese, 1918)		1st	1st			•
***Gamasellodes major* Athias-Henriot, 1961**	1st				•	•
***Geholaspis (G.) aeneus* Krauss, 1970**	1st					•
Geholaspis (G.) longispinosus (Kramer, 1876)	1st	1st	1st		•	•
Geholaspis (L.) mandibularis (Berlese, 1904)	1st	1st	1st	•	•	•
Holoparasitus inornatus (Berlese, 1906)	1st				•	
***Holoparasitus* sp.**	1st	1st	1st	1st	•	•
Holoparasitus stramenti Karg, 1971	1st					•
Hypoaspis (C.) vacuus (Michael, 1891)	1st					•
***Iphidozercon gibbus* (Berlese, 1903)**	1st	1st				•
***Leioseius elongatus* Evans, 1958**		1st	1st			•

SPECIES	A	B	G	N	Fs	Qr
Macrocheles (M.) montanus (Willmann, 1951)	1st		•	•	•	•
***Macrocheles (M.) dentatus* Evans & Browning, 1956**	1st		1st	1st	•	•
Macrocheles (M.) dentatus franzii Krauss, 1970		1st				•
***Macrocheles (M.) opacus* Koch, 1839**	1st					•
***Macrocheles (M.)* sp.**			1st		•	•
***Neodiscopoma* sp.1**			1st	1st	•	
***Neodiscopoma* sp.2**		1st	1st		•	•
***Neodiscopoma* sp.3**	1st					•
Ologamasiphis rothamstedensis (Bhattacharyya, 1963)	1st		1st	•	•	•
***Onchodellus regularis* (Berlese, 1920)**	1st					•
***Pachylaelaps (L.) cf. dubius* Hirschmann & Krauss, 1965**	1st	1st			•	•
***Pachylaelaps (L.)* sp.**			1st	1st	•	•
Pachyseiulus singularis (Schweizer, 1961)	1st	1st	1st	•	•	•
Pachyseius iraola Moraza, 1993	1st				•	
Pachyseius morenoi Moraza, 1993				•	•	
***Paragamasus cishispanus* Athias-Henriot, 1967**	1st					•
Paragamasus crinitus Willmann, 1939			1st	•	•	
Paragamasus navarrensis Athias-Henriot, 1967	1st		1st	•	•	•
***Paragamasus pertrematus* Athias-Henriot, 1967**	1st	1st	1st	1st	•	•
Paragamasus robustus (Oudemans, 1902)	1st	1st	•	•	•	•
***Paragamasus* sp.**	1st				•	•
***Paragamasus trichinulus* Athias-Henriot, 1967**		1st				•
***Parasitus evertsi* Oudemans, 1902**	1st		1st		•	•
***Parasitus cf. lunulatus* (Müller, 1859)**	1st				•	•
***Parasitus cf. nolli* (Karg, 1965)**	1st				•	•
Pergamasus crassipes (Linnaeus, 1758)	1st	1st	1st		•	•
Pergamasus longicornis (Berlese, 1906)	1st	1st	•		•	•
Pergamasus quisquiliarum (Canestrini & Canestrini, 1882)	1st				•	•
***Phaulodinichus* sp.**	1st					•
***Podocinum pacificum* Berlese, 1895**		1st				•
Polyaspinus cylindricus Berlese, 1916	1st		•	•	•	•
***Proctolaelaps (P.) pygmaeus* (Müller, 1859)**	1st					•
***Prozercon (P.) cf. aristatus* Athias-Henriot, 1961**	1st				•	
Prozercon (P.) davidi Moraza, 2006			1st		•	
***Prozercon (P.) cf. fimbriatus* (Koch, 1839)**			1st			•
Prozercon (P.) tellecheai Moraza, 1990	1st	1st			•	•
Pseudolaelaps doderoi (Berlese, 1910)	1st	1st	•	•	•	•
Pseudoparasitus (Pseudopachys) parasitizans Berlese, 1916			1st		•	
Rhodacarellus silesiacus Willmann, 1935	1st				•	•
Rhodacarus (R.) coronatus Berlese, 1920	1st	1st	1st		•	•
Rhodacarus (R.) mandibularis Berlese, 1920			1st		•	•
Trachytes eustructura Hirschmann & Z.-Nicol, 1969	1st			•	•	•

SPECIES	A	B	G	N	Fs	Qr
Trachytes pauperior Berlese, 1914		1st				•
Trachytes welbourni Moraza, 1989		1st	1st		•	•
Trichouropoda ovalis (Koch, 1839)	1st				•	
***Uroobovella* (Fuscuropoda) sp.**	1st				•	
Uropoda minima Kramer, 1882		1st	1st	•	•	•
Veigaia bouvieri (Berlese, 1916)	1st	1st	•		•	•
Veigaia cerva (Kramer, 1876)	1st				•	•
Veigaia decurtata Athias-Henriot, 1961	1st				•	
Veigaia exigua (Berlese, 1916)	1st	1st			•	•
Veigaia garraldensis Athias-Henriot, 1961	1st				•	
Veigaia nemorensis (Koch, 1839)	1st	1st			•	•
Veigaia perinsolita Athias-Henriot, 1961		1st	•	•	•	•
Veigaia planicola (Berlese, 1892)	1st				•	
Veigaia sanmamedi Athias-Henriot, 1961		1st	•	•	•	•
***Veigaia* sp.**			1st		•	•
Vulgarogamasus kraepelini (Berlese, 1905)	1st				•	
***Zercon (Z.) cf. gurensis* Mihelcic, 1962**	1st				•	
Zercon (Z.) navarrensis Moraza, 1989	1st					•
Zercon (Z.) subguttulatus Moraza, 2006	1st					•
Zercoseius spathuliger (Leonardi, 1899)	1st				•	•

3.3. Statistical results

A total of 13,800 individuals of Oribatida of 188 species and subspecies were recorded in the sampling sites, with a mean estimated abundance of 19,166.7 (±7,875.7) individuals/m^2. In the case of Mesostigmata 1,127 individuals of 86 species were recorded, with an estimated mean abundance of 1,565.3 (±699.4) individuals/m^2 (Table 5). The main communities parameters (N: number of individuals, N/m2: individuals per m^2, S: richness, H: Shannon diversity index, J: Pielou's evenness) are given in table 5.

There were evident differences in abundance (*N*) (ANOVA, F = 44.601, *P* < 0.001) and species richness (*S*) (ANOVA, F = 262.02, *P* < 0.001) when comparing Oribatida and Mesostigmata. Nevertheless, there were not significant differences in abundance (ANOVA, Oribatida: F = 1.0231, *P* = 0.345; Mesostigmata: F = 0.4197, *P* < 0.5377) or species richness (ANOVA, Oribatida: F = 0.0096, *P* = 0.9246; Mesostigmata: F = 0.3294, *P* < 0.584) among the beech and oak forests for both data sets.

There were not significant differences among beech and oak forests, neither in Shannon diversity index (ANOVA, Oribatida: F = 0.0419, *P* = 0.8437; Mesostigmata: F = 0.2794, *P* = 0.6134) nor in Pielou's evenness (ANOVA, Oribatida: F = 0.0417, *P* = 0.844; Mesostigmata: F = 0.0424, *P* < 0.8428).

Nevertheless, differences in Shannon diversity index were found between both Orders (ANOVA, F = 28.026, $P < 0.001$), but there were not in Pielou's evenness (ANOVA, F = 2.105, $P = 0.1661$).

Table 5. Community parameters of Oribatida, Mesostigmata and Total (Oribatida + Mesostigmata) data (N: number of individuals, N/m^2: individuals per m^2, S: richness, H: Shannon diversity index, J: Pielou's evenness).

ORIBATIDA	*N*	*N*/m^2	*S*	*H*	*J*
HA01	1,132	14,150	68	3.145	0.745
HA02	1,236	15,450	69	3.237	0.764
HA03	1,529	19,112.5	73	2.990	0.697
HA04	1,177	14,712.5	58	2.838	0.699
HA05	1,644	20,550	66	3.223	0.769
RO01	2,421	30,262.5	77	3.352	0.772
RO02	1,914	23,925	62	2.861	0.693
RO03	424	5,300	59	3.292	0.807
RO04	2,323	29,037.5	71	2.954	0.693

MESOSTIGMATA	*N*	*N*/m^2	*S*	*H*	*J*
HA01	53	662.5	20	2.647	0.884
HA02	156	1,950	30	2.921	0.859
HA03	130	1,625	25	2.265	0.704
HA04	66	825	14	1.952	0.740
HA05	165	2,062.5	25	2.253	0.700
RO01	162	2,025	27	2.376	0.721
RO02	216	2,700	28	2.673	0.802
RO03	61	762.5	21	2.758	0.906
RO04	118	1,475	23	2.282	0.728

TOTAL	*N*	*N*/m^2	*S*	*H*	*J*
HA01	1,185	14,812.5	88	3.306	0.738
HA02	1,392	17,400	99	3.552	0.773
HA03	1,659	20,737.5	98	3.208	0.700
HA04	1,243	15,537.5	72	2.998	0.701
HA05	1,809	22,612.5	91	3.440	0.763
RO01	2,583	32,287.5	104	3.525	0.759
RO02	2,130	26,625	90	3.170	0.705
RO03	485	6,062.5	80	3.603	0.822
RO04	2,441	30,512.5	94	3.115	0.686

As it was shown by the cluster analyses (UPGMA) and the unconstrained ordination (NMDS) of all the data sets (Figure 278), beech forests HA02 and RO02, both from Añarbe, were related together with HA01 (Artikutza). Geographically neighbouring HA03 - HA04, and RO04 - HA05, were another two linked site-associations. The RO01 was close to the Añarbe-Artikutza group (HA01-HA02-RO02) when Oribatida data-set was used, but with Mesostigmata data it turned out that gets closer to the association formed by HA03 - HA04 and RO04 - HA05. Finally, RO03 oak forest was practically non-grouped to the other clustered groups.

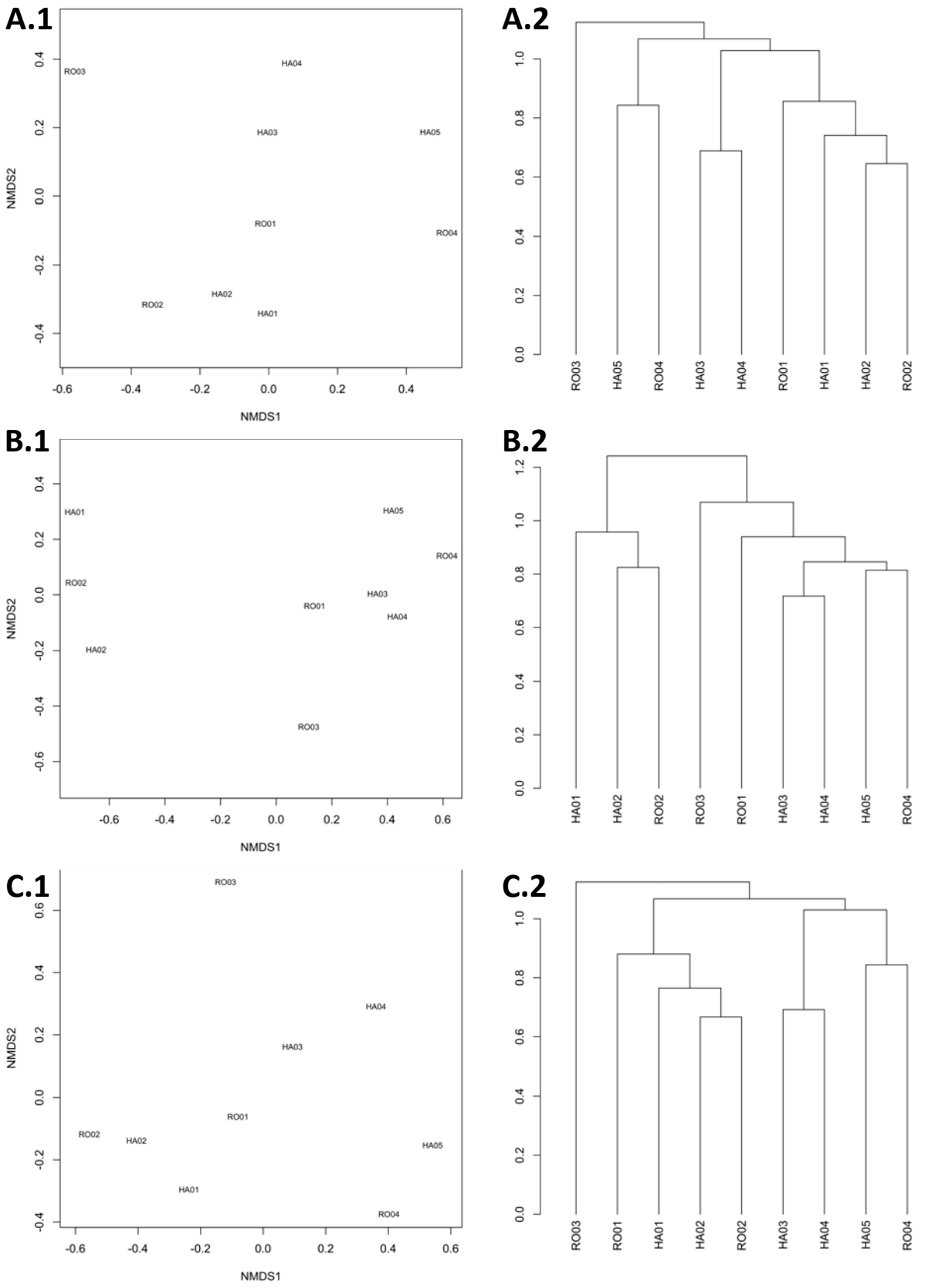

Figure 278. Nonmetric multidimensional scaling (NMDS) (.1) and Unweighted Pair-Group Method using arithmetic Averages cluster analyses (UPGMA) (.2) of Oribatida (A), Mesostigmata (B) and Total (Oribatida + Mesostigmata) (C) data.

All sampling sites were grouped almost similarly, especially when Oribatida and total mite (Oribatida and Mesostigmata altogether) were used.

Forward selection identified Bioclimate, Thermotype and Ombrotype as the environmental variables best explaining the variance in the three mite-data matrices. For each one, performed RDAs displayed the percentages of total and partitioned variance of the mite data explained by spatial and environmental variables (Table 6).

In all three cases, total explained variance showed almost the same percentage. On the one hand, around the 55% of the mite data variance could be explained significantly by both, spatial and Bioclimate variables. On the other hand, spatial and environmental variables, Ombrotype and Thermotype, explained around the 70% of the total variance.

The proportion of variance explained by the spatial structure alone (environmental variables as covariables) of mite data was slightly smaller on Mesostigmata data, but the variance was not significant for none of the three mite-data.

Among environmental variables, Bioclimate and Thermotype proved to be the variables that explained significantly the variance of mite-data after removing the effect of other variables (spatial and/or environmental as covariables), but for Mesostigmata-data Thermotype was not significant.

Performed RDA triplots for each mite-data of the significant variables, after removing the effect of covariables are shown in Figure 279.

Table 6. Results of partial Redundancy Analysis as percentage of variance explained by environmental and spatial (PCNM filter) variables using Oribatida, Mesostigmata and both data together (Hellinger transformed).

			%	P	
ORIBATIDA	Bioclimate	Unexplained	44.5		
		Total	55.5	0.004	
		Spatial	11.2	0.262	(n.s.)
		Bioclimate	29.6	0.034	
		S/E	14.6		
	Ombrotype & Thermotype	Unexplained	29.6		
		Total	70.4	0.002	
		Spatial	11.4	0.180	(n.s.)
		Omb. + Therm.	44.4	0.002	
		S/E	14.6		
		Ombrotype	10.1	0.235	(n.s.)
		Thermotype	34.7	0.005	
MESOSTIGMATA	Bioclimate	Unexplained	43.3		
		Total	56.7	0.007	
		Spatial	8.0	0.591	(n.s.)
		Bioclimate	20.0	0.288	(n.s.)
		S/E	28.8		
	Ombrotype & Thermotype	Unexplained	32.3		
		Total	67.8	0.002	
		Spatial	8.3	0.524	(n.s.)
		Omb. + Therm.	31.0	0.125	(n.s.)
		S/E	28.5		
		Ombrotype	8.1	0.476	(n.s.)
		Thermotype	23.5	0.086	(n.s.)
ORIBATIDA & MESOSTIGMATA	Bioclimate	Unexplained	44.6		
		Total	55.4	0.002	
		Spatial	11.0	0.312	(n.s.)
		Bioclimate	28.8	0.017	
		S/E	15.6		
	Ombrotype & Thermotype	Unexplained	30.4		
		Total	69.6	0.001	
		Spatial	11.1	0.191	(n.s.)
		Omb. + Therm.	43.3	0.002	
		S/E	15.2		
		Ombrotype	10.0	0.256	(n.s.)
		Thermotype	33.7	0.010	

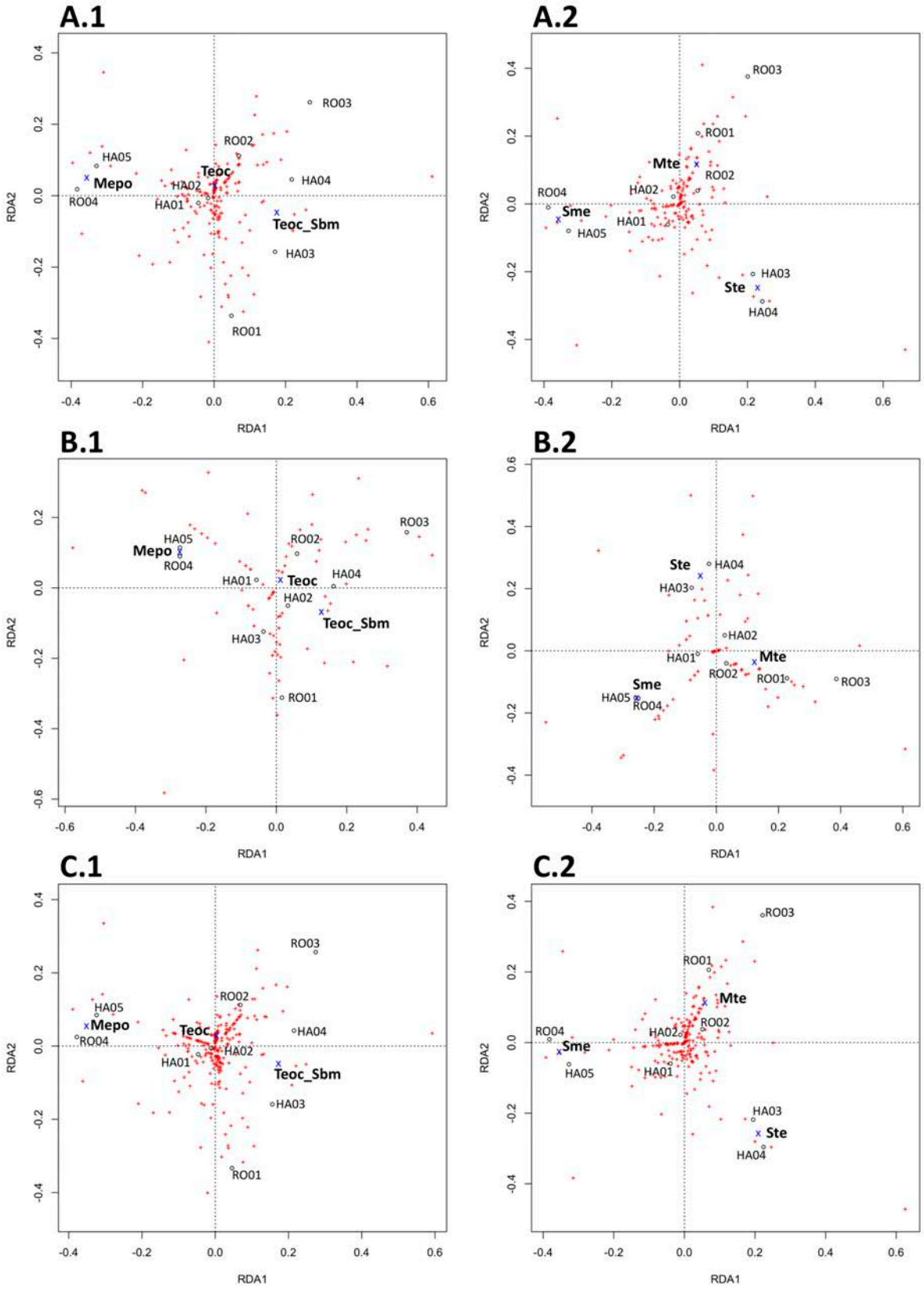

Figure 279. RDA ordination triplot of sites (circles), environmental variables (blue x) Bioclimate (.1) and Thermotype (.2), and Oribatida (A), Mesostigmata (B) and both data together (C) species (Hellinger transformed) (red +).

4. Discussion

This is the first time that oribatids and mesostigmatids of the east of the Spanish province of Gipuzkoa are studied. Añarbe, together with Artikutza (North of province of Navarre), are located in a special region where factors such as oceanic influence, moderate height and regional context, are responsible of the highest precipitation registers in the Peninsula and also in all Europe (Lozano-Valencia 2006).

Previously, several taxonomical and faunistical studies of Oribatida were carried out mainly by Dr. Iturrondobeitia in Biscay, Dr. Saloña-Bordas in Biscay and Araba, and Dr. Moraza in Navarre. In total, there are recorded 138 species in Araba, 240 species in Biscay, 90 species in Gipuzkoa and 346 species in Navarre (Subías *et al*. 2013). The present study extended the known distribution of 99 species, of which 64 species for Araba, 46 species for Gipuzkoa, 6 species for Navarre but none for Biscay.

Furthermore, *Damaeus (D.) firmus* and *Eupelops hygrophilus* were recorded for the first time in the Iberian Peninsula. The erroneous description of *Liacarus xylariae* (Willmann 1931) led to confussion in the Iberian *Liacarus* species, so *Liacarus xylariae* should be recorded for the first time in the Iberian Peninsula.

Among the studied species, probably six will be new for science, namely *Ramusella (cf. Inscultoppia)* sp., *Rhinoppia (cf. Rhinoppia)* sp., two species within *Rhinoppia (R.) cf. vera*, *Oppiella (Perspicuoppia)* sp. and *Parachipteria* sp.

Previous misidentifications were detected in *Steganacarus (S.) michaeli* erroneously identified as *S. (S) magnus*, and *Ctenobelba (C.) pseudomahnerti* as *Ctenobelba (C.) mahnerti*.

The bibliographic revision showed differences in recorded measurement of setae, e.g. *Nothrus cf. borussicus*, but mostly in body size, e.g. *Camisia (C.) segnis*, *Heminothrus (H.) targionii*, *Belba (B.) patelloides*, *Cepheus tuberculosus*, *Rhinoppia (R.) media*, *Subiasella (L.) quadrimaculata*, *Suctobelba granulata*, *Carabodes (C.) areolatus*.

Acording to the original descriptions, several morphotypes within *Rhinoppia (R.) media*, *R. (R.) cf. tridentata* and *Oribatula (O.) tibialis* were differentiated. Although specimens of *Neotrichoppia (N.) pseudoconfinis* with different aggenital setae were collected before (Subías & Arillo 2001), we differentiated three ecophenotypes, distributed along the ombrothermic gradient.

On the other hand, this is the first systematic study of Mesostigmata communities in the Basque Country. The results confirm that the study increases broadly the knowledge of the order because the known distribution area in the Iberian Peninsula of 92 species, from the total 94 identified species, was extended.

The bibliographical revision of the Mesostigmata species recorded in the Iberian Peninsula and Macaronesian region addressed 82 scientific papers (Moraza & Balanzategui 2015). In the studied area, most of the works were carried out by Dr. Moraza who studied the Mesostigmata communities and species from the Spanish province of Navarre. In Gipuzkoa only Santamaría *et al*. (2012) contributed to the distribution of 22 Mesostigmata species. In Biscay only six edaphic species (Saloña *et al*. 2010) and six ectoparasitic species on bats are known (Imaz *et al*. 1999), but in Araba there are not any species recorded.

Thus, the present study extended the known distribution of 68 species in Araba, 30 species in Biscay, 28 species in Gipuzkoa and 9 species in Navarre, being the latter the most studied province.

In total, eleven species were recorded for the first time in the Iberian Peninsula, namely *Zercon (Z.) cf. gurensis*, *Parasitus evertsi*, *Parasitus cf. lunulatus*, *Parasitus nolli*, *Eugamasus berlesei*, *Macrocheles (M.) dentatus s. str.*, *Pachylaelaps (L.) cf. dubius*, *Cheiroseius viduus*, *Iphidozercon gibbus*, *Leioseius elongatus* and *Dinychus (D.) arcuatus*, and probably 12 species are new to science, namely *Epicrius (E.)* sp., *Amblygamasus* sp., *Holoparasitus* sp., *Paragamasus* sp., *Veigaia* sp., *Macrocheles (Macrholaspis)* sp., *Pachylaelaps (Longipachylaelaps)* sp., three species of *Neodiscopoma*, *Phaulodinychus* sp. and *Uroobovella (Fuscuropoda)* sp.

The discussed morphological differences are mainly related to setation characteristics, and therefore is needed revision of some species, e.g. *Prozercon (P.) cf. aristatus*, *P. (P.) cf. fimbriatus*, *Zercon (Z.) cf. gurensis*, *Parasitus cf. lunulatus* and *Pachylaelaps (L.) cf. dubius*.

In respect of statistical analyses of mite communities data, the RO03 oak forest proved to be somehow different to other forests, using both classification and ordination methods. This means that the mite community of this forest differs from others. The most plausible explanation is that it is located in a humid ombroclimatic area where a positive soil-moisture balance takes place in summer due to its peculiar topography and soil-texture, and therefore hidromorphic events can take place (Rivas-Martínez & Loidi 1988).

The results obtained when using the total data, Oribatida and Mesostigmata together, are similar to those when Oribatida are used alone. The species of this group present higher abundances compared to Mesostigmata, and therefore, when using both data together, Mesostigmata species are down weighted.

The contribution of Mesostigmata mites to total explained variation is little when used together with Oribatida, and thus, the high effort of identification of both groups for sinecological studies seems to be unnecessary, which is contrary to Ruf & Beck (2005) or Gulvik (2007). Mite abundance and diversity did not varied with forest type, which agrees to previous studies on Oribatida (Sylvain & Buddle 2010).

Although differences in vegetation cover and litter type influence Oribatida community (Franklin *et al*. 2007, Erdmann *et al*. 2012), both forest types, beech and oak, did not affect the mite community composition, suggesting that they provide similar niches for both, Oribatida and Mesostigmata.

The mite communities differed significantly with Bioclimate and Thermotype variables which explains a great variance fraction. This points to the importance of regional factors, such as temperature, as structuring forces for mite communities than forest types (Déchene & Buddle 2009; Erdmann *et al*. 2012). Nevetheles, there is other great non explained variance, which may be related to non measured environmental variables related to soil, such as pH, mass of litter layer, etc., which are important for soil fauna and that contribute to structuring soil mite communities (Lindberg et al. 2012).

5. Final conclusions

Oribatida

16,792 individuals belonging to 200 species of 51 families were identified.

The known distribution of 99 species was extended.

Damaeus (D.) firmus, Liacarus xylariae and *Eupelops hygrophilus* were recorded for the first time in the Iberian Peninsula.

The species *Ramusella (cf. Inscultoppia)* sp., *Rhinoppia (cf. Rhinoppia)* sp., two morphotypes within *Rhinoppia (R.) cf. vera*, *Oppiella (Perspicuoppia)* sp. and *Parachipteria* sp, must be named as new for science.

Morphotypes within *Rhinoppia (R.) media*, *R. (R.) cf. tridentata* and *Oribatula (O.) tibialis* can be differentiated

Mesostigmata

1, 288 individuals belonging to 94 species of 14 families were identified.

The known distribution of 92 species was extended.

Zercon (Z.) cf. gurensis, *Parasitus evertsi*, *Parasitus cf. lunulatus*, *Parasitus nolli*, *Eugamasus berlesei*, *Macrocheles (M.) dentatus s. str.*, *Pachylaelaps (L.) cf. dubius*, *Cheiroseius viduus*, *Iphidozercon gibbus*, *Leioseius elongatus* and *Dinychus (D.) arcuatus*, are recorded for the first time in the Iberian Peninsula.

Epicrius (E.) sp., *Amblygamasus* sp., *Holoparasitus* sp., *Paragamasus* sp., *Veigaia* sp.,

Macrocheles (Macrholaspis) sp., *Pachylaelaps (Longipachylaelaps)* sp., three species of *Neodiscopoma*, *Phaulodinychus* sp. and *Uroobovella (Fuscuropoda)* sp., are probably new to science,

Prozercon (P.) cf. aristatus, *P. (P.) cf. fimbriatus*, *Zercon (Z.) cf. gurensis*, *Parasitus cf. lunulatus* and *Pachylaelaps (L.) cf. dubius*, need revision.

Statistical analysis of communities

Climate determines the observed patterns in mite communities. Temperature (Thermotype), over precipitation (Ombrotype), is the major force structuring mite communities.

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