BEITR. ARANEOL., 6 (2011)

EXTANT AND FOSSIL SPIDERS (ARANEAE)

HEUTIGE UND FOSSILE SPINNEN

Joerg Wunderlich

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Photos on the front cover of the book (for details see the part of the coloured photos):

Top left:	A fossil Juming Spider (Salticidae) in Baltic amber.
Top right:	A fossil member of the family Leptonetidae in Baltic amber.
Middle left:	A fossil spider of the family Anapidae in Baltic amber.
Bottom left:	An extant member of the family Gnaphosidae *(Setaphis murphyi)* from the Canary islands.
Bottom right:	A fossil member of the family Leptonetidae in Baltic amber.

Fotos auf dem Buckdeckel (Einzelheiten im Fototeil):

Oben links:	Eine fossile Springspinne im Baltischen Bernstein.
Oben rechts:	Eine fossile Schlankbeinspinne (Familie Leptonediae) im Baltischen Bernstein.
Mitte links:	Eine fossile gepanzerte Zwerg-Radnetzspinne (Familie Anapidae) im Baltischen Bernstein.
Unten links:	Ein heutiger Vertreter der Familie Plattbauchspinnen *(Setaphis murphyi, Gnaphosidae)* von den Kanarischen Inseln.
Unten rechts:	Ein fossiler Vertreter der Schlankbeinspinnen in Baltischem Bernstein.

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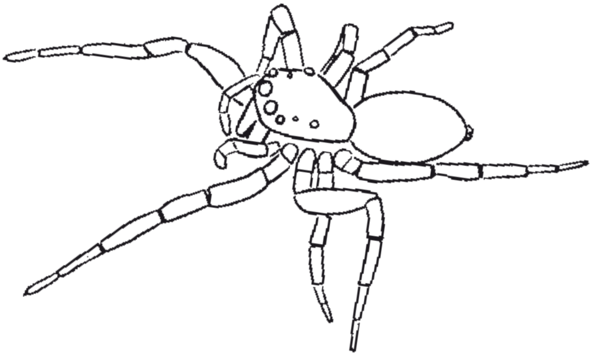
JOERG WUNDERLICH (ED.)



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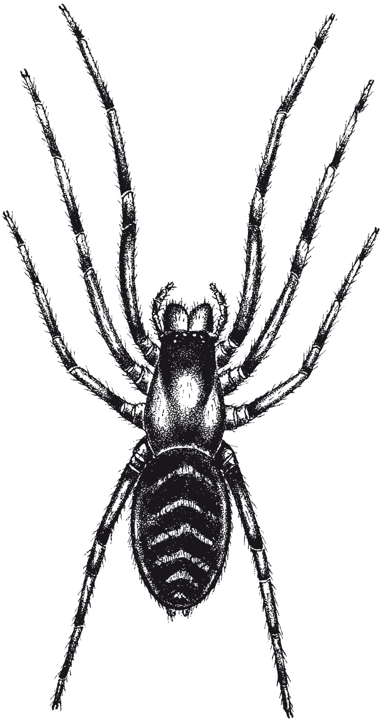

Segestriid Spider. See p. 175. Note the third pair of legs which is directed forward. – Taken from DIPPENAAR-SCHOEMAN & JOCQUE (1997): African Spiders

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PREFACE / INTRODUCTION

The evolution has an excessive preference for spiders (more than 40 000 described and more than 100 000 species to be expected).

With reference to J. B. S. HALDANE regarding beetles; adapted to spiders

Science is like sex. Sure, it may give some results, but that's not why we do it.

RICHARD FEYNMAN

Is it not a shame that numerous excellent taxonomic researchers have to prostitute themselves by publishing in periodicals which are dominated by mainstream reviewers which suppress findings outside the mainstream?

JW

During the last twenty years or so I worked mainly on fossil spiders, and I waited for the time to come for finishing certain investigations on extant spiders. Most of these papers – for example on various spiders of Southern Europe and the Canary Islands, on the families Clubionidae and Gnaphosidae (*), on the *Theridion melanurum* species-group (Theridiidae) and on the genus *Ariadna* (Segestriidae) – are published in this volume 6 of the periodicle "Beitraege zur Araneologie" (BEITR. ARANEOL.). 20 papers by the editor (JW) and one paper shared with C. DEELEMAN-REINHOLD on extant and fossil spiders are included in this volume, other papers will probably be published in a further volume of this periodical.

(*) Descriptions of taxa of this family (and few others) are found in different papers in this volume in which they fit well, e. g. descriptions on gnaphosid taxa in the revision of the European genera of this family, within a paper on spiders from Southern Europe and on spiders from the Canary Islands as well.

Material: Most spiders are deposited in the collection of J. WUNDERLICH (CJW), some in the Senckenberg-Museum Frankfurt a. M. (SMF).

Acknowledgements (see also the different papers, mainly on Southern European spiders (*Ariadna*)): I thank ALEX BEIGEL very much for some technical help like taking most of the photos with the help of a digital camera, THEO BLICK for sending numerous copies of papers to me, PETER JÄGER and JULIA ALTMANN (SMF) for the loan of material, and RUTHILD SCHÖNEICH for improving and correcting the English of several parts of the manuscripts. Thousands of fossil spiders were selected for my study by dealers.

Techniques: I used a microscope/binocular from the firm LEITZ; in some cases I used a Minolta camera (slides), a digital camera was used for most photos applying a special technique – stacking (in German "Stacken" or "Schichtaufnahmen") – which puts all layers in focus. For the clearing of vulvae of extant females I used pink oil, for the clearing of some amber pieces I used Bentylium benzoicum ($\mathrm{C14H12O2}$) which may cause some problems.

Methods of the investigations (see also WUNDERLICH (2008: 22-23)):
General remarks on the method used by me to investigate relationships and construct possible cladograms. While searching for monophyletic groups/taxa and sister groups in my opinion it is most important to ask essential questions, probably best in the following sequence:

(1) Which characters have newly evolved (apomorphically) in the taxon in question which may be only a hypothetical monophyletic taxon at the beginning? See no.(6).
(2) Which (morphological, ethological, ecological, biogeographical) characters are most special/peculiar/rare in the taxon in question? (The lower the number of characters the higher is the relative importance of *special* characters; *this is not a matter of quantity*! A quantitative analysis may cause quantitative nonsense).
(3) (Or later) Which may be the sister taxon, which shows common derived characters (synapomorphies)? Which one is a suitable outgroup for comparison?
(4) Which characters may have evolved convergently (analogous – or following the American newspeak – "homoplastic similarities") characters, and which may be reversals? (*). Do "tendencies"/dispositions for certain characters exist? (*).
(5) Are certain special rare/unusual characters linked with each other (existing in the same hypothetical monophyletic taxon)? (A very important matter in my opinion if the connection of certain – e.g. ecological and ethological – characters are considered, too! See the paragraph on "tendencies" below).
(6) Do fossils and/or gaps in former faunas exist which may provide conclusions on the phylogeny – e.g., apomorphic/plesiomorphic characters – rsp. the relationships of higher taxa? May fossils give hints at the origin of taxa in the timetable and at the construction of a chronocladogram; see WUNDERLICH (2004: 836, 1767) (**).
(7) Finally: Which is the simplest sufficient hypothesis/cladogram to be preferred even though others – alternative cladograms – are possible (law of parsimony)? (***).

(*) Reversals: See the paper on this matter in this volume. – In the study of spiders (and other animals or plants) the "similar" (convergently/analogously) evolved structures – e.g. somatical

structures or structures of the copulatory organs – may cause serious problems and confusions; the numerous independent evolution of lateral cheliceral stridulatory files or the numerous losses of the cribellum are well-known examples which misled even famous araneologists to erroneous conclusions. See the paper on “reversals” in this volume. – The question is: Did a given structure evolve a single time (e.g. within a family) as an apomorphy of this taxon or did it evolve at convergently more than once in taxa which are closely or not closely related. A further problem may result from the existence of a disposition (a “*tendency*”) like the evolution of cephalic lobes in male Erigoninae of the family Linyphiidae.
Some (further) examples: The sternal glands with their anterior openings are a unique apomorphic family character of the Theridiosomatidae (the most important character of this family). – The orb web is the best taxonomical character of the superfamily Araneoidea s. l. (the cribellate AND the ecribellate branch, united as “Orbiculariae” by most authors). – The egg-carrying behaviour of the females with the help of their chelicerae and pedipalpi is a rare character which evolved in the Pisauridae of the RTA-clade as an apomorphy, convergently in the large “egg-carrying scytodoid branch” of the Dysderoidea s. l., see WUNDERLICH (2004: 532, 645), in the Psechridae as well as in certain Ctenidae and in single genera of very few families like Sparassidae and Synotaxidae: see WUNDERLICH (2004: 532). – Stridulatory organs evolved numerous times in spiders; retrolateral cheliceral stridulatory files in combination with (a) stridulatory bristle(s) of the pedipalpus are the most frequent kind of such structures and exist for example (a) as a family character in the Linyphidae (with several losses/reversals, and probably symplesiomorphic with the Pimoidae), and (b) as a character of the superfamily Archaeoidea (= Palpimanoidea) s. str., see WUNDERLICH (2004: 761). – “Tendencies” are frequently hard to prove; a tendency to the evolution of ventral stridulatory bristles of the male opisthosoma apparently exists within the family Zoridae/Liocranidae, see WUNDERLICH (2004: 489) as well as within certain genera of the family Lycosidae. – A tendency to a coiled embolus exists in numerous spider families like Theridiidae, Synotaxidae, Linyphiidae, Gnaphosidae, Deleninae, Thomisidae and Salticidae. – A tendency to dwarfism exists, e.g., in the Anapidae s. l. as well as in the Erigoninae of the Linyphidae, and is linked with a shortening of the legs and the loss of leg bristles. – A tendency to ant mimicry exists, e.g., in the families Corinnidae, Gnaphosidae, Salticidae and Zodaridae; the tendency to ant eating exists in numerous (of their) taxa. – A tendency to the evolution of notched trochanters (fig. 23) exists within numerous families, e. g., of the RTA-clade, for example within the family Gnaphosidae (this volume) and Clubionidae (this volume).
Possible CONVERGENCES within the family Clubionidae – mainly regarding the genus *Elaver* O. PICKARD-CAMBRIDGE 1898 – are discussed in the paper on the family Clubionidae in this volume.

(**) No sure member of the family Lycosidae or of the Linyphiidae: Erigoninae (e.g.) has been found in Cretaceous ambers – see WUNDERLICH (2008: 524ff) – or in the Eocene Baltic amber (age 40-50 million years) in contrast probably to the Miocene Dominican amber (age less than 20 million years; only a single very dubious Lycosidae). Have both taxa evolved not before the Oligocene? See WUNDERLICH (2004: 201ff).

(***) Which is more than something playful masked as science.

Remark: With the help of this method I identified/introduced several new higher extant spider taxa like the families Comaromidae, Pimoidae and Synaphridae (originally described as subfamilies) as well the subfamily Stemonyphantinae (Linyphiidae) – which are widely accepted –, besides numerous extinct higher spider taxa.

BEITR. ARANEOL., 6 (2011)

ON EXTANT EUROPEAN SPIDERS OF THE TRIBE MANGORINI (ARANEAE: ARANEIDAE) AND TWO DOUBTFUL TAXA IN BALTIC AMBER

JOERG WUNDERLICH, 69493 Hirschberg, Germany.

Abstract: The occurrence of extant (four genera) and fossil (a single named genus and a dubious one) members of the tribe Mangorini (Araneae: Araneidae: Araneinae) in Europe is summarized; remarks on a further West-Palaearctic genus (*Drexelia*) are added. An identification key is given to the extant genera of the West-Palaearctic Mangorini. The genus *Lipocrea* O. PICKARD-CAMBRIDGE 1872 is reported for the first time from Europe (Cyprus). The adult female of the Eocene genus *Eochorizopes* WUNDERLICH 2008 is described for the first time. This taxon and a not closer determined one are regarded with some hesitation as members of the Mangorini; this tribe is reported from fossils for the first time.

Key words: Araneae, Baltic amber, Eocene, Europe, fossils, Mangorini, spiders.

The European members of the cosmopolitical – mainly tropical – araneinae tribe Mangorini are rare and not well-known; the only exception is the widely distributed and frequent species *Mangora acalypha* (WALCKENAER 1802) in which tibia III bears several feathery trichobothria (I found 2–10 trichobothria in specimens from the Acores), and the pedipalpal patella bears only a single bristle in contrast to other Mangorini which bears a pair.

Since the revisions of GRASSHOFF (1970ff) several additional taxa of the Mangorini besides *Mangora* were discovered in Europe. Species of *Larinia* spread north- and westward; the spreading may be connected with the global warming.

The Mangorini are characterized by a narrow thoracal fissure (fig. 6) – instead of a wide fovea which exists in most Araneinae and Araneidae –, and frequently by a raised thoracal area, see fig. 3 and GRASSHOFF (1970: Figs. 1b-f); but the thoracal area is not raised in *Lipocrea,* and in the fossil genus *Eochorizopes* WUNDERLICH 2008 (fig. 1) the caput is distinctly raised in contrast to all extant taxa.

This paper mainly treats the *Larinia*-group of the Mangorini of Europe. Remarks are furthermore given on other West-Palaearctic taxa which are all known from Israel, see LEVY (1986): *Drexelia acuticauda* (SIMON 1906) (figs. 6-9), *Larinia chloris* (AUDOUIN 1827), and *Siwa atomaria* (O. PICKARD-CAMBRIDGE 1876).
A single fossil genus – *Eochorizopes* in Baltic amber, figs. 1-2 –, and two extant genera have previously been reported from Europe: *Larinia* SIMON 1874 (3 species), and *Siwa* GRASSHOFF 1970 (only *dufouri* (O. PICKARD-CAMBRIDGE 1872), figs. 10-13). The only species of *Lipocrea* THORELL 1878 (= *Larinopa* GRASSHOFF 1979) – *epeiroides* O. PICKARD-CMABRIDGE 1872, figs. 4-5 –, is reported here for the first time from Europe (Cyprus), and Minor Asia (Turkey: Anatolia) as well; the species was previously known from Israel.
A dubious juvenile fossil spider in Baltic amber – a questionable member of the Mangorini – is also described (fig. 3).

Most West-Palaearctic taxa of the *Larinia*-group (see the tab. below) – as well as the extinct genus *Eochorizopes* WUNDERLICH 2008 – are characterized by the elongated body with a special shape of the opisthosoma (figs. 1, 7) which is pointed anteriorly and elongated beyond the spinnerets; the only exception is the genus *Siwa* (fig. 10) in which a stout body exists. In numerous species of the *Larinia*-group (and other Mangorini) a sexual size dimorphism is absent or only weakly developed in contrast to most of the remaining Araneidae in which frequently a female gigantism and/or a male dwarfism exist.

Remark on the taxonomy: GRASSHOFF (1970) split the "*Larinia*-complex" into 8 genera, LEVY (1986) followed this classification, LEVI (1975) regarded the taxa in question as subgenera, MARUSIK (1986) and TANIKAWA (1989) regarded *Larinia* in a wide sense. In my opinion most of the taxa in question may well be regarded as subgenera – see below: *Lipocrea epeiroides* – but *Siwa* MAY be a genus of its own: *Siwa* is the only one of the genera in question in which the ♂-coxa I bears a retrodistal hook like in numerous other Araneinae and most (!) *Mangora*-species.

	Drexelia	*Larinia*	*Lipocrea*	*Siwa*
Species	*acuticauda*	*bonneti,* *chloris*, *elegans*, *jeskovi*	*epeiroides*	*atomaria*, *dufouri*
West-palaearctic distribution	SE: e.g. Israel (not Europe)	wide (1)	South-East: Cyprus, Israel, Turkey	(2)
body shape	slender, figs. 6-7	slender	slender	more stout, fig. 10
thoracal fissure	long (3)	short (4)	long (3)	short (4)
♂-pedipalpus	fig. 8	(5)	fig. 5	fig. 13
epigyne	fig. 9	(6)	fig. 4	figs. 11-12

(1) *chloris*: Israel, Africa; remaining species north up to Central Europe.
(2) *atomaria*: Israel, Egypt; *dufouri*: SW-Europe, N-Africa, Israel.
(3) Length of the fissure = about the distance to the posterior prosomal margin.
(4) Length of the fissure = about two times of the distance to the posterior prosomal margin (fig. 6).
(5) See SZINETAR & EICHARDT (2004: 182: Figs. A-C), fig. 14.
(6) See SZINETAR & EICHARDT (2004: 183: Figs. A-C), figs. 15-16.

Tab. 1. Species, disrtibution and selected key characters of the extant west-palaearctic genera of the *Larinia*-group. s

Lipocrea THORELL 1878 (= *Larinopa* GRASSHOFF 1970) (extant)

The only species in the Western Palaearctic:

Lipocrea epeiroides (O. PICKARD-CAMBRIDGE 1872) (figs. 1-2)

Material: (1) Greece, (a) N Lukrunu, near a brook, among *Arundo*, 1♀ H. MALICKY leg. 4. V. 1974, SMF; (b) N-Cyprus, near Pollis, near the beach, beaten from bushes, 1♂ 1♀ 1 subad. ♂, JW leg. in V 2006, CJW; (2) Turkey, Anatolia, Hatay, 1♂ K. KUNT leg. in 2008, R20/AR/CJW.

Diagnosis: Metatarsus I bears usually 7–11 bristles, ♂-pedipalpus fig. 5, ♀: Epigyne fig. 4.

Description: Measurements (in mm, including the measurements given by LEVY): Body length ♂ 6-7.2, ♀ 7-8.9, prosomal length/width: ♂ 2.5-2.8/1.8-1.9, ♀ 2.5-3.2/1.5-1.9, prosoma and legs long and slender, prosoma low, thoracal area not raised, opisthosoma long and slender, overhanging the prosoma and the spinnerets, similar to figs. 1 and 7. Metatarsus I bears numerous – usually 7 to11 – slender bristles. All metatarsi bear a small trichobothrium in a position of 0.16-0.19. Bulbus (fig. 5) with a spoon-shaped median apophysis which stands widely out and bears anteriorly a slender apophysis; epigyne (fig. 4) medially with a large and strongly sclerotized scape and a pair of large rounded and depressed structures below the scape.

Relationships: The median apophysis of *Larinia cyclera* YIN et al. 1990 from China is quite similar to *epeiroides* which well may be regarded as a member of *Larinia*, too. The generotype of *Lipocrea* THORELL has been described from Australia (!).

Distribution: Israel – see LEVY (1986: 7-8, figs. 28-39) –, Cyprus (new to Europe), Turkey (Anatolia).

Measurements, distribution and identification key of/to the species of *Larinia* in Central Europe:

Remark on the distribution: All the three species are known from Russia (Caucasus) and Hungari, two (*bonneti* and *elegans*) from Austria, a single one from Poland (*jeskovi*) and France (*bonneti*) but none from Germany or Northern Europe. The reports of the genus in Austria and Poland are younger than 60 years; a spreading to the North and West may be connected with the global warming.

Larinia bonneti SPASSKY 1939 (material has been given to the SMF): (a) Austria, Illmitz, in reed near to the Neusiedler Lake and the Biological Station, 117 m, as well as near to the Oberstinker Lake (Hochstätten); (b) France, Loire-Atlantique, Briere Marshes, specimens of both sexes J. MURPHY leg. in II, 1♂ 1♀ SMF.

Distribution and length of the prosoma (in mm), taken from MARUSIK (1986), NEMENZ & PÜHRINGER (1973), TANIKAWA (1989) as well as material of the CJW and the SMF:

Species	♂	♀	distribution
bonneti	1.15–1.6	1.4–2.0	Austria, France, Hungary, Russia (Caucasus)
elegans	1.8–2.5	2.4–3.0	Austria, Hungary, Russia
jeskovi	2.4–3.0	3.1–3.45	Poland, Russia

Key to the Central European species of the genus *Larinia*:

Drawings of the genital organs: See SZINETAR & EICHARDT (2004). It is known that the scape in *Larinia* easily breaks off, and after the break its appearance is quite different.
Distribution: See above.

1 Opisthosoma ventrally medially with a large white or yellow area and black lateral margins. Metatarsus I most often with 5-8 bristles. Larger spiders, prosomal length ♂ 1.8-3.0 mm, ♀ 2.4- 3.45 mm. Scape wide (*) 2

- Opisthosoma ventrally medially with a large DARK area and light lateral margins. Metatarsus I most often with 1-3 bristles. Smaller spiders, prosomal length ♂ 1.15-1.6 mm, ♀ 1.4-2.0 mm. ♂-pedipalpus Fig. 14, ♀: Scape long (figs. 15-16) . . . . .*bonneti*

2(1) Length of the prosoma ♂ 1.8-2.5 mm, ♀ 2.4-3.0 mm. Light ventral area of the opisthosoma ca. 1.3-1.8 times longer than wide . . . . *elegans*

- Length of the prosoma ♂ 2.4-3.0 mm, ♀ 3.1-3.45 mm. Light ventral area of the opisthosoma ca. 2.5-4 times longer than wide . . . . *jeskovi*

(*) See above: The similar species *Lipocrea epeiroides* (figs. 4-5), in which metatarsus I bears 7-11 bristles, and which may actually be a member of *Larinia*, too.

The fossil taxa in Eocene Baltic amber:

Eochorizopes ?szeklinskiae WUNDERLICH 2008 (figs. 1-2) photo 26

Material: 1♀ in Baltic amber, F2167/BB/AR/CJW.

Remarks: *Eochorizopes* WUNDERLICH 2008 was based on a juvenile male holotype (body length 3.2 mm), and a subadult or adult female (body length 6.5 mm) of *E. szeklinskiae*, see WUNDERLICH (2008: 104, figs. 1-7) (the genus was partly erroneously – p. 104, 108 – called "*Chorizomma*"). The first congeneric adult spider is described below.

Preservation: The female is almost completely preserved in a piece of amber which is slightly heated; an anterior left part of the opisthosoma (within the amber), the left patella II and the tips of the left tarsi III and IV are cut off. The right side of the spider is partly covered with a white emulsion. A thin thread is running anteriorly from the left anterior leg.

Description:
Body length of 5.3 mm, its prosomal length is 2.1 mm, the length of tibiae I and IV is 1.3 and 1.15 mm. The body of the spider is slender (fig. 1, photo), most eyes, the thoracal fissure, and the mouth parts are hidden, the cephalic part is distinctly raised, the opisthosoma is protruding anteriorly and fairly rounded, strongly elongated beyond the spinnerets. The legs are only fairly slender (photo), their order is IV/I/II/III, the bristles are long and thin, tibia I bears probably 8 bristles, the metatarsi are bristle-less, the position of the trichobothrium on metatarsus I is in 0.27; I did not find a trichobothrium on metatarsus IV. The epigyne (fig. 2) is distinctly sclerotized and fairly protruding, bearing a wide margin in the posterior half. A distinct scape is absent (or has it broken off?), only a fairly bulging structure exists in front of the middle of the epigyne. A pair of indistinct circular questionable depressions exists in the middle of the length of the epigyne, a wide posterior "outgrowth" exists within the wide posterior opening of the epigyne.

Relationships of the genus and species: (a) The genus *Eochorizopes*: According to the long, slender and elongated opisthosoma, the thin leg bristles, the thoracal fissure and the apparently weak sexual size dimorphism I now regard the genus *Eochorizopes* WUNDERLICH 2008 as a member of the *Larinia*-group of the tribe Mangorini but not near to *Chorizopes* as previously considered. The shape of the prosoma is quite different from the known extant Mangorini and the *Larinia*-group sensu GRASSHOFF (1970: Figs. 1a-f) in which the thoracal region is usually raised. The whole prosoma is low in *Lipocrea* but its cephalic area is distinctly raised in *Eochorizopes* (fig. 1). The legs are more stout in *Eochorizopes* than in the extant members of the *Larinia*-group, and the metatarsi are bristle-less but they bear bristles in the extant *Larinia*-group. – (b) The species: Because of the difference of the body length of the three fossil specimens in question as well as their different development and sex I am not sure about their conspecifity. Probably exist more than a single species preserved in Baltic amber.

Distribution: Eocene Baltic amber forest.

Araneidae: ?Mangorini indet. (fig. 3) photo 25

Material: 1 juv. in Baltic amber, F1893/BB/AR/CJW.

Preservation and syninclusions: The spider is almost completely preserved, parts of the left legs I and II are cut off, few stellate hairs exist in the yellow piece of amber which was slightly heated.

Description (juv.): The very young spiderling is ca. 1.5 mm long, the prosoma is ca. 0.5 mm long; leg I: Tibia 0.17, metatarsus 0.15, tarsus 0.17.
The colour is yellow-brown, the eight eyes are partly covered with a white emulsion, the prosoma is posteriorly strongly domed (fig. 3, photo), the clypeus is short, the stout legs bear few thin bristles at least dorsally on patellae and tibiae, the tarsi are longer than the metatarsi, feathery trichobothria on tibia III are not recognizable, all metatarsi bear a single long trichobothrium in about their middle, the tarsi bear three claws, the paired claws bear long teeth, the opisthosoma is high (fig. 3), almost egg-shaped, and bears longer and thick hairs, the spinnerets are short.

The **relationships** are unsure; I regard it as a member of the family Araneidae. A similar posteriorly domed prosoma exists e.g. in the African genus *Psyllo* THORELL 1899 of the tribe Mangorini, see GRASSHOFF (1970: Fig. 1f). The shape of the prosoma is also similar in *Mangora semiater* LEVI 2007: Fig. 1 from South America in which feathery trichobothria on tibia III exist. Such trichobothria exist in all members of the genus *Mangora,* and are apparently absent in the juvenile specimen in question – but such trichobothria may be absent in juvenile spiders in contrast to adults. Adult fossils are needed for a closer determination.

Distribution: Eocene Baltic amber forest.

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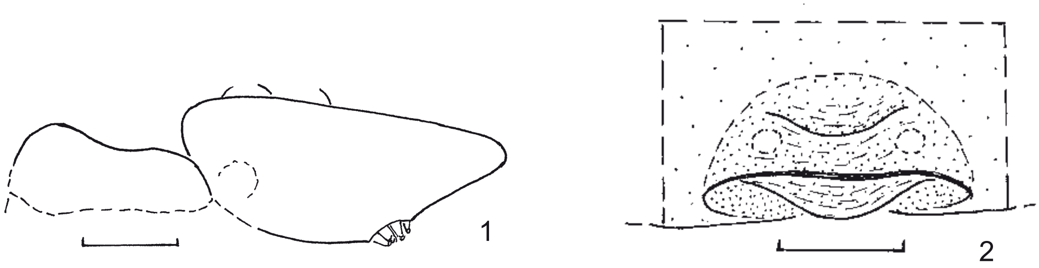
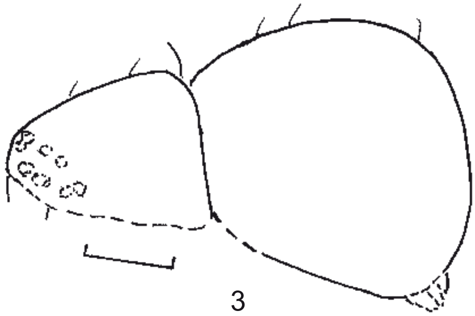


Figs. 1-2: *Eochorizopes* ?*szeklinskiae* WUNDERLICH 2008 (F2167/BB/AR/CJW), ♀ in Baltic amber; 1) lateral aspect of the body, outline; 2) epigyne, ventral and slightly left aspect. Scale bars 1.0 and 0.1 mm;



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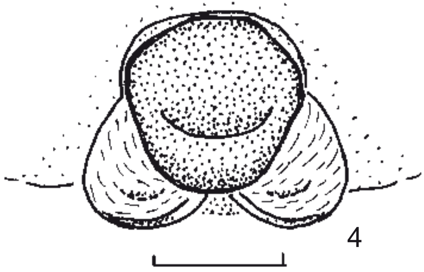

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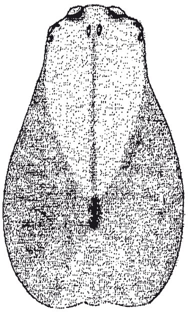

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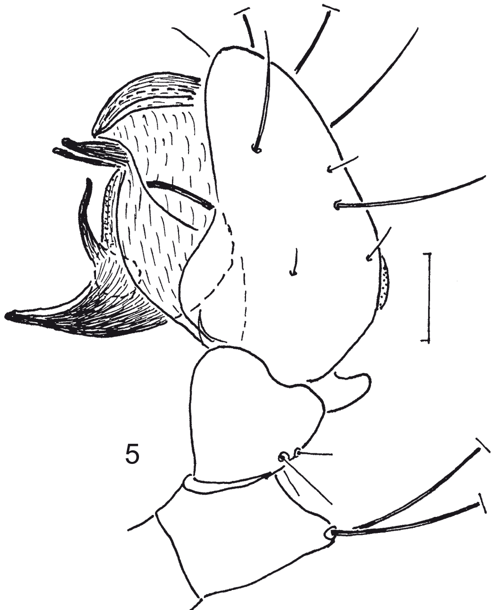

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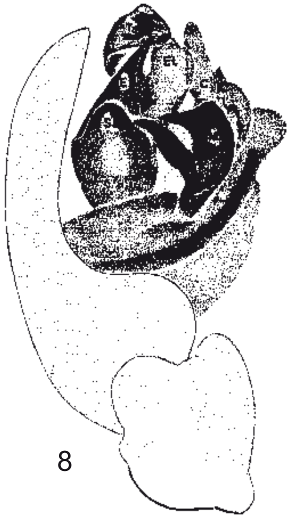

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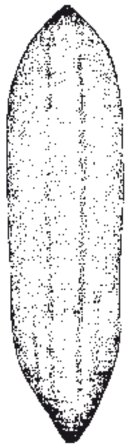

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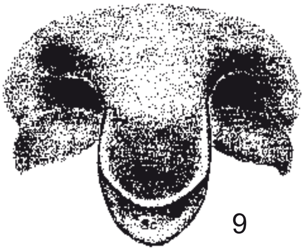

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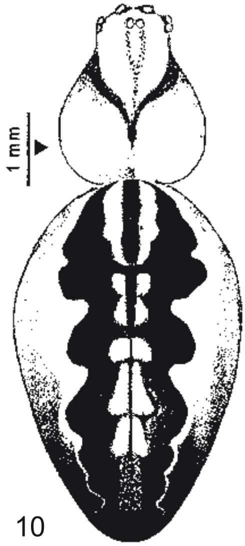
fig. 3) Araneidae: ?Mangorini indet., juvenile specimen in Baltic amber, left-anterior aspect of the body, outline. Note the strongly domed thoracal part. Scale bar 0.2;

figs. 4-5: *Lipocrea epeiroides* (O. PICKARD-CAMBRIDGE 1872); 4) ♀, epigyne; 5) ♂, prolateral aspect of the right pedipalpus. Scale bars 0.2;

figs. 6-9: *Drexelia acuticauda* (SIMON 1906); 6) ♀, dorsal aspect of the prosoma; 7) ♀, dorsal aspect of the opisthosoma; 8) ♂, prolateral aspect of the left pedipalpus; 9) ♀, epigyne. No scale bars. Taken from LEVY (1986);



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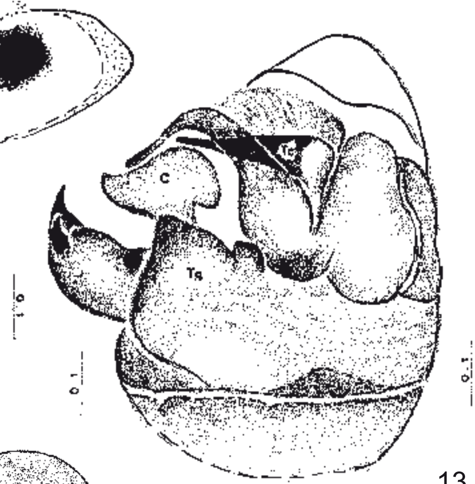

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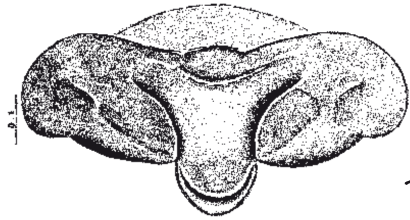

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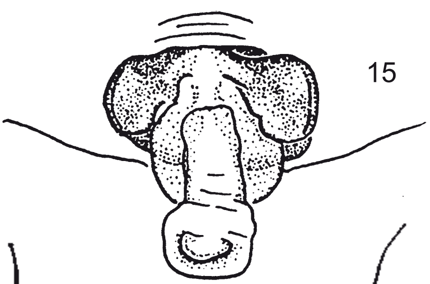
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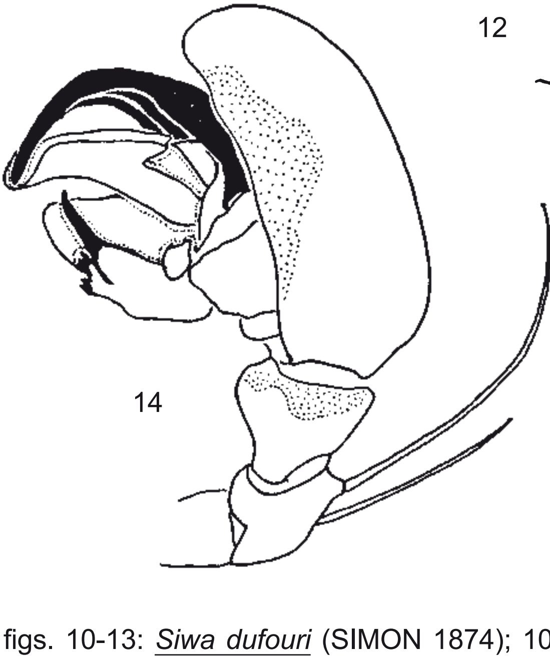
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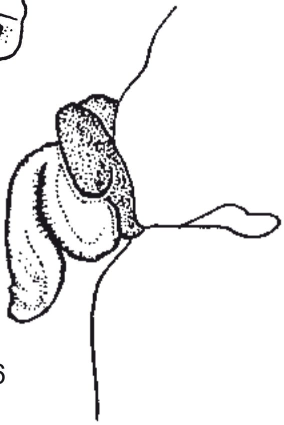
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figs. 10-13: <u>*Siwa dufouri*</u> (SIMON 1874); 10) ♀, dorsal aspect of the body; 11-12) ♀, epigyne, 13) ♂, lateral aspect of the left pedipalpus. Figs. 10-11 are taken from MELIC (2000), figs. 12-13 are taken from LEVY (1986);

figs. 14-16: <u>*Larinia bonneti*</u> SPASSKY 1939; 14) ♂, retrolateral aspect of the left pedipalpus; 15-16: ♀, ventral and lateral aspect of the epigyne. No scale bars. Drawings by PETER JÄGER.

BEITR. ARANEOL., 6 (2011)

TAXONOMY OF EXTANT AND FOSSIL (EOCENE) EUROPEAN GROUND SPIDERS OF THE FAMILY GNAPHOSIDAE (ARANEAE), WITH A KEY TO THE GENERA, AND DESCRIPTIONS OF NEW TAXA

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Abstract: (1) An identification key is given to the 41 extant European genera of the Ground Spider family Gnaphosidae (Araneae), including the genus *Cybaeodes* SIMON 1893 which is regarded with hesitation as the single member of the tribe Cybaeodini of the Gnaphosidae but not being a taxon of the Zoridae/Liocranidae (**rev. relat**.). Notes are given on selected gnaphosid genera – like *Arabelia* BOSSELAERS 2009, *Macedoniella* DRENSKY 1935, and *Zelotes* GISTEL 1848 – as well as on some tribus and subfamilies. Gnaphosidae s. l. could include the subfamilies Gnaphosinae, Eomactatorinae (this extinct taxon may be the sister group to the Gnaphosinae), Prodidominae, Molycriinae, Anagraphinae, and probably Cybaeodinae. *Poecilochroa furcata*, *patricia, perversa, pugnax* and *senilis* of the European fauna are transferred to *Macarophaeus* **n. gen**. (**n. comb**.). *Scotophaeus cultior* KULCZYNSKI 1899 (Madeira), and *Scotophaeus varius* SIMON 1893 (Canary Islands) are also transferred to *Macarophaeus* (**n. comb**.). *Macedoniella* DRENSKY 1935 is regarded as a dubious genus of the family Gnaphosidae, probably a malformation. The following taxa are described from the Canary Islands and Madeira: *Macarophaeus insignis* **n. gen. n. sp**. and *Setaphis murphyi* **n. sp**.; *Macarophaeus varius* SIMON 1893 and *M. cultior* KULCZYNSKI 1899 (Madeira) are revised, the male of *Haplodrassus deserticola* SCHMIDT & KRAUSE 1996 is described for the first time, *Canariognapha parwis* **n. gen. n. sp**. is described from the Canary Islands; *Gnaphosa artaensis* **n. sp**. from Spain (Mallorca), ?*Macarophaeus sabulum* **n. sp**. and *Scotophaeus nanoides* **n. sp**. from Portugal, *Zelotes turcicus* **n**. **sp**. from Asia Minor (Anatolia). Questionable stridulatory spines ventrally on the male opisthosoma are reported from *Drassyllus* and *Trachyzelotes*. Examples of the intrageneric and intraspecific variability, of convergences, and of questionable subspecies are discussed.

(2) Fossils: The previously described Eocene taxa in Baltic amber are revised: *Eomactator* PETRUNKEVITCH 1958 (Gnaphosidae s. l.) and *Captrix* PETRUNKEVITCH 1942 (family relationships unsure; Corinnidae?). The following extinct gnaphosid taxa from the Baltic amber forest are described: Eomactatorinae **n. subfam**., *Eomactator hamatus* **n. sp**., *E. hirsutipes* **n. sp**., and *E. obscurior* **n. sp**., *Eognaphosops* **n. gen**. with *E. cryptoplanoides* **n. sp**., and *Zelotetis* **n**. **gen**. with *Z. calefacta* **n. sp**.. A proof of extant genera and tribes of the Gnaphosidae in the Eocene Baltic amber is absent; the genera *Gnaphosa, Micaria* and *Zelotes* have to delete from the list of Baltic amber spiders.

Key words: Araneae, Baltic amber, Canary Islands, Cybaeodini, Eocene, Eomactatorinae, Europe, fossils, Gnaphosidae, Gnaphosinae, gnaphosoid branch, Canariognapha, *Macarophaeus*, *Macedoniella*, Madeira, *Nodocion*, Prodidomidae, spiders.

Acknowledgments: I thank T. BLICK for sending me copies of various papers, L.C. da F. CRISPO, A. HÄNGGI, A. MELIC, and J. MURPHY for the loan of material, J. MURPHY for helpful discussions, and for leaving the figures 16, 18, 32-51, 53-56, 59-63, 66-68, 69-69a, and 74-76 for the publication in this paper. With thanks I took also few figs. from papers of LEVY, PLATNICK and few other authors. There has been a fruitful discussion with M. M. KOVBLYUK, and helpful comments by A. TROTTA. Especially I thank PARWIS NABAVI for leaving me very important material from Gran Canaria which has been captured with the help of pit falls and a colleague.

Material: CJW = collection of J. WUNDERLICH, SMF = Senckenberg-Museum Frankfurt a. M. The material of the CJW will most probably go to the SMF in the future.

Methods: See the paper on the family Clubionidae in this volume.

Contents:

The chapters are arranged in the following order:

(A) Taxonomy, diagnoses, tribus of extant gnaphosids, key to the extant genera.
(B) Phylogenetics and questionable subspecies.
(C) The extant European (including Canary Islands) taxa, and key to the genera.
(D) The fossil European taxa in Eocene Baltic amber, with new descriptions.
(E) References.
(F) The figures.

“Ground Spiders” is an appropriate name for the family Gnaphosidae – and of the whole gnaphosoid branch as well – whose members mainly live on the ground (they are frequently collected under stones), but (a) several members live (also) on low vegetation or of/under the bark of trees (e.g. *Micaria subopaca, Scotophaeus blackwalli* and *nanus*) or even on trees (*Macarophaeus varius*), and (b) most spiders of related families like Corinnidae and Liocranidae are also mainly dwellers of the ground.

Gnaphosidae is one of the most diverse spider families at all; 41 genera and about 450 species are known from Europe. The rare but quite remarkable Eocene fossils in Baltic amber – which apparently possess archaic characters – may give important hints to the relationships and evolution of the taxa of the Gnaphosidae and even of the gnaphosoid branch.

I had to study gnaphosid genera of most parts of the world – especially the west-palaearctic genera – for many years before I was able to revise the Eocene taxa in Baltic amber which relationships are still not quite clear. The investigation of the spigots of their anterior spinnerets was most important to find out the relationships of the Eocene genera in Baltic amber although these spigots are difficult to observe and frequently hidden in the fossil spiders. Thee excellent publication by MURPHY (2007) and the numerous important papers by PLATNICK (some of these are listed below) and LEVY stimulated me to publish this paper on higher taxa of the family Gnaphosidae now.

I do not include here a systematical study of the trichobothriotaxy, the feathery hairs (see the remarks below), the epiandrous gland spigots, the ventral questionable opisthosomal stridulatory bristles/spines (fig. 148) (see the remarks below), as well as the praecoxal and intercoxal triangles of the sternum which may be of taxonomical value, and which all have to be investigated in the future.

(A) TAXONOMY

Gnaphosidae is a member of:

(a) the gnaphosoid branch s. l., in which the lenses of the posterior median eyes usually are flattened/irregular, and – at least in the European taxa – the apical article of the anterior spinnerets is reduced (really existing in certain taxa?). – Families in Europe besides (c): Cithaeronidae (only *Cithaeron praedonius* of Greece), and Trochanteridae (only *Platyoides venturus* of the Canary Islands), and

(b) the gnaphosoid branch s. str. (= “higher gnaphosoids” sensu PLATNICK 2000) in which the apical article of the anterior spinnerets is absent (a sclerotized apical ring may exist: In the Australian Lamponidae), and

(c) the gnaphosid-prodidomid branch of the gnaphosoid branch in which the piriform gland spigots are larger than the major ampullate gland spigots, a sclerotized ring (a plate) exists around the major ampullate gland spigots of the anterior spinnerets (figs. 3, 116, 123a) (and the piriform gland spigots of the anterior spinnerets are modified at least in the Gnaphosinae). A sclerotized apical ring of the anterior spinnerets is absent. – Families: (1) The Gnaphosidae (in which I include with some hesitation the extant tribe Cybaeodini (*Cybaeodes*, see below), and the extinct new subfamily Eomactatorinae, and (2) the family Prodidomidae which may be part of the Gnaphosidae, see the paper on the Prodidomidae in this volume. – Remark: Alternatively the Gnaphosidae **s. l**. could include the subfamilies Gnaphosinae, Eomactatorinae (its extinct sister group), Prodidominae, Anagraphinae, Molycrinae and probably the Cybaeodinae).

What are the diagnostic characters of the members of the Gnaphosidae (s. str.)? Different authors have differing opinions in this matter, and the limits of the Gnaphosidae appear unsure: Have the Cybaeodini, Eomactatorinae, and even the Prodidomidae to be included? In this paper I include with some hesitation the Cybaeodini and Eomactatorinae in the family Gnaphosidae.

An important DIAGNOSTIC CHARACTER of the Gnaphosidae s. l. is the existence of two quite different kinds of spigots of the anterior spinnerets (the spinnerets as well as the spigots on the spinning field may be retracted and can only insufficiently observed in such cases):

(a) a single (e.g. in *Hypodrassus* and *Sernokorba*) or – more often – a pair of (major ampullate) gland spigots in a (pro)ventral – more medial – position. These spigots are tiny (much smaller/thinner than the pririform spigots), and placed on a common sclerotized base (ring, plate) in the extant Gnaphosidae (fig. 3) (apparently exists only a single one in the Cybaeodini (fig. 8a)), and may be situated on DIFFERENT rings in the fossil taxa (fig. 116). PLATNICK (2000: 7) regarded this ring as “remnants of a plesiomorphically present distal article” of the anterior spinnerets (which exists in various related families, too) but this hypothesis appears unlikely to me: this ring may well be an apomorphic character, see below.

(b) usually several – up to two dozen, rarely only 1 (e.g. in *Micaria fulgens*) or 2 – large piriform gland spigots of the anterior spinnerets (figs. 3, 8-8b, 125a) which typically (!) have a widened base (**) (the base is not recognizable in retracted spigots). The position of these spigots may be more (retro)dorsally; they may build a group or – rarely – almost a circle, e.g. in *Taieria erebus* from New-Zealand, see the fig. in MURPHY (2007: 381).

Remarks: The piriform gland spigots (of the anterior spinnerets) are usually figured as BLUNT (e.g. fig. 3) in the papers of most authors like MURPHY (2007). Contrarily – according to my investigation of mainly fresh specimens and fossils spiders – these spigots are pointed (and have probably an additional short apical segment) which probably easily breaks off (!?). In several taxa of the Gnaphosidae (coll. JW) – e. g. *Pterotricha lentiginosa* and *Drassyllus villicus* – I found (using a light microscope) occasionally an apical pointed article of these spigots being (still?) present; in a male of *Pterotricha* both “forms” are preserved side by side (fig. 8), similar in *Cybaeodes* (figs. 8a-b) and in fossils (figs. 123a, 124a). ROBERTS in MURPHY (2007: 101) figured exceptionally similar – pointed – spigots of a male of the African species *Asemesthes lineatus*, and the same author (p. 563) numerous pointed piriform gland spigots of *Hypodrassus maoricus*. The question is: Exists originally and generally distinctly pointed piriform gland spigots – and probably an additional apical segment – which became lost during the procedure of preparation for expanding? See the fossil Eocene taxa below. Slender piriform spigots exist in *Cybaeodes* (figs. 8a-b, 25), see below as well as in *Eomactator* (figs. 123a, 125a). – The spigots in question are usually figured as flattened and possessing a wide opening, but several spigots of the same specimens may be tube-shaped and having a small opening (fig. 8) e.g. in *Pterotricha lentiginosa*.

The characters of the spigots of the anterior spinnerets are connected in the Gnaphosidae with the existence of three further patterns which are more easy to observe. The most usefull DIAGNOSTIC CHARACTERS of the Gnaphosidae besides the spigots of the anterior spinnerets – best used as a combination – are:

(a) cylindrical (most important) as well as usually long and widely spaced (more than one diameter) basal articles of the anterior spinnerets (figs. 24, 133) (*) (**) in contrast e.g. to fig. 126 (Zoridae), similar to Prodidomidae and most males of the Clubionidae; plus:

(b) most often ventrally right across depressed gnathocoxae (figs. 41, 137) (see the remark (1) below), and/or

(c) usually an oval shape of the posterior median eyes (fig. 1) (***); see remark (2).

The tendency to the existence of an opisthosomal scutum in the male sex – already existing in some Eocene taxa, figs. 132, 138 – may be a further autapomorphy of this family (convergently evolved in or within several related families, e.g. in the Prodidomidae: Molycriinae). It is absent in various genera, see the tribes and the key below.

(*) *Micaria*, key no. 1 – in which the anterior spinnerets are not so widely spaced and may be retracted – is one of the exceptions. In the small spiders of *Leptopilos*, *Leptodrassex* and *Leptodrassus* (no. 17), *Parasyrisca* (no. 31) and *Setaphis murphyi* (e.g.) the anterior spinnerets are relatively closely spaced, too (fig. 24).

(**) In several gnaphosid taxa the piriform gland spigots are only slightly widened basally, e. g. in *Zelotes turcicus* n. sp. (fig. 110); they are apparently not widened in the Eocene fossils (fig. 125a). – The anterior spinnerets may be similar in both sexes but in some taxa they are strongly sexually dimorphic: Cylindrically in the male sex but quite different in the female in *Cybaeodes* (Cybaeodini) which are different from other Gnaphosidae. Eocene Gnaphosidae are only known from the male sex, thus sexual dimorphy is unknown in these taxa. (Sexually dimorphic anterior spinnerets exist also in some genera of the Clubionidae (in *Cheiracanthium* and large species of *Clubiona* s. l. (part.): long and cylindrical spinnerets in the male sex but shorter and conical spinnerets in the female sex. The spigots of their anterior spinnerets are different in both families).

(***) Exceptions are e.g. *Anagraphis*, *Echemus angustifrons*, *Leptodrassex*, certain *Leptodrassus* and *Leptopilos*, *Scotophaeus*, *Talanites*, *Zelotes* which MAY have almost or virtually circular posterior median eyes similar to fig. 2, as well as certain Eocene fossil taxa. – On the other hand: Oval lenses of the posterior median eyes exist (e.g.) also in few other European members of the gnaphosoid (s. l.) branch, of the genera *Platyoides* and *Cithaeron*; see also the following remark.

Remarks: (1) The gnathocoxal depression is low in some tiny species of the Gnaphosinae, in most *Leptopilos*, *Leptodrassex*, *Leptrodrassus*, and in *Cybaeodes* (fig. 23). (2) Oval lenses of the posterior median eyes IN COMBINATION with a gnathocoxal depression (but possessing conical and shorter anterior spinnerets in contrast to all Gnaphosidae) exist also in European species of other families of the "gnaphosoid branch s.l.": In *Arabelia pheidoleicomes* BOSSELAERS 2009 (Zoridae/ Liocranidae but in my opinion more likely a Gnaphosidae, see below: Cybaeodini, Greece), *Cithaeron praedonius* (Cithaeronidae, Greece), and in *Platyoides venturus* (Trochanteriidae, Canary Islands).

Relationships of the Gnaphosidae s. l.: The strongly related Prodidomidae: see the paper on this family (or subfamily?) in this volume. – The Lamponidae of the Australian Region are also strongly related. According to PLATNICK their anterior lateral spinnerets have an incomplete apical ring of sclerotized cuticula (as remains of the base of the apical article) rather than just a tiny crescent, the base of the piriform gland spigots of their anterior spinnerets is not widened (this character is similar in some Gnaphosidae (!)). A pair of usually invaginated sclerites just behind the epigastric furrow is regarded by PLATNICK as an important character of the Lamponidae. Paired "post-epigastral sclerites" are also present in such extant (fig. 109) and fossil (fig. 123) Gnaphosidae in which a sclerotized opisthosoma exists, e.g. in *Zelotes* and in *Trachyzelotes,* but they are not invaginated in the Gnaphosidae.

(B) PHYLOGENETICS AND QUESTIONABLE SUBSPECIES

Evolution/phylognetics of the Gnaphosidae including indications from fossil taxa: Cretaceous taxa of the gnaphosoid branch are unknown (like other "Dionycha"). The oldest fossil gnaphosid members (Eomactatorinae) are known from the Paleogene: Eocene, see below. These ancient spiders of the Baltic amber forest are of very special interest, comparable partly with the archaic Eocene subfamily Cocalodinae of the familiy Salticidae, see WUNDERLICH (2004):

(1) None of the specialized apomorphic structures of extant Gnaphosidae are known from the Eocene taxa of the Baltic amber forest (e.g.): No common ring around the major ampullate gland spigots (fig. 116, compare fig. 3), no metatarsal "preening comb" of the Zelotini (fig. 108) ("preening hairs" may exist, in *Zelotetis calefacta* n. sp.), no strongly inclined trochanters (Drassodini) (but see fig. 121!), no ventral spines of the male opisthosoma (like in certain Zelotini: In *Drassyllus* and *Trachyzelotes*, fig. 148), no

scale-shaped hairs or an ant-shaped body like in the Micariini have been recognized. In Miocene Gnaphosidae from the Dominican amber forest – about 20 million years younger than the Baltic amber forest – a metatarsal “preening comb” of the Gnaphosidae: Zelotini has been described in contrast to the Eocene taxa, see WUNDERLICH (1988: 227), Beitr. Araneol., 2.

(2) On the other hand: Within most tribes of the Gnaphosinae – with the probable exception of the Zelotini – exist feathery (branched) hairs (fig. 68e) which apparently are absent (lost) in all members of the extinct Eomactatorinae.

(3) Eocene members within the extant taxa have not been found so far: Members of the subfamily Eomactatorinae are unknown from today’s spiders.

(4) Questionable result of the new findings: The Eocene fossils – members of the extinct Eomactatorinae n. subfam. (see below, figs. 116, 123a, 125a) – may be the sister group to all extant taxa of the Gnaphosidae (Gnaphosinae) in which – as apomorphies – probably blunt and flattened (?) piriform gland spigots of the anterior spinnerets evolved which are widened basally, and are distinctly larger than the small major ampullate gland spigots which possess a sclerotized ring as their common base (fig. 3).

Questionable subspecies are reported from numerous spider families but our knowledge about the status of most of these taxa is still weak, see WUNDERLICH (2008: 765-771). A larger number of POPULATIONS from different localities/islands has to study in the future for taxonomical conclusions. In the European Gnaphosidae I recognize several cases of questionable subspecies; I list and will discuss very short here three of them:

(a) *Zelotes tenuis* (L. KOCH 1866) (fig. 1-2): This mainly mediterranean species (locus typicus: Dalmatia, Yugoslavia; introduced to California) is very variable in several characters: The lenses of the posterior median eyes (e.g.) are smaller and distinctly oval in a male from France (Provence, coll. JW) (fig. 1) but larger and almost circular in a male from Spain (Mallorca, coll. JW) (fig. 2) which is smaller and has darkened posterior legs (a subspecies?). The shape of the median apophysis is very variable, too. See LEVY (1998: 131-133).

(b) *Trachyzelotes adriaticus* (CAPORIACCO 1953): Certain genitalic and somatic structures of specimens from different island of Greece are variable in this species, see paper no. (3) pp. 54-55.

(c) *Micaria gomerae* STRAND 1911: This species is known from different taxa – questionable species or subspecies – from several Canary Islands, see WUNDERLICH (2008: 771). I did not find differences of the structures of the bulbus and of the epigyne/vulva but of certain somatic characters.

(C) THE EXTANT EUROPEAN (INCLUDING CANARY ISLANDS) TAXA

(1) List of the extant European genera of the family Gnaphosidae:

(Genera of Central Europe are printed in heavy letters)

Aphantaulax**, Berinda,* ***Berlandina, ***Callilepis***, *Camillina*, *Canariognapha* n. gen., *Cesonia,* ***Cryptodrassus**, Cybaeodes,* ***Drassodes**,* ***Drassodex*** MURPHY 2007*,* ***Drassyllus**,* ***Echemus**,* ***Gnaphosa**,* ***Haplodrassus*** *(= Tuvadrassus),* ***Kishidaia**, Leptodrassex* MURPHY 2007*, Leptodrassus, Leptopilos* LEVY 2009*, Macedoniella:* A dubious genus, see below, key no. 10*, Macarophaeus* n. gen.*,* ***Micaria**, Minosia, Minosiella,* **Nomisia***, Parasyrisca,* ***Phaeocedus**,* ***Poecilochroa**, Pterotricha, Scotognapha,* ***Scotophaeus**, Setaphis, Sidydrassus,* ***Sosticus**, Synaphosus, Talanites,* ***Trachyzelotes**, Turkozelotes* KOVBLYUK et al*.* 2009*,* ***Urozelotes**, Zelominor* SNAZELL & MURPHY 1997*,* ***Zelotes**.*

The following genera are reported from the S- and SE Mediterranean areas*: Heser* TUNEVA 2003*, Megamyrmaekion, Odontodrassus* and *Pterotrichina*. See also below, the paragraph "Geographical distribution", and *Arabelia* BOSSELAERS: Cybaeodini.

(2) Provisional diagnoses and list of the extant tribes as well as the divers *Haplodrassus* (s.l.)-group of the European Gnaphosinae and their genera; remarks on the biogeography:

Remarks: (a) Echemini and Herpyllini possess usually a different pattern of their opisthosoma but some exceptions exist (see *Macarophaeus*). In both taxa exists the tendency to evolve a carina of the anterior cheliceral margin, and both have probably to unite; their diagnoses are insufficient, their genital structures are similar, see e. g. *Nodocion* and *Sergiolus*, but in the Echermini exists a hook-shaped median apophysis in contrast to the Herpyllini. (b) Anagraphini and Drassodini have probably also to unite, see their characters below (this is a matter of a worldwide taxonomical revision of the Gnaphosidae). (c) The diverse *Haplodrassus*-group is apparently not monophyletic. (A tribus name of this group does apparently not exist). (d) The relationships of the Cybaeodini are unsure, see below. (e) Members of the Hemichloeini and of the *Anzacia*-group sensu MURPHY (2007) are absent from Europe. – The rank, the number and the relationships of the subfamiliar gnaphosid taxa are still quite unsure, see especially below, the extinct Eomactatorinae, as well as the papers by PLATNICK (1991: 35), MURPHY (2007) – who used species-groups –, and UBICK (2005: 106-107) who used subfamilies.

(a) Anagraphini (*Anagraphis*-group sensu MURPHY 2007):
DIAGNOSIS: "Genera which possess, distally on their anterior lateral spinnerets, a very narrow, but clearly defined annular crescent, from which emerges a fringe of uniformly, closely spaced, thin setae." (MURPHY (2007: 41, figs. p. 234-237). Body length 4-15 mm. Trochanters fairly but distinctly and widely notched (similar to fig. 121). Scutum of the ♂-opisthosoma absent. – See the key nos. 13f and the *Drassodes*-group.
Anagraphis, Drassodex, Talanites.

(b) The tribe **CYBAEODINI** SIMON 1893 (**rev. relat**.)

Type genus by monotypy: *Cybaeodes* SIMON 1873.
Synonyms: *Cerrutia* ROEWER 1960 and – according to BOSSELAERS (2009) – *Brachyanillus* SIMON 1913. See LEHTINEN (1967: 226, 292), PLATNICK & DI FRANCO (1992) and WUNDERLICH (2008: 493-494, 504-505, figs. 3-41).
DIAGNOSIS: Trochanters distinctly notched (arrow in fig. 103, compare fir. 121) (similar in the Drassodini), Gnathocoxae ventrally only weakly depressed (fig. 23), spinnerets sexually strongly dimorphic, see WUNDERLICH (2008: 521, figs. 35-36): The anteriors in the male long and almost cylindrical (fig. 24), the medians in the female enlarged apically. Piriform gland spigots pointed (not flattened), and with a widened base (figs. 8a-b, 24), see PLATNICK & DI FRANCO (1992: Fig. 4)). – Further important characters: Eyes most often tiny to small (absent in *liocraninus* but large in *C. mallorcensis* WUNDERLICH 2008), long paired ventral bristles of the anterior tibiae are present, metatarsi and tarsi bear only a weak scopula, feathery hairs (similar to fig. 68e) and plumose hairs (fig. 23a) of the chelicerae present.
Remark: The oval shape of the posterior median eyes in *Cybaeodes* is not a matter of their reduction as shown in the large eyed *C. mallorcensis* WUNDERLICH 2008.
RELATIONSHIPS – see WUNDERLICH (2008: 493-494) (sub Zoridae) – : According to the oval shape of the posterior median eyes, the depression of the gnathocoxae – which is only weak (fig. 23), and was not recognized by me in 2008 –, and the long and cylindrical anterior spinnerets in the male sex (closely together and distinctly modified in the female sex) as well as the BASALLY WIDE piriform gland spigots (figs. 8a-b, 24) I regard – following SIMON (1913) – *Cybaeodes* as a member of the family Gnaphosidae. PLATNICK & DI FRANCO (1992: 5) wrote: "Because females <!> of *Cybaeodes* have unmodified piriform spigots, that genus does not seem <!> to belong to the Gnaphosidae. In addition, the anterior metatarsi and tarsi of *Cybaeodes* bear, in both sexes, two ventral rows of modified setae ... that, under light microscopy, closely resemble those found in the genera *Liocranum, Mesiotelus*, and *Hesperocranum*, all currently placed in the Liocranidae....". – Comments: Longer paired ventral bristles ("modified setae") exist also in certain Gnaphosidae like *Micaria dives, Scotognapha* sp., and *Pterotricha* sp., and the spinnerets are distinctly sexually dimorphic in numerous Zoridae s. l., in numerous Gnaphosidae s. l., and in numerous Clubionidae as well. The piriform gland spigots of the anterior spinnerets POSSESS a widened base (figs. 8a-b). In my opinion the taxonomical importance of the sexual dimorphy of spiders' spinnerets should not be over-emphasized.
To SUM IT UP: According to its taxonomic characters *Cybaeodes* is in my opinion most probably a genus of the Gnaphosidae – regarded in this paper as a tribe of its own – but not a member of the family Zoridae/Liocranidae as regarded by BOSSELAERS (2009), PLATNICK & DI FRANCO (1992) and WUNDERLICH (2008).

Remark: In my opinion *Cybaeodes* has to transfer from the Gnaphosidae to the Liocranidae (Zoridae) not because of the existence of a character of the Liocranidae but mainly because of sexually-dimorphic differences (in the female sex) of the spinnerets.
Cybaeodes; see the dubious genus *Macedoniella* DRENSKY 1935, see the key no. 10. I do not want to exclude that *Arabelia* BOSSELAERS 2009 (♂ (fig. 13a): See BOSMANS in Arachnol. Mitt. (2011), 40: 20-21, ?Liocranidae, ?Corinnidae) may be related of *Cybaeodes* SIMON 1873. In both taxa exist strong trochanteral notches and spatulate hairs of the claw tufts; in *Cybaeodes* the spinnerets are sexually strongly dimorphic, in *Arabelia* bulbus apophyses are absent.

(c) Drassodini (*Drassodes*-group sensu MURPHY 2007):
DIAGNOSIS: Trochantera (most distinct on III-IV) with strong ventral notches (arrow in fig. 103; compare fig. 121) (similar to the Cybaeodini), stronger and more narow than in the Anagraphini, see above. Body length 3-15 mm. Scutum of the ♂-opisthosoma absent. – See the key nos. 11 and 14.
Drassodes and *Sidydrassus*.

(d) Echemini:
DIAGNOSIS: Opisthosoma usually plain-coloured. A promarginal cheliceral keel may exist like in some Herpyllini. Body length 5-12 mm. Scutum of the ♂-opisthosoma and hook-shaped median apophysis (see Herpyllini) present. – See the key no. 26f.
Echemus, *Poecilochroa*, *Scotophaeus,* and *Sosticus;* see Herpyllini *(Macarophaeus).*

(e) Gnaphosini:
DIAGNOSIS: Cheliceral retromargin with a serrated keel (fig. 40) which is narrow and tooth-like in *Scotognapha* (fig. 43). Gnathocoxae short and strongly converging above the short labium, and only weakly inclined laterally (fig. 41). Body length of the European species 3-19 mm. Scutum of the ♂-opisthosoma usually absent (a small scutum exists in *Scotognapha* and some *Pterotricha*). – See the key no. 18f.
Berlandina, Gnaphosa, Minosia, Minosiella, Nomisia, Pterotricha, and *Scotognapha.*

(f) "*Haplodrassus*-group" s. l.: (A "sampling group"), *Haplodrassus-, Leptodrassex*- and *Leptodrassus*- groups sensu MURPHY (2007)):
CHARACTERS (no diagnostic/apomorphic structure is known, but the characters are different from the other higher gnaphosid taxa): A dorsal scutum of the ♂-opisthosoma is absent (it may be leathery or scutate in some *Leptodrassus*), the paired tarsal claws IV are elongated in several taxa (like in several other tribes!), at least and most distinct in small spiders. Body length 1.5-14 mm. – See the key nos. 17 (small and unusual gnaphosid spiders) and 31.
Haplodrassus, Leptodrassex, Leptrodrassus, Leptopilos, and probably *Parasyrisca.*

(g) Herpyllini:
DIAGNOSIS: Opisthosoma usually with clearly black and white pattern (fig. 66, photos 94-95), unicoloured in some species of *Macarophaeus* (fig. 89), also legs usually bicoloured. The spiders are active at day-time in contrast to the most often uniformly coloured Gnaphosidae. A promarginal cheliceral keel exists in some taxa like in certain Echemini. Scutum of the ♂-opisthosoma present (very large in some species, similar to most members of the related Echemini). A hook-shaped median apophysis ("retinacu-

lum") is absent in contrast to the Echemini. Body length 3->10 mm. – See the key no. 24f, 30 –, and ?*Macarophaeus sabulum* n. sp.
Aphantaulax, Cesonia, Kishidaia, Macarophaeus n. gen.*, and Phaeocedus*.

(h) Laroniini (*Laronius*-group sensu MURPHY 2007):
DIAGNOSIS: Cheliceral retromargin with rounded lobe(s) (fig. 46). Body length 3-7 mm. Scutum of the ♂-opisthosoma present similar to photo 4. Ant-hunters. – See the key no. 18.
Callilepis.

(i) Micariini:
DIAGNOSIS: Ant-shaped spiders with small eyes and thin legs and pedipalpi (photo 91), opisthosoma with scale-shaped hairs (fig. 2), usually slender and bearing white spots or a transverse white band. Leg I bears short ventral bristles in 1-2 rows, very variable (compare the convergently evolved ventral tarsal spines in *Pterotricha*, fig. 48, on parts of femur and/or tibia and/or – at least – on metatarsus/tarsus (figs. 10-11), reduced in small/tiny spiders. Body length 1.75 to about 7 mm. Scutum of the ♂-opisthosoma absent. – See the key no. 1.
Micaria. – Remark: LEVY (2009) (paper no. 12a) described *Micaria galilaea* n. sp. (♀ unknown) without noting the existence of scale-shaped (squamose) hairs which are typical for *Micaria*. According to the tooth-less anterior margin of the cheliceral furrow, the hump of the pedipalpal femur, the shape of the tegulum and the hooked embolus I exclude *galilaea* from the genus *Micaria* and probably even from the Micariini.

(j) Zelotini:
DIAGNOSIS: Metatarsi III and IV possess a ventral-apical "preening comb" (figs. 93, 108; compare fig. 104). Body length 2-10 m. Scutum of the ♂-opisthosoma usually present, but – intraspecificly, too – reduced or even absent in several species (see below), absent in *Heser* (Israel). Colour of opisthosoma and legs quite variable, frequently black.
REMARK: Short ventral opisthosomal spines/ bristles (fig. 148) were found by me in the male sex of two zelotine genera (I studied only few gnaphosid taxa). They resemble such spines/bristles in certain taxa of the family Lycosidae and Zoridae/Liocranidae, and may have a function as stridulatory spines, see WUNDERLICH (2008: 489). I found such spines only in the Zelotini within the Gnaphosidae: (a) in *Drassyllus*, e.g. in *D. villicus* (THORELL 1875) and the american *D. prosaphes* CHAMBERLIN 1936 (ventrally on the opisthosoma, in contrast to lateral and dorsal hairs which are thin and normal), as well as (b) in males of most *Trachyzelotes,* e.g. in *T. barbatus* (L. KOCH 1866) (the spines are quite similar to the short lateral and dorsal spines/bristles in this species). M. M. MYCOLA (in litt. in II 2009) found such spines in all of the 13 Ukrainen species which were investigated by him. (The spines are stronger developed in species which possess a dark opisthosoma). I regard these spines as a (?syn-)apomorphic character of the genera *Drassyllus* and *Trachyzelotes*, with a reversal in – only? – *T. lyonneti* in which only normal (thin) hairs exist.
See the key no. 2f.
Berinda, Camillina, Canariognapha n. gen.*, Cryptodrassus, Drassyllus, Setaphis, Synaphosus* (relationships unsure; included in the Echemini by MURPHY, related to *Cryptodrassus*)*, Trachyzelotes, Turkozelotes, Urozelotes, Zelominor,* and *Zelotes* s. l.

Remarks on Zelotes s. l.: This is the most diverse genus in Europe. The very diverse and "heterogene" nominal "sampling genus" *Zelotes* s. l. has most probably to split up to subgenera or even genera; some supraspecific taxa have already been described and named:
Latzelotes n. subgen. from Turkey (*boluensis* n. sp.) and Israel (*bashanensis* LEVI 1998), see the paper on spiders from Southern Europe in this volume,
as well as SENGLET (2004):
- *Heterozelotes* LOHMANDER 1944 (= *Zelotes petrensis* species-group including *femellus*, *hermani, longipes, manius, petrensis, sardus* and *talpinus*): "The emboli have a membranous flange and a ... expansion near their apex" as well as "a posterior sickle shaped sclerotized lamina on the embolar base" according to SENGLET (2004);
- *Microzelotes* MILLER 1967 (= *Zelotes gracilis* species-group including *caucasius gracilis* and *solstitialis*): The absence of embolar haematodocha and terminal apophysis would exclude *Microzelotes* from *Zelotes* but only two species have been studied by SENGLET (2004);
- *Zelotes* GISTEL 1848 s. str. (= *Zelotes subterraneus* species-group in a wide or in a strict sense): This taxon is mainly diagnosed by the existence of a transverse embolar base which bears an apical projection;

Further species-groups: See LEVY (1998), PLATNICK (1983), and SENGLET (2004).

(3) Identification key to the European (and most Palaearctic) genera of the spider family Gnaphosidae

In 1914 SIMON published a key to the 13 gnaphosid genera of France which were known/described at that time; some have been split up in the meantime. GRIMM (1985) treated the taxa of Central Europe, and TROTTA (2005) published a key to 26 gnaphosid genera of Italy. During the last 100 years the number of described European genera of the Gnaphosidae has grown up to about 40 after splitting of already known genera (mainly *Zelotes*), and the discovery of new ones, see the list above. The provisional identification key which is presented here, may be helpful for students as a first step; it is partly based on the important work of MURPHY (2007), and on numerous revisions as well, see the references below. Investigations of the structure of the prosomal cuticula, of the trichobothriotaxy, and of the epiandrous gland spigots (e.g.) are still wanted; the distribution of feathery (branched) hairs is not well studied, see below.
24 genera of the Gnaphosidae are treated in the key by UBICK (2005) from North America; 15 (~ two third) of these genera are shared with the 40 European ones. 33 genera were reported by SONG et al. (2002), from China; 19 of these (almost 50 %) are shared with European genera (*Tuvadrassus* has been synonymized with *Haplodrassus*).

General remarks: In some genera the typical characters of the Gnaphosidae are indistinct or even absent. Most of the tiny spiders of the genera *Leptopilos, Leptodrassus* and *Leptodrassus* (key no. 17) are examples: The lenses of their posterior median eyes may be circular like in fig. 2 (not oval like in fig. 1), a depression of their gnathocoxae may be absent, and the basal articles of their anterior spinnerets may be spaced by only less than their diameter similar to fig. 24 or even by only half of their diameter. Concerning the main diagnostic characters of the genera: See the key.

In the following some STRIKING CHARACTERS of certain gnaphosid genera are listed (see also the notes below):

BODY SIZE: Dwarfism: The most tiny spiders in Europe are (e.g.) members of the genera *Synaphosus* and *Zelominor* besides some species of *Drassodes*, *Haplodrassus* and *Zelotes*. Certain *Gnaphosa*- and *Scotognapha*-species are the largest spiders besides certain members of *Berlandina*, *Drassodes, Haplodrassus*, *Minosia, Nomisia, Pterotricha*, *Trachyzelotes* and *Zelotes*.

OPISTHOSOMAL COLOUR/PATTERN: The opisthosoma has more or less distinct bicoloured markings in most members of the Herpyllini (fig. 66, photos 5-6, no. 23) and few species of *Setaphis* like *murphyi* n. sp. (convergently evolved in this member of the Zelotini, photo 1, no. 4) as well as in some species of *Macarophaeus* (fig. 66) (Herpyllini). See the photos 90-05 and SAUER & WUNDERLICH (1995: Photos pp. 56-59) (*). *Macarophaeus* and *Setaphis* are examples in which the dorsal opisthosomal pattern/colour shows a remarkable intrageneric variability from unicoloured to distinctly bicoloured (fig. 90).

ANT-SHAPED members of European Gnaphosidae (when observed alive) are spiders of *Micaria* (photo 2, no. 1) which may be identified by their scale-shaped opisthosomal hairs (fig. 9). An ant- or WASP-shaped opisthosoma (or even body and legs) exist (evolved convergently) also in (photos 5-6) *Aphantaulax*, Callilepis, *Phaeocedus braccatus*, and *Setaphis murphyi* (photo 90). In contrast to most of the nocturnal remaining Gnaphosidae – which are mobile at night – these spiders are active hunters at day time; at least members of *Callilepis* feed on ants.

A THORACAL FISSURE (fig. 102) is completely absent in *Leptrodrassex* (no. 17) and *Leptodrassus* (no. 17); it is weakly developed in *Aphantaulax* (no. 24).

STIFF HAIRS anteriorly on the chelicerae (fig. 13, no. 3) exist in *Trachyzelotes*,

A SERRATED RETROMARGINAL CHELICERAL KEEL (fig. 40, no. 18) exists in the Gnaphosini. A not or only slightly serrated PROMARGINAL cheliceral keel exists in certain Echemini and Herpyllini.

A – smooth or serrated – KEEL/CARINA of the ANTERIOR cheliceral margin (more or less fused teeth) exists in *Aphantaulax*, *Macarophaeus* (fig. 66) (serrated) and in some related genera of the Herpyllini as wel as in some genera which are probably not related – e.g. *Nodocion* of the Echemini – and *Canariognapha* of the Zelotini ("serrated", figs. 166-167).

Tiny teeth WITHIN the cheliceral furrow: A single denticle exists in *Scotognapha* (fig. 43), three tiny teeth exist in *Canariogapha* (arrow in fig. 166). Both genera are endemics of the Canary Islands and are members of different tribes.

STRONGLY REDUCED POSTERIOR MEDIAN EYES exist – besides cave spiders – in most members of the genus *Cybaeodes* (no. 10) (except in *C. mallorcensis* WUNDERLICH 2008).

A DORSAL SCUTUM OF THE MALE OPISTHOSOMA (photo 93) exists in numerous taxa, but according to my investigations it may be – intrageneric or even intraspecific – hard to recognize, only leathery, strongly reduced or even completely absent in numerous species or specimens. It exists e.g. in the *Echemus*-group sensu MURPHY 2007 (Echemini: *Echemus, Scotophaeus*, *Sosticus, Synaphosus*) as well as *Cryptodrassus*, in few Gnaphosini sensu MURPHY (*Scotognapha,* some *Pterotricha*, and the North American genus *Nodocion*), in few species of the "*Haplodrassus*"-group (some *Leptrodrassus*), the *Herpyllus*-group sensu MURPHY (2007) (Herpyllini: *Aphantaulax, Kishidaia, Macarophaeus, Phaeocedus*, *Poecilochroa*), the Laroniini (*Callilepis*), and most Zelotini (*Berinda*, *Camillina, Canariognapha, Drassyllus,* most *Setaphis,* (absent in *S. murphyi* n. sp.) *Trachyzelotes, Urozelotes, Zelominor* and *Zelotes* (rarely strongly reduced).

VENTRAL SPINE-SHAPED BRISTLES of the ♂-OPISTHOSOMA (fig. 148; compare fig. 149) exist in members of *Drassyllus* and most *Trachyzelotes*.

The taxonomical value of the FEATHERY (BRANCHED) HAIRS of the opisthosoma (fig. 68e) is unknown in the Gnaphosidae because of the absence of a systematical study; only few species have been investigated. According to my preliminary study such hairs have been lost in numerous gnaphosid taxa; they are absent at least in certain or even all Zelotini (e.g. *Zelotes*) (an autapomorphic character of this tribe?), and in the members of the Eocene taxa. They exist in the Cybaeodini (*Cybaeodes*), and I found such hairs also in *Drassodex* sp. (Anagraphini), and in *Macarophaeus varius* (SIMON) (Herpyllini). In the book of MURPHY (2007) feathery hairs are figured in species of the Micariini (*Micaria*), certain Gnaphosini (*Minosia, Minosiella*) (found by me also in *Nomisia*), certain members of the "*Haplodrassus*-group" (*Leptodrassex, Parasyrisca*) (found by me also in *Leptodrassus albidus*, but not in *Haplodrassus aeneus*).

Well developed NOTCHES OF THE TROCHANTERS exist in *Anagraphis* (fairly), *Arabelia*, *Cybaeodes*, *Drassodes, Drassodex, Sidydrassus* and *Talanites* (Anagraphini, Cybaeodini, and Drassodini) (nos. 13f) in contrast to the remaining genera in which they are absent or weakly developed (fig. 121). These inclinations are deepest and more narrow in *Cybaeodes*, *Drassodes* and *Sidydrassus* (arrow in fig. 103).

A "PREENING COMB" of the metatarsi III (-IV) (fig. 93, see no. 2) exists in the Zelotini. "PREENING BRUSH" (fig. 68h) which hairs are distinctly longer than the distal scopula hairs under metatarsi I-II: See the key no. 2 – (*Cryptodrassus* and *Synaphosus*) as well as ?*Macarophaeus sabulum* n. sp.

ELONGATED PAIRED TARSAL CLAWS IV – in contrast to distinctly shorter claws of the remaining tarsi – exist in most often small/tiny species of several genera, e.g. of *Cryptodrassus* (no. 2), and in the strongly related genus *Synaphosus* (no. 2), as well as in *Zelominor* (no. 7), *Drassodes* (no. 14), *Haplodrassus* (no. 31) and *Zelotes* (no. 8).

MALE PEDIPALPUS: A retrolateral tibial apophysis is completely absent in *Callilepis* (no. 18), certain *Micaria* (no. 1), and certain *Drassodes* (fig. 105, no. 14). – Numerous times evolved a slender tibial apophysis with a hook-shaped tip, see e. g. figs. 68a-b and 90-91 (*Macarophaeus*). In these species evolved convergently also a striking similar shape of the large sperm duct and a membraneous conductor (and the median apophysis has been lost). – The tibial apophysis is widened distally (fig. 72) and/or bears a keel (fig. 72) in almost all species of the diverse genus *Haplodrassus* (no. 31). (It is rarely widened distally in other taxa, e.g. in *Phaeocedus braccatus*, fig. 59). – Simple structures of the bulbus evolved convergently e.g. in *Arabelia, Drassodes* (fig. 106, no. 14) and *Micaria* (no. 1, fig. 12). – A very long embolus exists e.g. in *Setaphis* (spirally, fig. 95, no. 4) (spirally also in *Drassodex* but in another way, fig. 36, no. 15) as well as in *Berinda* (fig. 16, no. 6) and in certain species of some other genera.

(*) Die schönsten Spinnen Europas nach Farbfotos erkannt.

The *GEOGRAPHICAL DISTRIBUTION* may be helpful in the determination of certain genera (or even a hole subfamily: Members of some taxa, are restricted to the south-western part of Europe (SWE), and special hints are given to the taxa of Central Europe, the Urals, as well as the Canary Islands and Madeira:
“SE” (= Southern Europe) means that the genus does not occur in Central and Northern Europe; *Anagraphis, Arabelia, Cesonia, Berinda* (Crete) and the dubious *Macedoniella* occur only in south-eastern parts of Europe (SEE), *Parasyrisca* is reported from Turkey (*), *Canariognapha* and *Scotognapha* are apparently restricted to the Canary (*Scotognapha* to the Selvage Islands as well), a species-group of *Macarophaeus* to Madeira and the Canary Islands, *Sidydrassus* and *Talanites* are known from the Urals, *Zelominor* (no. 7) is known only from south-western parts of Europe (SWE).

The following genera were recently *REPORTED FROM THE SOUTHERN MEDITERRANEAN AREA* (Israel and Algeria) by LEVY (1995, 1998, 1999, 2009) and TUNEVA (2005), and may also occur in the most southern-east parts of Europe:

Heser TUNEVA 2005 (Zelotini) e.g. from *NORTHERN AFRICA* and *ISRAEL* (sub *Zelotes*): *aradensis* LEVY 1998 and *infumatus*; scutum of the ♂-opisthosoma pre sent, terminal apophysis and intercalary sclerite absent, large skinny conductor existing,
Megamyrmaekion REUSS 1834 (= *Megamyrmecion*) (Echemini): only *M. caudatum*; with the eyes in an almost circular position and the anterior median eyes distinctly the largest,
Odontodrassus JEZEQUEL 1965 (Echemini): only *O. mundulus*; embolus long, in a longitudinal retrolateral position; both reported from *ISRAEL*, see the papers nos. (9), (10) and (11) and MURPHY (2007: 362-663, 116-117 and 368-369), *Pterotrichina* DALMAS 1921 (Gnaphosini) from *ALGERIA*: See M: 124-125 (♀ of *P. elegans*),
Talanitoides LEVY 2009 (Anagraphini): similar to *Talanites*, only *T. habesor* from Israel (paper no.12a).

Remarks: According to the structures of the ♂-pedipalpus – the existence of scaly hairs is unknown – I regard the species *Micaria galilaea* LEVY 2009 from Israel not as a member of *Micaria*; its relationships are unknown.

In few genera – which are not diverse – the names at least of their Central European species are listed.

Altogether about 46 extant genera of the Gnaphosidae are known now from the Western Palaearctic.

(*) For the determination of spiders from South-East Europe of special interest are the papers no. (1-3) and (9-12b) as well as new papers published by KOVBLYUK.

The high INTRAGENERIC VARIABILITY of several gnaphosid structures (see also above: "questionable subspecies") and numerous CONVERGENCES are fundamental problems regarding the sure determination of their genera, e.g., the size and the colour of body and legs, the position and the size of the eyes (e.g. figs. 1-2, 98-99), the spination and the scopulation of the legs and size and shape of their paired claws and claw tufts as well, size and position of the retrolateral pedipalpal tibial apophysis, the structures of the bulbus, e.g., in *Trachyzelotes adriaticus*, see below, and the shape/structure of the epigyne and vulva. A dorsal scutum of the ♂-opisthosoma exists in numerous genera but it may be quite indistinct or even absent in certain species of such genera, see above. A pedipalpal tibial apophysis (see above) and a median apophysis may be large, tiny or completely absent, both within the same genus like *Micaria*.
The construction of a useful key to the European genera of the diverse Gnaphosidae is more difficult than in any other spider families. For the determination of several genera a COMBINATION of characters is needed. While most genera in the male sex are fairly or even quite well identificable the determination of females of numerous taxa is difficult; in doubt one has to go both ways (e.g. in nos. 5f and 28f). A special difficulty exists in the determination of ?*Macarophaeus sabulum* n. sp. in which an exceptional combination of characters (other genera) exists, see below.

Regarding certain species of the genera *Drassodes, Gnaphosa, Nomisia, Pterotricha*, *Scotophaeus, Setaphis*, and *Zelotes* see the paper on spiders of the Canary Islands in this volume.
The NUMBERS IN BRACKETS indicate revisional papers which provide diagnoses, see the paragraph References: "Diagnoses/revisions of selected genera" below.- "M" indicate to the text and figures (drawn by M. ROBERTS) of the important work (two volumes) by MURPHY (2007).
Central European genera are printed in heavy letters.

1 Body ant-shaped (photo 91) (less distinct in alcohol material), the usually slender and dark opisthosoma bears frequently a saddle-shaped constriction and white spots or transverse white bands. Male opisthosomal scutum absent. Legs (see also the tribe Micariini above) and pedipalpi quite slender. Especially the opisthosoma bears IRIDESCENT/METALLIC SCALE-SHAPED HAIRS (fig. 9) which are shining in (sun)light. ♂-pedipalpus (fig. 12) simple. M: 548-549, paper no. (32).. . . . . ***Micaria***

- Body in some taxa ant-shaped (see above; e.g. *Setaphis murphyi* n. sp., photo 90, and the photos 92-95). The opisthosoma may be similar (in some taxa it is bicoloured) but scale-shaped hairs are absent. Male opisthosomal scutum absent or present (fig 132, 138), e.g., in the ant-shaped members of *Callilepis*, no. 18). Legs slender to stout, the pedipalpi and the epigyne may be similar 2

2(1) Metatarsus III AND – frequently less distinct – IV bear ventrally-apically a transverse row of numerous stiff, straight and fairly slender hairs/bristles ("PREENING COMB") (fig. 93). ♂-opisthosoma most often with a dorsal scutum in the basal half. ZELOTINI part 1 (part 2: see directly below). See the tab. given by KOVBLYUK et al (2009), paper no. 8a 3

- Metatarsi III and IV bear also ventrally-distally a "PREENING COMB" or – usually – a distinct brush of hairs ("PREENING BRUSH") (fig. 68h) (not known to me in *Cryptodrassus*; see also ?*Macarophaeus sabulum* n. sp.). (Paired tarsal claws of the posterior legs elongated, distinctly longer than the claws of the anterior legs). Embolus long to very long, with a "serrated" margin in *Cryptodrassus* (figs. 78-79) or smooth in *Synaphosus* (figs. 81-82), vulva ducts (figs. 80, 83) long and coiled. Small and rare spiders of two strongly related genera which possess a scutum of the ♂-opisthosoma. Mainly SE; *C. hungaricus* – in which an almost circular eye position exists (fig. 77) in contrast to *Synaphosus* –, occurs in the southernmost part of Central Europe. Zelotini part 2. M: 378-379, 528-535, papers nos. (13) and (31) . . . ***Cryptodrassus*** and *Synaphosus*

- Metatarsus III-IV without such a "preening comb" or "preening brush" but few STRONG bristles may exist in this position, e.g., in *Scotophaeus*, no. 30, figs. 104, 163. (In certain small species the paired posterior tarsal claws may also be longer than the claws of the remaining legs, e.g., in small members of *Drassodes*, *Haplodrassus* (no. 31), *Zelominor* and *Zelotes* s. l. (nos. 7/8)). Dorsal scutum of the ♂-opisthosoma present or absent. . 10

3(2) The chelicerae bear anteriorly a conspicuous cluster of stiff (partly spine-shaped) bristles (fig. 13). See *Drassyllus*, no. 6. In Central Europe *T. holosericeus, lyonneti,* and *pedestris*. M: 190-191, papers nos. (9a, 18) . . . . ***Trachyzelotes***

- No cluster of such bristles (long hairs may exist in this position) 4

4(3) Embolus usually strongly coiled several times (rarely only 1 ½ loops) in a distal position of the bulbus and in almost a single level (figs. 94-95), epigyne/vulva e.g. as in figs. 96-97. Body colour most often uniformly yellow or light brown but rarely bicoloured (*parvula, murphyi* n. sp.: photo 90). SE. M: 186-187, papers nos. (9a, 19). . . . *Setaphis*

- Embolus and ducts of the vulva rarely strongly coiled or coiled in a quite different way (*Berinda*, no. 6, and certain members of *Zelotes*, no. 9). 5

5(4) Posterior eye row distinctly procurved (almost as in fig. 68), large and almost touching posterior median eyes. Embolus stout (fig. 14). Epigyne with a median plate (fig.15). SE. M: 180-181 (species from Kenya!), paper no. (27). In S-Europe *C. europaea* from Italy (♂ unknown) and *C. metellus*, in which the colour is yellow grey, the eyes are small, and the epigynal groove is at least as wide as long . . . . *Camillina*

- Posterior eye row straight or almost so, posterior median eyes variable, pedipalpal structures different. Remark: The determination of the females of the following 7 genera may be difficult 6

6(5) Posterior median eyes large and almost contiguous (similar to figs. 1-2). ♂: Opisthosoma ventrally with numerous SPINE-SHAPED BRISTLES (fig. 148) at least in the middle behind the epigastral furrow (similar to most *Trachyzelotes*, no. 3), pedipalpus: Tibia in certain species dorsally with a brush of hairs (similar to fig. 111); terminal apophysis large and bifid; the epigyne (e.g. fig. 19a) may have a T-shaped medial structure. In Central Europe e.g. *D. pusillus* and *lutetianus*. M: 184-185 (species from the USA) . . . . ***Drassyllus***

- Posterior median eyes variable. ♂: Opisthosoma without such bristles (fig. 149), pedipalpal tibia with a brush of hairs in the *Zelotes erebeus*-group (fig. 111, no. 9). Genital structures different. 7

7(6) Posterior median eyes large. ♂-pedipalpus (fig. 16) (it may have a retrolateral patellar apophysis) with a relatively long embolus which has a clockwise position in the left pedipalpus, and with a large conductor which is protruding ventrally, and STICKS WIDELY OUT in the middle of the bulbus. Epigyne wider than long. SEE: Crete. M: 178-179, papers no. (1) (8a). . . . . *Berinda*

- Posterior median eyes large or small. ♂-pedipalpus different 8

8(7) Small spiders, body length only 2-3 mm. ♂-pedipalpus (fig. 17): Patella and tibia RETROlaterally with a field of dense hairs (see no. 9), tibial apophysis short and bent dorsally, median apophysis reduced/absent. Vulva (fig. 17a) with a pair of receptacula-shaped “sacs”. 3 species in SWE. M: 194-195 (the posterior median eyes may be distinctly smaller than figured here), paper no. (30) . . . . *Zelominor*

- Small spiders in which stiff pedipalpal patellar and tibial hairs exist, and a median apophysis is absent, too, but the pedipalpal tibial apophysis bears a membranous lobe (L in fig. 160). ♀ unknown. *T. microb* KOVBLYUK et al., Turkey. . . . . *Turkozelotes*

- Body length variable. ♂-pedipalpus: RETROlateral fields of patellar and tibial hairs absent (numerous DORSAL tibial hairs exist in the *Zelotes erebeus* species-group, fig. 11), the tibial apophysis may be similar, median apophysis not reduced.. 9

9(8) ♂-pedipalpus (figs. 20-21): Intercalary and additional tegular sclerites absent, tibia proventrally apically with a distinct bulge (arrow in fig. 20) which is stronger developed than in *Canariognapha* and *Zelotes*. Epigyne (fig. 22) with a long groove, and anterioriorly with a single (never paired) helm-shaped pocket, receptacula seminis clearly spaced. In Central Europe *U. rusticus*, in Southern Europe also *U. mysticus* M: 192-193, paper no. (18). . . . . ***Urozelotes***

- Bulbus prolaterally with an additional INTERCALARY SCLERITE (arrow in figs. 18, 112) in contrast to the related genera besides *Canariognapha* (it may be indistinct in some species like *Z. tenuis*). Epigyne anteriorly most often with A PAIR of sclerotized sickle-shaped pockets, in some species with a single "helm-shaped" pocket. Very diverse "sampling" taxon, several species groups and numerous species. M: 200-201, e. g. papers no. (3 and 9a) . . . . **Zelotes** s. l.

- Intercalary sclerite present (figs. 168-172), tegulum with a large additional tegular apophysis (fig. 168). Epigyne (fig. 174) very long, unpaired pocket in a quite anterior position, the thin-walled receptacula seminis are touching (fig. 175). The chelicerae bear three additionally tiny teeth IN its furrow (arrow in fig. 166). Canary Islands, only *C. parwis* n. sp. . . . . Canariognapha

10(2) Trochanteral notches strongly developed and narrow (as in fig. 103, arrow). Posterior median eyes strongly reduced, with the exception of *C. mallorcensis*. Gnathocoxae with an only weak/low depression (fig. 23), ♂-pedipalpus as or similar to fig. 26, epigyne as or similar to fig. 27. SE. See WUNDERLICH (2008: 504-505, 521). (*Arabelia: ♂: Bulbus apophyses absent, see fig. 13a,* SEE) . . . . Cybaeodes

- Trochanteral notches unknown. All eyes of the posterior row are large and almond-shaped (fig. 151), epigyne: Fig. 152. The legs of the holotype are apparently regenerations (fig. 150). Dubious genus, ♂ unknown. Macedonia. Only *M. karamani* (**) . . . . Macedoniella

- Trochanteral notch absent or only fairly developed and wide (arrow in fig. 121: *Talanites*) or strongly developed and narrow (arrow in fig. 103: *Drassodes* and *Sidydrassus*). The posterior median eyes may be small but not tiny (except in certain cave spiders). Gnathocoxal depression usually distinct, genital organs different 11

11(10) ♂-pedipalpus (figs. 28, 30) with the median apophysis greatly elongated. Epigyne as in figs. 29, 31. Urals. Remark: A scutum of the ♂-opisthosoma is absent in the nos. 12-15. 12

- ♂-pedipalpus and epigyne different, median apophysis not greatly elongated. . . . 13

12(11) ♂-pedipalpus (fig. 28) with a very long tibial apophysis, epigyne similar to *Drassodes* (no. 14, fig. 29). *S. shumakovi*. . . . . Sidydrassus

- ♂-pedipalpus (fig. 30) with a short tibial apophysis, epigyne (fig. 31) anteriorly with a helm-shaped structure. *M. fagei* and *strandi*. M: 236-237, papers nos. (10) and (20) . . . . Talanites

13(11) ♂-pedipalpus (figs. 32-33): Conductor in a distal position, long and transparent, embolus almost spirally in a distal, oblique and almost VERTICAL position in *A. pallens* (see no. 14). Epigyne in *pallens* (fig. 34) without a helm-shaped structure. SEE. *A. pallens* and *pallida*. M: 230-231. Paper no. (1) . . . . Anagraphis

- Genital structures different. Numerous species, in Central Europe, too. 14

14(13) Trochanters (most distinctly III-IV) deeply and not widely notched (arrow in fig. 103) (similar to *Sidydrassus*, no. 12). ♂-pedipalpus (figs. 105-107): Tibial apophysis undivided or (rarely) absent, strucures of the bulbus rather simple and quite uniformly. Epigyne/vulva (fig. 35) very uniformly: With a large pit and two pairs of distinct receptacula seminis. Frequent, numerous species. M: 444-446, paper no. (12a). . . . . . . ***Drassodes***

- trochanters not or only slightly and wider notched (arrow in fig. 121). Other characters variable 15

15(14) ♂-pedipalpus (figs. 36-37): Tibial apophysis divided, embolus spirally in a distal and partly almost vertical position similar to *Anagraphis* (no. 13). Epigyne/vulva (figs. 38-39) longer than wide, very uniformly, with a pair of large pits and strongly/widely coiled ducts. Not frequent; in Central Europe e.g. *hypocrita* (= *Drassodes*). M: 232-235. . . . .
. . . . ***Drassodex***

- Genital structures different, pedipalpal tibial apophysis rarely divided 16

16(15) Thoracal fissure completely absent (a thin black stripe may exist). Scutum of the ♂-opisthosoma absent or present (in some *Leptodrassus*). Small and pale spiders (body length 1.5-3 mm) with very large anterior and/or posterior median eyes similar to fig. 69 on a common dark base. SE 17

-Thoracal fissure present (similar to fig. 102), indistinct in *Aphantaulax*, no. 24. Eyes variable. Scutum of the ♂-opisthosoma present or absent 18

17(16) Cheliceral retromargin with two wider and more or less rectangular teeth (fig. 153). Embolus as in *Leptodrassex*. Epigyne with a large scape similar to *Gnaphosa*. SE, e.g. *albidus* and *femineus*. M: 504-505, paper no. (6) . . . . Leptodrassus

- Cheliceral retromargin with ?2-3 pointed teeth. Bulbus as in fig. 158, embolus unknown. Epigyne (fig. 159) anteriorly with a larger hood. Crete (Israel), e.g. *manolisi*. LEVY (2009), paper no. (12b) . . . . *Leptopilos*

- Cheliceral retromargin with two (rarely three) poited teeth (fig. 154). ♂-pedipalpus (figs. 74-75, 155-156, 157a) with a long embolus originating basally on the bulbus and a small tegular outgrowth, TO in fig. 157a. Epigyne (figs. 76, 157) without a scape or hood, a large groove may exist. Widely spread in SE, e.g. *hylaestomachi* (Canary Islands) and *simoni*. M: 512-513. . . . . *Leptodrassex*

18(16) (*) CHELICERAL RETROMARGIN WITH A WIDE SERRATED KEEL (fig. 40). Gnathocoxae strongly converging above the labium (fig. 41). Scutum of the ♂-opisthosoma usually absent but a short anterior scutum exists in some *Pterotricha*-species (no. 20). Gnaphosinae (except *Scotognapha*, see directly below) 19

- Cheliceral retromargin with a “double tooth”, and – unique – additionally with a single tiny tooth in the cheliceral furrow between the “keel” and the teeth of the anterior margin (fig. 43) which may be difficult to recognize. Opisthosoma grey-brown, without white spots. The ♂-opisthosoma bears a scutum. Tegulum with a long probasal outgrowth which may be longer than in fig. 44 (arrow); the epigyne (fig. 45) bears an anterior “knob” or helm-shaped structure. Endemic to the Canary and Selvage Islands. M: 126-127, paper no. (21) . . . . <u>*Scotognapha*</u>

- Cheliceral retromargin with a large/long rounded lobe (and 1-2 small lobes) (fig. 46) The small posterior median eye lenses have a transverse position. Gnathocoxae strongly converging Opisthosoma black with light spots, the ♂-opisthosoma bears a scutum. Tibia of the ♂-pedipalpus without an apophysis (fig. 47) like in some *Drassodes* (no. 14) and *Micaria* (no. 1). The spiders are ant-shaped and fed on ants. Laroniini. M: 250-251, paper no. (15) . . . . ***Callilepis***

- Cheliceral retromargin different, bearing usually 0-3 (rarely more) pointed TEETH. Gnathocoxae not strongly converging, more straight, frequently long. Scutum of the ♂-opisthosoma present or absent 23

19(18) Posterior eye row much wider than the anterior row, with the posterior median eyes much less spaced from each other than from the lateral eyes (fig. 42). Embolus long, in a longitudinal prolateral position (frequently not as long as in fig. 147). Epigyne with a scape similar to fig. 45. Opisthosoma unicoloured. Numerous species. M: 110-111 . . . . ***Gnaphosa***

- Posterior eye row not much wider than the anterior row, and/or posterior lateral eyes closer to the median eyes. Embolus different, epigynal scape absent. Opisthosomal markings are not rare 20

20(19) Tarsi ventrally with two rows of spine-shaped bristles (fig. 48) instead of a scopula, patella IV with lateral bristles, the extanded anterior spinnerets bear 6-9 large spigots in a circle (fig. 4), but are pointed in two groups if retracted (fig. 5). ♂-pedipalpus (fig. 50): Tibia with a ventral rim which sticks out and is usually sclerotized, but no true apophysis in this position. ♀: Epigyne (e.g. fig. 51) longer than wide, with a large anterior depression/pit which may be divided. Photo 92. SE. M: 122-123, paper no. (7) . . . <u>*Pterotricha*</u>

- No such bristle-shaped SPINES (fig. 49), lateral bristles of patella IV absent (most *Nomisia*) or present. The extanded anterior spinnerets bear 2-6 large spinules in a transverse row (fig. 6), as in fig. 7 if retracted. Pedipalpal tibia with a retrolateral and additionally with a retroventral apophysis (e. g. fig. 57) or with a single apophysis, and ventrally-distally sticking out (bulging) without sclerotization (fig. 54). Epigyne variable 21

21(20) Patella IV without retrolateral bristle, cymbium dorsally with strong spines (fig. 52), epigyne with a scape, fig. 53. SWE. M: 118-119: *M*. sp. (♀ from Ibiza) . . <u>*Minosiella*</u>

- Patella IV without (most *Nomisia*) or with retrolateral bristle(s). Strong dorsal cymbial bristles and epigynal scape absent. 22

22(21) Patella IV with a retrolateral bristle. ♂-pedipalpus (fig. 54): Tibia with a single retrolateral apophysis, ventrally sticking out without sclerotization, cymbium dorsally scopulate in the distal half. ♀: Epigyne (e. g. as in fig. 54a) with a central depression. In Central Europe *B. cinerea*. M: 102-103. . . . . ***Berlandina***

- Patella IV without (rarely a single) retrolateral bristle. ♂-pedipalpus (fig. 55) with a retrolateral and additionally (arrow) with an unsclerotized RETROVENTRAL apophysis in contrast, e. g., to the related genera *Berlandina, Pterotricha* and *Scotophaeus*; retrolateral apophysis usually with a coniform and tapering APICAL OUTGROWTH which is strongly bent and sticks out laterally. Epigyne with a large groove which may be divided. Mainly SE; southernmost Central Europe (*aussereri* and *exornata*; epigyne fig. 56). M: 120-121, DALMAS (paper no.7), LEVY (no. 9) . . . . ***Nomisia***

- Patella IV with several lateral bristles. ♂-pedipalpus (fig. 57) with a retrolateral and a retroventral apophysis, the retrolateral apophysis is not bent laterally this way. Epigyne fig. 58. SE, M. *spinosissima*. M: 114-115 . . . . Minosia

23(18) Opisthosoma usually bicoloured (dorsally with black AND white pattern, hairs may be rubbed off) (photos 94-95). ♂-opisthosoma with a large dorsal scutum. Sclerotized and sickle-shaped median apophysis absent. Herpyllini, the *Herpyllus*-group sensu MURPHY 24

- Opisthosoma unicoloured (fig. 89) (rarely with posterior dark markings). ♂-opisthosoma with a dorsal scutum in the Echemini, the *Echemus*-group sensu MURPHY (part.) (no. 28/29) but absent in the *Anagraphis*-group sensu MURPHY, and the *Haplodrassus*-group, nos. 28 and 31. Sclerotized median apophysis frequently present 28

24(23) Thoracal fissure quite indistinct, cheliceral retromargin with 2 small teeth. Photo 94. Pedipalpal femur ventrally bulging, bulbus simple and slender. Mainly SE. M: 266-267 . . . . ***Aphantaulax***

- Thoracal fissure distinct (similar to fig. 102), cheliceral retromargin with 0-1 tooth . . 25

25(24) Posterior median eyes large and spaced usually by less than their diameter. Cheliceral retromargin smooth. ♂-pedipalpus of *P. braccatus* (fig. 59) with a widened tibial apophysis, epigyne/vulva (fig. 60) with large and kidney-shaped receptacula. *P. braccatus* shows an ant-like locomotion. M: 288-289 . . . . ***Phaeocedus***

- Posterior median eyes smaller and spaced usually by more than their diameter (figs. 61, 66). Cheliceral retromargin smooth (*Poecilochroa*) or with a tooth. Genital structures different or similar 26

26(25) Cheliceral retromargin smooth. Photo 95. E.g. *P. variana* and *albomaculata.* Paper no. 10, M: 290-291 (not 370-371; = *Macarophaeus*) . . . . ***Poecilochroa***

- Cheliceral retromargin with a single tiny tooth (fig. 66) 27

27(26) Opisthosoma dorsally dark with light spots. ♂: Pedipalpal femur with a ventral-basal outgrowth (fig. 62), epigyne as in fig. 63, two pairs of receptacula seminis. In Europe *K. conspicua* (= *Poecilochroa c.*). M: 282-283 . . . . ***Kishidaia***

- Opisthosoma AND prosoma dorsally with distinct longitudinal light and dark bands. Genital structures (figs. 64 -65) different, pedipalpal femoral outgrowth absent, vulva with a single pair of receptacula seminis. *C. aspida*. SEE. M: 270-271 (species from the USA), paper no. (1) . . . . Cesonia

- Opisthosoma dorsally dark brown, with irregular light patches (fig. 66). ♂-pedipalpus (figs. 68a-c), epigyne: Figs. 67, 68f-g, vulva (fig. 68) with two pairs of receptacula seminis. Madeira and Canary Islands, *M. cultior* and *varius*, see below. M: 292-293 (under *Scotophaeus*) . . . . *Macarophaeus* ad part. (see no. 30)

28(23) Note: The sure determination of females of the following genera may be difficult, and one may have to go both ways of a bifurcation. – Tibia IV with or without dorsal bristle(s). ♂: Opisthosomal scutum present, similar to fig. 138. *Echemus*-group (part.). 29

- ♂: Tibia IV without DORSAL bristle(s). Opisthosomal scutum absent. *Anagraphis*- and *Haplodrassus*-group sensu MURPHY. 31

29(28) Tibia IV bears 2 DORSAL bristles. The cheliceral retromargin bears two teeth. Posterior eye row approximately straight. ♂-pedipalpus with a short and divided tibial apophysis. Epigyne with a long scape. *S. loricatus* occurs in Central Europe, too. M: 376-377 . . . . **Sosticus**

- Tibia IV bears 0-1 dorsal bristles. The cheliceral retromargin bears frequently a single tooth. ♂: Pedipalpal tibia undivided. Epigyne without a scape 30

30(29) Posterior eye row strongly procurved, its eyes large (fig. 69). Cheliceral retromarginal denticle present (similar to fig. 66). Retrolateral bristle of patella IV present. Mainly SE, in Central Europe only *E. angustifrons* in which a quite short pedipalpal tibial apophysis exists, and a hook-shaped median apophysis is absent. The epigyne bears anteriorly a “helm-shaped” structure. M: 348-349. . . . . ***Echemus***

- Posterior eye row slightly procurved, its eyes fairly small and widely spaced (fig. 69a). Cheliceral retromarginal denticle(s) existing (similar to fig. 66). Patella IV usually with a retrolateral bristle. Bulbus with a hook-shaped median apophysis and a long embolus (fig. 165), epigyne with or without a helm-shaped structure. Photo 93. M: 374-375 . . . . ***Scotophaeus***

- Posterior eye row straight or slightly procurved, its eyes usually fairly large. Cheliceral retromargin usually TOOTH-LESS (rarely exists a single denticle). Patella IV without a retrolateral bristle. ♂-pedipalpus (figs. 90-92): Median apophysis absent, embolus short, with a not sclerotized transverse basal suture (S). Epigyne without a helm-shaped structure, wide in the Macaronesian species (figs. 67, 92a). SE: E.g. *M. insignis* n. sp. and *senilis*, M: 370-371 (under *Poecilochroa*), paper no. (9). See also ?*M. sabulum* n. sp. (fig. 68e) . . . . *Macarophaeus* ad part. (see nos. 2 and 27)

31(28) Tibia I-II usually with 2 pairs of ventral bistles, labium as long as wide. ♂-pedipalpus (fig. 70): Tibial apophysis pointed. ♀: Epigyne (fig. 71) anteriorly with a helm-shaped structure. SE; in Central Europe only *P. vinosa* (= *Drassodes v.*) and *P. arrabonica* SZINETAR & EICHARDT 2009 (Hungary). M: 484-485, paper no. (14). . . . . ***Parasyrisca***

- Tibia I-II ventrally bristle-less, labium longer than wide. ♂-pedipalpus (figs. 84-85): Tibial apophysis usually widened distally and/or bearing a keel (fig. 72), bulbus rather uniformly, with a long tegular apophysis in a position near to the embolus. Epigyne anteriorly in almost all species with several folds right across (fig. 73) or – rarely – with a single sclerotized rim in an anterior position (fig. 86). Numerous species. M: 480-481, paper no. (12a) . . . . **_Haplodrassus_**

(*) A close investigation of the posterior cheliceral margin is needed.

(**) DRENSKI 1935 (figs. 150-152) described *Macedoniella* as a member of the Clubionidae s. l.; it was compared with the genus *Cybaeodes* by DRENSKY, and was regarded as a dubious genus. Material was not available. It may be a member of the Gnaphosidae, see WUNDERLICH (2008: 496). The existence of a gnathocoxal depression is unknown, the anterior spinnerets of the female are long and cylindrical like in the Gnaphosidae. DRENSKY figured the left legs I and II as almost bristle-less and hair-less, and I consider these legs as REGENERATED MALFORMATIONS.

(4) Descriptions of few taxa from the Canary Islands and Madeira, and on the synonymy:

The following genera of this family are known from the Canary Islands (less than 1/4 of the European gnaphosid genera), see WUNDERLICH (1992: 92-93): *Canariognapha* n. gen. (endemic to the Canary Islands, see below) *Drassodes, Haplodrassus*, *Leptodrassex (*only *hylaestomachi), Macarophaeus* n. gen. (see below), *Micaria* (at least two species, see above: Subspecies), *Nomisia* (3 endemic species)*, Scotognapha* (endemic to the Canary and Selvage Islands, a radiation to 13 species, see the key no. 18), ?*Scotophaeus*, *Setaphis* (a radiation to 5 species on the Canary Islands, see below: *S. murphyi* n. sp., and key no. 4), *Trachyzelotes* (only *lyonneti*)*,* and *Urozelotes* (only *rusticus*), and *Zelotes*.
(*Gnaphosa* and most probably *Scotophaeus* (see *Macarophaeus*) n. gen.) are absent on these islands; *Gnaphosa canaricola* STRAND 1911 is a member of *Scotognapha*). See the paper on spiders of the Canary Islands in this volume, chapter on the Gnaphosidae.

Canariognapha n. gen.

The gender of the name is feminine.

Type species (by monotypy): *Canariognapha parwis* n. sp.

Diagnosis: Chelicerae (figs. 166-167) with three tiny teeth WITHIN the cheliceral furrow, the anterior margin of this furrow bears three touching larger teeth which almost build a keel (figs. 166-167). ♂: Pedipalpus (figs. 169-173): Bulbus with a – questionable – intercalary sclerite, a pointed terminal apophysis close to the embolus, a large tegular apophysis, and a blunt embolus in a transverse position. ♀: Epigyne (fig. 174) very long, with a long medial plate and anteriorly with a small anchoring pocket; vulva (fig. 175) with thin-walled receptacula seminis which are contiguous, and well developed lateral pouches.

Selected further characters: Metatarsi III-IV bear a well developed apical comb, the eyes are only fairly large, the posterior row is more or less straight, praecoxal and intercoxal sternal triangles absent, the scutum of the ♂-opisthosoma short.

Relationships: According to the existence of an apical metatarsal III-IV comb *Canariognapha* is a member of the tribe Zelotinae: Zelotini in which teeth within the cheliceral furrow are unknown to me. In *Zelotes* GISTEL 1848 exists also an intercalary sclerite (usually in a more basal position) but an additional tegular apophysis is absent, and the cheliceral teeth are different.

Distribution: Canary Islands: Gran Canaria.

Canariognapha parwis **n. gen. n. sp**. (figs. 166-175)

Derivatio nominis: The species is dedicated to PARWIS NABAVI in Freiburg i. Br. who collected a larger number of this species on Gran Canaria.

Material: Canary Islands: Gran Canaria, PARWIS NABAVI leg. with the help of pit falls in 2000; (1) Roque Nublo, 1470 m, within a well developed vegetation, 11♂6♀; holotype ♂ R60/AR/CJW, paratypes: 1♂1♀ University La Laguna on Tenerife, 1♂2♀ SMF; 1♂1♀ coll. P. NABAVI; 7♂2♀ R61/AR/CJW; (2) 3 km NW Mogan, 450 m, between *Euphorbia*, gras and bushes, 3♂ paratypes R62/AR/CJW.

Diagnosis: Metatarsus I usually with a probasal bristle, all eyes about of the same size, the posterior row straight or very slightly procurved; chelicerae and genital organs: See the diagnosis of the genus.

Description:
Measurements (in mm): Body length 4.0-5.0, prosoma: Length 2.0-2.7, width 1.3-1.9; leg I ♂: Femur 1.9, patella 1.1, tibia 1.5, metatarsus 1.1, tarsus 0.8, tibia II 1.4, tibia III 0.9, tibia IV 1.5; ♀: Femur 1.3, patella 0.85, tibia 1.3, metatarsus 0.9, tarsus 0.75, tibia IV 1.5.
Colour: Prosoma and legs light to dark brown, the prosomal margin may be darkened, at least legs I-II are darkened beyond the femur, opisthosoma dorsally medium to dark grey brown, ventrally light grey, scutum of the ♂-opisthosoma dark brown.

Prosoma about 1.4-1.5 times longer than wide, thoracal fissure well developed, eyes only fairly large, all about of the same size, posterior row straight or very slightly procurved, posterior median eyes oval or (rarely) circular, spaced by about their radius. The basal cheliceral articles bear stronger and longer hairs (almost bristle-shaped, longer and less numerous than the stiff hairs of *Trachyzelotes*), teeth of the cheliceral furrow (figs. 166-167) variable, see the diagnosis of the genus, fangs long, gnathocoxae longer than wide, ventral depression well developed, labium distinctly longer than wide, free, with a distinct seam to the sternum which is not elongated between the coxae IV, praecoxal and intercoxal triangles absent. – Claw of the ♀-pedipalpus small and smooth. – Legs: Order IV/I/II/III; bristles: Femur I bears 1-2 dorsal one(s) and a prodistal one, tibia I is bristle-less, metatarsus I bears usually a probasal bristle, most patellae are bristle-less but III bears a retrolateral one, scopulae (spatulate hairs) exist on the tarsi I-II and in the distal half of the tibiae I-II, the claw tufts are weakly developed, feathery hairs exist, e.g. on the coxae, the metatarsal III-IV combs are well developed. – Opisthosoma oval, anterior spinnerets spaced by about their diameter; ♂: dorsal scutum short, triangular, ventral bristles absent. – Genital organs (see also the diagnosis of the genus): ♂-pedipalpus (figs. 169-173): Patella and tibia short, both bear a dorsal-distal bristle, the tibia bears at least 10 trichobothria, tibial apophysis long and straight, cymbium with a prodistal bristle, basal embolar outgrowth see fig. 172. I am not sure that the “intercalary sclerite” is really homologuous to that sclerite of *Zelotes*. – ♀: Epigyne/vulva figs. 174-175; the epigyne bears anteriorly few indistinct transverse furrows.

Relationships and **distribution**: See above.

Haplodrassus CHAMBERLIN 1922

Haplodrassus deserticola SCHMIDT & KRAUSE 1996 (figs. 84-88)

1996 *Haplodrassus deserticola* SAUER & KRAUSE, Abh. Mus. Tierkunde Dresden, 20 (11): 266, figs. 4-5 (♀).

Material: (1) Fuerteventura: N Betancuria, dry bed of a creek, mainly in pit falls, 46♂ 12♀ PARWIS NABAVI (most specimens) & JW leg in I-III 1999, CJW and SMF (3♂2♀); 2♂1♀ coll. KOVBLYUK, 2♂1♀ coll. MELIC, 1♂ coll. J. MURPHY; (2) Gran Canaria: Specimens from several localities, e.g., Roque Bentaiga and near Agaete, P. NABAVI leg. in pit falls in 2000, CJW and CPN.

Diagnosis: Small and pale spiders, body length ♂♀ 2-3.5 mm. ♂-pedipalpus (figs. 84-85): Tibial apophysis widened distally, median apophysis in a transverse position, embolus with tiny hooks; ♀: Epigyne and vulva figs. 86-88.

Description:
Measurements (♂♀ in mm): Body length ♂♀ 2-3.5, prosomal length 1.0.1.5, tibia I 0.45-0.9, tibia IV 0.5-0.8.
Colour: Prosoma and legs light (yellow) brown to medium brown, opisthosoma yellow brown to grey brown, frequently dorsally with transverse grey stripes.
Prosoma 1.5 times longer than wide, eyes of medium size, posterior row slightly procurved, posterior median eyes spaced by about their radius. Basal chaliceral articles large, both margins of their furrow bear usually 2 teeth. – Legs fairly long, bristles thin on I-II, tibia I-II none, metatarsus I none, metatarsus II usually with a ventral-basal pair. Scopula well developd on tarsus and metatarsus I-II. – Opisthosoma slender. – ♂-pedipalpus: See above.

Relationships: In *H. minor* (O. PICKARD-CAMBRIDGE 1879) the pedipalpal tibial apophysis is pointed but not widened distally, the conductor is wider, and the structures of epigyne/vulva are different. *H. minor* is in my opinion not a species of the Canarian Islands because of misidentifications with *deserticola*.

Distribution: Spain, Canary Islands: Fuerteventura and Gran Canaria.

Macarophaeus **n. gen**.

Diagnosis: Dorsal pattern of the opisthosoma in most species like *insignis* and *senilis* (fig. 89) uniformly, or irregularly bicoloured (fig. 66): in *cultior* and *varius*; cheliceral promargin with a carina which is weakly (fig. 66) or not serrated (smooth in *sabulum* n. sp., *insignis*), retromargin with a denticle in *cultior* and *varius* (fig. 66) or smooth in most species (few intraspecific exceptions, see the atavism in *insignis*). ♂-pedipalpus (figs. 68a-d, 90-92), MURPHY (2007: 371: *senilis*), with a membraneous conductor which partly enwined the embolus, MEDIAN APOPHYSIS ABSENT; the short embolus possesses basally a not sclerotized SUTURE (a basal outgrowth may exist, e.g., in *varius*, figs. 66c-d); the epigyne is quite variable (figs. 67, 68i, 92a) may possess a pair of sclerotized structures (bridges) – e.g. in the type species – or not (fig. 68i), see MURPHY (2007: 371), the vulva (figs. 68, 92b) has two pairs of receptacula seminis, a large kidney-shaped, and a small globular pair. – See the peculiar characters of ?*M. sabulum* n. sp..

Further characters: Medium to larger sized spiders. Posterior eye row more or less straight (fig. 66), the shape of the posterior median eyes may be circular. Tibiae and metatarsi I-II bear a scopula; number of bristles quite variable: Tibia I bears frequently a single and a pair of ventral bristles and a prolateral one, no bristle in *M. sabulum* n. sp., metatarsi I-II bear frequently a ventral pair of bristles and a single one in the distal half. I found feathery (branched) hairs on legs and opisthosoma of *insignis* and *varius* (fig. 68e), and the ♂-opisthosoma bears a large dorsal scutum (fig. 66), the praecoxal sternal triangles are well developed, the intercoxal triangles are only fairly well developed (fig. 66), the trochanteral notchs are only weakly developed. ♂-pedipalpus (see above), tibia with a long and slender apophysis which has a hook-shaped tip, cymbium and bulbus slender.

Type species: *Scotophaeus varius* SIMON 1893 (**n. comb**.) (Canary Islands). – Further species in Eurasia, N-Africa and the Near East (besides ?*M. sabulum* n. sp.) which were discussed with J. MURPHY who wants at least the not-Macaronesian species to regard as members of the North American genus *Nodocion* CHAMBERLIN 1922 – see PLATNICK & SHADAB (1980) – in contrast to my personal opinion: *Scotophaeus cultior* KULCZYNSKI 1899 (**n. comb**.) and *Macarophaeus insignis* n. sp. (Macaronesian Islands) as well as at least *antinae*, *furcata, golan, patricia, perversa, pugnax, senilis,* and *taborensis* (**n. combs**.). Not checked have been *hungarica, incompta*, *loricata, ochridana*, and *phyllobia*. The species which are listed above have been described as *Poecilochroa* and/or *Scotophaeus*. I do not want to exclude that ?*Echemus modestus* KULCZYNSKI 1899 from Madeira may be a member of *Macarophaeus*.

Species groups: According to the structures of epigyne and vulva exist several species groups; due to the divided median "bridge" of the wide epigyne are *cultior*, *insignis* and *varius* members of the same group in contrast to *senilis* and other species (several species-groups?) which may have a long epigyne and no sclerotized "bridge".

Relationships: *Macarophaeus* is a member of the Herpyllini (see above). In the SE-Asian genus *Sernokorba* KAMURA 1992 and the North and Central American genus *Sergiolus* SIMON 1891 – which both may be well related – (e.g.) exists also a promarginal cheliceral carina, and the ♂-pedipalpus (tibial apophysis, structures of the bulbus) are similar (a membraneous conductor exists, and a median apophysis is absent), but the opisthosomal pattern is quite different: It bears dorsally TRANSVERSE dark and light bands; a tooth of the cheliceral retromargin is absent and epigyne/vulva are quite different in *Sergiolus* (the receptacula seminis are large and sac-shaped), the conductor is longer in *Sernokorba*, and has a longitudinal position at the bulbus; the existence of feathery (branched) hairs is unknown in both genera. MURPHY (2007: fig. p. 295, 297) figured only a single major ampullate gland spigot of the anterior spinnerets at least in the male sex in these genera, but a pair exists in *Macarophaeus varius* (MURPHY, fig. p. 293, sub "*Scotophaeus*" *cultior*) (the intraspecific variability of this structure has not been studied!). – The species which are listed above have been described as *Poecilochroa* and/or *Scotophaeus*. In the TYPE SPECIES (the generotype of *Poecilochroa* is *variana* but not *senilis*) of these genera of the Echemini the opisthosoma is uniformly coloured, a cheliceral carina is absent, bulbus and vulva are more complicated (in *Scotophaeus* exists a long embolus in which no suture exists), and a median apophysis exists like in the North American genus *Nodocion* CHAMBERLIN 1922 in contrast to *Macarophaeus*. In *Kishidaia* an embolic suture is absent and the pedipalpal femur bears a strong ventral-basal outgrowth.

Distribution: At least Palaearctic including the Canary Islands and Madeira (on which *Scotophaeus* apparently is absent).

Macarophaeus varius (SIMON 1893) (**n. comb**.) (figs. 66-68, 68a-e) and congeneric species

1941 *Scotophaeus varius* DENIS. -- Ann. Soc. Ent. France, 110: 110 (♀) fig. 2 (epigyne).
2007 "*Scotophaeus*" *cultior* KULCZYNSKI 1899. -- MURPHY (2007: 48, 292-293 (figs.) (erroneous determination).

Material: Canary Islands, (1) La Gomera, El Cedro: Las Membreras, Meseta and Los Acevinos, 2♂ (1♂ with an injured coxa), 2♀ (1♀ freshly moulted), 2 juv., J. ASTRIN et al. leg. in X. 2008 by fogging trees, see STÜBEN et al. (2010: 15); CJW; (2) Gran Canaria, Bco. de Azuaje, 600-800 m, 1♀ P. NABAVI leg. together with both sexes of *M. insignis* n. sp. 23. V. – 5. VII. 2000, CJW.

Remark: The collection of several specimens, of juveniles as well as of adults of both sexes by fogging may indicate that spiders of this species are mainly dwellers of higher strata of the vegetation.

Diagnosis/description: Body length usually 6.2-7.2 mm (♀ from Gran Canaria 10.0), prosomal length usually 3.3-4.3mm (♀ from Gran Canaria 5.0), opisthosoma most often with a wide black longitudinal band and a pair of irregular longitudinal light bands (this pattern is quite indistinct in the large female from Gran Canaria in which a dark grey colour exists), ventrally mainly light, with a dark median band, tibia and metatarsus III-IV annulated. Cheliceral furrow: Anterior margin with a weakly serrated carina and a medial "tooth", retromargin with a denticle (fig. 66). Prolateral bristle on tibia I absent. ♂-pedipalpus (figs. 68a-d): Embolus short and with a large blunt outgrowth. ♀: epigyne (fig. 67) (usually wider than in this figure) with a pair of touching and strongly sclerotized tranverse ("bridging") structures, vulva (fig. 68) with a large and widely spaced, and a small pair of receptacula seminis.

Relationships: *Macarophaeus cultior* (KULCZYNSKI 1899) (sub *Scotophaeus*) – original description based on a juvenile spider, Madeira, see DENIS (1962: 36-38, figs. 23, 24a-b, 25, sub *Herpyllus*) (**n. comb**.) is usually larger, its prosomal length is 4.5-6.5mm, the embolus is thick, the epigyne (fig. 68g) is different, the structures of the vulva are unknown. See also *M. insignis* n. sp..

Distribution: Canary Islands: Tenerife, Gran Canaria, La Gomera, and El Hierro: See SCHMIDT (1990: 15) (sub *Scotophaeus*). On Gran Canaria and Tenerife occur *M. varius* and *M. insignis* as well, on Gran Canaria (Bco. de Azuaje) occur both species at the same locality.

***Macarophaeus insignis* n. gen. n. sp**. (figs. 89-92b)

Material: Spain, Canary Islands; (1) Gran Canaria: 5♂5♀ P. NABAVI leg. in pit falls in II-X 2000; Bco. de Azuaje, 600-800 m (together with a female of *M. varius*); holotype ♂, R41/AR/CJW, later most probably SMF; paratypes: 500 m SW Roque Nublo, 1470 m, within numerous plants, 1♂ R42/AR/CJW; near Agaete, Berrazales, 1♂ R43/AR/ CJW; 2 km NW Pico de las Nievas, dense Pine forest, 1770 m, 2♀ R44/AR/CJW; between Valesco and Artenara, 1550 m, 1♂ R45/AR/CJW; near El Pamital, 500-700 m, 1♂ R46/AR/CJW; near San Felipe, on sand between tamariscs, 20 m from the sea, 1♀ R47/AR/CJW; Baco. de Azuaje, 300-400 m, 1♀ R48/AR/CJW; 2 km NW Artenara, 1250 m, 1♀ R49/AR/CJW; (2) Tenerife, Las Canadas, ca. 2000 m, 1♂ paratype, P. OROMI Univ. La Laguna, Tenerife.

Diagnosis: Opisthosoma uniformly light brown, legs not annulated, eyes small, tibia I bears a prolateral bristle in the basal half; ♂: pedipalpus (figs. 90-92): Conductor long and transparent, embolus short, apically enclosed by the conductor. ♀: epigyne (fig. 92a) with a pair of touching and weakly sclerotized (“bridging”) structures in a transverse position, vulva (fig. 92b) with a large and a small pair of receptacula seminis, the large pair is not widely spaced.

Description:
Measurements (in mm): Body length ♂ 4.8-7.5, ♀ 6.5-7.7, prosoma: Length ♂ 2.5-3.3, ♀ ~ 3.2, width ♂♀ ~ 2.0, width of the eye field ~ 0.65, length of a basal cheliceral article ~ 0.9; leg I (♂): Femur 1.8, patella 1.1, tibia 1.5, metatarsus 1.1, tarsus 0.75, tibia II 1.3, tibia III 1.0, tibia IV 1.6; ♀: Tibia I 1.4, tibia IV 1.55.
Colour: Prosoma and legs light to medium brown, prosomal margin not darkened, mouth parts medium brown, legs not annulated, tarsi, metatarsi and tibiae I-II are frequently distinctly brown darkened (rarely light), opisthosoma light to medium grey brown, scutum medium brown.
Prosoma 1.37 times longer than wide, dorsally with some longer hairs, thoracal fissure short but distinct, eyes fairly large, the anterior medians largest, posterior row slightly procurved or straight, posterior median eyes slightly oval, spaced by almost their diameter from each other and from the lateral eyes, lateral eyes spaced by their diameter from each other. Basal cheliceral articles large, protruding (probably in an unnatural position), cheliceral retromargin usually smooth but in a single male (R42/CJW) with a denticle, anterior margin with a smooth carina and a medial “tooth”. Labium and gnathocoxae distinctly longer than wide, gnathocoxal depression well developed. Sternum distinctly longer than wide, coxae IV very close together, praecoxal and intercoxal triangles well developed. – Legs only fairly long, order IV/I/II/III, bearing numerous bristles which number is quite variable; I: Femur 3 dorsally and 1 prodistally, patella none, tibia a single one prolaterally in tha basal half, single one proventrally and usually a pair ventrally and apically, metatarsus a pair in the basal half, and occasionally a single one in the distal half, patella III frequently with a lateral pair, patella IV smooth. Trochantera only weakly notched. Scopulae distinct on tarsi I-II, present in the distal 2/3 on metatarsi I-II, tibiae none. Claw tufts dense, hairs widened on III-IV. Paired tarsal claws with long teeth, IV not elongated. – Opisthosoma (fig. 89) oval, covered with short hairs and a large dorsal scutum in the

basal half, anteriorly bearing long hairs, feathery (branched) hairs absent. The long anterior spinnerets are spaced by only slightly more than their diameter. – ♂-pedipalpus (see above); the tibial apophysis is as long as the body of the tibia, the cymbium bears few bristles and is only weakly inclined retrolaterally, the embolus is widened before its tip, and possesses a suture basally which is not sclerotized and which function is unknown (making the distal part of the embolus movable?). ♀: Epigyne (fig. 92a) medially with a weakly sclerotized "bridge" which bears a pair of introductory openings; vulva (fig. 92b) with two pairs of thin-walled receptacula seminis. The introductory openings connect probably the large primary and the small secondary receptacula as well.

Relationships: In *M. varius* and *cultior* (KULCZYNSKI 1899) exist a distinct dorsal pattern of the opisthosoma, the tibiae and metatarsi III-IV are annulated, a prolateral bristle on tibia I is absent, and the genital structures are different, the embolus is short and thick, the transverse epigynal structures are stronger sclerotized, and the large receptacula seminis are widely spaced in *varius*. – In *M. senilis* (= *Poecilochroa s.*) (O. PICKARD-CAMBRIDGE 1872) from the SW Mediterranean exists a ventral-distal branch of the pedipalpal tibial apophysis and a long epigyne.
According to a label the paratype of *insignis* from Tenerife has been determined as "*Herpyllus cultior* (KULCZYNSKI)" by V. OVTSHARENKO; but *cultior* from Madeira (the locus typicus!) – according to J. MURPHY (in litt. XI 2008), see MURPHY (2007: 293-294 erroneously reported also from the Canary Island La Gomera, too –, is a different species: Its opisthosoma has distinct markings, the pedipalpal tibial apophysis is distinctly shorter than the tibia, and the structures of the bulbus are different, see DENIS (1962: Figs. 23-24).
The relationships of *Scotophaeus mauckneri* SCHMIDT 1956 – the female holotype – SMF14368, epigyne missing, vidit – has been introduced with bananas allegedly from the Canary Islands (which one?), ♂ unknown, relationships quite unsure (genus?). The body length of the single known female specimen is 12 mm, the colour of body and legs is light brown, the eyes are small, the posterior row is straight, the anterior cheliceral margin bears a serrated carina, the retromargin bears a single tooth, a dorsal bristle on tibia IV is absent, patellae III-IV bear a retrolateral bristle, the very large primary receptacula seminis are close together, similar to *M. insignis* but their shape and the shape of the sclerotized lateral margins are different. See *Scotophaeus*. Both sexes are needed from a Canarian locality for a sure determination.

Distribution: Spain, Canary Islands: Gran Canaria (see *M. varius* above) and Tenerife (Canadas).

?***Macarophaeus sabulum* n. sp**. (figs. 68h-i)

Material: S-Portugal, ca. 20 km NE Faro, sandy area, holotype ♀ JW leg. in the end of V 2010, R124/AR/CJW.

Diagnosis (♀; ♂ unknown): Body unicoloured light brown orange, thoracal fissure/ fovea absent, tibia and metatarsus I-II and all patellae bristle-less, metatarsi III-IV bear a “preening brush” (fig. 68h), epigyne/vulva (fig. 68i) with a triangular groove which has strongly sclerotized lateral margins, translucent receptacula seminis large.

Description (♀):
Measurements (in mm): Body length 5.4, prosoma: Length 2.2, width 1.55; leg I: Femur 1.2, patella 0.8, tibia 0.95, metatarsus 0.85, tarsus 0.6, tibia II-IV 0.95/0.65/1.0; lenses of the posterior median eyes 0.15X0.1.
Colour: Prosoma uniformly light brown orange like the legs in which the patella and following articles I-II are darkened, opisthosoma uniformly yellow grey.
Prosoma 1.5 times longer than wide, thoracal fissure/fovea absent, hairs of medium length, eyes large, about equal in size, posterior row slightly procurved, posterior median eyes oval, spaced by their diameter, basal cheliceral articles and fangs slender, prolateral margin of the cheliceral furrow with a not serrated keel, retromargin tooth-less, labium distinctly longer than wide, gnathocoxae three times longer than wide in the middle, depressions fairly well developed, sternum 1.57 times longer than wide, not prolongated between the coxae IV. – Legs stout, all tarsi and metatarsi I-II bear a ventral scopula which is well developed, metatarsi III-IV bear a “preening brush” in the distal half (fig. 68h), tarsal claws III-IV not elongated; bristles: See the diagnosis; femora I-II bear 3-4, III-IV 4-5 bristles. – Opisthosoma 1.6 times longer than wide; the anterior spinnerets are long, cylindrical, slightly bent, and spaced by almost 1 ½ diameters. – Epigyne/vulva: See the diagnosis.

Relationships: The combination of characters of this species is peculiar and quite unusual, and may cause some problems regarding its determination, see the key to the genera nos. 2 and16: I do not know another species of *Macarophaeus* in which a thoracal fissure/fovea is absent – like in *Leptrodrassex* and *Leptodrassus* –, bristles on tibia and metatarsus I-II are absent and a metatarsal III-IV preening brush exists like in *Cryptodrassus* and *Synaphosus*. Shape and position of eyes and mouth parts, especially of the cheliceral margins, tarsal claws and claw tufts, epigyne and receptacula seminis are similar to *Macarophaeus*. Therefore I regard this species as a questionable member of *Macarophaeus;* the male is unknown.
According to its description *M. patricia* (SIMON 1878) from Corsica may be most related; in *patricia* the epigynal groove is similar triangular but the colour of leg I and the shape of the receptacula seminis appear different.

Distribution: S-Portugal.

***Setaphis murphyi* n. sp.** (figs. 93-97) photo 90

Derivatio nominis: This species is dedicated to JOHN MURPHY who published several important books and papers on spiders, mainly of the family Gnaphosidae.

Material (holotype an paratypes): Spain, Canary Island Tenerife; (a) N Betancuria, in a dry bed of a creek with some vegetation, 2♂, 2♀, 2 juv. JW and PARWIS NABAVI leg. in

I-III 1999 (pit falls), (b) near Vallebron, under a stone, 1♀ JW leg. in III; holotype ♂ R12/AR/CJW; 1♂, 2♀, 2 juv. paratypes R13/AR/CJW, and 1♀ R14/AR/CJW; 1 ♂-pedipalpus; 1 epigyne from R13: R15/AR/CJW. A part of the material will be deposited in the SMF.

Diagnosis: Small, ant-shaped spiders (*) which have a bicoloured (black and yellow) opisthosoma (photo 90). ♂: Opisthosomal scutum absent, pedipalpus: Figs. 94-95, embolus with ca. 3 ¼ coils, epigyne/vulva (figs. 96-97) distinctly longer than wide, shape of the receptacula seminis oval.

(*) I observed spiders of this species on Fuerteventura raising their anterior legs and their opisthosoma during the locomotion similar to ants.

Description:

Measurements (in mm): Body length in both sexes 2.3-2.6, prosoma: Length ca. 1.1, width 0.75; leg I (♂): Femur 0.75, patella 0.48, tibia 0.6 x 0.25, metatarsus 0.45, tarsus 0.42, tibia IV 0.7 x 0.18; ♀ : Tibia I 0.6 x 0.2, tibia IV 0.63 x 0.17, width of the eye field ca. 0.25, length of an anterior spinneret 0.17.

Colour (photo 90) prosoma mainly light orange, medially light grey in some specimens, margin black; legs mainly black but tarsi and metatarsi as well as the pedipalpi yellow; opisthosoma ventrally mainly yellow, posteriorly black, dorsally yellow in the anterior part, posteriorly black, medially with a black band which is widened anteriorly.

Prosoma ca. 1.45 times longer than wide, low, hairs short, thoracal fissure short and indistinct. Eyes large and in a compact group, the anterior medians largest, posterior row straight, posterior median eyes oval, spaced by their radius or more. Chelicerae small, promargin usually with 3 teeth, retromargin with few denticles, labium longer than wide, gnathocoxae long and only slightly converging, the sternum separates the coxae IV by less than their radius, intercoxal triangles absent, praecoxal triangles present but usually hidden. The female pedipalpus bears a small tarsal claw. – Legs (photo 90) fairly long and slender, IV longest, tibia I thickened (less in the female) and fairly dense hairy, tarsi relatively long and with an indistinct distal pseudoscopula, claw tufts absent. Bristles thin, almost hair-shaped on I-II, femora I 2 dorsally, patellae none, tibiae and metatarsi I-II none, tibiae III-IV and metatarsus IV bear few ventral bristles, ventral-apical metatarsal III-IV preening comb well developed (fig. 93). Paired tarsal claws with longer teeth, claws IV distinctly longer than I-III. – Opisthosoma (photo 90) long-oval, ca. 1.8 times longer than wide, without a distinct transverse inclination like in certain members of *Micaria*, scutum absent, spinnerets relatively short, the anteriors spaced by about one diameter, the male epigaster is more or less hardened. – ♂-pedipalpus (figs. 94-95): Patella and tibia short, tibial apophysis blunt and fairly bent, cymbial bristles absent, bulbus strongly protruding, median apophysis in a basal position, pointed and bent, embolus long, describing ca. 3 ¼ coils, bearing a lateral suture. – Epigyne/vulva: See above.

Remarks on the peculiar shape, colour and behaviour of this species: In contrast to most of the remaining congeneric species – e.g. *S. walteri* – which are much larger and uniformly coloured, *S. murphyi* has a bicoloured body and legs in both sexes and thickened anterior tibiae (less in the female). *S. parvula* is bicoloured, too, but it has different markings of the body (the existence of a scutum of its ♂-opisthosoma is unknown to me). Specimens of *murphyi* are active at daytime: I observed spiders raising their anterior legs while running similar to ant-shaped spiders of the genus *Micaria*, but – because

of the strong anterior legs – an “antennae illusion” appears unlikely to me. The body is slender in *murphyi*, the opisthosoma is almost cylindrical but an opisthosomal constriction is absent. – Moving spiders looked ant-shaped to me but look they also ant-shaped to certain enemies like birds?
The existence of a yellow anterior part of the opisthosoma which bears a longitudinal black medial band (photo 90) seems of special interest: Does this appearance provide an “petiolus illusion” OF A WASP, of a “dangerous” animal, and may we regard the shape and colour of this species as an example of Batesian mimicry? If so: What may be the model?

Relationships: In the most related *S. parvula* (LUCAS 1846) from the Western Mediterranean a bicoloured opisthosoma exists, too (the colour of the opisthosoma is also partly light), patella and tibia of the anterior legs are also black, and the tibia is thickened, but in *murphyi* the opisthosoma is more yellow in the anterior part, the pedipalpal tibia is less bent, the embolus is different, and the epigyne is longer. – *S. walteri* PLATNICK & MURPHY 1996 (Eastern Canary Islands) has similar genital structures but is much larger (body length 5-6 mm), the body colour is uniformly brown, a scutum of the ♂-opisthosoma exists, size and position of the eyes are different, the pedipalpal tibial apophysis is distinctly pointed, the structures of the bulbus are different, the epigyne is shorter, its structures are different.

Colonization of the Canary Islands: Members of *Setaphis* colonized the Canary Islands at least two times: (a) with the ancestor of *murphyi*, and (b) with the – only one? – ancestor of most of the remaining species which are larger, unicoloured, and possessing a scutum of the ♂-opisthosoma .

Distribution: Spain: The Canary Island of Fuerteventura.

(5) On Southern European members of the Gnaphosidae:

Drassodes serratichelis (ROEWER 1928) (figs. 102-107)

Material: Spain, Mallorca: (1) E Cap de Pera, in a forest, 1♂ JW leg. in VI 2003; (2) near Fornalux, 1♂ JW leg. 26. V. 2003, CJW, SMF.

Diagnosis (♂; ♀ unknown): Posterior eye row procurved (fig. 102), cheliceral promargin with 3 teeth, retromargin with 2-4 denticles, ♂-pedipalpus (figs. 105-107) without a tibial apophysis. Body length ca. 2.7 mm.

Legs: Figs. 103-104.

Relationships: In *D. luteomicans* and *lutescens* a pedipalpal tibial apophysis is also absent but these species are much larger.

Distribution: Mediterranean: Greece (paper no. 2) and Spain (Mallorca); new to Spain and the Western Mediterranean.

Gnaphosa artaensis n. sp. (figs. 146-147)

Material: Spain, NW-Mallorca, near Arta, below a stone, JW leg. in VII 2003, R19/AR/CJW.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 146-147): Bulbus with a long and slender embolus which is fairly bent.

Further characters: Tibiae I-II bristle-less, metatarsus I with a single pair, II with 1-2 pairs of ventral bristles, pedipalpal tibia short.

Description (♂):
Measurements (in mm): Body length 5.5, prosoma: Length 2.5, width 1.85; leg I: Femur 2.0, patella 1.15, tibia 1.7, metatarsus 1.4, tarsus 1.1, tibia II 1.3, tibia III 1.0, tibia IV 1.5, pedipalpal tibia 0.3.
Colour: Prosoma and legs uniformly medium brown but the mouth parts dark brown, opisthosoma light grey brown.
Prosoma 1.35 times longer than wide, most hairs are rubbed off, thoracal fissure long, posterior eye row recurved, distinctly wider than the anterior row, posterior median eyes oval, spaced by about the radius of their length, anterior median eyes not the largest. Basal cheliceral articles and fangs stout, anterior margin of the cheliceral furrow with a single tooth, posterior keel large, gnathocoxae short and converging, serrula indistinct, labium distinctly longer than wide. – Legs only fairly long, order IV/I/II/III, not hairy, tarsi I-II with a weak pseudoscopula (thin hairs), bristles on I-II: See above, III-IV with numerous bristles. – Opisthosoma 1.75 times longer than wide, soft, hairs of medium length, anterior spinnerets widely spaced, bearing 6/7 piriform gland spigots. – ♂-pedipalpus (see above) with short articles, tibial apophysis short, cymbium retrobasally with an outgrowth, apically with few short bristles, medium apophysis large.

Relationships: According to size and position of the long embolus *artaensis* is a member of the *Gnaphosa lugubris* species-group. In *G. barroisi* SIMON 1878 the embolus is thicker, in *G. ilika* OVTSHARENKO et al. 1992 embolus and median apophysis are more slender, in *G. saurica* OVTSHARENKO et al. 1992 the embolus possesses tiny teeth and is straight distally.

Distribution: Spain, Mallorca.

***Scotophaeus nanoides* n. sp.** (figs. 162-165)

Material: S-Portugal, near Sao Bras de Alportel, below a stone, holotype ♂ JW leg. in VIII 2010, R52/AR/CJW, later probably SMF.
Remark: Both pedipalpi of the holotype are cut off.

Diagnosis (♂; ♀ unknown): Tibia I with 3 pairs of long ventral bristles, metatarsus I without bristle, pedipalpus (figs. 164-165) with a pointed tibial apophysis, a fairly s-shaped embolus, and a short conductor.

Description (♂):
Measurements (in mm): Body length 5.0, prosoma: Length 2.5, width 1.7; leg I: Femur 1.65, patella 1.1, tibia 1.3, metatarsus 1.1, tarsus 0.65, tibia II 1.25, tibia III 1.15, tibia IV 1.55.
Colour: Prosoma and legs light brown, tarsi and metatarsi I-II fairly darkened, opisthosoma ventrally light grey, dorsally dark grey, scutum redbrown.
Prosoma (fig. 162) 1.47 times longer than wide, thoracal fissure well developed, rather short; eyes: Anterior medians largest and only slightly spaced, contiguous to the laterals, posterior row slightly procurved, posterior median eyes oval, spaced by less than their diameter, fangs fairly long, anterior/posterior cheliceral margin with 2/1 teeth, labium long, gnathocoxae long, with a distinct ventral depression, coxae IV closely together. – Legs (fig. 163) fairly stout, order IV/I/II/III, feathery hairs existing, bristles numerous, femora: I-II 2 dorsally and 2 prolaterally in the distal half, III-IV bear 7 ones, patellae: Only III-IV bear a retrolateral bristle, tibiae I-II ventrally usually with 3 pairs of long bristles, one of the proventrals is absent on II, tibia IV bears 11 bristles including a dorsal-basal one; metatarsi: I bristleless, II bears a single ventral-basal one, IV about a dozen. Trochanters III-IV are fairly notched (I-II very weakly); tarsi and metatarsi I-II are densely scopulate, the claw tufts are quite dense. – Opisthosoma 1.65 times longer than wide, dorsally densely covered with fairly short hairs, anteriorly with long hairs, dorsal scutum about half as long as the opisthosoma. – Pedipalpus (figs. 164-165): Femur fairly slender and laterally depressed in the basal half, patella as long as the tibia, tibia proventrally with a blunt apical and almost skinny outgrowth, and a relatively short and pointed retrolateral apophysis, median apophysis long, the skinny conductor is short and may be easily overlooked in the ventral aspect of the bulbus, embolus long and fairly s-shaped.

Relationships: According to the structures of the ♂-pedipalpus *S. nanoides* is most related to *S. nanus* WUNDERLICH 1995 from Austria. In *nanus* the pedipalpal tibial apophysis has a different shape and is wider, the conductor is distinctly longer, position and shape of the embolus are different.

Distribution: S-Portugal.

(6) Gnaphosidae from Turkey (Asia Minor):

Zelotes turcicus n. sp. (figs. 108-112)

Material: Turkey, Anatolia, NW Artvin, Arhavi, 70 m, in a garden, male holotype H. KORGE leg. 14. VII. 1977, R18/AR/CJW.

Remark: The right pedipalpus and the opisthosoma have been separated from the body by the present author, the left legs II-IV are lost beyond the coxa.

Diagnosis (♂; ♀ unknown): ♂-pedipalpus (figs. 111-112): Tibia dorsally with a brush of hairs, median apophysis hidden in the ventral aspect, embolic process long, pointed, and in an almost transverse position, embolus screw-shaped.

Description (♂):
Measurements (in mm): Body length 6.5, prosoma: Length 2.8, width 2.05; leg I: Femur 1.9, patella 1.1, tibia 1.5, metatarsus 1.3, tarsus 1.1, tibia II 1.25, tibia III 1.15, tibia IV 1.6, anterior spinnerets 0.7, cymbium 1.0.
Colour dark brown (almost black).
Prosoma 1.37 times longer than wide, hairs not distinct, thoracal fissure long, eyes small and in a compact group, posterior row slightly recurved, posterior median eyes oval, spaced by more than their radius. Basal cheliceral articles fairly protruding and small. The posterior margin of the cheliceral furrow bears 2 tiny teeth, the anterior margin bears 3 larger teeth. Fangs slender. Labium and gnathocoxae longer than wide. – Legs fairly stout, scopulae of tarsi and metatarsi well developed, claw tufts not well developed; bristles on I: Femur dorsally 1/1 and 1 prodistally (thin), patella and tibia none, metatarsus a basal pair, metatarsus II bears 2 ventral pairs, tibia and metatarsi III-IV with numerous strong bristles but patellae none. Feathery hairs absent. Preening comb of metatarsus III well developed (fig. 108). – Opisthosoma oval, dorsal scutum 1.35 mm long, hairs fairly short, feathery hairs absent, ventral bristles also absent, paired sclerotized post-epigastral structures (plates) fairly distinct, and epiandrous gland spigots tiny, a single pair (fig. 109). Anterior spinnerets long, cylindrically and widely spaced; the left one bears 5, the right one 6 large spigots of the piriform glands; their base is only slightly widened (fig. 110). The median spinnerets are not flattened, the tracheal spiracle is distinctly sclerotized. – Pedipalpus (figs. 111-112): Patella slightly longer than wide, tibia as long as wide, dorsally with numerous hairs, apophysis long and fairly bent, apically-proventrally bulging, cymbium long, without ventral-distal bristles, embolic process long, pointing retrolaterally, median apophysis partly hidden by the margin of the tegulum, intercalary sclerite large, not distinct.

Relationships: According to the numerous tibial hairs of the ♂-pedipalpus and the structures of the bulbus *turcicus* is a member of the *erebeus* species-group, and is strongly related to *erebeus* (THORELL 1871) and *khostensis* KOVBLYUK 2008 (Turkey), but the pedipalpal tibial apophysis, as well as the shape of embolus and – especially – of the embolic process are different.

Distribution: Turkey: Anatolia.

(D) THE FOSSIL EUROPEAN TAXA IN EOCENE BALTIC AMBER

See the short notes by WUNDERLICH (2004: 1681-1685).

The two new genera *Eognaphosops* and *Zelotetis* as well as *Eomactator* PETRUNKEVITCH 1958 may all be members of the new subfamily Eomactatorinae.

Frequency in amber, ecology, and diversity: Gnaphosidae in Baltic amber are extremely rare; I found only very few adult specimens, and only very few real fossil Gnaphosidae are known. The bad preservation – especially parts of body, spinnerets and genitalia are usually covered with a white emulsion – hinder the sure identification of most fossils but there exist few exceptions: E.g. in the paratype of *Eomactator hirsutipes* n. sp. the spinnerets are exceptionally well preserved (although the specimen was heated), and may indicate conclusions on the relationships of this – and probably other – fossil taxon/taxa. – The reason for their rarity may be that most Gnaphosidae live on the ground but not on trees where they would easily have been captured by the fossil resin; furthermore numerous Gnaphosidae are large(r) spiders and prefer open habitats similar to the Lycosidae which have never been reported from the Baltic amber forest. Although only very few (fairly) sure Eocene gnaphosid specimens have been discovered up to now, they represent not less than 3 genera; so we may suppose that Gnaphosidae were already diverse in the Eocene Baltic amber forest but specimens got into the resin only by rare accidents.

Already described Eocene Gnaphosidae in Baltic amber, synonymy and new combinations:

Remarks: Most taxa which were regarded previously as members of the family Gnaphosidae are actually taxa of other families, most often of Corinnidae or Zoridae/Liocranidae but also of Zodariidae and Spatiatoridae. The only sure Gnaphosidae in Baltic amber which has previously been described is identified by me as *Eomactator mactatus* PETRUNKEVITCH 1958. According to my investigation there is no indication of the existence of an extant genus in the Baltic amber forest – 100% of the fossil taxa are extinct.
DUNLOP et al. (2009) in PLATNICK's World Spider Catalog published a list of fossil spider taxa which includes the Gnaphosidae in Baltic amber including a list of nomina nuda. The list is not annotated, and previous transfers to other families – WUNDERLICH (2004), see below – are partly overlooked or are ignored. In DUNLOP's list three extant (!) genera are included but they have to delete from Baltic amber:

(a) *Gnaphosa* LATREILLE 1804 (two fossil species, *affinis* and *ambigua*, were originally described under *Pythonissa*).
(b) *Micaria* WESTRING 1851 (a single species was originally described by KOCH & BERENDT under *Macaria* (not *Micaria*); three nomina nuda were added by MENGE in KOCH & BERENDT p. 64 as new species without descriptions: *M. orata, tenuis* and *squamata*).
(c) *Zelotes* GISTEL 1848 (3 species were originally described under *Melanophora*) by KOCH & BERENDT (1854).

Discussion:

(a) *Pythonissa*.
REMARKS: (1) The combination of these species with *Gnaphosa* by DUNLOP et al. (2009) is not justified; the name *Pythonissa* was used in the 19th century for species of more than a dozen genera, *Gnaphosa* is only one of these. I did not find characters of the genus *Gnaphosa* in Baltic amber spiders. (2) MENGE in KOCH & BERENDT (1854: 82f) regarded members of *Philodromus* as actual members of his *Pythonissa* (!) see below.
The description of *Pythonissa affinis* is based on a female. According to its short spinnerets in a rosette-shaped position and the long ventral bristles of the anterior tibiae and metatarsi it is not a member of the Gnaphosidae but most probably of the Zoridae/Liocranidae. – The description of *Pythonissa ambigua* is also based on a female; its spinnerets are hidden. KOCH compared the holotype with *sericata* (Zoridae/Liocranidae, see below), MENGE compared it with *Pythonissa affinis*, see above. – MENGE (p. 82) regarded *Philodromus dubius* KOCH & BERENDT (based on a juvenile spider!) “doubtless” as a member of *Pythonissa affinis*, and DUNLOP & JEKEL – Bull. Br. arachnol. Soc., 14 (9): 359 – accepted this opinion but this synonymy was not founded.

(b) *Micaria procera* (KOCH & BERENDT 1854) (sub *Macaria*) is a member of the genus *Eomazax* PETRUNKEVITCH 1958 (Corinnidae), probably a senior synonym of *E. pulcher* PETRUNKEVITCH 1958, see WUNDERLICH (2004: 1637, 1653).

(c) The description of *Melanophora concinna* (the juvenile holotype has been seen by the present author) is based on a juvenile spider, and has been regarded as a probable synonym of *M. nobilis* by MENGE (p. 62) which is based on a male; the spinnerets of both holotypes are hidden. MENGE (p. 62) regarded three females (no types!) as conspecific with *nobilis* which possess long and cylindrical spinnerets like Gnaphosidae. According to PETRUNKEVITCH (1958: 376) are *concinna* and *nobilis* synonyms but KOCH & BERENDT (p. 62) regarded both species as only “probably” being synonyms. This species may be a member of the family Gnaphosidae, and of the genus *Eomactator*, see below. – *Melanophora mundula* KOCH & BERENDT 1854 has been regarded as synonym of *Therea* (sub *Thereola*) *hispida* KOCH & BERENDT 1854 by PETRUNKEVITCH (1958: 376), but *hispida* it is actually a member of the genus *Adorator* PETRUNKEVITCH 1942 (Zodariidae), see WUNDERLICH (2004: 1593). – The description of *Melanophora regalis* (type seen) is based on a probably adult female. According to fig. 51 of the holotype are the spinnerets not as long as in the family Gnaphosidae. – *Melanophora nitida* and *M. lepida* MENGE in KOCH & BERENDT (1854: 63) are nomina nuda, descriptions are absent.
I like to set fossil members of “*Gnaphosa*”, “*Micaria*”, “*Zelotes*” etc. in quotation marks.

Eomactator mactatus PETRUNKEVITCH 1958 (♂) and *Captrix lineata* (KOCH & BERENDT 1854) (♀) are regarded as members of the Gnaphosidae by PETRUNKEVITCH (1942, 1958) without question marks; their relationships are discussed in the following:

In *Eomactator mactatus* – according to PETRUNKEVITCH – the prosomal length is 1.75 mm, the eyes are missing, the gnathocoxae are hidden, an opisthosomal scutum and leg scopulae are absent, the legs (fig. 119) and their bristles are thin, tibia I bears at least 2 pairs of ventral bristles, the pedipalpal tibia is almost as long as the tibia (fig. 128) and half as long as the cymbium. These characters may be probably not quite sufficient for a sure identification of this genus but it seems very likely to me that this genus is a member of the family Gnaphosidae. Specimens which are regarded as congeneric by me are described below.

Captrix (figs. 143-145) – the only known species is *Textrix lineata* KOCH & BERENDT 1854 – possesses according to PETRUNKEVITCH circular posterior median eyes, its prosomal length is 3.04 mm, the posterior eye row is strongly procurved, the anterior median eyes are the largest (if not covered with an emulsion!), the spinnerets are lost, the gnathocoxae are long and depressed ventrally, the chelicerae are powerful, STRONGLY GENICULATE, and anteriorly bearing strong brisles, the epigyne (fig. 143) bears anteriorly a pair of sclerotized helm-shaped structures. Due to the combination of characters – e.g. to its chelicerae – this genus is in my opinion probably not a taxon of the family Gnaphosidae but most probably of the Corinnidae.

<u>(Other) erroneous or unsure determinations</u>: The genera of the Micariinae sensu PETRUNKEVITCH (1958: 287) in Baltic amber – Micariini is a taxon of the Gnaphosidae, see above, but has been regarded as a taxon of the Clubionidae in former times – are not members of the family Gnaphosidae, see WUNDERLICH (2004): *Ablator*, *Abliguritor* and *Eomazax* are taxa of the family Corinnidae; the relationships of *Machilla* and *Massula* are unsure, *Massula* may be a member of the Zoridae/Liocranidae.
Pythonissa sericata – regarded as a questionable member of the family Gnaphosidae by PETRUNKEVITCH (1958: 377) – is a member of the genus *Cryptoplanus* PETRUNKEVITCH 1958, see WUNDERLICH (2004: 1663) (regarded as a mmber of the Corinnidae) or – more likely – of the family Zoridae/Liocranidae, see WUNDERLICH (2008: 496) but surely – e.g. according to the short anterior spinnerets – not of the Gnaphosidae. *Philodromus microcephalus* and *squamiger* KOCH & BERENDT 1854 are regarded by MENGE (p. 82-83) as strongly related to or even conspecific with *sericata*. *Philodromus spinimanus* KOCH & BERENDT 1854 was regarded by MENGE (p. 84) as a possible member of his *Pythonissa*, but it is actually a member of *Apostenus* WESTRING 1851 (Zoridae/Liocranidae), see WUNDERLICH (2004: 1629). *Philodromus dubius*: See above, *Pythonissa affinis*.
Remarks on some species which were described by MENGE in KOCH & BERENDT (1854: 60) quite short under *Pythonissa* (apparently nomina nuda):
P. bipunctata possesses two white spots on the opisthosoma. White opisthosomal spots exist in certain species of the genus *Ablator* PETRUNKEVITCH 1942 (Corinnidae); see WUNDERLICH (2004: 477, photo 367). *P. discophora* possesses a disc-shaped cymbium similar to species of *Anniculus* PETRUNKEVITCH 1942 (Zodaridae), see

WUNDERLICH (2004: 469, photo 348). *P. glabra* is almost hairless similar to certain members of the family Zodaridae. *P. villosa* has very hairy (meta)tarsi like numerous species of spiders.
Two genera described by MENGE in KOCH & BERENDT (1854: 94) – without indication of a family – were regarded as questionable members of the family Gnaphosidae by PETRUNKEVITCH (1958: 376, 377) (material is most probably lost): *Spheconia* (with a long petiolus, a long opisthosoma and long spinnerets), and *Idmonia* (with ellipsoid raised cephalic part and ellipsoid position of the eyes). Both genera are only insufficiently characterized, too short for an identification. The description of the body of *Spheconia* is similar to *Myrmecarchaea* WUNDERLICH 2004 which is similar to wasps – see the generic name *Spheconia*! – but *Myrmecarchaea* has very long legs, and the type species of *Spheconia* has been named "*brevipes*" by MENGE. *Idmonia* is similar to *Spatiator* PETRUNKEVITCH 1942 – see WUNDERLICH (2004: 767) – but similar genera exist in Baltic amber, and thus the identity of *Idmonia* remains unsure.
Drassus oblongus MENGE in KOCH & BERENDT (1854: 69) is a nomen nudum; a description is absent.

Provisional **key** to the genera of the Gnaphosidae in Baltic amber:

Remark: In the species below the prosomal length is most often 2 mm or less, the posterior eye row is slightly procurved (fig. 113, 136), females are unknown.

1 Opisthosomal scutum present in the basal half (photo, figs. 132, 138), scopula existing at least under metatarsus I and II. Extremely rare spiders. 2

- Opisthosomal scutum absent (a questionable quite short scutum may exist in *E. obscurior*), scopula absent. Photos 42-44 . . . . Eomactator

2(1) Leg III almost as long as leg II. No questionable preening hairs under metatarsus III. Posterior median eyes distinctly spaced (fig. 127). Pedipalpal tibial apophysis short (fig. 136). Photos 41 a-b. . . . . *Eognaphosops cryptoplanoides*

- Leg III distinctly shorter than leg II. Questionable "preening hairs" exist under metatarsus III (fig. 139). Posterior median eyes closely together (fig. 136). Pedipalpal tibial apophysis very long (figs. 141-142). Photo 45a) . . . . *Zelotetis calefacta*

EOMACTATORINAE n. subfam.

Diagnosis (♂; ♀ unknown): Spigots of the anterior spinnerets (figs. 116, 123a, 125a, photo 44): Major ampullate gland spigots large, having a distinct sclerotized base (*). The number of piriform gland spigots is at least two; they are pointed, not flattened, the shape of their base is unknown. The structure of the prosomal cuticula is finely rugose (fig. 123b).

(*) Their number of one or two and their position proventrally/medially are like the ampullate gland spigots of the extant Gnaphosidae, they are pointed and have a large and strongly sclerotized base as in the extant Gnaphosidae, furthermore – if paired – they are not placed on a common ring but ON SEPARATE RINGS (fig. 116).

Further characters are the diagnostic characters of most members of the gnaphosoid branch: cylindrically, large and widely spaced anterior spinnerets (figs. 133, 138, photos), and ventrally depressed gnathocoxae (fig. 137). The posterior median eyes are circular or oval (figs. 113, 127, 136), a posterior lobe of the sternum is absent, a dorsal scutum of the male opisthosoma exists in some species (figs. 132, 138), an onychium is absent, retroventral bristles of tibiae and metatarsi I-II are absent in some species. I did not find feathery (branched) hairs.

Type genus: *Eomactator* PETRUNKEVITCH 1958. – As further genera I regard *Eognaphosops* n. gen. and *Zelotetis* n. gen. (all are extinct genera of the Eocenen Baltic amber forest). Unfortunately well preserved spigots of the anterior spinnerets are only known from very few specimens.

Relationships: In the extant tribes of the Gnaphosidae – the Gnaphosinae s.l. – the major ampullate gland spigots are usually small to tiny (larger in *Micaria fulgens*, see MURPHY (2007: 549)) and are placed ON A COMMON BASE/PLATE (fig. 3); their number is also one or two. Eomactatorinae MAY BE the archaic and extinct sister group to all extant gnaphosidae tribes or may even represent a family of its own. The rugose prosomal cuticula in the Eomactatorinae is peculiar.

Remark: Some years ago I sent few specimens of the Eomactatorinae to N. PLATNICK who was not sure about their relationships; he did not study the spigots of their anterior spinnerets more closely.

Evolution: If my findings and conclusions are correct we may PROBABLY conclude that the usually large major ampullate gland spigots of the Eocene taxa which are situated on different sclerotized rings (fig. 116; fairly smaller spigots exist in fig. 125a) show plesiomorphic patterns of the Eomactatorinae whereas the DWARF spigots ON A COMMON PLATE (fig. 3) indicate an apomorphic pattern of today's gnaphosid taxa.

Distribution: Eocene Baltic amber forest.

Eomactator PETRUNKEVITCH 1958

1958 *Eomactator* PETRUNKEVITCH, Trans. Connect. Acad. Sci., 41: 331. figs. 536-540 (♂).

Type species (by monotypy): *Eomactator mactatus* PETRUNKEVITCH 1958 in Eocene Baltic amber (figs. 119-120).

Remark: Further species are described below. I do not want to exclude that *Melanophora concinna* KOCH & BERENDT 1854 – may be a member of *Eomactator* (quest. n. comb.).

Diagnosis (♂; ♀ unknown): Opisthosomal scutum and leg scopula absent, eyes as in fig. 113. ♂-pedipalpus (figs. 117-120, 124-125, 125b): Cymbium with a retrobasal outgrowth (*) and a depression on which the pedipalpal tibial apophysis lies (fig. 117), and with a thin embolus in a distal position.

(*) I suppose that this outgrowth has been overlooked by PETRUNKEVITCH in the type species, see fig. 120.

Relationships: As pointed out by PETRUNKEVITCH (1958: 332) regarding the single male of the generotype “The placement of this genus in any subfamily is impossible because the armature of the chelicerae is not visible and the eyes are lost. Due to more fossil males different characters of the genus are now known. – Relationships of the fossil genera in Baltic amber: See the key above.

Distribution: Eocene Baltic amber forest.

***Eomactator hirsutipes* n. sp**. (figs. 113-118) photos 43a-c

Material (in Baltic amber): 2♂; holotype and a separated piece of amber F2157/BB/ AR/ CJW, paratype and a separated piece of amber F2158/BB/AR/CJW.

Remark: The conspecifity of the paratype seems unsure to me; only few of the structures of its bulbus are observable in these spiders.

Preservation and syninclusions: The holotype is almost completely preserved in a piece of amber which was heated, the tip of the right posterior spinneret is cut off, white emulsions are absent, the ventral part of the opisthosoma is depressed and covered with bubbles. Few stellate hairs are preserved in the separated piece of amber. – The paratype was also heated, its body bears mainly dorsally remains of a white emulsion, both legs II are lost beyond the coxa by autotomy, most parts of the right legs I-III are cut off, the right leg IV is lost by autotomy beyond the coxa and lying left of the spiders' body, remains of blood are preserved beyond the coxa (fig. 115). The anterior spinnerets are very well preserved. A complete female of the genus *Orchestina* SIMON (Oonopidae) lies left of the paratype. Few spiders' threads are preserved ventrally and behind the opisthosoma of the paratype.

Diagnosis (♂; ♀ unknown): Posterior eye row only slightly wider than the anterior row. Legs with distinct hairs, structures of the pedipalpus: Figs. 117-118, tibial apophysis almost as long as the tibia.

Description (♂):
Measurements (holotype/paratype in mm): Body length 3.0/3.5, prosoma: Length 1.4/1.7, width 1.2/ca. 1.4; legs (holotype): I: Femur 1.1, patella 0.5, tibia 0.7, metatarsus 0.63, tarsus 0.4, tibia II 0.7, tibia III 0.55, tibia IV 1.0, femur II 1.1, femur III 1.0; paratype: Femur I 1.2, tibia I 1.0; eye field (holotype) 0.43 wide.
Colour of the heated spiders mainly dark brown, opisthosoma of the holotype light brown but the epigaster dark brown.
Prosoma (fig. 113) 1.7 (holotype) to 1.21 times longer than wide, hairs numerous, thoracal fissure long in the holotype, short in the paratype. Eyes of medium size, anterior median eyes largest, covered with bubbles, posterior row procurved, lenses of the posterior median eyes circular, spaced by about their diameter, clypeus only fairly long, basal cheliceral articles of medium size, not protruding, teeth of the furrow hidden, fangs slender, labium as long as wide, gnathocoxae 1.75 times longer than wide, not converging, laterally inclined, ventrally distinctly depressed, serrula well developed. Sternum 1.17 times longer than wide, not rugose, fairly elongated between the coxae IV which are spaced by about their radius. Praecoxal and intercoxal triangles are apparently absent. – Legs (figs. 114-115) only fairly long, their position probably mediograde, IV the longest, III distinctly the shortest, hairs distinct, feathery hairs, "preening hairs" and scopulae absent, claw tufts only fairly well developed, hairs partly spatulate, tarsal claws short, bearing long teeth, tarsal trichobothria in more than one row. Brisles indistinct (thin) on I-II, distinct and numerous on III-IV. Metatarsus I without bristles, metatarsus II without or with a proventral bristle, tibia I-II without or with a proventral bristle. – Opisthosoma (photo, fig. 116) oval, covered with short hairs, dorsal scutum absent, epigaster leathery or even scutate; a pair of post-epigastral sclerites exists similar to fig. 123. Anterior spinnerets 0.3 mm long, cylindrically; at least two of their spigots are very well preserved in the paratype, not placed on a common plate but on separate sclerotized sockets, see above; piriform gland spigots are not observable. – Pedipalpus (figs. 117-118): Femur only slightly bent and depressed laterally, patella and tibia short, without distinct bristles, tibial apophysis almost as long as the tibia, lying on a depression of a retrobasal outgrowth of the cymbium which bears no dorsal bristles; median apophysis large and in a distal position, the embolus is observable in its distal part and position.

Relationships: According to the long pedipalpal tibial apophysis *E. mactator* may be most related but in *mactator* – according the original description – the legst are more slender and less hairy.

Distribution: Eocene Baltic amber forest.

Eomactator mactatus PETRUNKEVITCH 1958 (figs. 119-120)

Diagnosis (♂; ♀ unknown): The pedipalpal tibia is almost as long as the tibia (fig. 120) and half as long as the cymbium. (The eye position is unknown).

Further characters: The prosomal length of the single known male is 1.75 mm, the eyes are missing, the gnathocoxae are hidden, an opisthosomal scutum and leg scopulae are absent, the anterior spinnerets are widely spaced, long and cylindrical, the legs (fig. 119) and their bristles are thin, tibia I bears at least 2 pairs of ventral bristles. Due to the figs. given by PETRUNKEVITCH the legs are more slender than in the related species, and a retrobasal outgrowth of the cymbium has not been drawn but it has probably been overlooked.

Relationships: See *E. obscurior, hamatus* and *hirsutipes*.

Distribution: Eocene Baltic amber forest.

***Eomactator obscurior* n. sp.** (figs. 121-125)

Material: Holotype ♂ in Baltic amber, F2156/BB/AR/CJW.
Preservation and syninclusions: The spider is completely preserved in a piece of amber which is 2.5 cm long, placed on a layer within the amber. The prosoma is covered with an emulsion the eyes are hidden by bubbles, a larger bubble is situated above the posterior part of the prosoma. A Psocoptera is preserved below the left metatarsi III-IV. Also preserved are a mite, few Collembola, a Diptera, the larva of an Aphida, numerous particles of detritus, insects excrement, stellate hairs, and questionable pollen grains.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 124-125): Tibial apophysis distinctly shorter than the half of the cymbial length, straight, embolus in a distal position. (The eye position is unknown).

Description (♂):
Measurements (in mm): Body length 4.0, prosomal length ca. 2.0, tibia I ca. 1.15, tibia II 1.0, tibia III 0.8, tibia IV 1.3.
Colour mainly dark brown, opisthosoma medium to light brown.
Prosoma (most parts of the dorsal side including the eyes, and the mouth parts, are hidden): Basal cheliceral articles fairly protruding and of medium length, gnathocoxae not strongly converging, with a distinct ventral depression, cuticula finely rugose (fig. 123b). Sternum 1.36 times longer than wide, not protruding between the coxae IV. – Legs (figs. 121-122) fairly long, scopula absent, claws with long teeth, claw tufts well developed, metatarsal III preening comb or brush absent, trochanteral notch well developed, tibia and metatarsus I-II with a proventral bristle or none, femur I bears 3 dorsal bristles and

a prodistal one, tibia III-IV with several bristles. – Opisthosoma (fig. 123-123a) long oval, dorsally with longer hairs, and dorsally-anteriorly with a questionable short scutum which has 1/10 of the opisthosomal length. Epigaster probably sclerotized, paired postepigastral sclerites present (fig. 123), spinnerets partly hidden, the anteriors long, cylindrically and widely spaced. – ♂-pedipalpus (figs. 124-125): Femur distinctly depressed laterally in almost its whole length (concave medially), patella and tibia short, without strong bristles, tibia ventrally-apically strongly bulging, tibial apophysis slender, straight, less than 1/3 of the length of the cymbium, bulbus prominent, questionable median apophysis large, embolus thin (hair-shaped), bent, in a distal position.

Relationships: In *E. mactatus* PETRUNKEVITCH 1958 (figs. 119-120) the pedipalpal tibial apophysis is almost as long as half of the length of the cymbium, and the legs are – according to PETRUNKEVITCH more slender.

Distribution: Eocene Baltic amber forest.

***Eomactator hamatus* n. sp.** (figs. 125c-e) photos 42a-b

Material: Holotype ♂ in Baltic amber, F2160/BB/AR/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved in a piece of amber which was heated; a white emulsion is absent, the tip of the left tarsus IV is cut off, the pedipalpi are bent under the prosoma, the spinnerets are well preserved, the right legs I and II are broken off beyond their coxae, and were drifted with their bases below the sternum, remains of fluid are preserved which got out from openings of the lungs. Some stellate hairs are also preserved.

Diagnosis (♂; ♀ unknown): Posterior eye row distinctly wider than the anterior row; pedipalpus (figs. 125d-e): Tibial apophysis short and bent in the dorsal direction, the questionable median apophysis is long, the observable part of the embolus is short.

<u>Further characters</u>: The tibiae (fig. 125c) and metatarsi I-II bear 2 pairs of ventral bristles.

Description (♂):
Measurements (in mm): Body length 4.6, prosoma: Length 2.4, width ca. 1.8; leg I: Femur ca. 2.2, patella 1.0, tibia 2.5, metatarsus ca. 2.2, tarsus ca. 1.0, tibia II ca. 2.0, tibia III 1.45, tibia IV 2.1.
Colour medium brown (in a piece of amber which was heated), photos 42a-b.
Prosoma distinctly longer than wide, bearing indistinct short hairs, cuticula very fine rugose (similar to fig. 123b), thoracal fissure well developed. Eyes fairly small, field wide, almost equal in size, posterior row very slightly recurved, distinctly wider than the anterior row, anterior and lateral eyes spaced by their diameter, posterior median eyes oval, spaced by ca. their diameter, posterior eyes equally spaced. Basal cheliceral

articles and fangs of medium size, teeth hidden, gnathocoxae distinctly longer than wide, not converging, with a ventral depression, sternum partly hidden, coxae IV close together. – Legs fairly slender, order most probably I/IV/II/III, scopulae absent, claw tufts not well developed, preening comb of metatarsus III absent, trochanters short, notches absent, numerous trichobothria on tibiae, metatarsi and tarsi, tibiae and metatarsi I-II usually with 2 pairs of bristles (fig. 125c). – Opisthosoma 1.7 times longer than wide, scarcely covered with short hairs. Anterior spinnerets long, cylindrical and widely spaced, their spigots are difficult to recognize. – Pedipalpus (figs. 125d-e): Patella fairly short, tibia long and slightly bent, tibial apophysis short and bent dorsally, cymbium with a retrobasal outgrowth, bulbus protruding, median apophysis long, embolus thin and strongly bent, a conductor exists apparently, too.

Relationships: In *E. mactator* PETRUNKEVITCH 1958 and *E. hirsutipes* n. sp. the pedipalpal tibial apophysis is longer; in *hirsutipes* the posterior eye row is only slightly wider than the anterior row.

Distribution: Eocene Baltic amber forest.

Questionable members of the genus *Eomactator*:

♂, SMF (F2161/BB/AR/CJW): The spider is almost completely preserved but deformed by heating and partly covered with a white emulsion. The prosomal length is 1.6 mm, the posterior eye row is clearly procurved, the shape of the posterior median eyes is apparently circular, the anterior spinnerets are retracted and partly observable, a single major ampullate gland spigot is surrounded by a sclerotized ring. The pedipalpi are partly hidden, the tibial apophysis is short, the cymbium possesses a retrobasal outgrowth, the embolus has probably an almost circular position.

♂, SMF (F2162/BB/AR/CJW) (figs. 125a-b, photo 44): Two pieces of amber are separated from the piece which contains the spider. The spider is very well preserved in a piece of amber which was not strongly heated; a white emulsion is absent, some legs penetrate ventrally a layer within the fossil resin. The prosoma is 2.2 mm long. The spigots of the anterior spinnerets are well observable (fig. 125a, photo 44): A single major ampullate gland spigot is fairly small and surrounded by a sclerotized ring, at least two piriform gland spigots exist which possess a pointed tip. The pedipalpi (fig. 125b) are bent under the prosoma and the bulbi are partly hidden; the tibial apophysis is short, the cymbium has a retrobasal outgrowth.

***Eognaphosops* n. gen.**

The gender of the name is neuter.

Diagnosis (♂; ♀ unknown): Prosoma densely covered with hairs (fig. 127, 130, photo 41a-b), opisthosomal scutum present (fig. 132), leg III almost as long as II. ♂-pedipalpus (figs. 134-135): Tibia with a short apophysis which lies on a depression of a retrobasal outgrowth of the cymbium, the bulbus bears a long median apophysis.

Further characters: Clypeus rather long and vertical (fig. 128), posterior eye row procurved (fig. 127), tibia II bears a pair of bristles in the middle and a short apical pair, feathery hairs absent.

Type species (by monotypy): *Eognaphosops cryptoplanoides* n. sp.

Relationships: According to the oval posterior median eyes, the ventrally depressed gnathocoxae and the long, cylindrical and widely spaced anterior spinnerets (its spigots are hidden) I regard *Eognaphosops* as a member of the family Gnaphosidae. *Cryptoplanus* PETRUNKEVITCH 1958 – also reported from the Baltic amber forest; a member of the family Zoridae, see WUNDERLICH (2004: 1659f) and (2008: 496) – possesses also a very hairy prosoma, a long clypeus and a long leg III – an amazing case of convergences! – but the anterior spinnerets are short, conical and close together (fig. 126), the posterior median eyes are circular, gnathocoxal depressions are usually (?) absent (but see WUNDERLICH (2004: 1678, fig. 72!)), and the cymbium bears dorsal spines as well as a retrobasal outgrowth which bears denticles or bristles. – See also the key above.

Distribution: Eocene Baltic amber forest.

***Eognaphosops cryptoplanoides* n. gen. n. sp.** (figs. 127-135) photos 41a-b

Material: Holotype ♂ in Baltic amber, F2153/BB/AR/CJW.

Preservation and syninclusions:The spider is fairly well preserved on a layer in a piece of amber which was heated. The piece of amber has been put in bencylbencoat for a short time. A white emulsion is absent besides remains between the anterior spinnerets and between the right trochanter IV and the opisthosoma. The left legs III and IV are lost beyond their coxa by autotomy the tip of the left tarsus I is cut off; regenerations of three (!) legs: See below. Stellate hairs are absent.

Diagnosis: See above.

Description (♂):
Measurements (in mm): Body length 4.2, prosoma: Length 2.2, width 1.8; left leg I (regenerated): Femur 1.2, patella 0.5, tibia 0.75, metatarsus 0.7, tarsus ca. 0.7, tibia II: Left (regenerated) 0.75, right 1.25; tibia III ca. 1.2, tibia IV 1.45; dorsal-basal bristle of femur IV 0.6 (slightly longer than the femoral diameter). Basal cheliceral article 0.6, anterior spinneret 0.4.
Colour mainly dark brown, opisthosoma besides the dark scutum medium brown.
Prosoma (figs. 127-129, photo 41b) 1.2 times longer than wide, dorsally densely covered with thin adpressed hairs, narrow anteriorly, thoracal fissure well developed, eyes small, posterior row slightly procurved, posterior median eyes oval, separated by more than their diameter, clypeus long and vertical, most mouth parts are hidden, basal cheliceral articles fairly small, gnathocoxae ventrally fairly depressed, coxae IV spaced by less than their radius. – Legs. The left legs I-II and the right leg I are shortened and thin regenerations which are almost bristle-less (fig. 131, photo 41a), only their femora bear few dorsal bristles, their metatarsi are bent, scopulae are absent. The right tibia II bears a pair of long ventral bristles in the basal half and few apical bristles, the right metatarsus II bears a proventral bristle. The claw tufts are fairly well developed, the tarsal claws bear long teeth. Trochanters not notched. – Opisthosoma (figs. 132-133) oval, covered with adpressed hairs of medium length, bearing a dorsal-basal scutum. Anterior spinnerets widely spaced, cylindrical, spigots hidden, median spinnerets hidden, posterior spinnerets short. – Pedipalpus (see above): Femur straight and laterally not depressed, cymbium without dorsal spines, retrolateral cymbial outgrowth without spines, bristles or denticles.

Relationships and distribution: See above.

Zelotetis n. gen.

The gender of the name is feminine.

Diagnosis (♂; ♀ unknown): Metatarsus III with ventral ?preening hairs along its whole length (fig. 139).

Further characters: Gnathocoxae fairly converging (fig. 137), tibial apophysis very long, slender (fig. 141-142).

Type species (by monotypy): *Zelotetis calefacta* n. sp.

Relationships: See the key. I do not know such a long “preening brush” of metatarsus III in another gnaphosid genus.

Distribution: Eocene Baltic amber forest.

***Zelotetis calefacta* n. gen. n. sp.** (figs. 136-142) photos 45a-b

Material: Holotype ♂ in Baltic amber and a separated piece of amber, F2155/BB/AR/CJW.

Preservation and syninclusions: The spider is fairly well preserved in a yellow piece of amber, strongly darkened by heating, darkened are also parts within the amber on a layer. The opisthosoma is ventrally covered with a white emulsion, the mouth parts are partly observable. The left leg III is lost beyond the coxa by autotomy, the left patella I is cut off. Thin spiders' threads are preserved behind the spinnerets, small bubbles and stellate hairs are also preserved. The loose part of the amber has been cut off in front of the spider.

Diagnosis: See above.

Description (♂):
Measurements (in mm): Body length 3.5, prosoma: Length 1.35, width 1.15; leg I: Femur ca. 0.9, patella 0.5, tibia 0.75, metatarsus 0.5, tarsus 0.5, tibia II 0.65, tibia III 0.55, tibia IV 0.85, anterior spinnerets 0.3.
Colour: Dark brown (by heating).
Prosoma (figs. 136-137, photo 45a) 1.17 times longer than wide, bearing few dorsal hairs, thoracal fissure fairly long. Eyes (fig. 136) in a narrow field, posterior row very slightly procurved, posterior median eyes largest, oval and contiguous, anterior median eyes spaced by more than their diameter. Clypeus short, basal cheliceral articles fairly long, fangs long, labium longer than wide, gnathocoxae long and fairly converging, sternum 1.3 times longer than wide, not prolongated between the coxae IV. Legs (figs. 139-140) fairly long, I is the longest, III distinctly the shortest; I did not find feathery hairs. Tarsal and metatarsal I-II scopula well developed (short hairs), claw tufts not dense, tarsal claws with long teeth, claws IV distinctly longer than the claws of the other legs, metatarsus III with ventral ?preening hairs along its whole length which are not distinct (fig. 139), trichobothria partly long. Bristles: Femora usually with a prodistal one and 1/1 dorsally, tibia and metatarsus I-II bear a single proventral bristle, the left metatarsus II bears an additional prolateral bristle in the basal half. Tibia and metatarsus III-IV bear numerous bristles. – Opisthosoma (fig. 138) oval, hairs indistinct, a dorsal scutum exists in the basal third. Spinnerets (photo 45b) large, the anteriors cylindrical and widely spaced, the medians not laterally depressed. – Pedipalpus (see above): Tibia and patella short and without bristles, bulbus hidden; the long tibial apophysis is slender, pointed and almost straight.

Relationships and **distribution**: See above.

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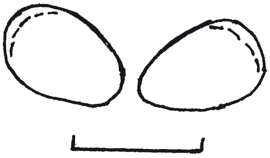

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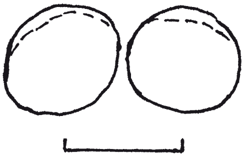

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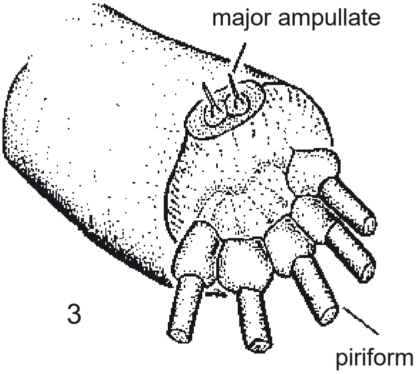

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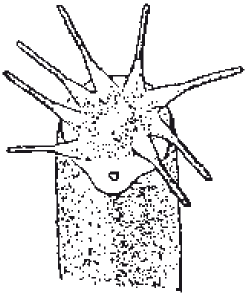

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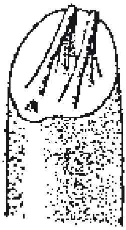

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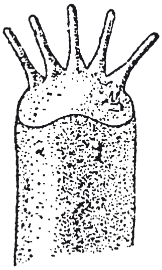

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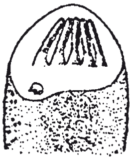

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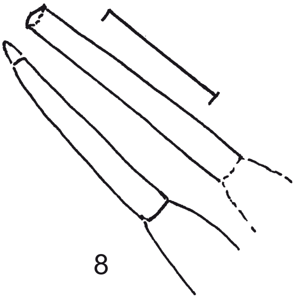

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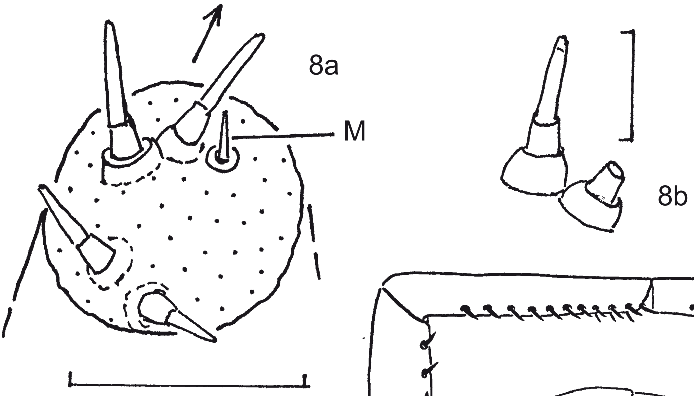
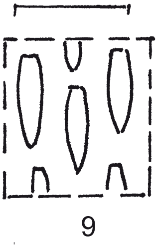
Figs. 1-2: Zelotes tenuis (L. KOCH 1866), ♂, from France (Provence) and Spain (Mallorca), dorsal aspect of the posterior median eyes; a case of pronounced intraspecific variability; see also figs. 98-99. Most species of *Zelotes* have small posterior median eyes. Scale bars 0.1 mm;

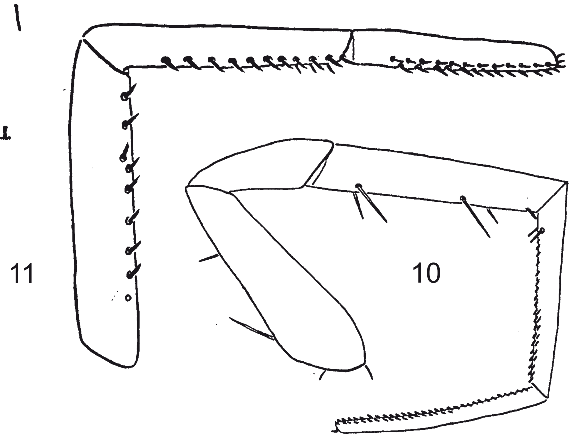
fig. 3) ventral aspect of a right ANTERIOR spinneret of a female spider of the family Gnaphosidae, generalized. Note the two groups of spigots: (a) the – usually paired – major ampullate gland spigots which possess a common sclerotized base and originate in a more proventral position, and (b) the group – usually more than two – of piriform gland spigots in a more retrodorsal position which are usually blunt (see fig. 8); they are shown in an extended position. Taken from PLATNICK (1990);

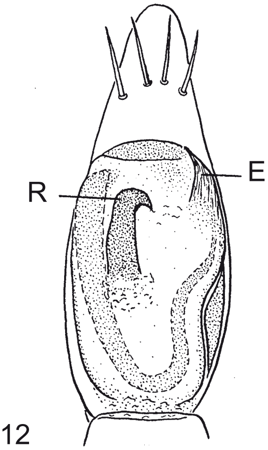
figs. 4-7: ANTERIOR GNAPHOSID SPINNERETS with the spigots extanded (4, 6) and retracted, in a horizontal and more hidden position (5, 7) of Pterotricha sp. (4, 5) and Nomisia sp. (6, 7). Taken from DALMAS (1921);

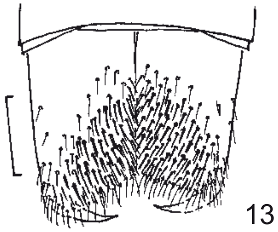
fig. 8) Pterotricha lentiginosa (C. L. KOCH 1837), ♂ (coll. JW), two piriform gland spigots of the anterior spinnerets which are extended in a natural way; they are not flattened (tubular), their bases are hidden. The left one has a pointed apical article which probably is broken off in the blunt right one (above) like probably in most of the spigots (!). Scale bar 0.1;

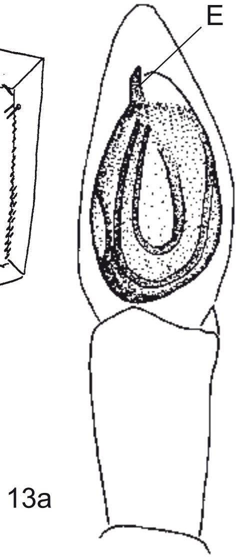












figs. 8a-b: Cybaeodes mallorcensis WUNDERLICH 2008, ♂; 8a) apical aspect of the right anterior spinneret. The arrow points to the anterior direction. The four piriform gland spigots are extended in a natural way and partly shown perspectively shortened. M = major ampullate gland spigot; 8b) two piriform gland spigots of the left anterior spinneret. The right one is broken off near its base. Scale bars 0.1 and 0.05;

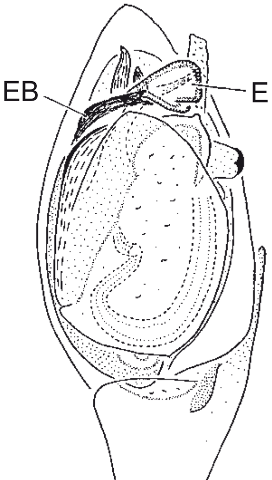
fig. 9) Micaria sp., scale-shaped hairs of the dorsal part of the opisthosoma. Scale bar 0.05;

figs. 10-11: Micaria sp., ♀, retrolateral aspect of a right leg II and prolateral aspect of a left leg I. In *Micaria* – like in other gnaphosids – exists a pronounced intrageneric variability of bristles and scopulae;

fig. 12) Micaria sp., ♂, ventral aspect of the right pedipalpus. E = embolus, R = median apophysis (“retinaculum”);

fig. 13) Trachyzelotes sp., anterior aspect of the ♂♀-chelicerae. Note the cluster of stiff hairs. Scale bar 0.5;

fig. 13a) Arabelia pheidoleicomes BOSSELAERS 2009, ♂, ventral aspect of the left pedipalpus. Taken from BOSMANS (2011).



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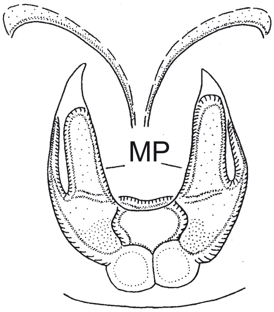

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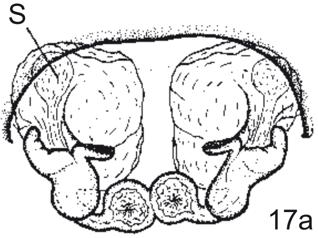

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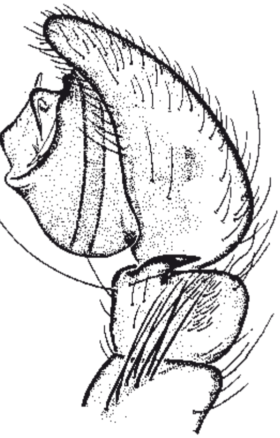

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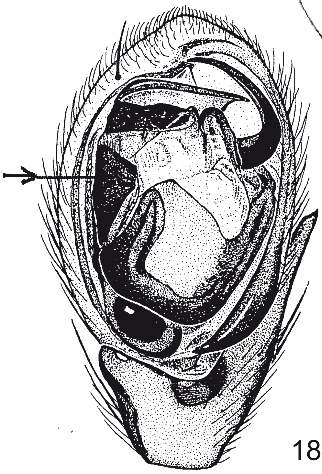

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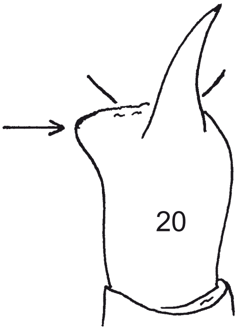
figs. 14-15: Camillina sp. (Crete); 14) ♂, ventral aspect of the left pedipalpus; 15) ♀, epigyne. E = embolus, EB = embolic base, MP = median plate. Taken from CHATZAKI et al. (2003);

fig. 16) Berinda amabilis, ♂, ventral aspect of the left pedipalpus;

figs. 17-17a: Zelominor algarvensis; 17) ♂, retrolateral aspect of the left pedipalpus; 17a) ♀, vulva. S = receptacula-shaped "sac". Taken from SNAZELL & MURPHY (1997);

fig. 18) Zelotes subterraneus, ♂, ventral aspect of the left pedipalpus. arrow = intercalary sclerite;

figs. 19-19a: Drassyllus pusillus; 19) ♂, ventral aspect of the left pedipalpus; 19a) ♀, epigyne. Fig. 19a) is taken from ROBERTS;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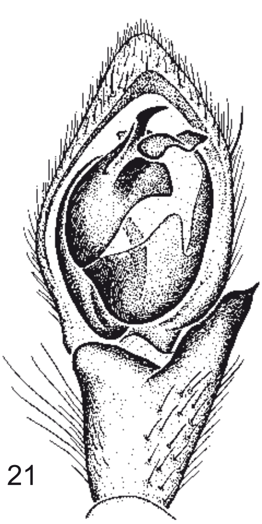
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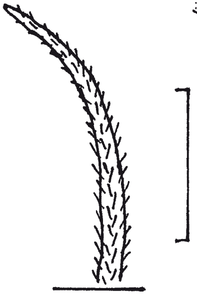
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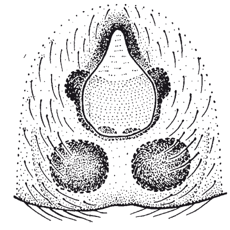
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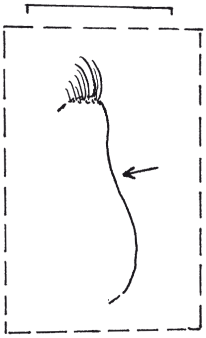
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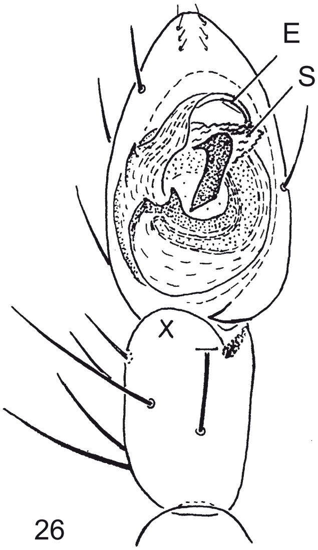

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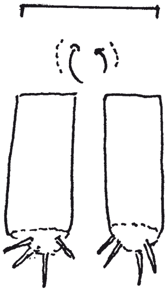
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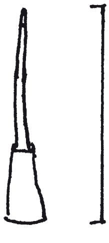
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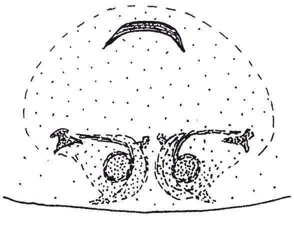
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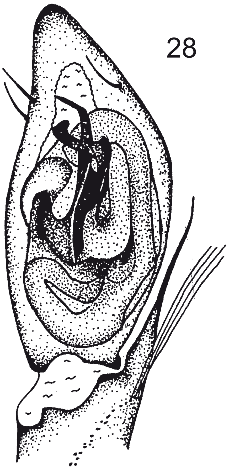
figs. 20-22: Urozelotes rusticus; 20) ♂, retrolateral aspect of the left pedipalpal tibia. The arrow points to the proventral-apical outgrowth; 21) ♂, ventral aspect of the left pedipalpus; 22) ♀, epigyne. Figs. 21-22 are taken from PLATNICK & MURPHY (1984);

figs.23-27) Cybaeodes mallorcensis WUNDERLICH 2008; figs.23-26) ♂; 23) prolateral aspect of the left gnathocoxa with its low depression (arrow); 23a) distal part of a plumose and strongly bent hair of the chelicerae near the base of the fang; 24) outline of the anterior spinnerets, ventral aspect (probably not all spigots are drawn); 25) piriform gland spigot of the left anterior spinneret, ventral aspect (see also figs. 8a-b!); 26) ventral aspect of the left pedipalpus; 27) ♀, epigyne. E = embolus, S = skinny conductor, X = ventral outgrowth of the tibia. Scale bars 0.2 mm in figs. 23-24, 0.1 mm in fig. 25, 0.05 in fig. 23a);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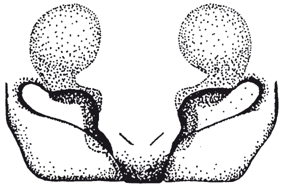

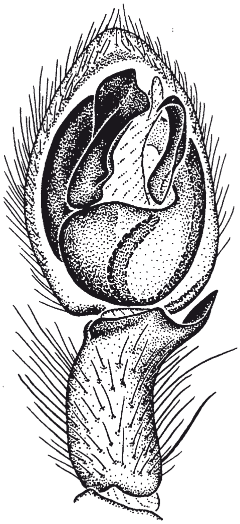
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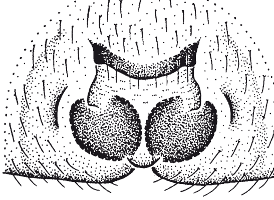
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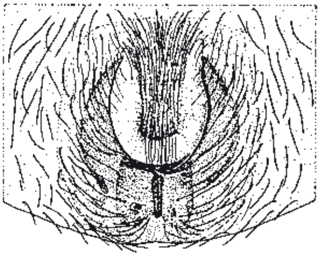
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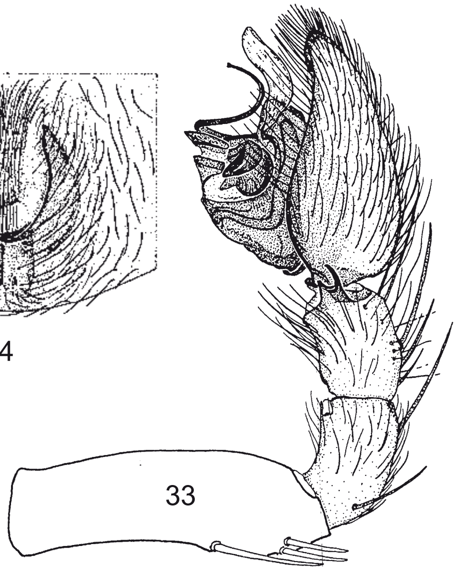
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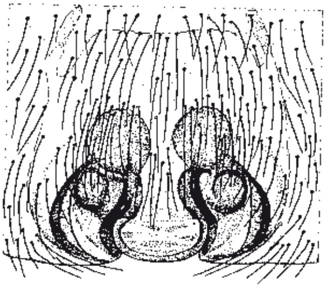
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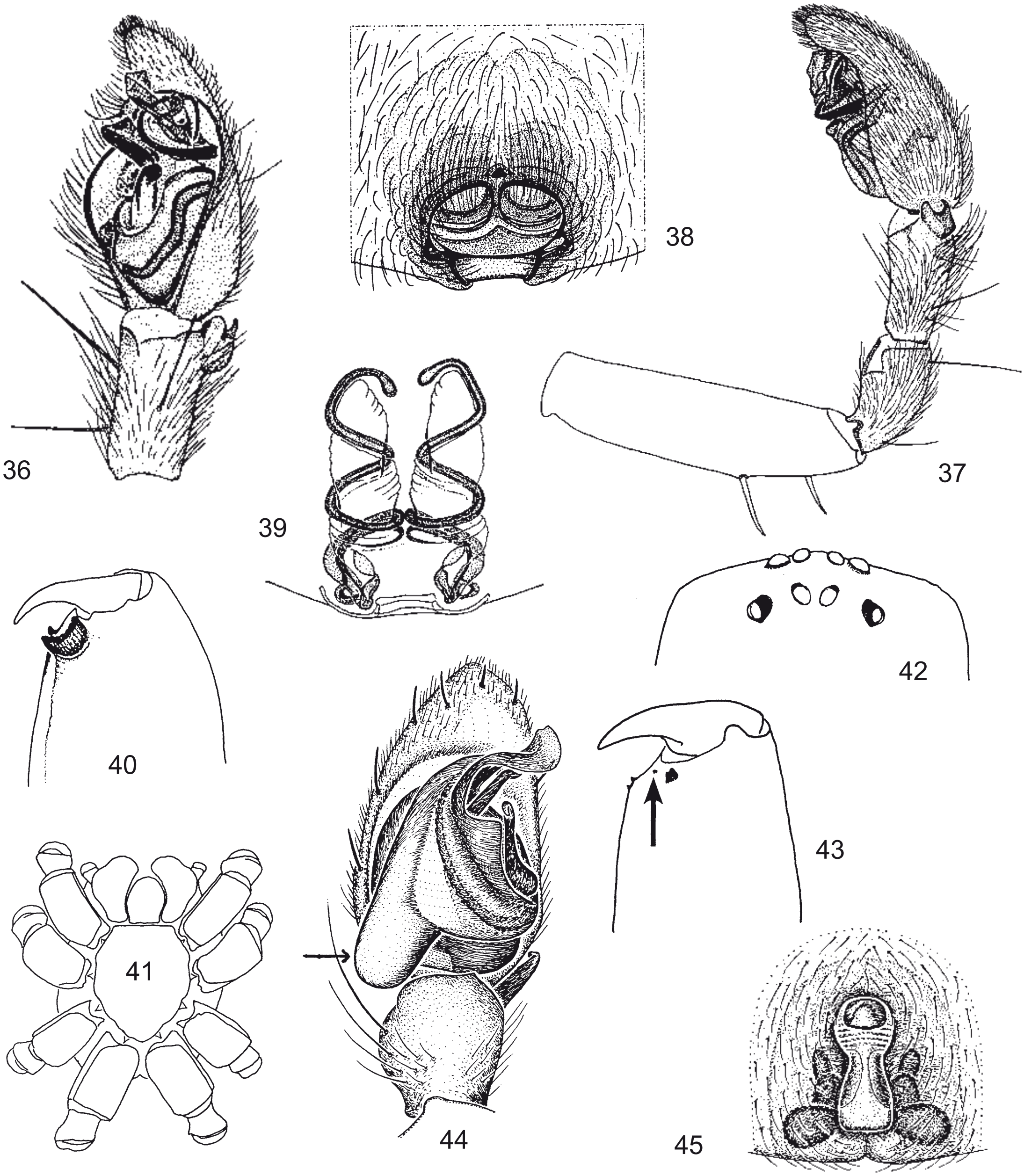
figs. 28-29: <u>*Sidydrassus shumakovi*</u>, ventral aspect of the left ♂-pedipalpus and epigyne. Taken from ESYUNIN & TUNEVA (2001);

figs. 30-31: <u>*Talanites strandi*</u>, ventral aspect of the left ♂-pedipalpus and epigyne. Taken from PLATNICK & OVTSHARENKO (1991);

figs. 32-34: <u>*Anagraphis pallens*</u> (Crete); 32-33: ventral and retrolateral aspect of the left ♂-pedipalpus; 34) epigyne;

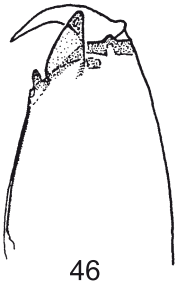
fig. 35) <u>*Drassodes lapidosus*</u>, ♀, epigyne;



figs. 36-39: <u>*Drassodex hypocrita*</u> (= *Drassodes h.*); 36-37) ventral and retrolateral aspect of the left ♂-pedipalpus; 38-39) ♀, epigyne and vulva;

figs. 40-42: <u>*Gnaphosa* sp.</u>; 40) posterior aspect of the left chelicera; 41) ventral aspect of the prosoma and basal leg articles; 42) position of the eyes, dorsal aspect;

figs. 43-45: <u>*Scotognapha* sp.</u>; 43) retrolateral aspect of the left chelicera, the arrow points to the tiny tooth IN in the cheliceral furrow; 44) ventral aspect of the left ♂-pedipalpus, the arrow points to the large prolateral tegular outgrowth; 45) ♀, epigyne;



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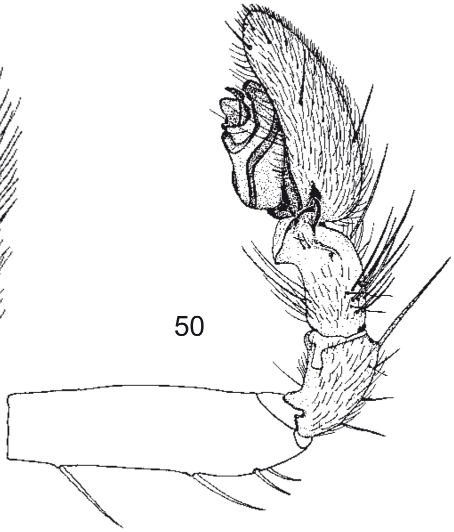

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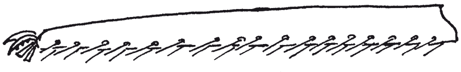

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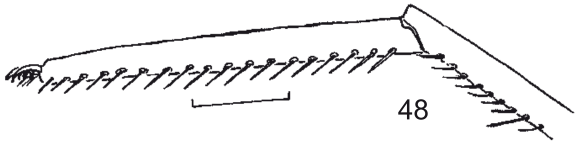

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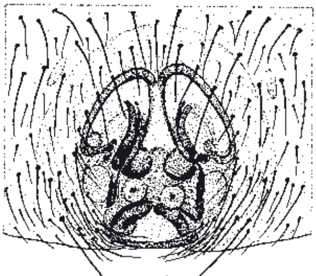

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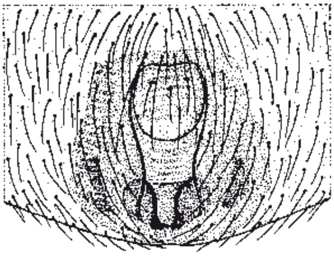

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figs. 46-47: Callilepis sp.; 46) retrolateral aspect of the left chelicera; 47) ventral aspect of the left ♂-pedipalpus;

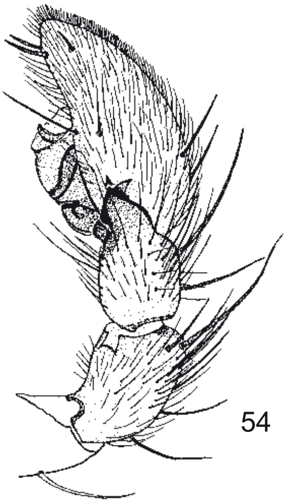
fig. 48) Pterotricha sp., retrolateral aspect of a tarsus and the distal part of a metatarsus which bear two rows of short ventral spine-shaped bristles instead of a scopula (one row is drawn). Normal hairs are not drawn. Scale bar 0.5;

fig. 49) Nomisia sp., retrolateral aspect of a tarsus which bears numerous normal ventral hairs; few hairs are drawn but no dorsal or lateral hairs;

figs. 50-51: Pterotricha lentiginosa; retrolateral aspect of the left ♂-pedipalpus and epigyne;

fig. 52) Minosiella mediocris, ♂ from Egypt, retrolateral aspect of the left pedipalpus. Taken from LEVY (1992);

fig. 53) Minosiella sp. indet., ♀ from Ibiza, epigyne;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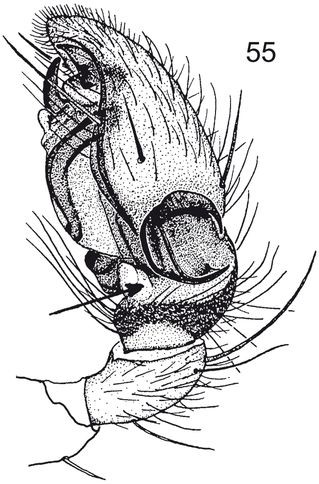
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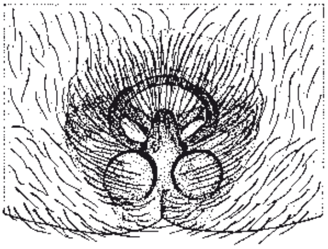
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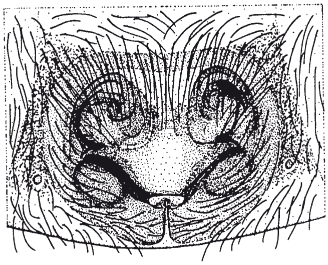
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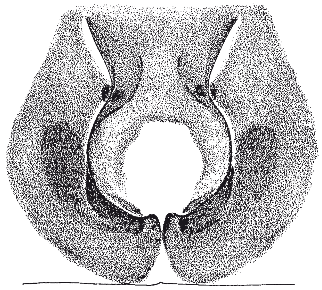
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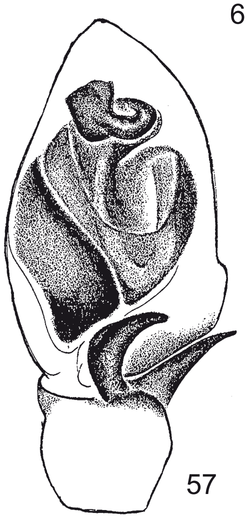
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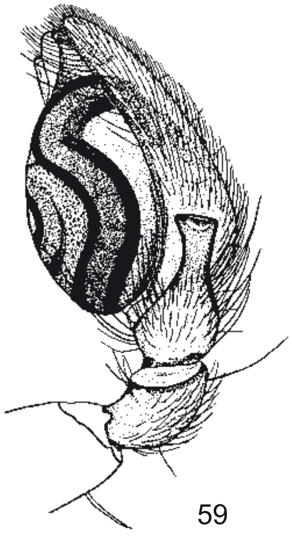
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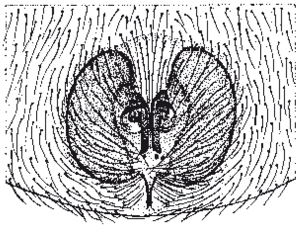
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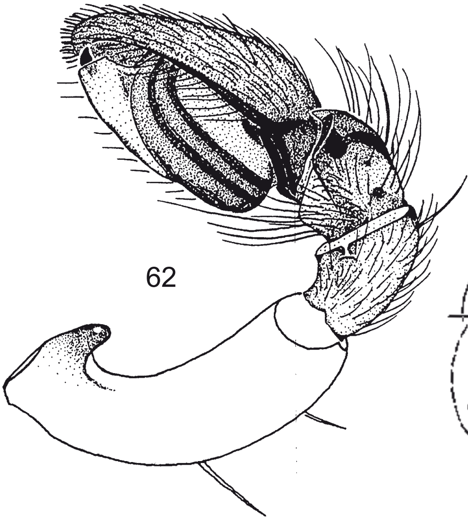
figs. 54-54a: Berlandina plumalis; retrolateral aspect of the left ♂-pedipalpus and epigyne;

figs. 55-56: *Nomisia exornata*; retrolateral aspect of the left ♂-pedipalpus and epigyne;

figs. 57-58: Minosia spinosissima; retrolateral aspect of the left ♂-pedipalpus and epigyne. Taken from LEVY (1995);

figs. 59-60: Phaeocedus braccatus; retrolateral aspect of the left ♂-pedipalpus and epigyne;

fig. 61) Poecilochroa variana, dorsal aspect of the eyes;



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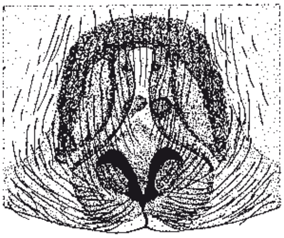

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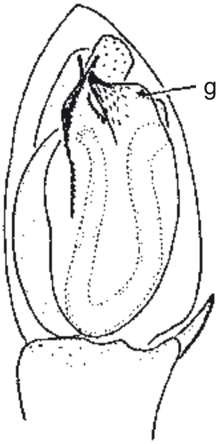

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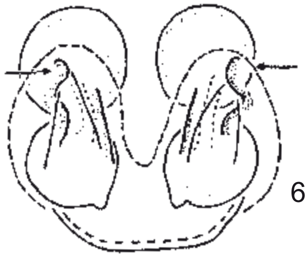

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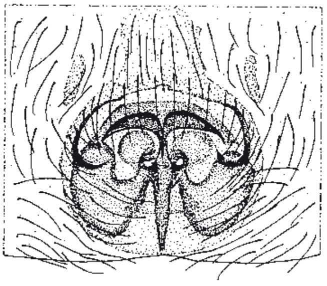

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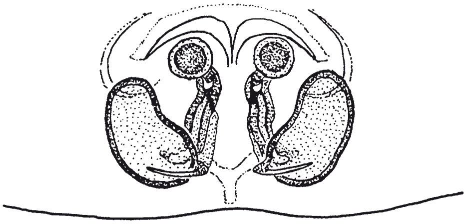

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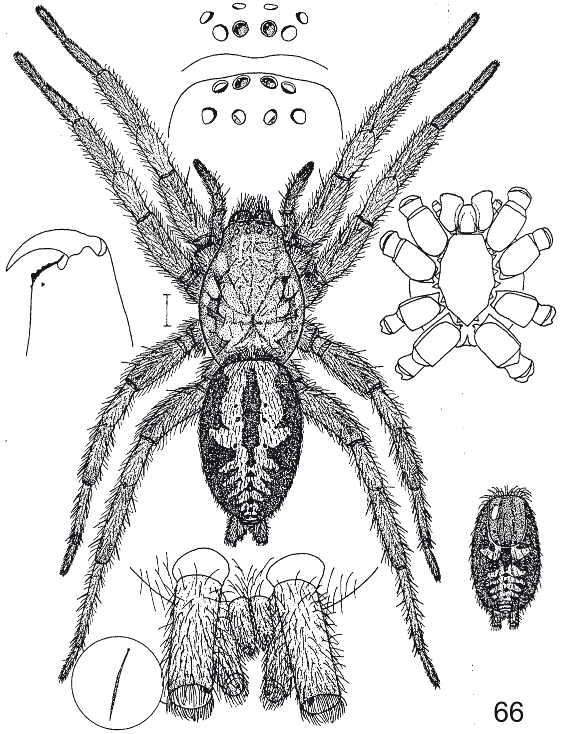

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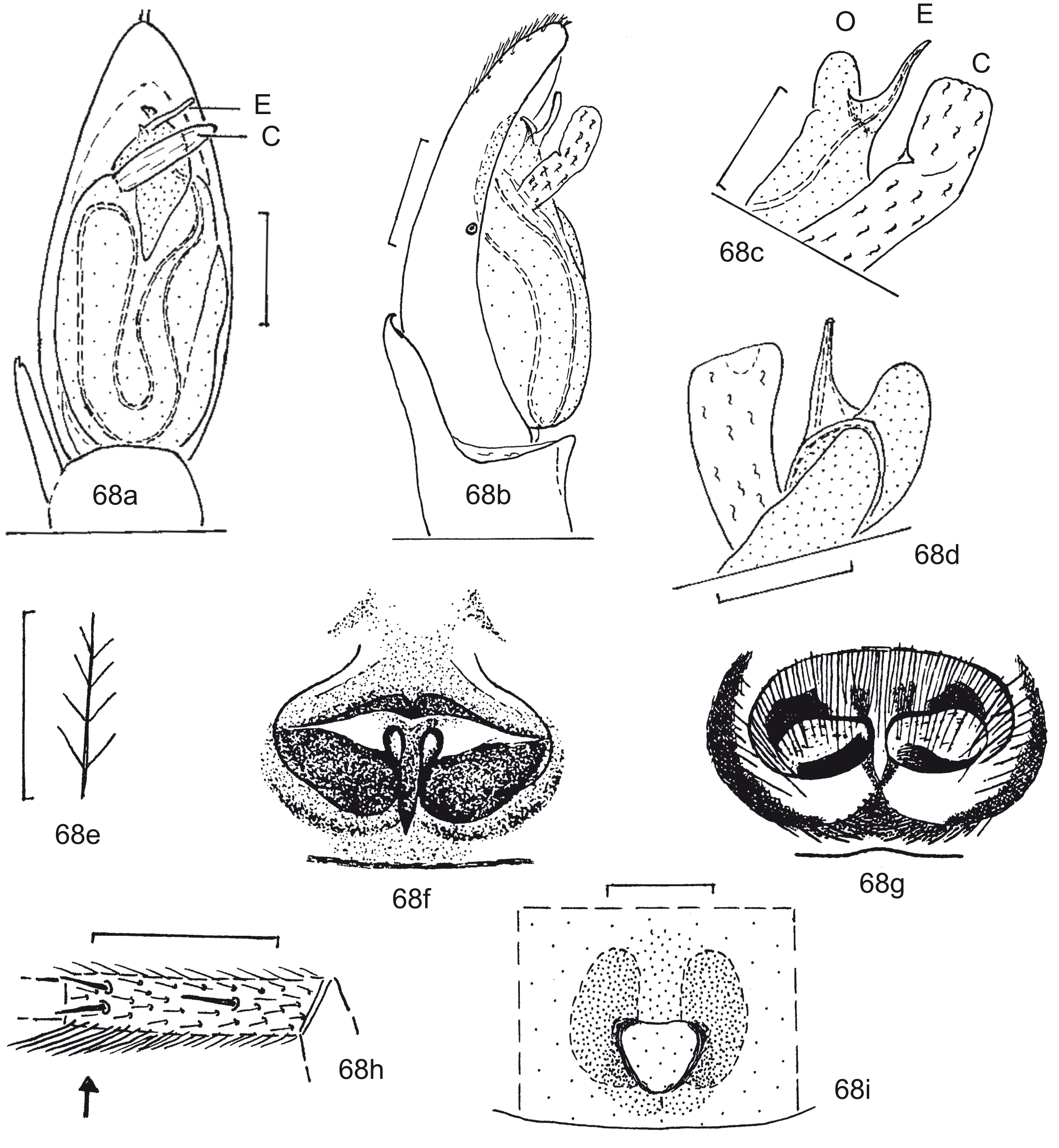
figs. 62-63: Kishidaia conspicua (L. KOCH) (= *Poecilochroa c.*); retrolateral aspect of the left ♂-pedipalpus and epigyne;

figs. 64-65: Cesonia aspida; ventral aspect of the left ♂-pedipalpus and epigyne. Taken from CHATZAKI et al. (2002);

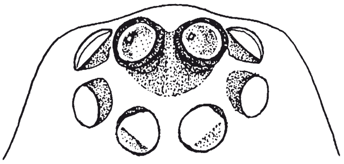
figs. 66-68f: Macarophaeus varius (SIMON 1893) (**n. gen.**) (Canary Islands: 66-66e from La Gomera, 68f from Tenerife); 66) female and dorsal aspect of the ♂-opisthosoma (at the right below); 67) ♀, epigyne (usually wider than figured); 68) vulva; 68a-b) ventral



and retrolateral aspect of the right pedipalpus (C = conductor, E = embolus); 68c-d) retrodorsal and prolateral aspect of the right embolus with its outgrowth (O), and conductor. A suture of the embolus is absent; 68e) feathery (branched) hair of the opisthosoma; 68f) ♀ from Tenerife, epigyne; taken from DENIS (1941: Fig: 2). Scale bars in figs. 68a-b 0.2, in figs. 68c-e 0.1;

fig. 68g) Macarophaeus cultior (KULCZYNSKI 1899), ♀, epigyne. Taken from DENIS (1962: Fig. 25);

fig. 68h-i: ?Macarophaeus sabulum **n. sp.**, ♀; 68h) prolateral aspect of the right metatarsus III. Note the dense brush of long ventral “preening hairs” (arrow) in the distal half. Trichobothria are not drawn; 68i) epigyne. Scale bars 0.5 and 0.2;



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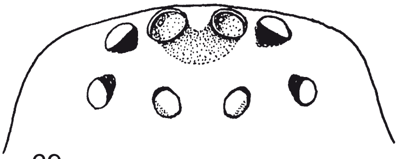

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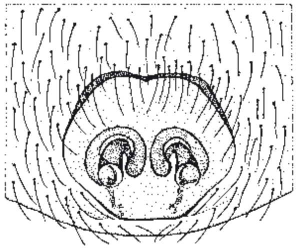

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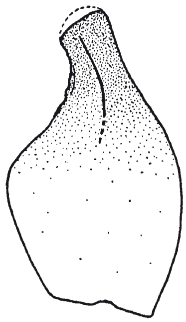

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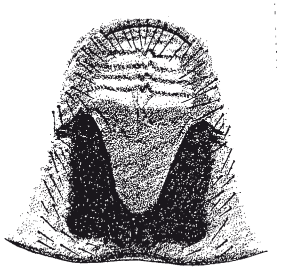

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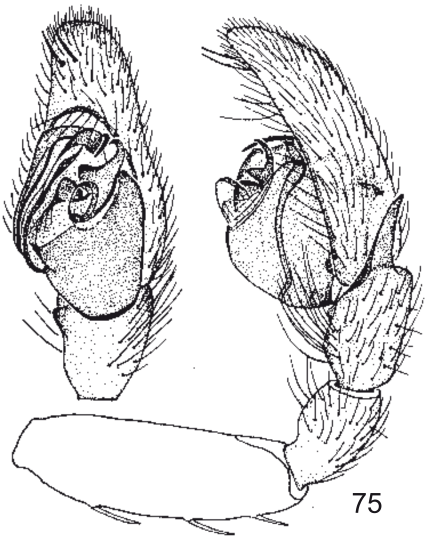

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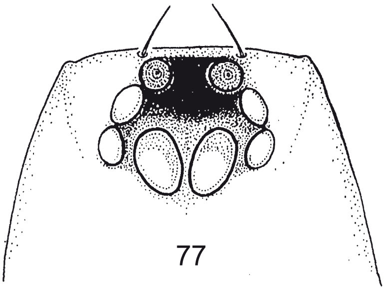
fig. 69) *Echemus angustifrons*; dorsal aspect of the eyes;

fig. 69a) *Scotophaeus quadripunctatus*; dorsal aspect of the eyes;

figs. 70-71: *Parasyrisca vinosa* (= *Drassodes v.*); ventral aspect of the left ♂-pedipalpus and epigyne. Taken from TROTTA (2005);

figs. 72-73: *Haplodrassus* sp.; 72) ♂, retrodorsal aspect of the tibial apophysis of the right pedipalpus; 73) epigyne;

figs. 74-76: *Leptodrassex simoni* (DALMAS) (= *Leptodrassus s.*); 74-75) ventral and retrolateral aspect of the left ♂-pedipalpus; 76) epigyne;



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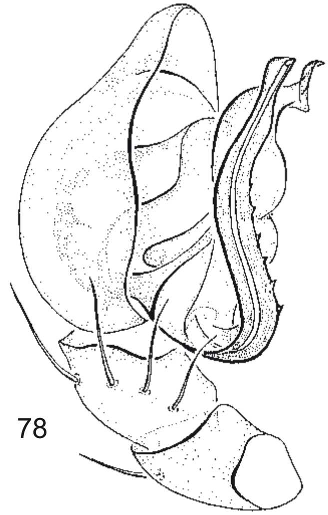

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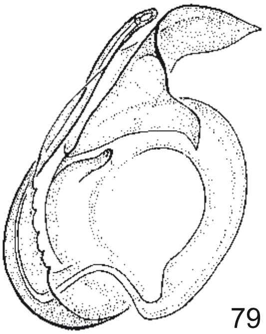

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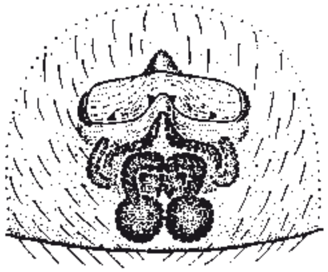

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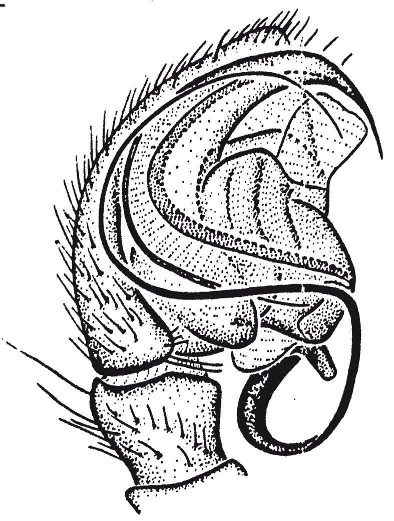

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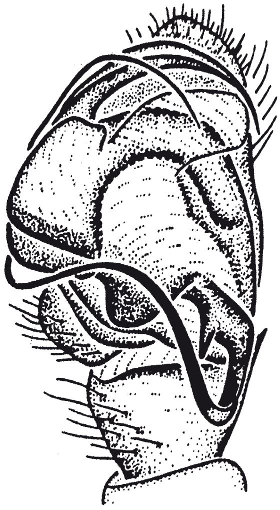

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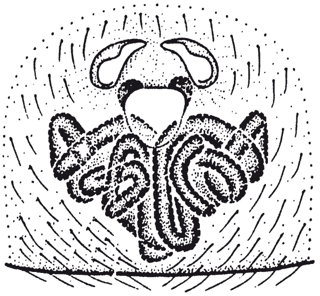

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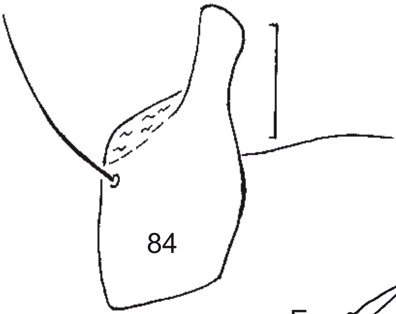
figs. 77-80: *Cryptodrassus hungaricus* (= *C. pulchellus*); 77) dorsal aspect of the eyes; 78-79) ♂, prolateral aspect of the left pedipalpus and ventral aspect of the left bulbus; 80) epigyne. Figs. 77-79 are taken from WEISS & MOLDOVAN (1998), fig. 80 is taken from OVTSHARENKO et al. (1994);

figs. 81-83: *Synaphosus* sp.; 81-82: retrolateral and ventral aspect of the left ♂-pedipalpus; 83) ♀, epigyne. Taken from OVTSHARENKO et al. (1994);



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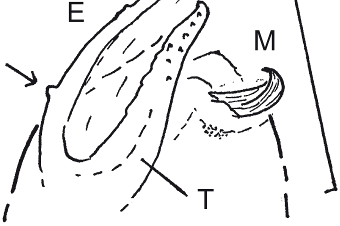

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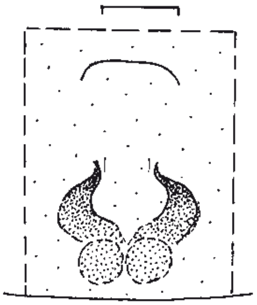

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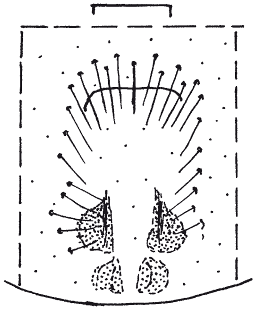

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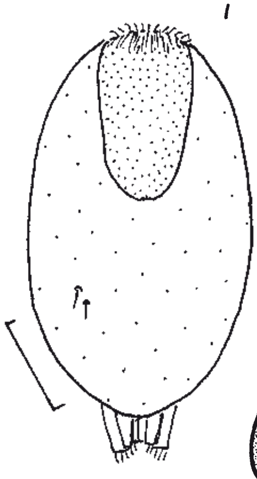

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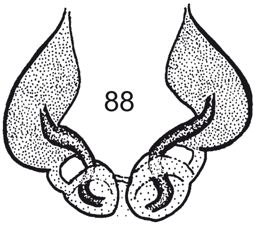

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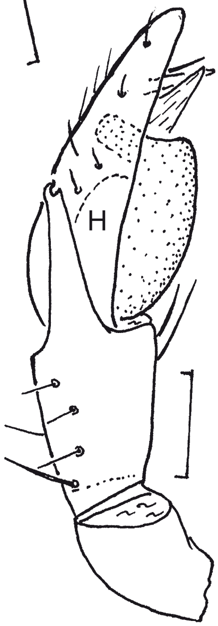

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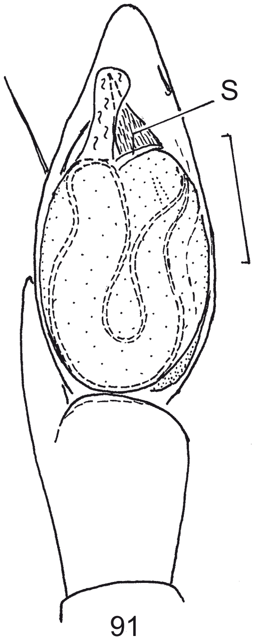

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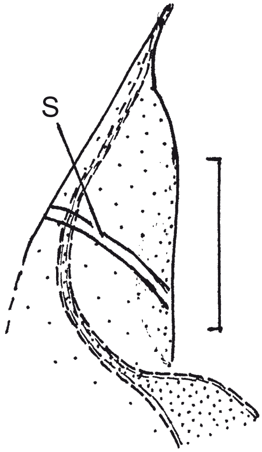
figs. 84-88: Haplodrassus deserticola SCHMIDT & KRAUSE 1996; 84) retrolateral aspect of the tibia of the left ♂-pedipalpus; 85) embolus (E), tegular- (T) and median apophysis (M) of the left bulbus, ventral and slightly retrolateral aspect. Note the hooks of the embolus (arrows); 86-87) epigyne; fig. 86) shows the most frequent form of the epigyne, in fig. 87) are some hairs drawn; 88) vulva. Scale bars 0.1. Fig. 88) is taken from SCHMIDT & KRAUSE (1996);

figs. 89-92b): Macarophaeus insignis **n. gen. n. sp.**, 89) dorsal aspect of the ♂-opisthosoma; 90-91: retrolateral and ventral aspect of the right ♂-pedipalpus; 92) proventral aspect of the left embolus; 92a-b) ♀, epigyne and dorsal aspect of the vulva. H = hairless area and low depression of the cymbium, L = left introcuctory opening, M = mass of sperm, S = basal suture of the embolus. Scale bars 0.5 in fig. 89, 0.1 in fig. 92, 0.2 in figs. 90-91, 92a-b;



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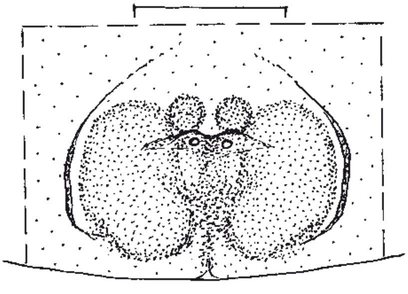

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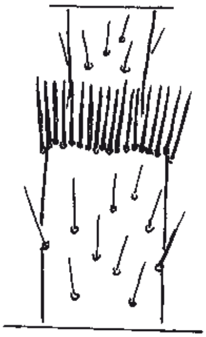

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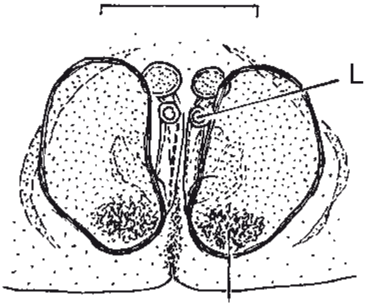

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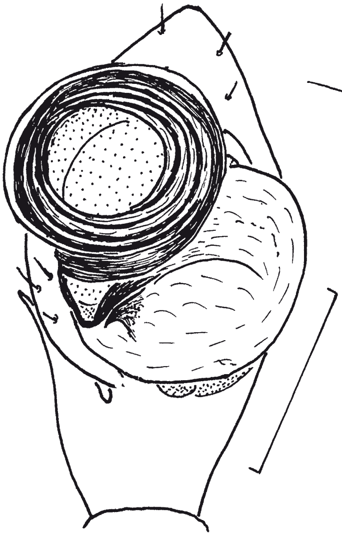

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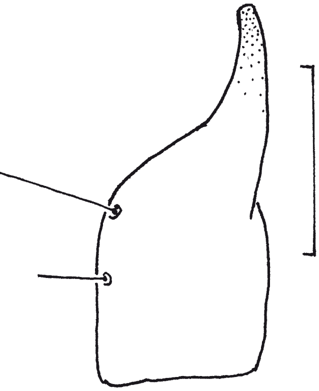

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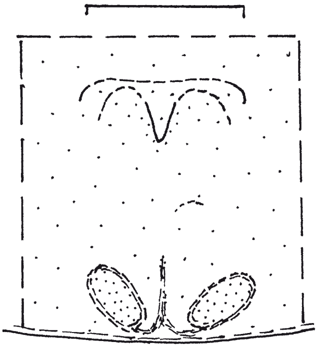

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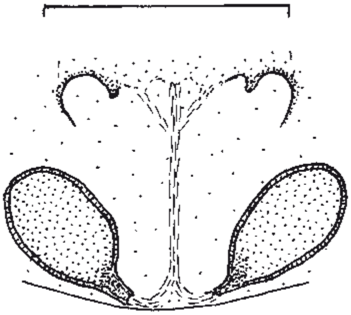

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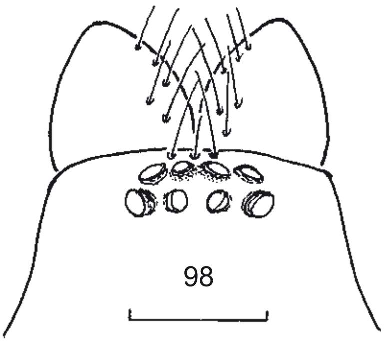
figs. 93-97: *Setaphis murphyi* **n. sp**.; 93) ventral-apical "preening comb" of metatarsus III; 94) retrolateral aspect of the tibia of the right ♂-pedipalpus; 95) ventral and slightly apical aspect of the right ♂-pedipalpus; 96) epigyne; 97) dorsal aspect of the posterior part of the vulva. Scale bars 0.1 in fig. 94, 0.2 in the remaining figs.;



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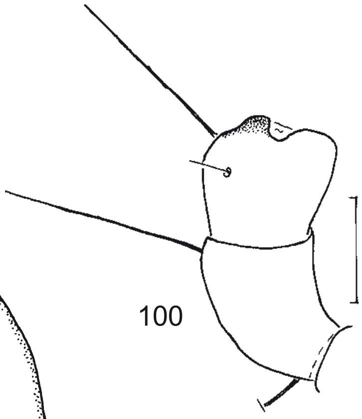

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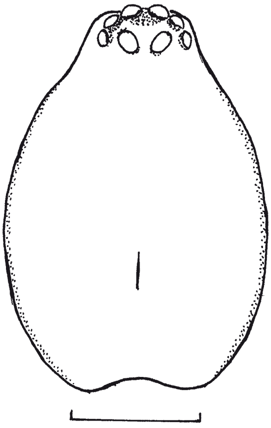

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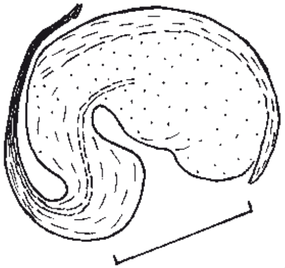

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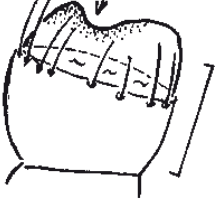

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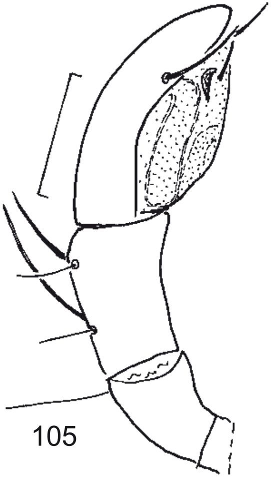

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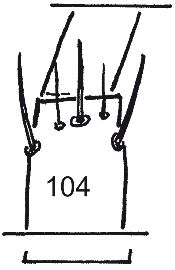

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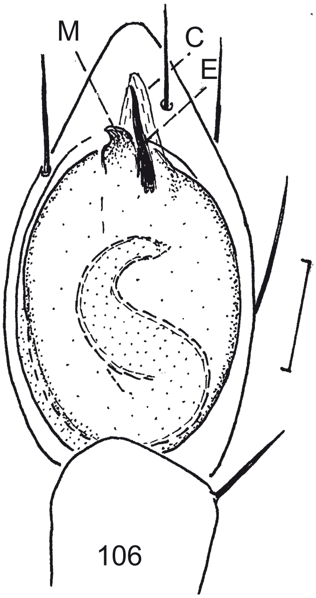

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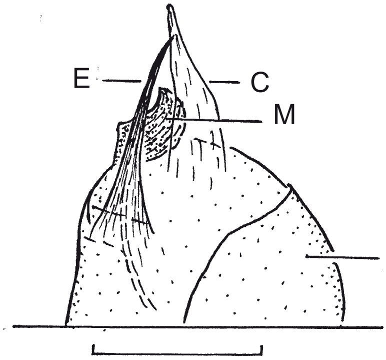
figs. 98-101: Zelotes scrutatus (O. PICKARD-CAMBRIDGE 1872); 98-99) variability of the shape of – especially – the posterior median eyes which may be almost circular or oval; 100) prolateral aspect of tibia and patella of the left ♂-pedipalpus; 101) retroanterior aspect of the embolus of the expanded left bulbus. Scale bars 0.5 in fig. 98, 0.1 in 101, 0.2 in the remaining figs.;

figs. 102-107: Drassodes serratichelis (ROEWER 1928), ♂; 102) dorsal aspect of the prosoma; 103) ventral aspect of the right trochanter IV. Note the distinct apical notch (arrow) which is stronger sclerotized); 104) ventral aspect of the left metatarsus III and the basal part of the tarsus. Only few hairs are drawn; 105-106) prolateral and ventral aspect of the right pedipalpus; 107) (see p. 88) prodorsal aspect of the separated right bulbus. C = conductor, E = embolus, M = median apophysis, S = subtegulum. Scale bars 0.1 in figs. 1-6-107, 0.2 in the remaining figs.;



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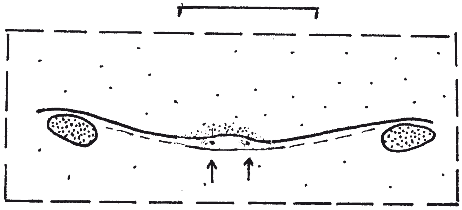

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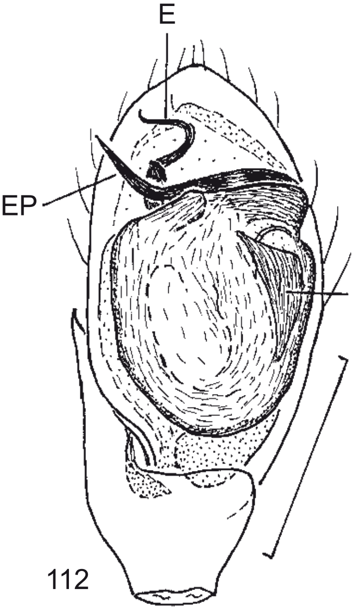

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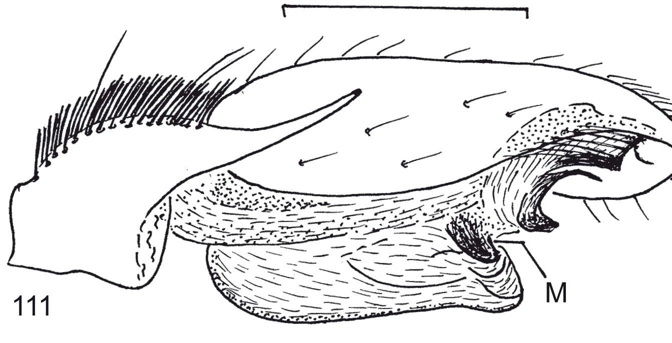

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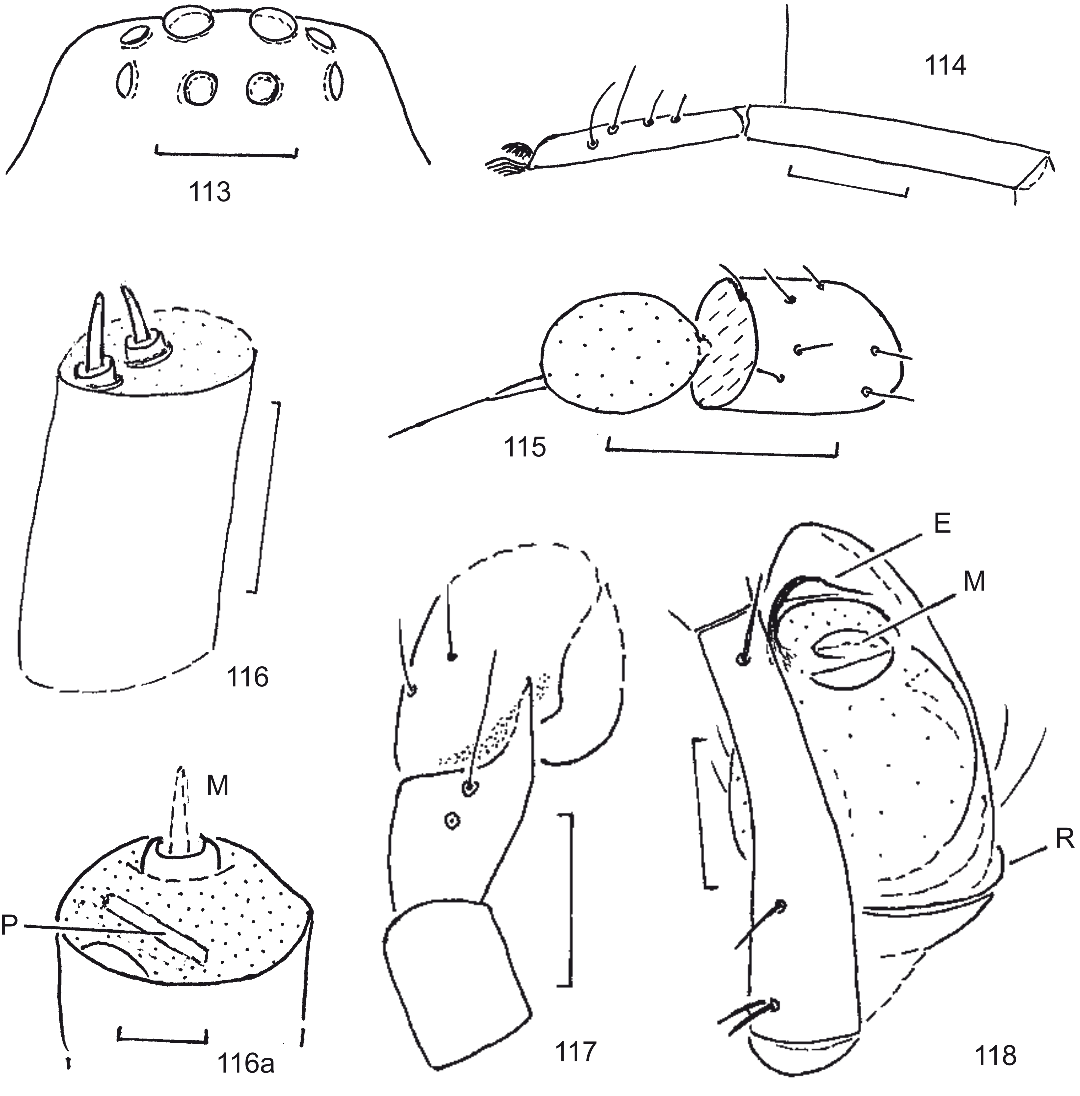
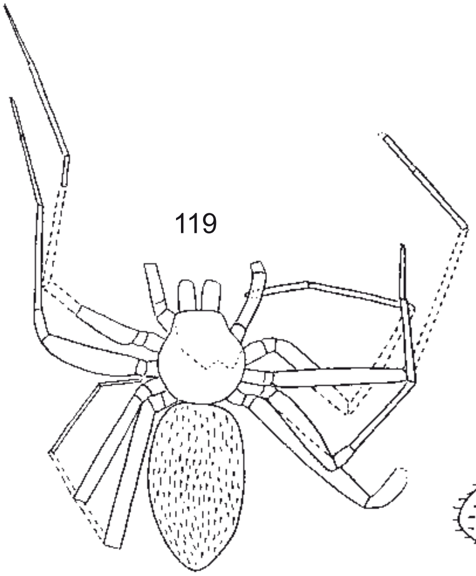
figs. 108-112: <u>*Zelotes turcicus*</u> **n. sp.**, ♂; 108) ventral aspect of the metatarsal III "preening comb" at the end of the article; 109) paired sclerites behind the epigastral furrow. Note the single pair of tiny epiandrous gland spigots (arrows). Hairs e.g. on the scuta are not drawn; 110) dorsal aspect of a dorsal spigot of the right anterior spinneret; 111-112) retrolateral and ventral aspect of the right pedipalpus. E = embolus, EP = embolic process, I = intercalary sclerite, M = median apophysis, T = terminal apophysis. Scale bars 0.1 in figs. 108 and 110, 0.5 in the remaining figs.;



figs. 113-118: *Eomactator hirsutipes* **n. sp**., ♂ in Baltic amber; figs. 115, 116 and 118 paratype, the remaining figs. holotype; 113) dorsal aspect of the anterior part of the prosoma. Emulsions cover at least the anterior median eyes; 114) retrolateral aspect of the left metatarsus and tarsus I. 5 of the trichobothria are drawn but no normal hairs; 115) ventral apect of the right coxa IV with remains of blood (haemolymph) at its end after autotomy. The remaining leg articles are preserved separately within the amber; 116) ventral-apical aspect of the right anterior spinneret. Two large spigots are observable in a more median position; 116a) retroapical-distal aspect of the left anterior spinneret (M = major ampullate gland spigot, deformed by heating, P = priform gland spigot); hairs are not drawn; 117) dorsal and slightly retrolateral aspect of the right pedipalpus; 118) left pedipalpus: dorsal aspect of the femur and ventral aspect of the bulbus. E = questionable embolus, M = median apophysis, R = retrobasal outgrowth of the cymbium. Scale bars 0.5 in fig. 114-115, 0.2 in the remainings figs.;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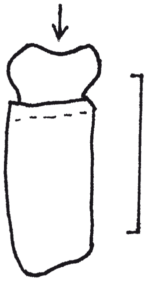
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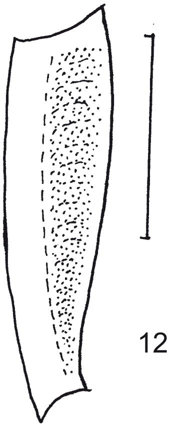
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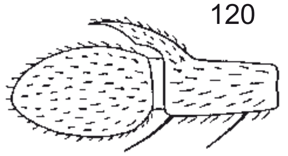
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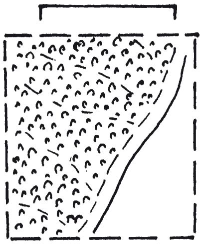
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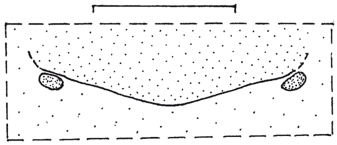
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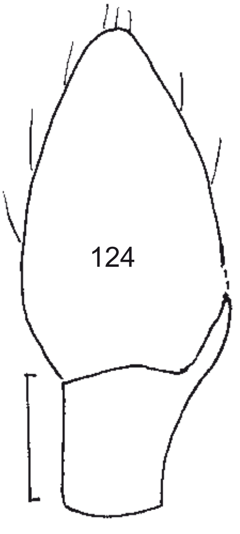
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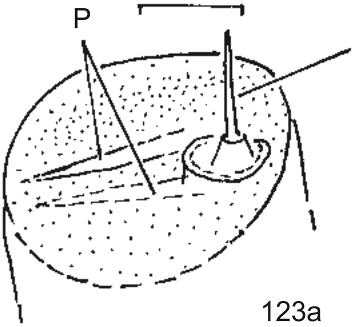

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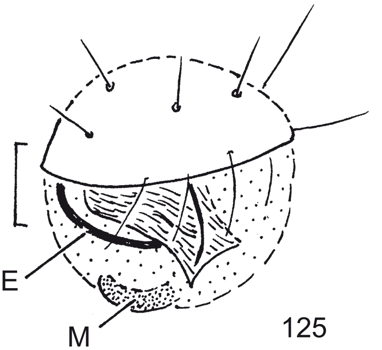

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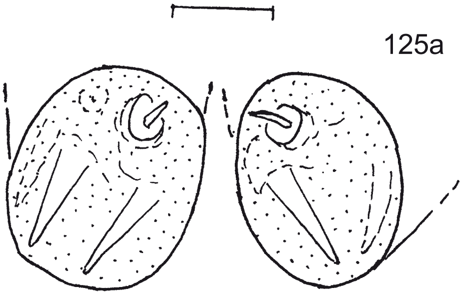
figs. 119-120: Eomactator mactatus PETRUNKEVITCH 1958, ♂ holotype in Baltic amber; 119) dorsal aspect of the fossil; 120) dorsal aspect of the right pedipalpus. Taken from PETRUNKEVITCH (1958);

figs. 121-125: Eomactator obscurior **n. sp.**, ♂ holotype in Baltic amber; 121) ventral aspect of the left coxa and trochanter I. The arrow points to the apical indication (notch) of the trochanter; 122) ventral aspect of the left pedipalpal femur; 123) paired sclerites behind the epigastral furrow; 123a) ventral-apical aspect of the left anterior spinneret. Hairs are not drawn. (M= major ampullate gland spigot, P = retracted piriform gland spigots); 123b) finely rugose cuticula of a retro-posterior area of the prosoma; 124) dorsal aspect of the right pedipalpus; 125) apical aspect of the right pedipalpus which is partly covered with a white emulsion. E = embolus, M = questionable median apophysis. Scale bars 0.5 in figs. 121 and 123, 0.3 in 122, 0.2 in 124, 0.1 in 123b) and 125, 0.05 in 123a);



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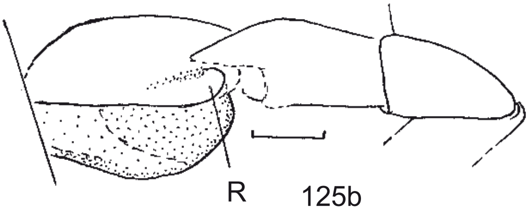

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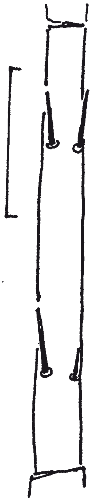

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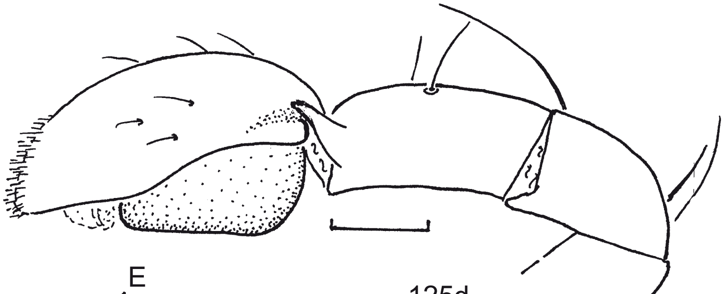

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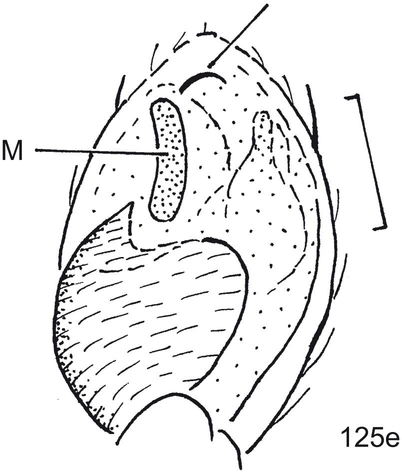

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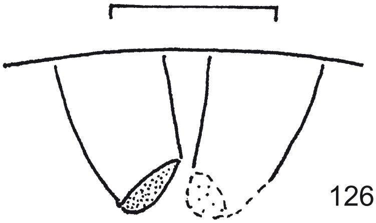

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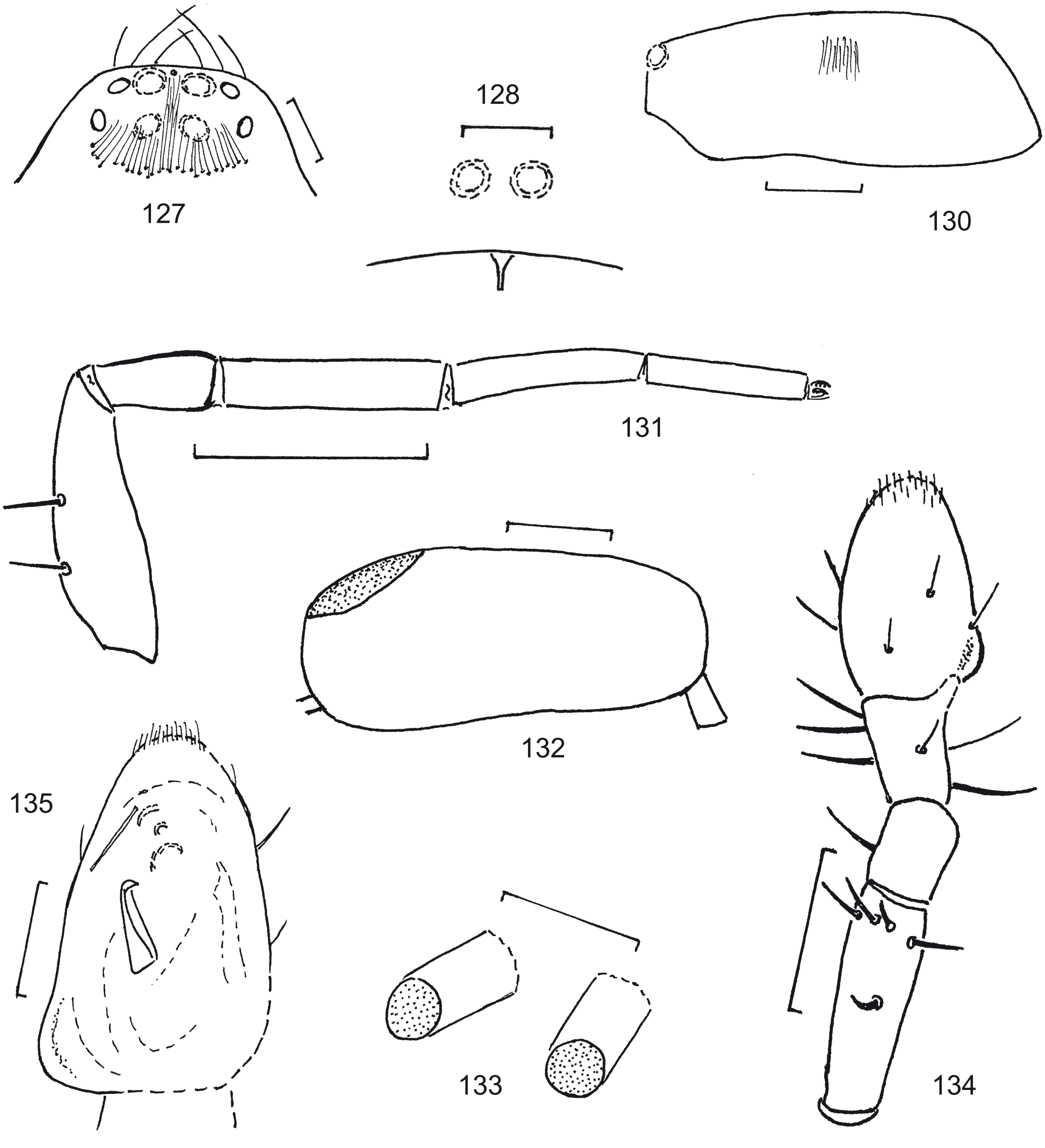
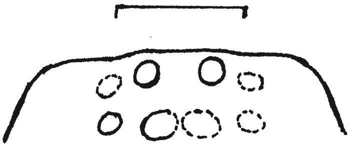
figs. 125a-b: *Eomactator* sp. indet., ♂, SMF (F2162/BB/AR/CJW); 125a) apical aspect of the anterior spinnerets.Note the single major ampullate gland spigots as well et least two retracted pointed piriform gland spigots. Hairs are not drawn. The anterior direction is above; 125b) retrolateral aspect of the left pedipalpus (the distal part is hidden). Note the retrobasal outgrows (R); scale bars 0.1 and 0.2;

figs. 125c-e: *Eomactator hamatus* **n. sp.**, ♂; 125c) ventral aspect of the right tibia I. Hairs are not drawn; 125d) retrolateral aspect of the left pedipalpus; 125e) ventral aspect of the right pedipalpus; E = distal part of the questionable embolus, M = questionable median apophysis; scale bars 0.5 in fig. 125c), 0.2 in the remaining figs.;

fig. 126) *Cryptoplanus* sp. indet. (Zoridae s.l.), ♂ in Baltic amber (F215/BB/AR/CJW), ventral aspect of the conical anterior spinnerets (the left spinneret is distally hidden). Scale bar 0.5;



figs. 127-135: <u>*Eognaphosops cryptoplanoides*</u> n**. gen. n. sp**., ♂ holotype in Baltic amber; 127) dorsal aspect of the anterior part of the prosoma. Bubbles cover the anterior median eyes. Only few hairs of the dense field are drawn; 128) anterior aspect of the clypeus with the anterior median eyes which are covered with an emulsion; 130) laeral aspect of the prosoma. Only the left anterior median eye and the hairs of a small area are drawn; 131) prolateral and slightly dorsal aspect of the left leg I which is an almost bristle- and hair-less regenerate; 132) lateal aspect of the opisthosoma, outline; 133) ventral aspect of the anterior spinnerets which are perspectively shortened, outline; 134) dorsal aspect of the right pedipalpus; 135) ventral aspect of the right pedipalpus. Most parts of the bulbus are hidden, artefacts are not recognizable with certainty. Scale bars 1.0 in fig. 131, 0.5 in figs. 130, 132-134, 0.2 in the remaining figs.;



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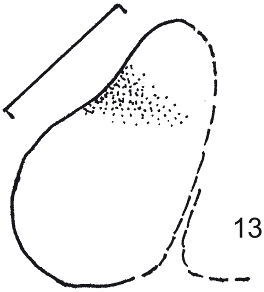

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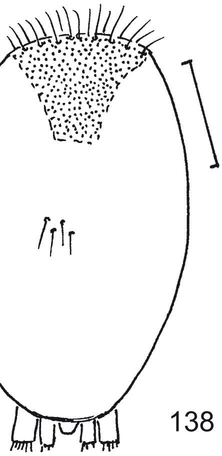

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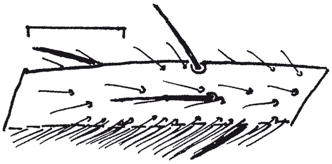

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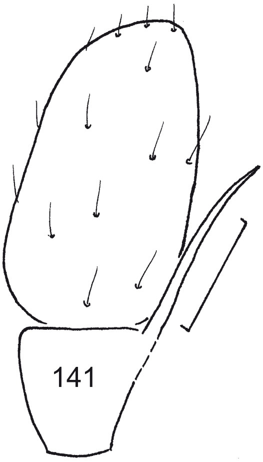

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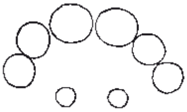

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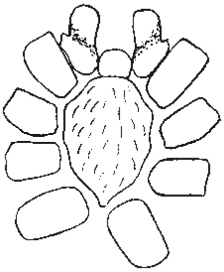

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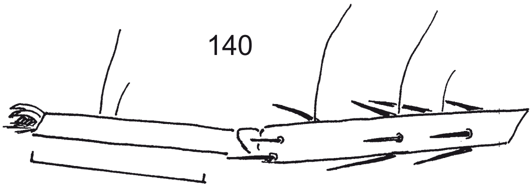

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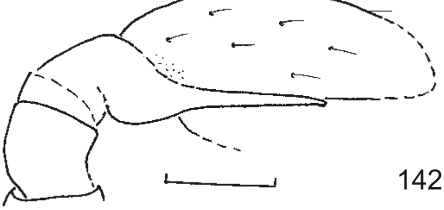

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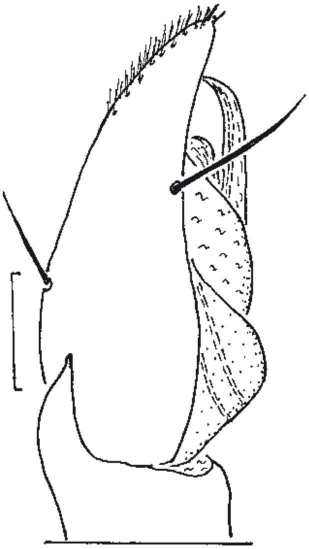
figs. 136-142: <u>*Zelotetis calefacta*</u> **n. gen. n. sp.**, ♂ holotype in Baltic amber; 136) dorsal aspect of the eyes which are partly hidden; 137) ventral aspect of the right gnathocoxa which is partly hidden; 138) dorsal aspect of the opisthosoma; 139) prolateral aspect of the right metatarsus III. Note the questionable ventral “preening hairs”. Not all hairs are drawn; 140) prolateral aspect of the right tarsus and metatarsus IV. Only few hairs and trichobothria are drawn; 141-142) dorsal and retrolateral aspect of the right pedipalpus. The bulbus is hidden. Scale bars 0.5 in figs. 138 and 140, 0.2 in the remaining figs.;

figs. 143-145: <u>*Captrix lineata*</u> (KOCH & BERENDT 1854), ♀ in Baltic amber; 143) dorsal aspect of the eyes which may be covered with an emulsion; 144) ventral aspect of the prosoma and basal leg articles; 145) epigyne. Taken from PETRUNKEVITCH (1942);



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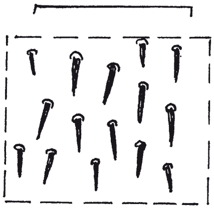

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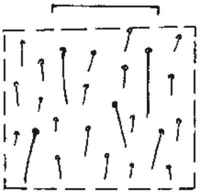

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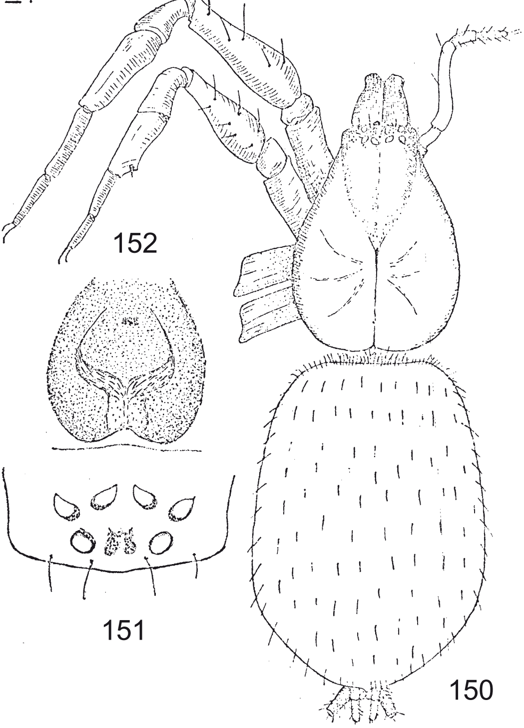

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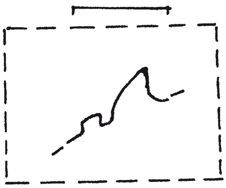

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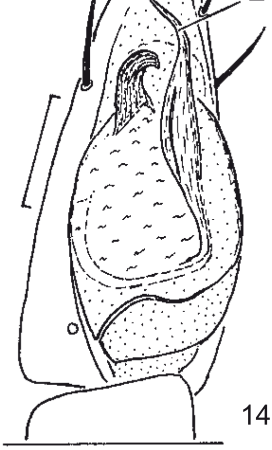

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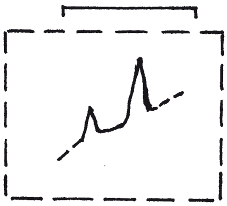
figs. 146-147: Gnaphosa artaensis **n. sp**., ♂, retrolateral and ventral aspect of the right pedipalpus. E = embolus. Scale bar 0.2;

fig. 148) Drassyllus sp., ♂, some ventral spines/bristles of the opisthosoma (absent in females by sexual dimorphism). Such spines are apparently absent in other Zelotini except *Trachyzelotes*. Note: A part of these bristles may be broken off, and normal hairs exist, too. Scale bar 0.1;

fig. 149) Zelotes sp., ♂, some ventral hairs of the opisthosoma. Similar is the – normal, thin – shape of hairs of females of other Gnaphosidae and males besides *Drassyllus* and *Trachyzelotes*. Scale bar 0.2.

figs. 150-152: Macedoniella karamani DRENSKY 1935, ♀; 150) dorsal aspect of the body; 151) dorsal aspect of the eyes; 152) epigyne. Taken from DRENSKY (1935);

fig. 153) Leptodrassus sp., rectangular teeth of the left cheliceral retromargin. Scale bar 0.05;



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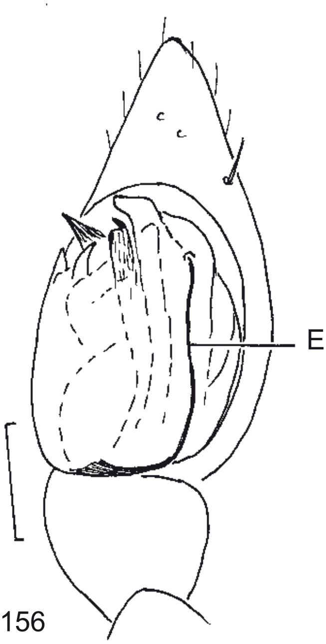

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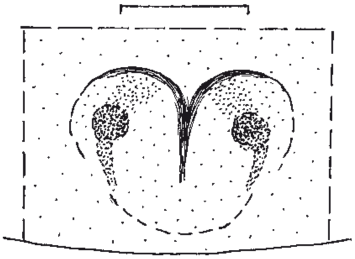

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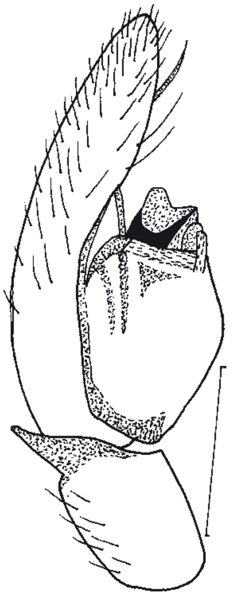

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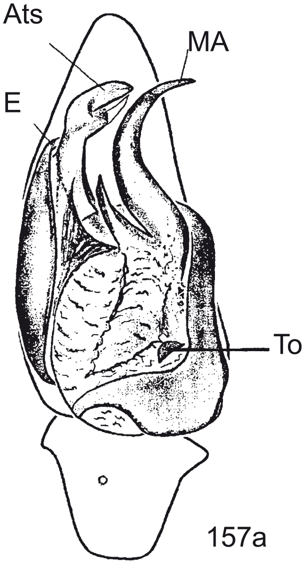

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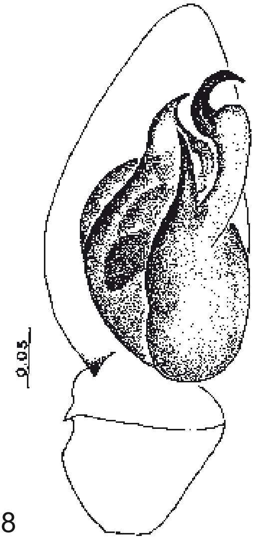

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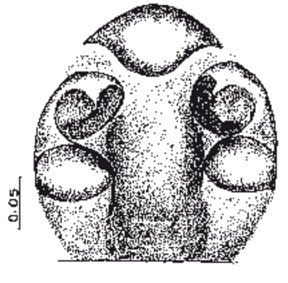

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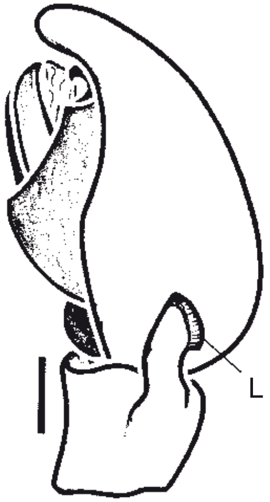
figs. 154-157: Leptodrassex hylaestomachi (BERLAND 1934), Canary Islands; 154) pointed teeth of the left cheliceral retromargin. Similar is *Leptopilos*. 155-156) ♂, retrolateral and ventral aspect of the right pedipalpus; 157) ♀; epigyne. Fig. 155) was drawn by PARWIS NABAVI. Scale bars: 0.05 in fig. 154), 0.1 in figs. 156-157), 0.2 in fig. 156);

fig. 157 a) Leptodrassex memorialis (SPASSKY 1940), ♂, ventral aspect of the left pedipalpus with the tegular outgrowth (TO). Taken from KOVBLYUK & NADOLNY (2010);

figs. 158-159: Leptopilos manolisi (CHATZAKI 2002) from Crete and Israel; 158) ♂, ventral aspect of the left pedipalpus; 159) ♀, epigyne. Taken from LEVY (2009);



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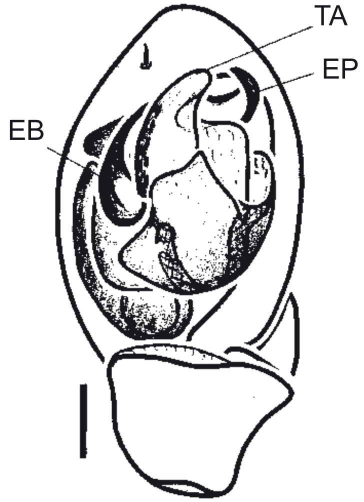

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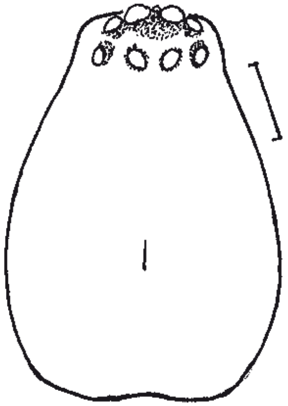

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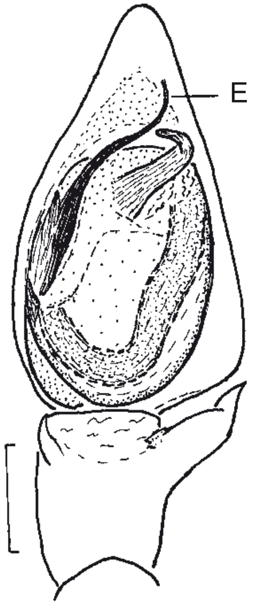

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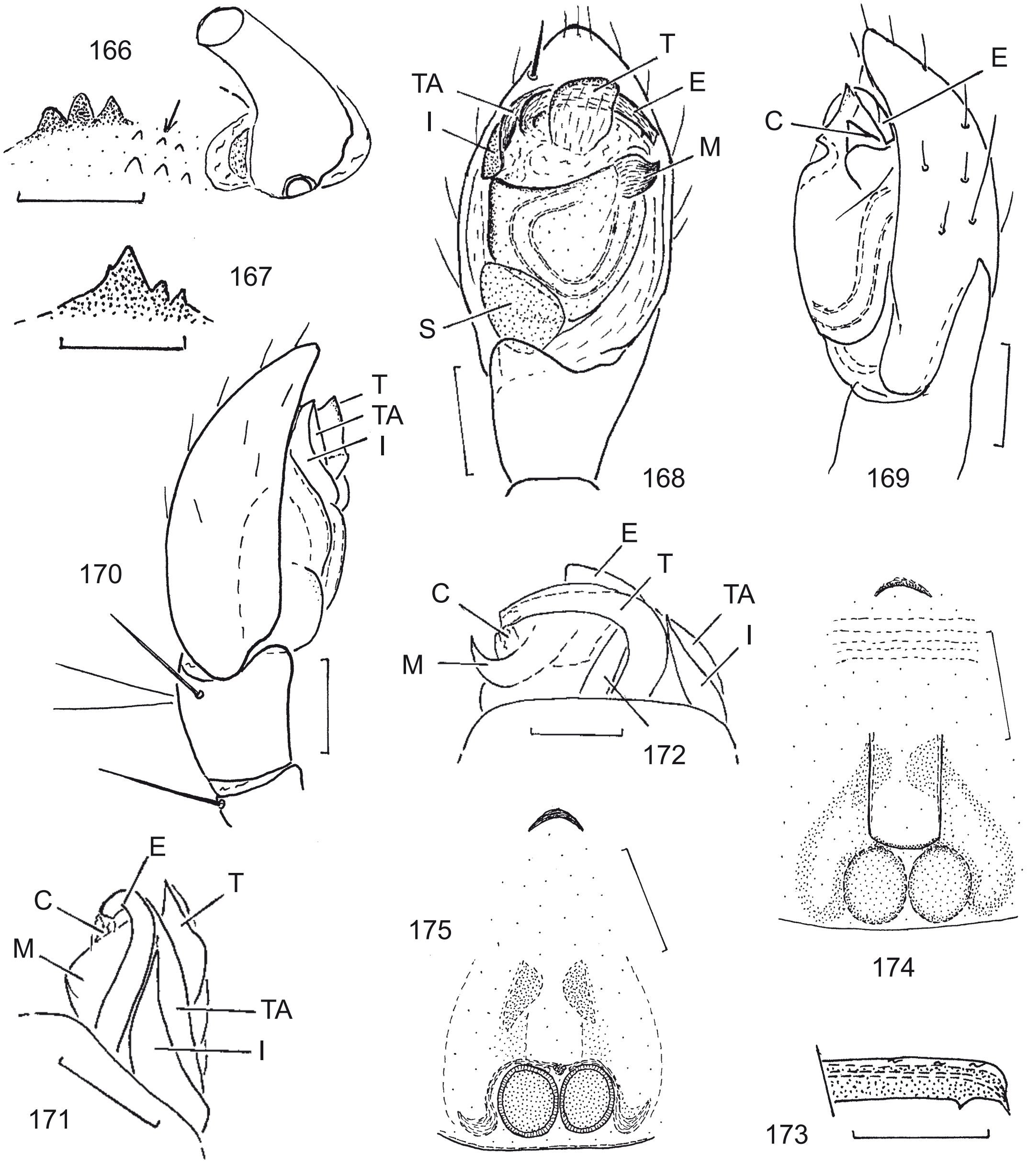
figs. 160-161: _Turkozelotes microb_ KOVBLYUK et al. 2010, ♂, retrolateral and ventral aspect of the left pedipalpus. L = lobus of the tibial apophysis. Taken from KOVBLYUK (2010);

figs. 162-165: _Scotophaeus nanoides_ **n. sp.**, ♂; 162) dorsal aspect of the prosoma; 163) ventral aspect of the right metatarsus III (hairs are not drawn); 164-165) ventral and retrolateral aspect of the left pedipalpus. C = conductor, E = embolus. Scale bars 0.5 in figs. 162-163), 0.2 in figs. 164-165);



figs. 166-175: Canariognapha parwis **n. gen. n. sp**.; 166) posterior-ventral aspect of the left ♂♀-chelicera. The arrow points to one of the tiny teeth IN the cheliceral furrow, the fang is cut off near its base; 167) variability of the teeth of the anterior cheliceral margin which build a keel; 168-170) ♂, ventral, retrolateral and prolateral aspect of the left pedipalpus; 171) retrolateral and slightly dorsal aspect of the distal structures of the left bulbus; 172) dorsal aspect of the distal structures of the left bulbus; 173) ventral-apical aspect of the distal part of the left embolus; 174) ♀, epigyne; 175) ♀, dorsal aspect of the vulva. B = basal outgrowth of the embolus, C = conductor, E = embolus, I = intercalary sclerite, M = median apophysis, S = subtegulum, T = tegular apophysis, TA = terminal apophysis. Scale bars 0.1 in figs. 171-173, 0.2 in the remaining figs.

BEITR. ARANEOL., 6 (2011)

SPIDERS OF THE FAMILY PRODIDOMIDAE (ARANEAE) FROM EUROPE AND MADAGASCAR

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Abstract: Few spiders of the family Prodidomidae (Araneae) from the Canary Islands and Madagascar are described or revised, a identification key is given to the European prodidomid genera. *Zimirina nabavii* **n. sp**. is described from the Canary Islands, *Zimirina gomerae* SCHMIDT 1981 (Canary Islands) is regarded as a questionable junior synonym of *Z. cineris* COOKE 1964, *Prodidomus madagascariensis* **n. sp**. is described from Madagascar. Prodidomidae is regarded as a possible part of the family Gnaphosidae s. l..

Key words: Araneae, Canary Islands, Gnaphosidae, Madagascar, new species, new synonymy, Prodidomidae, Prodidominae, *Prodidomus*, *Zimirina*.

The mainly tropical “Ground Spiders” of the family Prodidomidae are pale and usually small to tiny animals - frequently overlooked -, which live on the ground. In Europe occur only members of the subfamily Prodidominae, which are restricted to the South-western part, where three genera occur: *Prodidomus, Zimirina* (the only genus on the Canary Islands) and *Zimiris*. *Prodidomus* is a widely spread genus which has probably to split up. The family is – to my knowledge – reported in this paper from Madagascar for the first time.

Selected characters of the family Prodidomidae and their variability:
The position of the eyes is frequently similar to a half circle or even an almost complete circle in the Prodidominae s.l. (incl. Zimirini) (fig. 1) (similar in the gnaphosid genus

Megamyrmaekion, and different in the prodidomid Anagraphinae and Molycriinae), their posterior median eyes are usually oval, their spinnerets are frequently long to very long, the anteriors may bear long setae or piriform gland spigots (figs. 8-10), their basal cheliceral articles may be protruding and diverging, their fangs may be very long and slender (fig. 1), A DEPRESSION AND A SERRULA OF THE GNATHOCOXAE MAY BE ABSENT (in the Prodidominae), the sternum has a hairy posterior lobe between the coxae IV (fig. 16) in the Anagraphinae, Molycriinae and Prodidominae (incl. Zimirini), their trochantera are very long in some genera like *Prodidomus* (fig. 1), their tarsal claws are usually smooth in the Prodidominae, and the claws of their posterior legs are frequently longer than the claws of the remaining legs (similar e.g. in several small members of the Gnaphosidae).

Relationships: Prodidomidae are strongly related to the family Gnaphosidae even have been included in this family with their subfamilies Anagraphinae, Molycriinae, as well as Prodidominae (in which a dorsal scutum of the male opisthosoma, a gnathocoxal serrula and toothed tasal claws are absent; contrarily both characters exist in the Gnaphosidae). See below: “Conclusion”.

According to PLATNICK & BAEHR (2006: 7) – which provided “characters” of the family Prodidomidae but not an explicit diagnosis (!) – the following characters may distinguish both nominate families:

(1) “The greatly widened piriform gland spigot shafts bearing broad openings are a putative synapomorphy for the true <sic!> gnaphosids”;
(2) “The greatly elongated piriform gland spigot bases, accompanied by highly plumose setae..., are a <sic!> putative synapomorphy for the prodidomids”.
(3) “Tarsal claws placed on an onychium..”.

Comments (see the figs. in the paper on the family Gnaphosidae in this volume to which is referred here):
(1) Greatly widened piriform gland spigot shafts are also absent in some Gnaphosidae like *Pterotricha* (fig. 8-8b, 116), and broad openings of these spigots may in my opinion simply caused by the procedure of preparation for the extension of these spigots (see the figs. 8-8b, 116) (!). In “fresh” extant specimens and in the fossil spiders these spigots are usually preserved as not widened apically but pointed, bearing SMALL openings.
(2) Elongated piriform gland spigot bases exist also in certain members of the Gnaphosidae like *Pterotricha* (fig. 8), and highly plumose setae, too, e.g., in *Apopyllus*, *Haplodrassus*, and *Scotognapha*, see Murphy (2007: Figs. pp. 340, 480, and 126).
(3) I did not find an onychium e.g. in *Prodidomus* sp. indet. (Africa), and *P. madagascariensis* n. sp.. I doubt that this is really a diagnostic character of the family Prodidomidae.

Conclusion: None of the characters in question distinguish without exception the nominate families Gnaphosidae and Prodidomidae which probably have to unite in the single family Gnaphosidae s. l.. THE POSTERIOR HAIRY LOBE OF THE STERNUM (figs. 16,18) is probably a well diagnostic character of the family Prodidomidae; it is absent in the Gnaphosidae to my knowledge. This and several other characters - which probably evolved convergently – have to study and to discuss more closely in the future.

Key to the European genera of the family Prodidomidae:

Remark: *Zimirina* is the only one of the three European genera which is known from the Canary Islands.

1 Thoracal fissure present, short. Anterior spinnerets distinctly longer than the posterior ones (fig. 9). Trochanters short (fig. 7). ♂: Pedipalpal tibia with a single (retrolateral) apophysis. Tarsus of the ♀-pedipalpus slender, ca. 6 times longer than wide (fig. 11). Only *Z. doriai*. Iberian Peninsula . . . . *Zimiris*

- Thoracal fissure absent (fig. 1). Anterior spinnerets not longer than the posterior ones. Trochanters long (*Prodidomus*, fig. 1) or short (*Zimirina*, as fig. 7). Tarsus of the ♀-pedipalpus stout, ca. 3 ½ times longer than wide or stouter (figs. 12-13) 2

2(1) Trochanters – especially I and IV - unusually long, about as long as the coxae, similar to fig. 1 but trichobothria are absent in the European species. Posterior spinnerets (lateral aspect) much thicker than the anterior ones (fig. 8). ♂: Pedipalpal tibia in the European species with 2-3 apophyses. Cymbium without a "tooth". Mediterranean . . . . *Prodidomus*

- Trochanters distinctly shorter than the coxae (fig. 7). Posterior spinnerets (lateral aspect) smaller (fig. 10). ♂: Pedipalpal tibia with a single apophysis, cymbium retrolaterally with a "tooth" (arrows in figs. 14-15). Western Mediterranean, mainly Canary Islands . . . .*Zimirina*

Distribution of species of *Zimirina* on the Canary islands:

(1) Eastern Islands (Alegranza, Fuerteventura, Lanzarote): hirsuta COOKE 1964;
(2) Central Islands:
  (a) La Gomera: *gomerae* (SCHMIDT 1981), see WUNDERLICH (1987: 250, figs. 658-660, ♂♀) (?= *cineris*);
  (b) Tenerife: *cineris* COOKE 1964 (Canadas, Teide) (figs. 17, 22-24), *Z.* sp. indet., e.g. from Igueste de Candelaria (CJW);
  (c) Gran Canaria: ?*cineris* (figs. 17, 22-24), grancanariensis WUNDERLICH 1992, *moyaensis* WUNDERLICH 199, *nabavii* n. sp. (figs. 17-21), *spinicymbium* WUNDERLICH 1992. - See also below: *Zimirina cineris* (synonymy).
(3) Western Islands (El Hierro): *Zimirina* sp. indet. (juv.), see WUNDERLICH (1992: 76).

Remarks on the **determination** of species of *Zimirina* on the Canary Islands:

The separation of most of the tiny Canarian spiders is difficult; because of the very rare material of most species the intraspecific and the intrapopular variability is unknown, the variability of the size of the lenses of the anterior median eyes may be enormous (their diameter may be 0.05-0.07 or even 0.09 mm), the shape of the pedipalpal tibial apophysis and of the embolus may be quite similar. The shape of the retrolateral “tooth” of the cymbium is different in certain species, see figs. 21-22.
In contrast to the remaining species - which have a pointed pedipalpal tibial apophysis – this apophysis is weakly divided or blunt in *Z. hirsuta* COOKE 1964 from the Eastern Canary Islands, and the epigyne is unique, see WUNDERLICH (1992: Figs. 776-778). - See also below: *Zimirina cineris*.

Zimirina cineris COOKE 1964 from the Canary Islands (figs. 14, 17, 22-24)

Recently studied **material**: Canary Islands: (1) Tenerife, (a) Igueste de Candelaria, 1♂ JW leg. in VIII; (b) Las Canadas, 1♂, 1♀ M. ARECHAVALETA leg. 29. VI. 1996, Univ. La Laguna (Tenerife), 7V1/AN 1597. (2) Gran Canaria, P. NABAVI leg. in pit falls, CJW, later SMF: Near El Palmital, 600 m, 1♂ leg. in VIII 2000; 2km N Pico de las Nievas, dry Pine forest, 1900 m, 1♀ leg. 6. VII.-16. VIII. 2000 (fig. 24); road Vallesco-Artenara, 1550 m, 1♂ leg. in IX-X 2000; 3 km NW Mogan, 450 m, 1♂ leg. in III-IV 2000.

Synonymy: I am not sure that – as suggested by me already 18 years ago, see WUNDERLICH (1992: 488) – *Zimirina gomerae* SCHMIDT 1981 is a junior synonym of *Z. cineris* COOKE 1964. Probably conspecific spiders may occur on the Canary Islands Tenerife (locus typicus, both sexes from the same locality), La Gomera, and Gran Canaria. Genital organs: Figs. 22-24 and WUNDERLICH (1987: 401, figs. 658-660, both sexes). The relationships of *Z. grancanariensis* WUNDERLICH 1992, *Z. moyaensis* WUNDERLICH 1992 (the males are unknown), and *Z. spinicymbium* WUNDERLICH 1992 (female unknown) are also unsure. The structures of epigyne/ vulva of this/these species are apparently quite variable; the epigyne/vulva of one of these females is quite long (fig. 24). See the remarks on the determination above.

***Zimirina nabavii* n. sp.** (figs. 17-21)

Derivatio nominis: It is a pleasure to me to dedicate this species to PARWIS NABAVI in Freiburg, who collected the holotype and numerous other interesting and rare species on the Canary Islands.

Material: Canary Islands, Gran Canaria, 1 km NW Roque Nublo, 1200-1300 m, pit fall, holotype ♂ P. NABAVI leg. 23. V.- 5. VII. 2000; CJW/SMF. – Remark: The spider has probably dried out in the pit fall; the legs are somewhat deformed, the right legs I-II are missing.

Diagnosis (♂; ♀ unknown): Eyes tiny (fig. 17), diameter of the anterior median eyes only 0.02 mm; pedipalpus (figs. 19-21): Retrolateral cymbial tooth slender, long, almost straight, its base not widened, embolus slender, almost straight.

Description (♂):
Measurements (in mm): Body length 1.6, prosoma: Length 0.8, width 0.6, leg I: Femur 0.6, patella 0.4, tibia 0.48, metatarsus 0.45, tarsus 0.37, tibia II 0.35, tibia III 0.3, tibia IV 0.6.
Colour: Prosoma and legs light yellow, opisthosoma light grey.
Prosoma 1.35 times longer than wide, covered with numerous adpressed hairs, cephalic part not abruptly smaller, thoracal furrow absent, eyes tiny, diameter of the anterior median eyes only 0.02 mm (fig. 17), fangs fairly long. Posterior hump of the sternum: Fig. 18. - Legs only fairly long, order IV/I/II/III, most hairs are rubbed off. Most bristles are also rubbed off, tibiae I-II are bristle-less, tibia IV bears about 10 bristles, femur IV about 4, metatarsi I-II are bristle-less, III-IV bear several bristles. – Opisthosoma 1.5 times longer than wide. – Pedipalpus (see above) with a pointed tibial apophysis which is bent in its middle, and a slender cymbium.

Relationships: In the other congeneric species of the Central and Western Canary Islands the lenses of the anterior median eyes are distinctly larger, see fig. 17 (0.05-0.09 mm), the cymbial tooth is shorter and has a wider base (see figs. 21-22), the embolus is larger and distinctly bent.

Distribution: Canary Islands: Gran Canaria.

***Prodidomus madagascariensis* n. sp.** from Madagascar (figs. 1-6) photo 67

Material *): N-Madagascar, subrecent, relatively young resin (copal), bought in 2006, enclosed by a thin layer of artificial resin by C. GRÖHN in X. 2008, 2♂ in the same piece of copal, holotype (in which the right leg I is lost) and paratype, F2131/CM/ AR/CJW. – *) Bought from a dealer who sold copal from Madagascar AND Columbia.

Preservation and syninclusions: The piece of copal has a size of 4.5 x 3.5 x 1.7 cm. Both spiders are preserved closely together near the surface of the piece of copal; their ventral side is hidden. The holotype (photo 67) is excellently preserved, its right leg I is lost beyond the coxa by autotomy, its left leg III is cut off near the end of the femur. – Paratype: The left leg III is lost beyond the coxa by autotomy; the body – especially the eyes – are strongly deformed. – Numerous syninclusions exist: A juv. spider (Salticidae indet.), an incomplete juv. Araneae (?Mysmeninae indet.). In the centre of the piece, the same side as the Prodidomidae, lies a tiny enigmatic spider, body length 0.65 mm, only remains are preserved, some dorsal parts are cut off within the piece of copal, the legs are stout and probably bristle-less, the pedipalpal articles are slender but the tarsus is huge. I do not want to exclude that this is a subadult spider of the family Theridiidae but it may be adult. – Numerous Diptera, Auchenorrhyncha, Coleoptera, Collembola, Hymenoptera, Microleptidoptera, a questionable tiny scale insect (left of the posterior part of the opisthosoma), insect larva, Myriapoda, a questionable mammal's hair are also preserved in this piece.

Diagnosis (♂; ♀ unknown): The trochanters bear some longer sensory hairs, questionable trichobothria (figs. 1-2), there are only very few and weak leg bristles. ♂-pedipalpus (figs. 4-6): Patella long and slender, tibia thick, its apophysis claw-shaped, median apophysis large.

Description (♂):
Measurements (in mm): Body length 3.7, prosoma: Length 1.85, width 1.3; leg I: Femur 1.35, patella 1.15, tibia 1.3, metatarsus 1.0, tarsus 0.8, tibia IV 1.3
Colour light brown.
Prosoma (photo 67, fig. 1) 1.4 times longer than wide, hairs indistinct, thoracal furrow absent, eyes large, the anterior medians largest, basal cheliceral articles protruding, fangs long and slender, gnathocoxae, labium and sternum are hidden. – Legs (photo 67, figs. 1-3) fairly long, I and IV about equal in length, trochanters very long, at least as long as the coxae. Only very few and weak bristles: A short pair apically-ventrally on tibia and metatarsus IV. Scopulae absent, claw tufts well developed, tarsal claws smooth, tarsal pseudoannulations and onychiums absent. The long trochanters bear dorsally several hairs (figs. 1-2), 4 on I, at least 2 or 3 on the remaining trochanters. These hairs are long, thin, more or less erect and possess distinct bothria. The existence of bothria and their position in various directions indicate that they are movable at their base and most probably sensory hairs, a kind of trichobothria. Femoral or trochanteral trichobothria are rare in spiders, known mainly from the family Uloboridae, but unknown from members of the RTA-clade. I did not find trochanteral trichobothria in spiders of *Zimirina* or an African species of *Prodidomus* (coll. J. MURPHY). Femoral trichobothria are absent. – Opisthosoma (photo 67) distally wide, dorsally covered with thin and short hairs, spigots of the anterior spinnerets fairly long, posterior spinnerets huge. – Pedipalpus (figs. 4-6) with slender femur and patella but a stout tibia, tibial apophysis claw-shaped (but see the deformed tibial apophysis in fig. 4!), bulbus (most parts are hidden) protruding, median apophysis large.

Relationships: According to the long trochanters, the absence of a thoracal fissure, the distally wide opisthosoma, and the shape of the spinnerets I regard *madagascariensis* as a member of the genus *Prodidomus* HENTZ 1847. To my knowledge the shape of the pedipalpal tibial apophysis is different from the species of South and East Africa. Trochanteral trichobothria are unknown from other members of the genus *Prodidomus* which probably has to split up.

Distribution: N-Madagascar (subrecent).

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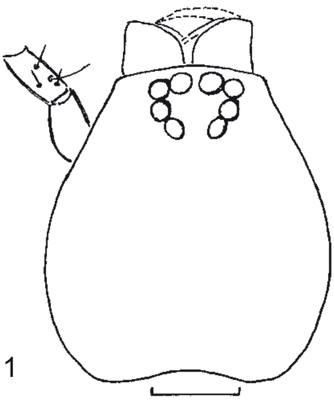
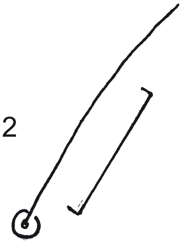
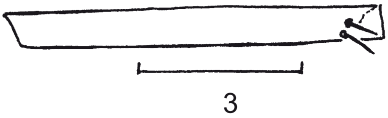
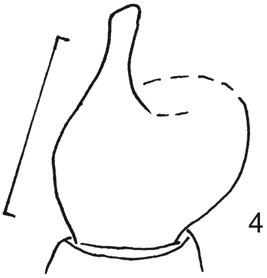
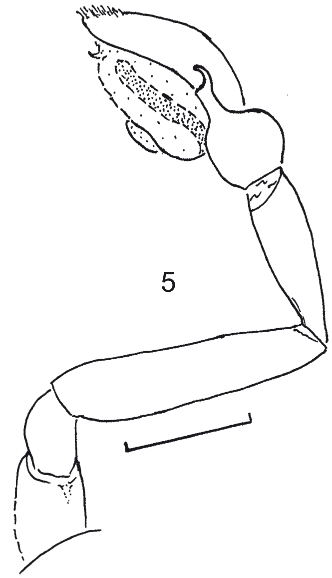
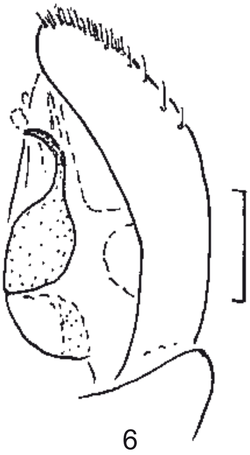


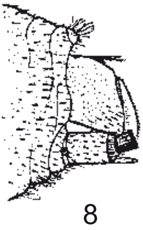


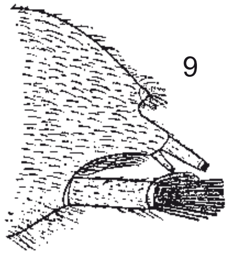


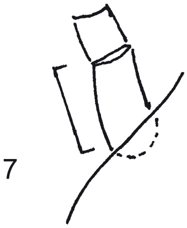


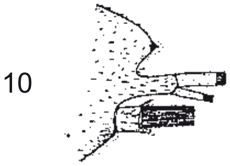








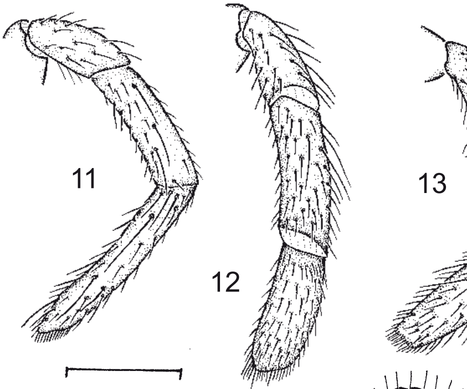


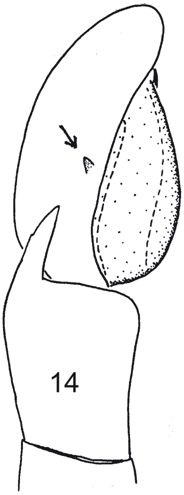


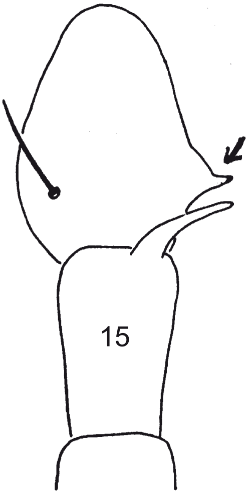
Figs. 1-6: Prodidomus madagascariensis **n. sp.**, ♂; paratype: fig. 4, remainings: the holotype; 1) dorsal aspect of the prosoma as well as the left anterior coxa and trochanter. The right fang is drawn spread off to show its great length. Note the questionable trichobothria on the trochanter. Remark: Because of the convex surface of the piece of copal above the spider the real prosoma is more slender than drawn, see the measurements; 2) questionable trichobothrium of the left posterior trochanter, prodorsal aspect; 3) proventral aspect of the left posterior metatarsus; 4) deformed left pedipalpal tibia, retrolateral aspect; 5) retrolateral aspect of the left pedipalpus (the distal parts of bulbus and cymbium are hidden); 6) prolateral aspect of the right pedipalpus (parts are hidden); scale bars 0.5 mm in figs. 1, 3 and 5, 0.2 in 4 and 6, 0.1 in fig. 2;

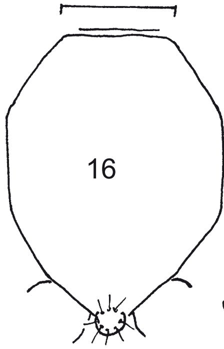
fig. 7: Zimirina sp., ♂♀, dorsal aspect of the left anterior coxa and trochanter; scale bar 0.2;

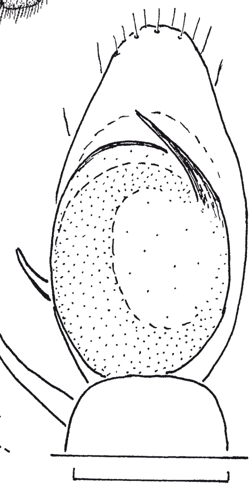
figs. 8-10: Left aspect o the SPINNERETS of three spiders of the family Prodidomidae: *Prodidomus* (8), *Zimiris* (9) and *Zimirina* (10). Taken from DALMAS (1918);

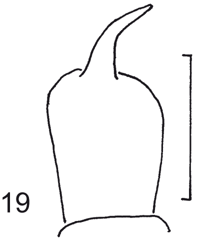


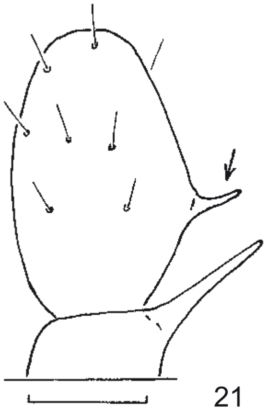


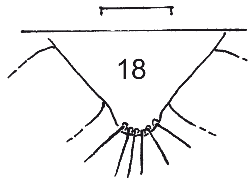


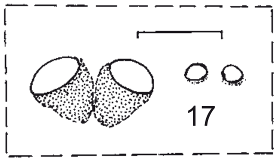












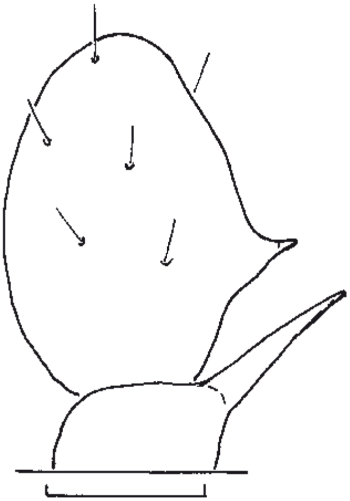
figs. 11-13: Prolateral aspect of the female pedipalpus of spiders of the family Prodidomidae: *Zimiris* (11), *Prodidomus* (12) and *Zimirina* (13). Taken from PLATNICK & PENNEY (2004);

fig. 14: *Zimirina cineris* COOKE 1964, retrolateral aspect of the r. ♂-pedipalpus; the arrow points to the cymbial "tooth"; scale bar 0.1;

fig. 15: *Zimirina spinicymbium* WUNDERLICH 1992, dorsal aspect of the r. ♂-pedipalpus; the arrow points to the cymbial "tooth"; scale bar 0.1;

fig. 16: *Prodidomus* sp., sternum. Note the hairy posterior lobe between the coxae IV; scale bar 0.5;

figs. 17-21: *Zimirina nabavii* **n. sp.**, ♂; 17) large anterior median eyes of *Zimirina cineris* COOKE 1964 (left, most common form) and related species, and tiny anterior median eyes of *Z. nabavii* n. sp. (right); 18) posterior spinose hump of the sternum; 19) dorsal aspect of the tibia of the right pedipalpus; 20) ventral aspect of the right pedipalpus; 21) dorsal and slightly prolateral aspect of the right pedipalpus: Cymbium and distal part of the tibia. Note the slender "tooth" of the cymbium (arrow); scale bars 0.1;



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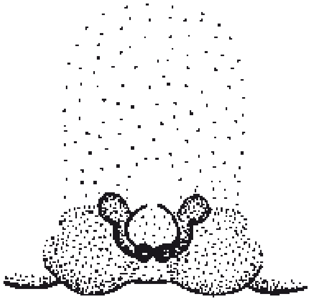

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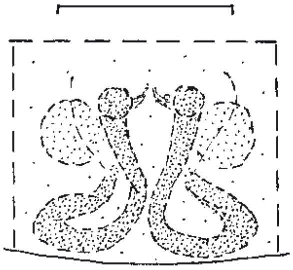

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fig. 22) *Zimirina ?cineris* COOKE 1964, dorsal and slightly prolateral aspect of the right pedipalpus: Cymbium and distal part of the tibia. Note the short cymbial "tooth" with its wide base. Scale bar 0.1;

fig. 23) *Zimirina cineris* COOKE 1964, ♀ holotype from Tenerife (Teide), epigyne/ vulva. Taken from COOKE (1964);

fig. 24) *Zimirina* ?*cineris* COOKE 1964, ♀ from Gran Canaria (N Pico de las Nievas), epigyne/vulva. Scale bar 0.1.

BEITR. ARANEOL., 6 (2011)

ON EUROPEAN SPIDERS OF THE NOMINAL FAMILIES LIOCRANIDAE, MITURGIDAE AND ZORIDAE (ARANEAE), WITH DESCRIPTIONS OF NEW TAXA

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Abstract: An identification key is given to the about 10 European spider (Araneae) genera of the family Zoridae F. O. PICKARD-CAMBRIDGE 1893 s. l. (including *Prochora* as well as the Liocranini and related taxa) (Araneae). Zoridae is proposed as a provisional name of this family but the older name Miturgidae SIMON 1892 may be correct if both are regarded as synonyms. *Prochora* SIMON 1885 and – with some hesitation – *Teminius* SIMON 1888 and *Syspira* SIMON 1895 are regarded as probably confamiliar with the Zorini and Liocranini, and all may be members of the family Miturgidae s.l.. The relationships of the closely related genera *Liocranum* L. KOCH 1866 and *Mesiotelus* SIMON 1897 are shortly discussed. *Cybaeodes* SIMON is again regarded as a member of the Gnaphosidae, with hesitation. The relationships of *Arabelia* BOSSELAERS 2009 (probably related *Cybaeodes* SIMON 1878) are shortly discussed. The following taxa are described: Prochorini **n**. **trib**. and *Apostenus* sp. indet. (Canary Islands).

Key words: Araneae, Europe, identification key, Liocranidae, Miturgidae, new taxa, Prochorini, spiders, Zoridae.

Hypotheses will go, relationships will stand.

Taken over from CHARLES DARWIN and altered.

I recently treated extant and fossil European Zoridae s. l. – including the Liocranini and related taxa – in a new sense, see WUNDERLICH (2008: 486-523). A provisional diagnosis of the family was given on p. 487 (*); see the remarks on taxonomy below. To the already known 9 extant genera *Prochora* SIMON 1895 is added in this paper with hesitation. *Lascona* GEORGESCU 1989 has turned out as a synonym of *Agraecina* SIMON 1932. The dubious genus *Macedoniella* DRENSKY 1935 - it has oval posterior median eyes and long, cylindrical anterior spinnerets - may be a member of the Gnaphosidae, see WUNDERLICH (2008: 496), and the paper on the Gnaphosidae in this volume. *Cybaeodes* SIMON 1878 is transferred back to the family Gnaphosidae, see the paper on this family in this volume. *Arabelia* BOSSELAERS 2009 from Greece: See the note at the key below. I consider the mediterranean genus *Prochora* SIMON 1885 and probably *Teminius* SIMON 1888 and *Syspira* SIMON 1895 (the Americas) to be members of the family Zoridae s. l. or of the Miturgidae (*). These three genera were transferred to the family Miturgidae by LEHTINEN (1967), and their relationships are still discussed. *Cheiracanthium* C. L. KOCH 1839 is a member of the family Clubionidae but surely not of the Miturgidae as erroneously reported/regarded by certain authors, see WUNDERLICH (2008: 491, 760).
The Mediterranean Region – about a dozen genera are reported – is apparently a "hot spot" of the family Zoridae s. l., similar to the family Dysderidae.

(*) The numerous adpressed prosomal hairs (fig. 18) in various genera of the Zoridae s. l. may be a good additional difference to most taxa of the family Corinnidae. – Feathery (branched) hairs (p. 490): Such hairs (fig. 4) exist also in *Apostenus* and the dubious genus *Arabelia*; I did not find them e.g. in *Agroeca, Prochora* and *Teminius*.

Remarks on the taxonomy of the family Zoridae F. O. PICKARD-CAMBRIDGE 1893 and related families: The diagnosis of the Zoridae which is given (e.g.) by RAVEN (2008) – as far as I know – is not different from the diagnosis of the classical Liocranidae SIMON 1897, and the Australian genera of the Zoridae sensu RAVEN may be real Zoridae/Zorinae or not. Clear differences of the Zoridae and Liocranidae to the Miturgidae SIMON 1892 besides the posterior spinnerets are also unknown to me, see below: Relationships of the Prochorini. So we have – in Europe, too – one, two or even three families or subfamilies of this group of "Ground Spiders"; their actual number is still a matter of discussion. If the three taxa in question would be regarded as a single family the name Miturgidae would have priority (!).

Key to the European genera of the family Zoridae s. l. incl. *Prochora*:

Compare the key to the extant and fossil European genera of the Zoridae s. l.: WUNDERLICH (2008: 497-499). – *Cybaeodes* and *Macedoniella*: See the paper on the family Gnaphosidae in this volume. – The monotypic genus *Arabelia* BOSSELAERS 2009 from Greece (figs. 18-21, familiar relationships unsure, legs III-IV are almost bristleless is not included in this key. Its oval posterior median eyes, gnathocoxal depressions, and widely spaced anterior spinnerets are similar to the Gnaphosidae and certain Corinnidae: Phrurolithinae but its spinnerets are different, and it really may be a genus of the family Gnaphosidae, see the paper on this family in this volume. ♂: See the paper on the Gnaphosidae in this volume.

1 Apical article of the posterior spinnerets about as long as the basal article, gnathocoxal serrula absent, hairs of the claw tufts thin, cymbium retrolaterally with a long and wide furrow (fig. 14), embolus long, with a loop partly in a basal position of the bulbus (fig. 13), epigyne (fig. 15) anteriorly with a small helm-shaped structure. Only *P. lycosiformis* O. PICKARD-CAMBRIDGE 1872, see below. Sicily . . . . *Prochora*

- Apical article of the posterior spinnerets at most half as long as the basal article, gnathocoxal serrula present, hairs of the claw tufts thin or spatulate, genital organs different, helm-shaped structure of the epigyne present or absent .2

2(1) Posterior eye row strongly recurved, see WUNDERLICH (2008: 520, figs. 24-26); feathery (branched) hairs absent 3

- Posterior eye row slightly procurved to slightly recurved (fig. 1). Feathery hairs (fig. 4) usually present at least on the basal leg articles 4

3(2) Distinctly bicoloured white/yellowish and dark brown spiders which bear conspicuous black patches/stripes on the body, see WUNDERLICH (2008: 520, fig. 24) and the legs. ♂: Ventral opisthosomal bristles absent, anterior spinnerets with a ventral brush of hairs (see WUNDERLICH (2008: 523, fig. 47)), posterior coxae usually with a ventral brush of hairs. ♀: Epigyne with a central pit . . . . *Zora*

- Almost unicoloured brown spiders without distinct marking of the body. ♂: Opisthosoma ventrally with short bristles (fig. 17a), see WUNDERLICH (2004 A: photo. 363), and *Agroeca*, no. 9; anterior spinnerets and posterior coxae without brushes of hairs/bristles. Pedipalpus similar to fig. 16a). ♀: Epigyne without a central pit, usually with a wide and wing-shaped structure. In Central Europe only *A. fuscus*. . . . . *Apostenus*

4(2) Smallest European Zoridae, body length 2.0-3.5 (♀) mm. Distance between the posterior median eyes wider than to the lateral eyes. Tibia I-II usually with 7-10 pairs of ventral bristles . . . . *Scotina*

- Body length usually 3.5-12 mm (2.4 mm in *Apostenus* sp., see below). Eyes of the posterior row equidistant (e.g. fig. 1). Number of ventral tibial bristles variable. 5

5(4) The tarsi bear dense (spatulate) claw tufts, tarsi and metatarsi bear dense scopulae. Only *S. rutilans* (= *Liocranum r.*) . . . . *Sagana*

- Claw tufts absent or quite indistinct (no spatulate hairs), tarsal/metatarsal scopulae absent. 6

6(4) Sclerotized praecoxal triangles present (distinct at least on III-IV), see WUNDERLICH (2008: 521, fig. 33). Median ♀-spinnerets more or less compressed 7

- Praecoxal triangles absent. Median ♀-spinnerets notcompressed 8

7(6) Tibia I bears usually 4-11 pairs of ventral bristles. ♀: Median spinnerets strongly flattened laterally (like in *Sagana*, no. 5), epigyne, e.g., fig. 12b. Southern Europe; in Central Europe only *L. rupicola* . . . . *Liocranum*

- Tibia I bears usually 2 pairs of ventral bristles. ♀: Median spinnerets not or only slightly flattened; epigyne, e.g., figs. 12a. Southern Europe . . . . *Mesiotelus*

8(6) Metatarsi I-II bear usually 3 (rarely 2) pairs of ventral bristles. The ♂-opisthosoma of certain species bears ventral bristles/spines (*) similar to most *Apostenus* (no. 3). Tegulum with longitudinal folds, median apophysis with a long and slender distal half whose tip points medially, epigyne with a pair of strongly sclerotized introductory openings and a large v-shaped medial field. . . . . *Agroeca*

- Metatarsi I-II bear usually 2 (rarely 3) pairs of ventral bristles. Ventral bristles/spines of the ♂-opisthosoma absent. Tegulum without folds, median apophysis and epigyne different. 9

9(8) ♂: Median apophysis very long, bulbus with an additional long and thin tegular apophysis. ♀: Epigyne with a medium septum, without helm-shaped anterior structure. (The eyes may be strongly reduced in cave spiders). E.g. *A. lineata* . . . . . . *Agraecina*

- ♂: Median apophysis stout, additional spine-shaped tegular apophysis absent. ♀: Epigyne with a shallow median furrow and an anterior helm-shaped structure. Only *L. striata* . . . .*Liocranoeca*

(*) I found none of such bristles/spines in *inopinata* but thin bristles existing in *dentigera* and *proxima* and short spines existing in *brunnea* and *cuprea*.

Mesiotelus grancanariensis WUNDERLICH 1992 (figs. 1-12) photo 88

Material: (1) Portugal, N-Algarve, 1 km N Bordeira, way at a brook and the margin of a mixed forest, between almost vertical cracks of earth, JW leg. a subadult male mid VIII 2008 and a subad. female JW leg. mid VIII 2009, adult 6. X. 2008 and end of XII 2009; both were fed with Drosophila and Zygentoma, CJW; (2) Gran Canaria (Canary Islands) ♂ ♀ P. NABAVI leg., CJW.

Diagnosis: Tibiae and metatarsi I-II ventrally with two irregular rows of bristle-shaped hairs (fig. 5), tibiae I-II bear 2 pairs of ventral bristles, metatarsi I-II only a single pair. ♂-pedipalpus: Figs. 9-12; ♀: The median spinnerets are weakly depressed; epigyne/vulva: See WUNDERLICH (1992: 602: 756-756a).

Description (♂ from Portugal; ♀ see photo 88, and WUNDERLICH (1992: 480-481)):
Measurements (in mm): Body length 4.1, prosoma: Length 1.8, width 1.5; leg I: Femur 2.0, patella 1.0, tibia 2.0, metatarsus 1.65, tarsus 1.0, tibia II 1.7, tibia III 1.3, tibia IV 2.0; length of a basal cheliceral article 0.9; pedipalpus: Patella 0.5, tibia 0.45.
Colour: Prosoma light to medium grey or yellow grey (margin not or weakly darkened), legs light grey, opisthosoma dark grey, ventrally lighter.
Prosoma (figs. 1-3) 1.16 times longer than wide, densely covered with short depressed hairs, thorax not raised, thoracal fissure short, eyes of medium size, posterior row slightly recurved, posterior median eyes spaced by more than their diameter, basal cheliceral articles long and slender, anteriorly with long hairs, anterior margin of its furrow with 3 teeth, posterior margin with 2 teeth which are widely spaced, fangs long and bent in a right angle in the basal half, labium slightly longer than wide, gnathocoxae distinctly longer than wide, praecoxal triangles present but weakly developed on I-II, coxae IV spaced by less than their radius. – Legs (figs. 4-6) fairly long and slender, bearing numerous feathery hairs. Bristles on legs I-II: Femora dorsally 1/1, I additionally with a single prodistal one, tibiae ventrally 2 pairs, metatarsi with a long ventral pair in the basal half. Trochanters not notched. Scopulae absent but tibiae and metatarsi I-II bear ventrally two rows of bristle-shaped hairs except basally (apparently modified scopulae), metatarsi with two long trichobothria, tarsi with several long trichobothria and a weak pseudoscopula (thin hairs), claw tufts practically absent (very few thin hairs), tarsal claws with long as well as short teeth (3/3 on IV). Position of the tiny tarsal organ in the middle of the length of the article. – Opisthosoma (figs. 7-8) 1.7 times longer than wide, covered with short hairs (anteriorly with longer hairs), genital area wider than long, sclerotized anteriorly, epiandrous gland spigots apparently absent. Spinnerets fairly short and close together, the medians not flattened. – ♂-pedipalpus (figs. 9-12): Patella almost twice as long, with a dorsal bristle in the distal half, tibia twice as long as wide, dorsally with several long bristles, with at least 6 trichobothria, ventrally with numerous long bristles, cymbium with a long prodistal bristle, retrolaterally not widened.

Relationships: As already pointed out by BARRIENTOS & URONES (1985: 354-355) the genera *Liocranum* L. KOCH 1866 and *Mesiotelus* SIMON 1897 are closely related, and a revision is urgently needed. – Ventral bristle-shaped hairs of tibiae and metatarsi I-II (fig. 5): These hairs were not mentioned by me in the original description of *M. grancanariensis* (most hairs were rubbed off); they exist in related species, too. – In *M. tenuissimus* L. KOCH 1866) the position of the median apophysis is more distally than in *grancanariensis*.

Distribution: Originally described from the Canary Island Gran Canaria (and regarded as a Canarian endemic), recently discovered by the present author on the European mainland, close to the west coast of Portugal.

Remarks on *Liocranum variabilis* WUNDERLICH 2008 and related species of the Mediterranea

See WUNDERLICH (2008: 508) and LEDOUX (2008: 57-58, figs. 19-20). In *L. apertum* DENIS 1954 (?= *L. varius* SIMON 1878) sensu LEDOUX the genital structures – especially the epigyne – are quite similar to *L. variabilis* but the body is distinctly darkened and spotted. These species have to revise.

Apostenus WESTRING 1851

Apostenus sp. indet. (figs. 16-16a)

Material: Canary Island Tenerife, Anaga Mountains, at the road to the Pico Ingles, laurisiva, 1♂ leg. 13. IX. 2001; Univ. La Laguna (T13 <100>).

The body length of the spider is 2.4 mm, its prosomal length is 1.15 mm, the legs are distinctly annulated, the ventral opisthosomal bristles are short and indistinct (probably partly rubbed off); ♂-pedipalpus (figs. 16-16a): The tibial apophysis is wide and stands out, the structures of the bulbus are similar to *A. annulipedes* sensu WUNDERLICH (1992: 478, figs. 750e-h) (Tenerife, Bco. del Pino) (really *annulipes*?), in which a slender tibial apophysis and a large conductor exist.
On Tenerife exist at least two or even three species of the genus *Apostenus* WESTRING 1851. The locus typicus of *annulipedes* (female holotype) is Esperanza. One of the males – the male from the Bco. del Pino or the male which is treated in the present paper – may be conspecific with the holotype of *annulipedes* or not; both sexes from the same localities are needed for sure conclusions.

Distribution: Canary Islands, Tenerife.

Apostenus grancanariensis WUNDERLICH 1992 (figs. 17a-d)

Material: Canary Islands: Gran Canaria, numerous specimens from different localities, pit falls, P. NABAVI leg., coll. P. N.; 6 ♂2♀, NW Artenara, grasland with pines, 1250 m, P. N. leg. 21. XI. 1999 – 15. I. 2000, CJW.

Description of the male which was unknown up to now:
Measurements (in mm): Body length 1.7-2.0, prosomal length 0.9-1.0, tibia I 0.7, tibia IV 0.8. – Opisthosoma ventrally with a large field of tiny bristles (fig. 17a) like in other congenerics. Leg bristles like in the female. Pedipalpus (figs. 17b-c; d): with a thick and almost pointed embolus and a slender median apophysis.

Relationships: In *A. annulipedes* WUNDERLICH 1987 from Tenerife the apical part of the embolus is wider – see WUNDERLICH (1992: Fig. 750g) –, in *A*. sp. indet. from Tenerife (fig. 16a) the embolus is more pointed.

Remark: In one of the males (CJW) the left pedipalpus is a malformation in which an additional tibial apophysis exists (arrow in fig. 17d), the cymbium is shortened, and the bulbus is absent. The right pedipalpus has a normal shape.

Distribution: Canary Islands: Gran Canaria.

PROCHORINI n. trib. (figs. 13-15)

Type genus (by monotypy): *Prochora* SIMON 1885.

Diagnosis: GNATHOCOXAL SERRULA ABSENT, praecoxal triangles absent, trochanters strongly notched, posterior eye row fairly procurved; ♂-pedipalpus (figs. 13-14): Cymbium with a long and wide retrolateral depression/furrow. Epigyne (fig. 15) anteriorly with a small sclerotized helm-shaped structure, vulva with long, thick and tangled ducts.

Further characters/description: Body length about 1 cm, colour of body and legs medium brown, prosomal cuticula finelly furrowed, eye field narrow, posterior median eye lenses circular, clypeus short, labium free, about as long as wide, gnathocoxal depressions absent, fangs long, basal cheliceral articles large, number of the teeth of its anterior/posterior margins 3/2, leg bristles numerous but absent on the patellae, tibiae I-II bear two ventral pairs (thin in the female), and short apical bristles, tarsal and metatarsal scopula dense and undivided, dense claw tufts of thin hairs exist, tarsal trichobothria in two irregular rows, feathery (branched) hairs absent, apical article of the posterior spinnerets about as long as the basal article, colulus strongly reduced or even absent, several longer hairs exist in this area. ♂-pedipalpus (fig. 13-14): Retrolateral tibial apophysis bifurcate, bulbus with complicated structures, the embolus describes a wide loop in a counterclockwise position of the right pedipalpus.

Relationships: *Prochora* has been regarded as a member of the Liocranidae by SIMON (1897) and was transferred to the family Miturgidae by LEHTINEN (1967) without a stringent foundation. The "diagnoses" of the Miturgidae given by JOCQUE & DIPPE-

NAAR-SCHOEMAN (2007: 174) and in UBICK et al. (2004: 173) do not indicate significant differences to the diagnosis of the Zoridae/Liocranidae besides the posterior spinnerets. In *Prochora* and *Teminius* the apical article of the posterior spinnerets is about as long as the basal article. Relatively long apical articles of the posterior spinnerets (they are long in the Miturginae) exist in *Zora*, too (I found the apical article about half of the length of the basal article in males), and the shape of the spinnerets is quite variable within families like Clubionidae, Gnaphosidae and Zoridae/Liocranidae. A retrolateral cymbial furrow (fig. 14) exists in certain Miturgidae s. str. but it evolved convergently in numerous spider families like Clubionidae, Corinnidae, Gnaphosidae, Thomisidae, Salticidae, and Zoridae/Liocranidae; compared to *Prochora* it is less developed in *Liocranum* and *Teminius*. Thick and heavily sclerotized ducts of the vulva exist in *Prochora* and *Teminius* like in most Miturgidae but exist quite similar in related taxa as well, e. g., in *Agroeca* (Liocraninae). A helm-shaped anterior structure of the epigyne (existing or absent within several families) exists in several genera of the Zoridae/Liocranidae but – so far known to me – not in the Miturginae. Therefore – with little hesitation – I regard the Prochorini as a member of the Zoridae s. l. A gnathocoxal serrula exists in the remaining Zoridae/Liocranidae/Miturginae which are known to me. – According to the absence of praecoxal triangles, the existence of thin hairs of the claw tufts, and – less distinct – to the position of the eyes (the posterior row may be only slightly procurved in the Agroecini) the Agroecini may be most related but in the Agroecini the apical article of the posterior spinnerets is short, trochanteral notchs are absent, the claw tufts are less developed, and the genital organs – e.g. cymbium, embolus, epigyne, vulva – are distinctly different.

Distribution: Palaearctic: Mediterranean.

Prochora SIMON 1885

Diagnosis: See the tribus. Femur of the male pedipalpus ventrally-distally with a row of bristle-shaped hairs on elevations, the embolus reachs the pedipalpal tibia.

Relationships:*Teminius* SIMON 1888 (the Americas) may be most related: The long apical article of the posterior spinnerets, its numerous adpressed prosomal hairs, strong trochanteral notchs, claw tufts and leg scopulae are as in *Prochora*, praecoxal triangles, feathery hairs and patellar bristles are completely absent, too, the conformation of the structures of the male pedipalpus are similar, the ducts of the vulva are also thick, tangled and heavily sclerotized, but the posterior eye row is only slightly procurved in *Teminius*, a gnathocoxal serrula exists, an anterior helm-shaped and sclerotized structure of the epigyne is absent, the retrolateral cymbial depression/furrow is much smaller, and a median apophysis which stands out is absent. – In *Syspira* SIMON 1895 (USA) the apical article of the posterior spinnerets is shorter.

Distribution: Israel, Sicily.

The single known (**type-)species** of *Prochora*:

Prochora lycosiformis (O. PICKARD-CAMBRIDGE 1872) (figs. 13-15)

Material: 1♂1♀ from Israel as a loan with many thanks from G. LEVY, Hebrew University of Jerusalem.

Diagnosis: ♂-pedipalpus (figs. 13-14): Embolus long, basally reaching the pedipalpal tibia, epigyne as in fig. 15.

Description and **relationships:** See above.

Distribution: Israel, Sicily.

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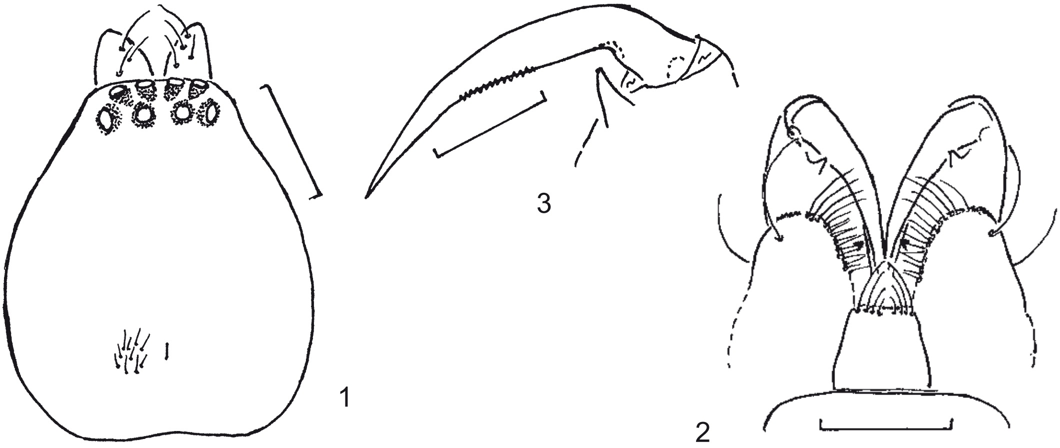
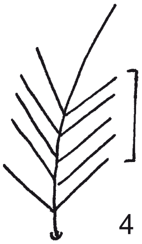


Figs. 1-12: *Mesiotelus grancanariensis* WUNDERLICH 1992, ♂ from Portugal; 1) Dorsal aspect of the prosoma. Only small fields of the long cheliceral and the dense prosomal hairs are drawn; 2) ventral aspect of the mouth parts. Only few hairs are drawn; 3) retroventral aspect of the left fang which is strongly bent in the basal half; 4) feathery (branched) hair of the left coxa I; 5) prolateral aspect of the right leg I. The tarsal



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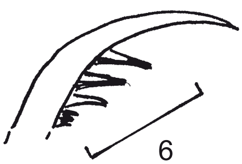

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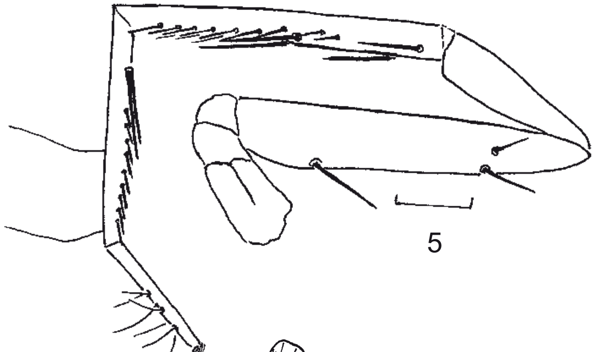

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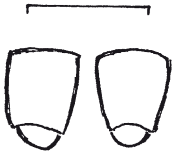

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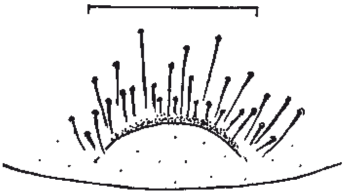

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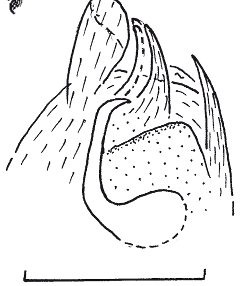

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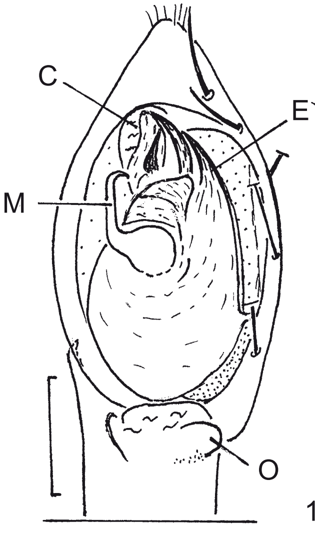

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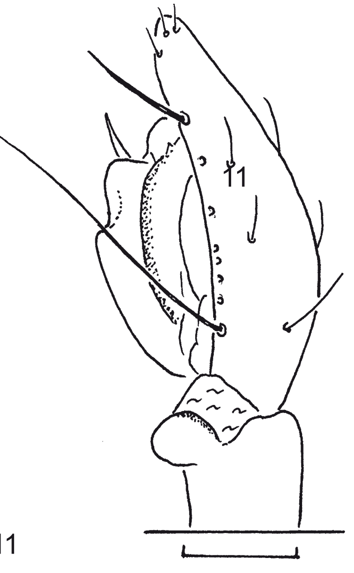

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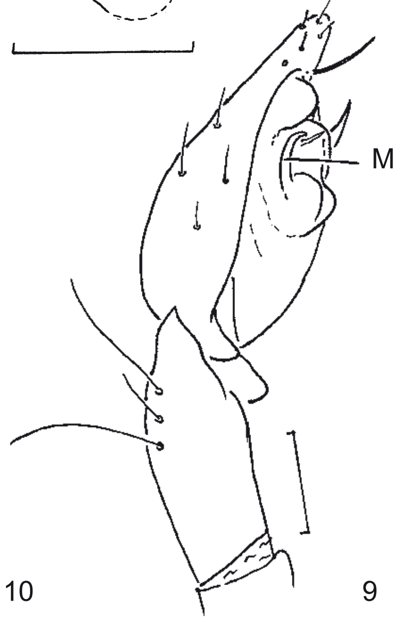

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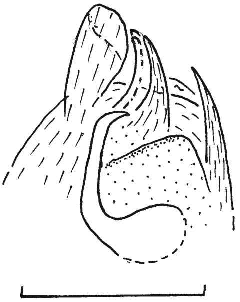
and metatarsal trichobothria as well as the bristles and the tibial and metatarsal bristle-shaped hairs are drawn but no normal hairs; 6) retrolateral aspect of the left retroclaw IV; 7) genital area in front of the epigastral furrow in which no epiandrous gland spigots are recognizable. Not all of the hairs anteriorly of the pit are drawn; 8) outline of the anterior spinnerets, ventral aspect; 9) retrolateral aspect of the right pedipalpus; 10) prolateral aspect of the right pedipalpus. Only two of the long retrolateral bristle-shaped cymbial hairs are drawn; 11) ventral aspect of the right pedipalpus; 12) slightly different retroventral aspects of the distal part of the right pedipalpus. C = conductor, E = embolus, M = median apophysis, O = proventral-distal outgrowth of the pedipalpal tibia. Scale bars 0.5 mm in figs. 1-2 and 5, 0.05 in fig. 4 and 6, 0.1 in fig. 7, 0.2 in the remaining figs;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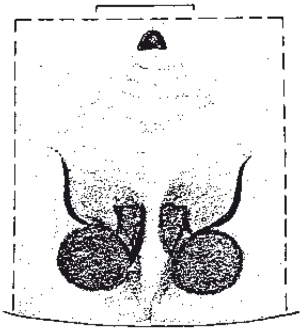
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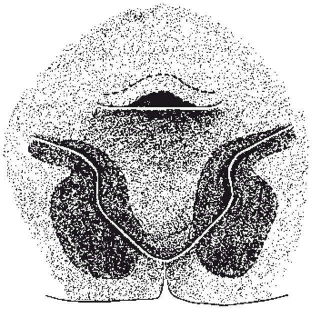
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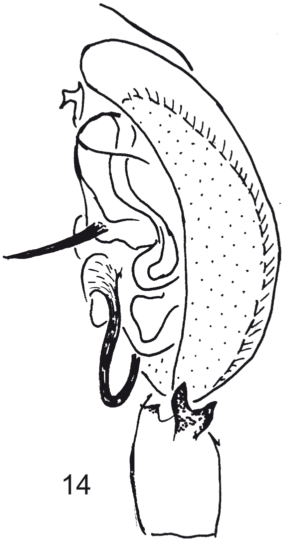
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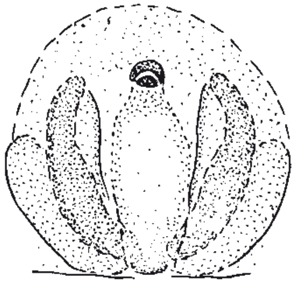
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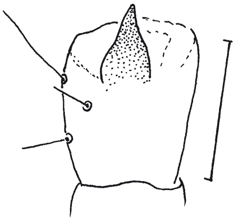
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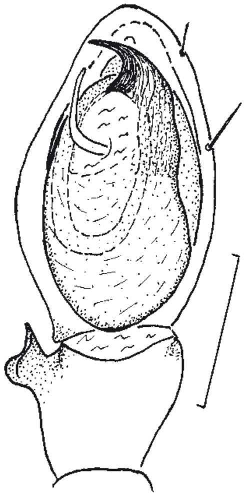
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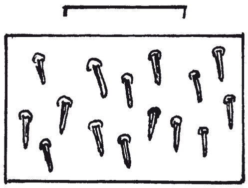
fig. 12a) *Mesiotelus grancanariensis* WUNDERLICH 1992, ♀, epigyne. Scale 0.1 mm;

fig. 12b) *Liocranum rupicola* (WALCKENAER 1928), ♀, epigyne. Taken from GRIMM (1986).

figs. 13-15: *Prochora lycosiformis* (O. PICKARD-CAMBRIDGE 1872); 13-14: Ventral and retrolateral aspect of the left ♂-pedipalpus; 15) ♀, epigyne;

figs. 16-16a: *Apostenus* sp. indet., ♂ (Tenerife, Anaga mountains); 16) retrolateral aspect of the right pedipalpal tibia; 17) ventral aspect of the right pedipalpus. The bulbus is slightly expanded. Scale bars 0.2 mm;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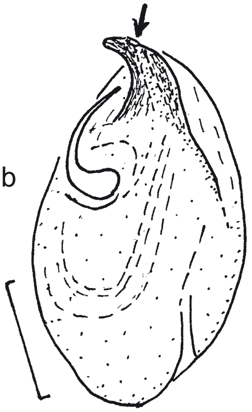
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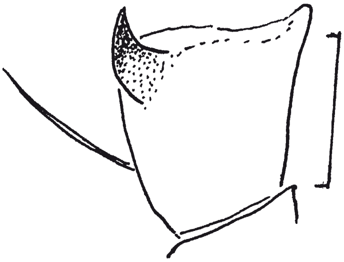
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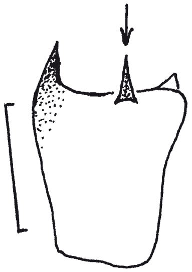
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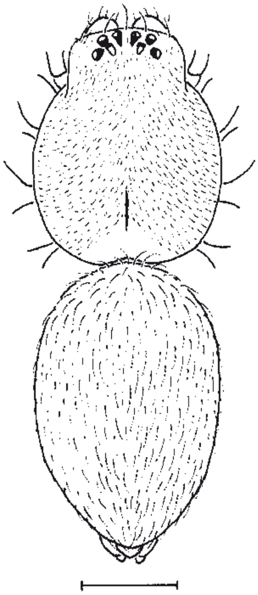
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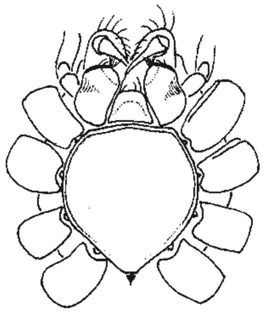
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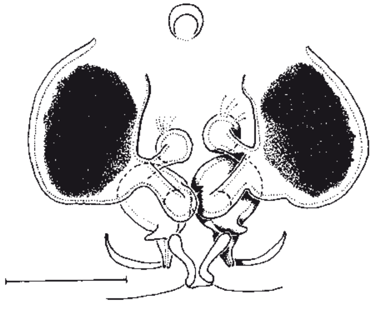
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figs. 17a-d: <u>*Apostenus grancanariensis*</u> WUNDERLICH 1992, ♂; 17a) tiny bristles of the ventral-medial part of the opisthosoma; 17b) ventral aspect of the left bulbus; the arrow points to the opening of the sperm duct; 17c) dorsal aspect of the right pedipalpal tibia; 17d) dorsal aspect of the left pedipalpal tibia: A malformation with an additional apophysis (arrow). Scale bar 0.1;

figs. 18-21: <u>*Arabelia pheidoleicomes*</u> BOSSELAERS 2009 ♀ (Greece); 18) dorsal aspect of the body; 19) ventral aspect of the prosoma; 20) epigyne; 21) vulva. Scale bars 0.5 in figs. 18-19), 0.25 in 20), 0.1 in fig. 21).Taken from BOSSELAERS.

BEITR. ARANEOL., 6 (2011)

ON EXTANT AND FOSSIL (EOCENE) HOLARCTIC SAC SPIDERS (ARANEAE: CLUBIONIDAE), WITH DESCRIPTIONS OF NEW TAXA

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Abstract: The supposedly four extant and fossil (Eocene) subfamilies as well as the tribes and genera of the family Clubionidae (Araneae) – mainly from Europe – are treated, Ataliini **n. trib**., Microclubionini **n. trib**. (Clubioninae) are described, Eutichurinae LEHTINEN 1967 (= Cheiracanthinae WAGNER 1887, praeocc.) and Systariinae DEELEMAN-REINHOLD 2001 are again regarded as taxa of the Clubionidae but not of the Miturgidae (**rev. relat**.); Clubioninae (extant) and Eodotinae **n. subfam**. (extinct, Eocene Baltic amber, with its type genus *Eodoter* PETRUNKEVITCH 1958) are described and/or revised. *Eodoter scutata* **n. sp**. and *E. tibialis* **n. sp**. are described. Members of extant genera like *Clubiona* LATREILLE 1804 are unknown from the Baltic amber forest; Eodotinae is the only – most probably clubionid - subfamily known from Eocene fossils. – *Systariella* WUNDERLICH 2008 (extinct) is excluded from the Clubionidae and considered as incertae sedis of the superfamily Clubionoidea (**n. relat**.). – The diverse genus *Clubiona* LETREILLE 1804 is split up; described, revived or upgraded are the extant genera *Atalia* THORELL 1887 (= *Paraclubiona* LOHMANDER 1945) (**gen. resurr**.), *Breviclubiona* **n. gen**., *Euryclubiona* LOHMANDER 1945 (**gen. resurr.**), *Gauroclubiona* LOHMANDER 1945 (**gen. resurr.**), *Hyloclubiona* LOHMANDER 1945 (**n. stat**., from *Clubiona*), *Marmorclubiona* **n. gen**., *Microclubiona* LOHMANDER 1945 (**gen. resurr**.), *Porrhoclubiona* LOHMANDER 1945 (**n. stat**., from *Clubiona*.), and *Tolophus* THORELL 1891 (= *Japoniona* MIKHAILOV 1990) (**gen. resurr**.). *Bicluona* MIKHAILOV 1994 is upgraded from the subgenus to the genus rank (**n. stat**.), the taxa *Epiclubiona* LOHMANDER 1945, and *Heteroclubiona* LOHMANDER 1945 are provisionally regarded as subgenera of *Clubiona* s. l. (they may be regarded as genera of their own). *Clubiona pteronetoides* DEELEMAN-REINHOLD 2001 and *C. viridula* ONO 1989 are transferred to *Porrhoclubiona* (**n**. **comb**.), *Clubiona alexeevi* MIKHAILOV 1990 is transferred to *Breviclubiona* (**n. comb**.), *Clubiona hyrcanica* MIKHAILOV 1990 is transferred to *Marmorclubiona* (**n. comb**.), *Clubiona moesta* BANKS 1890 and *Clubiona subtilis* L. KOCH 1860 are transfered to *Microclubiona* (**n. comb**.).

Key words: *Alloclubionoides*, Araneae, *Atalia*, Ataliini, *Breviclubiona*, *Bicluona*, *Cheiracanthium*, Cheiracanthidae, Clubionidae, Clubioninae, *Elaver*, Eocene, *Eodoter*, Eodotinae, *Euryclubiona*, Eutichurinae, fossils, *Gauroclubiona*, *Japoniona*, Liocranidae, *Marmorclubiona*, *Microclubiona*, Microclubionini, Miturgidae, new taxa, Palaeogene, *Porrhoclubiona*, spiders, Systariinae, *Tolophus*, Zoridae.

Methods: See above and below: The paragraph on fossils and phylogeny.

The importance of fossils is demonstrated once more by Eocene taxa in Baltic amber which provide impulses for studies on today's spider taxa for finding out the relationships of – in this case the clubionid subfamilies –, and may give hints to their phylogeny (if the present author is drawing correct conclusions). *Eodoter* is one of the most interesting genera in Baltic amber; it may help to throw light upon the phylogeny of the Clubionidae which is one of the most difficult spider family in this respect.

Sac Spiders (Clubionidae) are diverse worldwide and in Europe today (the number of genera has risen with this paper from two to ten; two ones are described for the first time, others are revived). Sac spiders are usually more or less yellow or (pale) brown animals which possess light legs and frequently a wide cephalic part which bears a wide eye field in two almost parallel rows (figs 13, 27, photo 40b); their males (e.g. in *Cheiracanthium*) are frequently not smaller than their females, the anterior spinnerets of the males in European taxa are frequently long and almost cylindrical (figs. 4, 11) – except in the Microclubionini, fig. 41 –, similar to the Gnaphosidae but closer together. Most species are dwellers of higher strata of the vegetation. The females guard their egg sacs and frequently their offsprings, too. – A worldwide revision of the higher taxa of the family Clubionidae – as well as of the Miturgidae and Zoridae/Liocranidae – is urgently needed, including the morphology of their spinnerets.

Fossils – mainly from the Eocene – and phylogeny

Within the part on fossils in the World Catalog of Spiders by PLATNICK (2009) 6 species of the genus *Clubiona* LATREILLE 1804 in Baltic amber are listed which were described by C. L. KOCH & BERENDT (1854): *attenuata* (♀) (not found by M. MORITZ when I visited the Humboldt University in 1988), *lanata,* (♀) *microphthalma* (?ad. ♀), *pubescens* (a badly preserved juvenile female spider), *sericea* (♀) and *tomentosa* (♀) (which may be a member of the genus *Sosybius,* Trochanteriidae). Not a single adult male has been described by these authors, and no epigyne has been dscribed or figured. Among 100 000 specimens of spiders in Baltic amber I did not find a single member of *Clubiona* or another extant genus of the Clubioninae. Most of the fossil spiders which were described under *Clubiona* may be members of the families Corinnidae or Liocranidae which are not rare in Baltic amber, see WUNDERLICH (2004: 1614). A proof of the genus *Clubiona* in Baltic amber does not exist. The relationships of the fossil species in question to *Eodoter* are also obscure; *Clubiona attenuata*, e. g., has – according to its first description - the anterior spinnerets spaced in contrast to *Eodoter* (fig.11). I prefer to set such taxa in quotation marks: "*Clubiona*".

Further fossil spider taxa in Baltic amber than those mentioned above:
The genus *Systariella* WUNDERLICH 2008 is here excluded from the subfamily Systariinae and questioned as a member of the Clubionidae according to the narrow eye field (the shape of the anterior spinnerets and the existence of trochanteral notches are unknown); it regarded as incertae sedis of the superfamily Clubionoidea (**n. relat**.); it may be related to the Zoridae/Liocranidae.

PETRUNKEVITCH described under Clubionoidea: Clubionidae: Micariinae two monotypic genera whose relationships are unsure: *Massula* in 1942, based on an adult male, and *Machilla* in 1958, based on a juvenile female. (Characters of these genera like position and shape of the eyes and the shape of the gnathocoxae are quite different from the Micariini which are members of the Gnaphosidae). According to PETRUNKEVITCH leg scopulae are absent (they exist in the Clubionidae; have they been overlooked by PETRUNKEVITCH in these two spiders?), and two parallel eye rows exist with the laterals widely spaced from each other in both genera; in *Massula* the large anterior eyes are contiguous and the anterior metatarsi bear only a single pair of ventral bristles (this paatern is unknown in *Machilla*).

PETRUNKEVITCH (1958: 323-331) described two new genera under Clubionidae incertae sedis: *Cryptoplanus*, which was regarded as a questionable member of the Liocranidae or Corinnidae by WUNDERLICH (2008: 496). *Concursator* was based on two juvenile females. I regard *Concursator* as a Clubionoidea incertae sedis.

Within the family Clubionidae MENGE in KOCH & BERENDT (1854: 69) described the new genus *Erithus* (type species by monotypy *E. applanatus*) in Baltic amber. The sex of the holotype has not been noted, and most probably the holotype is lost. I regard it as a nomen nudum because a description is absent, and only a short remark is given on the position of the eyes.

Remark on four fossil (Palaeogene) species which were described by SCUDDER (1890) from North America (Florissant) stones: *Clubiona arcana*, *C. eversa*, *C. latebrosa* and *C. ostentata*: According to their preservations, descriptions and figures even the family relationships of these taxa are quite unsure.

Remark on a fossil (Neogene) spider from Oeningen (Switzerland) which is preserved in stone: *Clubiona eseri* HEER 1865 is regarded here as a nomen nudum because a description is absent, and the drawing of this species is insufficient; even its family relationships are unsure.

Clubionidae are quite rare in the Eocene Baltic amber; I recognised only specimens of a singele extinct genus, about 15 specimens of the genus *Eodoter* PETRUNKEVITCH 1958 which is a member of the extinct subfamily Eodotinae n. subfam. This subfamily may be the sister taxon to the remaining clubionid subfamilies. Interestingly

a similar taxonomic situation exists within other araneomorph spiders of the “trionycha”, too: Within the Ground Spiders (Gnaphosidae) also only the single and most ancient subfamily is known from the Eocene in Baltic amber, and within the known Eocene Crab Spiders (Thomisidae) and Jumping Spiders (Salticidae) the derived subfamilies are unknown or extremely rare (Salticidae), and – at least members of the subfamily Thomisinae – were probably even still absent in this Eocene kind of amber (or even in the Eocene worldwide?). These families – and numerous other families - do not share a single Eocene genus with an extant one. Although we do not know which taxa existed in other parts of the World in the Eocene we may consider a relatively late radiation of most subfamilies of the families in question (and others of the RTA-clade like Lycosidae or of the superfamily Araneoidea like Linyphiidae); see WUNDERLICH (2008: 524 ff).
The Clubionidae of the Eocene which are preserved in Baltic amber possessed already the most important family characters like the reduced tarsal claw (and its teeth) of the ♀-pedipalpus (figs. 14), a wide eye field (figs. 13, photos 36-38) as well as – sexually dimorphic – long and almost cylindrical anterior spinnerets - solely in the sex (fig. 4) –, and diverging male chelicerae (fig. 1, photo 36b). In most (or all?) taxa of the advanced subfamily Clubioninae the median apophysis of the male pedipalpus has been lost (figs. 36, 43) in contrast to the Eocene fossils (fig. 9), see the possible cladogram below.

Possible CONVERGENCES within the family Clubionidae – mainly regarding the genus *Elaver* O. PICKARD-CAMBRIDGE 1898 – are discussed in the following:
The diverse structure and position of the “median apophysis” and the “functional conductor” may indicate that these structures evolved independently several times within the family Clubionidae, e.g., in *Elaver* and in the Eodotinae (genus *Eodoter*).
Trochanteral notches – ventral-apical inclinations which are usually more distinct on the legs III-IV (fig. 23) – are known within the Clubionidae in the subfamilies Eutichurinae (the genus *Cheiracanthium* is an example) and Systariinae apparently as apomorphies as well as in the genus *Elaver* which is traditionally regarded as a member of the subfamily Clubioninae. The existence of such a notch is surely not an suprageneric important taxonomical character (see above, “tendencies”), and the transfer of the three taxa in question from Clubionidae to Miturgidae mainly (!) based on the existence of such a notch is too simple and not justified in my opinion. The genus *Elaver* is characterized, e.g., by an epigynal scape in an anterior position (fig. 53). A scape in this position (similar to numerous Gnaphosidae) is quite rare within the Clubionidae (it is unique within the subfamily Clubioninae), and it furthermore exists in the extinct subfamily Eodotinae (the single genus *Eodoter*). Both taxa also share a weak leg scopula but the trochanters III-IV are distinctly notched in *Elaver* in contrast to *Eodoter*, and the conformation of the structures of the bulbus is quite different in both taxa: In *Eodoter* (fig. 9) a long embolus exists which originates basally on the bulbus as well as a long and slender median apophysis in contrast to the short and thick embolus in a distal position and a short hook-shaped median apophysis in *Elaver* (fig. 52). In respect to these differences it seems more likely to me that *Elaver* and *Eodoter* are not closely related to each other, and that they are supposedly taxa of different subfamilies although a special common structure of the epigyne exists.
A shallow conductor is a good character of the Clubionidae. In *Porrhoclubiona* of the Microclubionini (fig. 43) this kind of conductor is strongly – in my opinion a reversal taking in account other characters, see the cladogram.

A transverse depression of the ♂-gnathocoxae (fig. 45) evolved in *Hyloclubiona compta* convergently to the Gnaphosidae (as well as to few Systariinae like *Xantharia floreni*, see DEELEMAN-REINHOLD (2001: Fig. 258)). The long mouth parts in those taxa may be a disposition to such a depression.

Taxonomy and synonymy

DEELEMAN-REINHOLD (2001) distinguished three subfamilies of the Clubionidae in SE-Asia: Clubioninae, Eutichurinae (including *Cheiracanthium* C. L. KOCH 1839), and Systariinae DEELEMAN-REINHOLD 2001, see WUNDERLICH (2008: 1613). In PLATNICK's World Catalog of Spiders (2009) Eutichurinae and Systariinae are listed under Miturgidae but – in accordance with DEELEMAN-REINHOLD (2001) – I regard both taxa as members of the family Clubionidae (**rev. relat**.). Eutichurinae (= Cheiracanthinae): Members of *Cheiracanthium* are light coloured and weakly sclerotized spiders which are dwellers of higher strata of the vegetation, can jump, possess a wide eye field in two almost parallel rows and a smooth tarsal claw of the female pedipalpus like *Clubiona* but different from the Miturgidae. (The importance of trochanteral notches: See above, on the relationships of the genus *Elaver*).

If *Eutichurus* SIMON 1896 and *Cheiracanthium* C. L. KOCH 1839 are both regarded as taxa of the same subfamily two problems come up: (1) Eutichurinae LEHTINEN 1967 should be a junior synonym of Cheiracanthinae WAGNER 1887. (2) According to Y. MARUSIK (in litt. V. 2008) Cheiracanthidae WAGNER 1887 is praeoccupied by Cheiracantidae DRESNO 1861 (fishes), DIESING 1861 as well as COBBOLD 1878. In the present paper I will therefore use the name Eutichurinae. In my opinion is no need to create a separate family for the Eutichurinae.

My conclusions on the genera of the Clubionidae of the Northern Hemisphere – which are fairly well studied in contrast to the taxa of the Southern Hemisphere – are partly similar to the results of the studies by DEELEMAN-REINHOLD (2001), MIKHAILOV (1995, 2003), and WIEHLE (1965). Certain convergent developments and reversals are still problems which have to be solved in the future; see above (on *Elaver*) and the cladogram below. I agree in most parts with the splitting by LOHMANDER (1945) who provided two alternative classifications within the same paper.

CLUBIONIDAE WAGNER 1887

Diagnosis: Eyes in two VERY WIDE AND ALMOST PARALLEL (1) ROWS which are almost as wide as the cephalic part (figs. 1, 13, 27). Tarsal claw of the ♀-pedipalpus very small, its TEETH TINY OR EVEN ABSENT (figs. 14, 33) (2). Prosomal cuticula finely furrowed (never wrinkled or rugose like in the Corinnidae). Opisthosoma soft, scutum absent in almost all species (3). Legs light coloured and not annulated (4). Sexual dimorphism of the spinnerets: According to DEELEMAN-REINHOLD (2001: 85) in females of the SE-Asian Clubionidae (including the Eutichurinae) cylindrical gland spigots and modified posterior median spinnerets are absent (in contrast to the Corinnidae and the Miturgidae). Feathery hairs absent.

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(1) The posterior eye row is distinctly recurved in the SE-Asian "*Clubiona*" *biembolata* DEELEMAN-REINHOLD 2001.

(2) Tiny teeth exist in the extinct Eodotinae (the genus *Eodoter*, fig. 14) in contrast to the extant subfamilies (Eutichurinae and Clubioninae), see SIMON (1897: 74) but large teeth on a large claw exist in *Systaria* SIMON (person. observ., coll. DEELEMAN) which relationships are unsure.

(3) An opisthosomal scutum exists exceptionally in males of the SE-Asian "*Clubiona*" *biembolata* and "*Clubiona*" *pala* DEELEMAN-REINHOLD 2001, and probably in the holotype of the extinct *Eodoter scutata* n. sp. (photo).

(4) In some species apical femoral as well as proximal and apical tibial darkenings exist but no dark rings in a more medial position.

Further characters: Cephalic part basicly abruptly narrow (e.g. in the Eodotinae, fig. 13) but wide in most advanced Clubionidae, e.g., Clubionini (fig. 27), lenses of the posterior median eyes circular (never oval), ♂-chelicerae frequently long and diverging (figs. 1, 29), labium usually distinctly wider than long, gnathocoxae long and INCLINED laterally as well as widened distally (figs. 2, 28, photos), in several taxa modified in the male sex, leg I or IV longest, tibia I-II usually with 2 or 3 pairs of ventral bristles (tibia I bears only a single pair in small species of the Microclubionini but 6 pairs in *Clubiona crisisensis* BARRION & LITSINGER 1995), leg scopulae and claw tufts present (scopulae weakly developed e.g. in *Elaver* and in the Eodotinae), trochanters notched (fig. 23) in the Eutichurinae, Systariinae and *Elaver* (more distinct on trochanters III and IV). I found the basal articles of the anterior MALE spinnerets cylindrical or almost so (figs. 4, 11, 31) in contrast to the conical spinnerets in females of all subfamilies (figs. 16, 32, 41), and almost so in most males of the Microclubionini (fig. 41). See the possible cladogram.

Subfamilies and tribes in European Clubionidae (see below): Clubioninae WAGNER 1887 (tribes Ataliini n. trib., Clubionini and Microclubionini n. trib.), Eodotinae n. subfam. (extinct), and Eutichurinae LEHTINEN 1967 (= Cheiracanthinae WAGNER 1887).
A further (non-European) higher taxon may be the South East Asian Systariinae DEELEMAN-REINHOLD 2001.

Relationships: In most members of the related families Corinnidae, Miturgidae and Zoridae/Liocranidae the eye field is more compact, and the tarsal claw of the female pedipalpus is larger and most often distinctly toothed (tiny teeth exist, e.g., in *Zora*, fig. 34, teeth are absent in some Corinnidae). In the Corinnidae the prosomal cuticula is scaly or even rugose, the male opisthosoma very often bears a dorsal scutum. Corinnidae, Miturgidae, Zoridae/ Liocranidae (most taxa - see *Cybaeodes* which in my opinion is more likely a member of the Gnaphosidae), have conical basal articles of the anterior spinnerets in both sexes.

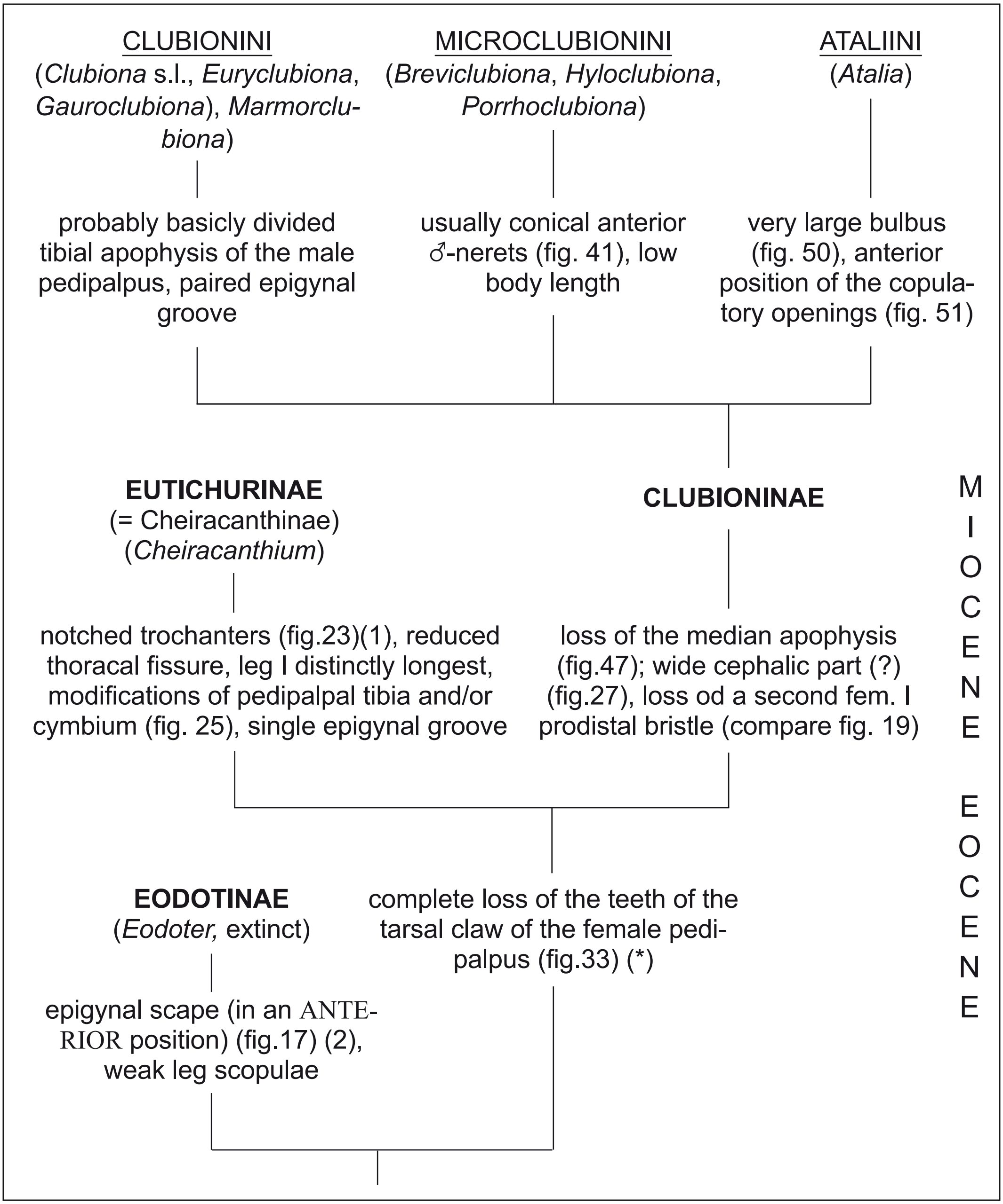
Distinct differences (besides the width of the eye field) of the Clubionidae and – the really monophyletic? – Miturgidae are unknown. Comments on trochanteral notches: See above.

Some taxa of the Zoridae/Liocranidae are difficult to distinguish from the Clubionidae, e.g., if they possess a relatively wide eye field; in such cases two or more important diagnostic characters have to be studied IN COMBINATION to exclude convergences if possible. In contrast to the Clubionidae they usually have dark and/or annulated legs, their anterior tibiae frequently bear more than 2 or 3 pairs of ventral bristles (they may be powerful), and their posterior eye row is distinctly recurved in several taxa. Most Clubionidae are dwellers of higher strata of the vegetation in contrast to most Miturgidae and Zoridae/Liocraninae which usually are ground living spiders (the extinct members of genus *Apostenus* in Baltic amber are rare exceptions).

Gnaphosidae possesses cylindrical anterior spinnerets similar to numerous male Clubionidae but they are usually widely spaced (most often more than their diameter) in the Gnaphosidae and have a cylindrical shape in BOTH sexes, their spigots are different, and other characters – e.g. the shape of the posterior median eyes and the gnathocoxae – are usually quite different from the Clubionidae.

Feathery hairs exist in several genera of the families related to the Clubionidae.

Distribution: Extant: Cosmopolitical. Fossil: Surely known from the Eocene Baltic amber forest: *Eodoter* (Eodotinae) (extinct).



(1) Like in the Systariinae and Elaver.

(2) Basicly so (similar to certain Gnaphosidae). An epigynal scape evolved convergently in Elaver and in certain taxa of the Clubioninae, as well, but here in a posterior position.

(*) This character was already published by SIMON (1897).

Possible **cladogram** of the extant and fossil European subfamilies of the Clubionidae including three tribes as well as their genera and a supposed rough geological time table. (The SE-Asian Systariinae: See below).

Supposed apomorphies: Two almost parallel eye rows in a very wide field, (figs. 1, 13, 27, photos), probably small tarsal claw of the ♀-pedipalpus (see the cladogram but compare the Systariinae), probably sexually dimorphic chelicerae which are diverging in the male sex (really an apomorphy?). Probably (the ?tendency to the evolution of) almost cylindrical basal articles of the male anterior spinnerets (figs. 4, 11, 31).

Supposed plesiomorphies: Abruptly narrow cephalic part (e.g. in *Eodoter*, fig. 13), unnotched trochanters, probably two prodistal bristles on femur I (fig. 19), strongly toothed tarsal claw of the female pedipalpus (fig. 14), probably dense leg scopulae; genital organs: Undivided pedipalpal tibial apophysis (?), existence of a median apophysis (figs. 9, 24) (various tegular apophyses exist within the Clubionini), probably a single epigynal groove (figs. 17, 26), and the existence of secondary receptacula or bursae.

Key to the European extant and the fossil (Eocene Baltic amber) subfamilies, tribes, and genera of the family Clubionidae:

1 Leg I DISTINCTLY the longest, thoracal fissure absent or quite indistinct, trochanteral inclination (notch) existing (fig. 23), ♂♀ genital organs quite uniform: Cymbium with a – usually long and pointed – retrobasal outgrowth which is directed backwards (figs. 24-25), tegular/median apophysis present, epigyne usually with a single large groove (fig. 26) (except in *C. mildei*), ducts of the vulva strongly coiled around the receptacula seminis (frequently well observable in the epigyne). Extant. Subfamily Eutichurinae (= Cheiracanthinae) . . . . *Cheiracanthium*

- Leg I shorter or not much longer than II or IV, thoracal fissure well developed, trochanteral notch absent, cymbium without a retrobasal outgrowth, median apophysis and epigynal groove present or absent. Extant (Clubioninae) or extinct (Eodotinae). 2

2(1) Fossil in Baltic amber. Femur I bears two prodistal bristles (arrow in fig. 19) (*). Median apophysis (fig. 9) and epigynal scape existing (in an anterior position) (figs. 17-18) (*). Subfamily Eodotinae. . . . . *Eodoter*

- Extant. Femur I bears only a single prodistal bristle in this position. Median apophysis absent (e.g. figs. 36, 43), epigynal scape usually absent, rarely existing but in a more posterior position. Subfamily Clubioninae 3

3(2) ♂-pedipalpus (fig. 50): Tegulum very large and standing out, embolus short and in a distal position. ♀: Epigynal groove in a quite anterior position (fig. 51). Dweller under the bark of trees. Tribe Ataliini. In Europe *A.* (= *Paraclubiona*) *corticalis* . . . . *Atalia*

- ♂-pedipalpus (figs. 44, 46): Bulbus much smaller. Epigynal groove not far in front of the epigastral furrow (e.g. fig. 48). Tribes Clubionini and Microclubionini 4

4(3) ♂-pedipalpus (figs. 43-44): Cymbium retrobasally with a brush of hairs, bulbus flat and frequently wide, tegular apophysis absent, conductor strongly reduced. ♀: Vulva (fig. 44b) with long and coiled ducts which are visible (translucent) in the epigyne (fig.44a). Small spiders, tibia III bears a single proventral bristle. Tribe Microclubionini (part 1) (= *Clubiona genevensis* species-group) . . . . *Porrhoclubiona*

- ♂-pedipalpus (figs. 42, 47) longer and more slender, cymbial hair brush absent, tegular apophysis and/or conductor usually present. ♀: Epigyne/vulva different. Small or large spiders, tibia III bears 1 or 2 proventral bristles 5

5(4) Smaller and weakly sclerotized spiders, body length usually 3-6 (♀) mm. Tibia III bears usually a single proventral bristle (rarely two proventral bristles). ♀: Single free epigynal groove which in some species is difficult to recognize (fig. 48). ♂: Shape of the basal articles of the anterior spinnerets +/- CONVEX (fig. 41), pedipalpal tibial apophysis usually undivided (figs. 44, 46, 55a). Tribe Microclubionini (part 2) 6

- Larger and stronger sclerotized spiders, body length usually 5-10 mm. Tibia III bears usually 1/1 proventral bristles. ♀: Free epigynal groove only rarely existing. ♂: Shape of the basal articles of the anterior spinnerets CYLINDRICAL or almost so (fig. 31), pedipalpal tibial apophysis undivided or divided (e.g. figs. 35, 37). (Basal ♂-cheliceral articles (fig. 29) usually distinctly diverging, longer and more slender than in the Microclubionini). Tribe Clubionini 8

6(5) Posterior margin of the cheliceral furrow with 6-7 teeth. ♂: Gnathocoxae (fig. 45) with a transverse depression, pedipalpus (figs. 46-47): Tibial apophysis with a long, thin, sickle-shaped and pointed outgrowth, embolus and conductor very long. ♀: Epigyne/vulva (figs. 48-49) wider than long, strongly sclerotized posteriorly, receptacula seminis widely spaced, ducts partly screw-shaped. In Europe only *H. compta* (= *Clubiona c.*) . . . .*Hyloclubiona*

- Posterior margin of the cheliceral furrow with 2-5 teeth. ♂: Gnathocoxae without a transverse depression (a medial longitudinal depression may exist), tibial apophysis somewhat similar in *Breviclubiona* (fig. 55a) but divided apically. ♀: Epigyne not strongly sclerotized posteriorly, usuallly longer but wide in *Breviclubiona* (fig. 55c), receptacula seminis not widely spaced (figs. 42c), 55d) 7

7(6) ♂: Pedipalpal tibial apophysis divided, with a long and slender branch (fig. 55a), skinny conductor very short (fig. 55b). ♀: Epigyne/vulva (figs. 55c-d) wider than long, first part of the introductory ducts directed laterally, receptacula seminis in contact with each other. In Europe only *B. brevipes* (= *Clubiona b.*) . . . .*Breviclubiona*

- ♂: Pedipalpus (fig. 42a): Tibial apophysis undivided and wide, skinny conductor long. ♀: Epigne/vulva (figs. 42b-c) longer than wide, first part of the introductory ducts in a longitudinal and parallel position, receptacula seminis more or less separated (= *Clubiona trivialis* species-group) . . . . *Microclubiona*

8(5) ♂: The pedipalpal tibia (figs. 36-37) bears 4 outgrowths/apophyses which are larger than the body of the tibia. ♀: Epigyne (fig. 38) with a large outgrowth protruding over the epigastral furrow which possesses (more or less distinct) transverse ridges (**). In Europe only *G. caerulescens* (= *Clubiona c.*) . . . . *Gauroclubiona*

- ♂-pedipalpus with a single large and undivided tibial apophysis (fig. 54a), bulbus (fig. 54b) with a large tegular apophysis which is anteriorly directed. ♀: Epigyne (fig. 54c) with transverse ridges but not protruding the epigystral furrow, vulva as in fig. 54d). In Europe only *M. marmorata* (= *Clubiona m.*). . . . .*Marmorclubiona*

- ♂-pedipalpus (e.g. fig. 35) with few apophyses/outgrowths, shallow conductor absent. ♀: Epigyne not protruding over the epigastral furrow, without transverse ridges, with a single or with a pair of grooves 9

9(8) ♂-pedipalpus (e.g. fig. 35) with a harpoon-shaped retrolateral tibial apophysis. ♀: Epigyne/vulva (fig. 35a) with a pair of shining receptacula seminis observable in the middle part; short and thin introductory ducts. (= *Clubiona reclusa* species-group) . . . .*Euryclubiona*

- ♂-pedipalpus different, harpoon-shaped tibial apophysis absent. ♀: Epigyne/ vulva usually with long(er) and wide introductory ducts. In Europe three groups which are here regarded as subgenera: *Clubiona* s. str. (= *pallidula* species-group), *Epiclubiona* (= *similis* species-group) and *Heteroclubiona* (= *lutescens* species-group). . . . . . *Clubiona* s. l.

(*) Like in the American genus *Elaver* (= *Clubionoides*) which is also fossil known: From Dominican amber.

(**) Like in the American *Clubiona abboti* species-group.

The SUBFAMILIES and TRIBES of the Clubionidae, and incertae sedis

(See the cladogram)

CLUBIONINAE WAGNER 1887

Diagnosis: ♂: Tegular/median apophysis absent, tibial apophysis of the male pedipalpus probably basicly divided. - Members of true Clubioninae possess probably only a single prodistal bristle on femur I (like numerous Eutichurinae), and their cephalic part is wider than in other Clubionidae; see the possible cladogram.

Remark: The very diverse Clubioninae is probably not a monophyletic taxon; see the taxa described by DEELEMAN-REINHOLD (2001: 125ff) from South East Asia and below, the paragraph "Clubionidae and Clubionoidea incertae sedis".

The **relationships** are unsure, see the possible cladogram. A branch of the SE-Asian taxa may be the real sister group to the Clubioninae, see below, the paragraph "Clubioninae incertae sedis". Eutichurinae is probably also related.

Remark on the mating behaviour: The copulatory behaviour may be of some taxonomical interest and different in certain taxa: In *Clubiona* (*Epiclubiona*) *germanica* the male approaches to the female from anteriorly-dorsally and then moves to the side. In *Microclubiona trivialis* the male moves upside-down under the female for mating; see BELLMANN (1997: 176). Contrarily – according to an observation by MENGE, reported by REIMOSER (1937: 64) – the copulatory position of the male of this species was above the female which had an upside-down position. More studies are needed.

Distribution: Cosmopolitical.

TRIBES:

(1) CLUBIONINI WAGNER 1887

Type genus: *Clubiona* LATREILLE 1804.

Further genera in Europe: *Euryclubiona* LOHMANDER 1945 (**gen. resurr**.), *Gauroclubiona* LOHMANDER 1945 (**gen. resurr**.), and *Marmorclubiona* **n. gen**.. Genera in South East Asia: See DEELEMAN-REINHOLD (2001).

Diagnosis: Basal articles of the anterior ♂-spinnerets cylindrical or almost so (fig. 31), basal articles of the ♂-chelicerae diverging, (fig. 29), basicly probably divided tibial apophysis of the ♂-pedipalpus, a conductor exists in a distal position in several subgenera and genera; epigyne frequently with a pair of grooves. Body length up to 10 mm.

Relationships: See Ataliini and Microclubionini.

The resurrections of genera and subgenera and general remarks:
Splitting of higher taxa is a matter of opinion, see WUNDERLICH (2008: 756-781).
Compared with the genera of related families like Zoridae/Liocranidae or Gnaphosidae (see this volume) I regard the level of clubionid genera in the sense of this paper as aequivalent.
Clubiona in the common/traditional sense – see PLATNICK (2009) – is a very diverse taxon which surely has more to split up in the future than done in this paper, and some subgenera may be upgraded to the genus level. In my opinion some species which are treated under *Clubiona* by DEELEMAN-REINHOLD (2001) from South East Asia are members of unnamed genera. "*Clubiona*" *pala* in an example; in this species the male chelicerae are strongly modified and the male opisthosoma bears a dorsal scutum like in "*Clubiona*" *biembolata* – an extremely rare character in this subfamily and in the whole family.

Distribution: Probably cosmopolitical.

The European GENERA of the Clubionini:

(a) Genus *Clubiona* LATREILLE 1804 s. l.

Type species: *Aranea pallidula* CLERCK 1757.
Further species: See the subgenera below. Provisionally all species should still be included in *Clubiona* s. l. which are not listed in the genera below.

Diagnosis and relationships: See the key and the remark below (with *Clubiona* s. str.). In *Gauroclubiona* exists a larger number of pedipalpal tibial apophyses, and the epigyne protrudes with a large outgrowth over the epigastral furrow.

Distribution: Mainly Holarctic but probably cosmopolitical; at least Holarctic.

The **SUBGENERA** of *Clubiona* s. l. in Europe and their species in the Palaearctic:

(1) ***Clubiona*** LATREILLE 1804 "s. str." (= *Clubiona pallidula*-group)

Type species: *Aranea pallidula* CLERCK 1757.
Further species in Europe: *C. phragmitis*. Further species: See MIKHAILOV (1995: 47) (the *C. pallidula*-group).

Diagnosis: ♂-pedipalpus: Tibial apophysis usually thick, embolus usually short. ♀: Epigyne/vulva with a pair of receptacula seminis which are usually clearly longer than wide and possess a parallel position.

Remark: The diverse genus *Clubiona* s. str. may be a paraphyletic taxon which has to split in the future, see the (sub)groups sensu DEELEMAN-REINHOLD (2001), MIKHAILOV (1995) and above.

Distribution: At least Holarctic.

(2) ***Epiclubiona*** LOHMANDER 1945 (= *Clubiona similis*-group)

Type species: *Clubiona similis* L. KOCH 1866.
Species in Europe: *C. aducta, congentilis, germanica, neglecta, pseudoneglecta* and *similis*.
Further species: See MIKHAILOV (1995: 45) (*C. similis*-group).

Diagnosis: ♂-pedipalpus with a more or less u-shaped tibial apophysis and a very long embolus which is distally flagelloid. ♀: Introductory ducts wide and long.

Distribution: Palaearctic.

(3) ***Heteroclubiona*** LOHMANDER 1945 (= *Clubiona lutescens*-group)

Type species: *Clubiona lutescens* WESTRING 1851.
Species in Europe: *alpicola, andreinii, fruteorum, hilaris, lutescens, riparia, saxatilis* and *terrestris*. Further species: See MIKHAILOV (1995: 44).

Diagnosis: ♂-pedipalpus with bifurcate and blunt tibial apophysis combined with a wide embolus. ♀ : Epigyne/vulva with wide introductory ducts, position of the primary receptacula seminis dorsally of the secondary receptacula seminis, LOHMANDER (1945: 20).

Distribution: Palaearctic.

(b) Genus ***Euryclubiona*** LOHMANDER 1945 (**gen. resurr**. from *Clubiona*) (= *Clubiona reclusa*-group)

Type species: *Clubiona subsultans* THORELL 1875.
Species in Europe: *Canadensis*, *kulczynskii, norvegica, reclusa, rosserae, stagnatilis* and *subsultans*.
Further species: See MIKHAILOV (1995: 47).

Diagnosis: ♂-pedipalpus (e.g. fig. 35) with a harpoon-shaped retrolateral tibial apophysis, embolus, the strongly sclerotized conductor and the tegular apophysis are all directed to the tip of the cymbium. ♀: Epigyne (fig. 35a) with short and thin introductory ducts and usually with a pair of shining receptacula seminis in the middle part.

Relationships: A harpoon-shaped tibial apophysis of the ♂-pedipalpus is unique in the Clubionidae. The shallow conductor of the Microclubionini - in a more basal position on the bulbus and in contact with the bulbus – is surely not homologous to the conductor of *Euryclubiona* in my opinion.

Distribution: Holarctic.

(c) Genus ***Gauroclubiona*** LOHMANDER 1945 (**gen. resurr**. from *Clubiona*) (= *Clubiona caerulescens*-group, see MIKHAILOV (1995: 48))

Type species (by monotypy): *Clubiona caerulescens* L. KOCH 1867 (Palaearctic).

Diagnosis: ♂: Pedipalpus (figs. 36-37): In the generotype with 4 apophyses/ outgrowths which are even larger than the body of the tibia. ♀: Epigyne (fig. 38) with a large outgrowth protruding over the epigastral furrow and with transverse ridges.

Relationships: See *Marmorclubiona*. In most of the other clubionid taxa exist fewer and smaller tibial apophyses/outgrowths of the ♂- pedipalpus, and the epigyne is not protruding over the epigastral furrow. – The members of the North American *Clubiona abboti*-group (not seen) have similar genital organs and have to revise.

Distribution: Palaearctic.

d) ***Marmorclubiona*** **n. gen.**

(= *Clubiona marmorata*-group sensu MIKHAILOV (1995: 43).

Type species: *Clubiona marmorata* L. KOCH 1866.
Further species according to MIKHAILOV (1995: 44): *hyrcanica* MIKHAILOV 1990 (sub *Clubiona*) (**n. comb**.).

Diagnosis: ♂: Pedipalpus (figs. 54a-b) with a single large and undivided tibial apophysis, bulbus with a large tegular apophysis which is directed anteriorly, and a short shallow skinny conductor. ♀: Epigyne (fig. 54c) with transverse ridges, not protruding the epigastral furrow, and with widely spaced introductory openings (EÖ), vulva (fig. 54d) with large atria (A) and receptacula seminis (R) in an anterior position, touching each other.

Relationships: *Gauroclubiona* – which also is a member of the Clubionini, and bears also two proventral bristles on tibia III – may be most related; it also has a shallow skinny conductor but the pedipalpal tibia bears 4 apophyses/outgrowths, their tegular apophyses are different (a large and anteriorly protruding apophysis is absent), and the epigyne protrudes over the epigastral furrow.

Distribution: Palaearctic.

(2) ATALIINI n. trib.

Type genus (by monotypy): *Atalia* THORELL 1887.

Diagnosis: ♂-pedipalpus (fig. 50) with short tibial apophyses, tegulum very large and standing out, containing “meandering” ducts, embolus short or fairly short and in a distal position, a tiny conductor may exist, a median apophysis is absent. ♀: Epigynal pit (fig. 51) far in front of the epigastral furrow and in front of the bursae, which usually are very large.

Relationships: A member of the subfamily Clubioninae, see the cladogram. In other Clubionidae the tegulum is smaller, the position of the embolus is different, and the introductory openings of the epigyne are in a more posterior position.

Distribution: Palaearctic and Oriental Region.

Atalia THORELL 1887 (**gen. resurr**. from *Clubiona*) (= *Paraclubiona* LOHMANDER 1945)
(= *Clubiona corticalis*-group, see MIKHAILOV (1995: 42)

Justification of the resurrection: See above (Clubionini), and DEELEMAN-REINHOLD (2001: 90, 114) (discussion and critical remarks).

Type species of *Atalia*: *Atalia concinna* THORELL 1887 (Burma). Type *species* of *Paraclubiona*: *Aranea corticalis* WALCKENAER 1802, the only species in Europe.
Further species: See MIKHAILOV (1995: 42) (under *Paraclubiona*), and DEELEMAN-REINHOLD (2001: 113-122) (under *Clubiona corticalis*-group: *hindu, mikhailovi, paraconcinna*, *stiligera*).

Remark: *A. corticalis* is a specialised dweller under the bark of trees; the species from Asia are collected from leaf litter and beaten from trees, see DEELEMAN-REINHOLD (2001: 114).

Relationships: See the tribe Ataliini and the key. In *Tolophus* THORELL 1891 which is similar in some respect, exists a strongly sclerotized conductor and the position of the female copulatory openings is in the middle of the epigyne; see below, Clubionidae incertae sedis.

Distribution: Palaearctic and Oriental Region.

(3) MICROCLUBIONINI n. trib.

Type genus: *Microclubiona* LOHMANDER 1945 (= *Clubiona trivialis* species-group)
Further genus in Europe: *Breviclubiona* n. gen., *Hyloclubiona* LOHMANDER 1945 and *Porrhoclubiona* LOHMANDER 1945.
Microclubionini is partly identical with the third group of *Clubiona* sensu SIMON (1932: 921), the *compta* species-group.
Further taxa of this tribe may be the species of the American *obesa*-, *abboti*-, and *maritima*-groups sensu DONDALE & REDNER (1982).

Diagnosis: Basal articles of the anterior ♂-spinnerets more or less conical as in the female, (fig. 41), basal articles of the ♂-chelicerae usually unmodified similar to the female (fig. 39) (modified e.g. in *Hyloclubiona compta*), embolus usually in a wider loop (*). Epigyne usually with a single groove. Weakly sclerotised spiders, body length most often 3-5 (rarely 6-7) mm.

(*) A shallow skinny conductor exists in the Microclubionini – see DONDALE & REDNER (1982: 23) – as well as in the Clibionini but is absent in *Porrhoclubiona*.

Relationships: The branch Clubionini + Ataliini may be the sister taxon, a median apophysis is also absent in both branches but the basal article of the anterior ♂-spinnerets is usually cylindrical in the Clubionini and Ataliini, the basal article of the ♂-chelicerae is (stronger) modified, and the epigyne has frequently a pair of grooves. Ataliini and Clubionini are most often larger spiders, body length up to ca. 10 mm long.

Distribution: Holarctic (mainly Palaearctic), and South East Asia (see *Porrhoclubiona*); probably absent in the Southern Hemisphere.

Diagnoses of the microclubioninae genera with references to their holarctic congeneric species:

a) *Microclubiona* LOHMANDER 1945 s. l. (**gen. resurr**. from *Clubiona*)
(= *Clubiona trivialis* species-group sensu DONDALE & REDNER (1982: 26-34) and MIKHAILOV (1995: 43)).

Type species: *Clubiona trivialis* C. L. KOCH 1843.
Further species in Europe: *M. subtilis* (L. KOCH 1867) (**n. comb**., from *Clubiona*). Further species: See MIKHAILOV (1995: 43).
This genus is almost identical with the first group of *Clubiona* sensu WIEHLE (1965: 480), as well as with *Microclubiona* s. l. sensu LOHMANDER (1945: 20) who included *Porrhoclubiona*. – The genus name *Microclubiona* was already used by STERGHIU (1985), and WUNDERLICH (1992) but the species treated by me in 1992 from the Canary Islands are in fact members of *Porrhoclubiona*, see WUNDERLICH (1995: 424).

Diagnosis: ♂: pedipalpus (fig. 42): Tibial apophysis long, wide, undivided, and strongly sclerotized (black) in the distal half, tegular apophyses well developed, distal part of the embolus lying in a shallow skinny conductor on the tegulum. ♀: Epigyne/vulva longer than wide, groove distinct, ducts not screw-shaped, introductory ducts in a longitudinal and parallel position, usually close together but widely spaced in the American *M. moesta* (BANKS 1890) **(n. comb**.) (from *Clubiona*).

Relationships: See the key, especially *Breviclubiona*.

Distribution: At least Holarctic.

(b) ***Breviclubiona*** **n. gen**. (from *Clubiona*)
(= *Clubiona brevipes* species-group sensu MIKHAILOV (1995: 44)).

Type species: *Clubiona brevipes* BLACKWALL 1841.
Further species: *Clubiona alexeevi* MIKHAILOV 1990 (**n. comb**.).

Diagnosis: ♂-pedipalpus (figs. 55a-b): Tibial apophysis divided, with a long and slender branch which is modified apically, skinny conductor very short. ♀: Epigyne/vulva (figs. 55c-d) wider than long, first parts of the introductory ducts directed laterally, receptacula seminis in contact with each other.

Relationships: See the key and *Hyloclubiona*.

Distribution: Palaearctic; apparently absent in the Americas.

(c) ***Hyloclubiona*** LOHMANDER 1945 (subgenus of *Clubiona*) (**n. stat**.)

Type species (by monotypy) *Clubiona compta* C. L. KOCH 1839.

Diagnosis: Posterior margin of the cheliceral furrow with numerous – usually 6-7 – teeth, ♂: Gnathocoxae (fig. 45) modified, with a transverse depression similar to the Gnaphosidae, pedipalpus (figs. 46-47): Tibial apophysis with a long, thin, pointed and sickle-shaped outgrowth, embolus and skinny conductor very long. ♀: Epigyne/vulva (figs. 48-49) wider than long, strongly sclerotized posteriorly, ducts partly screw-shaped, receptacula seminis widely spaced.

Relationships: The structure of the ♂-gnathocoxae, the pedipalpal tibial apophysis and epigyne/vulva are unique in the Clubionidae. In the related subgenera the number of retromarginal cheliceral teeth is only 2-5. In *Breviclubiona brevipes* a fairly similar tibial apophysis of the ♂-pedipalpus and a wide epigyne exist, too, but the structures of bulbus and vulva are quite different; the ♂-gnathocoxae are less modified (a transverse depression is absent). – MIKHAILOV (1995: 44) united the *genevensis*-group (= *Porrhoclubiona*) with *Hyloclubiona* (*compta*) as already SIMON (1932) did but I regard *Hyloclubiona* and *Porrhoclubiona* – mainly based on the different genital structures – as different genera. See also the key.

(*) Modified male gnathocoxae (but no transverse depression) exist also in members of "*Clubionoides*" sensu BARRION & LITSINGER (1995) (Clubioninae?), and in *Xantharia floreni* DEELEMAN-REINHOLD 2001 (Systariinae?).

Distribution: Palaearctic; apparently absent in the Americas.

(d) ***Porrhoclubiona*** LOHMANDER 1945 (subgenus of *Clubiona*) (**n. stat.**)

(= *Clubiona genevensis*-group)
(= *Clubiona pteronetoides*-group sensu DEELEMAN-REINHOLD 2001, **n. comb**.).

Type species: *Clubiona clandestina* MENGE 1873 (= *genevensis* L. KOCH 1866). Further species: The species of the *compta*-group sensu MIKHAILOV (1995: 44) except *compta* (= *Microclubiona: Hyloclubiona*). Species in Europe: *decora, diniensis, genevensis, leucaspis*, *minor, pseudominor*, and *vegeta* (= *tenerifensis*). – Remarks: (1) The structures of the bulbus and the apparent existence of a brush of retrobasal cymbial hairs – see DEELEMAN-REINHOLD (2001: 99, figs. 8-9) – indicate that the two species of the *Clubiona pteronetoides*-group from South East Asia – *C. pteronetoides* DEELEMAN-REINHOLD 2001 and *C. viridula* ONO 1989 - are members of the genus *Porrhoclubiona* (**n**. **comb**.). (2) I used already earlier – (1995: 424) – the genus name *Porrhoclubiona* but without justification at that time.

Diagnosis: ♂-pedipalpus (figs. 43-44): Tibial apophysis undivided, CYMBIUM RETROBASALLY (*) WITH A BRUSH OF HAIRS, bulbus flat and usually wide, median/tegular apophyses absent, conductor strongly reduced. ♀: Vulva (fig. 44b) with long and coiled ducts which are visible (translucent) in the epigyne (fig. 44a). (Small spiders, cheliceral retromargin usually with 2–3 teeth).

(*) Not prolaterally as erroneously reported by MIKHAILOV (1995: 44).

Relationships: See the key. The conical basal articles of the anterior ♂-spinnerets are as in other Microclubionini. The hair brush in this position of the cymbium is unique in the Clubionidae. In contrast to the related genera a (shallow/skinny) conductor is absent in *Porrhoclubiona*.

Distribution: Palaearctic and South East Asia; apparently absent in the Americas.

EODOTINAE **n. subfam**. photos 35-40

Type genus: *Eodoter* PETRUNKEVITCH 1958, extinct (Eocene), the only surely known genus of this subfamily.

Diagnosis: Femur I bears 2 prodistal bristles (fig. 19). ♀ (the female of the extinct genus *Eodoter* is described for the first time here): Epigyne (figs. 17-18 photo 39b) with a scape in an anterior position which partly covers a large groove, ♂: Bulbus (fig. 9) with a long tegular/median apophysis, a long embolus which originates in a basal position on the bulbus, as well as a conductor.

Further characters: Cephalic part (fig. 13, photos) narrow, thoracal fissure present, basal article of the ♂-chelicerae long and diverging (fig. 1, photo) in contrast to the females, gnathocoxae long and concave laterally, praecoxal sternal triangles absent, leg I not distinctly the longest, trochanters not notched in *Eodoter*, only two pairs of ventral bristles on tibiae I-II, weak leg scopulae (few spatulate hairs), feathery hairs absent, median spinnerets not flattened, basal articles of the anterior ♂-spinnerets (fig. 11) almost cylindrical (only slightly conical), distinctly conical in the female (fig. 16). Body length usually 4-5 mm.

Relationships: All typical characters of the Clubionidae exist in the Eodotinae: A wide eye field, long and diverging male chelicerae, long gnathocoxae which are widened distally, and small tarsal claws of the female pedipalpus (bearing tiny teeth). Therefore I regard this taxon as a member of the Clubionidae, although an epigynal scape in an anterior position (similar to numerous Gnaphosidae) is extremely rare within the Clubionidae (existing in *Elaver*, too). Eodotinae may be the most primitive known subfamily of the Clubionidae (see the cladogram) besides the Systariinae. – In most members of the Eutichurinae exists also a long and skinny median apophysis like in *Eodoter* but leg I is distinctly the longest, a thoracal fissure is absent or quite indistinct, an epigynal scape is absent, pedipalpal tibia and cymbium are modified. In the Clubioninae femur I bears only a single prodistal bristle, a median apophysis is absent, and an epigynal scape is usually also absent (if present it has a posterior position), in the Systariinae the anterior spinnerets are quite different, the trochanters are notched, and an epigynal scape is absent. In *Tolophus* THORELL 1891 (described under *Japonionia* MIKHAILOV 1990 as a subgenus of *Clubiona*; see below, “Cubionidae incertae sedis”) a strongly sclerotized “conductor” (a median apophysis?) exists, an epigynal scape is absent but an epigynal groove exists.
See also the genus *Eodoter* below.

Distribution: The Eocene Baltic amber forest.

Eodoter PETRUNKEVITCH 1958 (figs. 1-20, photos)

Type species (by monotypy): *Eodoter magnificus* PETRUNKEVITCH 1958, figs. 1-3. See WUNDERLICH (2004: 1616, figs. 2-9 + probably figs. 10-12).
Further species: *Eodoter eopala* WUNDERLICH 2004, *E. scutatus* n. sp., and *E. tibialis* n. sp.. – The real number of *Eodoter* species is unknown, see the high number of seven males indet. of this genus which are listed by WUNDERLICH (2004: 1616). The ventral side of the bulbi of the holotype of *E. magnificus* is hidden. The only probably conspecific male of *Eodoter magnificus* (p. 1621, figs. 10-12) may well be the member of an undescribed species.

Dignosis and relationships: See the Eodotinae, and the differences to the extant genus *Elaver* which possesses a similar epigyne. – *Eodoter* was originally placed by PETRUNKEVITCH (1958: 287, 318) in the Corinnidae (as a subfamily of the Clubionidae at that time) mainly based on its thickened sternal margin, but in fact (1) the margin is not thickened, (2) this is not a character of the family Corinnidae, and (3) the shape of the prosoma and of the basal articles of the male anterior spinnerets is different from the Corinnidae. On the other hand a weakly developed dorsal opisthosoma exists probably in the holotype of *Eodoter scutatus* n. sp., and which is extremely rare in the Clubionidae.

The conformation of the structures of the male pedipalpus in the American genus *Teminius* KEYSERLING 1887 (Clubionidae or Miturgidae?) is similar to *Eodoter* – apparently a convergence -; the eye field is more narrow in *Teminius* and the trochanters are notched.

Distribution: Eocene Baltic amber forest.

***Eodoter scutatus* n. sp**. (figs. 4-18) photos 35-39

Material in Baltic amber most probably from Kaliningrad (= Königsberg): Holotype ♂ and a separated piece of amber, F2173/BB/AR/CJW. Probably conspecific specimens: 2♂: F2174/BB/AR/CJW and F2175/BB/AR/CJW with a separated piece of amber as well as 4♀: F2176-2179/BB/AR/CJW.

Preservation and syninclusions: The holotype is excellently preserved in a yellow piece of amber which was not heated, a white emulsion is absent. The right leg IV is lost by autotomy beyond the coxa, the left patellae II and IV and parts of the left leg I are cut off. Short parts of two draglines are preserved behind the anterior spinnerets, a thin plants remains is preserved left of the left leg III, few stellate hairs are preserved in the separated piece of amber. – F2174: Most parts of the ventral side are covered with a white emulsion, parts of 4 legs are cut off, the right side of the opisthosoma is inclined. – F2175 is darkened by heating, mainly the ventral side is covered with a white emulsion, both legs I and the left leg IV are lost by autotomy beyond the coxa, parts of the right tarsi III and IV are cut off, a cocoon-shaped objects (2 mm wide) is preserved behind and in contact to the spinnerets. – F2176 is almost completely preserved in a larger piece of amber which was darkened by heating and which contains two Diptera: Nematocera and numerous stellate hairs; a white emulsion is absent. Its right leg IV is lost by autotomy behind the coxa, median parts of the left legs I and II are cut off. – F2177 is preserved in a larger piece of amber which was heated, the opisthoasoma is partly covered with a white emulsion, the left legs III and IV are lost beyond the coxa by autotomy, a larger drop of amber is preserved behind the spider. – F2178 is almost completely preserved in a piece of amber which was heated, white emulsions are absent, fissures exist on the prosoma and on some leg articles, the left patella II and the right tarsus IV are cut off. – F2179 is preserved in a light yellow piece of amber which was not heated. Mainly dorsally the opisthosoma is covered with a white emulsion, parts of the left side of the opisthosoma are broken off with a triangle-shaped piece of amber.

Diagnosis: ♂-pedipalpus (figs. 5-9): Tibia as long as the cymbium, usually longer than the patella (not in F2175), its retrolateral apophysis directed anteriorly. Probably conspecific ♀ (see below): Epigyne with a large groove which is anteriorly partly covered by a larger scape (fig. 17, photo. 39b).

Descriptions (mainly holotype ♂; ♀ see below):
Measurements (in mm): Body length 4.2, prosoma: Length 1.9, width ca. 1.6; leg I: Femur 1.6, patella 0.8, tibia 1.6, metatarsus 1.25, tarsus 0.75, tibia II 1.4, tibia III 1.1, tibia IV 1.6.
Colour: Prosoma medium brown (to dark brown in other males), opisthosoma and legs light brown, opisthosoma dorsally darkened in the holotype.
Prosoma (photos; probably conspecific ♀: Fig. 13) 1.19 times longer than wide, flat, bearing numerous hairs, cephalic part distinctly narrowish, thoracal fissure indistinct but distinct in F2174, eye field very wide, posterior row distinctly wider than the anterior row, posterior median eyes spaced by 1 ¼ diameters, all eyes about equal in size, posterior row slightly procurved, basal cheliceral articles long, condylus well developed, fangs long, labium about as long as wide, gnathocoxae distinctly longer than wide, widened distally and concave laterally. – Tarsal claw of the pedipalpus of a probably conspecific female (fig. 14) small, bearing few tiny teeth. – Legs long, III distinctly the shortest, I and IV about equal in length (IV probably usually slightly longer), hairs not distinct, scopula only indistinct prodistally on metatarsus I, bristles as in ?*E. tibialis* (e.g. fig. 19) claw tufts well developed, claws with large teeth (fig. 15), tarsal trichobothria in two irregular rows, IV bears at least 5 trichobothria, metatarsal III-IV preening hairs/bristles are absent. – Opisthosoma (photo) twice as long as wide, hairy, dorsally-anteriorly with long erect hairs, dorsally (only in the holotype) with a long dark brown structure which may indicate a leathery area. The spinnerets are expanded and very well preserved in the holotype, the long and bipartite posterior ones bear about 7 long and bipartite spigots, the basal articles of the anterior spinnerets are only slightly concave in the male (figs. 4, 11) but distinctly concave in a probably conspecific female (fig.16), observable are 4 long spinules in the holotype (fig. 10), a tiny colulus may exist (fig. 11). – ♂-pedipalpus (figs. 5-9, 12): Tibia usually distinctly longer than the patella and as long as the cymbium, with a retroapical apophysis, a short blunt proapical apophysis as well as a short ventral-apical outgrowth. Bulbus fairly prominent, bearing a long median apophysis, a conductor in a distal position, and a long embolus which originates basally on the bulbus and runs along the prolateral cymbial margin. The long distal hairs of the cymbium are not drawn.
Remarks on the probably conspecific males: In 2174 the left bulbus is fairly well observable. In F2175 the pedipalpal tibia is only slightly longer than the patella.
Remarks on the probably conspecific females: Habitus, eyes and chaetotaxy are quite similar to the holotype. Measurements (in mm): Body length 4.2-5.0 (F2176), prosomal length 1.7-2.3, length of tibia I 1.1 (F2179), 1.3 (F2176) to 1.7 (F2177), length of tibia IV 1.3-1.5. – F2167 has a very slender opisthosoma which is almost 3 times longer than wide. F2177: The tarsal claw of its pedipalpus bears 3 tiny teeth (fig. 14), its anterior spinnerets (fig. 16) are conical. F2178: The prosoma bears a field of very dense short hairs, the median spinnerets are not flattened, the epigynal scape covers most parts of the groove (fig. 18). F1879: Prosoma: Fig. 13; the epigyne (fig. 17, photo 39b) has a relatively short scape.

Relationships: In the other known congeneric species – *E. magnificus* PETRUNKEVITCH 1958, ?*E. tibialisn*. sp., and *E. eopala* WUNDERLICH 2004 the pedipalpal tibial apophysis is distinctly shorter/stouter, and the tibial apophysis is distinctly different, in *magnificus* furthermore the posterior median eyes are smaller (a probasal tibial apophysis which was figured by PETRUNKEVITCH (1958) – see WUNDERLICH (2004: 1620, fig. 8) – does not exist, it is an artefact). – In *Eodoter* ?*magnificus* sensu WUNDERLICH (2004: 1616, 1621, figs. 11-12) – probably an undescribed/ unnamed species – the structures of the pedipalpus are similar to *scutatus* but the median apophysis is longer and more slender.

Distribution: The Eocene Baltic amber forest.

?*Eodoter tibialis* n. sp. (figs. 19-20) photos 40a-b

Material: Holotype ♂ in Baltic amber (most probably from the Kaliningrad area), F2180/BB/AR/CJW.

Preservation and syninclusions: The spider is incompletely and not well preserved in a small yellow piece of amber which was not heated; the prosoma and the right pedipalpus are complete, the distal part of the opisthosoma, most distal leg articles and the left pedipalpus (cymbium and bulbus) are cut off, most ventral parts are covered with a white emulsion. Stellate hairs are absent.

Diagnosis (♂; ♀ unknown): Basal cheliceral articles with long bristle-shaped hairs, pedipalpus (fig. 20): The tibia is only fairly long and bears a long <u>pro</u>dorsal apophysis besides a small retroapical apophysis.

Description (♂):
Measurements (in mm): Body length 4.0, prosoma: Length 1.9, width 1.6; leg I: Femur ca. 2.0, patella ca. 0.75, tibia ca. 2.0, tibia III ca. 1.0, leg IV: Femur ca. 1.7, patella 0.7, tibia 1.6, metatarsus ca. 1.5.
Prosoma (photos 40a-b) 1.19 times longer than wide, bearing numerous dorsal hairs, cephalic part distinctly narrowish, thoracal fissure indistinct, eye field very wide, posterior row distinctly wider than the anterior row, posterior median eyes spaced by 1 ¼ diameters, all eyes about equal in size, posterior row slightly procurved, basal cheliceral articles long, anteriorly with numerous long and bristle-shaped hairs, slightly diverging, fangs long, labium and gnathocoxae hidden, sternum 1.55 times longer than wide, coxae IV close together, praecoxal and intercoxal triangles absent. – Legs (fig. 19) fairly long, IV probably the longest, bearing on III and IV numerous fairly long and thin bristles: Femur I 3 dorsally and 2 prodistally, patellae III and IV 1 retrolaterally, tibia I 2 ventral pairs, metatarsus I 1 ventral pair. Trochanters not notched. A true scopula is apparently absent or very weakly developed. No metatarsal III preening hairs or bristles. All tarsal claws are cut off. – Opisthosoma soft, dorsally covered with long hairs; spinnerets cut off. – Pedipalpus (fig. 20): Patella as long as the tibia which bears a small

retroapical and a large prodorsal apophysis, embolus (only partly observable) long; a median apophysis is not observable (this pedipalpal area is hidden).

Relationships: In ?*E. tibialis* the anterior cheliceral bristle-shaped hairs are stronger developed than in the related species, and a <u>pro</u>dorsal pedipalpal tibial apophysis exists.

Distribution: Eocene Baltic amber forest.

<u>EUTICHURINAE</u> LEHTINEN 1967 (= Cheiracanthinae WAGNER 1887, see above: The paragraph on taxonomy and synonymy)

Type genus: *Eutichurus* SIMON 1896.

<u>Further genera</u>: See PLATNICK (2009) contra DEELEMAN-REINHOLD (2001: 85, 223-254, 571). Remark on the genera in South East Asia which were described by DEELEMAN-REINHOLD (2001): The SE-Asian genera *Calamoneta, Calamopus* and *Summacanthium*, in which the basal article of the anterior male spinnerets are conical and no median apophysis exists, may build a tribe of its own.
The only genus in Europe is *Cheiracanthium* C. L. KOCH 1839.

Diagnosis: Thoracal fissure quite indistinct or absent, leg I distinctly the longest, trochanters notched (fig. 23) (not in the dubious SE-Asian genus *Calamoneta*), modifications of male pedipalpal tibia and/or cymbium (figs. 24-25) (a cymbial spur is absent in *Calamoneta* DEELEMAN-REINHOLD (2001)), epigyne with a single large groove (fig. 26) (except in *Cheiracanthium mildei*), the ducts of the vulva are usually strongly coiled around the receptacula seminis.
<u>Further characters</u>: Basal articles of the male chelicerae very long and diverging, basal article of the male anterior spinnerets usually slightly conical (almost cylindrical, e.g., in *Cheiracanthium*) but distinctly conical in the SE-Asian genera *Calamoneta*, *Calamopus* and *Summacanthium*, median apophysis basicly existing (see above).

Relationships: Systariinae may be related, see below and above: The paragraph on taxonomy and synonymy. Clubioninae may also be related, see the cladogram; cylindrical basal articles of the male anterior spinnerets evolved in the Clubionini, too.

Distribution: Cosmopolitical (unknown from fossils in amber).

SYSTARIINAE DEELEMAN-REINHOLD 2001

Type genus: *Systaria* SIMON 1897.
Further genera: See DEELEMAN-REINHOLD (2001: 201-222). According to the diverse shape of the eye field, the gnathocoxae, and the spinnerets Systariinae in my opinion is not a monophyletic taxon.
(*Systariellla* WUNDERLICH 2004: See below: Clubionoidea incertae sedis!)

Diagnosis: Trochanters notched, leg III only slightly shorter than leg II; a skinny median apophysis (fig. 22) exists frequently, including the type genus. In the type genus the eye field is very wide, a large and toothed tarsal claw of the female pedipalpus exists (person. observ.), the gnathocoxae are long/unmodified like in other Clubionidae, and the basal article of the anterior spinnerets is unusually long and DISTINCTLY CONICAL (in the male, too, fig. 21).

Relationships: Systariinae was originally described as a subfamily of the Clubionidae but is listed under Miturgidae in PLATNICK's (2009) World Spider Catalog, apparently following LEHTINEN (1967). In contrast to this tranfer see DEELEMAN-REINHOLD (2001: 201-202, 571): Systariinae is not a taxon of the Miturgidae but of the Clubionidae; I agree with the conclusions of this author.
According to the large tarsal claws of the female pedipalpi and their large teeth in the specimen of an undescribed species of *Systaria* from the Philippines (Mindanaho), coll. DEELEMAN, the type genus could well be a basal branch of the Clubionidae, and probably most related to the Eodotinae.
Eutichurae – in which the trochanters are usually notched, and a skinny median apophysis exists, too – are "similar" in some respect but the basal articles of their male anterior spinnerets are shorter as well as not distinctly conical, and their genital organs are quite different except their skinny median apophysis.

Distribution: South East Asia (unknown from fossils).

Clubionidae incertae sedis (see also the Clubionini and fossils under *Clubiona* above)

Bicluona MIKHAILOV 1994: According to its genital structures I regard the monotypic asiatic taxon *Bicluona* MIKHAILOV 1994 - described as a subgenus of *Clubiona* s. l., type species *Liocranum jucunda* KARSCH 1879, see MIKHAILOV (1995:43) – as a genus of its own (**n. stat**.). The bulbus of this species bears a "terminal apophysis".

Tolophus THORELL 1891 (**gen. resurr**.) = *Japoniona* MIKHAILOV 1990, described as a subgenus of *Clubiona*, = *Clubiona japonica*-group, see DEELEMAN-REINHOLD (2001: 94, 122) from SE-Asia: The introductory openings are situated in the middle of the epigyne, only a single pedipalpal tibial apophysis exists, as well as a strongly sclerotized “conductor” – a tegular apophysis –, which may be a derived median apophysis. Is this apophysis a “reversed” development? See DEELEMAN-REINHOLD (2001: 122-134).

These taxa may be related to the Clubioninae (Ataliini, Clubionini, Microclubionini), in which the structures of the bulbus are more simple and no median apophysis exists. They well may build the sister group to the Clubioninae and a subfamily of its own but the proof of its monophyly is needed.

Clubionoidea incertae sedis

Concursator PETRUNKEVITCH 1958 (extinct, preserved in Eocene Baltic amber) was based on two juvenile females which may be members of the Zoridae/Liocranidae.

Elaver O. PICKARD-CAMBRIDGE 1898 (= *Clubionoides* EDWARDS 1958) from the Americas including Miocene Dominican amber, a member of the Clubionidae or Miturgidae. The trochantera (at least III-IV) are notched.

Strotarchus SIMON 1888, an American genus which is regarded as a member of the family Miturgidae by several authors.

Systaria SIMON 1897 from the Oriental Region is here with some hesitation regarded as a member of the family Clubionidae but – according to its large tarsal claw and theeth of the female pedipalpus – I do not want to exclude that it may be a member of the family Miturgidae. See also above.

Systariella WUNDERLICH 2004 (extinct, preserved in Eocene Baltic amber, spinnerets and female unknown): According to the narrow eye field this genus is probably not a member of the Clubionidae in which it originally has been included, and it likely is also not a member of the Systariinae DEELEMAN-REINHOLD 2001. I do not want to exclude relationships to the Zoridae/Liocranidae.

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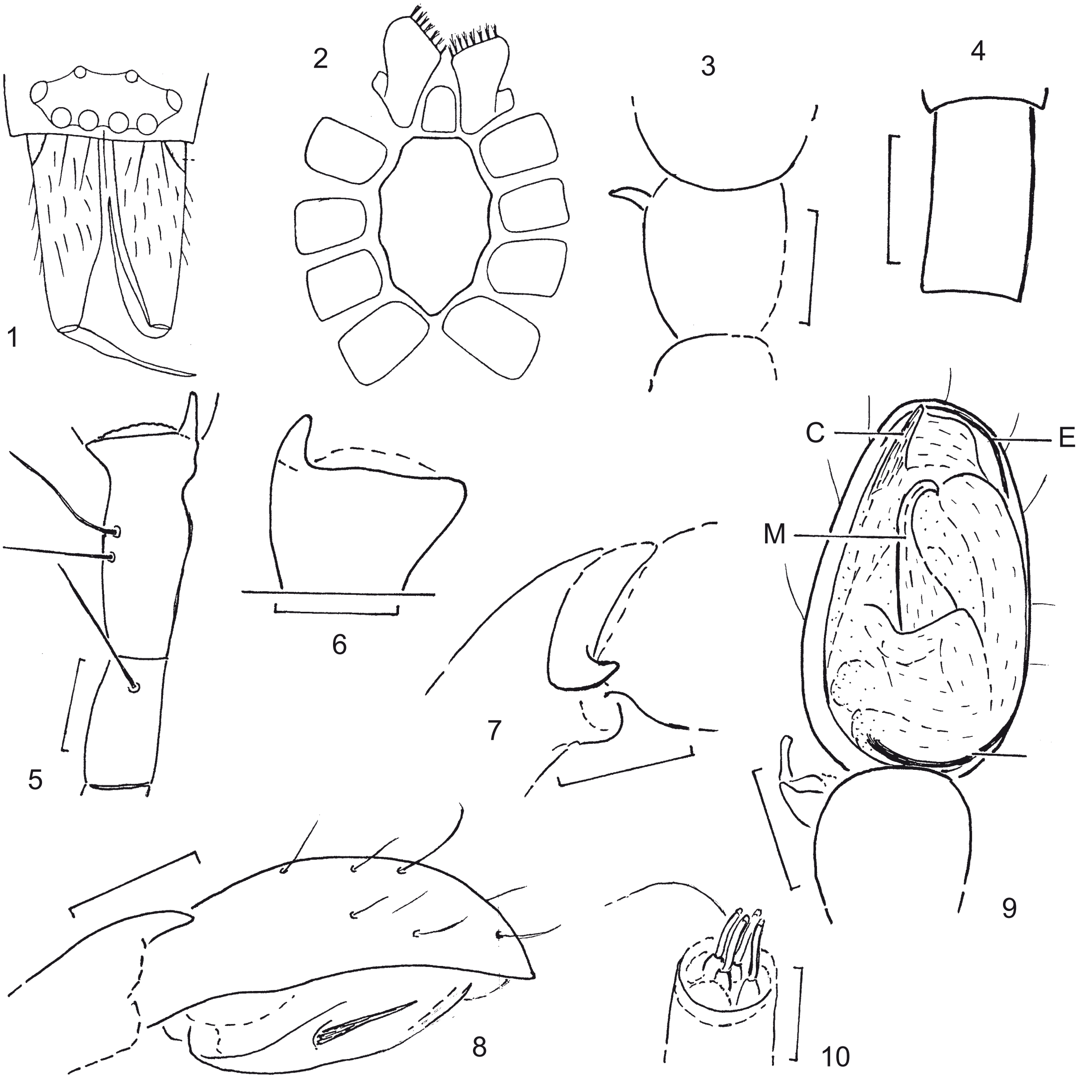
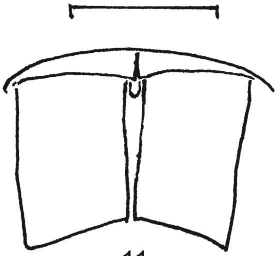
INDEX of the supraspecific taxa and selected genera and species



Figs. 1-3: *Eodoter magnificus* PETRUNKEVITCH 1958, ♂ holotype; 1) anterior aspect of the prosma (the posterior eyes are drawn too small), 2) ventral aspect of the prosoma; 3) ventral aspect of the right pedipalpal tibia, scale bar 0.2 mm. Figs. 1-2) are taken from PETRUNKEVITCH (1958);

figs. 4-10, 15: *Eodoter scutatus* **n. sp.**, ♂ holotype, 4) retroventral aspect of the basal article of the left anterior spinneret (hairs are not drawn); 5) dorsal aspect of patella and tibia of the right pedipalpus; 6) dorsal and slightly prolateral aspect of the left pedipalpal tibia (distal part); 7) retrodorsal-apical aspect of the tibia of the right pedipalpus; 8) retrolateral and slightly basal aspect of the right pedipalpus; 9) ventral aspect of the right pedipalpus; 10) apical part of the right anterior spinneret with 4 expanded spigots and tiny bubbles as well as the part of a dragline which origin is not exactly observable. C = conductor, E = embolus, M = median apophysis; scale bars 0.1 in fig. 10), 0.2 in the remaining figs.;



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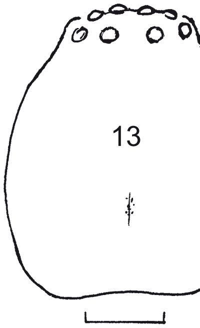

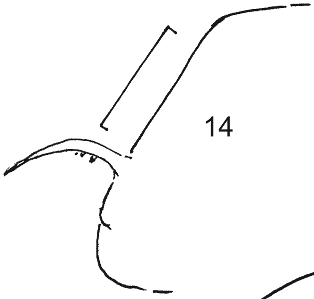

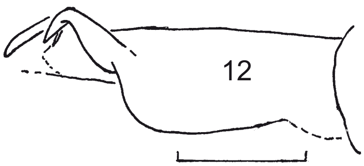

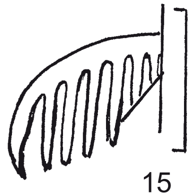

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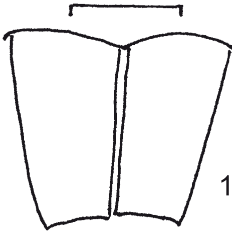

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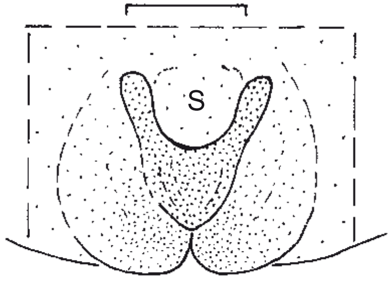
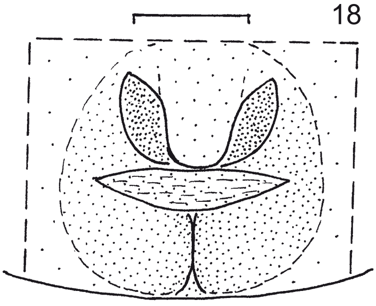
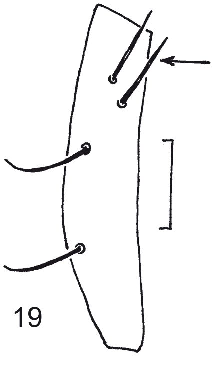
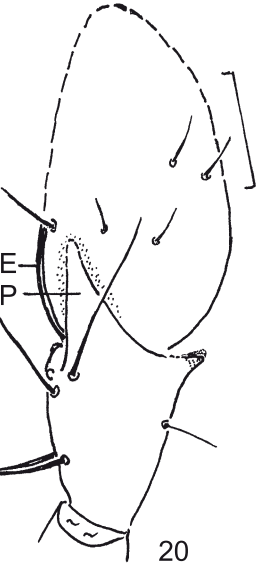


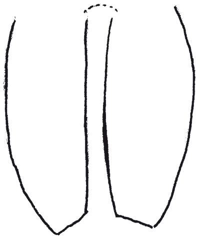


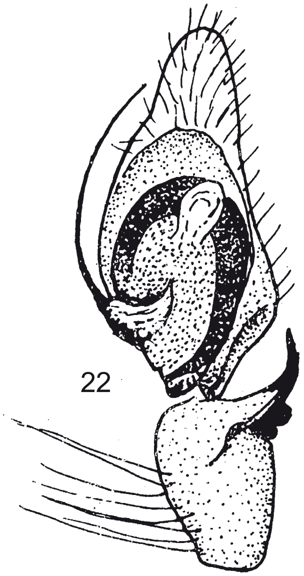


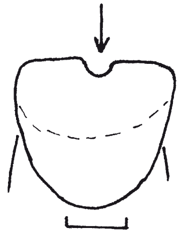


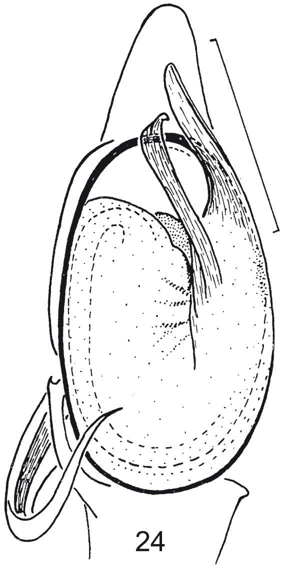
figs. 11-14, 16-18: Specimens which are probably conspecific with <u>*Eodoter scutatus*</u> **n. sp**.: 11) ♂ (F2174/CJW), ventral aspect of the basal articles of the anterior spinnerets (hairs are not drawn); 12) ♂ (F2174/CJW), retrolateral aspect of the left pedipalpal tibia (bristles and hairs are not drawn); 13) ♀ (F2178/CJW), dorsal aspect of the prosoma; 14) ♀ (2177/CJW) retrolateral and slightly dorsal aspect of the tarsal claw of the left pedipalpus (hairs are not drawn); 15) ♂ <u>holotype</u>, retrolateral aspect of the left retroclaw I (basally partly hidden); 16) ♀ (F2177), ventral aspect of the basal articles of the anterior spinnerets; 17-18), ♀ (F2178/CJW, F2179/CJW), epigyne (S = scape; some parts in fig. 17 may be deformed by heating); scale bars 0.2;

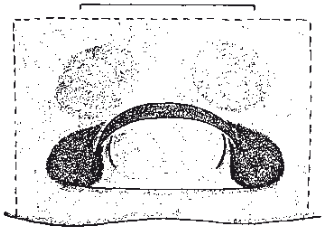
figs. 19-20: ?<u>*Eodoter tibialis*</u> **n. sp**., ♂ holotype; 19) prodorsal (slightly apical) aspect of the left femur I. The arrow points to the two prodistal bristles similar to the genus *Elaver*; 20) dorsal and slightly prolateral aspect of the right pedipalpus (only few hairs are drawn). E = embolus, P = prolateral tibial apophysis; scale bars 0.5 and 0.2;

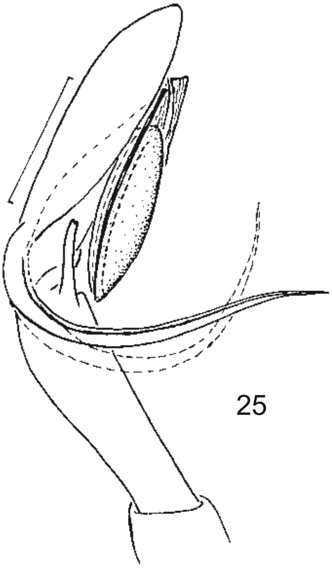


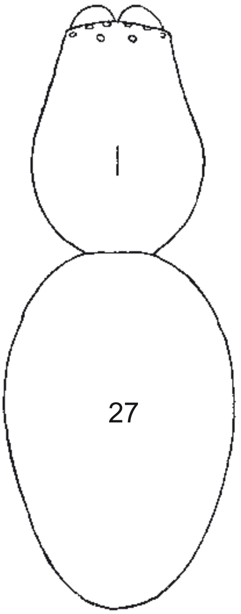


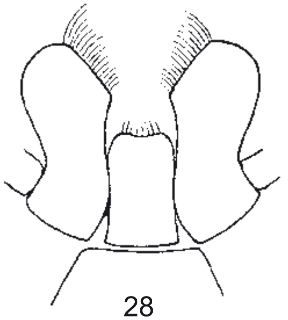








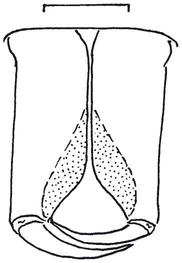




figs. 21-22: Systaria drassiformis SIMON 1879, ♂; 21) ventral aspect of the basal articles of the anterior spinnerets; 2) ventral aspect of the left pedipalpus. Taken from DEELEMAN-REINHOLD (2001);

fig. 23-26: Cheiracanthium sp., 23) ♂♀, ventral aspect of coxa IV with distal notch (inclination) (arrow); 24-25) ventral and retrolateral aspect of the right ♂-pedipalpus; 26) ♀, epigyne; scale bars 0.2;

figs. 27-28: Clubiona sp., dorsal aspect of the body and ventral aspect of the mouth parts;



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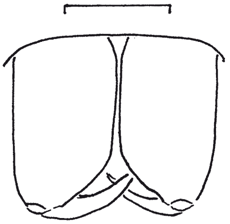

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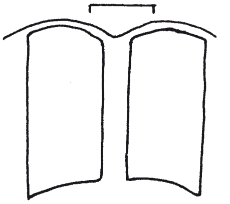

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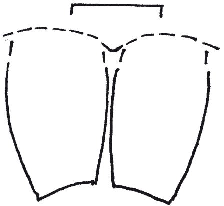

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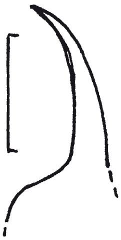

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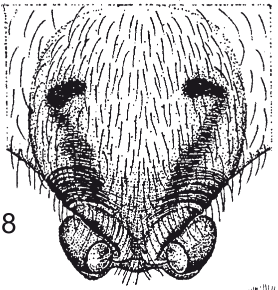

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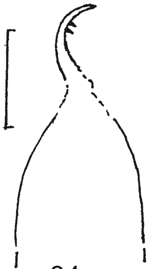

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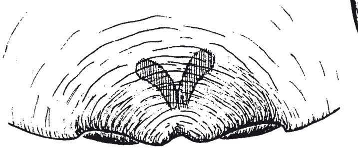

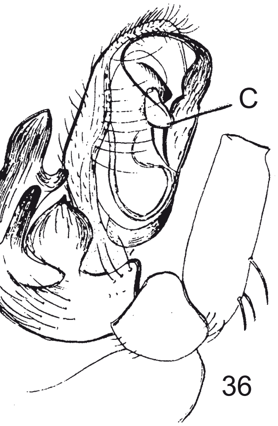

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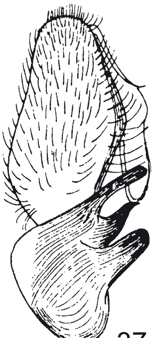

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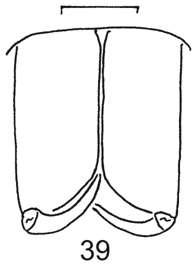
figs. 29-33: Clubiona neglecta C. L. KOCH 1839; 29) ♂, anterior aspect of the chelicerae; 30) ♀, anterior aspect of the chelicerae; 31) ♂, ventral aspect of the basal articles of the anterior spinnerets; 32) ♀, ventral aspect of the basal article of the anterior spinnerets; 33) ♀, tarsal claw of the right pedipalpus, prolateral and slightly dorsal aspect. Scale bars 0.05 in fig. 33), 0.2 in figs. 31-32), 0.5 in figs. 29-30);

fig. 34) Zora sp. (Zoridae/Liocranidae), ♀, tip of the right pdiplpus, retrolateral aspect (hairs are not drawn); scale bar 0.1;

fig. 35) Euroclubiona subsultans (THORELL 1875) (= *Clubiona s.*), ♂, retrolateral aspect of the right pediplpus. Taken from WIEHLE (1965);

fig. 35a) Euryclubiona norvegica (STRAND 1900) (= *Clubiona n.*), ♀, epigyne. Taken from DONDALE & REDNER (1982);

figs. 36-38: Gauroclubiona caerulescens (L. KOCH 1867) (= *Clubiona c.*); 36-37) retrolateral and dorsal aspect of the right ♂-pedipalpus with the skinny conductor (C), taken from WIEHLE (1965); 38) epigyne, taken from ROBERTS (1995);



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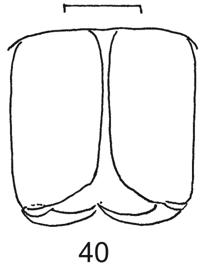

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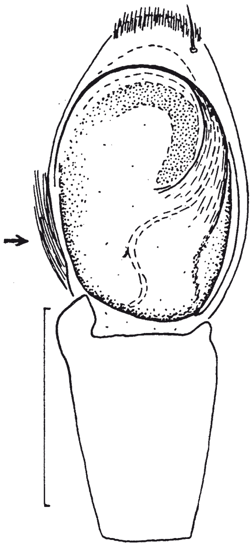

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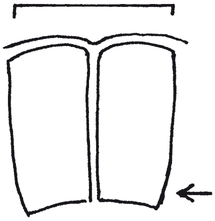

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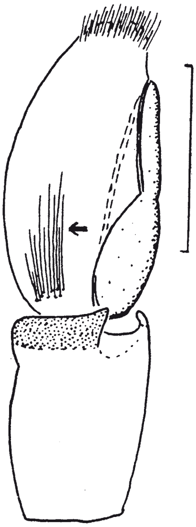

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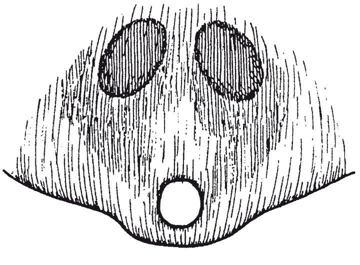

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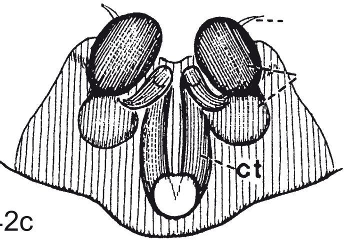


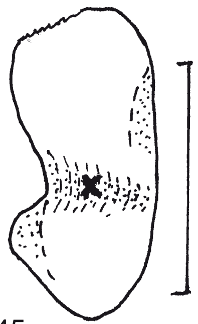
42c

figs. 39-41: Microclubiona diversa (O. PICKARD-CAMBRIDGE 1939) (= *Clubiona d.*); 39-40) anterior aspect of the male and female chelicerae (teeth of the cheliceral margins are not drawn); 41) ♂♀, ventral aspect of the basal articles of the anterior spinnerets. The arrow points to the conical distal part. Scale bars 0.5, 0.5 and 0.2;

fig. 42a-c: Microclubiona trivialis (C. L. KOCH 1843) (= *Clubiona t.*); 42a) ♂, ventral aspect of the left pedipalpus; 42b-c) ♀, epigyne and vulva. C = skinny conductor, E = embolus. Taken from DONDALE & REDNER (1982);

figs. 43-44: Porrhoclubiona minor (WUNDERLICH 1987) (= *Clubiona m.*), ♂, ventral and retrolateral aspect of the right pedipalpus. The arrows point to the cymbial hair brush. Scale bar 0.2;

fig. 44a-b) Porrhocubiona sp. (= *Clubiona* sp.), ♀, epigyne and vulva. Taken from WIEHLE (1965);



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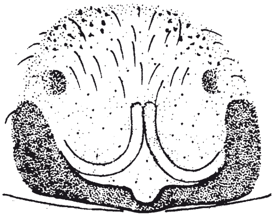

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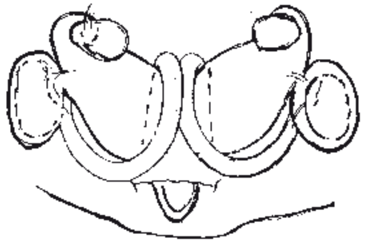

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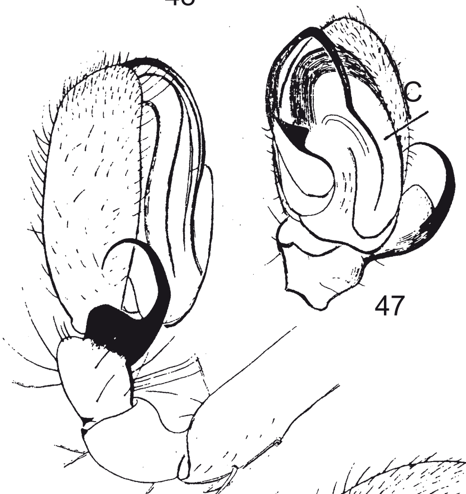

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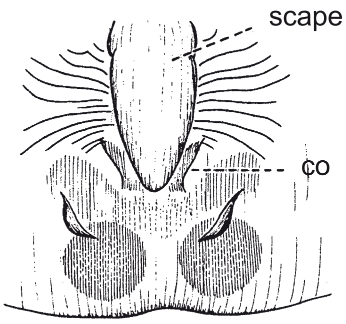

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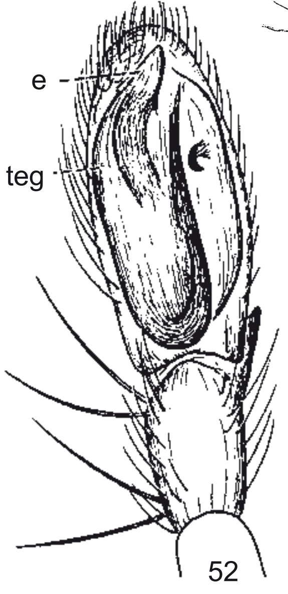

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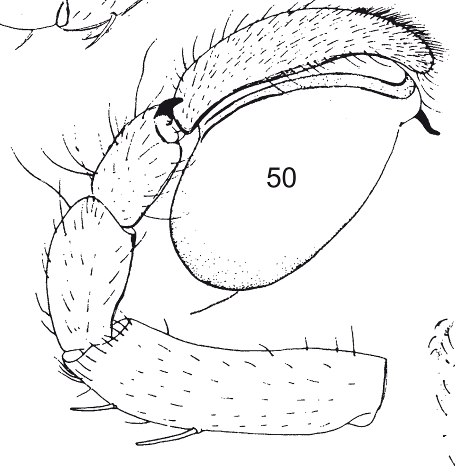

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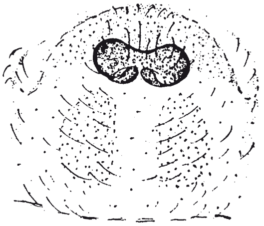

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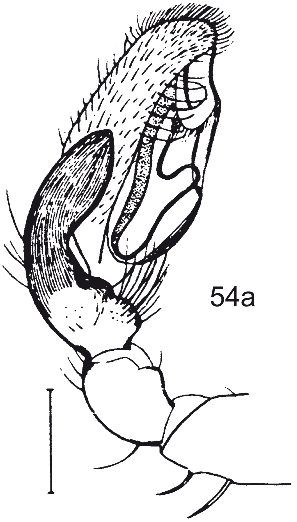
figs. 45-49: *Hyloclubiona compta* (C. L. KOCH 1839) (= *Clubiona c.*), 45) ventral aspect of the right ♂-gnathocoxa. Note the transverse depression (x); 46-47) retrolateral and ventral aspect of the right ♂-pedipalpus (C = shallow skinny conductor); 48-49) ♀, epigyne and vulva. Scale bar in fig. 45) 0.5. Figs. 46-49) are taken from WIEHLE (1965);

figs. 50-51: *Atalia corticalis* (WALCKENAER 1802) (= *Clubiona c.*); 50) retrolateral aspect of the right ♂-pedipalpus; 51) epigyne. Taken from WIEHLE (1965);

figs. 52-53: *Elaver excepta* (L. KOCH 1866) (North America), 52) ventral aspect of the left ♂-pedipalpus; 53) ♀, epigyne. Taken from DONDALE & REDNER (1982).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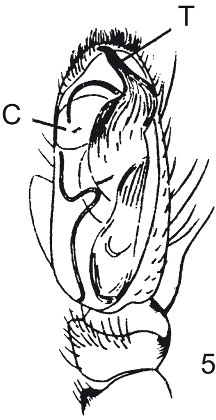

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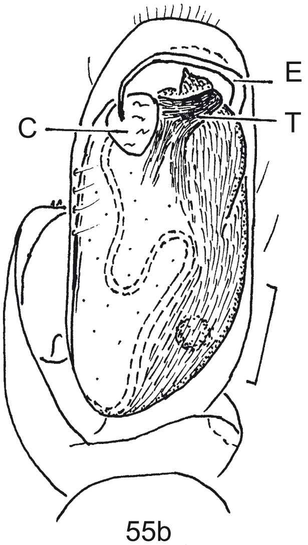

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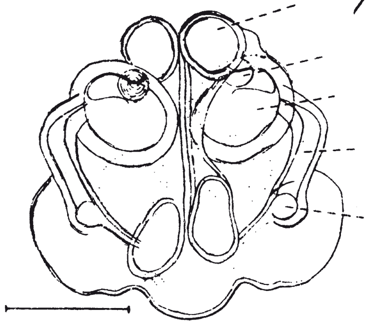
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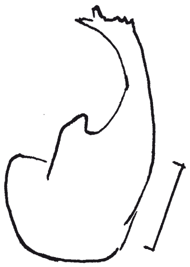
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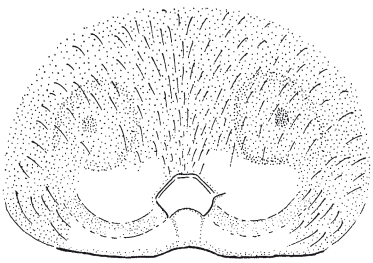

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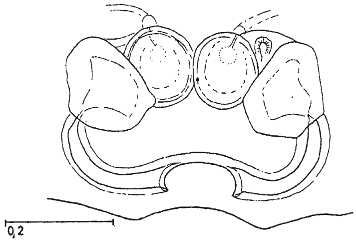

55d

figs. 54a-d: *Marmorclubiona* (**n. gen.**) *marmorata* (L. KOCH 186); 54a-b) ♂, retrolateral and ventral aspect of the right pedipalpus; 54c-d) ♀, epigyne and vulva. C = skinny conductor, T = tegular apophysis. Taken from WIEHLE (1965);

figs. 55a-d: *Breviclubiona* (**n. gen.**) *brevipes* (BLACKWALL 1841); 55a) ♂, dorsal aspect of the right pedipalpal tibia (scale = 0.2 mm); 55b) ♂, ventral aspect of the right pedipalpus (C = skinny conductor, E = embolus, T = tegular apophysis); 55c-d) ♀, epigyne and vulva. Figs. c-d are taken from WIEHLE (1965).

BEITR. ARANEOL., 6 (2011)

ON EXTANT WEST-PALAEARCTIC (MAINLY SOUTHERN EUROPEAN) SPIDERS (ARANEAE) OF VARIOUS FAMILIES, WITH NEW DESCRIPTIONS

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Abstract: New and rare species of the spider families Filistatidae, Gnaphosidae, Linyphidae, Nemesiidae, Oonopidae, Salticidae, Segestriidae and Therididae are described or listed mainly from Europe, including some taxa from the Canary Islands and from Turkey; selected taxa of the European Linyphiidae, Tetragnathidae and Dictynidae are revised, and keys to the families and genera of the Mygalomorpha as well as of the genera of certain araneomorph families are given. See the abstracts at the suprageneric taxa below, and p. 199.

Key words: Anatolia, Araneomorpha, Ariadninae, Atypidae, camouflage, caves, Comaromidae, Ctenizidae, Erigoninae, Europe, evolution, fossils, keys for identification, Filistaidae, Gnaphosidae, “hidden species”, Linyphidae, Metinae, Mygalomorpha, Nemesiidae, new species, Oonopidae, Salticidae, “sampling genus”, “sampling species”, Segestriidae, Sparassidae, Tetragnathidae, Tetragnathinae, Theridiidae, Turkey.

The **material** is stored in the SMF if not otherwise noted. CJW = collection of J. WUNDERLICH. For the loan of material I thank JULIA ALTMANN, ALEX BEIGEL, THEO BLICK, NIKLAS FRITZEN, PETER JÄGER, ALOISIUS STAUDT as well as some other authors and friends.

The countries of the European Union are growing together politically, economically, and probably ethologically, people of different countries are getting to know each other more and more but the progress in the knowledge of biota – of the taxonomy of arthropods as well – is growing only slowly. Money is needed for taxonomical investigations from relatively rich countries like Germany, but unfortunately Germany is in war again – billions of Euros are spend, e.g., for buying fighting aircrafts -, and German soldiers are fighting bloody wars together with the US army "for peace" in the sense of GEORGE ORWELL ("war is peace, peace is war"). Thus in Germany pensioners/old people may take care for studies on taxonomy besides few younger taxonomists... (And numerous of the "scientists of molecular genetics" are not interested in the knowledge of the organisms – their appearance, behaviour, ecology,... – they are working on).
The time just has come for creating keys to the identification of the European spiders at least to the level of the genera, and in some decades to the level of all the at least 4000 species, too) via the internet. The recognition (for political reasons) of humans by scanning their iris may soon be more developed than the identification of European arthropod animals.
A – sure – identification of taxa is the basis of ecological and ethological investigations/conclusions as well as of the distribution and endangering of species. A first step of spiders' identification – if the family is already known – is the determination to the genus, and I would like to draw attention to taxonomical problems in selected difficult genera like *Ariadna* (Segestriidae), *Entelecara*, and *Trichoncus* (Linyphiidae), *Meta* s. l. (Tetragnathidae), *Pritha* (Filistatidae), *Tetragnatha* (Tetragnathidae), and *Theridion* (Theridiidae) which are treat in this volume. On the family Comaromidae (**n**. **stat**.), and extant as well as extinct members of the genus *Balticoroma* WUNDERLICH 2004: See the paper on spiders in Eocene European ambers in this volume.
The important key to families and genera by TROTTA (2005) refers to the Italian taxa. The present author provided provisional keys to the European spider families and genera of the families of the infraorder Mygalomorpha (p. 478) as well as to the families Clubionidae (p. 121), Filistatidae, Prodidomidae (p. 98), Salticidae, Sparassidae, Therididae and Zoridae s. l. (rsp. Liocranidae; see WUNDERLICH (2008), and papers in this volume). A provisional key to another diverse spider family – the Gnaphosidae, p.19 – is given in the present volume. Included in that paper are the descriptions of some rare or firstly described extant and of some fossil (Eocene) European taxa.

A. Infraorder MYGALOMORPHA

Abstract: A key is given to the extant and fossil Eocene European families and genera of the infraorder Mygalomorpha as well as remarks on extant and fossil Atypidae. *Nemesia rastella* **n. sp**. (Nemesiidae) is described from Greece.

Notes: The name Mygalomorpha (not Mygalomorphae) is used in the sense of LEHTINEN (1967). – I thank PETER SCHWENDINGER for a very helpful discussion on the key to the mygalomorph genera.

Mygalomorph spiders may easily be recognized by their powerful and strongly prolongated chelicerae (figs. 1, 5, 24, photos 1-4) and two pairs of lungs; adult spiders are usually large, with a body length up to 5 1/2 cm (female *Chaetopelma*) in European spiders.
Most European mygalomorph spiders are hidden dwellers in the earth, which burrow tubes, e.g. members of the Ctenizidae and Nemesiidae (fig. 23), as well as the Atypidae. Exceptions are the members of the genera *Macrothele* (Hexathelidae) as well as *Chaetopelma* and *Ischnoculus* (Theraphosidae) which live above ground and are members of mainly tropical families; in Europe they have their northern limit at about the 40th latitude, quite similar to the – also mainly tropical – members of the family Hersiliidae (in Europe occur the genera *Hersiliola* and *Tama*).
Six families of the infraorder Mygalomorpha are known from today's Europe: Atypidae, Ctenizidae, Cyrtaucheniidae, Hexathelidae (or Dipluridae?): The subfamily Macrothelinae, see the note below, Nemesiidae (the most diverse family in Europe), and Theraphosidae. A member of the family Idiopidae – *Titanidiops canariensis* WUNDERLICH 1992 – is known from the Canary Islands (a related species exists in Morocco); these spiders build trap doors; see the paper on spiders of the Canary Islands in this volume. – Eocene fossils in Europe: See below under "Remarks on the family Atypidae".
The determination of Mygalomorpha to the level of genera – and even to some families – is difficult, even to most araneologists. The key below may be helpful for the identification – even of juveniles – of these most ancient spiders of Europe which mainly occur in Southern Europe. Only 3 species of *Atypus* of the family Atypidae are distributet up to Northern Europe and very few species of the family Nemesiidae reached Central Europe from the southeast (e. g. Hungary).

Remarks on the family Atypidae:

(1) Extant spiders: I found a pronounced and large field of strong spines (*) on the ventral side of the gnathocoxae in juveniles (fig. 3) which is absent in adult spiders of *Atypus* (fig. 2), see the paper on Eocene spiders in this volume. Such spines may exist in all juvenile specimens of *Atypus* according to P. SCHWENDINGER (in litt. XII. 2010). The function of these spines is unknown; P. SCHWENDINGER (in litt.) do not want to ecluded that they may be used for cutting their purse-like web to reach/catch their prey. Also in cotrast to adult (male) spiders marginal sternal ridges are absent in juveniles.

(*) Their bases (insertions) show clearly that these structures – which are called "cuspules" by most authors – are true spines but not "spiny warts" or "thorns" as called by certain authors.

(2) Fossils: The first fossil members of the ancient family Atypidae: Only juveniles of an extinct tribe (Balticatypini n. tribe, see p. 482) are known up to now which just has been discovered in Baltic amber, see the paper on Eocene European amber spiders in this volume. In these Eocene spiders the anterior (lateral) spinnerets were not yet reduced and the median spinnerets were not truncate like in extant relatives of the tribe Atypini.

Keys to the families and genera (below) of the European Mygalomorpha:

REMARKS:

(1) Number of spinnerets: In European Mygalomorpha exist three pairs of spinnerets (fig. 4) only in the ancient (“primitive”) family Atypidae. A single pair of spinnerets exists only in the genus *Iberesia* of the family Nemesiidae (fig. 17), members of the other European mygalomorphs possess two pairs of spinnerets (figs. 15-16).

(2) In European Mygalomorpha an unpaired tarsal claw is absent only in the family Theraphosidae.

(3) In European Mygalomorpha a cheliceral rastellum (fig. 6) is well developed in the families Ctenizidae and Cyrtaucheniidae (as well as in the Idiopidae: *Titanidiops* on the Canary Islands); it exist also in several members of the Nemesiidae (fig. 24, long arrow in fig. 26), where it is more or less reduced.

(4) In European Mygalomorpha Club-shaped tarsal trichobothria (special sensory hairs, fig. 18) exist in the Theraphosidae and – convergently evolved – in the genus *Ummidia* of the Ctenizidae.

(5) Mygalomorpha of the Canary Islands (see the paper on spiders of the Canary Islands in this volume): A species of the family Idiopidae – *Titanidiops canariensis* WUNDERLICH 1992 – is known from Fuerteventura and Lanzarote. In *Titanidiops* the anterior lateral eyes are situated far in front of the remaining eyes (fig. 14) in contrast to all other spiders of the Western Palaearctic. A related species occurs in Morocco.

(6) Fossil European mygalomorph families: The first fossil members of the Atypidae have just been discovered in Baltic amber, see the paper on Eocene European amber spiders in this volume and above. Other spider families which are known from these ambers are the Ctenizidae and the subfamily Macrothelinae of the family Hexathelidae (or of the Dipluridae?). In the fossil Ctenizidae the prosoma is distinctly punctuated – see the paper on fossil spiders in European ambers in this volume – in contrast to the extant European taxa. A member of the family Nemesiidae – which is most diverse in Europe today – has not (yet) been identified by me up to now in Baltic amber among more than 100 000 specimens of spiders.

(7) With the help of this key also juveniles can be determined at least to the family level.

(A) FAMILIES

The numbers in bold print indicate the keys to the genera below.

1 Gnathocoxae strongly prolongated (fig. 2, photo 78). 3 pairs of spinnerets (fig. 4) (the anterior (lateral) spinnerets are much larger in the Eocene fossils!). Chelicerae powerful (photos 2-4), longer than the posterior spinnerets. Opisthosoma anteriorly usually with a dorsal scutum in males (fig. 1) (only a light area in females). *Atypus*. Southern to Northern Europe. (A member of *Calommata* occurs in Israel in which the cephalic part is strongly raised, see LEVY (2007)) . . . . Atypidae

- Gnathocoxae of usual size, not strongly prolongated (short arrow in fig. 26). Usually 2 pairs of spinnerets (figs. 15-16), a single pair (fig. 18) in *Iberesia* (Nemesiidae). Chelicerae less powerful, in the Hexathelidae shorter than the posterior spinnerets. Opisthosomal scutum absent. Southern Europe and South Eastern limit of Central Europe (few Nemesiidae) 2

2(1) Two tarsal claws hidden by a thick claw tuft. Posterior spinnerets very long, up to half as long as the opisthosoma. At least tarsi I-II dorsally with club-shaped hairs besides thin hairs (fig. 18). *Chaetopelma* and *Ischnocolus* (**1**) . . . . Theraphosidae

- Three tarsal claws which are free visible. Posterior spinnerets usually shorter, e.g. figs. 1, 15-17, very long only in *Macrothele* (no. 3). Club-shaped hairs exist only in *Ummidia* of the Ctenizidae 3

3(2) Posterior spinnerets half as long as the opisthosoma. The labium bears more than 100 cuspules. Cheliceral rastellum absent. Embolus as long as the long pedipalpal tibia. ♂-coxa I in *calpeiana* anteriorly with paddle-shaped widened hairs (fig. 19).The spiders build funnel webs above ground, under rocks etc.. Macrothelinae (*): *Macrothele*. Iberian Peninsula and Italy (*calpeiana*), Crete (*cretica*) . . . . Hexathelidae

- Posterior spinnerets usually shorter than ¼ of the opisthosomal length (figs. 15-17). The labium bears far less than 100 cuspules. Rastellar teeth frequently existing (reduced in several Nemesiidae). Embolus distinctly shorter than the pedipalpal tibia. Spiders living in a silken tube or burrow in the soil which is usually closed by a cover (fig. 23) ("Trapdoor Spiders"), some Nemesiidae build their tubes/webs between rocks or even in stone walls 4

4(3) Sternal sigilla (they are hairless): A LARGE(R) pair situated in or just behind the sternal middle, 1-2 additional tiny marginal pairs exist (figs. 8-9). Fovea large and distinctly u-shaped (procurved) (fig. 5). Colour, shape of rastellum, legs and absent spur of the ♂-tibia I as in the very similar Cyrtaucheniidae. 3 genera (**2**) . . . . Ctenizidae

- Sternal sigilla: Most often 3 (rarely 2 or 1 or none, see *Nemesia rastella* n. sp. below) SMALL pairs exist near the margin of the sternum (figs. 10-11), sigilla near the middle are absent. Cephalic part and fovea: See below 5

5(4) Colour of prosoma and legs usually pale yellow-brown, rarely red-brown. Fovea usually recurved (fig. 24), in some taxa straight. Legs usually longer and more slender. The rastellum frequently more or less reduced, but in some species it is well developed (figs. 24, long arrow in fig. 26). Spur(s) of the ♂-tibia I (figs.21, 22, 27) exist in almost all taxa (they are absent in *Raveniola* and *Nemesia simoni*). Widely distributed in S-Europe and most diverse (**3**) . . . . Nemesiidae

- Colour of prosoma and legs usually dark brown, rarely red-brown. Shape of the fovea variable, slightly procurved to slightly recurved. Legs stout. Rastellum well developed (fig. 6). Eye field wider than in most other European Mygalomorpha, similar to *Cyrtocarenum* (Ctenizidae, fig. 13), about 2 ½ times wider than long. Spur of ♂-tibia I absent. Only *Cyrtauchenius* (= *Amblyocarenum*). Spain, Italy, Crete. . . . . Cyrtaucheniidae

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(*) The relationships of the Macrothelinae – really Hexathelidae or probably Dipluridae? – are unsure. Macrothelinae possesses 2 pairs of spinnerets but Hexathelinae 3 pairs; Hexathelidae are probably not monophyletic. See the paper on Eocene spiders (the genus *Clostes*) in this volume, p. 479.

(B) GENERA

(**1**) Theraphosidae:

1 Largest spiders of Europe, body length (without chelicerae) of adults usually 3 – 5.5 cm (♀). Clypeus absent, position of the anterior eyes close to anterior margin of the prosoma. The labium bears usually more than 35 spines (“cuspules”). Paired tarsal claws without teeth. ♂-tibia I with 2 blunt spurs. Cyprus, Turkey . . . . *Chaetopelma*

- Body length of adult spiders in Europe usually 1 – 2 cm. Clypeus well developed. The labium bears usually less than 15 spines. Paired tarsal claws usually with teeth. ♂-tibia I without a spur. Spain, Sicily . . . . *Ischnocolus*

(**2**) Ctenizidae:

Remark: The cephalic part of the spiders is raised (fig. 20), apparently variable within *Cteniza, Cyrtocarenum* as well as *Cyrtauchenius*.

1 Tibia III bears a distinct dorsal depression (arrow in fig. 7). Club-shaped tarsal trichobothria (fig.18) present. Only *U. aedificatoria*. Southern part of the Iberian Peninsula. (Also known fossil from the Eocene Baltic amber). . . . . *Ummidia*

- Neither such depression nor club-shaped trichobothria 2

2(1) Anterior median eyes situated between the anterior lateral eyes, eye field about 2 ½ times wider than long (fig.13). SE-Europe: Greece . . . . Cyrtocarenum

- Anterior median eyes situated distinctly behind the anterior lateral eyes, eye field less than twice as wide as long (fig.12). Southern Europe except SE-Europe. (= *Aepycephalus*) . . . . Ctenizа

(**3**) Nemesiidae:

Notes: Two genera are not included in this key because the male is unknown in their single European species: (a) The genus *Raveniola* ZONSTEIN 1987 with *R. micropa* from Minor Asia (Turkey). In the type species from Central Asia a rastellum as well as a spur of the ♂-tibia I are absent. – (b) The South African genus *Spiroctenus* – in which a rastellum exists and a single row of teeth of the paired claws of the ♂-tarsi – is represented in Europe only by *S. lusitanus* from Portugal. Compare *Nemesia rastella* n. sp. from Greece, in which the paired claws of the ♂-tarsi bear two rows of teeth and the labium bears no cuspules (bristles).

1 Only a single pair of STOUT spinnerets (fig. 17). Iberian Peninsula and Majorca . . . .*Iberesia*

- 2 pairs of spinnerets, the medians are small (figs. 15-16) 2

2(1) Posterior spinnerets slender, their apical article distinctly longer than wide (arrow in fig.16). The spur of the ♂-tibia I bears a pair of strong spines (fig. 22). Several species mainly in SE-Europa and a single species in Italy. (= *Nemesiothele*) . . . . . Brachythele

- Posterior spinnerets stout (they may be more slender than in fig. 15), apical article short. The spur of the ♂-tibia I bears a single strong spine (fig. 21) (a further slender spine may exist, fig. 27). The cephalic part may be quite low in this genus (fig. 25) up to distinctly raised, similar to fig. 20). More than fourty described species, mainly in SW-Europe and Italy, only few in SE-Europe . . . . Nemesia

Description of a new species of the family Nemesiidae:

Nemesia AUDOUIN 1826

The genus *Nemesia* has been splitted, see above: *Brachythele, Iberesia*, and *Spiroctenus*. The genus is restricted to the Western Palaearctic, and is by far the most diverse mygalomorph genus in the Mediterranean and most rich in species in this region after *Dysdera* and *Harpactea* (Dysderidae): 44 species have been described. Most species live in the Western Mediterranean in contrast to the Eastern Mediterranean, numerous are island endemics, few species occur northwards up to Hungary and Romania (e. g. *N. pannonica*); *N. caementaris* is widely spread from the east to the west. Some species are kown from North Africa. The real number of species – which live usually hidden in the earth – is most probably much more than 50 or even 100 like in *Dysdera*.
Variability of selected characters: (a) The shape of the prosoma is quite variable: It may be slightly or distinctly longer than wide, the cephalic part is quite low in some species like *N. rastella* n. sp. but it may be strongly raised like in fig. 20 in other species. – (b) A cheliceral rastellum is reduced or absent in most species of this diverse genus, but it is well developed in *N. rastella* (long arrow in fig. 26). – (c) The number of pairs of sternal sigillae is quite variable, from 3-1 (a single pair posteriorly) to none in *Nemesia rastella* n. sp..

***Nemesia rastella* n. sp**. (figs. 24-31)

Derivatio nominis: The name refers to the three rastella of this species, see the diagnosis.

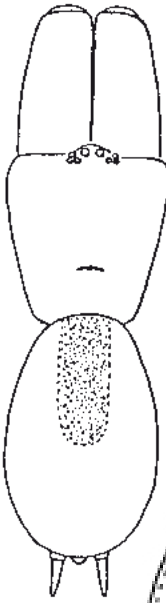
Material: Male holotype from the Greece island of Karpathos, inner bay of Pighadia, dry creek, pit fall between broom and *cypressus*, R. KINZELBACH leg. in IX. 1963; SMF. – The opisthosoma of the spider and the right pedipalpus have been separated, the opisthosoma is deformed.

Diagnosis (♂; ♀ unknown): The chelicerae, as well as the pedipalpal tibia, and the cymbium bear a rastellum which is well developed on the chelicerae (figs. 24, 26, 29-30), the prosoma is low, 1.48 times longer than wide, eyes large (figs. 24-25), pedipalpus (figs. 29-31) with the embolus as long as the bulbus.

Description (♂):
Measurements (in mm): Body length ca. 7.5, prosoma: Length 4.0, width 2.7; leg I: Femur 3.0, patella 2.0, tibia 2.2, metatarsus 2.2, tarsus 1.5; tibiae II-IV 2.0/1.8/3.6, diameter of the lenses of the anterior median eyes 0.16, of the anterior lateral eyes 0.2, length of the fangs 1.0; pedipalpal tibia: Length 1.2, height 0.6.
Colour pale yellow brown, prosomal margin small darkened.
Prosoma (figs. 24-26) (the cuticula of the peltidium is slightly lifted off): 1.48 times longer than wide, low, with few hairs, fovea recurved, bearing a median notch, eyes situated on an elevation, the anteriors large, the medians spaced by their radius, the anterior lateral eyes are spaced from the anterior prosomal margin by their diameter. Chelicerae large, rastellum well developed, consisting of 3-4 strong bristles/spines; the prolateral margin of the cheliceral furrow bears 6 strong teeth, the retrolateral margin bears numerous long hairs; labium fused to the sternum, slightly wider than long, gnathocoxae long, bearing 3 bristles, sternum 1.75 times longer than wide, sigillae absent. – Legs (fig. 27) long, order IV/I/II/III, bearing short hairs and numerous long bristles, usually 6-8 on the femora, patella I bears a single prolateral one, tibia I with 2 ventral pairs, 1/1 prolaterally, and a retrodistal one as well as a proventral-distal spur which bears a hugh bristle. Tarsi I-II bear a short pseudoscopula and short ventral bristles. The coxae IV are close together. Paired tarsal claws with two rows of long teeth, unpaired claw smooth and small. – Opisthosoma (it is deformed) long, posteriorly with long hairs; 2 pairs of spinnerets, the medians small and distinctly separated, posterior spinnerets: Fig. 28. – Pedipalpus (figs. 29-31) Femur with few bristles, tibia twice as long as high, bearing only few strong dorsal bristles and an apical rastellum of 3 strong bristles/spines, cymbium divided apically, dorsally bearing a dozen of strong bristles/spines which may be usefull for digging, embolus about as long as the bulbus.

Relationships: The fovea is similar in *N. daedali* DECAE 1995 from Crete (♂ unknown), in which the prosoma is stouter and the eyes are smaller. The well developed cheliceral rastellum is an unusual character in *Nemesia.* – A cheliceral rastellum exists in the related genus *Spiroctenus* which is represented in Europe by a single species in Portugal, in which the labrum bears cuspules/bristles, and the paired claws of the ♂-tarsi bear only a single row of teeth, see above.

Distribution: Greece, island of Karpathos.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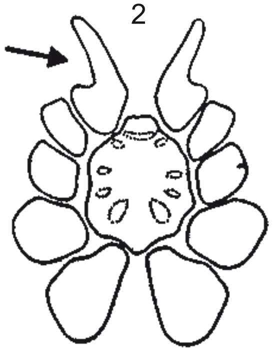
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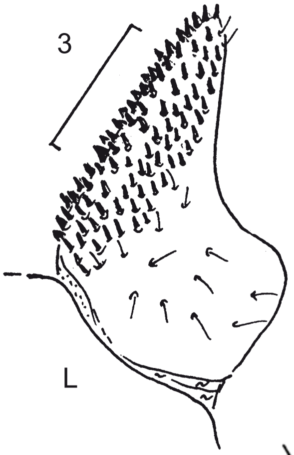
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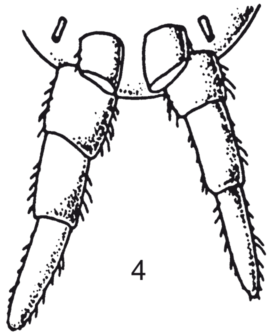
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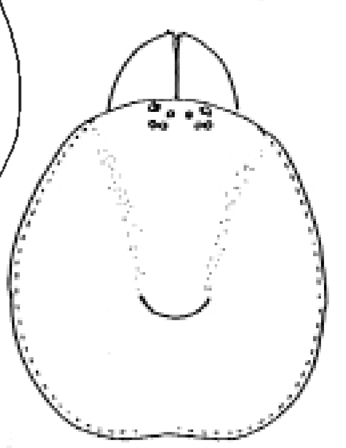
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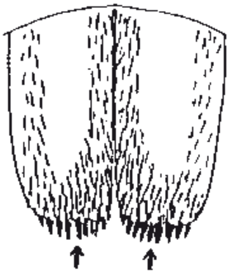
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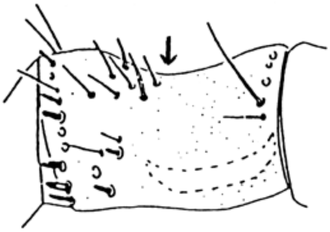
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Fig. 1) *Atypus* sp., dorsal aspect of the body. Note the opisthosomal scutum which may be much larger in adult males;

fig. 2) Atypidae sp., ventral aspect of the prosoma. Note the strongly prolongated gnathocoxae (arrow). Taken from DIPPENAAR-SCHOEMAN & JOCQUE (2007);

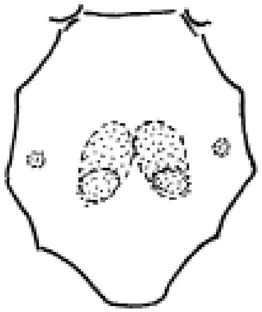
fig. 3) *Atypus piceus* (SULZER 1776), juv. (CJW), body length 5.5 mm, ventral aspect of the left gnathocoxa. Note the dense field of spines which are absent in adult spiders; compare fig. 2). Scale bar 0.5 mm;

fig. 4) Atypidae sp., spinnerets. Atypidae possesses three pairs of spinnerets, a small pair in an anterior lateral position (they are much larger in Eocene fossils), a stout median pair and a relatively long posterior pair. In the remaining European taxa exist usually two pairs (figs. 15-16), but in the genus *Iberesia* (Nemesiidae, fig. 17) exists only a single pair. Fig. taken from DIPPENAAR-SCHOEMAN & JOCQUE (2006);

fig. 5) Ctenizidae sp., dorsal aspect of the prosoma;

fig. 6) Cteniziae and Cyrtauchdeniidae sp., anterior aspect of the chelicerae with their apical spines (the rastellum) (arrows); similar are some members of the Nemesiidae;

fig. 7) *Ummidia* sp. (Ctenizidae), lateral aspect of tibia III with its dorsal depression (arrow);



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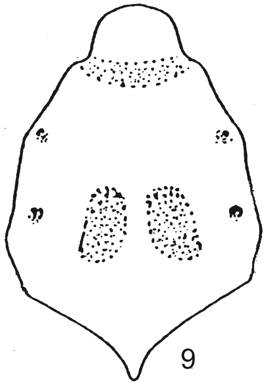

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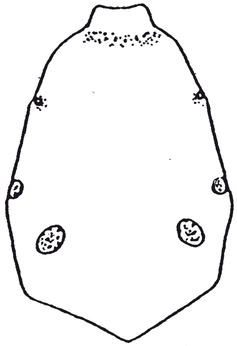

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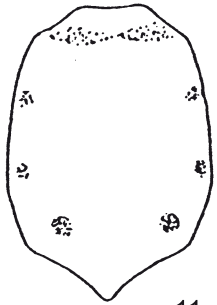

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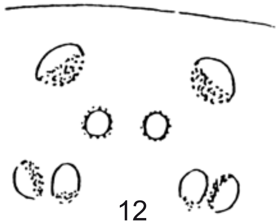

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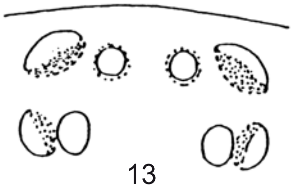

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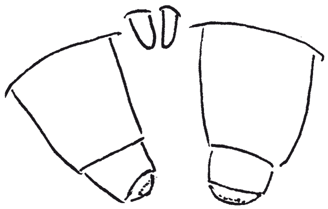

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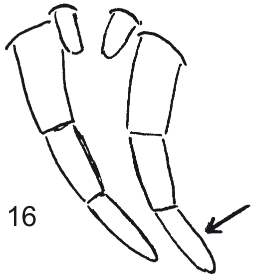

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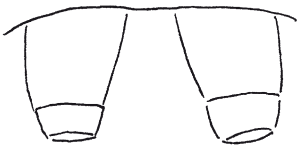

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figs. 8-9: Ctenizidae sp., sternum. Note the two large(r) hairless sigilla in or behind the middle in a variable position as well as the additional small/tiny marginal sigilla;

fig. 10) *Cyrtauchenius* sp., sternum;

fig. 11) Nemsiidae sp., sternum;

fig. 12) *Cteniza* sp., position of the eyes;

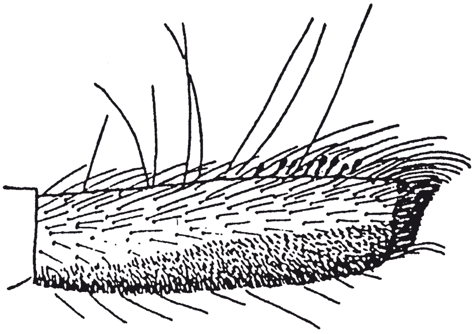
fig. 13) *Cyrtocarenum* sp., position of the eyes;

fig. 14) *Titanidiops canariensis* WUNDERLICH 1992, position of the eyes;

fig. 15) *Nemesia* sp., ventral aspect of the spinnerets;

fig. 16) *Brachythele* sp., ventral aspect of the spinnerets;

fig. 17) *Iberesia* sp., ventral aspect of the spinnerets (only a single pair exists!);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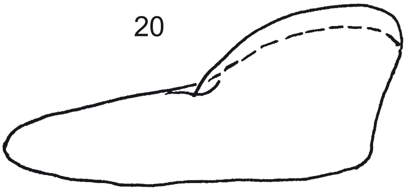
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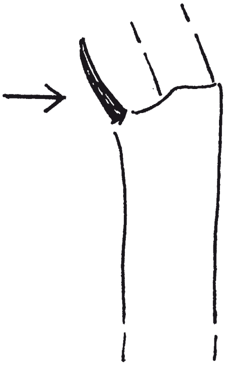
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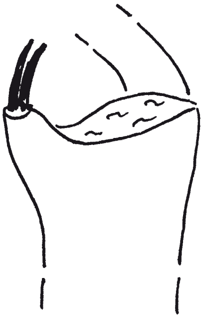
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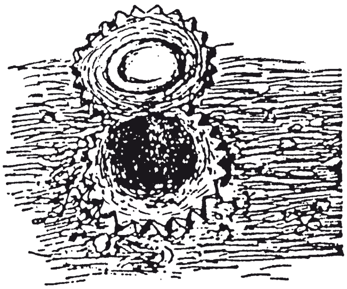
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fig. 18) *Ischnothele* sp. (Theraphosidae) (similar *Ummidia* sp., Ctenizidae), lateral aspect of an anterior tarsus which bears normal and club-shaped hairs (trichobothria) (short and black);

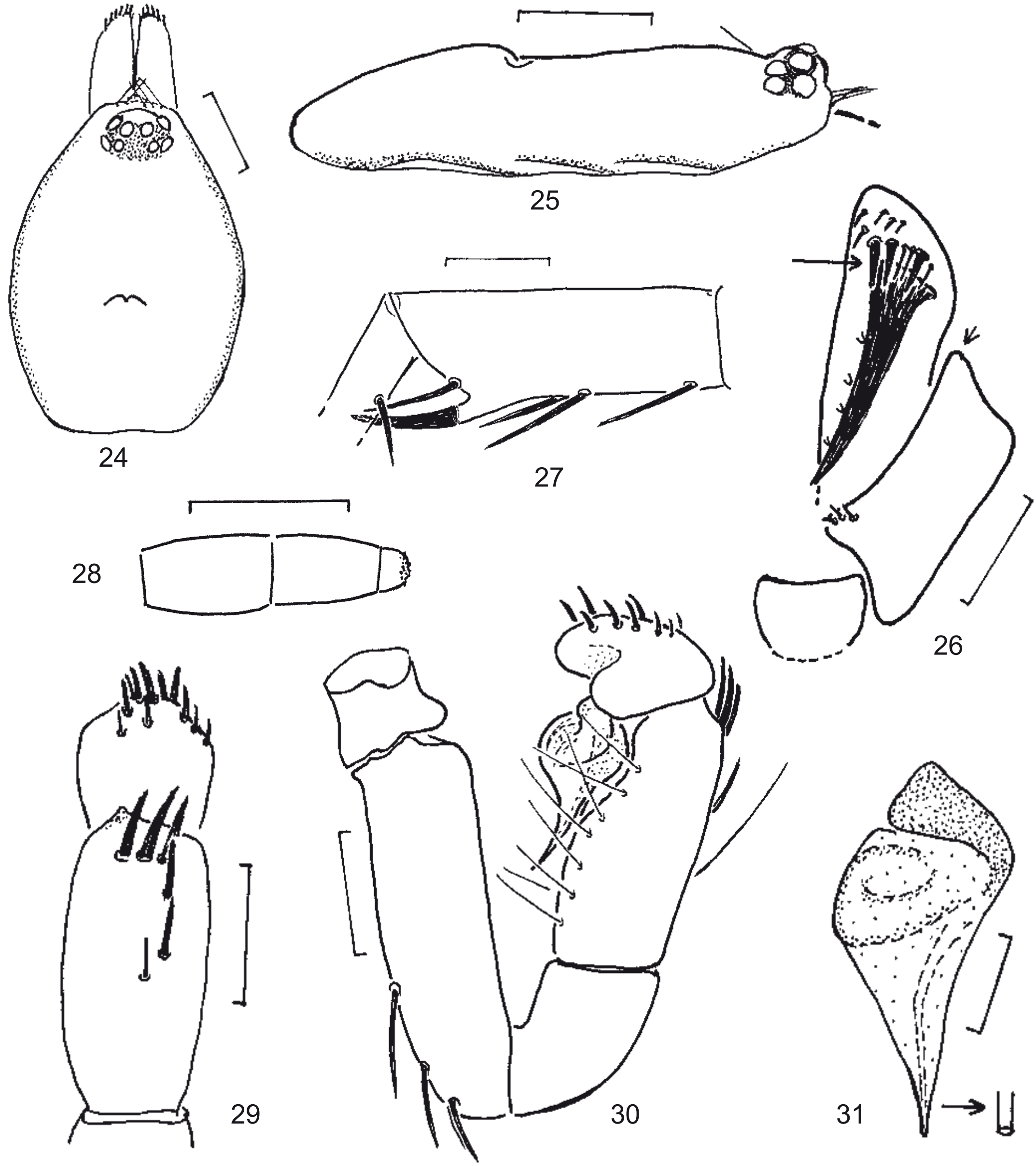
fig. 19) *Macrothele sp*. (Hexathelidae), anterior aspect of the ♂-coxa I which bears paddle-shaped thickened hairs;

fig. 20) Ctenizidae sp. and Cyrtaucheniidae sp., outline of the prosoma without chelicerae, lateral aspect, variability.

fig. 21) *Nemesia* sp., lateral aspect of the distal part of the ♂-tibia with its spur which bears a single strong bristle (arrow). Similar burrows build members of the families Ctenizidae and Cyrtaucheniidae;

fig. 22) *Brachythele* sp., lateral aspect of the distal part of the ♂-tibia I which bears a pair of strong bristles on a spur;

fig. 23) Nemsiidae sp., cover (above) and entrance to the subterranean tube of a spider;



figs. 24-31: *Nemesia rastella* **n. sp.**, ♂; 24-25) dorsal and lateral aspect of the prosoma. Normal hairs and the strong hairs above the rastellum have not been drawn; 26) ventral aspect of the mouth parts of the left side. The short arrow points to the fairly prolongated gnathocoxa, the long arrow points to the strong bristles/spines of the cheliceral rastellum; 27) retrolateral aspect of the left tibia I and the basal part of the metatarsus. Hairs are not drawn; 28) retrolateral aspect of the left posterior spinneret. Hairs are not drawn; 29) dorsal aspect of the tibia and cymbium of the right pedipalpus; 30) prolateral aspect of the right pedipalpus; 31) dorsal aspect of the right bulbus with embolus. The tip of the embolus (arrow) is enlarged. Scale bars 1.0 in figs. 24, 25 and 27, 0.5 in figs. 26, 28-30, 0.2 in fig. 31.

B. Infraorder ARANEOMORPHA

FAMILY FILISTATIDAE

Abstract: A key is given to the European genera and the continental European species of the spider family Filistatidae, the genera *Filistata* LATREILLE 1810, *Pritha* LEHTINEN, and *Zaitunia* LEHTINEN 1967. A peculiar paired – most probably secretory – "clypeal gland organ" is described from *Pritha*. *Pritha pallida* is reported from France, Italy, and the Azores for the first time, few erroneous determinations are corrected; its metatarsal trichobothrial pattern is reported.

Filistatidae is an archaic cribellate and mainly tropical family which is not diverse; the calamistrum is indistinct in several taxa, tarsal trichobothria are absent. Its relationships are quite unsure. To my knowledge it is the only spider family characterized by the combination of the following two characters: (a) the existence of SEVERAL metatarsal trichobothria (in a single row, fig. 1a) (this "plesiomorphic" pattern has not been reported by me (2004: 644) in the cladogram; see LEHTINEN (1980)) + (b) a patella-tibia autotomy.

The ernormous intraspecific variability in size (see figs. 4-6), shape, colour, and the chaetotaxy of the European filistatid taxa caused taxonomical problems, errors (*), nomina dubia (**), and synonyms – a rather chaotic situation. The determination of the specimens and the distribution of the European species of the genus *Pritha* has to be revised.

From Europe I know:

- a single continental species of *Filistata: insidiatrix* FORSKOEL 1775, as well as five congeneric endemic species from the Canary Islands, see WUNDERLICH (1992);
- two species of *Pritha: nana* (SIMON 1868) (= *vestita* SIMON 1873), and *pallida* (KULCZYNSKI 1899) (sub *Filistata*);
- a questionable species of *Zaitunia* LEHTINEN 1967: *annulipes* (KULCZYNSKI 1908) from Cyprus (sub *Filistata*, ♂ unknown, transferred by BRIGNOLI (1982: 66); in my opinion the generic position should be confirmed by the study of a male).

(*Zaitunia inderensis* PONOMAREV 2005 is known from Kazhakhstan).

Sahastata nigra (SIMON 1897) (♂ unknown, sub *Filistata*, transferred by BRIGNOLI (1982), Near East to India) is absent on Madeira to my knowledge. *Sahastata sabaea* BRIGNOLI 1982 has been reported from Yemen. *Sahastata* BENOIT 1968 occurs probably not in Europe.

(*) *Pritha nana* (SIMON 1868) sensu WUNDERLICH (1992: 83, 318) from the Azores (♂♀ Graciosa, near Santa Cruz; Terceira, Angra do Heroismo, CJW, later SMF) is really *P. pallida* (KULCZYNSKI 1897), see the key below. The male has been compared with a male from S-France, near St. Tropez, collected near the beach, JW leg. in V 2009, CJW, later SMF. *P. nana* is unknown from the Azores; *P. pallida* is new to France and the Azores. *Pritha nana* sensu HANSEN (1988:210) (Italy, Venezia) which I got from H. HANSEN, is also really *P. pallida*; *pallida* is new to Italy (the figs. 266-267 in the book of TROTTA (2005) (sub *P. nana*) apparently refer to *P. pallida*). *P. nana* and *pallida* are easily distinguishable by the colour of prosoma and legs, see the key. In *P. pallida* I found about six trichobothria in a row on metatarsus I.

(**) Nomina dubia are *Filistata dubia* WIDER 1834 and *Filistata truncata* RISSO 1826; see BRIGNOLI (1982).

Description of the paired lateral clypeal gland organs of *Pritha* of the European species (fig. 2, photo 79b): Secretory “clypeal gland organs”:

In both sexes of *Pritha nana* and *pallida* I found a pair of lateral furrows at the clypeal border which possess distinctly sclerotized margins (fig. 2); they lead anteriorly to the frontal part of the clypeus and posteriorly to – suppose secretory – sac-like structures within the clypeus which I regard as glands. These “clypeal gland organs” may be unique within the Filistatidae; they are hard to observe in dark coloured specimens of *P*. *nana*, and are unknown/absent in other genera of the Filistatidae like *Filistata* (pers. observ. of *Filistata insidiatrix*).

These structures have already been roughly drawn – as tiny lines – by O. PICKARD-CAMBRIDGE (1872: Fig: 1b) of *P. albimaculata* from the Near East, but they were not mentioned in the description, and were apparently overlooked or not recognized by various authors.

I observed remains of a questionable excretion of *P. nana* and *pallida* at the anterior tip of the clypeus (and the furrows as well) in both sexes. Is this a sticky or an olfactory excretion to attract particular prey like Collembola? Small flies (*Drosophila*) were not accepted as prey by a male of *P*. *pallida* for ten days in captivity.

Note: Prosomal glands are frequent in members of the Linyphidae: Erigoninae and exist also (e.g.) in certain members of the family Therididae (both are members of the superfamily Araneoidea), but they are restricted to the male sex in these families and play a role in the courtship behaviour.

Key to the European taxa of the family Filistatidae:

Remarks: (1) The single questionable European species of *Zaitunia* (*annulipes*, see above) is not included in the key; its legs are annulated in contrast to the members of *Filistata* and *Pritha*, the prosomal length of the female holotype is 1.6 mm.
(2) Two species are restricted to Southern Europe, only *Pritha nana* has been reported from Southern Switzerland, too.

1 Body length of adult spiders > 8 mm (some spiders of the Canary Islands are distinctly smaller, see WUNDERLICH (1992)). Clypeal furrows and glands absent. ♂-pedipalpus (fig. 1): Femur 4-10 times longer than wide, cymbium slender, at least as long as bulbus + embolus, its dorsal-apical margin straight. *F. insidiatrix* is the only species of the European continent, a radiation exists on the Canary Islands. Filistatinae . . . . . . *Filistata*

- Body length of adult spiders < 5 mm. Clypeus with a pair of sclerotized lateral furrows (fig. 2) which are difficult to observe in dark specimens of *P. nana*. ♂-pedipalpus (figs. 3-9): Femur 2 ½-3 times longer than wide, cymbium distinctly shorter than bulbus + embolus, its dorsal apical margin horseshoe-shaped (fig. 3). *Pritha*. Prithinae GRAY 1995 2

2(1) Colour of body and legs mainly dark brown (photos 80a-b). Numerous long leg bristles, e.g. two ventral pairs besides apicals on tibia I. ♂-pedipalpus (figs. 3-7): Femur strongly darkened, embolus without a dorsal outhgrowth, its tip only slightly bent (fig. 7). . . . . *nana*

- Colour of prosoma, legs and opisthosomal venter light brown to yellowish (photo 79a), prosoma medially and opisthosoma dorsally dark (a white patch may exist like in *nana*). Few leg bristles, no ventral pairs on tibia I (only apicals). ♂-pedipalpus (figs. 8-9): Femur unicolored light, embolus with a skinny dorsal-distal outgrowth (arrow in fig. 8) of different size, its tip abruptly bent. . . . . *pallida*

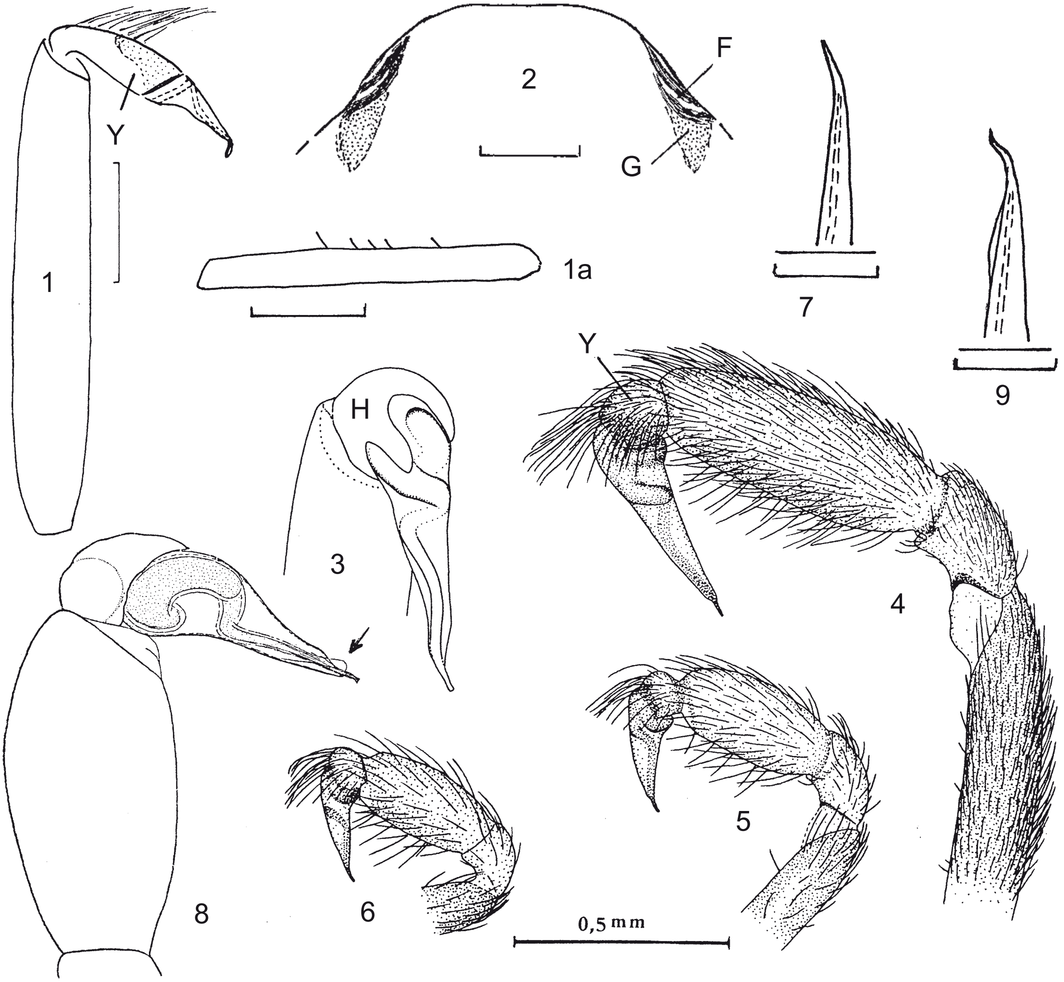


Fig. 1-1a) *Filistata insidiatrix* (FORSKOEL 1775); 1) ♂, retrolateral aspect of the right pedipalpus. Only few hairs are drawn. Y = cymbium. Scale bar 0.5 mm; 1a) retrolateral aspect of a left ♀-metatarsus I. Note the row of short dorsal trichobothria. Normal hairs and bristles are not drawn.

fig. 2) *Pritha pallida* (KULCZYNSKI 1897), ♂♀, dorsal aspect of the anterior part of the prosoma with the pair of lateral clypeal gland organs: Furrows with sclerotized margins (F) and translucent glands (G). Scale bar 0.1;

figs. 3-7: *Pritha nana* (SIMON 1868), ♂, left pedipalpus; 3) apical-prolateral aspect, with the horseshoe-shaped cymbium (H), 4-6) retrolateral aspect (Y = cymbium); 7) ♂ from France (Gorge du Carami, CJW), dorsal aspect of the distal part of the embolus (scale 0.05). The figs. 3-6 are taken from LEDOUX (1977);

figs. 8-9: *Pritha pallida* (KULCZYNSKI 1897); 8) ♂ from Portugal, prolateral aspect of the left pedipalpus; taken from MACHADO (1941: Fig. 1); 9) ♂ from France (near St. Tropez, CJW), dorsal aspect of the distal part of the embolus. Scale bar 0.05.

FAMILY SEGESTRIIDAE

Abstract: The taxonomy of the Mediterranean species of the genus *Ariadna* AUDOUIN 1826, of the subfamily Ariadninae, as well as erroneous synonymizations are discussed. *Ariadna* AUDOUIN 1826 is probably not a monophyletic genus; two generic characters are added to the previously known ones. In the Mediterranean an unknown number of species of the genus *Ariadna* exists, *A. isidiatrix* AUDOUIN 1826 auct. (type species of the genus!) is regarded as a "sampling species", *A. insidiatrix*, *A. spinipes* (LUCAS 1846) (both described from North Africa but unknown from Europe), and *A. garbigliettii* (CANESTRINI & PAVERSI 1870) (Italy) are regarded as dubious species (*garbigliettii* not being a synonym of *insidiatrix*), *Ariadna ionica* O. PICKARD-CAM-BRIDGE 1873 (Greece) is removed from the synonymy with *A. insidiatrix* (**sp. resurr**.). *Ariadna algarvensis* **n. sp.** and *A. inops* **n. sp**. are described from Portugal, *A. cyprusensis* **n. sp**. from Greece (Cyprus and probably Kos), *A. exuviaque* **n. sp**. from Spain (Mallorca), *A. brignolii* **n. sp**. from Italy, *A. europaensis* **n. sp**. from France and Italy, *A. levyi* **n. sp**. from Israel, and A. *maroccana* **n. sp.** from Morocco.

Acknowledgements: For the loan of material I thank very much FRANCESCO BALLARIN, Italy, Museo Civico di Storia Naturale in Verona; JANET BECCALONI, Great Britain, Natural History Museum London; ARIEL CHAPMAN, Israel, The Hebrew University of Jerusalem; JOHAN VAN KEER, Belgium; JEAN-CLAUDE LEDOUX, Solignac-sur-Loire, France; CHRISTINE ROLLARD, Museum Paris; PAUL SELDEN, University of Kansas, USA; ZOE SIMMONS, England, University Museum Oxford; MARCO ULIANA, Italy, Museo die Storia Naturale Venezia. For nomenclatorical references and notes I thank OTTO KRAUS, Hamburg. – For the support of my spider collecting in S-Portugal I thank very much JEAN-JACQUES DE KONING in Estiramantens (Algarve).

Material and behaviour: The male holotypes of *Ariadna exuviaque* and and *A. algarvensis* were collected as subadults; they moulted to maturity in captivity. Spiders of both sexes fed on Diptera like *Drosophila*, some females of *algarvensis* live already more than one year. The males were killed for study or died shortly after moulting to maturity. A mating experiment with *algarvensis* failed. Dead and living specimens of this genus are still kept in my private laboratory.

Ariadna AUDOUIN 1826 (see below the discussion on the nomenclature!)

Ariadna is a member of the subfamily Ariadninae WUNDERLICH 2004. The differences of Ariadninae (*Ariadna*) and Segestriinae (extant: *Segestria*, extinct in Eocene Baltic amber: *Ariadna* and *Vetsegestria* WUNDERLICH 2004) were listed by WUNDERLICH (2004: 658). Here I will add (1) that the basal cheliceral article bears a retrobasal hook ("CONDYLE") (fig. 1) in both sexes of the extant Ariadninae in contrast to the Segestriinae including the extinct *Vetsegestria* (*Vetsegestria quinquespinosa* WUNDERLICH 2004, paratype F688/CJW) and most probably to the extinct Lebansegestriinae WUNDERLICH 2008, Microsegestriinae WUNDERLICH 2004, and *Palaeosegestria* PENNEY 2004 as well. – (2) A tooth of the cheliceral retromargin is completely absent in some specimens of *Ariadna* (see below), and very rarely two teeth exist instead of the usually single one near the base of the fang, see WUNDERLICH (2004: 666, fig. 2c). – (3) In the males of extant species of *Ariadna* the proventral row of bristles on tibia I-II is absent in contrast to the females and both sexes of *Segestria*. – (4) In most extant members of *Ariadna* I observed a light, narrow and hairless longitudinal opisthosomal stripe/band (photo 81 of *A. exuviaque*) which may be indistinct or probably even absent in some specimens. – (5) The differences in the shape of the labium is variable; it is NOT a well usable character to distinguish all species of the two subfamilies, and has to be deleted from the list given by me previously (2004: 658).

In most males of the genus *Ariadna* "clasping structures" exists on the metatarsus I in contrast to *Segestria* (most often prolaterally near the middle of the length of the article, not rarely a second similar spine exists proapically); most often these modified thickened bristles are blunt in the European species, figs. 10-11. Such thick "clasping spines" are not known from – or even absent in – the European *A. ionica* and *inops* (figs. 32-33). See also the key: *A. exuviaque*.
Remark/question: Why are these spines blunt/club-shaped but not pointed if they are used as "clasing spines" during copulation?
Three kinds of such structures are known to me:

(a) one or two (a pro- and a retrolateral one in this case), frequently large lateral spurs (outgrowths) which are – at least basally – not sclerotized, in Europe only in *exuviaque* (figs. 2, 3a-b); but they are not rare in North American species, see BEATTY (1970),
(b) a thick and POINTED bristle/spine (not in European species but see the veriability of the PROAPICAL spine in *A. europaensis* below),
(c) a strongly sclerotized blunt and more or less club-shaped modified bristle/spine in most European species (figs. 11-12, 19, 29, 39), which exist prolaterally near the middle and may be situated on a hump; in few cases additionally a proAPICAL one exists (fig. 19) at least on one leg, variable, see directly below.

In *Ariadna europaensis* n. sp. (fig. 19) – and in other species like *A. algarvensis* (figs. 39-42) – a remarkable variability within specimens of the same population exists: The proapical metatarsal clasping structure may possess the shape of a normal bristle but in other specimens a blunt and shortened (club-shaped) structure of the same kind exists as in the middle of the metatarsus. The normal bristle-like shape of this proapical structure may be a reversal of the club-shaped one – or are both metatarsal clasping structures connected with each other by a single genetical information?

One may ask: Why do several species of *Ariadna* exist in North America – see BEATTY (1970) – but (to our recent knowledge) only a single one in Europe and even in the whole Western Palaearctic? The answer is given directly below:

It took more than twenty years for me to recognize that (1) in Europe more than a single species of the genus *Ariadna* exists, (2) that no proof exists that the European species are conspecific with the species of North Africa – *insidiatrix, spinipes* – which are best considered as dubious species, and (3) that one of the previously described species – *ionica* O. PICKARD-CAMBRIDGE 1873 – is hidden within PLATNICK's World Spider Catalogue.

The key to solving the "taxonomical thriller" of the West-Palaearctic members of *Ariadna* was simply not to believe – or to strongly doubt – the results of most previous papers even if published by renowned authors. The main mistake was to synonymize European spiders – and species like *A. ionica* – with doubtful North African species (*insidiatrix, spinipes*) by E. SIMON. The rareness of males, the similar structures of their secondary genital organs, the intraspecific variable number of leg bristles/spines, and problems in the documentation of the structures of the vulva caused the errors.

Taxonomy and synonymy of the species; remarks on the nomenclature

Taxonomical investigations of the highly interesting, "difficult", and very old genus *Ariadna* AUDOUIN 1826 in Europe is at its very beginning. In my opinion this genus is not a monophyletic taxon (*); see mainly the differences of the anterior male leg but also the groups described by BEATTY (1970), the opisthosomal pattern of *A. mollis* (HOLMBERG), and the stridulatory organ of *A. fidicina* (CHAMBERLIN 1924) from North America which has been described under the genus name *Citharoceps* CHAMBERLIN 1924, see BEATTY (1970: 478-479, fig. 10).

The history of the taxonomy and the synonymy of the European/Mediterranean members of the genus *Ariadna* is quite remarkable and confusing – see the discussion by DENIS (1951), BRIGNOLI (1976) and above -, and a lot of work will have to be done in the future on this genus in which some species are extremely similar even according to their male pedipalpal structures. Females of different species are quite difficult to distinguish, their vulva has not been studied when they were synonymized. Males of several species were/are unknown (males of European *Ariadna* were extremely rarely collected; apparently they are short-living after mating, see BEATTY (1970: 437)); the male holotype of *Ariadna exuviaque* n. sp. and some males of *A. algarvensis* n. sp. were collected subadult and brought to maturity in captivity. The high variation of the leg spination – even asymmetrically, see figs. 3a-b, 10 – is unknown in most species because of scarce material.

Most dubious/erronerous are the alleged synonyms of *Ariadna insidiatrix* AUDOUIN 1826 (*) (**) (Egypt): *garbigliettii* (CANESTRINI & PAVESI 1870) (Italy)*,* *ionica* O. PICKARD-CAMBRIDGE 1873 (Greece) and *spinipes* LUCAS 1846 (Algeria), see PLATNICK's (2010) "World Spider Catalog". According to DENIS (1951: 153) SIMON erroneously considered *Ariadna insidiatrix* AUDOUIN 1826 being praeoccupied by *Aranea insidiadrix* FORSKAL 1775 (but the latter species is a member of *Filistata* (Filistatidae) (!)), and SIMON synonymized *Ariadna insidiatrix* with *spinipes*. *A*. *insidiatrix, garbigliettii* and *spinipes* were described insufficiently, without knowing the adult male, and their synonymizing was not at all well founded and not justified; *insidiatrix* and *spinipes* were described from Northern Africa, based on females which were probably juvenile, type material is lost to my knowledge. Furthermore several Southern European spiders –

some with hesitation – were regarded as intraspecific taxa or "variability" by authors like BRIGNOLI (this author used a question mark), DENIS (1951: 155: "races locales"), LEDOUX and SIMON as members of a single species, of *insidiatrix* or *spinipes*. According to fig. 7 of the original description (see photo 82) the colour of the prosoma of *spinipes* is DARK brown in contrast to most of the remaining species in question (but the colour is variable in most species). The identity and number of really existing North African species is unknown, (more) adult males are needed for a revision; see the descriptions of *A. levyi* n. sp. and *A. maroccana* n. sp. from the Southern Mediterranean. Due to my investigations and the figures published by several authors the West Palaearctic spiders are members of several species, and I suppose the existence of further "hidden" and still unnamed species (in my opinion probably more than 10 or even15 species in the Western Palaearctic); one may compare the figures of "*insidiatrix*" auct. – e.g. DENiS (1951: Figs 1-7) – rsp., "*spinipes*" auct., *ionica* (figs. 27-28), *exuviaque* n. sp. (figs. 1-6) etc. I doubt the synonymy of the species and specimens in question, and I remove *A. ionica* O. PICKARD-CAMBRIDGE 1873 (from Corfu) from the synonymy of the North African *A. insidiatrix* or *spinipes* (**sp. resurr**.). *A. insidiatrix* (?= *spinipes*) auct. may represent one or two species which are most probably restricted to Northern Africa. – According to its eye position and the pattern of its opisthosoma I regard *Segestria garbigliettii* (CANESTRINI & PAVESI 1870) (N-Italy, Liguria, Genova) as a dubious species of *Ariadna* which may be conspecific with one of the European species which were published by BRIGNOLI, DENIS, LEDOUX or SIMON under *Ariadna insidiatrix* or *spinipes*, but being not conspecific with the latter two species. The holotype of this species (a juvenile spider, the only known specimen of this species) is most probably lost, it has not reported to me from the museums in Verona, Genova and Florence.

In order to prepare a revision of the European/Mediterranean members of the genus *Ariadna* it would be necessary (1) to collect spiders at or near the loci typici, (2) to study more closely the spiders which were published by various authors under *A. insidiatrix* and *spinipes*, (certain material of old collections was unfortunately not available to me or has been lost), and (3) to examine the vulvae.

(*) Other genera in Europe which include "sampling species" are for example *Orchestina, Loxosceles, Oecobius, Scytodes, Pardosa*, *Zelotes*, *Philodromus* and *Theridion*. In these genera also "hidden species" are not rare.

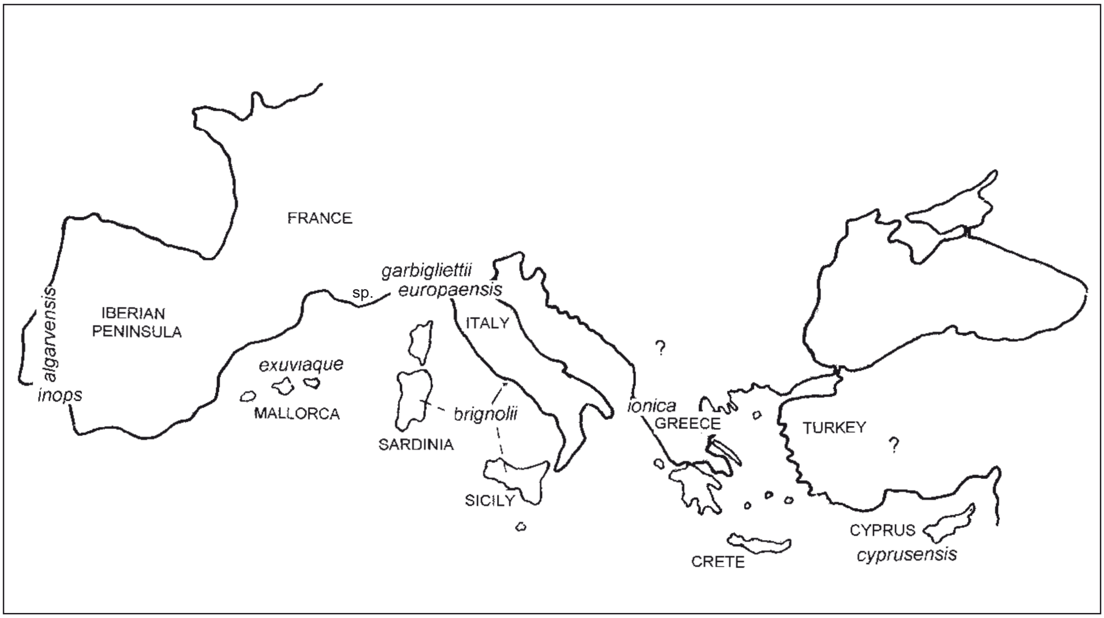
Cases of erroneous synonyms which are similar to the West-Palaearctic species of *Ariadna* are the members of the genus *Oecobius* – *annulipes* – (Oecobiidae), see WUNDERLICH (1995: 585ff), *Lasaeola testaceomarginata* (Theridiidae, this volume), and *Pardosa lugubris* (Lycosidae). *Theridion melanurum* (Theridiidae) has turned out as another "sampling species".

(**) Year and author(s) of the genus *Ariadna* and its type species *insidiatrix*: According to DENIS (1951: 153) the first description of these taxa goes back to two authors, SAVIGNY & AUDOUIN in 1825 (the first edition of the publication), BEATTY (1970: 454) writes "AUDOUIN 1825", in ROEWER's Katalog der Araneae, 1 (1942: 304) we find "AUDOUIN 1827", but according to PLATNICK's World Spider Catalog (2010 and in litt.) as well as O. KRAUS (in litt. 2010, including the reference to the opinion 1461 of the ICZN from 1987) author and year of these taxa are "AUDOUIN 1826".

Biogeography: A lot of work will have to be done in the future, determinations will have to be revised, new species will probably be identified, e.g., from the Balkan Peninsula and the Iberian Peninsula. Remarkably most of the West-Palaearctic species of *Ariadna – brignolii, canariensis*, *cretaensis*, *cyprusensis*, *exuviaque*, *ionica* and *maderiana* –

are known from islands (*) and may be palaeo-endemics – *Ariadna* is one of the (in the geological sense) oldest genera of the Araneomorpha. At least two species (*brignolii, europaensis*, and the dubious *garbigliettii*) are known from Italy now, two from Greece and two from Portugal, in France and Spain occur probably a single or two species each. Nothing is known to me about species from the area of the former Jugoslavia, from Turkey or from the Ukraine. The 45 ½ latitude – north of Venice in Northern Italy – may be the northernmost limit of the genus in Europe.

(*) A similar kind of a European generic "island distribution" exists in *Cybaeodes* SIMON 1878 (Gnaphosidae or Zoridae/Liocranidae).



DISTRIBUTION OF THE SPECIES OF *ARIADNA* IN EUROPE
roughly provisionally indicated; without the species from Madeira and the Canary Islands

In the following I **list** the Mediterranean (including Macaronesian) species of *Ariadna*:

(1) Species from Northern Africa:

insidiatrix AUDOUIN 1826, based on juv. from Alexandria (Egypt), dubious species,
spinipes LUCAS 1846, based on the female sex from Oran (Algeria), dubious species,
Remark: There is no proof of the synonymy of these two species with each other or with species which are reported from Southern Europe, the Near East or North Africa,
maroccana **n. sp**., Morocco, figs. 45-50.

(2) Species from the Macaronesian Islands (the only and endemic species of these archipelagos):

canariensis WUNDERLICH 1995, ♀ unknown, Eastern Canary Islands, see WUNDERLICH (1995: 425-427, figs. 49-52),
maderiana WARBURTON 1882, Archipelago of Madeira, and probably Salvage Islands (= *portisancti* KULCZYNSKI 1899), see WUNDERLICH (1995: 427, figs. 53-55).

(3) The remaining (European) species:

brignolii **n. sp**., Italy: Isola di Ponza, and probably Sardinia, figs. 8-16,
cyprusensis **n. sp**., ♀ unsure, Greece: Cyprus, Kos?, fig. 51,
europaensis **n. sp**.: France and Italy, figs. 17-26,
exuviaque **n. sp**.: ♀ unknown: Spain: Mallorca, figs. 1-6,
garbigliettii (CANESTRINI & PAVESI 1870): Italy, adults unknown, dubious, see above,
inops **n. sp**.: Portugal, ♀ unknown, figs. 32-37,
ionica (O. PICKARD-CAMBRIDGE 1873), ♀ unknown, Greece: Corfu, figs. 27-28,
Ariadna sp. indet., ♂, S-France, Var: See the key no. 5 and below the key,
(*Ariadna* sp. indet., ♂, country and locality unknown, see DENIS (1951: 153-155: (ex) 3, figs. 3, 7-7a)).

(4) Species from Israel:

levyi **n. sp**., ♀ unknown, Jerusalem, figs. 29-31.

The Mediterranean species

(excl. the species from the Macaronesian Islands, see the list above)

Key to the Mediterranean species of the genus *Ariadna*:
The endemic Macaronesian species – see the list above – are not included.
The home country of the male of *A*. sp. (ex.) 3 which was described by DENIS (1951: 153-16, figs. 3, 7-7a) (sub *A. insidiatrix*) is unknown; it is not included in this key.

Remarks: (1) The female of *A. europaensis, exuviaque, ionica, levyi* and sp. indet. (France) is unknown, the identity of the female of *cyprusensis* is unsure; the female – including the "fragile" vulva – has been more closely described only from *A. brignolii* (fig. 14). – (2) Because of the enormous intraspecific variability in the number of leg bristles the taxonomical value of this character is only limited, see, e.g., figs. 17-19, and the description of *A. maroccana*. – (3) A sexual dimorphism exists in the legs: Clasping structures of metatarsus I exist in the male sex of most species (see the key) and quite fewer bristles, the position of the bristles of tibia I-II is more irregular in the male sex, the retroventral row of bristles of the tibia I-II is absent in the male sex, the anterior legs are distinctly more slender in the male sex and more spiny in the female sex but femur IV is bristleless in certain European females, and the legs I-II are usually more strongly darkened in the females. – (4) Most males are easier to determine due to the structures (shape, spines, spurs) of their anterior legs than to the structures of their pedipalpi which may be quite similar or even identical in different species. – (5) A lateral opisthosomal stripe (see the photo of *A. exuviaque*) – more or less distinct in specimens which are not bleached out – exists probably in all European species. – (6) The distribution is helpful in the determination of most species but in S-Portugal and in N-Italy occur two species each in the same region.

1 ♂: Metatarsus I bears prolaterally AND retrolaterally a large "clasping spur" (not a spine) which is not sclerotized (figs. 2-3b), pedipalpus (figs. 5-6) with a relatively slender femur and tibia similar to *A. europaensis* (fig. 21), and a short embolus. Prosoma and leg I dark chestnut brown. Spain: Mallorca. Ad. ♀ unknown . . . . . *exuviaque* n. sp.

- ♂: Metatarsus I bears prolaterally near the middle a stout spine (a "clasping spine") which is strongly sclerotized, usually blunt and more or less club-shaped as well as/or such a spine in an proapical position (figs. 10-11, 19, 22, 24-25, 39-41). Colour variable. Not known from Mallorca 3

- ♂: Metatarsus I not modified, club-shaped spines absent, straight (figs. 28, 32-33). .2

2(1) ♂: Tibia I (figs. 32-33) stouter, ca. 10 times longer than high, bristles longer. Metatarsus I as in fig. 35. Pedipalpus (fig. 37): Femur 3.3 times longer than high, embolus as long as the bulbus. Prosoma dark brown. ♀ unknown. S-Portugal . . . . *inops* n. sp.

- Tibia I more slender, ca. 12.5 times longer than high, bristles shorter. Metatarsus I as in fig. 28. Pedipalpus (fig. 27): Femur only 2.5 times longer than high, embolus longer than the bulbus. Prosoma light brown. ♀ unknown. Greece: Corfu . . . . *ionica*

3(2) Tarsi with a distinct dorsal inclination (arrow in fig. 20) which is more distinct on I-II (existing in the female, too?). Position of the – usually existing – stout/blunt "clasping spine" slightly beyond the middle (fig. 19). ♂-pedipalpus (fig. 21): Femur relatively slender, ca. 3.6 times longer than high, distal part of the embolus only slightly s-shaped. Up to now known from Italy only . . . .<u>*europaensis*</u> n. sp.

- Tarsal inclination absent. 4

4(3) Species from Europe 5

- Species from Israel. ♂: Pedipalpus (fig. 31): Embolus relatively thick, only fairly bent in the dorsal direction. Leg I as in figs. 29-30. ♀ unknown. . . . . <u>*levyi*</u> n. sp.

- Species from Morocco. ♂: Pedipalpus (fig. 50): Embolus more slender in the distal part, and distinctly bent in the dorsal direction. Leg I as in figs. 45-49 . . . . .<u>*maroccana*</u> n. sp.

5(4) ♂-tibia I ca. 12 times longer than high. Prosoma chestnut brown, its length 3.3 mm (a single male) / 3.55-3.7 mm (♀). Metatarsus I as in figs. 9-12. ♂-pedipalpus (fig. 16): Femur stout, only 2.6 times longer than high, distal part of the embolus only slightly bent, not slightly s-shaped in the single known male. Italy: Lazio: Isola Ponza and most probably Sardinia and Sicily. . . . . <u>*brignolii*</u> n. sp.

- ♂-tibia I ca. 5 times longer than high or wide (fig. 51). Colour variable, prosomal length 2.7 mm (a single male) / 3.1-3.2 mm (2♀ which are probably conspecific). Metatarsus I similar but position of the medial "clasping spine" in the middle of the length. ♂-pedipalpus: Femur slender, 3.3 times longer than high, tibia ventrally-basally NOT strongly bulging, as in *A. maroccana* (fig. 50), distal part of the embolus strongly bent and slightly s-shaped similar to fig. 21. Greece: Cyprus and probably Kos . . . . <u>*cyprusensis*</u> n. sp.

- ♂-tibia I 5.6 times longer than high. Prosomal lengths 3.1 mm (a single male). Metatarsus I: Position of the "clasping spine" in 0.42. ♂-pedipalpus: Femur 2.9 times longer than high, tibia ventrally-basally NOT strongly bulging, embolus similar to fig. 21. S-France . . . .<u>sp. indet</u>(*)

- ♂-tibia I ca. 7 times longer than high (fig. 38). Prosoma in adults usually dark/black brown, occasionally chestnut brown, its length 1.9-2.6 mm (few males only) / 2.7 – 3.5 mm (♀). Metatarsus I as in figs. 39-42. ♂-pedipalpus (fig. 43): Femur slender, 3.0-3.5 times longer than high, tibia strongly bulging ventrally-basally, embolus longer than the bulbus, strongly bent distally. S-Portugal . . . . <u>*algarvensis*</u> n. sp.

....

(*) <u>Remark during print</u>: I just got a male (under *Ariadna insidiatrix*), from S-France, "Var. Port Cros", J. DENIS leg. in 1933, MNHNP, bottle 555, which is similar to *A. cyprusensis,* see the key no. 5, *Ariadna* sp., but the position of the metatarsal I clasping spine is in a more basal position than in *cyprusensis*. It may be the member of a further unnamed species.

Description of the European species:
(The Macaronesian species: See the list above).

***Ariadna exuviaque* n. sp**. (figs. 1-6a) photo 81

Material: Spain: Mallorca, (a) Tramontana, holotype ♂ R28/AR/ CJW, later probably SMF, captured subadult, JW leg. in VI 2003, moulting to adult 12. VII. 2003; its exuvia R28a/AR/CJW, later probably SMF; (b) Alcudia, 1 ?subad. ♀ paratype, JW leg. in IV 2006, R59/AR/CJW.

Diagnosis (♂; ad. ♀ unknown): Metatarsus I with each a large pro- and retrolateral outgrowth (spur, not club-shaped spines) near the middle (figs. 3a-b), embolus continuinly strongly bent distally (figs. 5-6). Colour of prosoma and legs usually (at least alive or dry) dark chestnut brown.

Description (♂):
Measurements (in mm): Body length 7.2, prosoma: length 3.5, width 2.3; leg I: Femur 3.5, patella 1.25, tibia 2.8, metatarsus 2.5, tarsus 0.9, tibia II 2.8, tibia III 1.8, tibia IV 2.3, pedipalpal femur 1.0 x 0.3.
Colour: Prosoma dark (chestnut) brown, sternum light grey brown, legs: I almost as dark as the prosoma, II-IV light brown, opisthosoma light grey, laterally with a narrow light line which is less distinct than in the ♀ (photo).
Prosoma (fig. 1) 1 ½ times longer than wide, smooth, narrow anteriorly, thoracal fissure short, eyes fairly large, posterior row slightly recurved, posterior median eyes close together; basal cheliceral articles slender and protruding (in a natural/alive position, too?), retrobasally with a hook (arrow in fig. 1) (similar to the condylus, e.g., in the family Araneidae), anterior margin of the cheliceral furrow with two teeth, posterior margin with a single small tooth, fangs short and slightly bent, labium 1.6 times longer than wide, sternum 1.8 times longer than wide, not elongated between the coxae IV. – Legs (figs. 2-3b) fairly long, I-III directed foreward, order I/II/IV/III, III distinctly the shortest, metatarsus I strongly modified, bearing a long apophysis ("clasping spur") each pro- and retrolaterally near the middle, and some lateral spines (the number is variable), the retroventral bristle in the middle is observable in fig. 3a, the proventral one not; the tibia bears retrolaterally a row of 6 bristles and retroventrally an irregular row (increasing in size) of 7 (the right tibia) rsp. 11 (the left tibia) (quite similar the exuvia), the apical one is thick like a spur. Femora I bear 5 rsp. 7 dorsal bristles, femur IV bears 4 dorsal bristles in a row, no other bristle on leg IV, all patellae are bristle-less. All tarsi and the metatarsi III-IV bear weak pseudoscopulae (thin and more or less dense hairs), position of the metatarsal I trichobothrium and the tarsal organ I are both in 0.9, the paired tarsal claws I bear 6-7 strong teeth, the unpaired claw is bent in a right angle. – Opisthosoma cylindrical, 1.8 times longer than wide, covered with short hairs which are usually 0.1-0.15 mm long. – Pedipalpus (figs. 4-6; see also the diagnosis): Tibia with a single dorsal trichobothrium, cymbium short, elongated prodistally and here with long hairs, bulbus

almost globular, embolus almost as long as the bulbus, strongly bent distally, bearing a distal "seam" like in *A. canariensis* and other congenerics.

Exuvia: Its peltidium (dorsal prosomal cover) is 3.2 mm long, a retrobasal cheliceral hook exists, metatarsus I is not (!) modified, the distal pedipalpal articles are only slightly thickened (fig. 6a).

Subad. ♀ (paratype): Prosomal length 3.2 mm, tibia I 1.9 mm long, prosoma dark brown, legs light brown, I fairly darkened, opisthosoma medium grey, lateral stripe indistinct.

Relationships (see the key): In the remaining European males of *Ariadna* the metatarsus I possesses near the middle only a single blunt and more or less club-shaped "clasping spine" (e. g. figs. 10, 19, 22), never simply a spur; club-shaped spines exist on a spur in *A. maderiana* WARBURTON 1882. No spine or spur exist in *A. inops and A. ionica*. In *A. pilifera* O. PICKARD-CAMBRIDGE 1898 from North America – which apparently is closely related – the shape of metatarsus I (fig. 7) is almost identical with *A. exuviaque* but the number of spines of tibia I is distinctly lower, and the embolus is distinctly shorter than the bulbus. *A. exuviaque* is more closely related to species from North America than to species of Europe; it may well be an European relict of an old holarctic branch of the genus *Ariadna*.

Distribution: Spain: Mallorca.

***Ariadna brignolii* n. sp.** (figs. 8-16)

1976 *Ariadna* ?*insidiatrix*, -- BRIGNOLI, Fragm. entom., 12 (1): 36-39, figs. 1-7.

Derivatio nominis: The species is named after PAOLO BRIGNOLI, who described numerous species of spiders including the present species (under *Ariadna* ?*insidiatrix*).

Material: Italy, (1) (terra typica): Lazio, W Neaples, Isola di Ponza (Latina), Scoglio Rosso di Pilato 21. VII. 1968, 8 specimens leg. ULTZERI, det. BRIGNOLI 1974; holotype ♂ (left leg I and left pedipalpus are loose), 2♀ (one loose vulva) and 5 juv. paratypes, Museo Civico di Storia Naturale, Verona, Italy; (2) (probably conspecific females): Sardinia, Costa Verde, Marina di Arbus, between rocks, J. VAN KEER leg. in V. 1997, 2♀ coll. VAN KEER, 1♀ CJW; (3) (probably conspecific female): Sicily: Either Stromboli or Lipary Islands, 1♀ KAHMANN leg. in 1957, SMF (no number).

Diagnosis: ♂: Tibia I ca. 12 times longer than high, prosomal length ~ 3.3 mm, position of the prolateral metatarsal clasping spine slightly basally of the middle of the length of the article, and situated on a distinct hump (fig. 10); ♂-pedipalpus (fig. 16): Femur only about 2.6 times longer than high, embolus pointed dorsally. ♀: Posterior area of the genital area fig. 15), vulva figs. 14-14a).

Further character: In contrast to the pale legs I-II of the – single! – male are these legs darkened in the females and most juveniles.

Description:
Measurements (in mm): ♂: Body length 7.0, prosoma: Length 3.3, width 2.5; leg I: Femur 3.5 (height up to 0.57), patella 1.25, tibia 2.8 (height in the middle 0.3), metatarsus 3.3, tarsus 0.85, tibia II 3.05, tibia IV 2.25, femur IV 2.9 (height up to 0.65); ♀: Body length 8.2, prosoma 3.55, width 2.3; leg I: Femur 2.9, patella 1.2, tibia 2.3, (height in the middle 0.5), metatarsus 2.1, tarsus 0.7, tibia II 2.2, tibia III 1.55, tibia IV 2.0.
Colour (probably bleached out): Prosoma and legs light to red brown, labium and sternum slightly darkened, legs I-II darkened in the female (not in the single male – a kind of sexual dimorphism?), tibia and tarsus of the ♀-pedipalpus darkened, opisthosoma light to medium grey, a distinct light lateral opisthosomal stripe exists in some specimens.
Prosoma 1.32 (♂) to 1.54 (♀) times longer than wide, thoracal fissure indistinct, posterior eye row slightly recurved, posterior median eyes contiguous, fangs stout, anterior cheliceral margin with 2-3 teeth which are widely spaced, retromargin with a single tooth. Claw of the ♀-pedipalpus smooth. – Legs (figs. 8-13) much more slender in the male and less spiny, ♂-tibia I-II fairly bent in the dorsal aspect, I ca. 12.2 times longer than wide, order I/II/IV/III, III distinctly the shortest, patellar bristles absent, leg IV bristless in the female, in the male femur IV bears 4-6 bristles. Femur I bears 2-3 dorsal and 3 almost apical bristles. Tibiae and ♀–metatarsi I-II ventrally with rows of 7-10 pairs of bristles. Tibia III ventrally usually with 3 (rarely 2) retroventral bristles in a row. The ♂-metatarsus I is bent, bulging prolaterally slightly before the middle and bearing here a short and almost club-shaped “clasping spine”; besides 3 other bristles, both anterior metatarsi bear a second almost club-shaped “clasping spine” proapically-ventrally (fig. 10) (in the related *A. europaensis* such a spine may exist or may be absent!). All metatarsi bear a trichobothrium, its position on I and IV in ca. 0.9 and 0.78. Claw tufts and true scopulae are absent, the unpaired tarsal claw bears a single small tooth or is smooth, the paired claws bear long teeth. – Opisthosoma long ovally, hairs fairly short. – ♂-pedipalpus (fig. 16): Femur 2.6 times longer than high, tibia thick, bulbus almost globular, embolus longer than the bulbus, fairly bent dorsally. Vulva: Figs. 14-15.

Relationships: See *A. levyi* n. sp. and *europaensis* n. sp.

Distribution: Italy.

Ariadna europaensis n. sp. (figs. 17-26)

1951 *Ariadna insidiatrix*, -- DENIS, Bull. Soc. Hist. nat. Toulouse, 86: 153-155, 1-7a.
1967 *Ariadna insidiatrix*, -- LEDOUX, L’entomologiste, 23 (3): 68-70, figs. 1-3.

Material: N-Italy, Venezia, in a house, 3♂ HANSEN leg. in VII-VIII 1985 and X 1990, BRIGNOLI det. ?*insidiatrix*; holotype ♂ and 2♂ paratypes Museo Civico di Storia Naturale Venezia, Italy.

Diagnosis: ♂: Prosomal length 2.2-2.6 (3♂), position of the prolateral metatarsal clasping spine slightly distally of the middle of the length of the article (ca. 0.55), not situated on a hump (figs. 19-20); pedipalpus (figs. 21, 23, 26): Femur slender, 3.5 times longer than high, distal part of the embolus slightly s-shaped. ♀: Body length probably up to 11.0 mm (SIMON (1914: 111), vulva unknown.

Remark: A dorsal tarsal inclination (arrow in fig. 20) exists at least in the male but has not yet studied by me in the female.

Description:

Measurements (in mm): Body length ♂ 4.5-4.8 (3♂), ♀ probably up to 11.0 (SIMON (1914: 111)), prosomal length ♂ 2.2-2.6 (3♂), ♀ unknown; legs (♂): I: Femur 3.0, patella 1.05, tibia 2.4, metatarsus 3.0, tarsus 0.8, tibia II 2.2, tibia III 1.45, tibia IV 1.75, femur IV 2.15 (height in the middle 0.5.

Colour: Prosoma and legs yellow brown, labium, sternum and legs not darkened, opisthosoma light grey, a light lateral opisthosomal stripe is absent or not observable in the few spiders which are bleached out.

Prosoma similar to *A. brignolii* n. sp. but smaller, and pro-/retromargin of the cheliceral furrow with 1-2/0-1 denticles. – Legs (figs. 17-20, 22, 24-25) slender and spiny in the male, ♂-tibia I distinctly bent in the dorsal aspect, ca. 12.5 times longer than wide. ♂-metatarsus: See the diagnosis; the prolateral metatarsal “clasping spine” in the middle is rarely completely absent (!), the proapical metatarsal bristle (fig. 19) may be club-shaped as in *A. brignolii* or of a normal pointed shape (!). Number of femoral I bristles (figs. 17-18) quite variable, femur IV bears 4-7 dorsal bristles, position of the metatarsal I/IV trichobothrium in ca. 0.87/0.65, the tarsi bear a dorsal inclination basally of the middle (fig. 20) which is indistinct on III-IV. – Opisthosoma as in *A. brignolii*. – ♂-pedipalpus (figs. 21, 23, 26): See the diagnosis. The bulbus has an almost globular shape.

Relationships: *A. brignolii* n. sp. is larger (at least in the male sex), a tarsal inclination is absent, the position of the prolateral male metatarsal clasping spine is in the basal half and situated on a distinct hump, the pedipalpal femur is stouter, and the shape of the distal part of the embolus is different. – According to the structures of metatarsus I and the bulbus *A. canariensis* WUNDERLICH 1995 is closely related; but in *canariensis* bear the basal cheliceral articles numerous long anterior-lateral hairs, and a tarsal inclination is absent or only slightly developed. – The relationships to the dubious *A. garbigliettii* (CANESTRINI & PAVESI 1870) (♂ unknown) are unknown, see above.

Distribution: At least N-Italy (Venezia, see above) and France (e.g. dpt. Var, East Pyrenees); according to SIMON (1914: 118) in some more countries but questioned by me, see above, the paragraph on taxonomy and synonymy.

Ariadna ionica (O.-PICKARD-CAMBRIDGE 1873) (figs. 27-28)

1873 *Ariadne ionica* O. PICKARD-CAMBRIDGE, Linn. Soc. Journ. Zool., 11: 532, t. 14, fig. 2.
1951 *Ariadna insidiatrix*: DENIS, Bull. Soc. Hist. nat. Toulouse, 86: 153-155, fig. 1.

Remarks: (1). The species is removed here from the synonymy with *insidiatrix*, see above (**sp. resurr**.). (2) The original spelling of the name of this species by PICKARD-CAMBRIDGE is *ionica*; *jonica* is an invalid emendation. (3) I had no opportunity to study material directly but I kindly got photos from the holotype (Oxford University Mueum, KATHERINE CHILD, ZOE SIMMONS) via the internet.

Diagnosis (♂; ♀ unknown): Metatarsus I (fig. 28) not modified, pedipalpus (fig. 27) with the embolus longer than the bulbus.

Only a single male – the holotype – is known; its prosomal length is 2.6mm, its body length about 6 mm, the colour of prosoma and legs is yellow brown, the anterior legs are not darkened, metatarsus I (fig. 28) slender, 3.1 mm long, 12.5 times longer than high, metatarsal clasping spines absent, tibia I only fairly long, probably straight. (Femur IV is – according to the original description – “very much stronger” than the other femora, but it is not stronger than in related species). – Pedipalpus (fig. 27): Femur fairly stout, only 2.5 times longer than high, 2.5 times longer than high, embolus longer than the bulbus (longer and more slender than in a drawing by A. R. JACKSON which was published by DENIS (1951: fig. 1)).

Relationships: See the key, *A. inops* n. sp.

Distribution: Greece: Corfu.

***Ariadna cyprusensis* n. sp.** (fig. 51)

Material: Greece, (a) (under *Ariadna insidiatrix*): Cyprus, three localities, 1♂ (holotype), 2♀ (paratypes) P. SELDEN leg. in IV 1995; tubes (1) – (3), ex P. SELDEN coll., BMNH (E) 2009-108: (1) Aylos Georgios, Cape Drepanum, ♀ which has been dried out and is slightly deformed; (2) Fontana Amorosa, Akamas, ♂; (3) Pissouri beach, ?subad. ♀. (Its left metatarsus I has been amputated near its end and apparently healed). – (b) Island Kos, fort, 1 probably conspecific ♀ J. MARTENS leg. in IV 1968, SMF.

Remark: The locus typicus (male holotype) of this species is Fontana Amorosa, the females were collected at different localities. The colour of the spiders varies from almost orange brown (male) to dark brown in one of the females. Therefore I am not sure about the conspecifity of the three specimens from Cyprus. The relationships of the female from Kos is also unsure.

Diagnosis: ♂-tibia I 5.2 times longer than high, ♂-metatarsus I similar to *A. brignolii* n. sp. but pedipalpal femur more slender (3.3 times longer than high), pedipalpal tibia as in *A. maroccana* (fig. 50), distal part of the embolus strongly bent, similar to fig. 21.

Description:
Measurements (in mm, in the sequence of the tube numbers):
Specimens from Cyprus: Measurements (in mm): Body length 7.3, 6.0, 8.1, prosoma: Length 3.2, 2.7, 3.1, width 1.8, 1.9. 1.9; length/ height of tibia I 1.8 x 0.5, 2.1 x 0.4, 1.6 x 0.5.
Colour variable: Prosoma orange- to chestnut-brown but (female 1) dark brown, ♀: chelicerae and distal two articles of the pedipalpus darkened, legs I-II (especially tibia, metatarsus and tarsus) darkened in the females; opisthosoma light to dark brown, light lateral stripe indistinct.
♂-tibia I (fig. 51) bent as in *algarvensis* (fig. 38), 5.2 times longer than high, tarsal inclination absent. Leg bristles: Tibia I: ♂ prolaterally 4, retrolaterally 8/10, ventrally 7/8; ♀ prolaterally 2-4, retrolaterally 3-4, ventrally 5 pairs of long bristles and up to 3 short ones. Metatarsus I: ♂ almost straight, position of the blunt proapical spine/spur – located on a weak thickening – in 0.53, proapically a similar blunt spine on both metatarsi; ♀ ventrally with 7 long pairs and up to 2 pairs of short spines. Femur IV distinctly thicker than the remaining femora. Tarsal inclination absent. – ♂-pedipalpus: Femur 3.3 times longer than high, tibia thick (1.3 x 0.81 mm), as in *maroccana* (fig. 50), not strongly bulbing ventrally basally, bulbus globular, about as long as the embolus which distal part is slightly s-shaped as in fig. 21.

Specimen from Kos: Measurements (in mm): Body length 10.0, prosoma: Length 3.8, width 2.3, tibial length I 2.2. Colour: Prosoma dark brown, legs mainly medium brown, II and especially I distally darkened, opisthosoma medium gey. Lateral opisthosomal stripe not observable (absent?). Tibia and metatarsus I-II bear 6-7 ventral pairs of bristles. The female may be conspecific with the specimens from Cyprus but a male from Kos is needen to confirm this speculation.

Relationships: See the key; *algarvensis* and especially sp. indet. from France are most related.

Distribution: Cyprus and probably Kos.

Ariadna inops n. sp. (figs. 32-37)

Material: S-Portugal, E Faro, peninsula near Mata Rota, at the beach, in a fissure at the bottom side of a soft plastic lying on sand at the beach, 1♂ (apparently recently moulted), 1 juv. (still alive in VIII 2010) JW leg. in V 2010; holotype ♂ (the left leg III has been separated in alc. abs. for a genetical study in the future), R131/AR/CJW; juv. paratype R135/AR/CJW.

Diagnosis (♂; ♀ unknown): Metatarsus I (figs. 35-36) unmodified, without “clasping spines”, tibia I (figs. 32-33) straight and stout, only 5.4 times longer than wide, pedipalpus (fig. 37) with the embolus as long as the bulbus.

Description (♂):
Measurements (in mm): Body length 5.0, prosoma: Length 2.3, width 1.5; leg I: Femur 2.7, patella 0.35, tibia 1.8, metatarsus 1.8, tarsus 0.65, tibia II-IV 1.8/1.2/1.55.
Colour: Prosoma medium grey brown, legs light to medium grey brown, opisthosoma dark brown, laterally with a narrow light and hairless longitudinal band.
Prosoma 1.53 times longer than wide, quite similar to *A. exuviaque* n. sp., see above. – Legs (figs. 32-36) only fairly long, tibia I relatively stout, only 5.4 times longer than wide, metatarsus I 10 times longer than wide, not modified, straight and without club-shaped bristle(s), femur IV bears 7/9 bristles, further bristles: See the figs. – Opisthosoma oval, 1.55 times longer than wide, covered with short hairs. – Pedipalpus (fig. 37): Femur 3.3 times longer than high, tibia not bulging ventrally basally, embolus as long as the bulbus, strongly bent distally.

Relationships: According to the absence of club-shaped spines of the male metatarsus I *A. ionica* O. PICKARD-CAMBRIDGE from Greece is related, see the key. – In *A. algarvensis* n. sp. (collected, e.g., only few km away from *inops*) the ♂-metatarsus I bears club-shaped spines, the ♂-tibia I is more slender (ca. 6.8 times longer than high), the pedipalpal tibia is distinctly bulging ventrally-basally, and the embolus is longer. – In *A. maderiana* WARBURTON 1882 (Madeira) the ♂-tibia I is also straight and relatively stout but a spur which bears a club-shaped bristle exists on the ♂-metatarsus I and the pedipalpal tibia is much more slender.

Distribution: S-Portugal, E Faro.

***Ariadna algarvensis* n. sp.** (figs. 38-44) photo 81

Material: S-Portugal, (1) S Aljezur, near Bordeira, at the border of a forest to a small road, at a sharp slope, between loose parts of hardened redbrown earth and stones, 6♀, two egg sacs, numerous juveniles (some are still alive in VIII 2010), paratypes, and prey (a beetle and a juvenile gnaphosid spider), JW leg. in VIII. 2009; holotype ♂ (moulted to maturity in VII 2010), and its exuvia (a leg III was separated in alcohol abs. for a genetical study in the future), R136/AR/CJW, 1♀ with egg sac and a juv. spider (Gnaphosidae indet.) (probably a prey of the spider), R133/AR/CJW; 3♀ 1 ?juv. R134/AR/CJW. – (2) E Faro, Cacela Velha, on the right side in opposition to the entrance to the village at a sharp slope within hardened redbrown earth, ♂♀ paratypes JW leg in V-VI 2010: 1♂ (moulted to maturity in VII 2010) with exuvia (the right leg III was separated in alc. abs. for a genetical study in the future), R137/AR/CJW; 2 subad. ♂, moulted to maturity in IX 2010, and died in XI 2010, R147/AR/CJW (both were fed with *Drosophila* sp.); 1♀ with an orange egg-sac, ca. 30 spiderlings in VIII 2010 which all died in I 2011, R148/AR/CJW. Some females and juveniles are still alive in VIII 2010, feeding *Drosophila* sp.

Diagnosis: ♂: Tibia I (fig. 38) bent sideward, slender, 6.8-7.2 times longer than wide, metatarsus I (figs. 39-42) ca. 13 times longer than high at the base, with few bristles only, a club-shaped bristle exists in a proapical position, and additionally either a club-shaped (fig. 42) or a pointed, short and thick spine near the middle (long arrow in fig. 41) (intraspecific variability). Pedipalpus (fig. 43): Tibia strongly bulging ventrally basally, embolus as long as the bulbus, distally bent in a right angle. ♀: Genital area as in fig. 44, translucent structures indistinct. Colour of the prosoma usually dark, see below.

Description:
Measurements (in mm): ♂: Body length ♂ from Bordeira 3.8, ♂ from Cacela Velha 4.8, prosoma: Length 1.9-2.4, width 1.35-1.6; leg I: Femur 2.65, patella 0.8, tibia 2.05, metatarsus 2.65, tarsus 0.8, tibia II-IV 2.25/1.35/1.8; ♀: Body length 6.0-10.0, prosoma: Length 2.6-3.5, width 1.8-2.6; leg I (large ♀): Femur 2.9, patella 1.25, tibia 2.25, metatarsus 2.0, tarsus 0.6, tibia II-IV: 2.2/1.45/1.95; femur IV: Length 2.2, height 0.8.

Colour of the prosoma variabel, medium or dark grey to almost black, occasionally chestnut brown; ♀: Legs I-II beyond the patella and pedipalpus usually distinctly darkened. The grey opisthosoma bears a narrow white and hairless lateral band (photo).
Prosoma oval, usually 1.4-1.5 longer than wide, as in *A. exuviaque* n. sp. – Legs: Order I/II/IV/III in the female but II/I/IV/III in the male, more slender in the male (figs.). ♂-tibia I 6.8-7.2 times longer than high, tarsal inclination absent.
Leg bristles: ♂: See the diagnosis, figs. 38-42. ♀: Patellae and femur IV none, femur I-II with 2-3 prodistal and 1-2 near the middle, femur III with 1-2 prodistally, tibia and metatarsi I-II ventrally with 6-8 pairs, tibia III with 2-3 retroventrally in a row and occasionally 1 prolaterally, metatarsus III with 2-3 retroventrally and a pair ventrally-apically. Scopulae and position of the trichobothria as in *exuviaque*. – ♀-pedipalpus: Tarsus with a large claw. – Opisthosoma long ovally, photo 81. – ♂-pedipalpus (fig. 43): See the diagnosis; the femur is 3.0-3.5 times longer than high. – ♀-genital area: Fig. 44, see the diagnosis. The vulva contains a large number (~ 20) of tiny structures (glands?) in a sac-shaped structure (diameter 0.4 mm), similar to the drawing by BRIGNOLI (1976: Fig. 5) of *A. brignolii*.
♂-exuvia: The tarsus is only weakly thickened and bears a claw similar to fig. 6a.

Relationships: See the key; *cyprusensis* is most related.

Distribution: S-Portugal; S Aljezur and E Faro; probably widely spread: I looked more closely for spiders at several localities, and I found two populations.

Description of a species from Israel:

Ariadna levyi n. sp. (figs. 29-31)

Derivatio nominis: The spider is named after the late GERSHOLM LEVY who discovered and described numerous species of spiders from Israel and discovered the present one.

Material: Israel, Jerusalem, under "*Ariadna insidiatrix*" (J. DENIS det. erroneously); holotype ♂ A. SHULOV leg. 10.-15. VIII. 1938; The Israel National Collection of Natural History, The Hebrew University of Jerusalem, cat. no. HUJINVARA 15584 (A. CHAPMAN).

Diagnosis (♂; ♀ unknown): Prosomal length 2.25 mm, position of the blunt metatarsal I clasping spine in 0.57 (fig. 29), tibia I (fig. 30) with a relatively low number of bristles. Pedipalpus (fig. 31): Femur 2.6 times longer than wide, embolus relatively thick, slightly longer than the bulbus, only fairly bent in the dorsal direction.

Description (♂):
Measurements (in mm): Body length about 4.5 (the opisthosoma is deformed and contracted), prosoma: Length 2.25, width 1.6; leg I: Femur 2.5, patella 0.9, tibia 2.1, metatarsus 2.55, tarsus 0.6, tibia II 2.2, tibia III 1.35, tibia IV 1.65; femur IV: Length 1.9, height in the middle 1.05.
Colour (the male is bleached out): Prosoma and legs yellow brown, opisthosoma medium grey.
Prosoma 1.4 times longer than wide. Eyes: Posterior row straight, posterior median eyes contiguous. Basal cheliceral articles slender, fangs stout, anterior/posterior margin of the cheliceral furrow with 2/0 teeth, coxae IV only slightly spaced. – Legs long and slender, order I/II/IV/III, III distinctly the shortest. Most bristles are rubbed off, tibia I (fig. 30) bears a relatively low number of bristles, metatarsus I (fig. 29) bears 5 bristles and a prolateral blunt clasping spine on a low hump in a position 0.57. – The opisthosoma is deformed like in a spider which has been dried out for a short time. – Pedipalpus (fig. 31) (see also the diagnosis) with a distinctly thickened tibia and a globular bulbus.

Relationships: The metatarsal clasping spine is similar to most of the European species (except *A. exuviaque* n. sp.), the pedipalpal femur is fairly stout and the embolus is only fairly bent like in *A. brignolii* n. sp., which may be most related, but in *brignolii* tibia I bears much more bristles (fig. 12) and the distal part of the embolus is thinner.

Distribution: Israel: Jerusalem.

The species from North Africa: See also the paragraph "Taxonomy and synonymy" above.

Ariadna maroccana n. sp. (figs. 45-50)

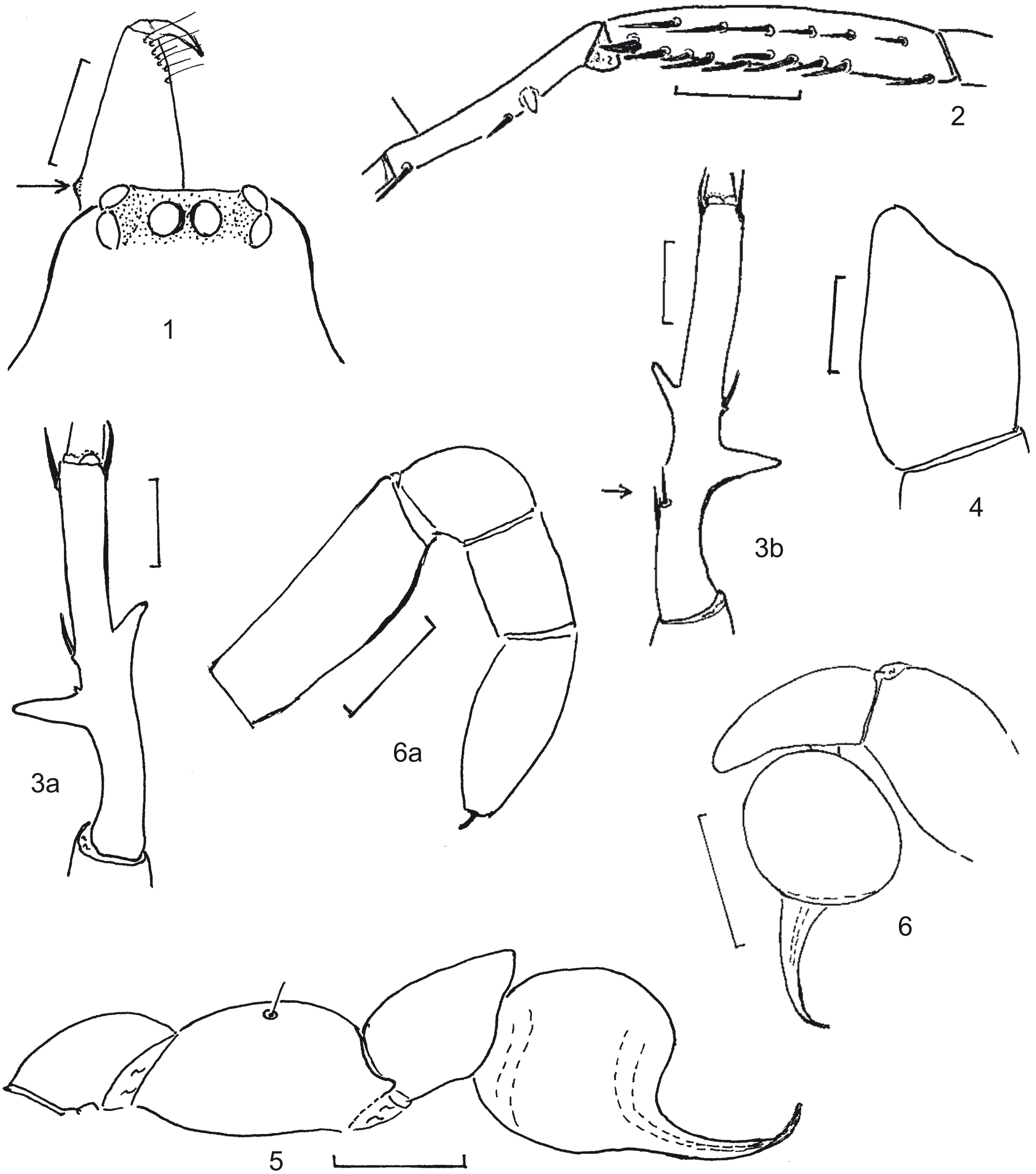
Material: Morocco, pref. Rabat, Temara, near the coast, holotype ♂ and 2♀ paratypes J.-C. LEDOUX leg. 19. VIII. 1990 (det. *Ariadna insidiatrix*), MNHNP, coll. LEDOUX 18.649 OT.

Diagnosis: ♂: Tibia I slightly bent in the dorsal aspect, ca. 5.6 times longer than wide, metatarsus I (figs. 45-47) with a prolateral club-shaped spine in the basal half. Pedipalpus (fig. 50): Bulbus fairly bulging ventrally, embolus as long as the bulbus, strongly bent distally.

Description (♂):
Measurements (in mm): Body length ♂ 6.5, ♀ 7.5-7.8, prosoma: Length ♂ 2.9, ♀ 3.5-3.7, width ♂ 2.1, ♀ 2.3-2.45; leg I ♂/♀: Femur 3.1/2.8, patella 1.15/1.2, tibia 2.5/2.2, metatarsus 2.9/2.15, tarsus 0.8/0.8, tibia II-IV: 2.65/2.25-1.8/1.5-2.1/2.1.
Colour: Prosoma chestnut brown to yellow brown (♂), legs yellow brown (♂), light to medium brown with the distal articles of I-II more or less darkened in the ♀, opisthosoma dorsally light to medium grey, laterally and ventrally light grey, laterally light band indistinct or absent (bleached out?), tibia and tarsus of the ♀-pedipalpus darkened.
Prosoma oval, 1.38-1.52 times longer than wide, fovea absent, eyes of medium size median eyes close together, their position slightly in front of the posterior lateral eyes. Basal cheliceral articles more slender in the male, anterior margin of the cheliceral furrow with 2-3 teeth, posterior margin with a single tiny tooth, fangs stout. The tarsus of the ♀-pedipalpus bears a large and smooth claw. – Legs: Order II/I/IV/III (♂) or I/II/IV/III (♀); ♂: Tibia I slightly bent in the dorsal aspect, ca. 5.6 times longer than wide, metatarsus I: See the diagnosis; bristles: Tibia I prolaterally 6, retroventrally 9, retrolaterally 10 (fig. 48) (the number is most probably intraspecificly variable), tibia II fig. 49, femur I 5-7, femur IV 4-5; ♀: Metatarsus I 8-9 ventral pairs, tibia I 5-7 ventral pairs, femur I 1-4, femur IV 0-1. – Opisthosoma long oval, bearing short hairs; epiandrous gland spigots of the male absent. – ♂-pedipalpus (fig. 50; see the diagnosis) with the femur 3 times longer than high.

Relationships: In *A. algarvensis* n. sp. from Portugal, which apparently is most related, the colour of the prosoma is usually dark brown, an additional proapical club-shaped metatarsal spine exists (figs. 40-42), and the pedipalpal tibia is strongly bulging ventrally-basally (fig. 43). – See also the discussion on *A. insidiatrix* above.

Distribution: Morocco.



Figs. 1-6: Ariadna exuviaque **n. sp.**; 1-6a: ♂; 1) dorsal aspect of the eyes and the left chelicera with its retrobasal hook (“condyle”) (arrow); 2) retrolateral aspect of the left tibia and metatarsus I; 3a-b) dorsal aspect of the left and right metatarsus I. The arrow in fig. 3b) points to the two bristles which are absent on the left metatarsus I; 4) dorsal aspect of the right cymbium (hairs are not drawn); 5) retrolateral aspect of the right pedipalpus (hairs are not drawn); 6) retrolateral aspect of the left pedipalpus. Note that a slightly different position of the bulbus may cause a quite different pointing of the embolar tip; 6a) exuvia of the male holotype, retrolateral aspect of the right pedipalpus. Scale bars 1.0 mm in fig. 2), 0.5 in figs. 3, 5, 6 and 6a), 0.2 in figs. 1 and 4);

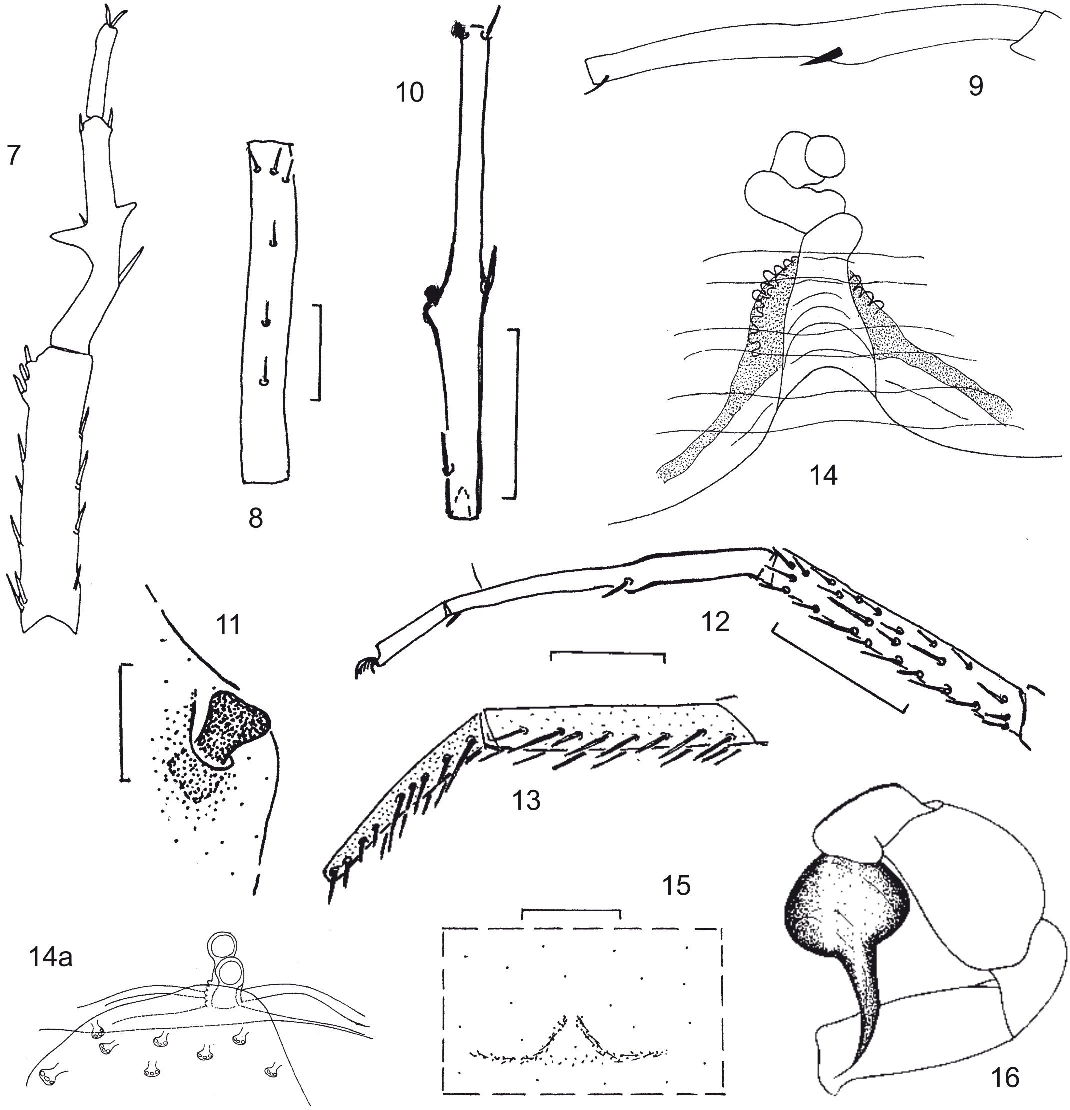
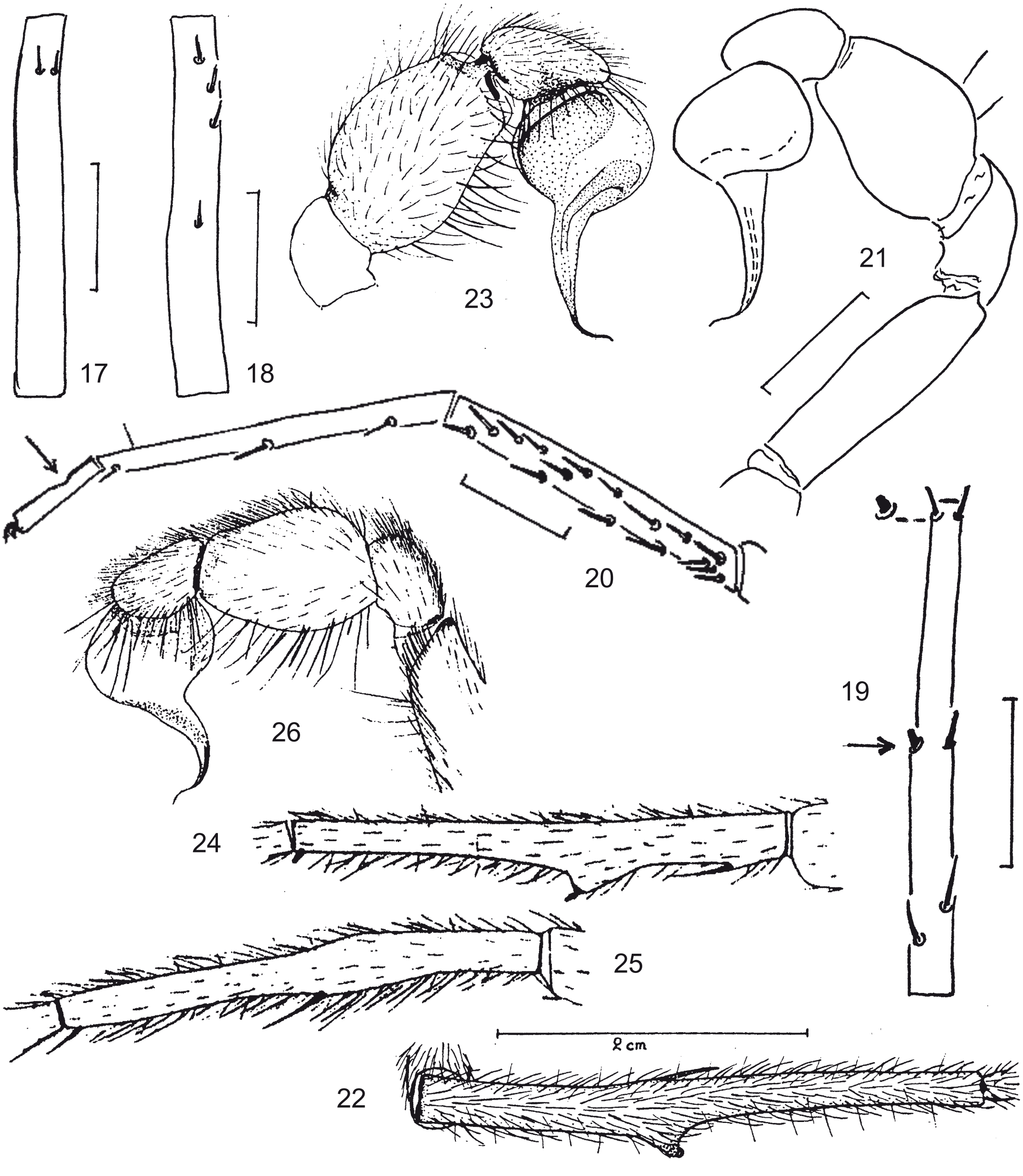
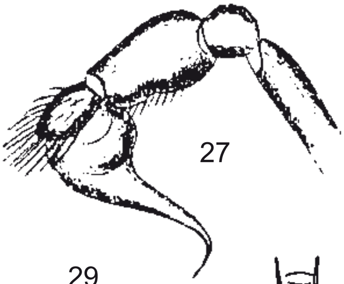


fig. 7) <u>*Ariadna pilifera*</u> O. PICKARD-CAMBRIDGE 1898, ♂ from North America, dorsal aspect of the left tibia, metatarsus and tarsus. Taken from BEATTY (1970);

figs. 8-16: <u>*Ariadna brignolii*</u> **n. sp**.; 8) ♂, dorsal aspect of the left femur **I**; 9-10) ♂, retrolateral and ventral aspect of the left metatarsus I. Note on fig. 10: In some specimens of the related *A. europaensis* n. sp. the proapical metatarsal bristle (clasping spine) has a normal shape like the other bristle of the apical pair, see fig. 19); 11) ♂, enlarged club-like medial bristle of the left metatarsus I, prolateral and slightly dorsal aspect; 12) ♂, retrolateral aspect of the left tibia, metatarsus and tarsus **I**; 13) ♀, proventral aspect of the right tibia and metatarsus **I**; 14-14a); 14) ♀, ventral and dorsal aspect of the vulva; 15) probably conspecific ♀ from Sardignia, posterior aspect of the genital area; 16) ♂, retrolateral aspect of the left pedipalpus. Scale bars 1.0 in figs. 8, 10 and 12-13, 0.1 in figs. 11 and 15a. Figs. 9 and 14-16 are taken from BRIGNOLI (1976);



figs. 17-26: <u>*Ariadna europaensis*</u> **n. sp.**; ♂, 17-18) dorsal aspect of the right and left femur I of a paratype; 19) ventral aspect of the left metatarsus I. The blunt prolateral spine in the middle (arrow) may be completely absent. Note the intrapopular variability of the proapical metatarsal bristle which may be short and blunt or of a normal pointed shape; 20) retrolateral aspect of the left tibia, metatarsus and tarsus I. Note the dorsal tarsal inclination (arrow); 21) retrolateral aspect of the left pedipalpus of a paratype; 22) dorsal aspect of the left metatarsus I; 23) retrolateral aspect of the right pedipalpus; 24-25) two aspects of the right metatarsus I; 26) retrolateral aspect of the left pedipalpus. Scale bars 1.0 in figs. 17-19, 0.5 in fig. 20. Figs. 22-23 are taken from LEDOUX (1967) (under *A. insidiatrix*), figs. 24-26 are taken from DENIS (1934) (under *A. spinipes*);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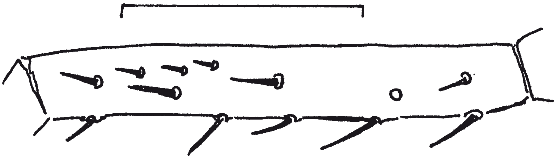
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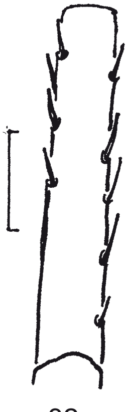
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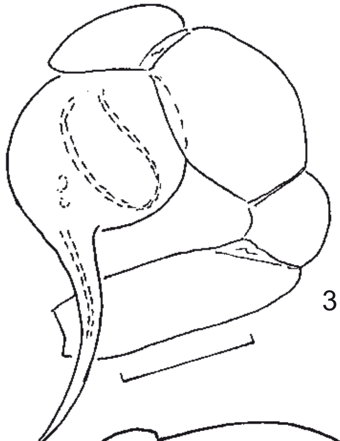
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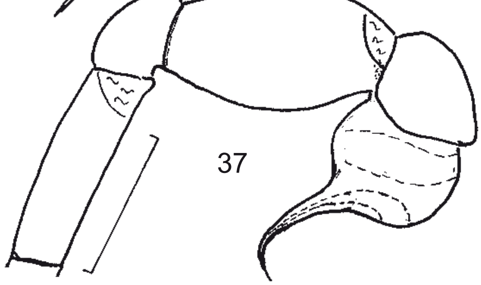
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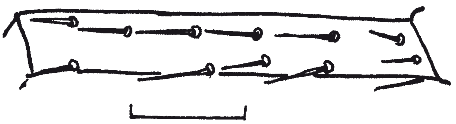
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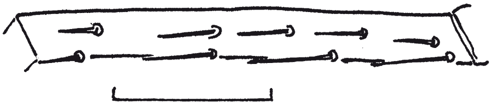
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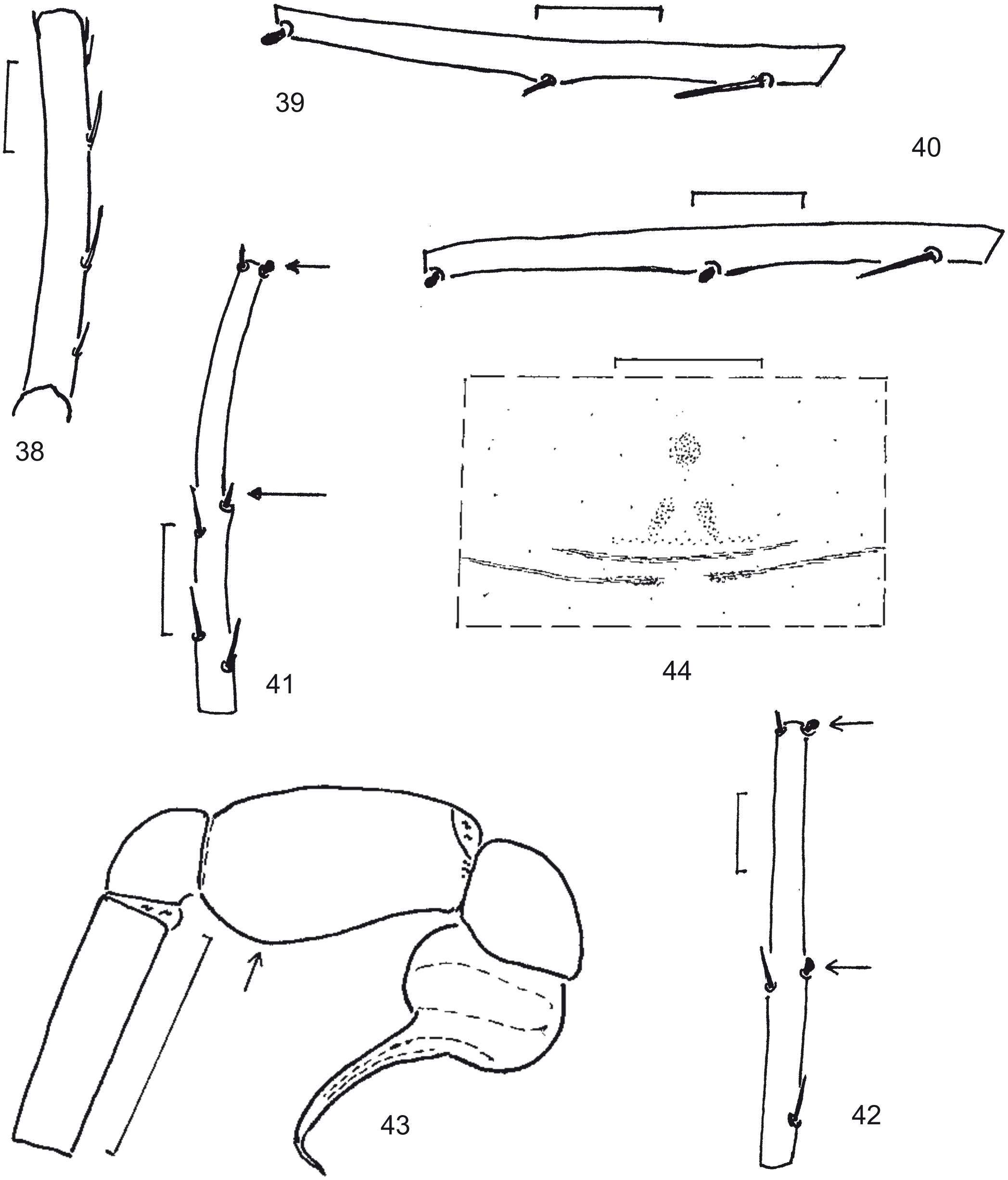
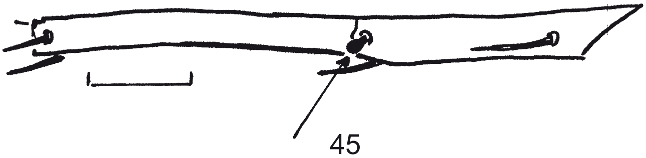
figs. 27-28) Ariadna ionica (O. PICKARD-CAMBRIDGE 1873), ♂, holotype from Corfu, 27) retrolateral aspect of the left pedipalpus, taken from O. PICKARD-CAMBRIDGE (1873) (sub *Ariadne ionica*); 28) prolateral aspect of the right metatarsus I; drawn from a photo via e-mail, scale bar 0.5;

figs. 29-31: Ariadna levyi **n. sp.**, ♂; 29) ventral aspect of the right metatarsus I; 30) retrolateral aspect of the left tibia I; 31) retrolateral aspect of the left pedipalpus. Scale bars 1.0, 1.0 and 0.5;

figs. 32-37: Ariadna inops **n. sp.**, ♂, 32) dorsal aspect of the right tibia I; 33-34) retrolateral aspect of the left tibia I and II (similar is *A. algarvensis*); 35-36) right metatarsus I, prolateral and ventral aspect; 37) retrolateral aspect of the right pedipalpus. Scale bars 0.5;



figs. 38-44: *Ariadna algarvensis* **n. sp**.; 38-43: ♂, 44: ♀; 38) dorsal aspect of the right tibia I (specimen from Cacela Velha; in the male from Bordeira exists an additional short prolateral bristle in the distal half); only some bristles are drawn; 39-40) prolateral aspect of the right metatarsus from Bordeira and Cacela Velha); 41-42) ventral aspect of the right metatarsus I from Bordeira (the left metatarsus is straight! The short proventral spine in the middle – long arrow – is pointed), and Cacela Velha. The short arrows point to the club-shaped spines; 43) holotype, retrolateral aspect of the right pedipalpus. Note the tibia which is distinctly bulging ventrally-basally (arrow); 44) posterior aspect of the genital area. Scale bars 0.1 in fig. 44), 0.5 in the remaining figs.;



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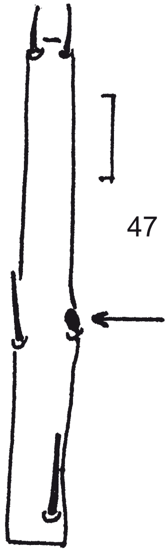

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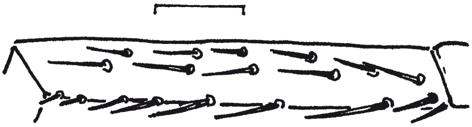

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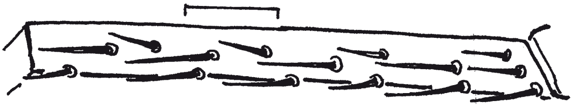

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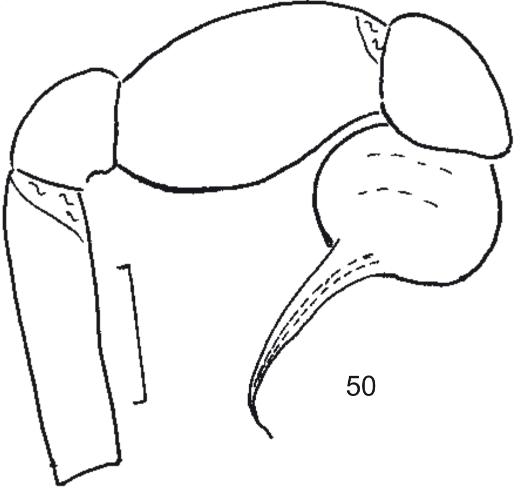

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figs. 45-50: *Ariadna maroccana* **n. sp.**, ♂; 45) prolateral aspect of the right metatarsus I. The arrow points to the club-shaped "clasping spine"; 46) enlarged club-shaped spine which is movable between a pair of sclerotized structures; 47) ventral aspect of the right metatarsus I; 48-49) retrolateral aspect of the left tibia I and II; 50) retrolateral aspect of the right pedipalpus. Scale bars 0.5;

fig. 51) *Ariadna cyprusensis* **n. sp.**, ♂, dorsal aspect of the right tibia I. Only some bristles are drawn. Scale bar 0.5 mm.

FAMILY OONOPIDAE

Abstract: *Opopaea saaristoi* **n. sp**. from Cyprus and *Silhouettella osmaniye* **n. sp**. from Turkey (Anatolia) (Araneae: Oonopidae) are described. The name *Orchestina dalmasi* WUNDERLICH 2008 (Malaysia) is praeoccupied by *O. dalmasi* DENIS 1956; it is here replaced by *O. codalmasi* **nom. nov.**

The Mediterranean members of the family Oonopidae are still insufficiently known, especially a revision of the genus *Orchestina* is needed. *Opopaea* SIMON 1891 and *Silhouettella* BENOIT 1979 are two of 11 genera found in Europe; some of these occur only in warm houses. The family has a mainly tropical distribution.
The European spiders of this family are tiny, usually 1 ½ to 2 mms long; they possess only six eyes and only two tarsal claws, a thoracal fissure is absent, their body colour is usually pale yellow or redbrown, never black or dark grey; the opisthosoma bears scuta in several genera.

Opopaea saaristoi **n. sp**. (fig. 1-5)

Derivatio nominis: The spider is named in honour to MICHAEL SAARISTO who published numerous important papers on the family Oonopidae, and on other families as well.

Material: N-Cyprus, between plants on the sandy ground; holotype ♂ JW leg. in V 2008, R21/AR/CJW.

Diagnosis (♂; ♀ unknown): Prosoma fairly distinctly punctuated, thoracal region with 4 pairs of tiny bristles (and a further indistinct one), pedipalpus (figs. 3-5): Cymbiobulbus with characteristic distal/apical structures: Two blunt distal outgrowths and two tiny apical teeth.

Description (♂):
Measurements (in mm): Body length 1.45, prosoma: Length 0.62, width 0.5; leg I: Femur 0.35, patella 0.18, tibia 0.21, metatarsus 0.18, tarsus 0.14, tibia II 0.21, tibia III 0.19, tibia IV 0.27; pedipalpal tibia: Length 0.24, height 0.12.
Colour: Prosoma yellow redbrown, legs yellow brown, opisthosoma redbrown.
Prosoma narrow anteriorly, fairly distinctly punctuated, thoracal region with at least 4 pairs of tiny hair-shaped bristles. Eyes (fig. 1): Posterior row straight, posterior median eyes largest, clypeus short, with 2 pairs of long bristles and a central one, basal cheli-

ceral articles of medium size, fangs long and slender, gnathocoxa with long outgrowth, labium free, sternum with well developed radial furrows. – Legs fairly stout, bristle-less, IV longest. Some articles (e.g. metatarsus III prolaterally; most hairs are rubbed off) bear distinctly thickened and flattened hairs. Metatarsi I-IV bear a trichobothrium which is longer than the articles diameter, their position on I in ~ 0.83. – Opisthosoma distinctly flattened dorsoventrally, dorsally and ventrally completely covered with large scuta, dorsally punctuated, genital pore transverse oval; a ring exists around the spinnerets . – Pedipalpus: See the diagnosis. The cymbiobulbus bears a large “window”.

Relationships: *O. punctata* (O. PICKARD-CAMBRIDGE 1872) (at least Israel and Lebanon) and *O. lingua* SAARISTO 2006 (Israel) are most related; in *punctata* the thoracal region bears only 3 pairs of bristles – see SAARISTO (2006: Fig. 78), the prosoma bears distinct longitudinal streaks, in both species – and in *O. santschi* BRIGNOLI 1974 from Cyprus, Israel and Tunesia as well – the apical structures of the bulbus/embolus are different. In *O. concolor* (BLACKWALL 1859) (Madeira, Canary Islands) the apical structures of the bulbus/embolus are distinctly different.

Distribution: Cyprus.

***Silhouettella osmaniye* n. sp.** (figs. 6-11)

Acknowledgement: I thank VOLKER BRACHAT for collecting the spiders and leaving me the specimens of the new species for the description.

Material: Turkey, SE-Anatolia; 1♂1♀ leg. BRACHAT & MEYBOHM 24/25. IV. 2002; holotype ♂ TR-Antakya, Nur Daglari, Str. Osmaniye-Zorkun, 550-850m; R22AR/ CJW; ♀ paratype TR-Adana, N Osmaniye, National Park; R23/AR/CJW.

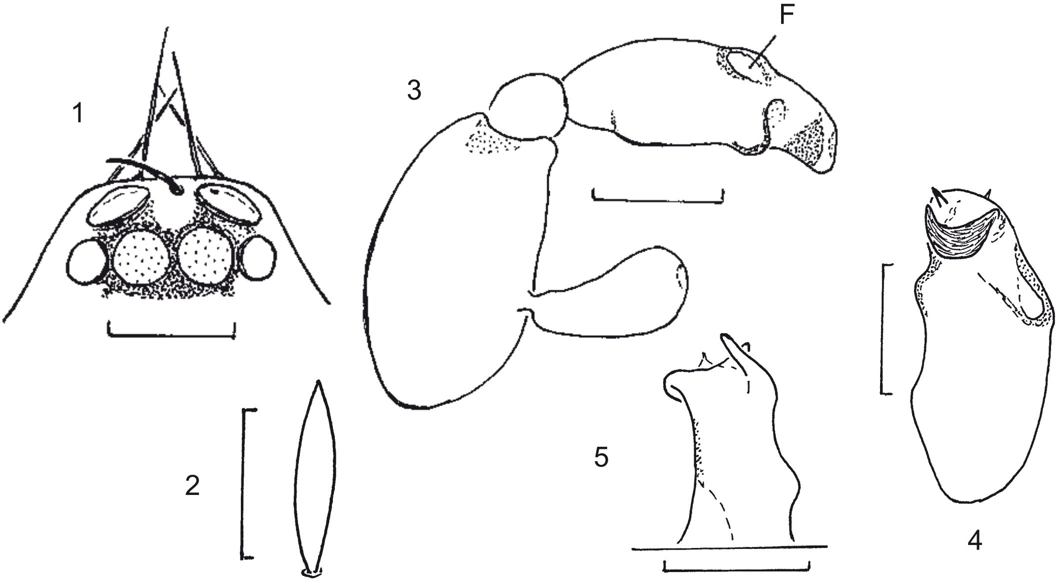
Diagnosis: Position of the eyes as in fig. 6, paired sternal depressions (pouches) widely spaced (fig. 7); ♂ genital area fig. 8, ♀ genital area fig. 9, ♂-pedipalpus (figs. 10-11): Embolus long, guided by a translucent conductor, ventrally with a bulge which stands out.

Description:
Measurements (♂♀ in mm): Body length 1.9/2.0, prosoma: Length 0.8/0.82, width 0.6/0.65; leg I: Femur 0.53/0.5, patella 0.25/0.26, tibia 0.38/0.39, metatarsus 0.32/0.3, tarsus 0.3/0.3; tibia II 0.35/0.34, tibia III 0.3/0.3, tibia IV 0.42/0.49.
Colour orange brown.
Prosoma about 1.3 times longer than wide, cuticula finelly punctuated and anteriorly narrow, like in *S. tomer* SAARISTO 2006, thorax not elevated, probably bearing two pairs of hair-shaped bistles; eyes (fig. 6): Posterior row recurved, posterior median eyes largest and almost touching, not far away from the posterior lateral eyes, clypeus longer than the diameter of the posterior median eyes, basal cheliceral articles fairly stout, fangs fairly slender, labium with 3 pairs of apical hairs and a seam to the wide

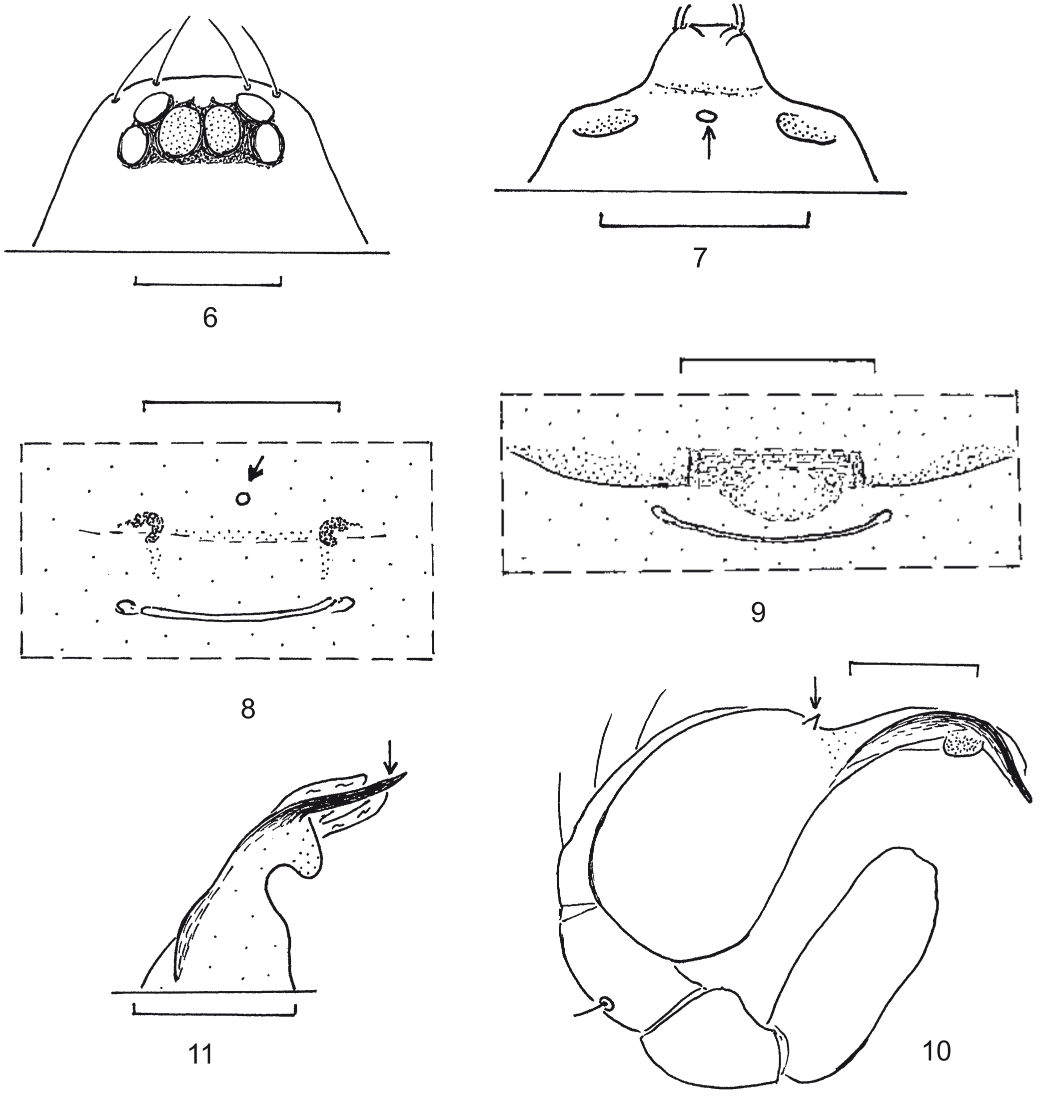
sternum which is more distinct in the female. Sternum wrinkled, separating the coxae IV by more than their diameter. Sexual dimorphy of the sternum: Male with a pair of anterior depressions (pouches) (fig. 7) as in other congeners, widely spaced, and medially with a tiny roundish pit (diameter ~ 0.003 mm) which is difficult to recognize, and which also exists in *S. loricata* but was not mentioned by SAARISTO (2006). This pit exists probably in all congeners. Due to the size and position the strongly bent embolus and its accompined structures fits well into these pouches which well may bear and hide the male copulatory organs in their resting position. – ♀-pedipalpus dorsally-distally with a field of scopula-like hairs. – Legs fairly stout, IV longest, bristles absent; all metatarsi bear a trichobothrium, its position on I in ca. 0.9. – Opisthosoma 1.7 (♀) – 1.8 (♂) times longer than wide, in both sexes dorsally and ventrally completely covered with a large scutum, indistinctly punctuated, hairs only fairly long, indistinct, scarce. Ring around the spinnerets well developed in both sexes. – ♂ genital area fig. 8. ♂-pedipalpus (figs. 10-11) with fairly stout articles, bulbus large, dorsal tooth at the base of the embolus well developed, see above. – ♀ genital area fig. 9; a distinct elevation behind the epigastral furrow is absent.

Relationships: Prosoma and genital organs are similar to the related *S. tomer* SAARISTO 2006 from Israel in which posterior median and posterior lateral eyes are widely spaced, the genital area is different in both sexes, the sternal pouches are close together; a distinct elevation behind the ♀ epigastral furrow exists in *tomer* in contrast to *osmaniye*.

Distribution: Turkey (Anatolia).



Figs. 1-5: ***Opopaea saaristoi* n. sp.**, ♂; 1) dorsal aspect of the eyes; 2) thick/flat hair of a leg; 3) retrolateral aspect of the right pedipalpus (hairs are not drawn); 4) proventral aspect of the right cymbiobulbus; 5) dorsal aspect of the bulbus. F = fenestra (window) of the cymbiobulbus. Scale bars 0.05mm in fig. 2, 0.1 in the remaining figs.;



figs. 6-11: ***Silhouettella osmaniye* n. sp.**; 6) ♀, dorsal aspect of the eyes; 7-8, 10-11) ♂; 7) labium and anterior part of the sternum, ventral aspect. Note the widely spaced sternal pouches and the tiny unpaired medial depression/pit (arrow); 8) genital area. Note the genital porus (arrow); 9) ♀, genital area; 10) retrolateral aspect of the right pedipalpus. The arrow points to the tooth of the base of the embolus; 11) ventral aspect of the right embolus and accompanying structures. The arrow points to the distal part of the flattened embolus. Scale bars 0.1 in figs. 10-11, 0.2 in the remaining figs.

***Orchestina codalmasi* nom. nov.**

The name *Orchestina dalmasi* WUNDERLICH 2008 (Malaysia) is praeoccupied by *O. dalmasi* DENIS 1956; it is here replaced by *O. codalmasi (***nom. nov.)**

FAMILY TETRAGNATHIDAE

Abstract: Selected taxa of the European spider family Tetragnathidae (Araneae) are revised, a key is given to the European members of the genera *Meta* C. L. KOCH 1836 and *Tetragnatha* LATREILLE 1804, *Tetragnatha intermedia* KULCZYNSKI 1891 (**n. stat**.) (?= *Tetragnatha obtusa* forma *maior* KULCZYNSKI 1891, quest. n. syn.) (♂♀) and the dubious *T. corsica* SIMON 1929 (♂ unknown) are redescribed, *Meta milleri* KRATOCHVIL 1942 = *Meta bourneti* SIMON 192 (**n. syn**.), *Tetragnatha fuerteventurensis* WUNDERLICH 1992 is regarded as synonym of *T. nitens* (AUDOUIN 1827) (**n. syn**.), *Tetragnatha obtusa propior* KULCZYNSKI 1891 is regarded as synonym of *T. dearmata* THORELL 1873 (**n. syn**.), *Eucta zangherii* CAPORIACCO 1926 is not regarded as a member of the family Tetragnathidae but of the Linyphidae. Dubious species as well as the synonymy of several nominal subspecies and "variations" of the genera *Meta* and *Tetragnatha* are discussed. Remarks are given on the Eocene fauna of the family Tetragnathidae in Baltic amber, as well as on the scotophily and on the evolution of cave spiders of the genus *Meta* s. l..

Members of the Tetragnathidae are characterized mainly by their usually large basal cheliceral articles which may strongly diverge (fig. 2), and their simple genital organs. In the European genera the male pedipalpus (figs. 3, 26) possesses usually a large paracymbium (*Sancus* is an exception) and a large bulbus, a median apophysis is absent, the conductor enwinds the embolus distally; the female genital area is not or only weakly sclerotized, and a distinct scape is absent in the European species. Femoral trichobothria (fig. 7) may exist, and the distinctly diverging basal cheliceral articles may bear strong anterior and/or lateral teeth (*): In the Tetragnathinae, the genus *Tetragnatha* (= *Arundognatha, Eucta*) (tribe Tetragnathini) and in the genus *Pachygnatha* (the tribe Pachygnathini) but not in the genera *Meta* s. l. (the tribe Metini, see WUNDERLICH (2008: 91-103)) and *Sancus* (Leucauginae? See WUNDERLICH (1992: 359-361)). See the tab. 1 below. – The spiders bite out the hub of their orb web; adult members of *Pachygnatha* build no capture web. The length of prosoma and legs may be larger in the male sex. Apparently smaller species are less dependent on high humidity than larger species, at least in the European gener

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(*) Similar cheliceral teeth exist in males (but not females) of certain members of the Pholcidae and Tetrablemmidae.

Character	***Meta* s. l.**	***Pachygnatha* (*)**	***Tetragnatha***	***Sancus* (**)**
opisthosoma	stout	stout	slender	slender
shape of the chelicerae, teeth	not powerful	strongly divering & toothed	strongly diverging & toothed (fig. 2)	not powerful
leg bristles	numerous	absent (!)	numerous	several
femoral trichobotria	absent	present (as in fig. 1)	present (fig. 1)	absent

(*) The spiders live on the ground in contrast to members of the remaining genera which live in higher strata of the vegetation. The loss of a capture web in adult *Pachygnatha* may be connected with their ground-living. See SENGLET (1972). – Like in *Tetragnatha* a special fixing copulatory position exists in which the enormous chelicerae are used, see e. g. WUNDERLICH (2004: 171, fig. 21).

(**) = *Leucognatha* WUNDERLICH 1992. Only *S. acoreensis* WUNDERLICH 1992 of the Azores. This genus has an African origin.

Tab. 1. Selected characters of the West-Palaearctic genera of the Tetragnathidae.

From Europe almost 30 species of the tetragnathid genera *Meta, Pachygnatha*, *Sancus* (= *Leucognatha*) and *Tetragnatha* are reported. *Meta* has been considered as a member of the family Araneidae for a long time. Previously some authors – e.g. WUNDERLICH (1992: 359) – regarded the genus *Zygiella* s. l. as a member of the family Tetragnathidae. WUNDERLICH (2004: 924) split the genus and placed it in the family Zygiellidae, separating it from the family Araneidae. *Zygiometella* WUNDERLICH 1995 (subfamily?) from the Near East (Jericho) is known by a single species which has been originally described as *Tetragnatha perlongipes* by O. PICKARD-CAMBRIDGE 1872, and has been regarded as a member of the subfamily Metinae by WUNDERLICH (1995). It is unknown from Europe, lacks femoral trichobothria, and possesses a peculiar stridulatory organ in the male sex, see WUNDERLICH (1995: 639-642). In the following the European members of the genera *Meta* and *Tetragnatha* are treated more closely.

In the European species of the genera *Meta* and *Tetragnatha* exist an enormous intraspecific variability e.g. in the size and the colour of the body, in the number and position of the cheliceral teeth exists but also in the shape of the genital lobe (not pointed out by most previous authors). In *Meta minima* DENIS 1959 I found differences in the length of the prosoma between 1.8 and 4.1 mm in both sexes. In *Meta merianae* SCOPOLI 1763 occasionally a very dark form exists, the colour of species of *Tetragnatha* may be very variable, see *T. intermedia*. The intraspecific number of the teeth of the female pedipalpal claw is not constant. The high number of about a dozen synonyms and so-called subspecies in species like *T. extensa* and *T*. *nitens* reflects this fact as well as the uncertainty and errors of various authors including the present author (see the synonymy of *T. fuerteventurensis*), of W. KULCZYNSKI and of E. SIMON.

Numerous structures evolved convergently, concerning the genital structures, too, and the absence of a sclerotized epigyne complicate the identification of several species; the shape of their "genital lobe" is intraspecifically also more variable than published by previous authors.

(1) ***Meta*** C. L. KOCH 1836 s. l.; see WUNDERLICH (2008: 91-103)

Differences of *Meta* to related European tetragnathid taxa: See the tab. above.

In this paper I regard the genus *Meta* in a wide sense, containing 7 extant subgenera and a single extinct subgenus, see WUNDERLICH (2008: 91ff). From Europe (including the Canary Islands) I know 4 subgenera which can be distinguished as follows:

Distribution, species & characters	*Stridulameta*	*Metellina*	*Merianmeta*	*Meta* s. str.
species in Central Europe	*stridulans*	*antrorum*, *barretti*, *minima*, *mengei*, *segmentata*	*merianae*	*bourneti*, *menardi*
endemics of ...	Madeira	*barreti*: Madeira, *minima*: Canary Islands		
scotophily, cave dwellers	–	–	entrances of caves; celars and outside	+ (*bourneti* deep in caves)
body size	fairly large	small to medium	medium	large
body colour	light	light photo 83	medium to dark (rarely)	dark photo 84
paracymbium branches	tiny teeth between branch	both long and slender	dorsal branch standing out	d. branch compact (figs. 3–4)
(stridulatory) files	♂♀: Chelicerae laterally (fig. 8	–	♂, on the cymbium (fig. 9)	–
behavior	(*)			

(*) Special courtship behaviour at least in some species in which the male presents a prey to the female within her capture web, see WIEHLE (1931: 121-122). (A similar courtship behaviour exists in members of the family Pisauridae).

Tab. 2. Differences in the European subgenera of *Meta* s. l.
(Further differences: See WUNDERLICH (2008: 92-93)).

In Cetral Europe occurs only a pair each of *Meta* and *Metellina* which can be determined as follows:

(a) Subgenus *Meta*:

1 ♀: Central genital area (the lobe) strongly standing out, more narrow, with a wide skinny/white lateral field, arrow in fig. 3a, length of the prosoma usually (!) 6-7 mm. ♂: Distal part of the embolus slightly bent ventrally, shape of the variable paracymbium as in fig. 3b, length of the prosoma most often 5-5.5 mm. . . . . *menardi*

- ♀: Central genital area only fairly protruding, wider, with a small skinny/white lateral field (fig. 4a), length of the prosoma usually 7-9 mm. ♂: Distal part of the embolus bent dorsally in a right angle (fig. 4b), shape of the variable paracymbium similar, variable as in fig. 4b, length of the prosoma usually 5.5-7.5 mm. *bourneti*

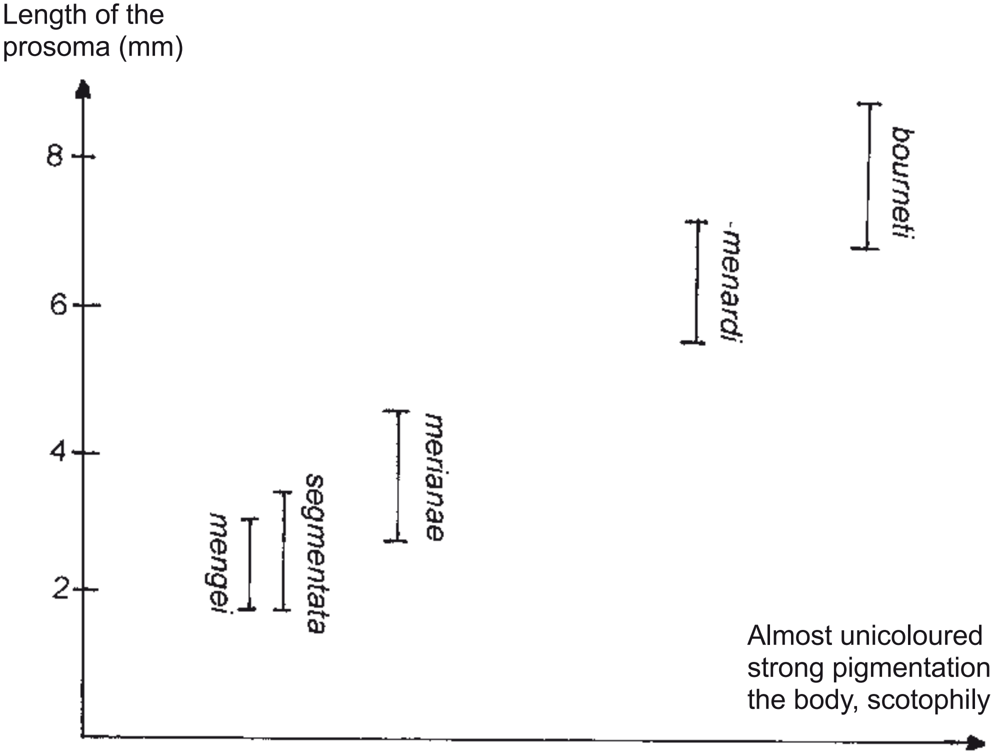
(b) Subgenus *Metellina*:

1 ♀: Epigyne (seen from below-behind) posteriorly with a grey field, vulva (fig. 5a) apparently bipartite. ♂: Conductor (fig. 5) distally narrow, near the tip with pigmentations and a depression. Adult usually V-VI . . . .*mengei*

- ♀: Epigyne (seen from below-behind) posteriorly with a white field and frequently inclined, vulva as in fig. 6a). ♂: Conductor (fig. 6) distally wider than basally, near the tip unmodified. (= *reticulata*). Adult usually VIII-X . . . . *segmentata*

Remarks on the ecology of continental European spiders of the genus *Meta* s. l.:

Comparing the body size, the pigmentation of the body, the number of teeth on the cheliceral margins and the linkage to the life in caves we find the following connections (tab. 3):



Tab. 3. Connection of selected characters to cave dwelling in continental European members of the genus *Meta* s. l.

The observations:
(a) The smallest species – *M. mengei* and *segmentata* – are free-living spiders and short-lived (few months only) as adults, they are light coloured (photo 83), the posterior margin of their cheliceral furrow usually bears 2 (rarely 3) teeth.
(b) *M. merianae* is of medium size compared with the groups (a) and (c); it occurs outside caves as well as at the entrances of caves, the colour of its body and legs is quite variable, darker than in group (a), occasionally the opisthosoma is as dark as in group (c), the number of the posterior cheliceral teeth is usually 4 (rarely 3).
(c) *M. menardi* and *bourneti* are the largest species; they live in caves, *menardi* in cellars, too, *bourneti* exclusively deep inside caves, body and legs (photo 84) are strongly pigmented (almost black in some *menardi* or dark (red)brown and partly lighter, the number of the posterior cheliceral teeth is usually 4. In contrast to the members of groups (a) and (b) mature specimens exist during the whole year, and the spiders may live longer.

To sum it up:
The cave dwellers build the largest capture webs; their eye lenses are not reduced, and their legs are not lengthened compared with their free-living relatives and with other true cave-dwellers. The largest and most strongly pigmented spiders (*Meta* s. str.) are the cave dwellers but the smallest, less pigmented spiders are free-living (sugbenus *Metellina*).

Remarks: (1) *Meta stridulans* WUNDERLICH from Madeira is a larger species – its size lies between *merianae* and *menardi* – but it is free-living and less pigmented. (2) The Canarian free-living *Meta* (*Metellina*) *minima* DENIS 1953 and the North American *M.* (*Metellina*) *mimetoides* CHAMBERLIN & IVIE 1941 – which is frequently found in caves – are more pigmented than their close congeners.

Discussion: What are the REASONS for the connection of these characters? Is there a selective advantage of the cave dwelling (continental European) *Meta*-species, which are larger and more strongly pigmented than their free-living relatives?

I do not want to exclude that the size of the body (and the capture web) are linked to the size of the prey – which may be larger in caves – but I do not know comparative studies on this matter. I observed larger Coleoptera, Diptera and Hymenoptera in caves near Bad Urach in Southern Germany in which I also found members of *Meta menardi*.

The light colour of the patterned specimens of *M. mengei* and *segmentata* (photo 83) may well be cryptical, and a cryptical pattern is superfluous in cave spiders (photo 84). Body and legs are usually depigmented in true cave spiders (and other animals) but rarely dark brown. It is surprising that a dark colour of body and legs exists (e.g.) in several cave dwelling *Dysdera*-species of the Canary Islands like *D. obscuripes* WUNDERLICH 1992, see WUNDERLICH (1992: 302), and a dark colour of the body is also known from certain true cave scorpions like the North American *Pseudouroctonus reddelli* and insects like beetles. Such strongly pigmented cave species of the genus *Dysdera* may have normal (large) eye lenses but others have strongly reduced eye lenses. The chemical importance/function of a dark colour in cave arthropods is unknown to me, and it may be caused by quite different factors. Are these “pigments” in the cave spiders in question nothing else than by-products or deposits caused (e.g.) by special food?

Are *Meta* (*Meta*) *menardi* and *bourneti* (and the North American *Meta* (*Meta*) *americana*) relatively “young” taxa in the geological sense which have not yet lost the pigmentation of body and legs, in which large eye lenses still exist, and the leg articles are not yet lengthened? The existence of an “additional sclerite” (*) of the bulbus at the base of the embolus in these members of *Meta* s. str. (a), the absence of close relatives in Eocene Baltic amber but the existence of free-living relatives of the different extinct subgenus *Praetermeta* which is closer to *Metellina* than to *Meta*, see WUNDERLICH (2008: 89ff) (b), as well as their weak morphological adaptation to cave life (no lengthened leg articles or reduction of eyes lenses) (c) may indicate a late evolution of *Meta* s. str., which apparently is an evolutionary young subgenus, and not a relict taxon like numerous other true cave arthropods.

I do not want to exclude that the ancestor of the extant members of the subgenus *Meta* evolved – in dark habitats? – a dark colour of body and legs which lightened slightly in some specimens. The large body size of the cave spiders is probably connected with the relatively constant temperature in this habitat similar to most tropical habitats, in which larger species – e.g. in the Sparassidae – occur than in relatives of moderate regions or outside of caves. The body length of the more epigaeic members of the genus *Porrhomma* SIMON (*montanum, pallidum* and *pygmaeum*) is smaller in average than the body length of the true cave spiders *P. lativela, myops* and *rosenhaueri* (in which the colour is more pale, the eye lenses are strongly reduced and the legs are strongly lengthened in contrast to the cave-dwelling members of the subgenus *Meta*).

(*) This is actually not a true/free additional sclerite but only an enlarged and modified part.

Synonyms and questionable European taxa of *Meta* s. l.:

Meta (Metellina) antrorum SIMON 1907 (♂♀, caves in Spain, prov. Alicante, e.g. cueva del Agua; Baleares, 6♀ 1♂, E. SIMON det. MNHNP no. 1745). According SIMON this species is similar to *M. segmentata* but the structure of the ♂-pedipalpus is allegedly different with a branch of the paracymbium long and bent according to the rough drawing (see fig. 7) by SIMON. I found no difference to *M. segmentata*, and regard therefore *antrorum* as a junior synonym of *Meta* (*Metellina) segmentata* (CLERK 1757) (**n. syn.**).

Meta (Metellina) merianae celata KULCZYNSKI 1899 (♀, Hungaria) = *merianae*, see WIEHLE (1931: 126).

Meta merianae SCOPOLI 1763 and *"Meta" (Metellina) "merianae var.* ? *obscura* " KULCZYNSKI 1899 (p. 70, ♀, Madeira, sub *Meta*): Elevated to species rank by DENIS (1953) but in my opinion it is a dubious taxon. Determinations of *M. merianae* from the Canary Islands and Madeira are most probably incorrect: Spiders from the Canary Islands are apparently *M. minima* DENIS 1953, see DENIS (1962: 82). The determination of spiders from Madeira are unsure and may be members of *barretti*, see WUNDERLICH (1992: 361-362) for both species. *Meta merianae* has been introduced to the Azores but most probably not to other Macaronesian islands. – According to the Katalog of the Araneae by ROEWER (1942) *Epeira obscura* WIDER 1834 from Central Europe is – according to the cataloges of Araneae – regarded as a junior synonym of *M. merianae.*

Meta (Meta) milleri KRATOCHVIL 1942 = *bourneti* SIMON 1922 (**n. syn**.). According to BRIGNOLI (1983: 229) both are questionable synonyms. The shape of the epigyne is fairly variable in this species, see KRATOCHVIL (1942: Figs. I, 1-2) (the vulva of *milleri* has not been figured), the shape of the paracymbium (fig. 4) is also fairly variable, the structures of the terminal apophyses and the strongly bent distal part of the embolus of *milleri* – see KRATOCHVIL (1942: Fig. II, 1) – is typical for *bourneti*. – Although strictly cavernicolous *bourneti* is widely spread in the Palaearctic and Northern Africa.

Meta (Metellina) nigra FRANGANILLO BALBOA 1920 (♀, Portugal): A dubious species, the description is only four lines long. *M. nigra* is compared with *M. segmentata* but the colour of the body is reported as "black" in *nigra*. Therefore I do not want to exclude that *nigra* is a junior synonym of *M. merianae* in which a "black form" exists.

(2) ***Tetragnatha*** LATREILLE 1804

Tetragnatha is in Europe (almost a dozen species) and worldwide a diverse genus; it is one of the most difficult genera in the taxonomic sense. Its species are frequent but a usable key for the identification of the species which includes all European species was absent. A revision of the genus is still wanting (this paper is only a small step), several taxa like *T. corsica* (only the female is known) are doubtful, see below.

Diagnostic characters of the genus: See the tab. above. A large and bent “great apophysis” (A in fig. 2) exists only in the male sex.

Synonymy of European *Tetragnatha* (sub)species, dubious taxa, and n. stat.:

Eucta zangherii CAPORIACCO 1926 (Italy): According to the original description (♂) – small chelicerae, the stout pedipalpal tibia and cymbium – I regard this species not as a member of the family Tetragnathidae but probably of the Linyphiidae (genus *Linyphia*?).

Tetragnatha extensa var. *contigua* FRANGANILLO BALBAO 1909 and *T. trichodes* var. *mendax* FRANGANILLO BALBAO 1909 (N-Portugal) are regarded here as nomina dubia: The short description gives no differentiating diagnostic characters, the sex is not listed, type material is probably lost.

Tetragnatha extensa maderiana SCHENKEL 1938 (Madeira) = *T. extensa*, see WUNDERLICH (1992: 363).

Tetragnatha extensa pulchra KULCZYNSKI 1891 (Hungaria): ?= *T. extensa* (LINNAEUS 1758): A dubius taxon, ♂ unknown; drawings are absent in the original description. I did not get the opportunity to study type material.

Tetragnatha fuerteventurensis WUNDERLICH 1992 (Canary Island Fuerteventura) = *T. nitens* (AUDOUIN 1827) (**n. syn**.) (figs. 16-29). The variability of the genital organs (see the figs.) has studied by me more closely than previously in specimens from several parts of Europe. See also the next taxon.

Tetragnatha nitens kullmanni WIEHLE 1962 = *T. nitens* (AUDOUIN 1827), see WUNDERLICH (1992: 365).

Tetragnatha obtusa corsica SIMON 1929 (figs. 43- 46): Material: 2♀ (questionable holotype and lectotype) from Corsica, Mus. Nat. Hist Paris. – The male is still unknown. The female opisthosoma (fig. 43) is 3.4 times longer than wide, the chelicerae are as in the figs. 44-45, the vulva (fig. 46) is quite similar to *T. montana* (fig. 42) but the retrobasal outgrowth of the receptacula seminis are much smaller, and the cheliceral teeth are different. This may be a species of its own.

Tetragnatha obtusa intermedia KULCZYNSKI 1891 (terra typica: Hungaria): According to BONNET’s catalog of spiders = *T. obtusa* but here regarded as the independent species *Tetragnatha intermedia* KULCZYNSKI 1891 (**n. stat**.). The species is not rare in Southern Europe, see the description below.

Tetragnatha obtusa “forma” major KULCZYNSKI 1891 (Hungaria) in my opinion probably = *T. intermedia* (**quest. n. syn.**), see CHYZER & KULCZYNSKI (1891: 145) “Mas huius formae T. intermediae omnino similis est, paulo maior...”, or *T. dearmata*. I did not get the opportunity to study type material.

Tetragnatha obtusa “forma” *propior* KULCZYNSKI 1891 (Hungaria) = *T. dearmata* THORELL 1873 (**n. syn**.). According to the figs. given by these authors (t. 6, figs. 12a-b) I regard *propior* as junior synonym of *dearmata*. *T. dearmata* was not treated in the work of CHYZER & KULCZYNSKI (1891). – Remark: In the World Spider Catalog by PLATNICK (2010) (Internet) *propior* is erroneously listed under *proprior*.

Tetragnatha intermedia KULCZYNSKI 1891 (**n. stat**. from *T. obtusa* forma *intermedia* and *T. ?obtusa* forma *major*, quest. n. syn., see above) (figs. 54-70)

Material: southern Europe: Italy (Sardinia, SMF), and Toscana, E Grosseto, JW leg. in VIII-IX 2010, CJW; Spain (SMF), Ibiza, Salinas, 1♂ JENS RUNGE leg. in IX 2008, coll. J. R.; Portugal: Algarve, (1) S Aljezur near Bordeira, near a creek, beaten from trees and bushes, 6♂, 5♀ JW leg in VIII 2008, CJW; (2) near Faro, 1♂ JW leg in VIII 2009, CJW.

Diagnosis: Conductor with a translucent apical part which encloses the distal part of the embolus and bears A PEAK (arrow in fig. 64) which is tiny and indistinct. (The tip of the conductor is directed retrolaterally and longer than the embolus; the position of the outgrowth of the paracymbium is at the end of the basal third of the paracymbium (fig. 61)). ♀: Genital area wide (figs. 65-68), vulva (figs. 68- 69) with the dorsal pair of receptacula seminis longer and usually more slender than the ventral pair, posterior aspect of the chelicerae as in fig. 60, posterior margin with about 7 teeth; ♂-chelicerae (figs. 56-59) with a large “great apophysis” which is divided apically, the large “guiding tooth” is DISTINCTLY BENT; the number of the marginal teeth is anteriorly 6 and posteriorly usually 4-5 but 5/6 in the male from the area of Faro.

Description:
Measurements (♂/♀ in mm): Body length 4-5/5.5-7.7, prosoma: Length 1.8-2.0/ ~ 2.0; width 1.1-1.2; femur I 3.4-4.5/3.3-4.0.
Colour very variable but the prosoma usually as in *T. obtusa*, with the cephalic area most often grey darkened in contrast to the light thoracal area, sternum uniformly light to dark brown, laterally darker in some specimens; in some specimens from Italy (Toscana) the sternum bears a yellow field just behind the labium (fig. 54a), opisthosoma dorsally yellow brown with two wide, light to dark brown longitudinal bands, with nacre spots in some specimens, laterally darkened or not, ventrally with a wide dark medial band, legs yellow brown, most articles apically with small dark annulations.
Prosoma: Eyes as in fig. 54, chelicerae: See the diagnosis, the claw of the ♀-pedipalpus may bear about 10 teeth (only about 7 teeth in some females from the Toscana), legs

slender, bristles numerous, metatarsal trichobothrium IV absent, its position on I in 0.1-0.16. Opisthosoma fairly slender, usually slightly concave ventrally and slightly convex dorsally, ca. 2.9 (♀) – 4.1 (♂) times longer than wide. Genital organs: See the diagnosis.

Relationships: See the key. In *T. obtusa* the prosomal colur is similar but the position of the receptacula seminis is more side by side (fig. 53), the tip of the conductor is similar to a bird's head, and the cheliceral teeth are different: The "guiding tooth" is straight (the great apophysis is quite similar). In *T. montana* and *dearmata* the distal part of embolus and conductor are different, their tip points prolaterally, and the position of the paracymbial outgrowth is in the middle of the length of the paracymbium.

Distribution: Hungary (terra typica); new to Southern Europe (Italy, Iberian Peninsula). The species is frequent in Southern Europe and apparently confused with *obtusa* by most students, it has probably been overlooked in southernmost parts of Central Europe (Austria, Switzerland).

Key to the European species of *Tetragnatha*

REMARKS: (1) The male of *T. corsica* is unknown. – (2) *T. corsica, nitens* and *osidis* are restricted to Southern Europe, *T. intermedia* is probably absent from Central and Northern Europe. – (3) The colour – especially of the opisthosoma and in alcohol – is more variable than supposed by ALMQUIST (2005) in his important work. The shape of the opisthosoma is intraspecificly quite variable, especially in the female, see *T. obtusa* (no. 10). The teeth of the chelicerae are variable, too, see the figs. 41 and 48 as well as *Tetragnatha extensa* forma brachygnatha THORELL, see TULLGREN (1947: Figs. 23-24) (a malformation?). – (4) In the first four species the anterior and posterior lateral eyes are widely spaced from each other (fig. 13) (compare fig. 54). With the exception of *T. striata* these species are only rarely collected. – (5) To "clear" and observe the vulva one may use; e. g., clove oil for a few minutes (a) directly put on the genital area above the level of alcohol (the genital area may be cut off at one side and and turned over to the other side) or (b) one may put the complete detached vulva in clove oil for a few minutes out of the alcohol, and observe it from the dorsal side. – (6) Determinations may be quite confusing if two or more species – or both sexes from different species – exist in a single sample or!

1 Opisthosoma strongly tail-shaped elongated beyond the spinnerets (fig. 10-11) 2

- Opisthosoma not strongly elongated (figs. 16-17) 3

2(1) Opisthosoma less elongated (fig. 10). ♀: The flat genital lobe is about as long as wide. (= *Eucta kaestneri*) . . . . <u>reimoseri</u>

- Opisthosoma greatly elongated (fig. 11). ♀: The flat genital lobe is distinctly longer than wide (fig. 12). (= *Eucta gallica*). . . . .<u>isidis</u>

3(1) Anterior and posterior lateral eyes distinctly wider spaced from each other than the anterior and posterior median eyes from each other (fig. 13) (like in *osidis* and *reimoseri*) 4

- The median eyes not wider spaced from each other than the lateral eyes from each other; both eye rows almost parallel (fig. 15) 5

4(3) Legs relatively short, femur I about 1.7 times longer than the prosoma. ♂: Great cheliceral apophysis pointed (fig. 14) as in *pinicola*, pedipalpal tibia only about as long as wide. ♀: Genital lobe longer than wide apically, unpaired (median) structure of the vulva absent. (= *Arundognatha s.*) . . . .<u>striata</u>

- Legs long, femur I about 2.7 times longer than the prosoma. ♂: Great cheliceral apophysis widened – and usually divided – apically as in fig. 31, pedipalpal tibia about twice as long as wide. ♀: Genital lobe wider than long, unpaired (median) structure of the vulva present as in fig. 36 (arrow) . . . .<u>shoshonae</u>

5(3) ♂: Paracymbium apically with a DISTINCT notch (arrow in figs. 25-26) (this shape is unique in the European species). ♀: Chelicerae apically-retroventrally with a large tooth (arrow in fig. 18), genital lobe (figs. 19-20) distinctly longer than wide, in some specimens with a posterior notch, vulva with a single pair of receptacula seminis only (besides the unpaired medial structure) (fig. 21) (unique in the European species). (= *T. fuerteventurensis*). Not in Central and Northern Europe . . . .<u>nitens</u>

- ♂: Paracymbium apically without a notch but – usually – convex (fig. 38), rarely straight or prolaterally elongated (*obtusa*, fig. 51) or slightly concave (in *nigrita* fig. 47). ♀: No large cheliceral tooth in this position, genital lobe similar or different, vulva usually with two pairs of receptacula seminis or with outgrowths (figs. 36, 42). 6

6(5) Sternum bicoloured, brown and medially distinctly yellow (fig. 30). ♀: Genital lobe distinctly converging posteriorly, posterior margin usually concave (fig. 35), rarely straight, vulva (fig. 36): The large POSTERIOR receptacula seminis directed laterally. .7

- Sternum unicoloured, light to dark brown, sometimes slightly darkened laterally (but see fig. 54, a rare colour form of *T. intermedia*). ♀: Genital lobe rarely distinctly converging posteriorly (in some specimens of *T. dearmata*, no. 11), vulva (e.g. figs. 53, 68) different; in *T. dearmata* (fig. 73) a SMALL OUTGROWTH of the receptacula seminis is directed laterally, in *montana* and *corsica* the ANTERIOR receptacula are directed laterally (figs. 42, 46) 8

7(6) Yellow band of the sternum usually (!) distinctly widened anteriorly (fig. 30). ♂: Body length most often 4-8 mm, great cheliceral apophysis widened or – usually – even divided apically (fig. 31), dorsal aspect of cymbium, conductor and embolus as in fig. 32. ♀: Body length most often 6-10 mm; the shape of the genital lobe may be quite similar to *pinicola* . . . . <u>*extensa*</u>

- Yellow band of the sternum very narrow (fig. 30: Dotted line), ♂: Body length most often 4.5-5 mm, great cheliceral apophysis POINTED APICALLY (arrow in fig. 33) (as in *striata*), dorsal aspect of cymbium, conductor and embolus as in fig. 34. ♀: Body length usually 5-6 mm; genital lobe/vulva as in figs. 35-36 . . . . <u>*pinicola*</u>

8(6) ♂: Embolus distally DISTINCTLY s-shaped, and distally partly free (figs. 39-39b). (Paracymbium apically convex, fig. 38). Chelicerae anteriorly-distally with a well developed hump (x in fig. 37). ♀: Basal cheliceral articles with a retrofrontal hump (short arrows in figs. 40-41), fangs with a strong and tooth-like dorsal-basal OUTGROWTH (fig. 40), genital lobe wider than long, sides parallel, vulva as in fig. 42, anterior receptacula seminis directed laterally . . . . <u>*montana*</u>

- ♂: Pedipalpusus (unknown in *corsica*!): Embolus not distinctly s-shaped (bent in *dearmata*, fig. 71), apically strongly bent in *dearmata*, no. 11, fig. 71. (Tip of the conductor pointing retrolaterally in *intermedia* (fig. 63) in contrast to *montana* (the embolus) and *dearmata* (fig. 71)). (Paracymbium apically convex or different, figs. 38, 47). Chelicerae anteriorly-distally without a distinct hump (a TINY hump may exist in *T. dearmata*). ♀: Basal cheliceral article without a hump in this position, fangs without such a strong outgrowth (a smaller hump may exist in *nigrita*, fig. 48, no.10), genital lobe variable, receptacula seminis directed laterally only in *T. corsica* (see no. 9) 9

9(8) ♂ unknown. ♀: Genital lobe with a wide plate, vulva (fig. 46) with the anterior receptacula seminis similar to *T. montana*; very long opisthosoma and chelicerae as in figs. 43-45. See above. (Endemic of Corsica?) . . . . <u>*corsica*</u>

- Different genital structures (*) 10

10(9) ♂: Paracymbium widest apically and slightly concave, fairly protruding prolaterally (fig. 47). Most distal parts of the Embolus (figs. 47a-b) hidden by the conductor which is truncated and frequently partly (distally) strongly pigmented (**, chelicerae with a straight guiding tooth (fig. 47c). ♀: Genital lobe slightly wider than long (fig. 49). Anterior margin of the chelicerae near the fang with a SMALL/SLENDER TOOTH (x in fig. 48). Vulva: Fig. 49a) Larger and usually stronger pigmented spiders, body length usually 6-11 (♀) mm . . . .<u>*nigrita*</u>

- ♂: Apical margin of the paracymbium MORE PROTRUDING PROlaterally (arrow in fig. 51), conductor similar to a birds head (fig. 51a). ♀: Genital lobe distinctly wider than long (fig. 52), vulva: Fig. 53. No cheliceral tooth in this position. Opisthosoma (especially in the female) most often relatively stout and raised dorsally (in some specimens of, e. g., *dearmata* and *nigrita* similar!). Smaller spiders, body length usually 4-6.5 (♀) mm . . . . <u>*obtusa*</u>

- ♂: Apical margin of the paracymbium (medially) convex (fig. 61), conductor different. ♀: genital structures: Figs. 65-70, 72-73. No cheliceral tooth as in *nigrita* 11

11(10) ♂: Tip of the embolus shorter than the conductor and distally hidden by it, embolus distally straight (figs. 63-64). The conductor bears a tooth-like hook which is tiny and indistinct; chelicerae in the retrolateral aspect showing a large "guiding tooth" which is distinctly BENT (figs. 56-57). ♀: Chelicerae fig. 60, genital lobe distinctly wider than long (figs. 56-57), vulva (figs. 68-70) with two pairs of receptacula seminis in a longitudinal dorsal and ventral position; the medial structure has a globular shape. Smaller spiders, body length ♂ 4-5, ♀ 5.5-7.7 mm. Hungary and Southern Europe . . *intermedia*

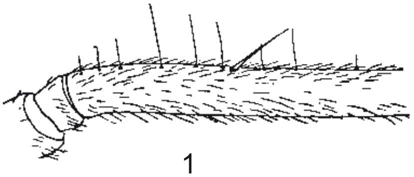
- ♂: Tip of the longer embolus FREE, embolus distally distinctly bent (figs. 71-71a) and pointing prolaterally; no large cheliceral "guiding tooth" in this position. ♀: Genital lobe about as wide as long (fig. 72), vulva (fig. 73) with a pair of receptacula seminis which bear a posterior-lateral outgrowth; the medial structure of the vulva has a longitudinal shape. Body length ♂ 6-8, ♀ 8-10 mm. Central Europe, too . . . . *dearmata*

(*) The prosomal colour may help to distinguish the following species:
The cephalic part is darkened grey in contrast to the yellow-brown thoracal part in almost all specimens of *obtusa* and *intermedia* (fig. 50), it is rarely so in *nigrita*, and there is no difference of the cephalic and the thoracal part in *dearmata*.

(**) Drawings of the distal part of embolus and conductor of *nigrita* by certain authors (TULLGREN, WIEHLE) are quite misleading.

Remarks on Eocene Tetragnathidae in Baltic amber:

The 5 tetragnathid genera which are known in Baltic amber are quite different from today's spiders; 4 genera are extinct, only the genus *Meta* s. l. (the extinct *Praetermeta* WUNDERLICH 2004) existed already and survived, see WUNDERLICH (2008: 91ff). Members of the derived subfamily Tetragnathinae – in which powerful strongly toothed and diverging chelicerae exist, femoral trichobothria as well, and a peculiar copulatory behaviour – are absent in Baltic amber in contrast to Miocene spiders in Dominican amber – see WUNDERLICH (1988) –, to Europe, as well as worldwide today.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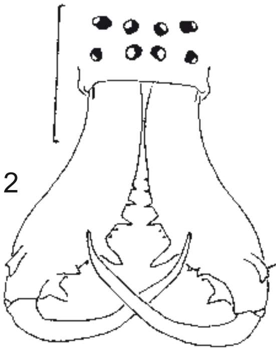
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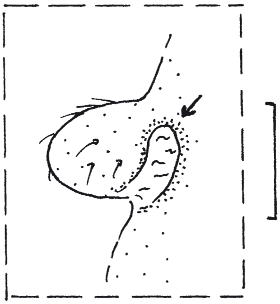
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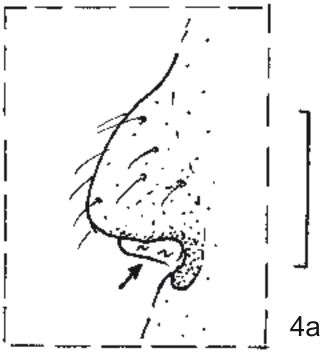
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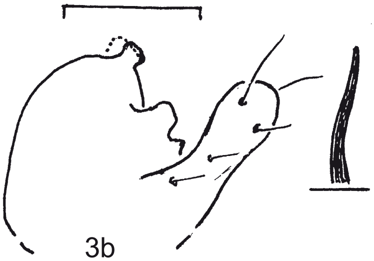
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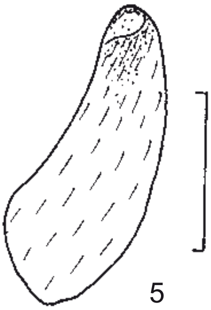
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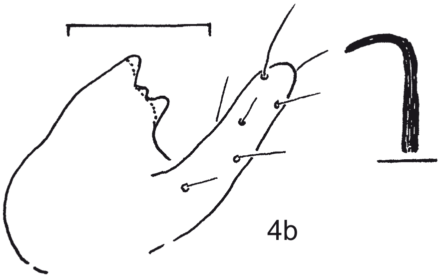
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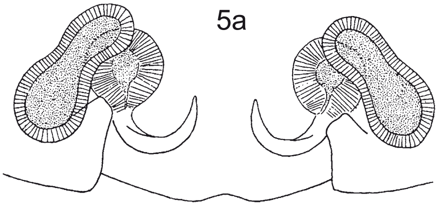
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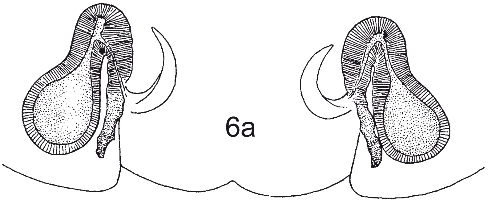
Fig. 1) Lateral aspect of a femur of *Tetragnatha* sp., showing the erect trichobothria (besides normal hairs and a bristle). Taken from LOCKET & MILLIDGE (1953);

fig. 2) *Tetragnatha* sp., ♂, anterior aspect of the prosoma. Note the large, strongly diverging and toothed basal cheliceral articles and the large “great apophysis” (A). Taken from LOCKET & MILLIDGE (1953);

fig. 3a-b: *Meta* (*Meta*) *menardi* (LATREIELLE 1804); 3a) ♀, lateral aspect of the genital area. Note the large skinny/white lateral field (arrow); 3b) ♂, paracymbium of the right pedipalpus, retrolateral aspect, and distal part of the embolus, ventral aspect (on the right). Scale bars 0.5 mm;

fig. 4a-b: *Meta* (*Meta*) *bourneti* SIMON 1922; 4a) ♀ lateral aspect of the genital area. Note the small skinny/white lateral field (arow); 4b) ♂, right pedipalpus: Paracymbium with its variability (dotted) and distal part of the embolus, ventral aspect (on the right). Scale bars 0.5;

fig. 5) *Meta* (*Metellina*) *mengei* (BLACKWALL 1869), ♂, conductor of the right pedipalpus, widest aspect. Scale bar 0.2; 5a) ♀, vulva; taken from LOCKET & MILLIDGE & MERRETT (1974) like fig. 6a).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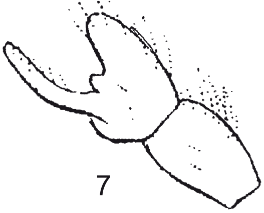
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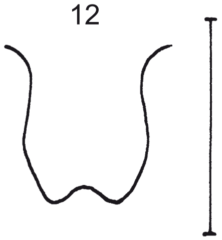
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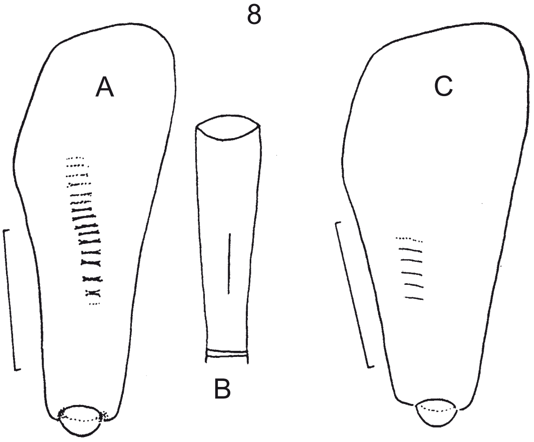

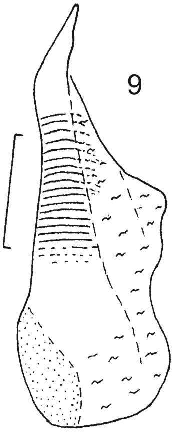
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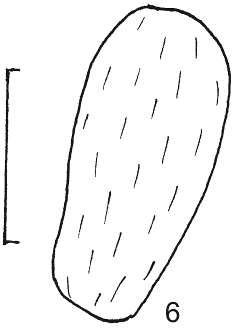
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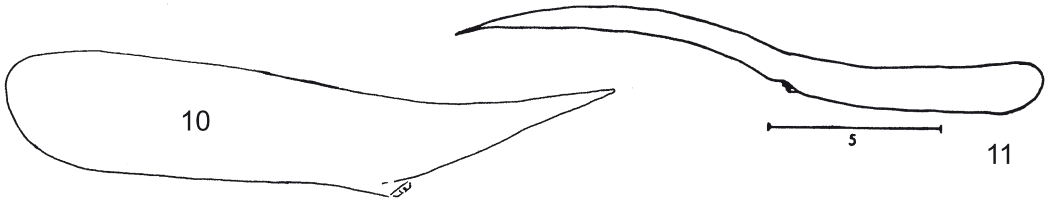

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fig. 6) *Meta* (*Metellina*) *segmentata* (CLERCK 1757), ♂, conductor of the right pedipalpus, widest aspect. Scale bar 0.2; 6a) ♀, vulva;

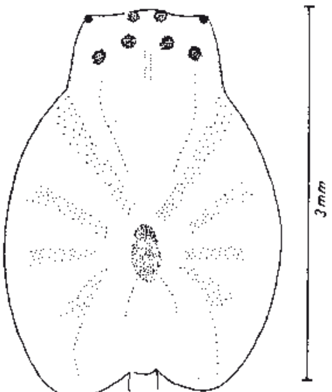
fig. 7) *Meta* (*Metellina*) *antrorum* SIMON 1907), ♂, retrolateral aspect of the left pedipalpus. Taken from SIMON (1907);

figs. 8 A-C: *Meta* (*Stridulameta*) *stridulans* WUNDERLICH 1987): A-B: ♂, retrolateral aspect of the right chelicera with stridulatory files, and pedipalpal femur with the prolateral stridulatory ledge; C: ♀, retrolateral aspect of the right chelicera with stridulatory files. Scale bar 0.5;

fig. 9) *Meta* (*Merianmeta*) *merianae* (SCOPOLI 1763), ♂, dorsal aspect of the right dorsal paracymbial branch which bears – stridulatory? – files. Scale bar 0.2;

fig. 10) *Tetragnatha reimoseri* (ROSCA 1939), ♀, outline of the opisthosoma, lateral aspect. Note the tail-shaped elongation beyond the spinnerets;

figs. 11-12: *Tetragnatha isidis* (SIMON 1880), ♀; 11) lateral aspect of the opisthosoma; note the extremely long tail-shaped elongation beyond the spinnerets; 12) genital lobe. Scale bars in mm. Taken from HERNANDEZ & FERRANDEZ (1985).



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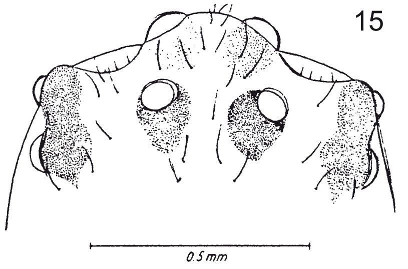

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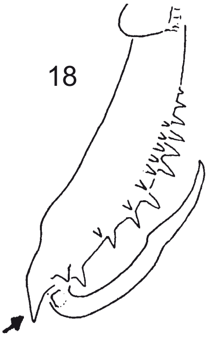

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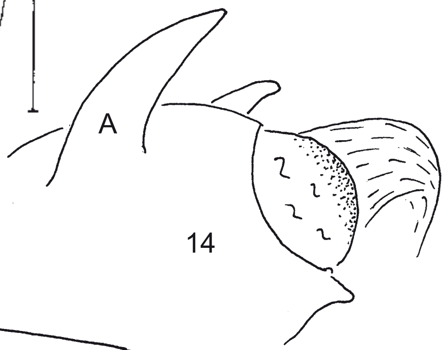

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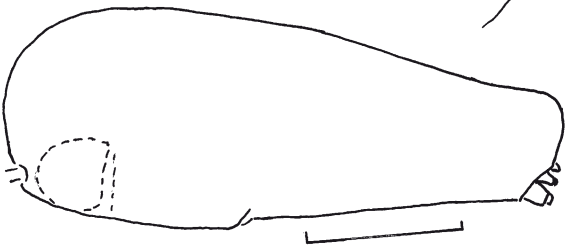

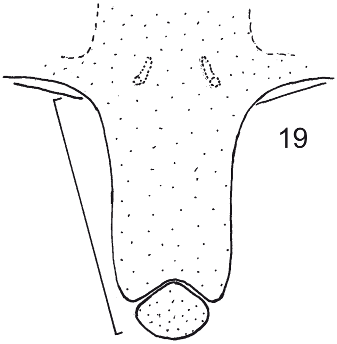

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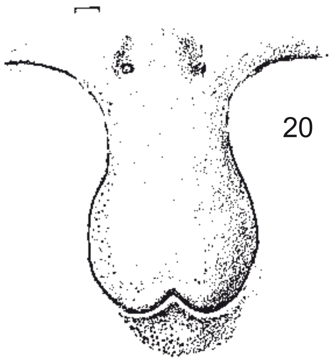

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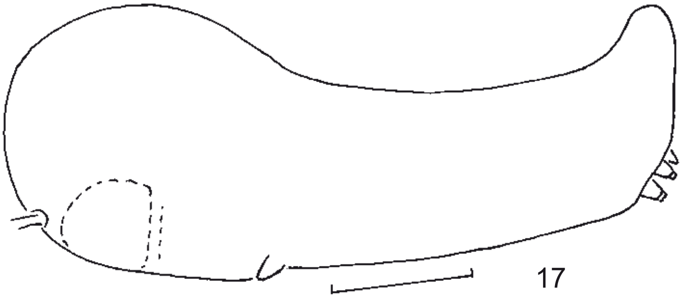

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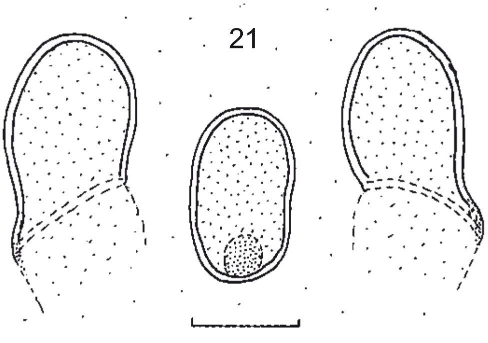
figs. 13-14: *Tetragnatha striata* L. KOCH 1862; 13) ♂♀, dorsal aspect of the prosoma; 14) distal part of the right ♂-chelicera, retrolateral aspect; A = great apophysis which is pointed apically in this species as in *pinicola*. Fig. 13) is taken from WIEHLE (1963) as well as the figs. 35-37, 40, 42, 48-49a, 51a, 54a, 71, and 73;

fig. 15) *Tetragnatha obtusa* C. L. KOCH 1837, ♂♀, position of the eyes;

figs. 16-29: *Tetragnatha nitens* (AUDOUIN 1826); 16-17: ♀, outline of the opisthosoma, lateral aspect; 18) ♀, left chelicera from below; 19-20) ♀, genital lobe, variability; 21) ♀, dorsal aspect of the vulva; figs. 22-29: Male; 22) right chelicera from below; retrolateral aspect of the right chelicera; dorsal aspect of the right pedipalpus (Mallorca). Left of the arrow: shape of the embolus of a male from Crete; 25) distal part of the right para-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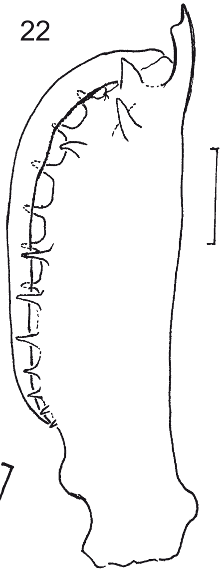
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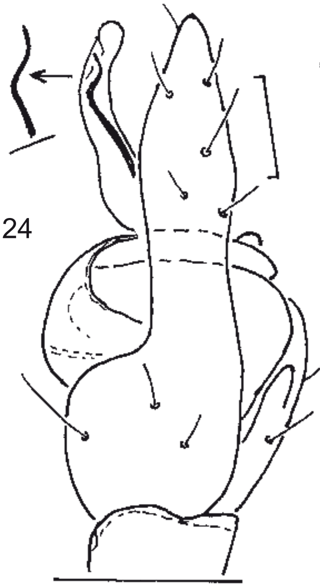
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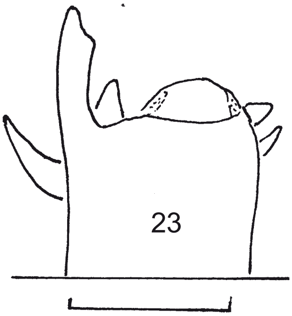
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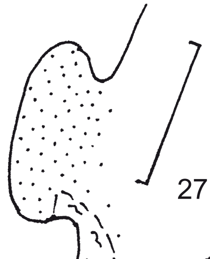
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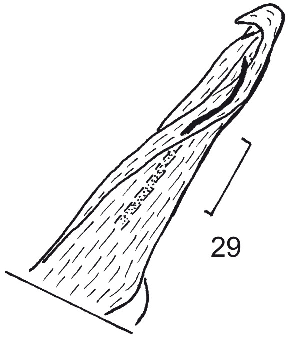
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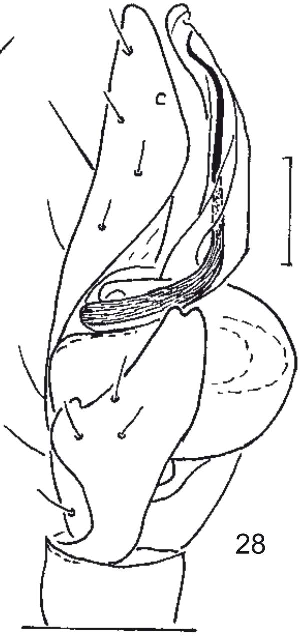
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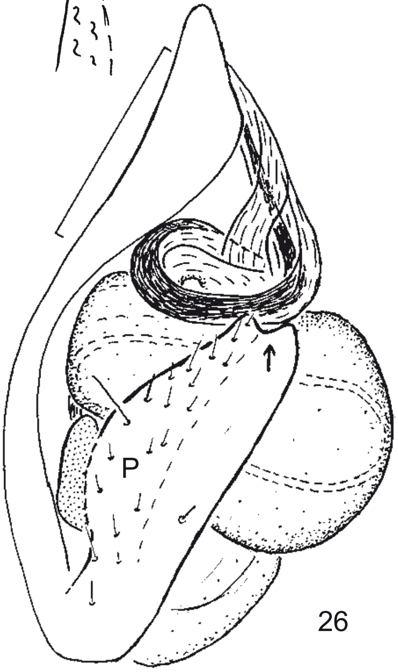

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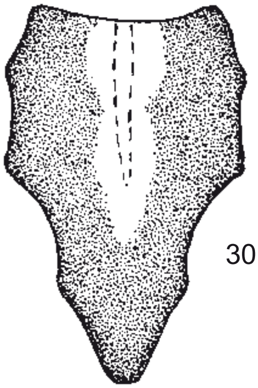
cymbium, retrolateral aspect; 26) retrolateral aspect of the right pedipalpus (P = paracymbium); 27) outgrowth of the right paracymbium, retrodorsal aspect; 28) retroventral aspect of the right pedipalpus; 29) ventral aspect of the distal part of the right embolus (black and dotted) and conductor. Scale bars 2.0 in figs. 16-17 and 19, 0.5 in figs. 22-23 and 26, 0.2 in figs. 21, 24 and 28, 0.1 in figs. 27 and 29. Figs. 18 and 20 are taken from LEVI (1961);



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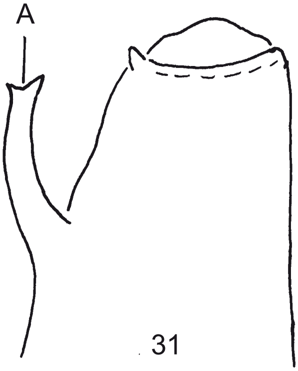

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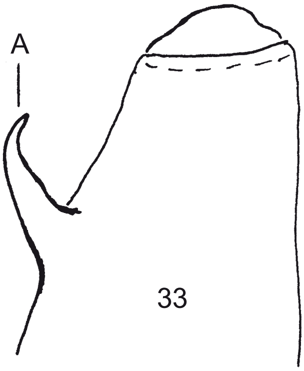

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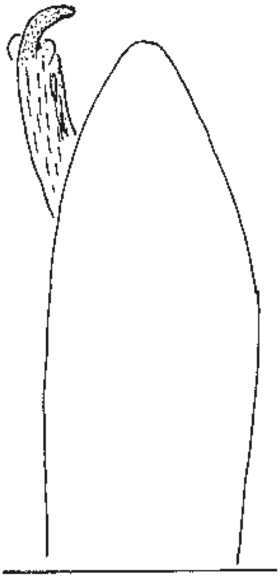

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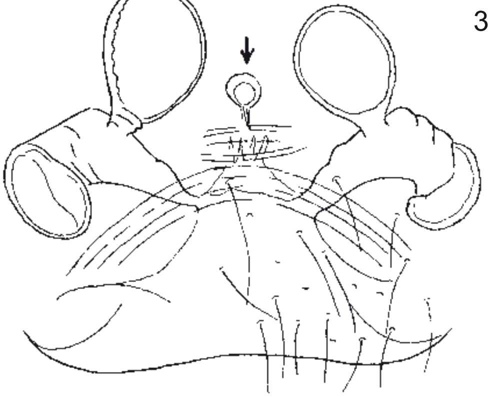

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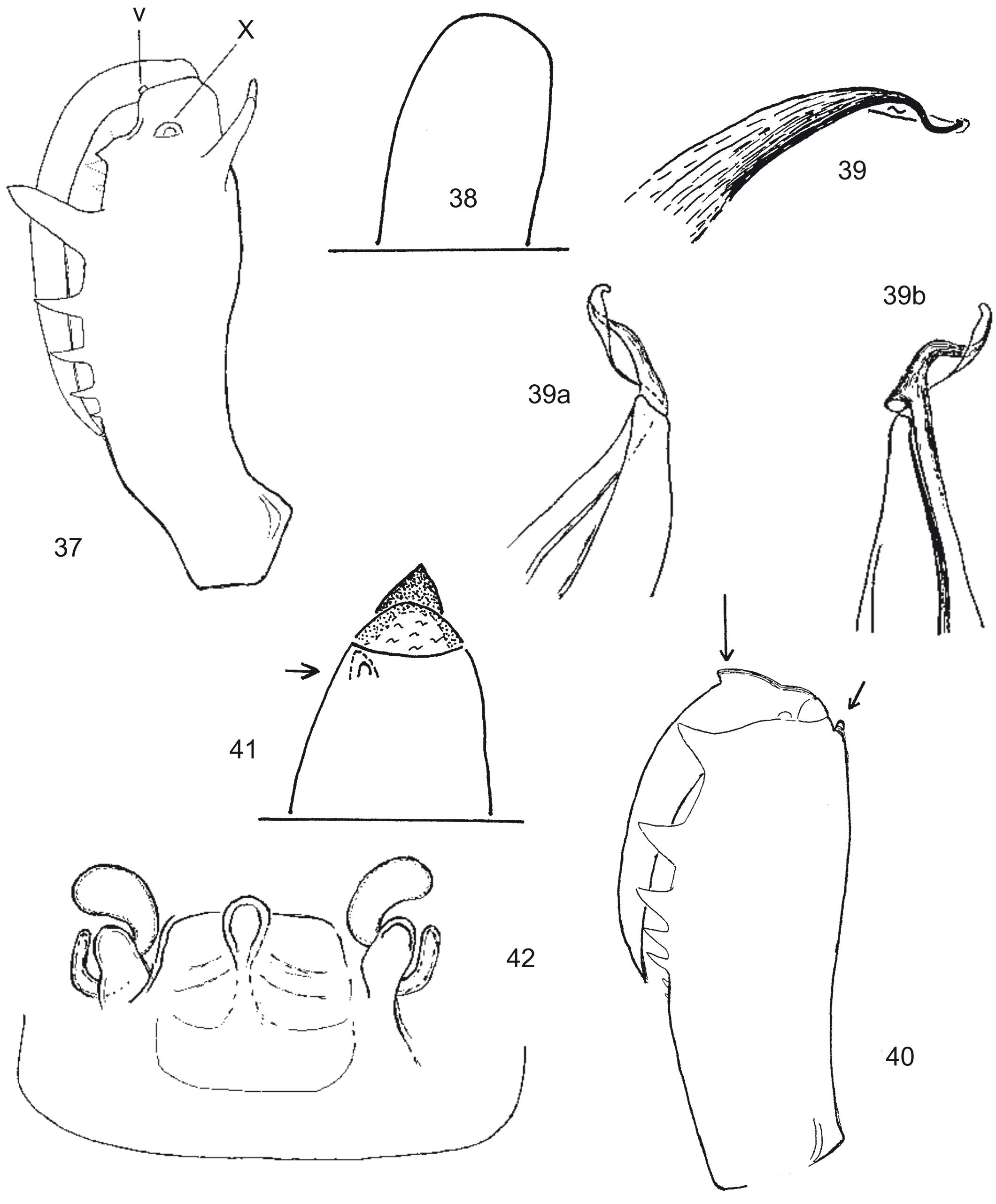
figs. 30) Tetragnatha *extensa* and *pinicola*, sternum. Note the yellow medial band which is wide in extensa but quite narrow in *pinicola* (dotted);

figs. 31-32: *Tetragnatha extensa* (LINNAEUS 1758); 31) ♂, retrolateral aspect of the right chelicera (A = great apophysis); 32) dorsal aspect of the distal part of the right cymbium with embolus and conductor;

figs. 33-36: *Tetragnatha pinicola* L. KOCH 1870; 33) ♂, retrolateral aspect of the right chelicera (A = great apophysis which is pointed as in *striata*); 34) dorsal aspect of the distal part of the right cymbium with embolus and conductor; 35-36) ♀, genital lobe and vulva;



figs. 37-42: *Tetragnatha montana* SIMON 1874, ♂ figs. 37-39, ♀ figs. 40-42; 37) dorsal aspect of the right chelicera; 38) distal part of the right paracymbium, retrolateral aspect. (Quite similar is this part in *T. dearmata, extensa, intermedia, montana* and *pinicola*); 39-39b) distal part of the right embolus, proventral aspect; 39a-b) two different aspects of the distal part of conductor and embolus; taken from TULLGREN (1947) (sub *T. solandri*); 40) dorsal aspect of the right chelicera; 41) distal part of the right chelicera, retrolateral aspect. Note the variable size of the retrofrontal outgrowth (arrow); 42) dorsal aspect of the vulva;

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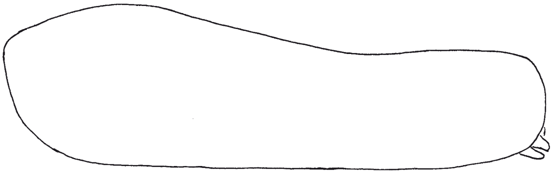

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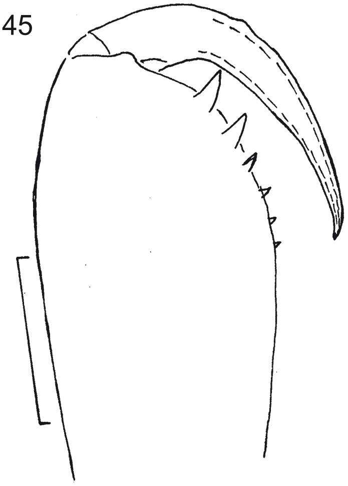

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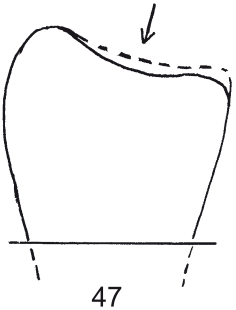

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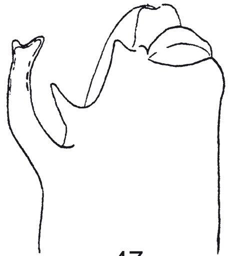

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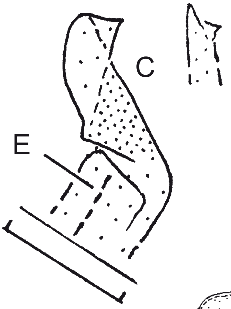

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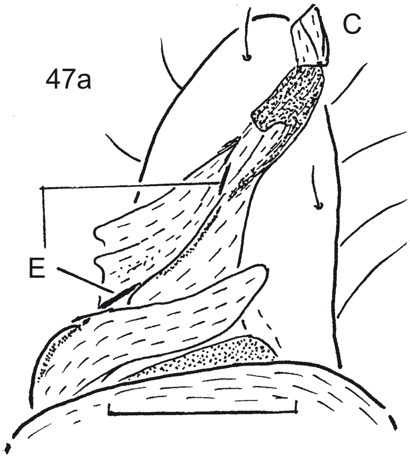

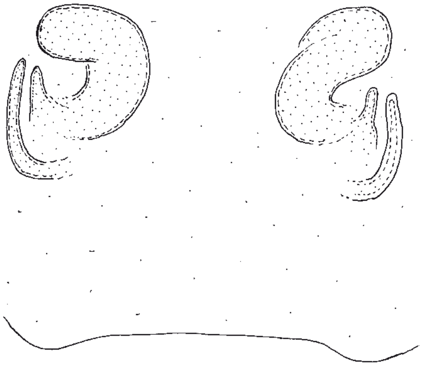

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figs. 43-46: *Tetragnatha corsica* SIMON 1929, ♀; fig. 43) lectotype (Mus. Paris), fig. 46) questionable holotype (Mus. Paris); 43) outline of the opisthosoma, lateral aspect; 44-45) right chelicera from above and below; 46) dorsal aspect of the vulva (the upaired medial structure is not drawn). Scale bars 1.0 in fig. 43, 0.5 in figs. 44-45, 0.2 in fig. 46;

figs. 47-49: *Tetragnatha nigrita* LENDL 1886; 47) ♂, distal part of the right paracymbium, retrolateral and slightly anterior aspect; 47a) distal part of the bulbus sclerites, ventral aspect; the distal part of the conductor may be light as in fig. 47b); 47b) distal

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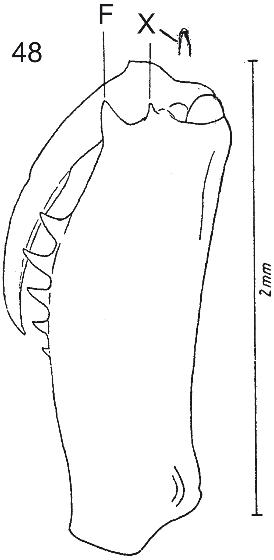

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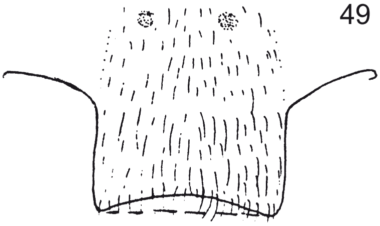

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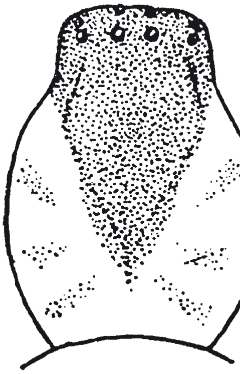

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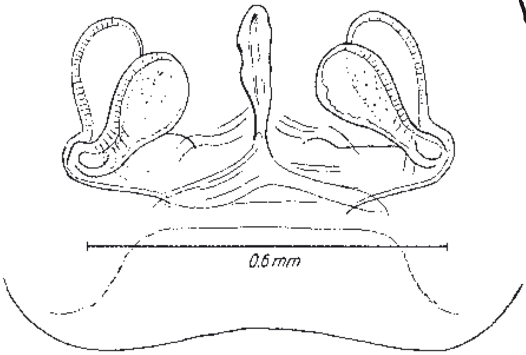

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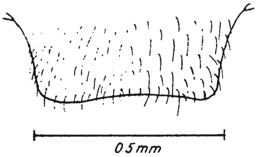

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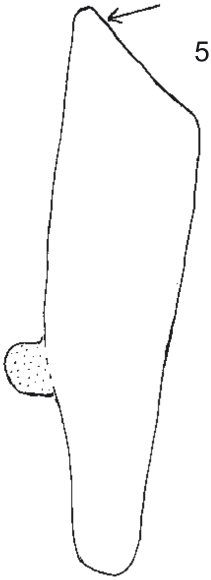
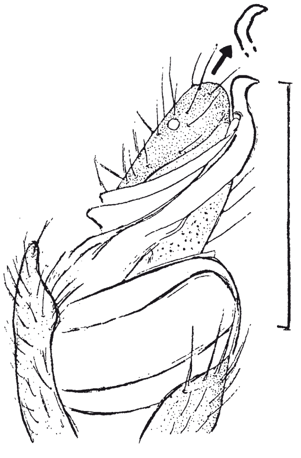


51a



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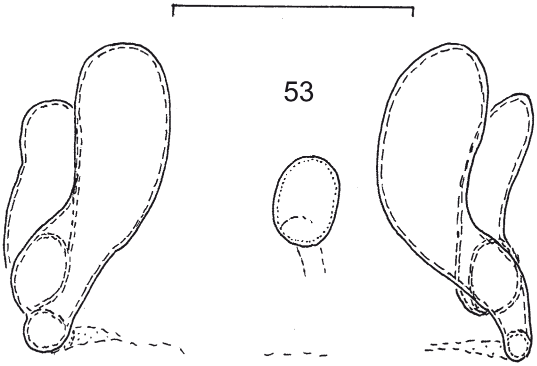
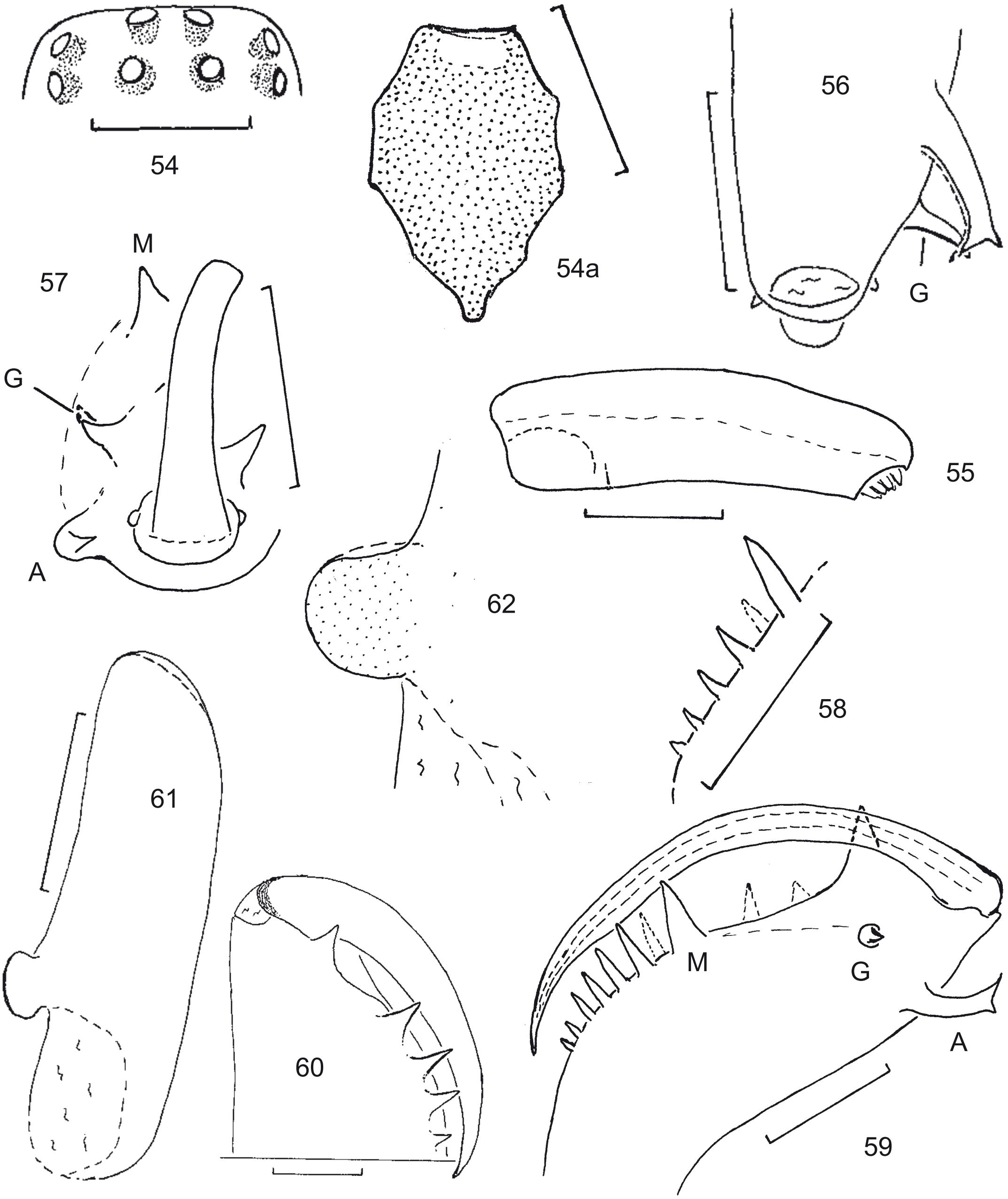
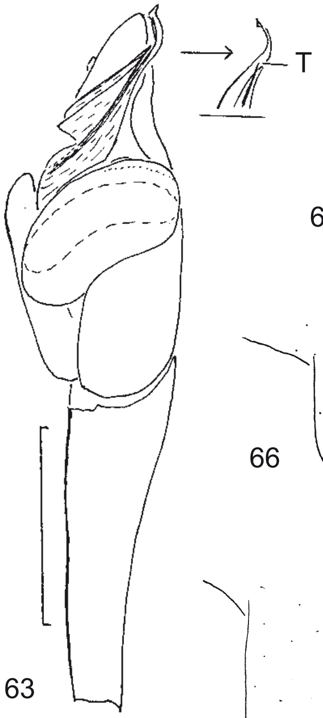


part of embolus and conductor, dorsal aspect; the tip on the right side in a retroventral position; 48) ♀, right chelicera from above; note the variable size of the apical tooth (x); 49), ♀ genital lobe, dotted: Variability; 49a) ♀, ventral aspect of the vulva; C = conductor, E = embolus. Scale bars in figs. 47a-b) 0.2;

figs. 50-53: *Tetragnatha obtusa* C. L. KOCH 1837; 50) ♂♀, dorsal aspect of the prosoma (taken from LOCKET & MILLIDGE (1953); 51) ♂, retrolateral aspect of the paracymbium of the right pedipalpus. Note the elongated tip (arrow); 51a) ♂, retroventral aspect of the distal part of the right pedipalpus; the arrow points to the variable distal part of the conductor; 52-53) ♀, genital lobe and dorsal aspect of the vulva. Scale bars 0.5 in figs. 51a), 52, 0.2 in fig. 53;



figs. 54-70: *Tetragnatha intermedia* KULCZYNSKI 1891; 54) ♂♀, position of the eyes; 54a) ♂♀ from Italy (Toscana), sternum, rare colour form. Note the anterior yellow field just behind the labium; 55) ♂ (Portugal) outline of the opisthosoma, lateral aspect. Note the border of a dark band (dotted) which exists in most specimens; 56) ♂, retrolateral aspect of the right chelicera (dotted: Variability of the great apophysis); 57) ♂, apical aspect of the right chelicera. Note the variability of the leading tooth (dotted) which usually is distinctly bent; 58) ♂ (Portugal), posterior aspect of the right chelicera: Main tooth and only 4 small teeth in a more basal position; 59) ♂ (Sardinia), anterior aspect



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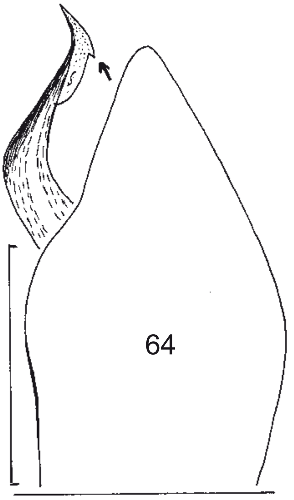

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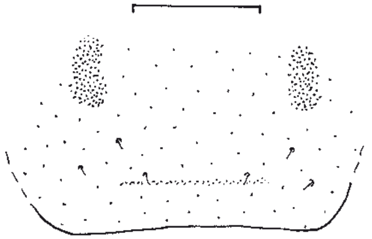

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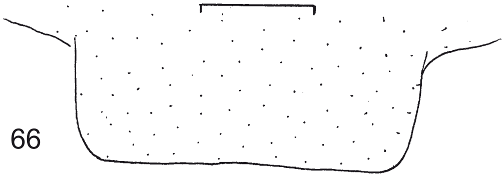

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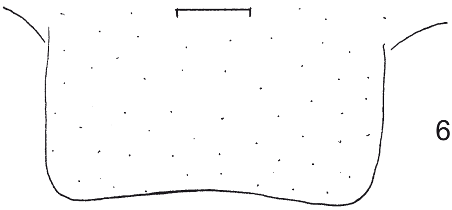

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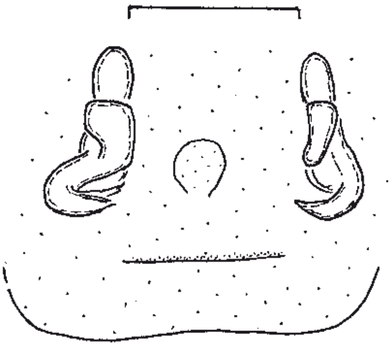

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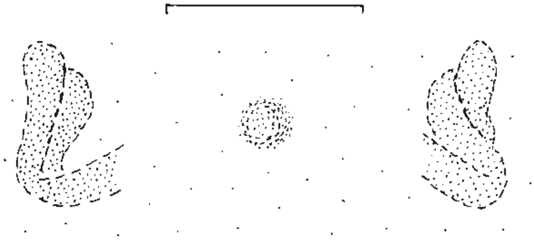

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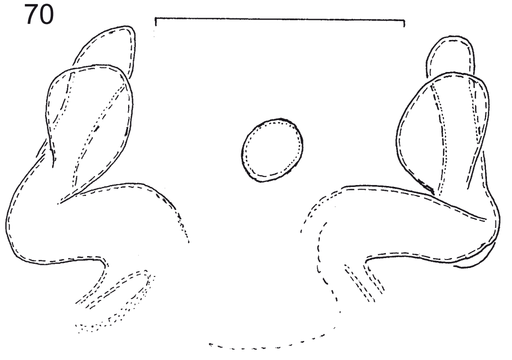
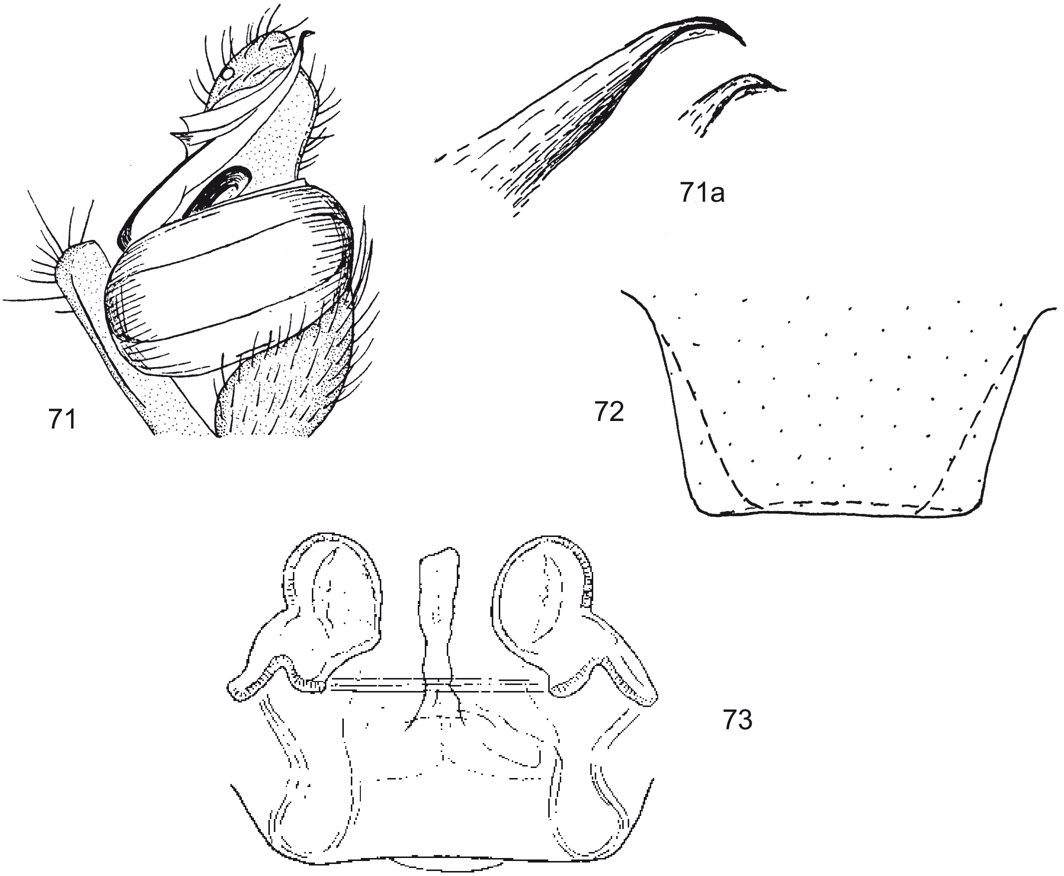


70

of the right chelicera. The great apophysis may be larger; 60) ♀, posterior aspect of the left chelicera; 61) ♂, retrodorsal aspect of the right paracymbium (dotted: variability; hairs are not drawn); 62) outgrowth of the right paracymbium and variability, shown in a slightly different position to fig. 61); 63) ♂, ventral aspect of the right pedipalpus. Arrow: Two slightly different positions of the distal part of embolus and conductor; 64) ♂, dorsal aspect of the right cymbium and conductor/embolus. The arrow points to the distal peak of the translucent conductor; 65-67) ♀ (Portugal, Sardinia, Spain), genital lobe; 68-70) ♀ (Portugal, Sardinia, Spain), dorsal, ventral and dorsal aspect of the vulva. A = great apophysis, L = leading tooth, M = main tooth, T = tip of the embolus. Scale bars 1.0 in fig. 5; 0.5 in figs. 54, 54a, 56-59 and 63; 0.2 in the remaining figs.;



figs. 71-73: *Tetragnatha dearmata* THORELL 1873; 71) ♂, distal part of the right pedipalpus, proventral aspect; 71a) ♂, distal part of the right embolus, proventral aspect, variability; 72) ♀, genital lobe, most frequent form; dotted: Variability; 73) ventral aspect of the vulva.

FAMILY THERIDIIDAE

Abstract: The splitting of the genus *Achaearanea* STRAND 1929 is discussed; the genera *Cryptachaea* ARCHER 1946 and *Parasteatoda* ARCHER 1946 occur in the Palaearctic but not *Achaearanea* (s. str.) which is restricted to Central and South America. *Robertus brachati* **n. sp**. (Araneae: Theridiidae) is described from Turkey (Anatolia). Some species of the genus *Theridion* WALCKENAER 1805 are described or revised, and compared with species which were previously described: *T. cyprusense* **n. sp**. from Cyprus, as well as species of the *Theridion melanurum* species-group s. str.: *bosniense* **n. sp**. from Bosnia (Yugoslavia), *cairoense* **n**. **sp**. from Egypt, *helena* **n. sp**. from Greece, as well as *harmsi* **n. sp**. and *malagaense* **n. sp**. from SW-Europe (Spain/Portugal/France); the relationships of some questional species are discussed. The monotypic genus *Grancanaridion* **n. gen**. from the Canary Islands is described, *Theridion grancanariense* WUNDERLICH 1987 is transferred to *Grancanaridion* (**n. comb**.); the monotypic genus *Ruborridion* **n. gen**. is described, the mediterranean *Theridion musivum* SIMON 1873 is transferred to *Ruborridion* (**n. comb**.). The relationships of some European species of the genera *Lasaeola* (s. l., and s. str.) as well as *Dipoenata* are discussed; *Dipoenata* is excluded from the European fauna (the European species – e.g., *longitarsis, testaceomarginata* – are regarded as members of *Lasaeola* s. l.), *Lasaeola algarvensis* **n. sp**. and *L. minutissima* **n. sp**. are described from Portugal. A revised key to the European theridiid genera and notes on the synonymy are given. The non-correlation of the length of the embolus and the length of the female copulatory ducts in the *melanurum* species-group is shortly discussed. The occurrence of a “mating plug” – existing in the *Theridion varians* species-group, but apparently rare in the *T. melanurum*-group – is regarded as probably of taxonomical value in certain spider taxa.

Note: I thank K. H. HARMS and P. POOT for leaving some interesting specimens for my study more than twenty years ago. Sorry for my belated completed investigations.

Several genera of the diverse family Theridiidae in Europe have to be revised in the future, examples are *Euryopis*, *Lasaeola* and *Theridion* s. l., and surely still not all of the European species are described. The European genera have recently been treated by the present author in 2008, new taxa and findings are added in this paper.

Notes on the list of European theridiid genera in addition to WUNDERLICH (2008: 375-377):

Achaearanea s. str.: The genus is absent from Europe if *Parasteatoda* ARCHER 1947 is regarded as a genus of its own – see YOSHIDA (2008) –, and not as a subgenus of *Achaearanea*, see below (*Achaearanea*) and WUNDERLICH (2008: 383).

Anatolidion WUNDERLICH 2008: The type species of this monotypic genus has turned out to be a junior synonym of *Theridion gentile* SIMON 1881 (= *T. crinigerum* SIMON 1881), see KNOFLACH et al. (2009: 229), epigyne fig. 96. This species and genus has a wide – circummediterranean – distribution. The genus is apparently most related to *Neottiura* in which the clypeus is ventrally protruding and the genital structures are different.

Cryptachaea: has to add to the European fauna, see below (*Achaearanea*); I do not want to exclude that it is synonym with *Parasteatoda*, see below (*Achaearanea*).

Dipoenata WUNDERLICH 1988 is excluded from the European fauna.

Grancanaridion **n. gen**. (type species *Theridion grancarariense* WUNDERLICH 1987): This monotypic genus is added in this paper.

Keijia (praeocc.) has to be replaced by *Platnickina* KOCAK & KEMAL 2008.

Melos O. PICKARD-CAMBRIDGE 1900 – with the single known enigmatic species *Melos bicolor* – is based on a subadult male from England (probably introduced); it has a strongly protruding clypeus, the posterior coxae spaced very wide, and a strongly developed cymbial claw. Its – even family – relationships are quite unsure. It was not listed by LEVI & LEVI (1962). The protruding clypeus is similar in the Southern European *Theridion nasutum* WUNDERLICH 1995 in which the colour of prosoma and legs is quite different.

Paidiscura ARCHER 1950: See the notes with *Ruborridion* n. gen. below.

Parasteatoda ARCHER 1947 – regarded as a subgenus of *Achaearanea* STRAND 1929 by WUNDERLICH (2008: 383) is regarded as a genus of its own by YOSHIDA 2008), and has to add to the European fauna; see above: *Achaearanea*.

Phycosoma O. PICKARD-CAMBRIDGE 1879 (= *Trigonobothrys* SIMON 1889) – including the European *inornatum* (O. PICKARD-CAMBRIDGE 1861) – is listed in the catalog of Araneae by PLATNICK; it has been regarded as part of *Lasaeola* s. l. by see WUNDERLICH (2008: 283f) although a median apophysis is absent in *Phycosoma*. Further European species of "*Dipoena*" may be members of *Phycosoma*, a revision is needed.

Platnickina: See *Keijia*.

Ruborridion **n. gen**. (type species *Theridion musivum* SIMON 1873): This monotypic genus is added in this paper. Photo 85.

Selimus (praeocc.) (= *Saaristoa* KOCAK & KEMAL 2008, praeocc., too) has to be replaced by *Seycellocesa* KOCAK & KEMAL 2008 (in Europe: *pulchellus* and *vittatus*).

Takayus YOSHIDA 2001: The relationships of *Theridion palmgreni* MARUSIK & TSELLARIUS 1986 are still unsure; the species has been regarded with hesitation as the single European member of *Takayus* by WUNDERLICH (2008: 396), and so the presence of the genus *Takayus* in Europe remains unsure.

Revised and completed list of the West-Palaearctic genera of the Theridiidae, and selected characters (see the previous list given by WUNDERLICH (2008:375))

There are at least 45 (probably even 50) genera – some are treated in a wide sense (s. l.) in this paper –; more than half of them (26) belong to the subfamily Theridiinae, and almost the same percentage is known from a single species only.

Remarks:

Certain corrections may be necessary because not all west-palaearctic taxa were studied by well preserved material.

Exclusively dwellers of green-houses are usually not listed; *Coleosoma* is an exception.

Four genera which names are underlined, are known as fossils in Baltic amber, too. The names of the two genera which are described for the first time in this paper are market with an asterix.

SUBFAMILIES:

AN = Anelosiminae, AR = Argyrodinae, AS = Asageninae, EN = Enoplognathinae, EP = Episinae, HA = Hadrotarsinae, PL = Pholcommatinae, PR = Phoroncidiinae, TH = Theridiinae;

"red." = reduced colulus. The colulus is also tiny in other taxa, mainly of the Hadrotarsinae, tibial bristles: Sequence of the dorsal bristles on tibia I-IV (*);

tm III, tm IV: Existence of a trichobothrium on metatarsus III and IV. The position of the trichobothria is usually in the basal half, but more distally in numerous Hadrotarsinae. In three genera their unusual position on I-II within the Theridiinae is noted.

chelical teeth: Number of teeth on the anterior/posterior margins of the cheliceral furrow. "+" means that usually more than a single tooth exist and a variability as well.

Genus	hairy colulus	sequence of tibial bristles	tm III/IV	anterior/posterior cheliceral teeth
TH *Achaeridion*	-	2/2/1/2	+/-	1/0
TH *Anatolidion*	-	2/2/1/2(1?)	+/-	1/0
TH *Arctachaea*	-	2/2/1/2	+/-	♀ 0/0, ♂ 0/1
AR *Argyrodes* s. l.	+	0/0/0/0	+/-	+/+
AS *Asagena*	+	2/2/1/1	+/+	+/-
TH *Canalidion*	-	2/2/1/2	+/-	2/0
PL *Carniella*	+	2/2/1/2	-/-	3/2
TH *Coleosoma*	-	2/2/1/2	+/-	1/0
HA *Coscinida*	- 2/2/1/1(2) **	+/-	0/0	
AS *Crustulina*	+	1/1/1/1	+(-)/-	1/0
TH *Cryptachaea*	-	2/2/1/2	+/-	0/0
HA *Dipoena*	+	2/2/1/2	+/-	0/0
TH *Echinotheridion*	-	2/2/1/2	+/-0-	1/0
EN *Enoplognatha*	+	2/2/1/2	+/-	+/1

Genus	hairy colulus	sequence of tibial bristles	tm III/IV	anterior/posterior cheliceral teeth
EP *Episinus*	+	2/2/1/2	+/-	0/0
HA *Euryopis* s. l.	+/-	variable	+/-(+)	0/0
TH *Grancanaridion**	-	2/2/1/2	+/-	0/0
TH *Heterotheridion*	-	2/2/1/2	+/-	1/0
AN *Kochiura*	+ (red.)	1/1/1/1	+/-	+/+
HA *Lasaeola*	+ (red.)	variable	+/-	0/0
AS *Latrodectus*	+	2/2/1/2	+/-	0/0
TH *Macaridion*	-	1/1/1/1	-/-	0-1/0
TH *Neottiura*	-	2/2/1/2	+/-	1-2/0
TH *Nesticodes*	-	2/2/1/2	+(0.6-0.7)/-	1-2/0
TH *Ohlertidion*	-	2/2/1/2	+/-	0/0
TH *Paidiscura*	-	2/2/1/1 or 2/1/1/1	-/-	0/0
TH *Parastetoda*	-	2/2/1/2	+/-	0/0
PL *Pholcomma*	-	2/2/1/2	+/-	+/+
HA *Phycosoma*	-	str. reduced	+/-	0/0
TH *Phylloneta*	-	2/2/1/2	+(0.25!)/-	0-1/0
TH *Platnickina*	-	1/1/1/1	+(0.9!)/-	0/0
EN *Robertus*	+	2/2/1/2	+/-	+/1-2
TH *Ruborridion**	-	2/1/1/1	-/-	1/0
TH *Rugathodes*	-	2/2/1/2	+/-	2-3/0
TH *Sardinidion*	-	2/2/1/1	+/-	1/0
AN *Seycellocesa*	+	1/1/1/1***	+/-	+/+
TH *Simitidion*	-	2/2/1/2	-/-	0/0
AS *Steatoda* s. l.	+	2/2/1/2	+/-	1-2/0-1
TH ?*Takayus*	-	2/2/1/2	+/-	1/0
PL *Theonoe*	+	2/2/1/2	-/-	3/2
TH *Theridion*	-	2/2/1/2	+/- ?	0-1/0
TH *Theridula*	-	2/2/1/2	+/-	1-2/0
TH *Thymoites*	-	2/2/1/2	+/-	1/0
TH *Tidarren*	-	2/2/1/2	+/-	0-2/0
PR *Ulesanis*	+	(tiny) 0/0/0/0	+/-	+/-

(*) The tibial bristles may be rubbed off. The sequence of the dorsal tibial bristles is 2/2/1/2 if tibia IV bears 2 dorsal bristles (very rarely 2/2/2/2).

** The sequence of the tibial bristles is variable in *Coscinida tibialis:* usually 2/2/1/1 but also 2/2/1/2.

*** The sequence of the dorsal tibial bristles is 1/1/1/1 in the European species of the subgenus *Clavilosimus* WUNDERLICH 2008 (*S. pulchellus* and *vittatus*) (formerly under *Anelosimus* and *Theridion*) but unknown to me in the nominate subgenus.

Revised and completed key to the extant West Palaearctic genera of the **subfamily Theridiinae**

Remarks:

(1) The numbers of the figures refer to the paper on the family Theridiidae by WUNDERLICH (2008) if not otherwise noted. Correction p. 381, no. 14 -: figs. nos. 606-608 have to replce by the nos. 610-612, no. 607 has to replace by figs. nos. 610-611, fig. no. 609 by no. 613.

(2) Exclusive dwellers of green-houses are not treated, with the exception of *Coleo soma* (key no. 1) which is relatively frequent.

(3) The genus *Coscinida* (Hadrotarsinae) possesses certain characters similar to the Theridiinae: A colulus is absent and the basal cheliceral articles are relatively large, see above, and the figs. 327-332.

(4) The sequence of the dorsal tibial bristles in the Theridiinae is basicly and most often 2/2/1/2 (not quite sure in *Anatolidion* and *Ruborridion*); in *Platnickina* (= *Keijia*) and *Macaridion* all tibiae bear only a single bristle (1/1/1/1). In *Paidiscura* (no. 6 below), *Ruborridion* and *Sardinidion* (nos. 10-11 below) the tibia IV bears also only a single bristle, the sequence is 2/2/1/1 or 2/1/1/1. Tibia III bears never 2 bristles. The bristles are most often thin, frequently almost hair-shaped (strong in *Coleosoma*), their position is more erect than in the hairs. Notes: (a) If tibia IV bears 2 bristles bear the tibiae I and II also 2 bristles. (b) Tibial bristles on I-I: If there exists only a single one its position is always in the basal half. So: If there exists a single bristle in the distal half, a second bristle of the basal half has existed, and has been broken off.

(5) A trichobothrium on metatarsus III exists in all genera except in *Macaridion* (no. 9) *Paidiscura, Ruborridion* and *Simitidion* (nos. 10–11). Its position is retrodorsally, most often in the second quarter of the article, frequently near the middle but 0.9-0.95 in *Platnickina* (=*Keijia)* (fig. 519).

(6) A dorsal – usually distal – opisthosomal outgrowth (e. g. figs. 484-486, 498, 532) exists – at least in the female sex – in the genera *Cryptachea* (*acoreensis*), *Achaeridion, Arctachaea, Echinotheridion, Neottiura* (part., small) and *Tidarren* (part.). See also fig. 97 (*Heterotheridion*).

(7) A distinctly bulging male epigaster (fig. 595) exists in *Theridion* and strongly related genera (probably the most important diagnostic character of the tribus Theridiini), but not in various genera like *Achaearanea* (s. l.) (e. g., *Cryptachaea, Parasteatoda), Canalidion, Echinotheridion* and *Neottiura*, the nos. 1-8.

(8) The key starts with a pantropical dweller of green-houses (*Coleosoma*), followed by a genus which has a unique shape of the opisthosoma (*Theridula*), by taxa in which the opisthosoma possesses a dorsal posterior hook (e. g. fig. 484) and by two genera (*Thymoites* and the questionable member of *Takayus*) each with a single rare species, nos. 7 and 8), which possess peculiar characters. The sequence of the dorsal tibial bristles is 2/2/1/2 in these taxa, and a trichobothrium on metatarsus III exists (like in *Theridion*, the most diverse genus, no. 19). In certain taxa of no. 9ff the number of tibial bristles is lower than 2/2/1/2, and a trichobothrium on metatarsus III may be absent.

1 Shape of the opisthosoma sexually dimorphic: oval to globular in the ♀ (fig. 504), cylindrical in the male, with a constriction, with a large and more or less sclerotised anterior ring which covers the epigaster and has a divided dorsal lobe (figs. 501-502). ♂-pedipalpus: Fig. 503, epigyne: Fig. 505. Pantropical; in green-houses *C. floridanum* . . . . *Coleosoma*

- Characters different, male opisthosoma without a sclerotised ring 2

2(1) Shape and colour of the opisthosoma quite variable, wider than long, black or bearing white spots in *T. gonygaster* (figs. 598-599, 601-602), with a pair of lateral lobes in about the middle and a dorsal-posterior hump (lobes and hump may be indistinct in the male). *T. gonygaster*: ♂-pedipalpus (fig. 603) small and simple, with a cork-screwed embolus, epigyne (fig. 600) with paired openings. – *T. aelleni* (Spain), and the cosmopolitical *gonygaster* and *opulenta* (Southern Europe) . . . . *Theridula*

- Characters different; a wide opisthosoma exists also in females of *Paidiscura* (no. 11) in which the humps have a more anterior position (figs. 547, 551) and in Macaridion (no. 9, fig. 582), in both genera the colour of the smaller body is lighter 3

3(2) The sexually dimorphic dwarf adult males possess only a single pedipalpus. ♀: Opisthosoma higher than long, a dorsal hump may exist IN THE MIDDLE; the epigyne is strongly sclerotized, and bears a scapus which stands widely out (e. g. figs. 507-508). Two genera, Southern Mediterranean, Canary Islands, Madaira 4

- Males with two pedipalpi and no sexual size dimorphism. ♀: Epigyne usually different, rarely similar (e. g. in *Neottiura*, nos. 6, 15). The ♀-opisthosoma is in some taxa very high, see nos. 6, 19, fig. 484; bearing a dorsal hump POSTERIORLY in: *Achaearanea* (part.), *Arctachea*, *Achaeridion*, and in *Neottiura* (e. g. *uncinata*, no. 6), figs. 484, 485, 496, 533) 5

4(3) ♂: Pedipalpus compact. ♀: Coxa IV without a spur, epigyne with a smaller scapus. *T. chevalieri* . . . . *Tidarren*

- ♂: Cymbium distinctly bilobed, bulbus with large projecting structures (fig. 509). ♀: Coxa in the West-palaearctic species with a basal-medial spur (fig. 506) and epigyne with a larger scapus fig. 507-508. *E. gibberosum* . . . . *Echinotheridion*

5(3) Opisthosoma (figs. 484, 485, 496, 532) with a dorsal-posterior hump at least in the male, high opisthosoma in the female 6

- Opisthosoma without a dorsal hump, highest in *Parasteatoda* (fig. 482, no. 19). (A dorsal hump may exist exeptionally in *Heterotheridion nigrovariegatum*, see fig. 97) . .7

6 (5) ♂: Fang (fig. 499) sexually dimorphic thickened in a unique way, pedipalpus: Fig. 500, epigyne: Fig. 497. Holarctic, Hungary. *A. nordica* . . . . *Arctachaea*

- ♂-pedipalpus (figs. 487-489) with a short and straight embolus, vulva: Fig. 490. *A. conigerum*. . . . . *Achaeridion*

- ♂-pedipalpus (fig. 532) with a very long and slender femur, ♀: Epigyne/vulva different. E. g. *N. uncinata*. See no. 15 . . . . <u>Neottiura</u> (min. part.)

- Characters different. Opisthosoma at least in the female with a hump in *blattea* (= *acoreensis*) and *dubitabilis* (Canary Islands, fig. 484a, ♂ uunknown), without a hump in *veruculata* and in the frequent *riparia* (= *saxatilis*). See no. 19 . . . . <u>Cryptachaea</u>

7(5) Male: Area directly behind the eye field slightly raised, short hairs in the field of the median eyes (fig. 604), pedipalpus: Fig. 606. ♀: Epigyne (figs. 607-608) strongly sclerotized and protruding posteriorly. Northern Europe. *T. belissimus*. . . . . <u>Thymoites</u>

- Area behind the eye field not raised, no hairy field in this position, copulatory organs different. 8

8(7) ♂-pedipalpus: Figs. 589-590, ♀: Epigyne (figs. 591-592) with a flat pit which has a strongly sclerotized posterior margin. Poland, NE- Europe; *palmgreni* . . . . . . ?<u>Takayus</u>

- Copulatory organs different. All tibiae bear only a single bristle in *Platnickinia* and *Macaridion* (no. 9) but 2 bristles at least on leg I in the remaining genera 9

9(8) (See the remark no. 8 above). Sequence of the dorsal tibial bristles 1/1/1/1, trichobothrium present on metatarsus III, its exceptional position on I-II is in 0.9-0.95 (fig. 519). ♂-pedipalpus (figs. 520-521) small, the embolus bears a wide and skinny seam. *P. tincta* and *nigropunctata*. (= *Keijia*). . . . . <u>Platnickina</u>

- Sequence of the dorsal tibial bristles 1/1/1/1, too, but trichobothrium absent on metatarsus III, and the position of the tiny trichobothria on I-II in ca. 0.3. Eyes unusually small and widely spaced (fig. 527). ♂-pedipalpus (figs. 530-531) small, the embolus bears a wide and skinny seam. The epigyne (fig. 529) bears a pair of small and widely spaced openings. Colour alive green, blanching in alcohol. Madeira, Canary Islands. *M. barretti*.. . . . .<u>Macaridion</u>

- Sequence of the dorsal tibial bristles 2/1/1/1, 2/2/1/1 or 2/2/1/2, metatarsal III trichobothrium absent or present, its position < 0.75, most often in the basal half. A small ♂-pedipalpus exists in *Rugathodes* (no. 13) and *Theridula* (no. 2).. 10

10(9) Trichobothrium absent on metatarsus III, sequence of the dorsal tibial bristles 2/2/1/1 or 2/1/1/1 (*Paidiscura* and *Ruborridion*) or 2/2/1/2 (*Simitidion*). Coxae IV widely spaced (fig. 88 in this paper) or close together (*Simitidion*, fig. 88) 11

- Trichobothrium present on metatarsus III, sequence of the tibial bristles 2/2/1/2* . .12

- Trichobothrium present on metatarsus III (position on I-II in ca. 0.6), sequence of the tibial bristles 2/2/1/1. ♂-pedipalpus (figs. 573-576) with a very long embolus. ♀: Epigynal pit longer than wide. *S. blackwalli* . . . . <u>Sardinidion</u>

11(10) Body length 1.5-2 (♀) mm, coxae IV spaced by more (!) than their diameter by the sternum (fig. 88 in this paper) (even when observed slightly from behind), sequence of the dorsal tibial bristles 2/2/1/1 or 2/1/1/1, labium almost triangular (fig. 95 in this paper), ♀-opisthosoma (figs. 547, 551) wider than long, in most species with a pair of lateral humps in the anterior half, ♂-opisthosoma oval. Embolus long, free visible, and in an almost circular position (figs. 550, 552). . . . . *Paidiscura*

- Body length, sternum and tibial bristles as in *Paidiscura* but labium wide (fig. 90 in this paper) in contrast to *Paidiscura* and *Simitidion* (fig. 95 in this paper). Genital structures: Figs. 93-94 in this paper. See the diagnosis and the relationships of this monotypis genus below. *R. musivum* (= *Theridion m.*). Photo 85. Southern Europe . . . . *Ruborridion* **n.gen**.

- Body length 2.3-3.6 (♀) mm, coxae IV spaced – frequently distinctly, and pointed – less than their diameter like in most other Theridiinae, sequence of the dorsal tibial bristles 2/2/1/2, labium almost triangular (fig. 95 in this paper), ♀-opisthosoma oval. Male: Chelicerae diverging and bulging basally (fig. 579), conductor extending beyond the tip of the cymbium (fig. 582), embolus only fairly long and bent, partly enclosed by the conductor. *S. lacuna* and *simile* . . . . *Simitidion*

12(10) Metatarsi with a long dorsal-basal bristle-shaped hair (fig. 491) which is larger on the posterior legs (it is longer than the metatarsal hairs and more erect). ♂-pedipalpus (figs. 492-495) with long tegular apophysis, conductor and embolus. Epigyne fig. 96. Mediterranean. *A. gentile* (SIMON 1881) (= *osmani* WUNDERLICH 2008). See *Neottiura* (no. 15) . . . . *Anatolidion*

- Metatarsal bristle-shaped hair absent, copulatory organs different 13

13(12) Anterior cheliceral margin with 2-3 teeth (one large tooth exists on the male's diverging articles, figs. 564-566). Paired tarsal claws smooth. ♀: Claw of the pedipalpus smooth, introducing ducts of the vulva partly glandular. (Position of the metatarsal trichobothria usually in 0.4-0.5). ♂-pedipalpus (figs. 567-568) with the small embolus and the conductor in a distal position . . . . *Rugathodes*

- Anterior cheliceral margin with 0-2 teeth (a smaller tooth and diverging articles exist in the male of *Phylloneta* (figs. 553, 556) (no. 14). Paired tarsal claws and claw of the ♀-pedipalpus with distinct teeth (at least a single large tooth) 14

14(13) The anterior margin of the cheliceral furrow bears 0-1 tooth. Position of the trichobothrium on metatarsus I-II in ca. 0.25. ♂: Chelicerae distinctly diverging (fig. 553, 59), pedipalpus (figs. 561, 557-558) with the femur distinctly bent, and with a long conductor. Epigynal pit distinctly wider than long. Opisthosomal patern typical as in fig. 554. *P. impressa and sisyphia* . . . . *Phylloneta*

- The anterior margin of the cheliceral furrow bears 2 teeth (fig. 605). Position of the trichobothrium on metatarsi I-II in ca. 0.3. ♂: Chelicerae not diverging, pedipalpus (figs. 610-612): Femur straight, cymbium with a basal inclination/depression, embolus in a DORSAL position (fig. 610-611), hidden in the ventral aspect. Epigyne (fig. 613) a sclerotized plate which bears a pair of sickle-shaped structures which are widely spaced (and a small circular opening). Scandinavia. *C. montanum*. . . . . *Canalidion*

- The anterior margin of the cheliceral furrow bears usually 0-1 tooth, see the tab. below. Position of the metatarsal I-II trichobothrium usually >0.3 or even >0.4. ♂-pedipalpus different, the epigyne may be similar 15

15(14) Clypeus ventrally strongly protruding in both sexes (fig.). The Opisthosoma bears a dorsal-distal hump in some species (fig. 532) (distinct in *uncinata*, see no. 6), ♂-pedipalpus (fig. 532): Femur long and slender, 0.6-1.3mm long, cymbium large and frequently elongated, bulbus large. See no. 6 and *Anatolidion* (no. 12) . . . . *Neottiura* (max. part.)

- Clypeus usually not protruding, protruding in *Theridion* (no. 19) *nasutum* WUNDERLICH from Sardinia. Femur of the ♂-pedipalpus only 0.3-0.6mm long. Cymbium – except in certain members of *Achaearanea* (no. 19) of normal size and not elongated. 16

16(15) Position of the trichobothrium on metatarsus I-II in 0.6-0.7. Epigyne (figs. 536-537): Position far in front of the epigastral furrow, strongly sclerotized and protruding; ♂-pedipalpus (figs. 534-535) with an almost straight embolus which bears a large basal outgrowth. *N. rufipes* . . . .*Nesticodes*

- Position of the metatarsal trichobothrium usually in the basal half, copulatory organs different. 17

17(16) ♂-pedipalpus (figs. 510-514): Tibia elongated in a slender part, cymbium distally with an outgrowth which bears numerous cusps. ♀: Epigyne (fig. 515) tiny, with a median path and a pair of small posterior pits which are strongly sclerotized (black). Opisthosoma: ♂ dorsally with black spots, ♀ most often uniformly white-green; see fig. 97). *H. nigrovariegatum* . . . . *Heterotheridion*

- ♂-pedipalpus (e. g. fig. 541, 597): Tibia and cymbium different; ♀: Epigyne larger, with a single pit which is usually large (e. g. fig. 545) 18

18(17) ♂: Epigaster distinctly bulging (as in fig. 595), pedipalpus (figs. 541-544): The distal part of the embolus bears tiny cusps. ♀: Epigyne: Fig. 545. E. g. *O. ohlerti* (= *Achaearanea umbratica*) in Central Europe . . . . *Ohlertidion*

- Embolus without cusps, male epigaster bulging (*Grancanaridion*, *Theridion*, fig. 595) or not (*Parasteatoda*) 19

19(18) Opisthosoma higher than long (figs. 482, 484), more or less vertical above the spinnerets (a dorsal-posterior hump may exist, see no. 6), usually with bent dorsal-lateral streaks at least in the female (fig. 483). ♂: Epigaster not bulging (like in the ♀, fig. 482), cymbium distally usually modified, e. g. inclined. See no. 6 and below (*Achaearanea*). E. g. *tepidariorum* . . . .*Parasteatoda*

- Shape of the opisthosoma more globular (female) or oval (most males), usually with a longitudinal dorsal "band" at least in the female (e. g. fig. 594). ♂: Epigaster strongly bulging (fig. 595); pedipalpus (fig. 597): Cymbium not modified, convex at the tip, median apophysis large and standing widely out in a retrolateral position, embolus thin, in a circular position. The most diverse genus. . . . . *Theridion*

- Opisthosoma/epigaster similar. ♂-pedipalpus (figs. 63-65 in this paper) with a thick embolus not in a circular position. Epigyne: Figs. 66-67. *G. grancanariensis* (= *Theridion g.*). Canary Islands . . . . <u>*Grancanaridion*</u> **n. gen**.

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* Probably 2/2/1/1 in *Anatolidion*, no. 12.

<u>***Achaearanea*** STRAND 1929 and related genera</u>

Achaearanea STRAND 1929 has recently been treated in a wide sense e. g. by WUNDERLICH (2008: 375, 380, 382, 383) including *Parasteatoda* ARCHER 1946 as a subgenus, but *Achaearanea* has been split again by YOSHIDA (2008), adding for the European fauna the genus *Cryptachaea* ARCHER 1946, in the sense of ARCHER (1950), as well as the genus *Parasteatoda*. This splitting may be justified or not: I found a “predetermined breaking point” (thanks to previous publications and a hint by PETER JÄGER) near the tip of the embolus (fig. 98) in *Parasteatoda simulans* and *P. tepidariorum* (SMF) as well as in *Cryptachaea riparia* (SMF 32179). Both taxa may probably to be regarded as subgenera.
The genus *Achaearanea* s. str. (existing in Central and South America) has to delate from the list of European and even Palaearctic spiders; the remaining genera (of *Achaearanea* in the sense of previous publications) include the following species in Europe:

(a) *Cryptachaea*: *blattea* URQUHART 1886 (= *acoreensis* (BERLAND 1932), *riparia* (BLACKWALL 1834) (= *saxatilis* C. L. KOCH), *verruculata* (URQUHART 1886) and probably *dubitabilis* (WUNDERLICH 1987) from the Canary Islands (male unknown; see WUNDERLICH (2008: 380) (key to the genera no. 6);

(b) *Parasteatoda*: *lunata* (CLERCK 1757), *simulans* (THORELL 1875), *tabulata* (LEVI 1980), and *tepidariorum* (C. L. KOCH 1841); see WUNDERLICH (2008: 382) (key no. 19) and below (*).

(c) *Ohlertidion* WUNDERLICH 2008: *ohlerti* (THORELL 1870) (= *umbraticum* L. KOCH 1872); see WUNDERLICH (2008: 382) (key no. 18).

Cryptachaea and *Parasteatoda* may be separated as follows:

1 Cymbium not elongated apically, embolus with the large conductor protruding the tip of the cymbium, the conductor bears numerous denticles, epigyne without posterior lobe, depression distinct. Opisthosomal hump absent. . . . . *Parasteatoda*

- Cymbium elongated apically, embolus and conductor not protruding the tip of the cymbium, epigyne usually with posterior lobe, depression indistinct. The opisthosoma may bear a hump at least in the female, see the key above . . . . *Cryptachaea*

(*) Remarks on the sibling species *Parasteatoda simulans* and *tepidariorum*:

After a study of hugh material and several papers I did not find (genital-) morphological differences between the two species in both sexes (although reported by some authors) besides weak differences in the scaly/denticled surface of the conductor which is apparently a bit stronger developed in *tepidariorum*.

According to MARTIN (1974) the index introduced by KULCZYNSKI:

$$\frac{\text{length of tibia I}}{\text{length of the prosoma}}$$

is different in these species. Also different is the length of the prosoma.
The following data are taken from MARTIN (1974) and slightly completed by the present author:

prosomal length (index)	♂	♀
simulans	1.0-1.22 (1.49-1.58)	1.32-1.5 (1.0-1.35)
tepidariorum	1.86-2.0 (1.62-1.7)	1.9-2.39 (1.38-1.56)

Notes: (1) The possible influence of allometric growth of tibia I regarding the index has been discussed by LOCKET and MARTIN as well. – (2) According to LOCKET (1975: 227) "...there are very few overlappings in the two different absolute sizes of the species." – (3) In the similar related species *P. lunata* (not rare) and *P. tabulata* (rare) the colour od the body is different – e g., the prosoma is usually darker – and the conductor is stronger bent – like a knee –; the bending is in a more basal position of the conductor.

***Robertus brachati* n. sp.** (fig. 1-2)

Derivatio nominis: With pleasure I name this species after one of its collectors, VOLKER BRACHAT in Geretsried.

Material: Southern Turkey, W Adana, road Mersin to Arslanskoy, Aladag, 830m; holotype ♂ BRACHAT leg. 6. V. 2002.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 1-2): Embolus very long, originating in the distal half of the bulbus, describing about one loop, guided partly by the retromargin of the cymbium; the terminal apophysis has a thin apex, the conductor possesses a long, straight, pointed and strongly sclerotized sclerite in a medial position.
Further characters: Body colour fairly pale, pedipalpal patella and tibia short.

Description (♂):
Measurements (in mm): Body length 3.2, prosoma: Length 1.5, width 1.3, width of the eye field 0.5, diameter of a posterior median eye 0.08; leg I: Femur 1.8, patella 0.6, tibia 1.55, metatarsus 1.35, tarsus 0.85, tibia II 1.1, tibia III 0.9, tibia IV 1.45.
Colour pale, prosoma and legs yellow brown, margin not darkened, opisthosoma yellow grey, dorsally bearing indistinct transverse bands.
Prosoma 1.15 times longer than wide, anteriorly abruptly narrow, most hairs are rubbed off, the remainings are quite short, eyes of medium size, field narrow, posterior row straight, posterior median eyes spaced by their diameter and slightly more from their lateral eyes, eyes of the anterior row slightly smaller than the posterior eyes, posterior median eyes black. The posterior stridulatory files are well developed. Basal cheliceral articles fairly large, not diverging, anterior margin of the cheliceral furrow with a larger tooth (0.015 mm long), posterior margin smooth, fangs slender, labium with a seam to the sternum, sternum pointed posteriorly, reaching less than the middle of the coxae IV. – Legs fairly long, order I/IV/II/III, hairs and comb of tarsus IV not well developed, tibial bristles long and thin, their sequence 2/2/1/1, metatarsus I-III bear a trichobothrium, its position on I is in 0.47. The long paired tarsal claws bear long teeth, the long unpaired claw is bent in a right angle. – Opisthosoma oval, bulging above the spinnerets, anteriorly-dorsally with a distinct sclerotized stridulatory margin; the colulus bears a pair of hairs. – Pedipalpus: See above.

Relationships: A very long embolus exists e.g. in *R. arundineti* (O. PICKARD-CAMBRIDGE 1871), too, in which the remaining structures of the bulbus are quite different. – The size and the position of the embolus are similar in several other Therididae, e.g. in *Enoplognatha hangzhouensis* ZHU 1998 in which a distinct dorsal opisthosomal pattern exists, and in *Pholcomma gibbum* (WESTRING 1851) which is much smaller and in which the male bears an opisthosomal scutum.

Distribution: Southern Turkey.

Theridion WALCKENAER s. str., sensu WUNDERLICH (2008)

The very diverse cosmopolitical genus *Theridion* s. l. has partly been split by several authors, recently by WUNDERLICH (2008); a revision of the numerous – mainly unnamed – tropical genera is still needed. Certain West-Palaearctic members of *Theridion* s. str. are still not or only insufficiently known; some examples are treated below.
The opening of the epigyne of certain Therididae (e.g.) is frequently filled with a hard and usually smooth secretion (the "mating plug", see below) after mating, which may prevent further successful copulations of the female. It is very frequent e.g. in *Theridion varians* (figs. 12-13; compare fig. 11) as well as in related species, and may irritate determinators.

New(er) European synonyms in *Theridion* (see PLATNICK's Catalog of Spiders):

antusi KASAL 1982 = *hemerobium* SIMON 1914 (= *berkeleyi* EMERTON 1925),
cretaense WUNDERLICH 1995 = *adrianopoli* DRENSKY 1915,
denisi WUNDERLICH 1987 = *hannoniae* DENIS 1944,
denticulatum (WALCKENAER 1802) (praeocc.) = *melanurum* HAHN 1831,
hauseri BRIGNOLI 1984 = *adrianopoli*,
hublei JOCQUE 1977 = *uhligi* MARTIN 1974,
kratochvili KOLOSVARY 1934 = *varians* HAHN 1833,
neglectum WIEHLE 1952 = *mystaceum* L. KOCH 1870,
pindi BRIGNOLI 1984 = *refugum* DRENSKY 1929,
pirini DRENSKY 1921 = *petraeum* L. KOCH 1872.

Selected new(er) combinations of *Theridion* species:

Theridion acoreense BERLAND 1932 = *Cryptachaea a*.,
Theridion aelleni HUBERT 1970 = *Theridula a*.,
Theridion barretti KULCZYNSKI 1891 = *Macaridion b*.,
Theridion blackwalli O. PICKARD-CAMBRIDGE 1870 = *Sardinidion b*.,
Theridion gentile SIMON 1881 = *Anatolidion g*.,
Theridion grancanariense WUNDERLICH 1987 = *Grancanaridion g*. (n. gen.),
Theridion musivum SIMON 1873 = *Ruborridion m*. (n. gen.).

Descriptions of two European species of Theridion:

Theridion cyprusense n. sp. (figs. 3-5)

Material: Greece, N-Cyprus, beach near Pollis, holotype ♂ JW leg. in V 2007; R26/AR/CJW; later most probably SMF.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 3-5): Median apophysis pointing obliquely ventrally-distally, embolus long and thin, describing a complete wide loop near the cymbial margin, the cymbium guides most parts of the embolus.

Description (♂):
Measurements (in mm): Body length 1.8, prosomal length and width 0.7; leg I: Femur 1.45, patella 0.35, tibia 1.2, metatarsus 1.2, tarsus 0.5, tibia II 0.65, tibia III 0.4 (tibia IV is lost).
Colour: Prosoma medium to dark grey, sternum almost black, legs yellow with dark rings and patches on all articles, opisthosoma dorsally and laterally mainly white, dorsally with two rows of dark patches, ventrally black, and 3 pairs of small white patches around spinnerets.
Prosoma as wide as long, fovea large, eyes fairly large, anteriors largest, posterior row straight, posterior medians spaced by their diameter. Clypeus long, ventral margin convex protruding, basal cheliceral articles long and slender, margins of the furow tothless, fangs slender, gnathocoxae long slender and converging above the labium which is connected by a seam to the sternum, coxae IV spaced by their diameter. – Legs (IV is lost): I distinctly longest, sequence of the long tibial bristles 2/2/1/2?, position of the metatarsal I trichobothrium in 0.33. – Opisthosoma oval, epigaster strongly protruding; hairs are rubbed off. – Pedipalpus (figs. 3-5): Patella as wide as long, bearing two long dorsal bristles, tibia very wide/high, bearing a dorsal trichobothrium and only indistinct short distal-marginal hairs. Structures of the bulbus: See above. The tip of the conductor is strongly sclerotized, thick and pointed prolaterally.

Relationships: According to the structures of the bulbus *T. zekharya* LEVY 2007 from Israel (figs. 6-7) is strongly related; in *zekharya* the median apophysis is pointing in the ventral direction and the distal structures of the bulbus – conductor, terminal apophysis – are different.

Distribution: Greece, Cyprus.

Theridion familiare O. PICKARD-CAMBRIDGE 1871 (figs. 8-10b)

Material: S-France, Provence, near Ste. Maxime, beaten from bushes, 2♂1♀ JW leg. at the end of V 2009; CJW.

Diagnosis: ♂-pedipalpus (fig. 8-10): Median apophysis small and not standing out, conductor large, its strongly sclerotized tip pointing retroapically. ♀: Epigyne (fig. 10a) with a wide pit and widely spaced introducing openings, vulva (fig. 10b) with large receptacula semines and very long ducts.

Further characters: Paracymbium in a marginal position, position of the metatarsal I trichobothrium in 0.31-0.4.

Description:
Measurements (♂/♀ in mm): Body length 2.3/3.0, prosomal length 1/1/1.0, prosomal width 0.9/0.85; leg I, ♂: Femur 1.25, patella 0.4, tibia 0.9, metatarsus 1.4, tarsus 0.6, tibia IV 0.8, ♀: Femur 1.25, patella 0.4, tibia 0.9, metatarsus 1.0, tarsus 0.5, tibia IV 0.65.
Colour quite variable: Prosoma mainly yellow brown, medially and laterally widelyblack, sternum medium grey, legs yellow grey brown, distinctly dark annulated, opisthosoma mainly black, ♀ dorsally with a light longitudinal band and white lateral bands; a white spot in front and above the spinnerets, and a dark ring around spinnerets, ♂ with a pair of white anterior spots, and its epigaster black.
Prosoma wide, fovea low in the ♀, well developed in the ♂, posterior eye row straight, posterior median eyes spaced by their diameter, anterior median eyes largest, posterior stridulatory files indistinct, clypeus long, its margin slightly convex, teeth of the cheliceral furrow absent, fangs long and slender, labium with a distinct seam to the sternum, which is fairly narrow posteriorly. – ♀-pedipalpus with ca. 8 long teeth. – Legs fairly long, order I/IV/II/III, bristles well developed and long, their sequence 2/2/1/2, metatarsal trichobothria existing on I-III, their position on I in 0.31-0.4. – Opisthosoma oval, dorsally scarcely covered with long hairs, ♂-epigaster strongly bulging. – ♂-pedipalpus (figs. 8-10, see also above): Patella slightly longer than wide, bearing some stronger long hairs, the tibia bears two trichobothria, the terminal apophysis is hidden in the ventral position but observable in the retrolateral position (fig. 9). – Epigyne (fig. 10a) only slightly protruding, well sclerotized, with a wide pit (0.21 mm) which has the lateral margins stronger sclerotized, introducing openings widely spaced, the translucent ducts are well, the receptacula seminis are fairly well visible. Vulva (fig. 10b) with long ducts and large receptacula seminis which are close together and possess fairly thin walls.

Relationships: In *Theridion dodonaeum* BRIGNOLI 1984 from Greece (♀ unknown) the median apophysis stands distinctly out and the conductor is smaller. In *T. nasutum* WUNDERLICH 1995 from Sardinia the ♂-clypeus is strongly protruding, the base of the embolus is wider, the shape of conductor and terminal apophysis are different, and the walls of the receptacula seminis are thicker. The distal structures of the bulbus are fairly similar in *T. ochreolum* LEVY & AMITAI 1982 from Israel.

Distribution: Palaearctic.

Contribution to the *Theridion melanurum* species-group s. str.

A further revision of this species-group is needed which should include much more material than included in this paper – e. g. from the SMF -; see *Theridion* sp. indet. 1, 2, and 3.

In this paper I regard the holarctic *Theridion melanurum* species-group – at least 8 species in the Western Palaearctic – in a strict sense. To my knowledge it has the following characters:

Conductor and terminal apophysis possess no strongly sclerotized tips – in contrast to (e.g.) *Theridion nasutum, familiare* (see above, figs. 8-9) or *cyprusense* n. sp. (figs. 4-5) -, the median apophysis is not standing out but most parts are hidden (fig. 33) (similar to certain other species-groups of *Theridion*), the conductor bears TINY DENTICLES (e.g. figs. 14-15), the ♂-clypeus bears a pair of bulges (arrows in fig. 59; indistinct in some males similar to some females), the chelicerae bear an anterior-distal tooth-like structure (fig. 32) (similar to other species-groups of *Theridion*), the epigyne (figs. 17, 45) is a large pit which is low anteriorly and bears a pair of small introducing openings. Opisthosomal colour: The "undulating" dorsal band usually has parallel sides, ventrally it is partly black, so the epigaster, the spinnerets are surrounded by a black ring, and in front of it exists a large white spot (fig. 22) (similar in certain other species-groups). – Sexual (mating) behaviour: Mating plugs – which may cover/close the epigynal pit after copulation (figs. 12-13) – are absent at least in *betteni* and *mystaceum* – see BRAUN (1964), KNOFLACH (1998: 600) – (as well as in the other members of this species-group? I never saw a mating plug in a member of this group) in contrast to the *varians*-group in which they were frequently observed. (Diagnosis and limits of the *varians*-group are wanted).

The body length of spiders of the *melanurum*-group is usually 2 (♂) up to 4.5 mm (♀), the length of the prosoma is usually 1.1-1.8mm, the position of the metatarsal I trichobothrium is usually in 0.3-0.4, the pedipalpal tibia bears usually 3 trichobothria.

The following *Theridion*-species are treated and figured in this paper besides some sp. indet. (♀):

bosniense (♂), *cairoense, harmsi* (with its probably conspecific female), *helena* (compare *T*. sp. indet. 2, fig. 56), and *malagaense* (♂; compare *T*. sp. indet. 3, fig. 57) are described for the first time, furthermore both sexes of *betteni, melanurum, musivivum,* and *mystaceum.* ♀ of *semitinctum* (♂ unknown): See directly below.

Remarks concerning the relationships of some – related or not-related – species:

According to the uniformly white ventral colour of the opisthosoma and the large anterior median eyes – see SIMON (1914:270) – *Theridion semitinctum* SIMON 1914 may be not a member of the *melanurum*-group. Its epigynal pit is transverse oval, see SIMON (1914: 270) but slightly longer than wide according to KNOFLACH et al. (2009: 256, figs. 76-77) who regard it to be a member of the *melanurum* species-group. Due to the unknown male the relationships of this species are unsure. See also *T*. sp. indet. 3 (fig. 57) at the end of the key.

According to the structures of the ♂-pedipalpus (median apophysis, conductor, embolus) *Theridion nasutum* WUNDERLICH 1995 from Sardinia is strongly related to the *melanurum* species-group and may even be regarded as an outsider within this speices-group. In contrast to *melanurum* and strongest related species the ♂ -clypeus is strongly concave in *nasutum* and distinctly protruding ventrally, see WUNDERLICH (1995: 383, fig. 56), a pair of humps is absent, parts of the conductor are stronger sclerotised, one part is sickle-shaped. – Remark: The female paratype of *nasutum* may be the member of another species: The position of the metatarsal trichobothria, the shape of the clypeus, and the opisthosomal colour are different from the male holotype; the vulva is similar to *T*. *mystaceum*. *Theridion familiare* is also related.

The conformation of the structures of the bulbus *Theridion accoense* LEVY 1985 from Israel may be the member of a separate species-group of *Theridion*.

T. musivum SIMON 1873: See *Ruborridion* n. gen. below.

Theridion musivivoides SCHMIDT & KRAUSE 1995 from the Cape Verde Islands. (♂ unknown, ♀ quite insufficiently described) appears to me – according to the figured structures of the vulva (shown ventrally, dorsally or more posteriorly?) – not belonging to the *melanurum*-group, too.

The probably still unnamed *Theridion* sp. indet. (1) sensu ROBERTS (1998: 301) from Central Europe: According to the drawings by ROBERTS I find no difference in the structures of the bulbus to *T. betteni*. The – really conspecific? – female has the epigynal pit distinctly smaller than *betteni*, the position of the receptacula semines is more in front of the pit, and the copulatory ducts are much longer/complicated.

Females of *Theridion* sp. indet from Southern Europe: See the end of the keys below.

No correlation/synevolution of the length of the embolus and the length of the female copulatory ducts?

During copulation the (tip of the) embolus is inserted into the introducing opening of the female epigyne in entelegyne spiders. Conspecific male and female copulatory organs are usually well corresponding with each other in the length of the (distal part of the) embolus and the female copulatory ducts. Examples are members of the genera *Latrodectus* and *Kochiura* of the Therididae and *Linyphia* of the Linyphidae. If a long embolus exists – “Einführungs-Embolus” sensu WIEHLE (1961) – it presses forward up to the receptacula semines and may anchor the partners during copulation.

In the *melanurum* species-group – similar to most Theridiidae – the embolus has a wide basal part (bulb) and a thin distal part which is fairly bent and stiff (e.g. fig. 14). In the *melanurum*-group the length of the thin part of the embolus is rather constant, about 0.15-0.2 mm (e.g. figs. 16, 53). Contrarily the length of the female copulatory ducts vary greatly, from less than 0.2 mm in *betteni* (fig. 18) up to 0.4 or even probably more than 0.6 mm in the questionable female of *harmsi* (fig. 31a), of *mystaceum* (fig. 55), *T. semitinctum*, and *T*. sp. indet. 3 (fig. 57). In the remaining females the duct’s length is intermediate (figs. 27a, 39, 49a) (the females of *bosniense* and *malagaense* are unknown, the vulva of *T*. sp. indet. 2 is unknown).

At least in *harmsi, malagaensis, mystaceum* and most probably in sp. indet. 3 the tip of the embolus apparently cannot reach the receptacula semines – a quite unusual situation in species which possess a long/thin embolus! One may ask:

(1) Which way may the sperm reach the receptacula – which mechanism transports the sperm? I did not find glands at the copulatory ducts.
(2) Why are these ducts so much longer than the thin parts of the emboli? Does an unknown evolutionary advantage exist?
(3) Does a longer mating time exist in those species which have longer or shorter ducts?

Conditions in a related species-group: In the *T. varians* species-group – in contrast to the members of the *T. melanurum* species-group – shorter and longer (thin parts of the) emboli and female copulatory ducts are well linked, e.g. short ducts and emboli in *pictum* and *varians*, long dicts and emboli in *melanostictum, pinastri* and *refugum*, see KNOFLACH (1998).

Key to the European/Mediterranean species of the *melanurum*-group:

Remarks: ROBERTS (1998: 299-301) treated *T. betteni, melanurum, mystaceum* and sp. indet. 1 (see above).
In the males the shape of the embolus is most important, in the females the shape of the epigynal pit, the thickness of the receptacula seminis, as well as length and shape of the copulatory ducts.
The colour of body and legs may be very variable, see *T. musivivum*.
The distribution may be helpful in the determination of some species: From the regions north of Italy only T. *betteni, melanurum* and *mystaceum* (most frequent) of the *melanurum* species-group are known.

♂♂:

1 Bulb of the embolus very long, with a distal outgrowth (arrow in fig. 28), thin part of the embolus also very long, strongly bent (figs. 30, 62). Iberian Peninsula and Mallorca, ?France 2

- Bulb and thin part of the embolus also very long (fig. 42) but thin part less bent. Macaronesian Islands (endemic) . . . . *musivivum*

- No such bulb of the embolus, embolus less bent, e. g., figs. 14, 16 3

2(1) Embolus (its distal part may be hidden by the conductor) bent in a right angle (fig. 30) . . . . *harmsi*

- Embolus bent continuously (fig. 62). . . . . *malagaensis*

3(1) Embolus as in figs. 23-25, pedipalpal tibia very long, terminal apophysis not bulging (arrow in fig. 19). Egypt . . . . *cairoense*

- Embolus as in figs. 19-21, pedipalpal tibia slender, too, distinctly longer than wide, terminal apophysis bulging (arrow in fig. 19). Balkan Peninsula, Bosnia . . . *bosniense*

- Pedipalpus (figs. 14-16, 33-36, 51-53, 99): Tibia usually stouter (but – e.g., in *melanurum* – intraspecifically quite variable!). Southern to Northern Europe (*helena* only in Southern Europe). 4

4(3) Pedipalpus (fig. 99): Distal part of the embolus bent in an almost right angle, embolus prolaterally in the basal half with a sclerotized and distinct "band" (short arrow), diameter of the distinctly flattened embolus in the middle of the slender part ca. 0.025 mm, distal margin of the tegulum distinctly concave (long arrow). Greece: Crete . . . .*helena*

- Pedipalpus (figs. 14, 33, 51): Embolus less bent in the distal half, sclerotized "band" absent or indistinct, diameter of the embolus in the middle ca. 0.012 mm, apical margin of the tegulum distinctly concave only in *betteni* (fig. 14) in which the embolus is quite different, and cymbium/bulbus are more slender. Southern Europe and North of Italy 5

5(4) Pedipalpus (figs. 14-16): Apical margin of the tegulum STRONGLY concave and with a fused – seemingly free – sclerite (arrow in fig. 14), terminal apophysis and conductor as in the figs., cymbium/bulbus more slender. In more dry, sunny, warm and stony biotopes . . . . *betteni*

- Tegulum, terminal apophysis and conductor different, cymbium/bulbus (figs. 33, 51) wider. 6

6(5) Basal outgrowth of the conductor (prolateral aspect) more slender (O in fig. 35), apical tegular margin less oblique (fig. 33). . . . .*melanurum*

- Basal outgrowth of the conductor larger (O in fig. 53), apical tegular margin more oblique (fig. 51). . . . . *mystaceum*

♀♀:

Remarks: The shape of the epigynal pit and the copulatory ducts is fairly variable. The female of *T. bosniense* and *malagaense* (see *T*. sp. indet. 3) is unknown, the conspecifity of the female of *T. harmsi* is unsure. *T. semitinctum*: See below (*T*. sp. indet. 3). The vulvae of *melanurum, mystaceum* (sub *neglectum*), *betteni* and sp. 3 indet. (see above and fig. 57) were already published by THALER (1966: 153).

1 Epigynal pit protruding posteriorly (figs. 27, 37-38) 2

- Epigynal pit not protruding posteriorly (e.g. fig. 54) 3

2(1) Epigynal pit widest behind of its middle, (fig. 27), walls of the receptacula seminis thinner (fig. 28). Egypt . . . .*cairoense*

- Epigynal pit frequently widest in front of its middle (fig. 37-38), wall of the receptacula seminis thicker (fig. 39). Holarctic . . . . *melanurum*

3(1) Copulatory ducts quite short (figs. 18, 49a, 101) 4

- Copulatory ducts long, e.g. figs. 30b, 31b, 55), see also fig. 57). 5

4(3) Copulatory openings widely spaced, epigynal pit very wide, posterior and lateral margin of the epigynal pit strongly sclerotized (figs. 45-49), copulatory ducts slightly longer (fig. 49a). Macaronesian Islands (endemic) . . . . *musivivum*

- Copulatory openings also widely spaced but margins of the more narrow pit not strongly sclerotized (fig. 100), vulva (fig. 101) similar. Greece: Crete . . . . *helena*

- Copulatory openings not widely spaced, posterior margin of the more narrow pit not strongly sclerotized (fig. 17), copulatory ducts shorter (fig. 18). Continental Europe . . . . *betteni*

5(3) Femur I distinctly/widely annulated (ventral aspect similar to fig. 50). Copulatory openings near the middle of the epigynal length, THIN walls of the receptacula seminis (fig. 30b). Iberian Peninsula, Mallorca, ?France. . . . . .questionable ♀ of *harmsi*

- Femur I (in every specimen?) distinctly annulated (fig. 50). Epigynal pit widest near the middle, copulatory openings near the middle, widely spaced (fig. 54-54a), thick walls of the receptacula seminis (fig. 55). Europe, frequent spiders. . . . . *mystaceum*

- Femur I usually indistinctly annulated (fig. 58, probably variable, unknown in sp. indet. 1) as in *malagaense* in which the female is unknown; four sp. indet.:

(a) *Theridion* sp. indet. 1 ♀ from Central Europe in which the colour of femur I is unknown to me, the epigynal pit is almost circular, the position of the copulatory openings is in the middle of the length, the copulatory ducts are very long, see above and ROBERTS (1998: 301, pl. 23). In a recently in S-Germany (Hirschberg near Heidelberg, beaten from a bush in my garden, CJW) by me collected male – which apparently is conspecific with spiders from Belgium – the femur I is partly fairly darkened.

(b) *Theridion* sp. indet. 2 ♀ from Greece, Crete, CJW/SMF. Epigynal pit widest in the middle, position of the copulatory openings posteriorly (fig. 56). Most probably conspecific with *T. helena* n. sp.

(c) *Theridion*. sp. indet. 3 (see *T. malagaense*): Epigynal pit and position of the copulatory openings unknown, extremely long and coiled ducts, thick walls of the receptacula seminis (fig. 57). N-Italy, at the Lake Lugano, coll. THALER. Very long and coiled ducts exist also in *T. semitinctum* – see KNOFLACH et al. (2009: Figs. 76-77) – in which the walls of the receptacula seminis are distinctly thinner.

Theridion sp. indet. 4: 1♀ from France, Ardeche, Coux, P. POOT leg. 2.-7. VI. 1987, coll. POOT. Epigyne/vulva: Figs. 31a-b).

Description of the European/Mediterranean species of the *melanurum*-group

Theridion sp. indet. 1-3: See the key no. 5 and just above; sp. indet. 3: See *T. malagaense*.

Theridion betteni WIEHLE 1960 (figs. 14-18)

Material: SW-Germany, near Balgheim (between Rottweil and Tutlingen), ♂♀ JW leg. in VI 1970; Italy, Abbruzzes, 1♀ JW leg. in VII, SMF; Switzerland, Saas-Fee, 2000 m, 2♀ JW leg in VII, SMF; France, Maurcilles, 1♂ P. POOT leg in V, coll. POOT.

Diagnosis: ♂-pedipalpus (figs. 14-16): Cymbium and bulbus more slender than in related species, the tegulum bears a pointed ventral-distal "outgrowth" which is fused but seemingly free (arrow in fig. 14); tibia relatively stout, basally only slightly smaller than distally (its smallest diameter ca. 0.14 mm). ♀: Epigynal pit (fig. 17) only fairly wider than long, vulva (fig. 18) with quite short copulatory ducts (the shortest of the known related species).

Relationships: See the key. In *T. mystaceum* the pedipalpal tibia is basally wider, and the copulatory ducts of the vulva are quite longer.

Distribution: Palaearctic.

***Theridion bosniense* n. sp**. (figs. 19-21)

Material: Balkan Peninsula, Bosnia, Ston, ca. 50 km NE Dubrovnik, holotype ♂ P. POOT leg. 7. V. 1988, SMF 37611.

Diagnosis (♂; ♀ unknown): ♂-pedipalpus (figs. 19-21): Tibia distinctly longer than wide in the holotype (but it may be variable), terminal apophysis retrolaterally bulging (arrow in fig. 19), embolus as in fig. 21.

Description (♂):
Measurements (in mm): Body length 3.0, prosoma: Length 1.35, width 1.1; leg I: Femur 1.9, patella 0.65, tibia 1.75, metatarsus 1.9, tarsus 0.7, tibia II 1.1, tibia III 0.65, tibia IV 0.95.
Colour: Prosoma grey, medial and marginal darkened, sternum with a black margin, legs yellow and distinctly annulated, femur I darkened ventrally in the basal and in the distal half, opisthosoma dorsally mainly dark grey, with a light longitudinal band which has parallel margins and some redbrown spots, ventrally similar to fig. 22.
Prosoma with a deep fovea, eyes of medium size, posterior row procurved, posterior median eyes spaced almost by their diameter. The clypeus bears a pair of bumps. Basal cheliceral articles long and slender, not diverging, distally with a tooth-like structure as in fig. 32, fangs long and slender. Sternum narrow posteriorly. – Legs fairly long, their order I/II/IV/III, sequence of the long tibial bristles 2/2/1/2, position of the metatarsal I trichobothrium in 0.3. – Opisthosoma oval, covered with long and short hairs. – ♂-pedipalpus: See the diagnosis. Tibia in ventral aspect distinctly longer than wide.

Relationships: See the key. In *T. cairoense* conductor and terminal apophysis are different, the embolus is less bent.

Distribution: Bosnia (Jugoslavia).

***Theridion cairoense* n. sp.** (figs. 22-27a)

Material: Egypt, Cairo (no locality), holotype ♂, 3♂2♀ paratypes, SMF.

Diagnosis: ♂-pedipalpus: Figs. 23-26. Epigynal pit (fig. 27) longer than wide, widest behind the middle, protruding posteriorly, introductory opening close together, vulva (fig. 27a): copulatory ducts only fairly long, walls of the receptacula seminis fairly thick.

Description:
Measurements (♂/♀ in mm): Body length 2.6-3.6/4.0-4.5, prosomal length 1.2-1.8/ca 1.5, prosomal width 1.1-1.5/ca. 1.5; leg I (♂): Femur 2.2, patella 0.7, tibia ca. 1.95, metatarsus 2.1, tarsus 0.8, tibia II 1.2, tibia IV 1.0; ♀: Tibia I 2.0, tibia IV 1.1.
Colour: Prosoma yellow brown, laterally and in front of the fovea darkened, sternum darkened laterally, legs yellow, distinctly annulated, femur I ventrally in the basal third with a dark brown spot, opisthosoma (fig. 22) with a dorsal longitudinal band which may be as in *bosniense*.
Prosoma, legs and opisthosoma as in *bosniense*. – Copulatory organs: See the diagnosis.

Relationships: See the key. *T. bosniense* is most related, see above. In *T. mystaceum* the shape of the conductor is different, the copulatory openings are widely spaced, and the epigynal pit is not protruding posteriorly.

Distribution: Egypt: Cairo.

Theridion harmsi n. sp. (figs. 28-30b)

Derivatio nominis: It is a pleasure to me to dedicate this species to K.-H. HARMS who collected the holotype and a paratype of this species 38 years ago in Spain.

Material: a) Spain, (1) Prov. Murcia, 2 km SW Moratalla, Arroya de Cararaca, 700-780 m, 2♂1♀ beaten from *Quercus coccifera*, K.-H. HARMS leg. in IV 1973, holotype and paratypes SMF; (2) Mallorca, N Soller, 1♂ paratype JW leg. in V; (3) Huesca, Broto, 2♂ P. POOT leg. in V, 1♂ paratype CJW/SMF, 1♂ paratype coll. P. POOT; (b) S-Portugal, 20 km NE Faro, 1♂ paratype JW leg. in V 2010, beaten from a bush, R112/AR/CJW; (c) France (1) Herault, Mt. Baudille 1♂ paratype P. POOT leg. in V, coll. P. POOT; (2) Gorge du Caramel, JW leg., 1♂ paratype, CJW.

Remark: I am not quite sure about the conspecifity of the males outside the locus typicus (Arroya de Caracara); their embolus is a bit shorter, compare figs. 30-30a).

Diagnosis: ♂-pedipalpus (figs. 28-30a): Basal part of the embolus as long as wide, distinctly widened to the tip of the embolus (arrow in fig. 30), distal/slender part of the embolus long and abruptly bent in/up to a right angle. The pit of the epigyne is hidden by a plug, the vulva (fig. 30b) with two pairs of long copulatory ducts which are directed sideward, and with thin walls of the oval receptacula seminis.

Description:
Measurements (in mm): ♂: Body length ca. 2.6, prosomal length ca. 1.1, prosomal width ca. 0.95; leg I: Femur1.5, patella 0.45, tibia 1.5, metatarsus 1.55, tarsus 0.55, tibia II 0.85, tibia III 0.5, tibia IV 0.75. ♀: Body length 2.2, prosoma: Length 0.75, width 0.65, tibia I 0.75, tibia IV 0.55.
Colour, body and legs as in *bosniense*. Genital structures: See the diagnosis. The pedipalpal tibia is short.

Relationships: See the key. The shape of the embolus is similar to *malagaense* (fig. 62) but stronger bent in the distal half; in *malagaense* the conductor bears a tongue-shaped apophysis.

Distribution: Iberian Peninsula, Mallorca, S-France (?).

Theridion helena **n. sp**. (fig. 99-101; see fig. 56)

Material: Greece, Crete, (1) Malia, holotype ♂ and 1♀ paratype H. EIKAMP & U. KLUGE leg. 11. V. 2008, C. DELTSHEV det. *Theridion mystaceum* in X. 2008, SMF 58769; (2) Goumes, 1♂1♀ paratypes (1 ♂-pedipalpus and vulva separated), H. EIKAMP & U. KLUGE leg. 4. V. 2008, C. DELTSHEV det. *T. mystaceum* in X. 2008, SMF 58758. See also *Theridion* sp. indet 2 from Crete at the end of the key to females.

Diagnosis: ♂-pedipalpus (fig. 99) apical margin of the tegulum distinctly concave (long arrow), embolus wide and flattened, distally bent in an almost right angle, apically slightly bent to the tip of the cymbium, its diameter in the middle of the thin part ca. 0.025 mm, prolaterally in the basal half with a distinct darkened wide sclerotized "band" (short arrow); terminal apophysis and conductor quite similar to *T. melanurum*. ♀: Epigyne (fig. 100): Pit widest in the middle, copulatory openings widely spaced, in a more posterior position, see fig. 56, vulva (fig. 101): Copulatory ducts fairly short, receptacula seminis almost touching, their walls thin.

Description:
Measurements (in mm): Body length 3.3-3.8 (♀), prosoma (♂♀): Length 1.4-1.6, width 1.15-1.25; leg I (♂/♀): Femur 2.5/2.1, patella 0.75/0.65, tibia 2.3/1.8, metatarsus 2.5/1.9, tarsus 0.9/0.8, tibia II 1.3/0.95, tibia III 0.8/0.55, tibia IV 1.2/0.95.
Colour variable like in *T. melanurum*: Prosoma medium to dark brown, legs distinctly annulated, opisthosoma dorsally with an undulating longitudinal lighter band.
Body like in *T. melanurum*, eyes large, posterior row slightly procurved, anterior median eyes largest, anterior margin of the cheliceral furrow with a large tooth. – Legs longer in the male, order I/II/IV/III, sequence of the tibial bristles 2/2/1/2, metatarsi I-III bear a trichobothrium, its position in ca 0.3. – Opisthosoma oval, slender in the male. – Genital structures: See the diagnosis.

Relationships: See the key and *Theridion* sp. indet. 2, the key to the females above. Terminal apophysis and conductor are quite similar to *T. melanurum*, the vulva is similar to *betteni* and *musivivum*.

Distribution: Greece: Crete.

Theridion malagaense **n. sp**. (figs. 55-62)

Material: (1) Spain: Prov. Malaga, Ronda, way from Ronda into the valley, 600-750 m, holotype ♂ leg. BORNEFELD, K. H. HARMS vidit, coll. HARMS/SMF. I do not want to exclude that three females from El Pardal (MNHN AR 2298) may be conspecific.
(2) Italy: Sardinia, E Villanova, 500 m, 1♂ paratype KAHMANN leg. 13. IV. 1955, SMF 30454.

Diagnosis (♂; ♀ unknown but see below, "relationships"): Pedipalpus (figs. 60-62): The conductor bears a tongue-shaped apophysis, the basal part of the embolus is as long as wide, the distal part of the embolus is thin and strongly bent.
The ventral black markings in femora I-II are small (fig. 58).

Description (♂):
Measurements (in mm): Body length 2.4-3.1, prosoma: Length 1.15-1.3, width 1.0-1.15; leg I of the larger ♂: Femur 2.0, patella 0.6, tibia 1.9, metatarsus 1.9, tarsus 0.7, tibia II 1.05, tibia III 0.6, tibia IV 0.9.
Colour, body and legs very similar to *T. bosniense* but opithosoma variable and femur I as in fig. 58. Position of the metatarsal I trichobothrium in 0.36-0.4. ♂-pedipalpus (see above) as in figs. 60-62; the conductor bears distinct tiny cuspules.

Relationships: See the key, *T. harmsi* and *T. mystaceum*. I do not want to exclude that the ♀ of *Theridion* sp. 3 from Northern Italy (fig. 57) may be conspecific with *malagan-ense*, and the ♀ of *T*. sp. indet. 2 from Crete (without locality, fig. 56) may be related.

Distribution: Spain and Italy.

Theridion melanurum HAHN 1831 (figs. 32-39)

Synonyms: *T. denticulatum* WALCKENAER 1802 (praeocc.), *dorsatum* BANKS 1897, and *stanfordi* EMERTON 1924. Questionable new synonym: *Theridion albipes* L. KOCH 1878, 1♀ (holotype?) Caucasus, L. KOCH coll., BMNH; vidit ca. 1988.

Material: Numerous specimens from Austria and Germany, CJW/SMF.

Diagnosis: ♂-pedipalpus (figs. 33-36): Basal part of the embolus wider than long, distal part relatively thick (diameter of this thinner part up to 0.025 mm), and only fairly bent, median apophysis as in fig. 36. Epigynal pit (figs. 37-38) widest in front of the middle, at least as long as wide, copulatory openings widely spaced; vulva (fig. 39), copulatory ducts only fairly long, walls of the receptacula semines very thick.

Relationships: See *T. cairoense* and the key. Members of *T. betteni* and *mystaceum* are most ofter smaller spiders.

Distribution: Holarctic.

Theridion musivivum SCHMIDT 1956 (figs. 40-49a)

Material: Both sexes from the Canary Islands, Madeira and Azores (Graciosa, Sao Miguel, Terceira; see WUNDERLICH (1992: 30)), CJW/SMF.

Diagnosis: ♂-pedipalpus (figs. 40-44): Subtegulum only fairly large, median apophysis as in fig. 44, basal part of the embolus about as long as wide, distal part thin and strongly continuously bent. Epigynal pit (figs. 45-49): Widest posteriorly, posterior margin variable protruding and distinctly sclerotized, copulatory openings widely spaced and in a posterior position (they may be hidden). Vulva (fig. 49a): Copulatory ducts only fairly long, walls of the receptacula semines very thin.

Further characters and variability: Body length 2.9-3.7 mm.
The colour of body and legs is quite variable: Prosoma frequently yellow, medially variable darkened, margin usually black only anteriorly, sternum yellow, frequently more or less darkened or even black, legs weakly to strongly darkened, opisthosoma dorsally very variable, medially with a longitudinal band which has pointed or undulating margins and may be fragmented. In a male from La Palma, El Paso (CJW) (fig. 49b) the chelicerae are very strongly diverging.
In the spiders from the Azores the posterior margin of the epigynal pit stands usually wider out and is stronger sclerotized than in spiders from the Canary Islands.

Relationships: See the key.

Distribution: Macaronesian Islands (Azores, Canary Islands, Madeira).
Remark: The species from the Azores which was reported by DENIS (1964) as *Theridion denticulatum* (= *melanurum*) – Azorean material has not been studied by DENIS – is apparently *T. musivivum*; *T. melanurum* is unknown to me on the Azores.

Theridion mystaceum L. KOCH 1870 (figs. 50-55)

Syn.: *Theridion neglectum* WIEHLE 1952.

Remark: This species was previously mistaken as *T. melanurum* by certain authors.

Material: Numerous specimens from Germany, Austria, Spain and Geece, SJW/ SMF.

Diagnosis: Distal margin of the tegulum oblique (arrow in fig. 51), basal part of the embolus distinctly wider than long. Epigynal pit (figs. 54-54a) variable, usually slightly wider than long and widest just behind its middle; copulatory openings widely spaced.

Vulva (fig. 55) with long copulatory ducts, walls of the receptacula semines thick, similar to *Theridion nasutum* WUNDERLICH 1995. Annulations of femur I usually as in fig. 50.

Relationships: See the key. In an undescribed species e. g. from Belgium and Germany – see *Theridion* sp. 1 at the end of the key above – the copulatory ducts are still longer.

Distribution: Palaearctic. The most frequent species of the *melanurum* group at least in Central Europe.

Grancanaridion **n. gen**.

Type species (by monotypy): *Theridion grancanariensis* WUNDERLICH 1987 (**n. comb**.), see WUNDERLICH (1987: 221, figs. 586-589).

Diagnosis: ♂-pedipalpus (figs. 63-65): Tegulum bipartite, with a short ventral part and a longitudinal retrolateral part which bears a winding sperm duct, median apophysis long and not standing out from the bulbus, conductor large and widely enclosing the embolus which is wide, flattened, strongly sclerotized and somewhat screw-shaped, nor circular. Epigyne (fig. 66) with a large pit, vulva (fig. 67) with large and globular receptacula seminis.

Further characters (see the Theridiini sensu WUNDERLICH (2008: 369)): Opisthosoma with a longitudinal dorsal band like in most members of *Theridion*, body length 2.6-3.2 mm, sequence of the tibial bristles 2/2/1/2, metatarsal trichobothria existing on I-III, their position on I in 0.33-0.46, teeth of the cheliceral margins absent.

Relationships: A member of the tribe Theridiini, see WUNDERLICH (2008: 369). In *Theridion* WALCKENAER 1805 s. str. – see WUNDERLICH (2008: 396) – tegulum and embolus are quite different, the embolus (except its bulb) is thin and has a circular position (e.g. fig. 42), the median apophysis stands out retrolaterally. I do not know a difference from *Theridion* in the female sex. – In *Theridula* EMERTON 1882 the shape of the embolus is fairly similar but the opisthosoma is wider than long, conductor and median apophysis are absent.

Distribution: Spain: Canary Islands: Gran Canaria.

Lasaeola SIMON 1881 s. l.

The taxonomy of the diverse genus *Lasaeola* s. l. and its possible subgenera are still controversial discussed, see WUNDERLICH (2008: 283-284).
Recently I studied the most tiny European members of this genus and found (1) that at least three species-groups exist in this region, and (2) that – according to the structures of the male pedipalpus – the (sub)genus *Diponenata* WUNDERLICH 1988 (first described as a genus of its own from fossil species in Dominican amber, see WUNDERLICH (1988)) has to delete from the list of European spiders. The shape of the prosoma and the structures of the bulbus of the type species of *Dipoenata* – *stipes* WUNDERLICH 1988 – are different from the European species although the chaetotaxy is like in the *Lasaeola convexa* species-group, see below. *Dipoenata flavitarsis* WUNDERLICH 1992 is regarded as a member of *Lasaeola* s. l. (**n. comb**.), and *Dipoena longitarsis* DENIS 1962 is regarded most likely as a member of *Lasaeola* s.l. (**n. comb**.).
Remarks on the dorsal prosomal furrows in the male sex of numerous species of *Lasaeola* s. l.: These furrows evolved several times independently within this diverse genus in my opinion, and a disposition to the development of such structures may exist in *Lasaeola*. Apparently *Lasaeola algarvensis* n. sp. is a remarkable example of such furrows being just about to develope: The sclerotized narrow lines (not furrows) (fig. 68) are weakly developed in this species but completely absent in the remaining members of this species-group; therefore their reduction appears more unlikely to me than the begin of their development in this species. See below.

Key to the most tiny European taxa of *Lasaeola* s.l. (body length 1.0-1.8 mm (few ♀)):

Remark: *Lasaeola longitarsis* (DENIS 1962) (**n. comb**.) (described under *Dipoena*, transferred to *Dipoenata* by WUNDERLICH (1992: 89), male and relationships unkown, Madeira, tarsi as long as the metatarsi) is not included in this key.

1 Position of the trichobothrium on metatarsus I-II in ca. 0.45. Tibial bristles unknown. Prosoma (fig. 79) grey, darkened medially. Prosomal profile less convex (fig. 80). ♂- pedipalpus (figs. 81-83), ♀ unknown. S-Portugal . . . . *minutissima*

- Position of the metatarsal I-II trichobothrium in 0.65-0.95. Sequence of the tibial bristles 1/1/1/1 or 2/2/1/1. Prosoma bicoloured (*striata* species-group) or unicoloured dark grey (*convexa* species-group). Prosomal profile strongly convex (fig. 69). Western Mediterranean incl. Portugal 2

2(1) Prosoma bicoloured (fig. 68). Sequence of the long tibial bristles 2/2/1/1. *L. striata* species-group. 3

- Prosoma uniformly dark. Sequence of the tiny tibial bristles (position near to the tibial base) 1/1/1/1. *L. convexa* species-group 6

3(2) Species of the Macaronesian Islands 4

- Species from the European mainland and mediterranean islands 5

4(3) Species of the Acores. Embolus/conductor and epigyne: See WUNDERLICH (1992: Figs. 574-575) . . . . *oceanica*

- Species of the Central and Western Canary Islands. ♂-pedipalpus figs. 74-75 as well as WUNDERLICH (1987: Figs. 560-561), ♀ epigyne/vulva: See WUNDERLICH (1987: Figs. 562-563). *L. grancanariensis* may be a synonym . . . .*striata*

5 (3) ♂: Prosoma dorsally with distinct sclerotized lines (figs. 68-69), pedipalpus (figs. 70-71), cymbium retrodistally modified, conductor shorter. ♀: Epigyne/vulva figs. 72-73. SW-Portugal . . . . *algarvensis*

- ♂: Prosoma dorsally without such lines, pedipalpus (figs. 76a-b, and WUNDERLICH (1992: Fig. 576), cymbium not modified, conductor longer, course of the sperm duct different. ♀ Epigyne/vulva: Figs. 77-78. France (terra typica), Italy and probably Spain . . . . *testaceomarginata*

6(2) Legs (except III) distinctly annulated. See WUNDERLICH (1987: Figs: 552-556). Canary Islands: Tenerife, La Gomera, La Palma . . . . *canariensis*

- Legs light brown, not annulated (tibia I may be darkened). Species from SW-Europe, probably the Eastern Canary Islands (in prep.: Description of specimens from Lanzarote and Fuerteventura) and Israel (see below, ♂-pedipalpus figs. 85-86), epigyne fig. 87. Probably a "sampling species" . . . . *convexa*

- Legs mainly uniformly black (except the light coxa, trochanters and tarsi). Caput strongly domed, see WUNDERLICH (1992: Fig. 572), epigyne see WUNDERLICH (1992: Fig: 573), ♂ unknown. Tenerife . . . . *flavitarsis*

Remarks on the European taxa and descriptions of new species:

(1) The *Lasaeola striata* species-group

This group is characterized by the distinctly darkened cephalic part in contrast to the light lateral parts, the distinctly convex prosomal profile (figs. 68-69), and the sequence of 2/2/1/1 of the long tibial bristles.

European species:

L. algarvensis n. sp. is known from SW-Portugal,

L. grancanariensis WUNDERLICH 1987 (♂ unknown) is known from the Canary Island Gran Canaria, and may be a synonym of *striata*,

L. oceanica SIMON 1883 is known from the Azores,

L. striata WUNDERLICH 1987 (?= *grancanariensis*) is known from the Central and Western Canary Islands (Gran Canaria, Tenerife, La Gomera, La Palma). New material: (a) Gran Canaria: Barranco de Moya, 600 m, Laurisilva, ♂♀ P. NABAVI leg. in X 1990, CJW; (b) Tenerife: Teno mountains, Los Tilos, 1♂1♀ J. ASTRIN leg. by fogging in 2008, CJW; (c) La Gomera: Los Acevinos, 2♂2♀ J. ASTRIN leg. in X. 2008, CJW,

L. testaceomarginata SIMON 1881 (figs. 76-78) is known from S-Europe: France (terra typica), Italy and probably Spain; it may be a “sampling species”, further studies are needed.

(2) The *Lasaeola minutissima* species-group (figs. 79-84)

Prosoma grey, darkened in the middle (fig. 79), lower than in the *convexa*- and the *striata* species-groups (fig. 80), the tibial bristles are unknown.

Only *L. minutissima* n. sp. from S-Portugal (♀ unknown).

(3) The *Lasaeola convexa* species-group

This group is characterized by the uniformly dark prosoma, the distinctly convex cephalic part – see WUNDERLICH (1987: Figs. 552-553), and the sequence (1/1/1/1) of their tiny tibial bristles in a position near to the tibial base.

European species:

L. canariensis WUNDERLICH 1992 is known from the Canary Islands (Tenerife, La Gomera, La Palma),

L. convexa (THORELL 1870) is known from SW-Europa, new to the Canary Islands (Eastern Islands: Fuerteventura, Lanzarote) and probably from Isreal, see LEVY (1998: 154-155). In contrast to a male from S-France (Menton, CJW) the anterior ♂-tibia is more or less darkened in the specimens from the Canary Islands. The structures of the ♂-pedipalpus of a male from France (terra typica) seem not quite identical with the structures which were published by LEVY (1998: Figs. 290-291), see the figs. 85-86 below. – New material from the Canary Islands: (a) Fuerteventura: N Tenuineje, Bco. Aqua de Burges, in plants near the ground, 1♂ JW leg in III 1997, CJW; (b) Lanzarote: Risco Fumara, in lower plants, 2♂ 3juv. P. NABAVI leg. 17. I. 1999, CJW.

L. flavitarsis WUNDERLICH 1992 (♂ unknown) is known from the Canary Island Tenerife.

Description of two new species from Portugal:

Lasaeola algarvensis n. sp. (figs. 68-73)

Material: W-Portugal, N-Algarve, W Aljezur, near the beach, 1♂1♀ JW leg. in VIII 2009, holotype ♂ R39/AR/CJW, 1♀ paratype R40/AR/CJW; later probably SMF. The female opisthosoma is loose, the epigyne and the right male pedipalpus were separated.

Diagnosis: ♂: Prosoma (figs. 68-69) dorsally with narrow sclerotized lines (not furrows), pedipalpus (figs. 70-71): Cymbium prodistally slightly modified (arrows), bulbus with long sperm ducts, embolus short. ♀: Prosomal profile as in the male, lines absent, epigyne (fig. 72) with a tiny pit within a larger low sclerotized groove which is slightly wider than long. Vulva: Fig. 73.

Description:
Measurements (in mm): Body length ♂ 1.3, ♀ 1.5, prosomal length/width ♂ 0.58/0.5, ♀ 0.6/0.5, ♂-leg I: Femur 0.48, patella 0.21, tibia 0.32, metatarsus 0.34, tarsus 0.2, tibia II 0.28, tibia III 0.24, tibia IV 0.42; ♀: Tibia I 0.31, tibia IV 0.46.
Colour: Prosoma (figs. 68-69) yellow, margins not darkened, median part widely darkened in the anterior half, sternum yellow, legs uniformly yellow, opisthosoma dark grey.
Prosoma (figs. 68-69) high, profile convex without a sexual dimorphism but in the male dorsally with narrow sclerotized lines (not furrows), thoracal fissure absent in the female. Eyes large, anterior medians largest, posterior row straight (♀) or slightly procurved (♂), posterior median eyes spaced by about their largest diameter. Clypeus long, basal cheliceral articles small (larger in the female), diverging distally, teeth of the margins absent, fangs long and slender, labium wider than long, gnathocoxae strongly converging, coxae IV spaced by their diameters. ♀-pedipalpus: Tarsus not thickened, claw slender and smooth. – Legs fairly short, bearing longer hairs, order IV/I/II/III, tibial bristles long and thin, sequence 2/2/1/1. Metatarsal trichobothria very long, absent on IV, their position on I-II in ca. 0.93. Tarsal claws long and smooth so far observable with the magnification of 150x. A comb of hairs under the tarsi IV is absent. – Opisthosoma almost egg-shaped, covered with large hairs, dorsally leathery in the male. – Genital organs: See the diagnosis, patella and tibia of the ♂-pedipalpus short.

Relationships: See the key. The sclerotized (sexually dimorphic) dorsal lines of the male prosoma and the retrodistally modified cymbium are unique within this species-group. The dorsal prosomal lines possess the same position as furrows which exist in numerous species of the genus *Lasaeola* s. l., and are probably being just about to develop. In the remaining species of this group such lines are completely absent; therefore their reduction appear more unlikely to me than the begin of their development in this species.

Distribution: Portugal (Algarve).

***Lasaeola minutissima* n. sp.** (figs. 79-84)

Material: S-Portugal, Algarve, N Faro, near Estavao, under a stone, 1♂ and 1 subad. ♀ JW leg. in VIII 2009; holotype ♂ R37/AR/CJW, subad. ♀ paratype R38/AR/CJW.

Diagnosis (♂; subad. ♀): Prosoma (figs. 79-80) grey, high but not domed, pedipalpus (figs. 81-83): Cymbium with two tiny apical-internal bristle, paracymbium spine-shaped, bulbus slender, embolus rather short, with the conductor in an almost parallel position.

Description (♂):
Measurements (♂ in mm): Body length 1.1, prosoma ca. 0.6 long and wide; leg I: Femur 0.68, patella 0.24, tibia 0.5, metatarsus 0.42, tarsus 0.32, tibia II 0.32, tibia III 0.25, tibia IV 0.36.
Colour: Prosoma (fig. 79) grey, medially darkened, legs: Tibiae not annulated but darkened apically, opisthosoma dark grey.
Prosoma (figs. 79-80) as wide as long, profile fairly convex, without furrows or lines, thoracal fissure and posterior stridulatory files absent, eyes large, anterior medians largest, posterior row straight to slightly recurved, clypeus strongly concave, basal cheliceral articles small, teeth of the margins absent, labium distinctly wider than long, with a seam to the sternum, gnathocoxae strongly converging, sternum convex, coxae IV spaced by more than their diameter. – Legs only fairly long, tibial bristles unknown (rubbed off), anterior tarsi slightly thickened, metatarsal IV trichobothrium absent, their position on I-II in 0.45, on III in 0.4. Tarsal claws small, unpaired claw thin and strongly bent. A comb of hairs under the posterior tarsi is absent. – Opisthosoma egg-shaped, posteriorly slightly pointed in contrast to the female, epigaster not bulging, spinnerets in an apical position. – Pedipalpus (figs. 81-83) (see the diagnosis): Patella and tibia short, patella with a dorsal-distal bristle, tibia with about 3 trichobothria.

Subad. ♀: Measurements (in mm): Body length 1.1, prosomal length 0.42, leg I: Femur 0.35, patella 0.14, tibia 0.28, metatarsus 0.22, tarsus 0.25 (!). Colour, body and legs similar to the male but the prosoma is slightly higher in the middle, the tarsi are longer than the metatarsi, the shape of the opisthosoma is almost globular, and thick hair bases exist. The chelicerae bear strong hairs (fig. 84). The pedipalpal tarsus is only slightly thickened, the position of the metatarsal I-II trichobothria is in ca. 0.4.

Relationships: See the key. The tegular sperm duct is relatively shorter than in the related tiny European species, the shape of embolus and conductor is different.

Distribution: S-Portugal.

Ruborridion **n. gen**. (figs. 88-94) photo 85

The gender of the name is neuter.

Type species (by monotypy): *Theridion musivum* SIMON 1873 (**n. comb**.).

Diagnosis: Red haemolymph and striking red colour of body and legs in living spiders (fades in alcohol) (*). Sequence of the tibial bristles most probably 2/1/1/1, trichobothium absent on metatarsus III, labium (fig. 90) twice as wide as long, coxae IV separated by the sternum by more than their diameter (fig. 88) (a quite unusual character in the Theridiinae). ♂-pedipalpus (figs. 92-93; see KNOFLACH et al. (2009: Figs. 60-62)): Paracymbium hood-shaped, embolus fairly thick, bearing a seam, median apophysis long, directed basally/ventrally, epigyne/vulva (fig. 94) with thick and strongly sclerotized introductory openings/ducts.

(*) A droplet of red haemolymph appeared on the stump of the pedipalpal trochanter after amputation five days after the dead of a male spider which I collected in V 2010 in S-Portugal (CJW). After less than five days the red colour of the spider faded to yellowish (prosoma and legs) and irregular redbrown (opisthosoma) – similar to members of *Hypomma* (Linyphiidae) – but the red colour of the haemolymph remains for a longer time.

Further characters: Position of the metatarsal trichobothrium in ca. 0.35, the anterior margin of the cheliceral furrow bears a single tooth (fig. 89), ♂-epigaster (fig. 91) not bulging but protruding posteriorly, seminal vesicle (part of the male genital system) conspicuously dark, translucent, probably a single pair of epiandrous gland spigots, shape of the male opisthosoma globular.

Relationships: A member of the Theridiinae. WUNDERLICH (1987) placed *musivum* in *Paidiscura* but KNOFLACH et al. (2000: 424) – following SIMON – placed the species again in *Theridion,* although the chaetotaxy and the trichobothriotaxy as well as the shape of the sternum are different, and corresponding more *Paidiscura* which may be most related, see the tab. below. The colour of body and haemolymph, the shape of the labium, the genital structures, and probably the shape of the egg sac (unknown to me in *Ruborridion*) are different from *Paidiscura*.
A red orange (not striking red) colour of prosoma and legs exists in living spiders of *Theridion familiare*.

Distribution: Mediterranea.

Differences of the genera *Ruborridion*, *Paidiscura* and *Theridion*:

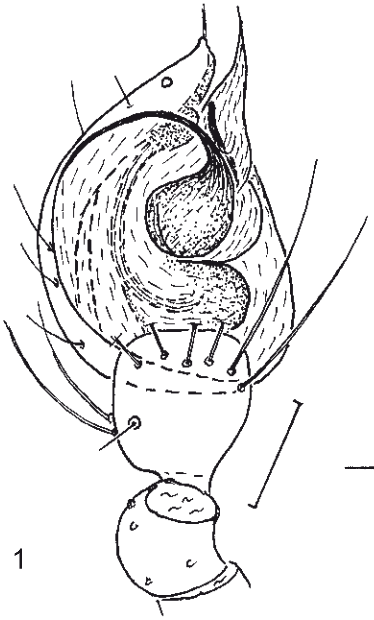
Character	*Ruborridion*	*Paidiscura*	*Theridion*
tibial bristles	2/1/1/1	2/1/1/1	2/2/1/2
metatarsal III trichobothrium	absent	absent	existing
opisthos. shape, colour alive	globular, red	widened (♀) (*), light yellowish	globular, different
male epigaster	not bulging	not bulging	strongly bulging
haemolymph	red	colourless	colourless
cheliceral promargin	1 tooth (fig. 89)	toothless	1 tooth
labium	very wide (fig. 90)	narrow (fig. 95)	narrow to wide (fig. 95)
coxae IV	widely spaced (fig. 88)	widely spaced (fig. 88)	narrow (fig. 88)
paracymbium	hood-like (fig. 92)	hook-like	hood-like
embolus	with seam	with seam	without seam
vulva	entrance of copulatory ducts strongly sclerotised (fig. 94)	copul. ducts distally strongly sclerotised (**)	different
egg sac	unknown (rounded?)	lobate	rounded

(*) lobate in *dromedaria* and *orotavensis* but rounded in *pallens*, see KNOFLACH & THALER (2000: 425).
(**) seemingly two pairs of receptacula seminis.

<u>*Heterotheridion nigrovariegatum*</u> (SIMON 1873) (fig. 97)

Material: S-Germany, Hirschberg, 3♂10♀ JW leg. in VI 2010, beaten from bushes in my garden, CJW.

Remarks: (1) WUNDERLICH (2008: 388) stated that the ♂-epigaster is distinctly bulging in this species but actually it is only slightly to fairly bulging. (2) In one of the ten females from S-Germany the opisthosoma bears a dorsal-central hook (fig. 97) similar to some *Achaearanea* and related taxa. (3) All females from this locality have body and legs uniformly yellow in contrast to the males which possess distinct dark markings on body and legs (sexual dimorphism) (some darkenings are known from females of other localities). The male may resemble a part of a plant; this may be a case of camouflage (mimese); especially its long and mainly yellow but partly black legs are distangled, and hard to recognize as legs of a spider. A stronger camouflage in the male sex is not unusual in spiders.



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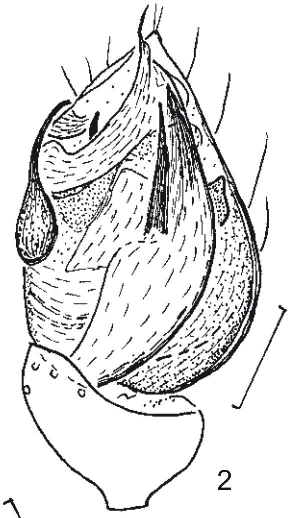

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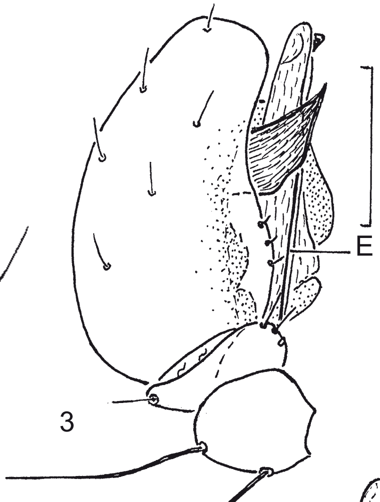

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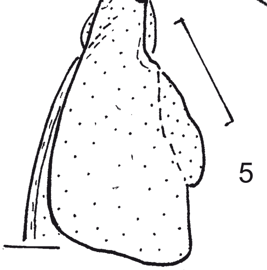

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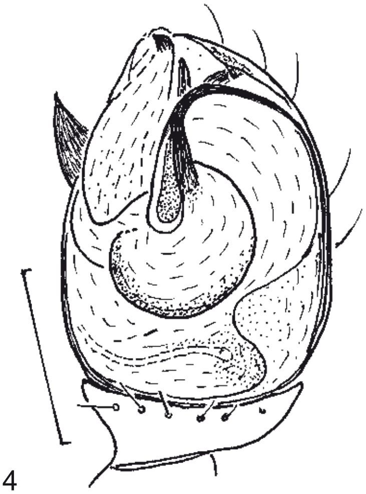

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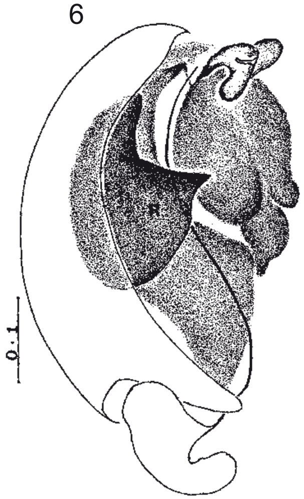

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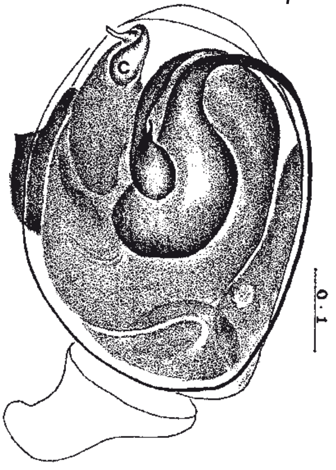

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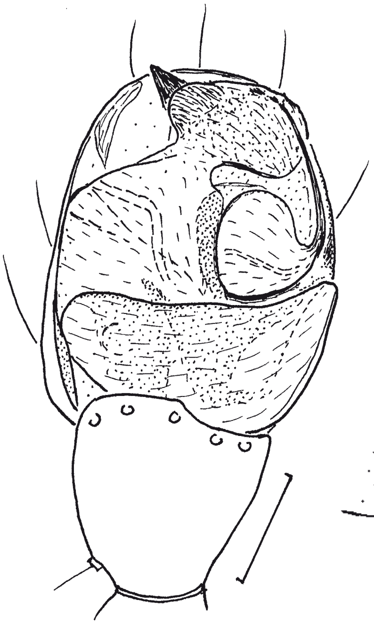
Figs. 1-2: <u>*Robertus brachati*</u> **n. sp.**, ♂, ventral and proventral aspects of the right pedipalpus. Scale bars 0.2 mm;

figs. 3-5: <u>*Theridion cyprusense*</u> **n. sp.**; ♂; 3-4) prolateral and ventral aspect of the left pedipalpus; 5) proventral aspect of the distal sclerites of the left bulbus. E = embolus. Scale bars 0.2, 0.2 and 0.1;

figs. 6-7: <u>*Theridion zekharya*</u> LEVY 2007, ♂, prolateral and ventral aspect of the left pedipalpus. C = conductor, R = median apophysis. Taken from LEVY (2007);



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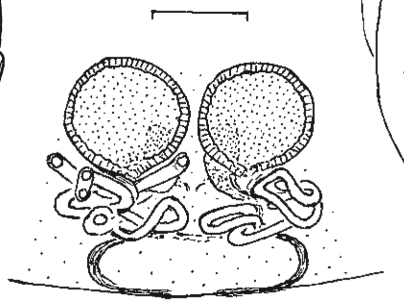

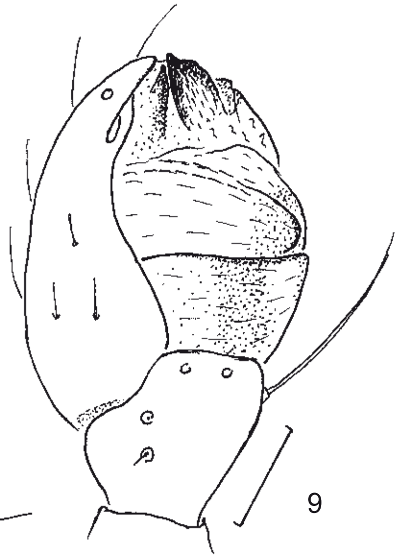

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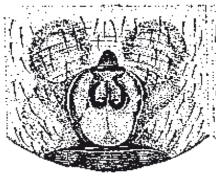

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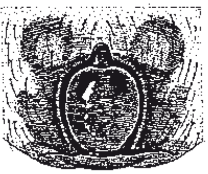

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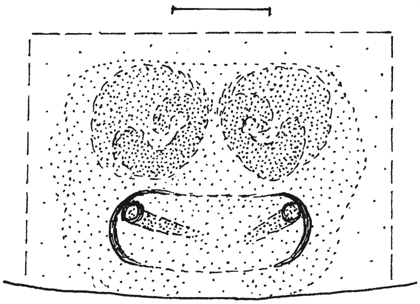

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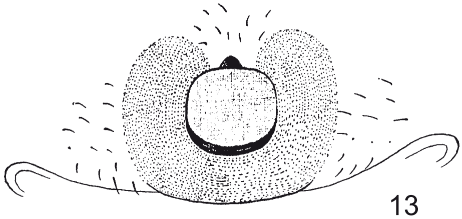

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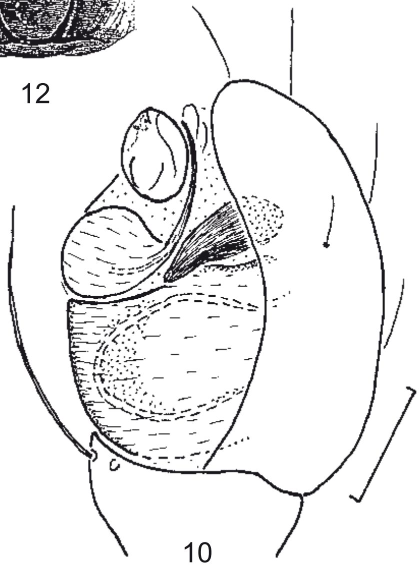

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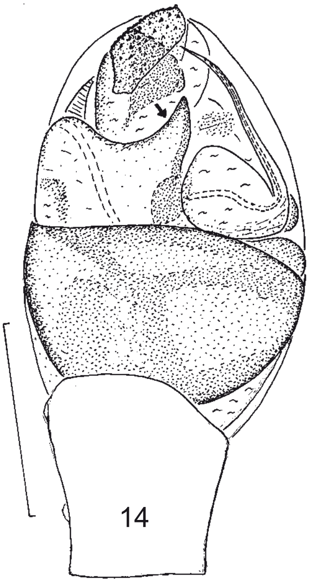
figs. 8-10b): *Theridion familiare* O. PICKARD-CAMBRIDGE 1871; 8-10: Ventral, retrolateral and prolateral aspect of the right ♂-pedipalpus; 10a-b): ♀, epigyne and dorsal aspect of the vulva. Scale bars 0.1;

figs. 11-13: *Theridion varians* HAHN 1833, ♀; 11) epigyne with a free pit, 12-13) epigyne in which the pit is covered by a mating plug. Figs. 11-12 taken from ROBERTS (1995), fig. 12) taken from WIEHLE (1931);



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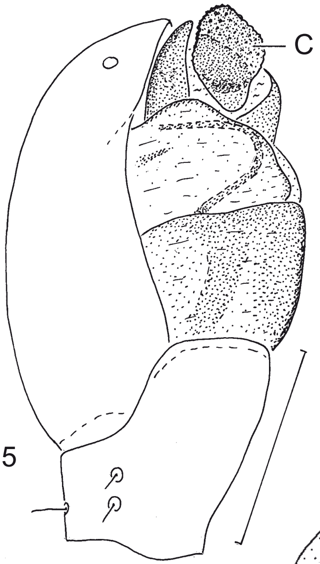

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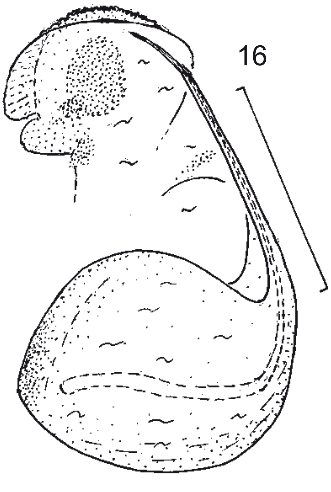

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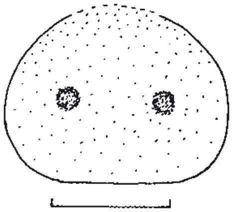

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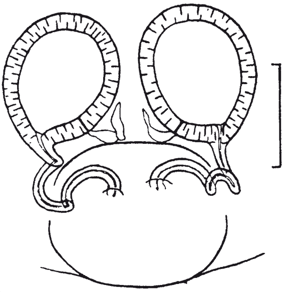

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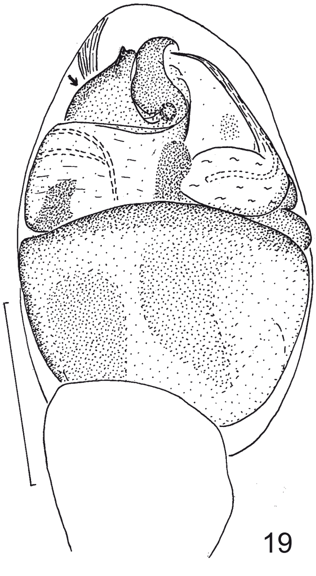

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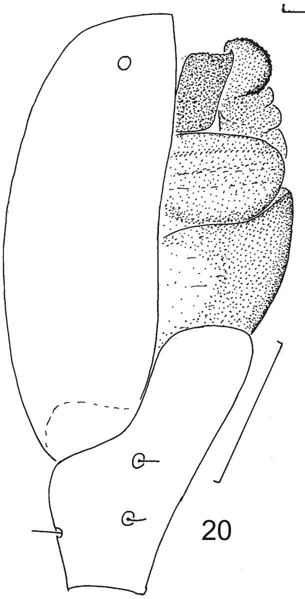

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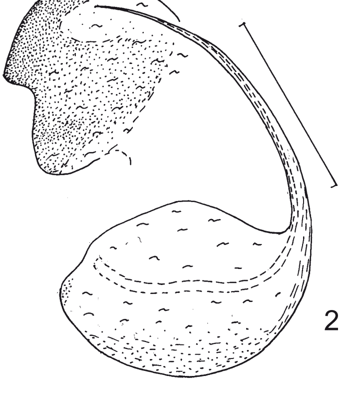

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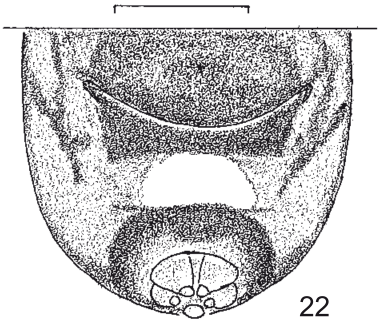
figs. 14-18: *Theridion betteni* WIEHLE 1960; 14-15) ♂, ventral and retrolateral aspect of the right pedipalpus, 16) proventral and slightly apical aspect of the right dissected embolus and conductor (C); 17-18) ♀, epigynal pit and vulva. Fig. 18) is taken from THALER (1966). Scale bars 0.2 in figs. 14-16, 0.1 in figs. 17-18;

figs. 19-21: *Theridion bosniense* **n. sp.**, ♂; 19-20) ventral and retrolateral aspect of the right pedipalpus; 21) proventral and slightly apical aspect of the right embolus and conductor. Scale bars 0.2, 0.2 and 0.1;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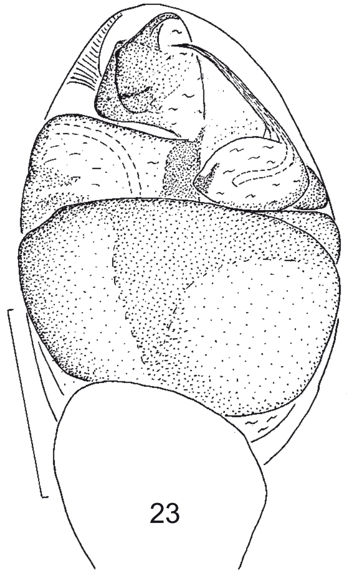
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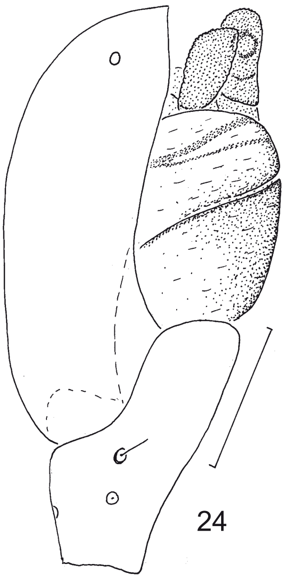
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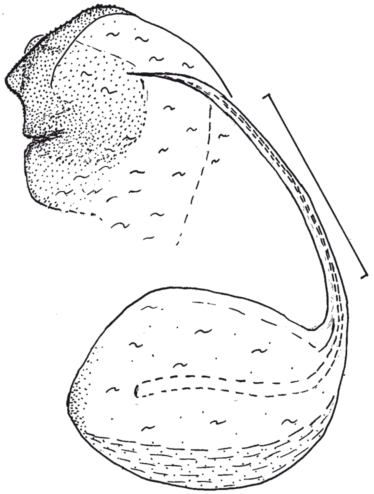
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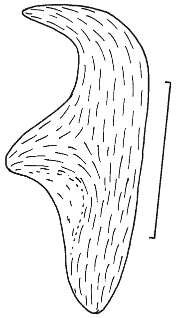
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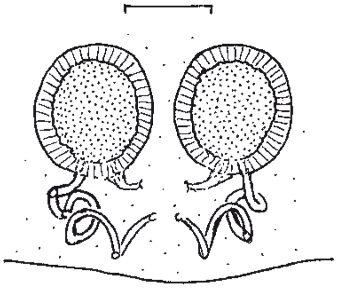

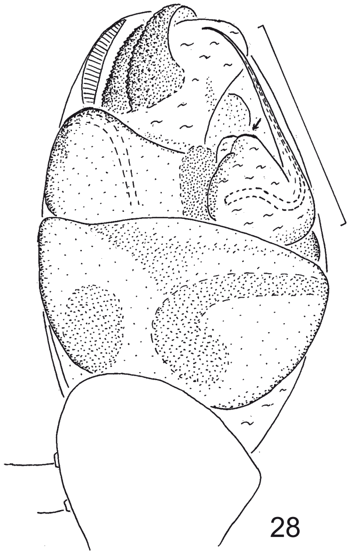
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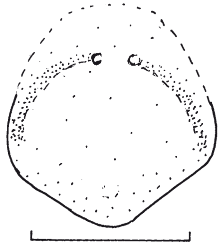
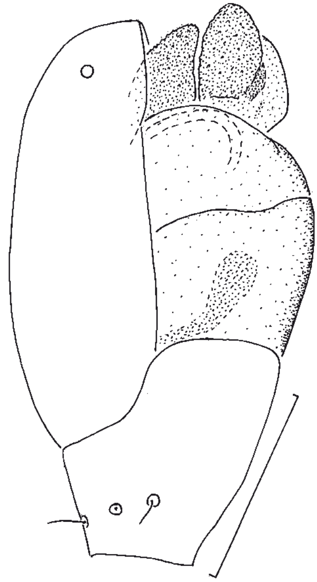


figs. 22-27a: *Theridion cairoense* **n. sp.**; 22) ♂, ventral aspect of the distal half of the opisthosoma; 23-24) ♂, ventral and retrolateral aspect of the right pedipalpus; 25) proventral and slightly apical aspect of the right embolus and conductor; 26) prolateral aspect of the right median apophysis; 27-27a) ♀, epigynal pit and dorsal aspect of the vulva. Scale bars 0.5 in fig. 2), 0.2 in figs. 23-24, 0.1 in the remaining figs.;

figs. 28-30b: *Theridion harmsi* **n. sp.**; 28-29) ♂ holotype from Spain (Arroya de Caracara), ventral and retrolateral aspect of the right pedipalpus; 30) proventral and slightly



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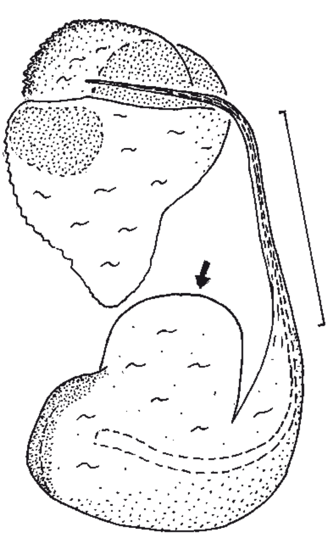

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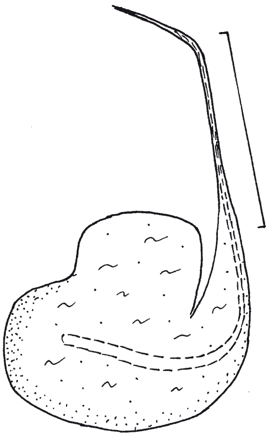

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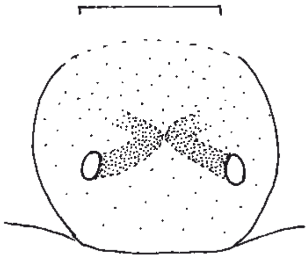

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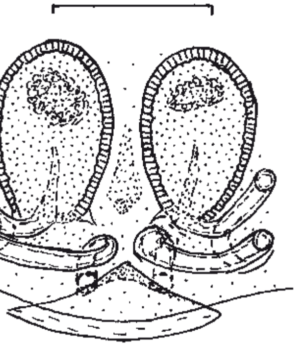

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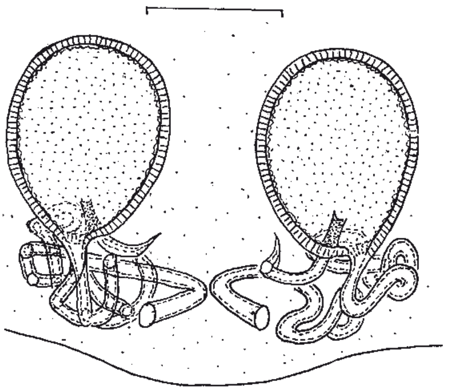
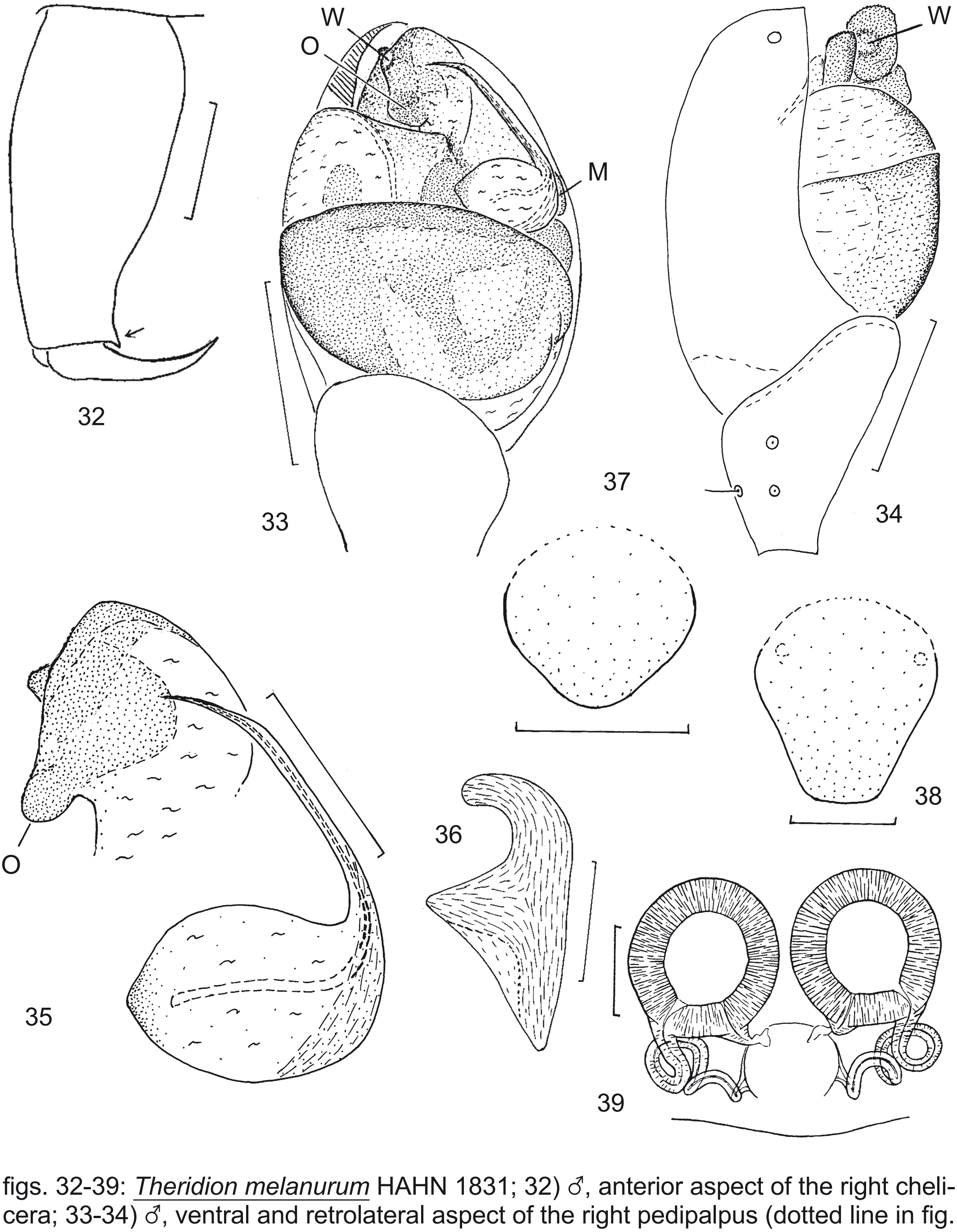


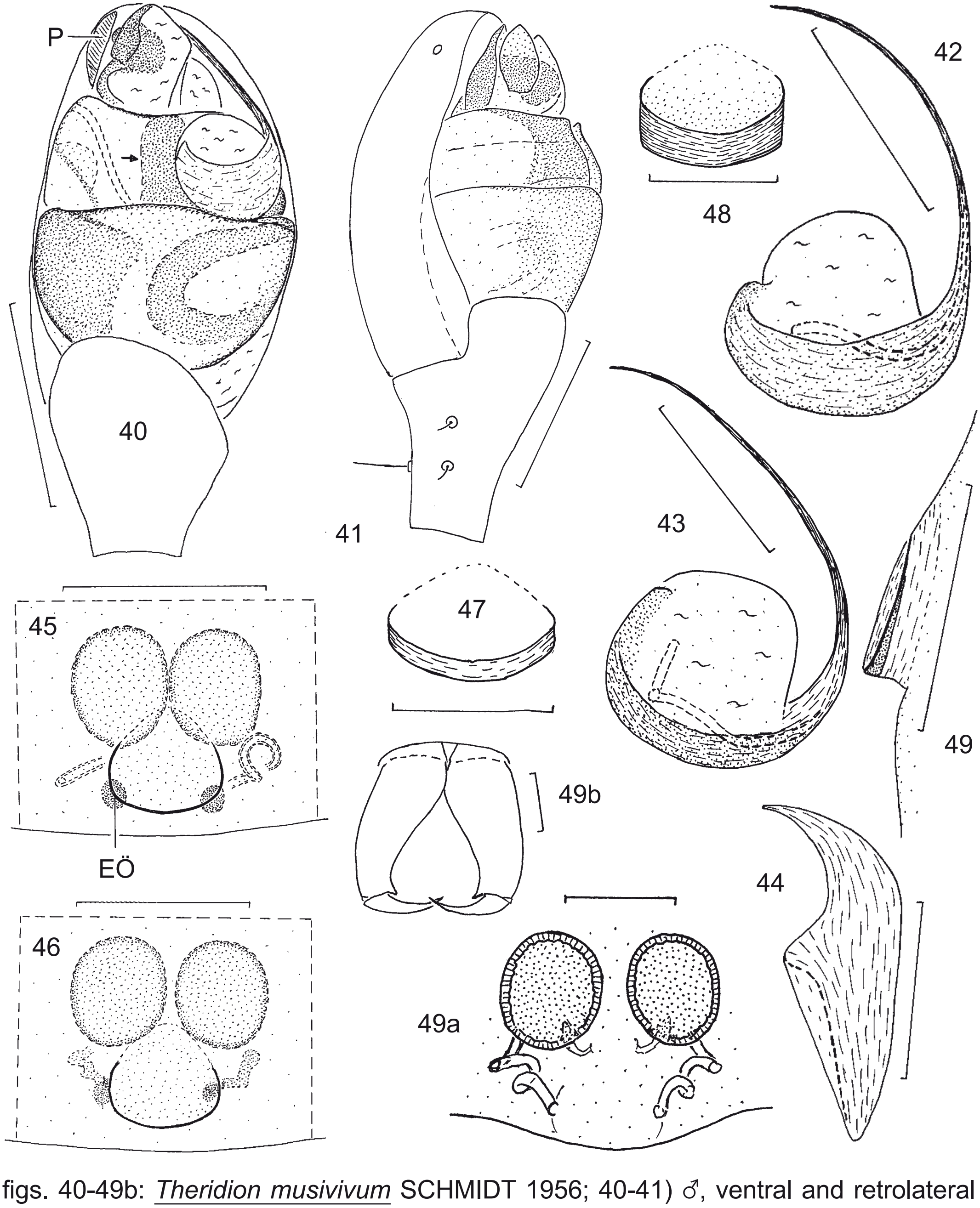
31b

apical aspect of the right embolus and conductor; 30a) paratypes ♂ from Sollers (Mallorca) as well as Menton and Gorge Caramel (France); proventral and slightly apical aspect of the right embolus which is less bent than in the holotype; 30b) ♀ paratype from Spain (Arroya de Caracara), dorsal aspect of the vulva. Scale bars 0.2 in figs. 28-29, 0.1 in figs. 30a-b;

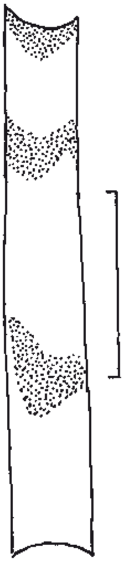
31a-b) *Theridion* sp. indet. 4. ♀ from Coux (France), epigynal pit and dorsal aspect of the vulva. Scale bar 0.1;



figs. 32-39: *Theridion melanurum* HAHN 1831; 32) ♂, anterior aspect of the right chelicera; 33-34) ♂, ventral and retrolateral aspect of the right pedipalpus (dotted line in fig. 33 (arrow): stronger convex tegular margin in a more anterior aspect of the pedipalpus); 35) proventral and slightly apical aspect of the right embolus and conductor with its outgrowth; 36) prolateral aspect of the median apophysis of the right pedipalpus; 37-38) ♀, epigynal pit, variability; 39) dorsal aspect of the vulva, taken from THALER (1966). M = median apophysis, O = basal outgrowth of the conductor, W = weakly sclerotized area of the terminal apophysis. Scale bars 0.2 in figs. 32-34, 36, 0.1 in the remaining figs.;



figs. 40-49b: Theridion musivivum SCHMIDT 1956; 40-41) ♂, ventral and retrolateral aspect of the right pedipalpus (P = paracymbium); 42-43) proventral and slightly apical aspect of the right embolus; 44) prolateral aspect of the median apophysis of the right pedipalpus; 45-46) ♀, ventral aspect of the epigyne (variability); 47-48) aboral aspect of the epigynal pit in which the posterior margin is stronger sclerotized in fig. 47) (from Sao Miguel, Azores) than in a ♀ from Madeira (fig. 48); 49) lateral aspect of the epigyne; 49a) ♀ from La Gomera, Canary Islands, dorsal aspect of the vulva; 49b) ♂ from La Palma, El Paso (CJW), anterior aspect of the chelicerae which are very strongly diverging in this specimen. Scale bars 0.2 in figs. 40-41, 45-46, 49, 0.1 in the remaining figs.;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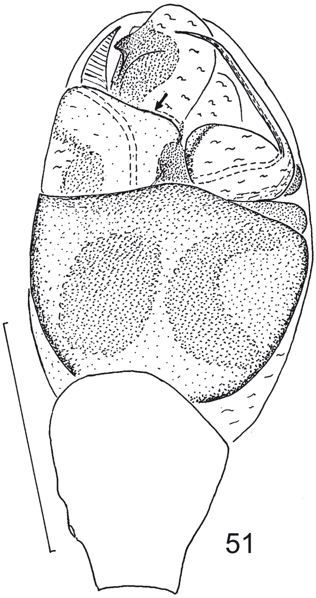
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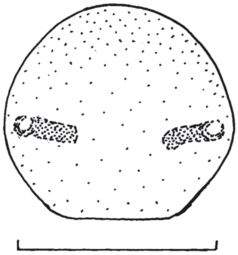

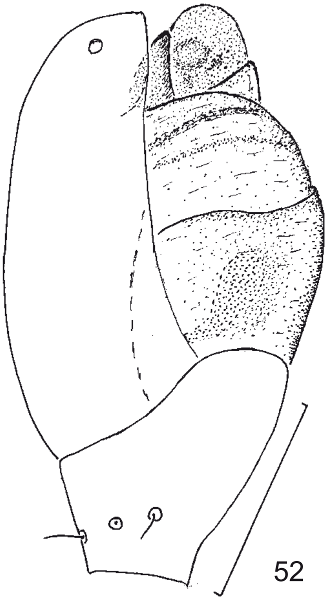
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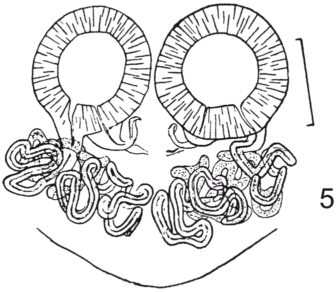
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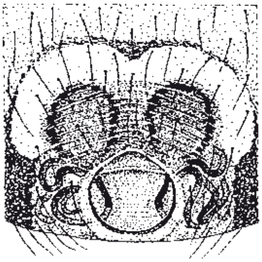
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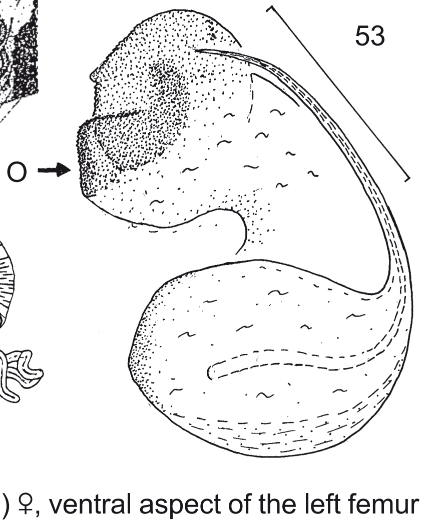

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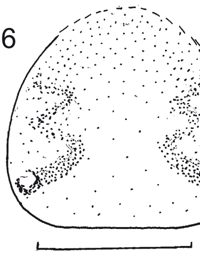

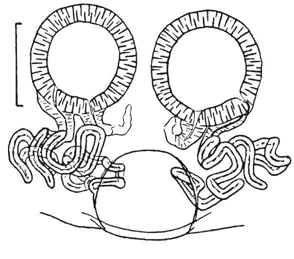
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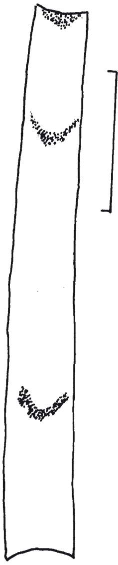
figs. 50-55: _Theridion mystaceum_ L. KOCH 1870; 50) ♀, ventral aspect of the left femur I; 51-52) ♂, ventral and retrolateral aspect of the right pedipalpus; 53) proventral and slightly apical aspect of the right embolus and conductor; 54-54a) ♀, epigynal pit, variability, 54a) taken from ROBERTS (1998); 55) dorsal aspect of the vulva, taken from THALER (1966). Scale bars 0.5 in fig.50, 0.2 in 51-52, 0.1 in the remaining figs.;

fig. 56) _Theridion sp. indet. 2_ from Crete (?= *helena* n. sp.), ♀, epigynal pit. Scale bar 0.1; see the key to the females above;

fig. 57) _Theridion sp. indet 3_ from N-Italy (Lake Lugano) ♀, vulva, taken from THALER (1966). Scale bar 0.1;



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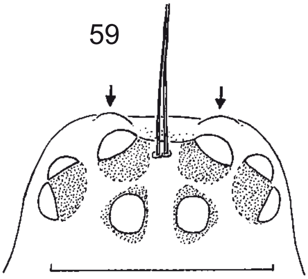

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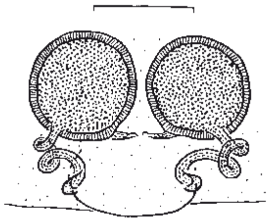

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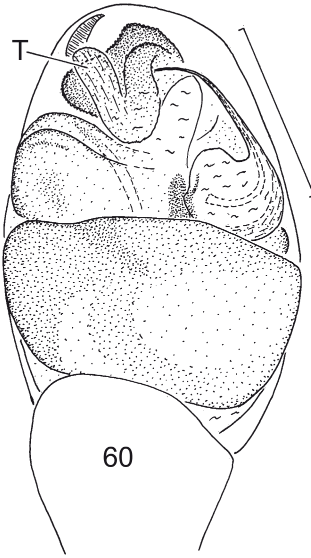

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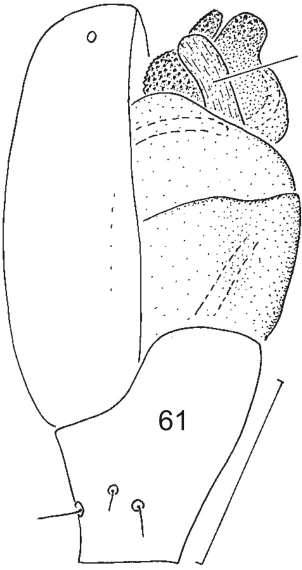

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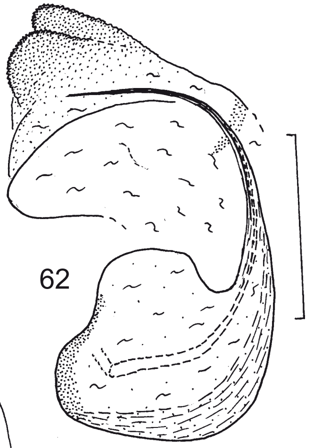

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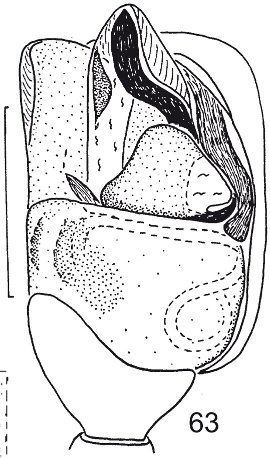

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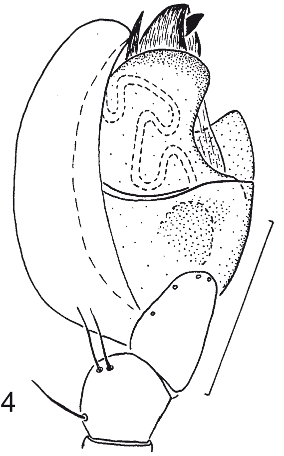

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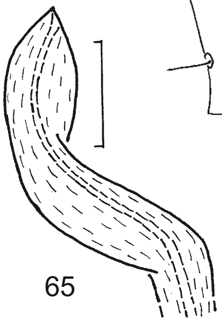

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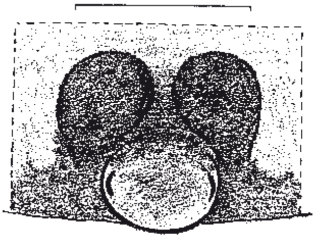

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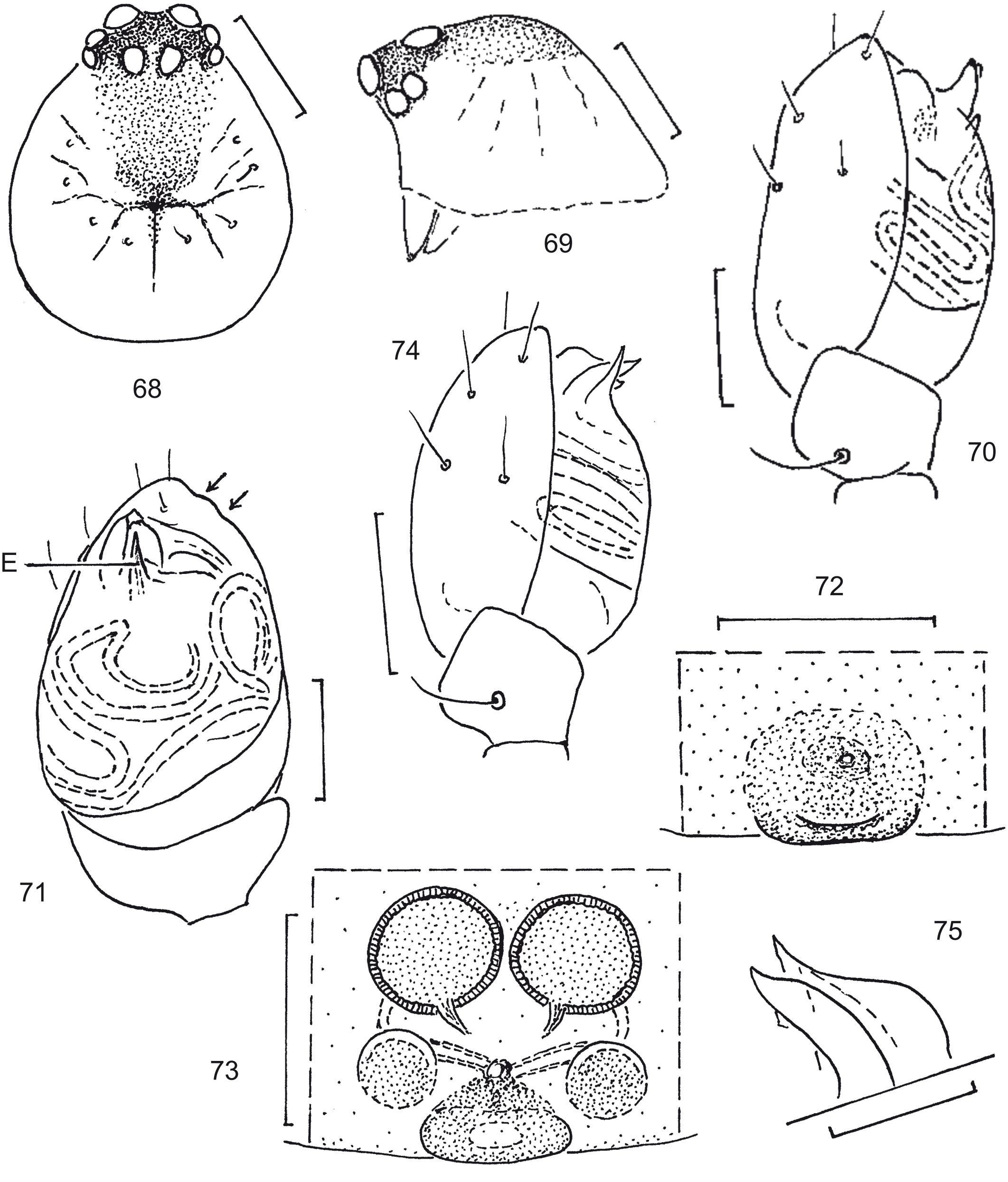
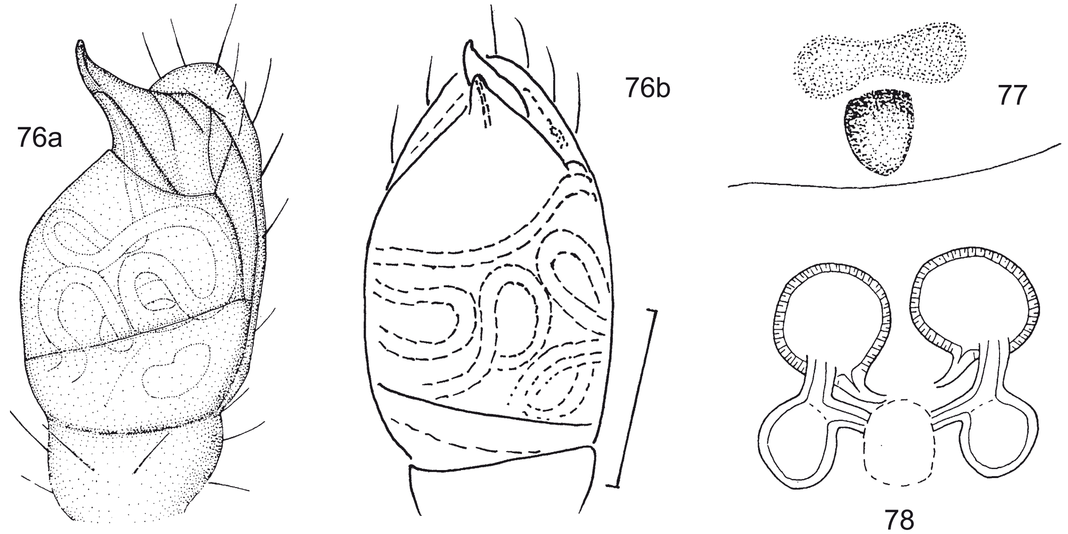
figs. 58-62: *Theridion malagaense* **n. sp.**; 58) ♀, ventral aspect of the left femur I (as in *Theridion* sp. indet. 2); 59) dorsal aspect of the anterior part of the ♂-prosoma. The arrows point to the pair of the clypeal humbs which exist also in related species; 60-61) ♂, ventral and retrolateral aspect of the right pedipalpus (T = tongue-shaped apophysis of the conductor); 62) proventral and slightly apical aspect of the right embolus and conductor. Scale bars 0.5 in fig. 58-59, 0.2 in 60-61, 0.1 in 62;

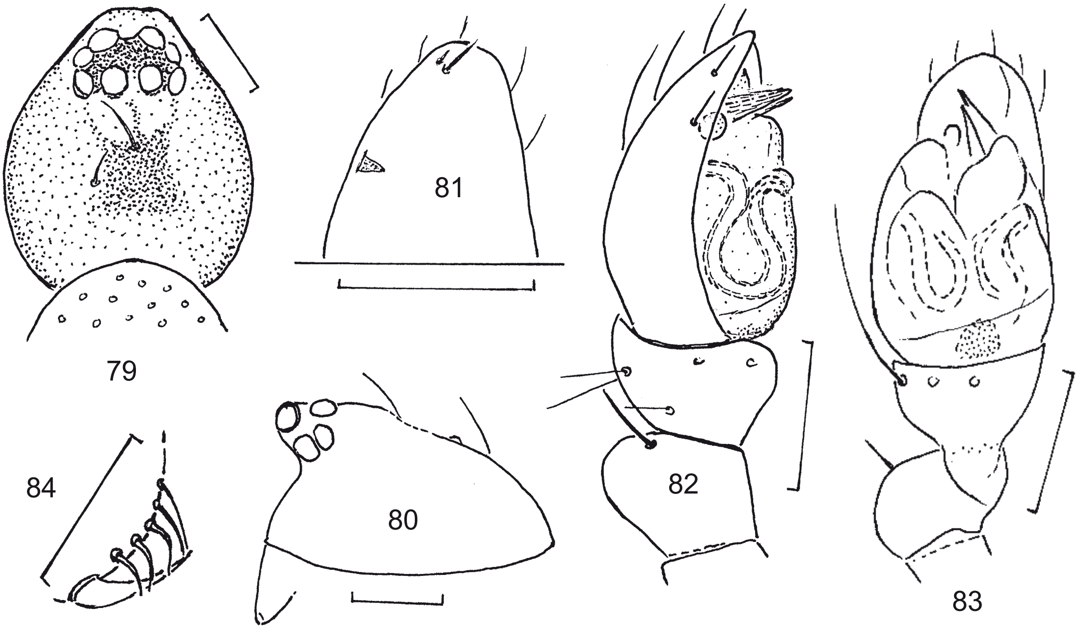
figs. 63-67: *Grancanaridion grancanariense* (WUNDERLICH 1987); 63-64) ventral and retrolateral aspect of the right ♂-pedipalpus, 65) ventral aspect of the right embolus. Note the sperm duct which ends near the tip of the embolus; 66-67) ♀, epigyne and dorsal aspect of the vulva. Scale bar 0.1 in fig. 67) 0.2 in the remaining figs;



figs. 68-73: *Lasaeola algarvensis* **n. sp**.; 68-69: dorsal and lateral aspect of the ♂-prosoma. Note the sclerotized lines which are not furrows; 70-71) retrolateral and ventral aspect of the right ♂-pedipalpus (E = embolus); the arrows point to the modified prodistal part of the cymbium; 72) ♀, epigyne; 73) dorsal aspect of the vulva. Scale bars 0.2 in figs. 68-69), 0.1 in the remaining figs.;

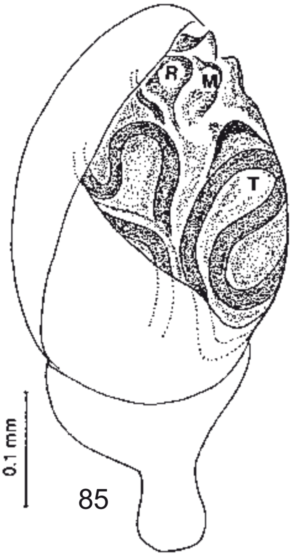
figs. 74-75: *Lasaeola striata* (WUNDERLICH 1987), ♂ from Gran Canaria; 74) retrolateral aspect of the right pedipalpus; 75) distal part of the right bulbus, prolateral aspect. Scale bars 0.1 and 0.05;





figs. 76-78: <u>*Lasaeola testaceomarginata*</u> SIMON 1881, specimens from Italy (Sicily); 76a) proventral aspect of the right ♂-pedipalpus; 76b) ventral (slightly different from fig. 76a) aspect of the right ♂-pedipalpus; 77-78) ♀, epigyne and vulva. The figures except 76b) are taken from BRIGNOLI (1968);

figs. 79-84: <u>*Lasaeola minutissima*</u> **n. sp**.; 79-80) dorsal and lateral aspect of the ♂-prosoma; the darkening is not drawn in fig. 80); 81) distal part of the right cymbium, ventral aspect. Note the spine-shaped internal retromarginal paracymbium and the two tiny apical bristles within the cymbium; 82-83) retrolateral and ventral aspect of the right ♂-pedipalpus; 84) subadult ♀, anterior aspect of the distal part of the right chelicera. Note the strong and bent hairs. Scale bars 0.2 in figs. 79-80), 0.1 in the remaining figs.;



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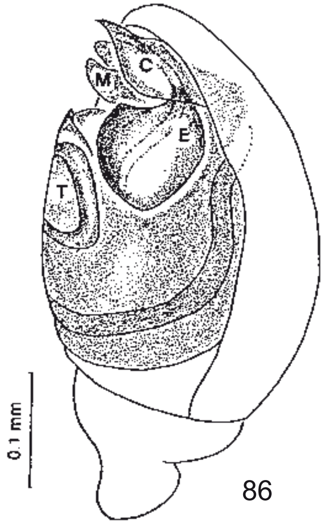

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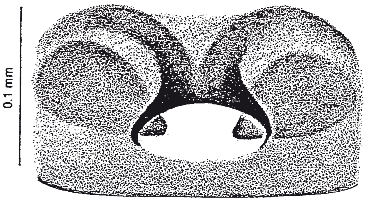

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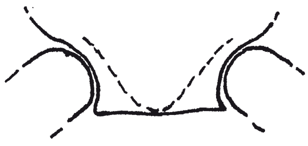

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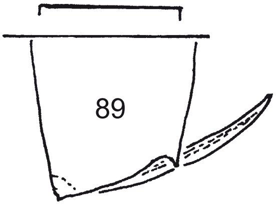

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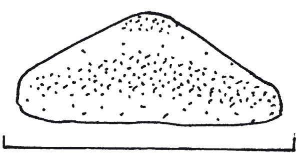

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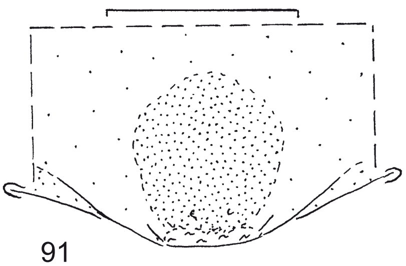

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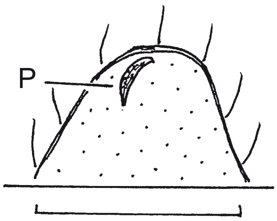

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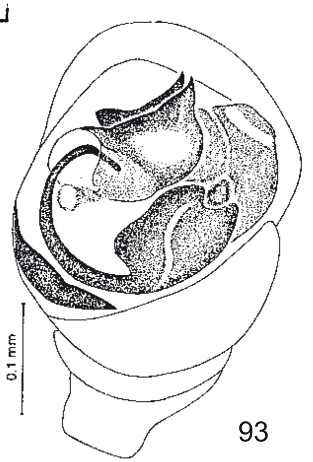

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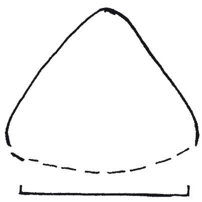
figs. 85-87: Lasaeola convexa (BLACKWALL 1870); 85-86) ♂ from Israel, prolateral and retrolateral aspect of the left pedipalpus; 87) ♀ from France, epigyne. Taken from LEVY (1998) (under *Dipoena*);

figs. 88-94: Ruborridion musivum (SIMON 1873) (**n. gen. n. comb**.); 88) ♂♀, coxae IV which are widely spaced by the sternum like in *Paidiscura*. Dotted medially: Shape of this structure in most Theridiinae like *Simitidion* and *Theridion*; 89) ♂, distal part of the right chelicera, anterior aspect; 90) labium (hairs are not drawn); 91) ♂, epigaster; 92) ♂, distal part of the right cymbium with the hood-shaped paracymbium (P), ventral aspect; 93) ♂, ventral aspect of the left pedipalpus; 94) ♀, epigyne. Figs. 93-94 are taken from LEVY (1998). Scale bars 0.1 in fig. 89), 0.2 in figs. 90-92, no scale in fig. 88);



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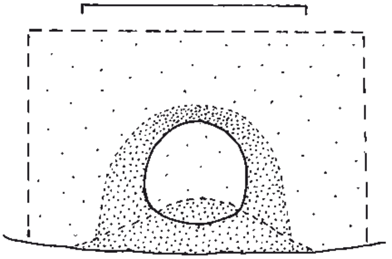

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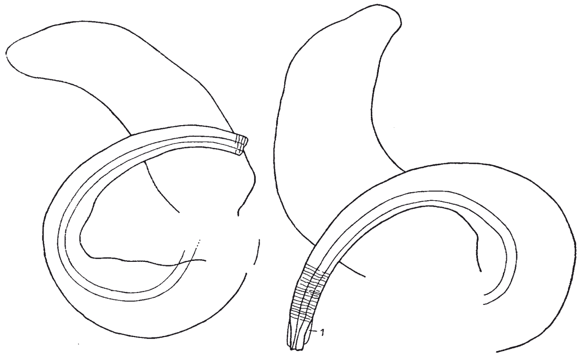
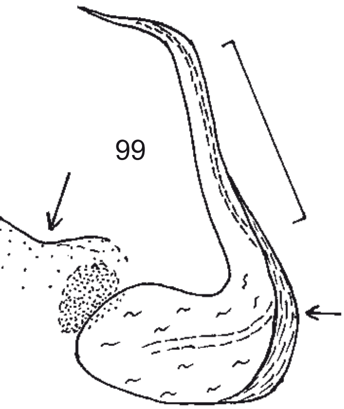
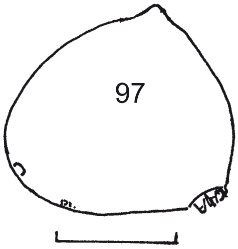


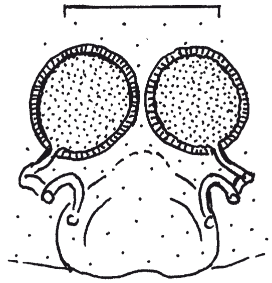
98



99



101



100

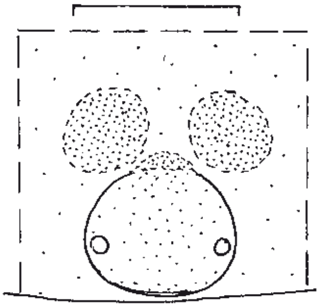


fig. 95) frequent shape of the labium in members of the Theridiinae, e. g. in *Paidiscura, Simitidion* and *Theridion* (hairs are not drawn). Scale bar 0.2;

fig. 96) *Anatolidion gentile* (SIMON 1881), ♀ from Morocco, MNHN AR 2253 (under *Theridium crinigerum*), epigyne. Scale bar 0.2;

fig. 97) *Heterotheridion nigrovariegatum* (SIMON 1873), ♀ from Germany, outline of the opisthosoma, lateral aspect. Note the dorsal hump in the centre which is absent in other specimens of the same population (ca. 20 spiders were studied). May this hump be regarded as a "reversal" which allows conclusions on the relationships of the taxon? Scale bar 1.0;

fig. 98) *Parasteatoda tepidariorum* (C. L. KOCH 1841), ♂, left and right embolus. The right embolus is intact (1), the tip of the left embolus has been broken off at a "predetermined breaking point". – Taken from LOCKET & LUCZAK (1974: Fig. 6);

figs. 99-101: *Theridion helena* **n. sp.**; 99) ♂, embolus and distal tegular margin of the right pedipalpus, ventral-prolateral aspect; 100-101) epigyne and dorsal aspect of the vulva. Scale bars 0.1 in fig. 99), 0.2 in figs. 100-101). Vgl. fig. 56).

FAMILY LINYPHIIDAE

Abstract: The genus *Stajus* SIMON 1884 (**gen. resurr**.) is removed from the synonymy with *Entelecara* SIMON 1884, the male of *E. cacuminum* DENIS 1954 is described for the first time, *Entelecara italica* THALER 1984 is regarded as a questionable member of *Entelecara*, *Entelecara errata* O. PICKARD-CAMBRIDGE 1913 is regarded as a questionable synonym of *E. media* KULCZYNSKI 1887 (**quest. syn**.). The following synonyms are based on A. HOLM's personal information: *Entelecara forsslundi* TULLGREN 1955 = *E. flavipes* (BLACKWALL 1834) (**n. syn**.), *E. helfridae* TULLGREN 1955 ?= *E. acuminata* (WIDER 1834) (**quest. n. syn**.), and *E. klefbecki* TULLGREN 1955 = *Gnathonarium dentatum* (WIDER (1834) (**n. syn**.). Selected species of the genus *Entelecara* are figured, a key is given to the European species of this genus except the Southern European ones which are characterized in short. – The genus *Trichoncus* SIMON 1884 s. l. is partly revised, *Lasiargus* KULCZYNSKI 1894 is downgraded from genus to subgenus rank (**n. stat**.) of *Trichoncus*, *Lasiargus hirsutoides* WUNDERLICH 1995, *L. hirsutus* MENGE 1869, *L. pilipes* KULCZYNSKI 1908, and *L. zhui* ESKOV & MARUSIK 1994 are transferred to *Trichoncus* (**n. comb**.); the following **new subgenera** of *Trichoncus* are described: *Remottrichoncus* (type species: *Trichoncus orientalis* ESKOV 1992) (Eastern Palaearctic), *Tanatrichoncus* (type species: *Trichoncus villius* TANASEVITCH & PITERKINA 2007) (Kazakhstan), *Obscurtrichoncus* (type species: *Walckenaera saxicola* O. PICKARD-CAMBRIDGE 1861, and *Sulctrichoncus* as well as *Trichoncus* (*Sulctrichoncus*) *ambrosii* **n. sp**. iaredescribed from Switzerland, *Trichoncus vasconicus* DENIS 1944 is regarded as a dubious species and a questionable synonym of *Trichoncus affinis* KULCZYNSKI 1894 (**quest**. **n. syn**.), *Trichoncus varipes* DENIS 1965 is regarded as a synonym of *Trichoncus saxicola* (O. PICKARD-CAMBRIDGE 1861) (**n. syn**.), *Trichoncus trifidus* is regarded as a questionable synonym of *Trichoncus helveticus* DENIS 1965 (**quest**. **n. syn**.). *Saloca elevatum* **n. sp**. is described from Turkey (Anatolia), *Plesiophantes tanasevitchi* **n. sp**. is described from the Caucasus.

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In the European taxa of the diverse family Linyphidae exist still numerous problems, see e.g. WUNDERLICH (2008: 685-697); examples which are treated in this paper are the genera *Entelecara* and *Trichoncus*.

A. SUBFAMILY ERIGONINAE

(1) and (2) the genera *Stajus* SIMON 1884 and *Entelecara* SIMON 1884 in Europe

The monotypic genus *Stajus* SIMON 1884 was synonymized with *Entelecara* SIMON 1884 by MILLIDGE (1977), followed e.g. by BOSMANS (2007: 124, figs. 19-24) (sub *Entelecara*), but both genera are quite different, and *Stajus* has to "revive", see below. Some work has still to do in the taxonomy of *Entelecara*.

(1) ***Stajus*** SIMON 1884 **(gen. resurr.)** (figs. 1-5) photo 86

Type species (the only known species of the genus): *Erigone truncatifrons* O. PICKARD-CAMBRIDGE 1875 (figs. 1-5, photos). -- Material: Spain, N-Mallorca, (1) near Arta, in a garden, beaten from bushes, 3♂2♀, JW leg. in VI 2004, 2♂2♀, CJW, 1♂ coll. BOSMANS; (2) near Alcudia, 1♀ JW leg. in VI, CJW.

Diagnosis: Sequence of the tibial bristles 1/1/1/1, metatarsal IV trichobothrium absent, colour of body and legs alive orange, ♂-caput with two ledges behind the lateral eyes (photos, figs. 1-2) but without depressions or lobe, with long dorsal hairs (photos, fig. 1). Embolic division: Fig. 4. Epigyne (fig. 5) with a light medial plate; vulva: Receptacula seminis widely spaced, introducing ducts not sclerotized.

Further characters: Eyes large, position of the metatarsal I trichobothrium in about 0.55. Pedipalpal tibial apophyses: Fig. 3. Note: The hairs of the male caput are much longer than shown in the figs. 19-20 by BOSMANS (2007); most hairs are most probably rubbed off in old material.

Close **relationships** (the sister taxon) are (is) unsure. The sequence of the tibial bristles is identical with the single – myrmecophilous – member of *Evansia* O. PICKARD-CAMBRIDGE 1900 which genital structures are differrent (but similar to *Moebelia* DAHL 1886), and which ♂-prosoma is also different. According to the different characters of the body, the colour, the chaetotaxy, and the structures of the embolic division (fig. 4) *Entelecara* may also be related but is clearly different in certain characters, see below (the tab., and the figures 6ff). In these genera exist two long tibial apophysis of the male pedipalpus which are directed retrolaterally (similar in several other erigonine genera like certain members of *Diplocephalus*); members of *Entelecara* (part.), *Moebelia* (on bark) and *Stajus* are dwellers of higher strata of the vegetation.

Character	*Entelecara*	*Moebelia*	*Stajus*	*Diplocephalus*
sequence of the tibial bristles	2/2/1/1 (*)	2/2/1/1	1/1/1/1	2/2/1/1
prosomal colour	(dark) brown (**)	(dark) brown	orange photo 86	(dark) brown
♂-caput	with furrows behind the post. lateral eyes, (fig. 7), no long hairs	variable	a pair of ledges behind the lateral eyes and long hairs (photos, fig.1)	variable
trichobothrium on metatarsus IV	most often present but absent in *flavipes*, *omissa* and *schmitzi*	present	absent	absent
epigyne	---- with a median plate (e.g. figs. 5, 49) ----			divided

(*) Except ?*Entelecara italica* THALER which has it 1/1/1/1 like *Stajus* and *Evansia*.
(**) Yellow in a sp. indescr. from E-Siberia, coll. Y. MARUSIK.

Tab. 1. Selected characters of *Entelecara* and certain related genera.

Herewith I remove (resurrect) *Stajus* SIMON 1884 from the synonymy with *Entelecara* SIMON 1884 (**gen. resurr**.).

Arguments for "reviving" *Stajus*: Chaetotaxy, trichobothriotaxy, the colour of the prosoma and the hairs of the male caput as well as the presence of prosomal depressions/furrows are quite different in *Stajus* and *Entelecara*. As already correctly noted by SIMON (1926: 363) lateral depressions/furrows of the male caput are absent in *Stajus truncatifrons*; existing are two ledges which borders are bulging areas behind the lateral eyes (photo 86, figs. 1-2). The shape of the pedipalpal tibial apophyses is similar in both genera but they are similar – convergently evolved – in several genera of the Erigoninae, see above. The embolic division of *Stajus truncatifrons* (fig. 4) is quite different to *Entelecara* and *Moebelia*.

Distribution: Western Mediterranean: Algeria, Corsica, continental France; new to Spain (Mallorca).

(2) ***Entelecara*** SIMON 1884

Material: Most material is deposited in the CJW and the SMF. Further material:
cacuminum: Pyrenenees, Bague res-de Bigorre, 1♂1♀, MNHN Paris, b. 934 (sub *Entelecara erythropus*);
errata: England, 1♂2♀ PICKARD-CAMBRIDGE coll., University Oxford;
media: 1♂, lectotype, 1♂1♀, paratypes, South Tyrol, Trafoier Valley, Franzenshöhe, coll. KULCZYNSKI; Museum Warsaw; 7♀ Austria, near Heiligenblut, 2100 m, below stones, JW leg in VIII 1971, CJW/SMF; 1♂1♀, 1juv. Switzerland, Saas-Fee, 2500 m, below stones, JW leg in VIII 1970, CJW/SMF;
schmitzi: Madeira, 1♂6♀, coll. KULCZYNSKI, Museum Warsaw;
turbinata: France, Ax-les-Thermes, 1♂, MNHN Paris, b. 934, 25557.

The genus *Entelecara* SIMON 1884 in the sense of various authors of the 20th century – besides *Stajus* (see above) and the true *Entelecara* – has turned out as a mixtum of at least six genera which are related or not:

E. graeca (O. PICKARD-CAMBRIDGE 1872) = *Diplocephalus g.*,
?E. italica THALER 1984: See below (relationships unsure),
E. meticulosa SIMON 1918 (incl. sensu WIEHLE (1960)) = *Diplocephalus picinus*,
E. subelevata (L. KOCH 1869) = *Erigonella s.*,
E. thorelli (WESTRING 1861) = *Trichopternoides* WUNDERLICH 2008,
E. trifrons (O. PICKARD-CAMBRIDGE 1863) = *Baraphyma t.*

Species: In Europe occur at least 10 species of *Entelecara*: *Acuminata, aestiva, cacuminum, congenera, errata, erythropus, flavipes, ?italica* (relationships unsure), *omissa, schmitzi*, and *turbinata*.
Dubious species are *erecta* L. KOCH, *frontalis* OHLERT, and *strandi* KOLOSVARY; according to the strongly protruding epigyne *strandi* is not a member of *Entelecara*.
Synonymy: A long time ago HOLM studied type material of some *Entelecara* species which were described by the late TULLGREN (1955) from Sweden, based on females. To my knowledge the synonymy of these species has never been published: According to HOLM (in litt. 1971) *E. klefbecki* is a junior synonym of *Gnathonarium dentatum* (WIDER 1834) (**n. syn**.), *E. helfridae* TULLGREN is probably a junior synonym of *E. acuminata* (WIDER 1834) (**quest. n. syn**.), and *E. forsslundi* is a junior synonym of *E. flavipes* (BLACKWALL 1834) (**n. syn**.). According to JONSSON (2005) *E. depilata* TULLGREN 195 is a junior synonym of *E. omissa*. TANASEVITCH (e-mail in V 2009) do not want to exclude that *E. errata* and *omissa* may be junior synonyms of *E. media* KULCZYNSKI 1887(questioned by THALER (in litt. 1971); see DELTSHEV (1985)). In my opinion *errata* is probably a junior synonym of *media* (**quest. n. syn**.), I did not find distinct/constant differences in the structures of the bulbus of the two nominal species which both live under stones in high altitudes of mountains. Are both probably subspecies? See the suggestion of LOCKET, MILLIDGE & MERRETT (1974: 76).

Biogeography: *E. schmitzi* is most probably restricted to Madeira and the Azores.
E. aestiva, cacuminum, italica and *turbinata* are restricted to Southern Europe, *turbinata* is only known from the pyrenees, *errata* is only known from Great Britain.

Ecology of the Central European species: The following species are mainly dwellers of higher strata of the vegetation:
acuminata, congenera, erythropus, flavipes and some *omissa* (on lower plants in wet areas). The remaining species of Central Europe are mainly found on the ground, under stones, in detritus ect. E. *media* (like *errata*) is a species of (higher) mountains.

Diagnostic characters and relationships of *Entelecara*: See the tab. above.
A trichobothrium is absent on metatarsus IV in *flavipes, omissa* and *schmitzi.*
The sequence of the tibial bristles (2/2/1/1) is different from *Stajus* (1/1/1/1), in which the colour of the body, the shape of the prosoma and the embolic division are quite different, see the tab above.
In *Moebelia* DAHL 1886 the embolus is longer (ca. 1 ½ circles), the embolic loop is wider, the posterior margin of the epigyne is stronger sclerotized, their openings are widely spaced, in a quite lateral position. The European members of *Moebelia – berolinensis* (WUNDERLICH) and *penicillata* (WESTRING) – are dwellers of the bark of trees in contrast to members of *Entelecara*.
?Entelecara italica THALER 1984 (figs. 17-18; ♀ unknown) the sequence of the tibial bristles is 1/1/1/1 (like in *Evansia* and *Stajus*, see below!) in contrast to the (remaining) members of *Entelecara* in which the sequence is 2/2/1/1, and the male prosoma is also different, similar to certain members of *Diplocephalus*. Therefore I am in doubt about the relationships of this species.
The single – myrmecophilous – member of *Evansia* O. PICKARD-CAMBRIDGE 1900 is – according to its genital structures in both sexes closely related to *Moebelia* and *Entelecara* but its colour is light yellow brown and the tibiae bear only a single bristle as in *Stajus*.

Key to the European species of *Entelecara* except species which occur in Southern Europe only (diagnoses of these species see below):

Remarks: Intraspecific variability: The prosomal profile – namely in *acuminata* and *erythropus* – is rather variable in both sexes, I found the position of the tibial IV bristle varying between 0.23 and 0.3 within this species, the view of the epigyne varies strongly intraspecific and in slightly different aspects. The bulbi of some species – namely *errata* and *media* – are practically identical. Questionable synonymy of *errata, media* and *omissa*: See above. WIEHLE (1960) described *E. erythropus* erroneously as *media*, and *Entelecara meticulosa* SIMON sensu WIEHLE 1960 is really *Diplocephalus picinus* (BLACKWALL).
Distribution and ecology may be helpful in the determination of some species.

1 Metatarsal IV trichobothrium absent 2

- Metatarsal IV trichobothrium existing. 3

2(1) ♂: Pedipalpal tibia as in fig. 40. ♀-caput lower, as in fig. 43 . . . . *omissa*

- ♂: Pedipalpal tibia as in fig. 34. ♀-caput as in fig. 42 . . . . *flavipes*

3(1) ♂ 4

- ♀ 7

4(3) Prosomal lobe very high (fig. 7), pedipalpal tibia fig. 32 . . . . *acuminata*

- Prosomal lobe lower (figs. 12-14, 16) (its shape varies within every species!) 5

5(4) The large distal pedipalpal tibia apophysis bears a tooth at its base (arrow in fig. 33) . . . . *congenera*

- No such tooth (e.g. figs. 34-36) 6

6(5) Pedipalpal tibial apophysis as in fig. 35, with the shorter/basal apophysis pointed. Dwellers of higher strata of the vegetation (the following species – *errata* and *media* – live on the ground in (higher) mountains). . . . . *erythropus*

- Pedipalpal tibial apophysis as in figs. 36-38. Great Britain . . . . *errata*

- pedipalpal tibial apophysis (figs. 26-27, 39) slightly different (or only intraspecific variable?). Not Great Britain. Vulva fig. 56. . . . .*media*

7(3) caput higher, like in *cacuminum* (fig. 42) . . . . *acuminata*

- caput lower (fig. 43) 8

8(7) Epigyne (fig. 46): Medial plate only about as long as wide. . . . . *congenera*

- Medial plate of the epigyne distinctly wider than long (figs. 49, 47). 9

9(8) Epigyne (figs. 49-50) strongly protruding. Dwellers of higher strata of the vegetation (the following species – *errata* and *media* – live on the ground in (higher) mountains) . . . . *erythropus*

- Epigyne less protruding, usually as in figs. 47-48. . . . . *errata* (Great Britain) and *media* (not Great Britain; vulva fig. 56)

Remarks on Southern European and Macaronesian species of *Entelecara*:

Material: See above. The female is still unknown in *italica* and *turbinata*.
Entelecara aestiva SIMON 1918 (figs. 6, 41, 51-52)

Diagnosis: According to DENIS (1945) the bristle on tibia IV is quite long, 1.75 times the tibial diameter in contrast to related species (1.4 times). The lobe of the ♂-prosoma (fig. 6) is very high, wider than in the related *E. turbinata*. Pedipalpal tibial apophysis: Fig. 41, epigyne (figs. 51 – 52) with a very wide medial plate.

Distribution: SW-France, Italy (PISARINI (1996)).

Entelecara cacuminum DENIS 1954 (figs. 14, 19, 23, 42, 44-45)

Material of specimens which I regard as most probably as conspecific with *E. cacuminum*: See above. The male was unknown up to now.

Diagnosis: Lobe of the ♂-prosoma (figs. 14, 19) fairly high, anteriorly strongly widened, and with a restriction behind the posterior eye row. Pedipalpus: Tibial apophyses as in fig. 23. ♀: Prosoma distinctly elevated (fig. 42), epigyne (figs. 44 – 45) with a wide plate. Position of the metatarsal I trichobothrium in ca. 0.45, tm present on IV.

Further characters: Prosomal: Length 0.68 mm in both sexes, colour (alcohol material) medium brown, tibial bristles about as long as the tibial diameter, in the male on tibia I slightly shorter.

Distribution: SW-France.

?Entelecara italica THALER 1984 (figs. 17-18)

Diagnosis (♂; ♀ unknown): Sequence of the tibial bristles 1/1/1/1, ♂-prosoma (fig. 17) with two lobes. Metatarsal IV trichobothrium present.

Relationships: See above. The sequence of the tibial bristles is as in *Evansia* and *Stajus*.

Distribution: Italy (Abbruzzes).

Entelecara schmitzi KULCZYNSKI 1905 (figs. 15, 21, 28-29, 43, 53-55)

Diagnosis: Lobe of the ♂-prosoma (figs. 15, 21) fairly high, anteriorly widened. Pedipalpus: Tibia as in fig. 28, bulbus as in fig. 29. ♀: Prosomal profile as in fig. 43, epigyne as in figs. 53-54, vulva as in fig. 55. Position of the metatarsal I trichobothrium in ca. 0.65, no trichobothrium on metatarsus IV.

Distribution: Azores, Madeira, see WUNDERLICH (1992: 25); in my opinion most probably not France, but see DENIS (1945: 211).

Entelecara turbinata SIMON 1918 (figs. 8, 22, 30-31)

Diagnosis (♂; ♀ unknown): Lobe of the ♂-prosoma (figs. 8, 22) very high and slender. ♂-pedipalpus: Tibia with three apophyses (fig. 30), the basal one slender and pointed, bulbus as in fig. 31.
The position of the metatarsal I trichobothrium and its existence on IV are unknown.

Distribution: France: Pyrenees.

(3) ***Trichoncus*** SIMON 1884 s. l. – mainly Central European subgenera and species.

The present paper is only a small step in the knowledge of the very difficult genus *Trichoncus*, and most probably errors will exist; misidentifications may exist in few of the figures which I took from several authors.
Competent arachnologists like DENIS, KULCZYNSKI, MILLER, MILLIDGE, SIMON and WIEHLE published on this genus. DENIS (1965) treated 17 species of *Trichoncus*, and two subspecies of *T. vasconicus* as well as *pusillus* (now *Heterotrichoncus*); several species are dubious or synonyms, *uncinatus* is still known from N-Africa only, 4 species were based on the female sex only.
Especially this paper by the late DENIS caused numerous confusions. This author described two or three times the same species although they were based on both sexes, and the corrections as well as the clarifying of further possible synonyms will be difficult work in the future.
The number of published erroneous determinations is endless. Errors resulted for example from the not well-known intraspecific variability in *Trichoncus*, e.g. the more or less darkened tibiae I-II (see *T. affinis* and *ambrosii* below), the shape of the clypeus, the dorsal prosomal profile and the epigyne as well as the length of the tibial bristles.

The tibiae I-II – even intrapopular – may be uniformly yellow or slightly to distinctly darkened in species of the subgenera *Obscurtrichoncus* and *Sulctrichoncus* (and bleached out in old preserved material, see e.g. *T. ambrosii*). The copulatory/genital organs may furthermore give a quite different view in only slightly different aspects; and the bulbi of most species are very similar. DENIS (1965: 464) reports very short ("anormalement courtes") tibial bristles from – the single (!) – male of *Trichoncus similipes* DENIS. In a male of *T. ambrosii* n. sp. from Switzerland I also found very short tibial bristles – they are pointed and surely not broken off – in contrast to females of the same locality and males from Italy in which they are about double in length, see below. Within 5 specimens of *T. affinis* from the Czech Republic (near Znojino) (kept in the East Bohemian Museum), I found the length of the tibial bristle I/II as following: 3♂ 0.07/0.14, 1♂ 0.1/0.15, 1♀ 0.2/0.2. In these males the length of the tibial bristles is apparently reduced at most on tibia I in contrast to females.

The real distribution of most species is unknown and – because of numerous misidentifications – has to be revised; in Europe may well be more synonyms in *Trichoncus* than really existing species, see below, as well as the endless list of misidentifications in the "World Spider Catalog" by PLATNICK. The list of misidentified spiders given by DENIS (1965: 474-475) has to be corrected.

Possible convergences and reversals in the evolution of *Trichoncus* s. l. (suggestions; see the possible cladogram):

Long hairs of the opisthosoma evolved in the subgenera *Trichoncus* and *Lasiargus* + – or (convergently and?) – *Tanatrichoncus*, darkened tibiae I-II evolved in *Lasiargus* (other darkened leg articles, as well), *Sulctrichoncus* + *Obscurtrichoncus*, a modified male caput evolved in my opinion convergently in *Sulctrichoncus, Lasiargus* and *Tanatrichoncus*.

Reversals may exist in *T. hispidosus* (presence of a trichobothrium on metatarsus IV, see the possible cladogram), in *Lasiargus* (shortened prodorsal pedipalpal tibial apophysis), in *Sulctrichoncus* (undivided receptacula seminis), and in *Remottrichoncus hyperboreus* in which tbiae I-II are not darkened.

In this paper I regard *Trichoncus* in a wide sense and include *Lasiargus* KULCZYNSKI 1894 as subgenus (n. comb.), see below.

Trichoncus SIMON 1884 is one of the taxa which have been splitted several times during the last years, it has turned out to be a polyphyletic taxon, certain species were transferred to other genera:

T. inerrans (O. PICKARD-CAMBIDGE 1885)= *Collinsia* O. PICKARD-CAMBRIDGE 1913,
T. pusillus MILLER 1958 = *Heterotrichoncus* WUNDERLICH 1970 (monotypical),
T. simoni (LESSERT 1904) = *Trichoncyboides* WUNDERLICH 2008 (monotypical),
T. vejdovskyi MILLER 1939 = *Trichoncoides* DENIS 1950 (= *Paratrichoncus* MILLER 1966, *Spaniophrys* DENIS 1966), = *Trichoncoides piscator* (SIMON 1884) (sub *Gongylidium*) (= *Rhaebothorax p.*) (probably monotypical).

Synonyms of selected species:

T. kulczynskii MILLER 1935 = *T. auritus* (L. KOCH 1869),
T. sordidatus MILLER 1947 = *T. sordidus* SIMON 1884,
T. trifidus DENIS 1965 may be a synonym of *helveticus* DENIS 1965 (**quest. n. syn**.),
T. varipes DENIS 1965 = *T. saxicola* (O. PICKARD-CAMBRIDGE 1861) (**n. syn**.).
T. vasconicus DENIS 1944 ?= *T. affinis* KULCZYNSKI 1894 (**quest**. **n. syn**.).

Remarks on selected European species of *Trichoncus*:

T. (Trichoncus) aurantiipes SIMON 1884 (figs. 107-111) has been reported by DENIS (1965) (sub *aurantipes*) from Northern Africa but has reported by BOSMANS (2007: 142) also from the Iberian Peninsula and Mallorca (I collected a male on Mallorca, too, CJW). The species is similar and related to *sordidus* (figs. 100-106).
T. (Obscurtrichoncus) gibbulus DENIS 1944 (♂ unknown) has been reported from France (the Pyrenees) only.
T. (Trichoncus) hirtus DENIS 1965 (♂ unknown) has been reported from Corsica only.
T. (Trichoncus?) patrizzii CAPORIACCO 1953 (♂ unknown) has been described from Italy (Isand Zannone). This dubious species may be a member of another genus; the position of its metatarsal I trichobothrium is in 0.47.
*T. (*subgenus *Trichoncus?) pinguis* SIMON 1926 (♂ unknown) has been reported from a cave in Spain only. SIMON (1926:461) compared this dubious species with *T. scrofa* sensu KULCZYNSKI (not SIMON). The species has not been described/figured in the paper by DENIS (1965) nor included in his key to the species. According to its colouration it is not a true cavernicolous species.

In Europe – all species are known from Southern Europe, some from Central (*) and/or Northern Europe, too – may occur at least the following 12 or 13 species of which the subgenera are listed, and few synonyms, too (see also above: the remarks, on selected species, and synonyms). These species are known from both sexes:

T. (Sulctrichoncus) ambrosii* **n. sp.,
**T*. (*Obscurtrichoncus) affinis* KULCZYNSKI 1894 (?= *vasconicus* DENIS 1944),
T. (Trichoncus) aurantiipes SIMON 1884,
**T. (Trichoncus) auritus* (L. KOCH 1869) (= *kulczynskii* MILLER 1935); see the note in the key below on the intraspecific variability),
**T. (Obscurtrichoncus) hackmani* MILLIDGE 1955),
**T. (Trichoncus) helveticus* DENIS 1965 (see *trifidus* below),
T. (Lasiargus) hirsutus* (MENGE 1869) (downgraded, **n. comb.),
T. (Trichoncus) monticola DENIS 1965 (living > 3000 m in Spain),
**T.* (*Obscurtrichoncus) saxicola* (O. PICKARD-CAMBRIDGE 1861) (= *varipes* DENIS 1965),
T. (Trichoncus) scrofa SIMON 1884 (the tibiae I-II bear a pair of lateral bristles!),
T. (*Obscurtrichoncus) similipes* DENIS 1965,
**T. (Trichoncus) sordidus* SIMON 1884,
(*T. (Trichoncus) trifidus*: Probably a synonym of *helveticus*, see below and above: “Intrapsecific variability”); see BOSMANS et al. (2010: 54-55, figs. 111-117).

Diagnosis of the genus *Trichoncus* s. l.: All tibiae bear a single dorsal bristle (*); ♂: Prosoma very variable, unmodified (most often) or with a pair of pits (*Lasiargus*, fig. 597) or pits and longitudinal furrows (*Sulctrichoncus*, figs. 59-60) or lobe as well as a transverse furrow (*Tanatrichoncus*, fig. 115), (see the cladogram) (**), pedipalpus (e.g. figs. 62-64): Tibia with several (at least two) apophyses, the prodorsal one close to the cymbium, usually very long (short in *Lasiargus*), in this case slender and bent, the cymbium bears dorsal borders, bulbus with a very long anterior radical process; ♀: epigyne (e.g. figs. 65-66) most often strongly protruding, vulva (figs. 71, 81, 95) usually with multisectional receptacula seminis (or with strongly thickened copulatory ducts).

Further characters: Tendency to the existence of darkened tibia I-II (see the cladogram), clypeus variable, most often vertical (figs. 59, 61, 115), fairly convex or concave, metatarsal IV trichobothrium absent or present (***), its position on I-II usually in the basal half (most often in 0.3-0.4 but ~ 0.8 in T. (*Lasiargus*) *hirsutus*), structures of the bulbus very similar/uniformly within the European species of the genus, the long embolus bears a seam in its whole length (fig. 64); the vulva (e.g. fig. 67) has very long and frequently partly strongly thickened copulatory ducts.

(*) The bristles are usually very long but occasionally short (see above: “intraspecific variability”) they may be very thin and similar to the numerous long leg hairs (in *Lasiargus* and *Tanatrichoncus*). According to WIEHLE (1960: 325) the sequence of the tibial bristles is 2/2/1/1 in *T*. (*Lasiargus*) *hirsutus* (in my opinion an error). DENIS (1965: 48) reports a pair of additional lateral (!) bristles in *T. scrofa*.

(**) A cephalic part of the male prosoma (sexual dimorphism) intragenerically modified in many ways is not rare in the subfamily Erigoninae of the Linyphidae; examples are the genera *Diplocephalus* and *Walckenaeria* (subgenera: See WUNDERLICH (1972), in which the male prosoma may be low, slightly modified or strongly modified within the same genus.

(***) It exists in *Lasiargus*, *Tanatrichoncus,* and within *Trichoncus* in *hispidosus* TANASEVITCH.

Type species: *Trichoncus scrofa* SIMON 1884.

Close **relationships** are unknown to me; *Dismodicus* SIMON 1884 may be one of the related genera.

Distribution: Palaearctic and probably tropical Africa (see below: The subgenus *Remottrichoncus*).

The subgenera of *Trichoncus* s. l.:

Note: The number of subgenera and the limit of the genus *Trichoncus* are a matter of opinion; the sister groups are not sure, and therefore I can only provide a possible cladogram which may appear arbitrary: Three authors will probably produce three different arrangements of the taxa in question; a “splitter” may regard some of my subgenera of *Trichoncus* as separate genera (and *Trichoncus* as sensu stricto).

(a) The nominate subgenus ***Trichoncus*** SIMON 1918 (= species-group I sensu DENIS (1965)).

Type species: *Trichoncus scrofa* SIMON 1884. Further European species: See the list above.

Diagnosis: Opisthosoma dorsally with long and thick (partly bristle-shaped) hairs which are 0.3-0.45 mm long, and not numerous (fig. 57); the tibiae I-II are yellow brown, not darkened, metatarsal IV trichobothrium usually absent (*Trichoncus hispidosus* TANASEVITCH & PITERKINA 2007 may be a member of this subgenus although metatarsus IV bears a trichobothrium), position of the metatarsal trichobothria I-II usually in the basal half (but 0.5-0.6 in *T. hispidus*).

Relationships: See the cladogram below; *Sulctrichoncus* + *Obscurtrichoncus* may be related. A long and erect retrodorsal tibial apophysis like in *Obscurtrichoncus* is absent.

Distribution: Palaearctic.

(b) ***Obscurtrichoncus*** **n. subgen**. (= species-group II sensu DENIS (1965)).

Type species: *Walckenaera saxicola* (O. PICKARD-CAMBRIDGE 1861). Further species: See above. *Trichoncus orientalis* ESKOV 1992 from the Russian Far East is also a member of this subgenus.

Diagnosis: Opisthosoma dorsally with short hairs, 0.1-0.2 mm long, which are slender and numerous (fig. 58). The tibiae I-II (and occasionally the femora) are frequently more or less (in most *affinis*) darkened, quite variable within the same population, see above ("intraspecific variability"). Metatarsal IV trichobothrium absent, its position on I-II in the basal half. The male pedipalpal tibia bears an erect and usually long dorsal apophysis (fig. 69).

Relationships: See the possible cladogram below.

Distribution: Palaearctic.

(c) ***Sulctrichoncus*** **n. subgen**. (figs. 59-66)

Type species (by monotypy): *Trichoncus* (*Sulctrichoncus*) *ambrosii* n. sp.

Diagnosis: Opisthosomal hairs short (fig. 58), tibiae I-II more or less darkened, metatarsal IV trichobothrium absent, its position on I-II in 0.34-0.37, The ♂-prosoma bears a pair of lateral furrows and small pits (figs. 59-60), long/erect dorsal pedipalpal tibial apophysis absent, receptacula seminis thin-walled.

Relationships: See the possible cladogram and *S. ambrosii* below; *Obscurtrichoncus* may be the sister group. Cephalic pits evolved convergently in *Lasiargus hirsutus*.

Distribution: Europe.

***Trichoncus* (*Sulctrichoncus*) *ambrosii* n. subgen. n. sp.** (figs. 59-67)

Derivatio nominis: It is a pleasure to me to dedicate this species to AMBROSIUS HÄNGGI, Naturhistorisches Museum Basel, who recognized the peculiarity of this species.

Acknowledgement: I thank A. HÄNGGI as well as MARCO MORETTI (Swiss Federal Research Institute WSL Biodiversity and Conservation Biology, Birmersdorf, Switzerland, M. K. OBRIST), who collected the spiders at the type locality in Switzerland.

Material: (1) Switzerland: Tessin, community of Locarno, areas which were burned several times between 1968 and 1997, 1♂2♀ M. MORETTI leg. in IV (♂) and VI (♀) 1997, holotype ♂ and 2♀ paratypes Museum of Natural History Basel. – (2) Italy (paratypes, Mus. Civico Sc. Nat. Bergamo, Zoology): (a) Esino Lario, 1100 m, Ortanella (2 tubes: 1♂/1♂1♀) P. PANTINI leg. in VI 1999; (b) Ferrara, Bosco della Mesola, 2♂5♀ (6 tubes), E. FABBRI leg. in VI-VIII 1995-1996.

Diagnosis (see the diagnosis of the subgenus): ♂: Cephalic part (figs. 59-60) distinctly raised posteriorly, bearing long hairs and a pair of lateral furrows/pits; pedipalpus (figs. 62-64): Prodorsal tibial apophysis long and slender, longitudinal cymbial border short; ♀: Epigyne (figs. 65-66) strongly protruding, medially with a longitudinal fissure behind a pair of circular structures and in front of a weakly sclerotized plate-shaped structure; vulva (fig. 67) with long and thick copulatory ducts and thin-walled receptacula seminis in a posterior position very near to the epigastral furrow which apparently are not divided (multifractional).

Description:
Measurements (♂/♀ in mm): Body length 1.65-1.9/~2.3, prosoma: Length 0.7-0.85/ 0.8-0.9, width 0.65/0.65-0.7; leg I: Femur 0.75/0.8, patella 0.21/0.22, tibia 0.7/0.75, metatarsus 0.58/0.64, tarsus 0.5/0.52, tibia IV 0.75/0.85.
Colour: Prosoma light to dark grey brown, surroundings of the eyes, cephalic furrows and margin darkened, legs mainly yellow to yellow brown, tibiae I-II very variable, frequently more or less darkened at least at their tips, most probably bleached out in the specimens from Switzerland as well as some specimen from Italy, opisthosoma light to dark grey brown.
Prosoma (figs. 59-61) 1.07-1.23 times longer than wide, posterior cephalic part with about 5 long and almost erect bristle-shaped hairs and weakly convex in the female but

distinctly raised in the male and bearing a pair of lateral furrows and small pits. Eyes: Posterior row ~ straight, posterior median eyes spaced by ca. their diameter, slightly more in most males, thoracal fissure indistinct, clypeus slightly to fairly convex, basal cheliceral articles large, lateral stridulatory files present, anterior margin of the cheliceral furrow with 4 larger teeth, posterior margin with 4 tiny teeth, fangs long and slender, sternum slightly longer than wide, coxae IV spaced by ca. ¾ of their diameter. – Legs slender, order IV/I/II/III, only fairly hairy, sequence of the tibial bristles 1/1/1/1, length of these bristles quite variable, on I/IV 0.12/? in the holotype from Switzerland but only 0.05-0.1/0.9-? in a male from Italy (Esino Lario), ca. 0.2/0.2 in most females; trichobothrium absent on metatarsus IV, its position on I in 0.34-0.37; the unpaired tarsal claw is bent in a right angle. – Opisthosoma oval, the short dorsal hairs are up to 0.16 mm long, most often only 0.1 mm (fig. 58). – ♂-pedipalpus (figs. 61-64, see also above): Patella slightly longer than wide, tibia wide, bearing two trichobothria, with a long and slender prodorsal apophysis which bears a tiny tooth-like basal structure, dorsal apophysis short (not erect), bearing a tooth-like structure. – ♀: Epigyne/vulva (see above): Figs. 65-67.

Relationships: According to the short opisthosomal hairs (fig. 58) and the frequently darkened tibiae I-II *T. ambrosii* is related to the subgenus *Obscurtrichoncus*, see the cladogram. Longitudinal cephalic furrows are unknown in other species of *Trichoncus*; pits exist in *Lasiargus* which is different in several characters, see the cladogram below. – A raised cephalic part exists also in *T. similipes* DENIS 1965 (which is a member of the subgenus *Trichoncus*), and in the female of *T. (Obscurtrichoncus) gibbulus* DENIS 1944 (Pyrenees, male unknown) in which the epigyne is quite different. In the dubious *T. patrizii* CAPORIACCO 1953 (Italy, male unknown) the position of the trichobothrium I is 0.47 according to DENIS (1965: 435). The vulva of *T. (Trichoncus) affinis* is similar but the receptacula seminis are thick-walled, fig. 71.

Distribution: Southern Switzerland (Tessin) and Italy.

(d) Subgenus ***Lasiargus*** KULCZYNSKI 1894 (**n. comb. & n. stat.**)

Type species: *Micryphantes hirsutus* MENGE 1866.
Further species: *Lasiargus hirsutoides* (WUNDERLICH 1995) (Mongolia) (**n. comb**.), *Metopobactrus pilipes* (KULCZYNSKI 1908) (Russia) (**n. comb**.), *Lasiargus zhui* ESKOV & MARUSIK 1994 (Russia) (**n. comb**.).

Diagnosis: Opisthosomal hairs long (similar to fig. 57), metatarsal IV trichobothrium present, its position on I-II in ca 0.8. ♂: Eye region protruding/bulging (fig. 118), small lateral cephalic pits exist (fig. 118), prodorsal pedipalpal tibial apophysis short, ♀: Epigynal scape usually present (fig. 117), absent in *T.* (*L.*) *laricetorum* ESKOV 1991 as a reversal.

Relationships: According to the genital organs – the conformation of the structures of the bulbus and the multisectional receptacula seminis as well as the chaetotaxy – which all are like in *Trichoncus* – I downgrade here *Lasiargus* KULCZYNSKI 1894 from genus to subgenus rank (**n. comb. & n. stat**.). See the possible cladogram below. *Tanatrichoncus* may be most related, see below and the possible cladogram. The position of the metatarsal I-II trichbothrium in other taxa of *Trichoncus* is less than 0.65.

Distribution: Palaearctic.

(e) ***Remottrichoncus*** **n. subgen**. (= *hyperboreus* species-group of *Trichoncus* sensu ESKOV (1992: 156)).

Type species: *Trichoncus hyperboreus* ESKOV 1992.
Questionable further species: According to ESKOV (1992) *Trichoncus kenyensis* THALER 1974 from the East Efrican mountains is "very similar" to *hyperboreus*.

Diagnosis: Opisthosomal hairs short (most probably as in fig. 58), tibiae I-II not darkened, metatarsal IV trichobothrium absent, its position on I in 0.35, erect dorsal pedipalpal tibial apophysis absent.
Further characters: Legs relaively thick, embolus only fairly long, epigyne strongly protruding, receptacula seminis not diveded (?).

Relationships: According to its characters *Remottrichoncus* may be closests to the subgenera *Sulctrichoncus* + *Obscurtrichoncus*, see the cladogram.

Distribution: Eastern Palaearctic and probably Africa.

(f) ***Tanatrichoncus*** **n. subgen**. (fig. 115)

Derivatio nominis: "Tana" is choosen in honour to ANDREI TANASEVITCH who described (e.g.) the type species of the new subgenus.

Type species (by monotypy):*Trichoncus villius* TANASEVITCH & PITERKINA 2007.

Material of *T. villius*: 2♂2♀ paratypes, Zool. Mus. State Univ. Moscow.

Diagnosis: Metatarsal IV trichobothrium present, its position on I-II in 0.54-0.6, opisthosoma with long dorsal hairs similar to fig. 57, tibial bristles very long and thin, similar to the very long dorsal hairs of this article. ♂-prosoma (fig. 115) anteriorly falling back, bearing a transverse furrow and a strong and hairy lobe, pedipalpal tibia with a very long, bent and slender prodorsal apophysis (and other apophyses), embolus relatively short; ♀: Epigyne not strongly protruding, with a posterior "plate", vulva unknown. Note: Spiniform long opisthosomal hairs exist in the subgenera *Lasiargus* and *Trichoncus*, and are apparently convergently evolved at least in *Trichoncus*.

Relationships: *Lasiargus* may be the sister taxon, see the possible cladogram.

Distribution: Kazakhstan.

New and questional synonyms:

Trichoncus varipes DENIS 1965 = *Trichoncus* (*Obscurtrichoncus*) *saxicola* (O. PICKARD-CAMBRIDGE 1861) (**n. syn**.) (figs. 72-75)

Material: (1) (sub *saxicola*): SW-Germany, Lorchhausen near Darmstadt, ♂♀ A. MALTEN leg., coll. A. MALTEN and CJW; W Tuttlingen 3♂3♀ JW leg. 1972, CJW/SMF; (2) Switzerland, Bedretto, 1♂1♀ NMB; 1♂ St. Luc (VS), coll. J. WALTER; (3) *T. varipes*: France, Mont Aigonal, holotype ♂, 2♀ paratypes, MNHN coll. SIMON tube no. 23706.

DENIS (1965) separated both nominal species mainly due to their distribution – *varipes* widely spread in Europe including France, *saxicola* only in Great Britain -, the existence of a "nose" of the ♂-clypeus (allegedly absent in *saxicola*), and minor differences in the copulatory organs. I found transitions in the variable shape of the clypeus and profile of the prosoma which were already known by ROBERTS (1987: 68), and I regard the differences of the copulatory organs partly as caused by intraspecific variability and partly by different positions which are shown by the figures given by DENIS (1965). The tip of the radical apophysis of the holotype of *varipes* (fig. 73) is actually distinctly stronger bent ventrally than figured by DENIS (1965: Fig. 99). Therefore I regard *Trichoncus varipes* DENIS 1965 as a junger synonym of *T. saxicola* (O. PICKARD-CAMBRIDGE 1861) (**n. syn**.).

Trichoncus (*Obscurtrichoncus*) *vasconicus* DENIS 1944 ?= *T. affinis* KULCZYNSKI 1894 (**quest. n. syn**.) (figs. 68-71a)

Material of *affinis* has been studied by me from Austria, the Czech Republic, France and Germany.

The taxonomy/synonymy of *T. vasconicus* is extremely confusing. It is a dubious species which has originally been described from Southern Europe (France); I doubt the conspecifity of specimens which were reported from Central or Northern Europe. Males from the locus typicus may be helpful for bringing light in the synonymy of this species.

The original description of *T. vasconicus* was based on the female sex only, collected in the Dordogne (2♀, syntypes – “cotypes” sensu DENIS (1965: 454) –; the males which were described by DENIS (1965) were collected in different areas but not at the locus typicus (!). Therefore the conspecifity of the male and the female sex which were described by DENIS (1965) as *vasconicus* appear doubtful to me; the figures – at least of the male – may well refer to *affinis*, and therefore I regard *vasconicus* as a questionable synonym of affinis (**quest. n. syn**.). – Remark: DENIS (1965) did not note if the vulva (shown in his fig. 63; see fig. 71a in the present paper) has been taken from a syntype of *vasconicus* or of a female from a different locality which may be the member of a different species in this case (!).
In contrast to my opinion DENIS (1965) regarded *hackmani* and *vasconicus* as subspecies of *vasconicus*; he reported *hackmani* from several European countries including France, and *vasconicus* only from France. (Both taxa have mainly been distinguished by the colour of their tibiae I-II; DENIS overestimated the value of this character. I found the colouration of the tibiae I-II of the subgenus *Obscurtrichoncus* quite variable (see above; ROBERTS (1987: 68) already recognized correctly the high variability of this character). Some of the males from the Czech Republic, which were studied by me, have the tibiae I-II yellow, others distinctly darkened, and one is intermediar. The shape of the prodorsal pedipalpal tibial apophysis and the number of its (1-2) basal tooth-shaped structures are variable, even intrapopular. – PALMGREN (1973: 41) regarded *hackmani* as a junior synonym of *vasconicus*.

Trichoncus trifidus DENIS 1965 ?= *Trichoncus* (*Trichoncus*) *helveticus* DENIS 1965 (**quest. n. syn**.) (figs. 96-99, 114)

Material: *T. helveticus*: Switzerland (Jura bern., Raimeux), 1♂1♀ syntypes NMB no. 1631a. – Type material of *T. trifidus* (Portugal) was not available.

The shape of the pedipalpal tibial apophyses – compare the figs. 96 and 114 – is very similar in both nominal species, the tip of the radical apophysis is directed ventrally. The tip of the prodorsal tibial apophysis of the holotype of *helveticus* is drawn too wide in the fig. 38a by DENIS (1965: 445). *T. helveticus* was reported from Switzerland and *trifidus* from Portugal by DENIS (1965: 428/9). The synonymy of both species appears likely to me (**quest. n. syn**.); the name *helveticus* is more in use than *trifidus*.

Key to the European subgenera and the Central as well as Northern European species of *Trichoncus*, with notes mainly to some species of Southern Europe:

Note: For the study of the vulva one may cut the epigyne at one side and clap it to the other side (and later back). The vulva may be lightened in (pink) oil for some minutes.

1 Metatarsus IV bears a trichobothrium, position of the metatarsal I-II trichobothrium in ca. 0.8; ♂: Prosoma with the eye region distinctly bulging/protruding, and with a pair of small lateral cephalic pits (fig. 118); ♀: Epigyne (fig. 117) with a scape. . . . *Lasiargus: hirsutus*

- Metatarsal IV trichobothrium absent, its position on I-II in the basal half; ♂: Prosoma not bulging (in *Sulctrichoncus ambrosii* (figs. 60-61) with a pair of lateral cephalic furrows and small pits); ♀: Epigynal scape absent. 2

2(1) Dorsal hairs of the opisthosoma more numerous and shorter (0.1-0.15, rarely up to 0.2 mm long, fig. 58). Tibia I-II most often darkened (very variable, sometimes quite dark (as in *Lasiargus*), some times darkened only at the end, or even uniformly yellow or bleached out in alcohol material, e.g. in some specimens of *affinis* and *ambrosii*). ♂: Dorsal pedipalpal tibial apophysis (with the exception of *Sulctrichoncus ambrosii* fig. 63) long and erect (figs. 69, 73). Subgenera *Obscurtrichoncus* and *Sulctrichoncus* 3

- Dorsal hairs of the opisthosoma fewer, stronger and longer (up to 0.35 mm long, fig. 57) (similar in *Lasiargus*). Tibiae I-II yellow to yellow brown, not darkened. ♂: Dorsal pedipalpal tibial apophysis short, not erect (figs. 87, 103). Subgenus *Trichoncus* 6

3(2) ♂: Prosoma with a pair of furrows and small pits (they may be indistinct), and fairly raised (figs. 59-60, unique in the European species of *Trichoncus*; pits exist also in *Lasiargus hirsutus*, no. 1) pedipalpus (figs. 62-64) with a short dorsal pedipalpal tibial apophysis. ♀: Epigyne: Figs. 65-66, vulva (fig. 67): Receptacula seminis not divided, thin-walled. In Central Europe: Switzerland (Tessin) . . . . *Sulctrichoncus: ambrosii*

- ♂: Prosoma without furrows or pit, fairly raised or not, pedipalpus with a long and erect retrodorsal tibial apophysis (figs. 69, 73). ♀: The epigyne may be similar, the vulva is multifractional, the receptacula are thick-walled (fig. 71) or thin-walled (fig. 74b). Subgenus *Obscurtrichoncus*. 4

4(3) ♂: Dorsal (erect) pedipalpal tibial apophysis (fig. 73) shorter than in the related species (similar in *T. similipes*, fig. 82), prodorsal tibial apophysis strongly (almost in a right angle) bent (fig. 72), tip of the sclerotized radical apophysis directed VENTRALLY in the not expanded bulbus, and less bent (fig. 73). ♀: Epigyne (figs. 74-74a) with a small anterior widening, vulva with thin-walled posterior receptacula seminis (fig. 74b) . . . *saxicola*

- ♂: Dorsal (erect) pedipalpal apophysis (figs. 69, 76) longer, prodorsal tibial apophysis slightly less bent (fig. 75) or distinctly less bent (fig. 68), tip of the sclerotized radical apophysis apically directed DORSALLY in the not expanded bulbus, and stronger bent (figs. 69, 76). ♀: Epigyne similar or different, vulva (figs. 71, 81) with thick-walled posterior receptacula seminis 5

5(4) ♂: Prodorsal pedipalpal tibial apophysis (fig. 68) mainly almost straight except the short bent distal part, retrodorsal (erect) tibial apophysis longer, and strongly bent only near the end (fig. 69). ♀: Epigyne (fig. 70): Anterior structure less widened, vulva: Fig. 71-71a. (?= *vasconicus*) . . . . *affinis*

- ♂: Prodorsal pedipalpal tibial apophysis (fig. 75) strongly bent, retrodorsal (erect) tibial apophysis shorter and strongly bent (fig. 76). ♀: Epigyne (fig. 80): Anterior structure wider, vulva with thin-walled posterior receptacula similar to fig. 74b). . . . . . . *hackmani*

6(2) ♂: Prodorsal pedipalpal tibial apophysis (fig. 96) short (the dorsal cymbial border is longer than this apophysis), and slightly bent, tip of the retrodorsal tibial apophysis bent prolaterally, tip of the radical apophysis bent ventrally in the not expanded bulbus (fig. 97). ♀: Epigyne: Figs. 98-99. In Central Europe: Switzerland . . . . *helveticus* (*)

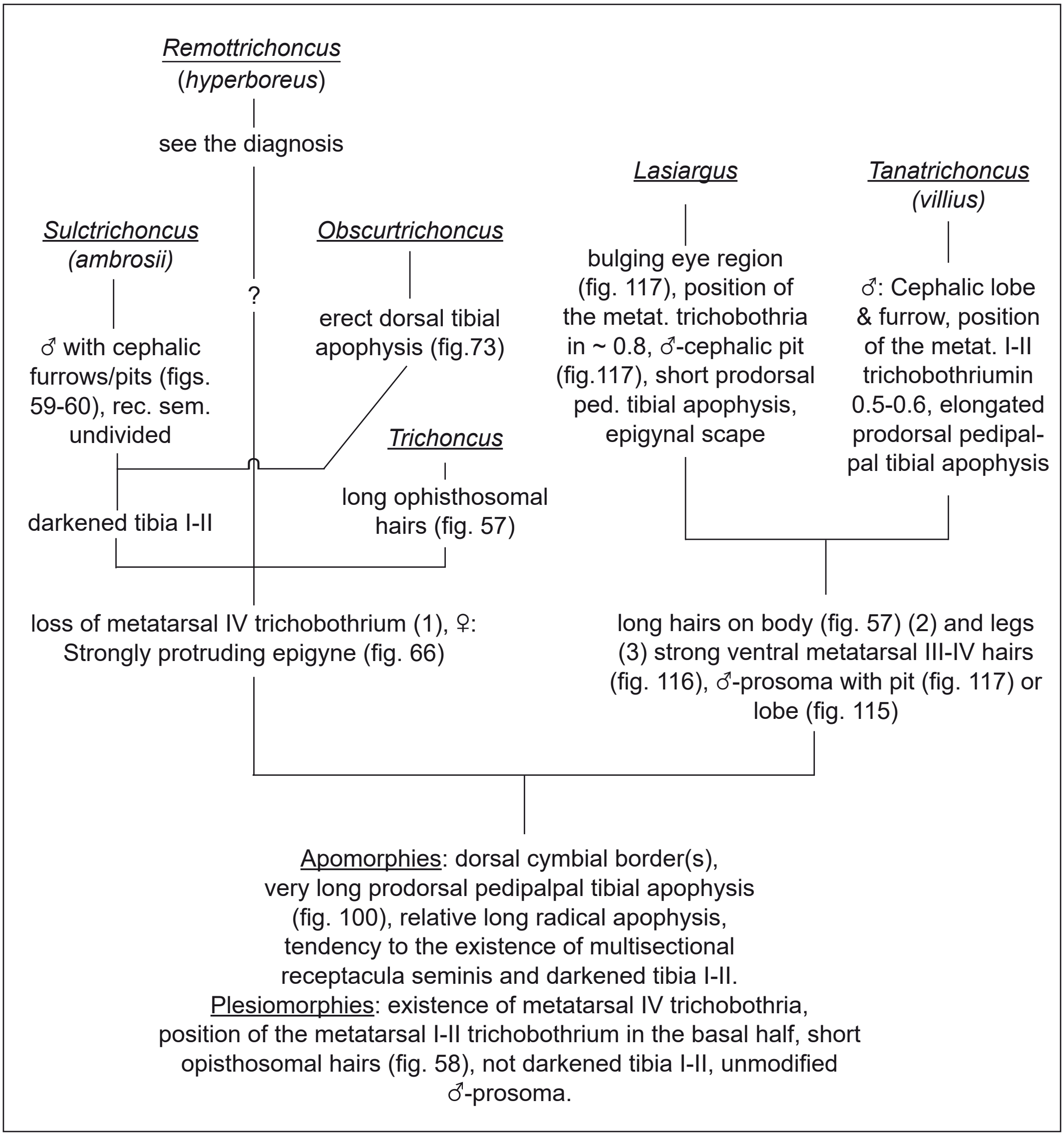
- ♂: Prodorsal tibial apophysis (figs. 83, 100, 107) long (the dorsal cymbium border is not longer than this apophysis), and strongly bent, tip of the retrodorsal tibial apophysis not bent prolaterally (figs. 83, 83a, 100), tip of the radical apophysis bent dorsally in the not expanded bulbus (figs. 87, 103). ♀: Epigyne (figs. 89-93, 104-105) different 7

7(6) ♂: Cymbium with an additional border (B in fig. 100), prodorsal pedipalpal apophysis less bent, dorsal tibial apophysis long and with a large basal "tooth" (arrows). ♀: Epigyne (fig. 104) with a fissure, vulva as in fig. 106. (Similar is *T. aurantiipes* from Southern Europe, figs. 107-111). In Germany: Near Tübingen . . . .*sordidus*

- ♂: Cymbium without an additional border (figs. 83-84), prodorsal padipalpal apophysis stronger bent, dorsal apophysis shorter and bearing denticle(s) only. ♀: Epigyne (figs. 89-93) quite variable (if all specimens are conspecific), without a fissure, vulva (figs. 94-95) quite variable. In Central Europe e.g. Switzerland, in Germany: S-Bavaria. (= *kulczynskii*). Note: With some hesitation I regard the differences in the copulatory organs of specimens from Switzerland and other countries as a result of intraspecific variability . . . .*auritus*

(*) Similar are *T. monticola* (fig. 112) and *T. scrofa* (fig. 113) as well as – or even synonymous – *T. trifidus* (fig. 114), all from Southern Europe. In the very similar *T. lanatus* TANASEVITCH 1987 (Caucasus, Georgia, former USSR) the prodorsal pedipalpal tibial apophysis is as long as the dorsal cymbial edge, and both are in a parallel position.

Note: I try to give the most simple (parsimonious) suggested cladogram, and – if possible – I selected unusual/peculiar characters, which unite a taxon, but I do not refer to a high number of unimportant and useless characters. Quite unusual characters within the related Erigoninae are for example the strongly protruding epigyne in most taxa the epigynal scape *Lasiargus* and the multisectional receptacula seminis. Possible convergences and reversals cause questions which are hard to solve; the reversal to a short prodorsal tibial apophysis in *Lasiargus* is only a supposition. A cephalic pit evolved in *Lasiargus* and separately in *Sulctrichoncus*.



(1) Reversal in *T. hispidosus* TANASEVITCH 1990.
(2) As in *Trichoncus*.
(3) The thin dorsal tibial bristles are usually difficult to recognize among the similar long hairs – like in numerous species of the family Therididae.

Possible cladogram of the subgenera of *Trichoncus*. One may use it as a key to the subgenera.

(4) Saloca SIMON 1926

Saloca elevatum **n. sp**. (figs. 119-125)

Material: Turkey, Anatolia, Abant mountains, almost 250 km E Istanbul, near Bolu 800-1000m, pit falls, 25♂ 1♀ H. KORGE leg. in V 1976; holotype ♂ R35/AR/CJW; paratypes: 24♂1♀ R36/AR/CJW (later most probably SMF).

Diagnosis: ♂ with a distinct cephalic lobe (figs. 119-120) which bears the posterior median eyes, without paired hair brush or lateral depressions; pedipalpus (figs. 121-123) with a long dorsal apophysis which is bent retrolaterally in a right angle. ♀: Epigyne (fig. 124) with a pair of sclerotized longitudinal structures and translucent receptacula seminis, introductory openings in a central position. Vulva (fig. 125) with oval and thin-walled receptacula seminis.

Description:
Measurements (in mm): ♂♀ body length1.0-1.2, prosoma. length 0.5-0.6, width 0.45-0.5; leg I (♂): Femur 0.42, patella 0.15, tibia 0.43, metatarsus 0.3, tarsus 0.28, tibia II 0.42, tibia III 0.32, tibia IV 0.45; ♀: Tibia I 0.43, tibia IV 0.4.
Colour: Prosoma and legs yellow- to medium brown, margin of the sternum small black, opisthosoma yellow- to dark grey.
Prosoma (figs. 119-120) ca 1.1 times longer than wide, bearing short hairs (mainly on the ♂-clypeus), thoracal fissure distinct, eyes large, posterior row distinctly procurved, posterior median eyes spaced by almost their diameter; profile fairly convex in the female, in the male the cephalic part with a distinct lobe which bears the posterior median eyes, lateral depressions absent, clypeus long, bearing numerous short hairs, basal cheliceral articles robust, lateral stridulatory files widely spaced, anterior margin of the furrow with 3 larger and about 3 small teeth, posterior margin with about 5 teeth. Labium fused to the sternum, gnathocoxae converging, sternum as wide as long, coxae IV spaced by almost their diameter. – Legs only fairly long, order IV/I/II/III, sequence of the indistinct tibial bristles 1/1/1/1; metatarsi I-III bear a trichobothrium, its position on I is in about 0.33. – Opisthosoma oval, hairs short. – ♂-pedipalpus (figs. 121-123): Patella longer than wide, tibia large, bearing a retrolateral outgrowth, dorsally with a large apophysis which bears retrolaterally tiny denticles on its retrolateral branch, and distally a large outgrowth which is bent retrolaterally; embolus fairly long, bearing a skinny seam. – Epigyne/vulva: See the diagnosis.

Relationships: The chaetotaxy, the conformation of the structures of the bulbus as well as epigyne/vulva are like in other members of *Saloca* in which the shape of the male prosoma is modified in quite different ways: (a) it is low and bears a pair of small lateral holes in *S. khumbuense* WUNDERLICH 1983 and *gorapaniense* WUNDERLICH 1983 from Nepal (the *khumbuense* species-group); (b) in *elevatum* n. sp. the male prosoma is distinctly raised, bearing the posterior median eyes, and has no further modifications; (c) it bears a paire of hair brushes in the field of the median eyes in *ryvkini* ESKOV &

MARUSIK 1994 from Northern Asia as well as in the European *diceros* (O. PICKARD-CAMBRIDGE 1871) and *kulczynskii* MILLER 1971. In the European species – as well as in *elevatum* and *ryvkini* – bears the retrolateral branch of the dorsal pedipalpal tibial apophysis retrolaterally tiny dentiles (fig. 122) which refer to the close relationships of the members of this group; in *elevatum* the pair of hair brushes is absent and may have been lost.

Distribution: Turkey (Anatolia).

(5) ***Diplocephalus*** BERTKAU 1883

Diplocephalus toscanaensis **n. sp.** (figs. 126-130)

Material: Italy, Toscana, ca. 40 km E Grosseto, Salustri, in the garden of a wine growing estate, among detritus, under an bush, holotype male JW leg. in VIII 2010, R143/AR/CJW.

Diagnosis (♂; ♀ unknown): Prosoma (figs. 126-127): Cephalic part raised, bearing a pair of lateral grooves/furrows. Pedipalpus (figs. 128-130): Tibial apophysis large, wide, flattened distally, undivided, embolus with an outgrowth near its middle. Tiny spiders, body length of the single male only 1.15 mm.

Description (♂):
Measurements (in mm): Body length 1.15, Prosoma: Length 0.58, width 0.45; leg I: Femur 0.45, patella 0.15, tibia 0.4, metatarsus 0.36, tarsus 0.3; tibiae II-IV 0.34/0.3/ 0.47.
Colour: Prosoma black brown, legs yellow, tibiae I-II very slightly darkened, opisthosoma dark grey, almost black.
Prosoma (figs. 126-127) almost 1.3 times longer than wide, cephalic part raised, bearing a pair of lateral furrows, eyes fairly small, prosterior row procurved, posterior median eyes spaced by their diameter, placed anteriorly on the cephalic lobe. Clypeus long and protruding medially, lateral cheliceral files well developed, fangs long and slender. The coxae IV are spaced by the sternum by about 2/3 of their diameter. – Legs fairly slender, order IV/I/II/III, sequence of the dorsal tibial bristles 2/2/1/1, their length is about one tibial diameter; metatarsi I-III bear a trichobothrium, their position on I is in 0.4. – Opisthosoma oval, covered with short hairs; tracheal fold relatively wide. – Pedipalpus: See the diagnosis.

Relationships: I do not know a very close related species. *D. graecus* is distinctly different regarding the pedipalpal tibial apophysis and the structures of the bulbus.

Distribution: Italy, Toscana.

B. SUBFAMILY LINYPHIINAE

Plesiophantes tanasevitchi **n. sp**.

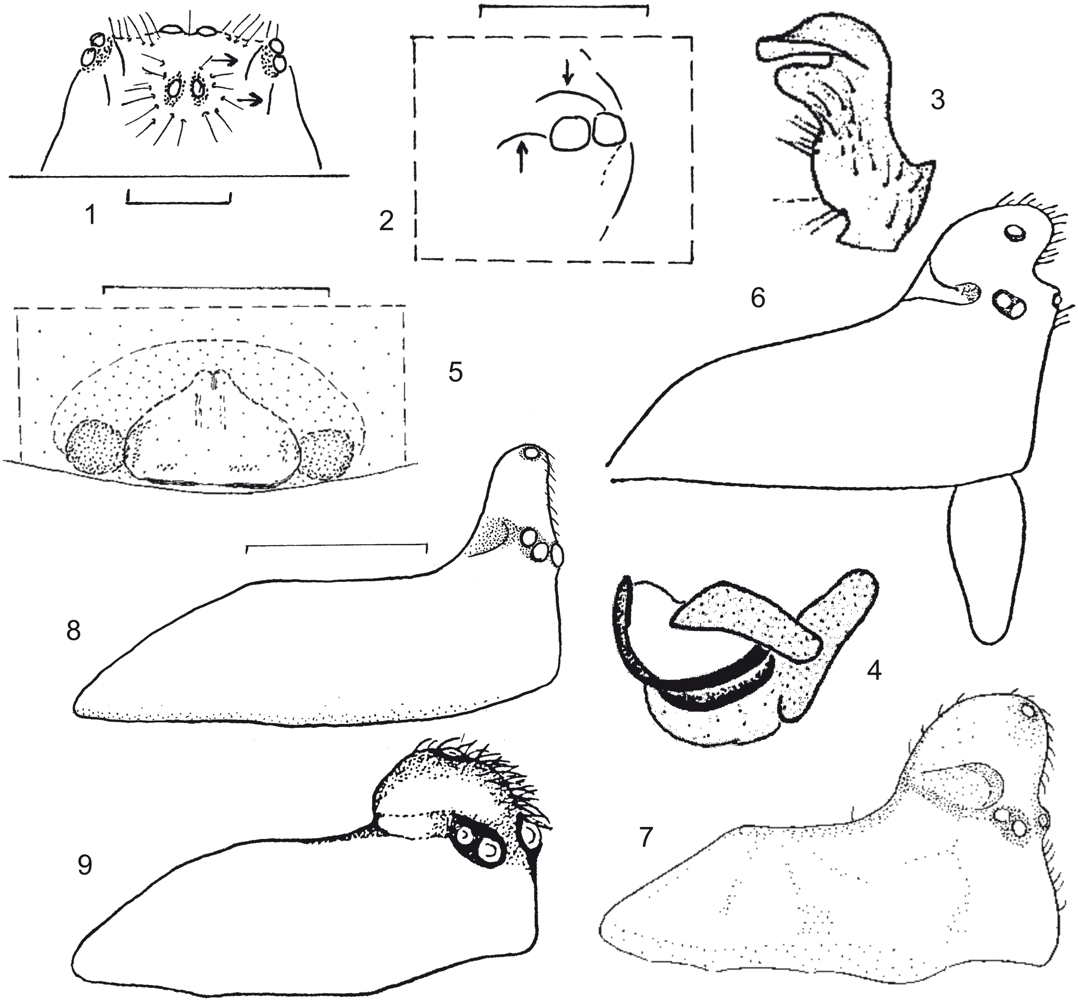
1987 *Plesiophantes joosti*, -- TANASEVITCH, Senckenbergiana biol., 67: 323, figs. 38-40 (♂).

1990 *Plesiophantes tanasevitchi* WUNDERLICH sensu TANASEVITCH in STRIGANOVA (ed.): 33, 91 fig. 25: 25, 96 (**nomen nudum**).

The figures of the male (the female is unknown) given by TANASEVITCH (1987) under *Plesiophantes joosti* HEIMER 1981 do not correspond with the figs. of *P. joosti* given in the original description; both are based on different species. I now dedicate the species which has published by TANASEVITCH (1987: 323) under *P. joosti* from the Caucasus, Mt. Chugush, 1500 m, male holotype ZMMU, to my friend ANDREI TANASEVITCH as *Plesiophantes tanasevitchi* **n. sp**. This species was published already by TANASEVITCH (1990) – as a nomen nudum – under the name *Plesiophantes tanasevitchi* WUNDERLICH 1989, but *P. tanasevitchi* has never been published as a new species up to now.

Sintula SIMON 1884

Sintula iberica BOSMANS 2010 from the Iberian Peninsula is – according to the existence of a additional prolateral bristle on tibia I-II, the absence of a cymbial outgrowth bearing spines, the tripartite epigyne (with a median scape and a pair of additional projections) – in my opinion not a member of the genus *Sintula* but probably a member of an unnamed genus.



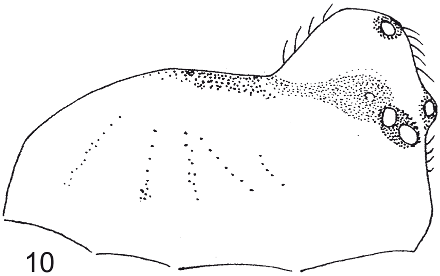
Figs. 1-5: *Stajus truncatifrons* (O. PICKARD-CAMBRIDGE 1875); 1-2) ♂, dorsal and right-retrolateral aspect of the anterior part of the prosoma (hairs are not drawn in fig. 2). Note the paired two ledges (bulging areas) medially and behind the lateral eyes (arrows); 3) dorsal aspect of the left pedipalpal tibial apophysis; 4) prolateral aspect of the left embolic division; 5) ♀, epigyne. Scale bars in figs. 1-2, 3) 0.2 mm. Figs. 3-4 are taken from BOSMANS (2007) (sub *Entelecara truncatifrons*);

fig. 6) *Entelecara aestiva* SIMON 1918, lateral aspect of the ♂-prosoma. Taken from DENIS (1945);

fig. 7) *Entelecara acuminata* (WIDER 1834), lateral aspect of the ♂-prosoma. Taken from WIEHLE (1960);

fig. 8) *Entelecara turbinata* SIMON 1918, lateral aspect of the ♂-prosoma. Scale bar 0.2;

fig. 9) *Entelecara flavipes* (BLACKWALL 1834), lateral aspect of the ♂-prosoma. Taken from LOCKET & MILLIDGE (1953);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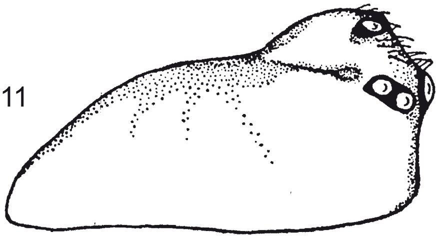
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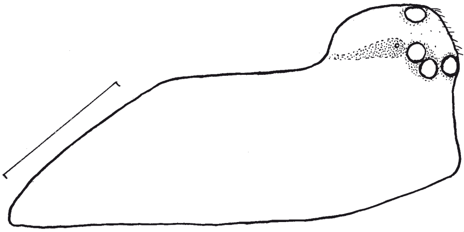
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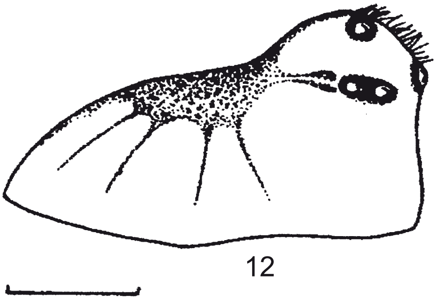
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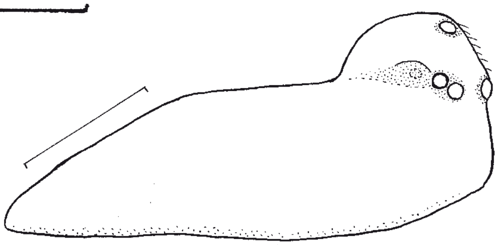
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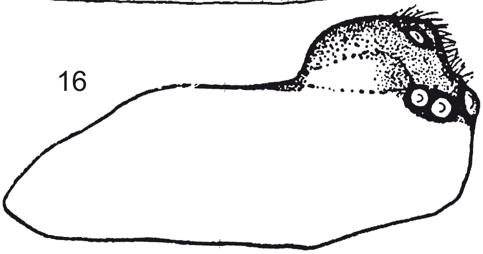
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fig. 10) Entelecara congenera (O. PICKARD-CAMBRIDGE 1879), lateral aspect of the ♂-prosoma. Taken from WIEHLE (1960);

fig. 11) Entelecara omissa O. PICKARD-CAMBRIDGE 1902, lateral aspect of the ♂-prosoma. Taken from LOCKET & MILLIDGE (1953);

fig. 12) Entelecara media KULCZYNSKI 1887 sensu DELTSHEV, lateral aspect of the ♂-prosoma. Scale bar 0.2. Taken from DELTSHEV (1985);

fig. 13) Entelecara errata O. PICKARD-CAMBRIDGE 1913, lateral aspect of the ♂-prosoma. Scale bar 0.2;

fig. 14) Entelecara cacuminum DENIS 1954 and *congenera* (O. PICKARD-CAMBRIDGE 1879), lateral aspect of the ♂-prosoma. Scale bar 0.2;

fig. 15) Entelecara schmitzi KULCZYNSKI 1905, lateral aspect of the ♂-prosoma. Scale bar 0.2;

fig. 16) Entelecara erythropus (WESTRING 1851), lateral aspect of the ♂-prosoma. Taken from LOCKET & MILLIDGE (1953);

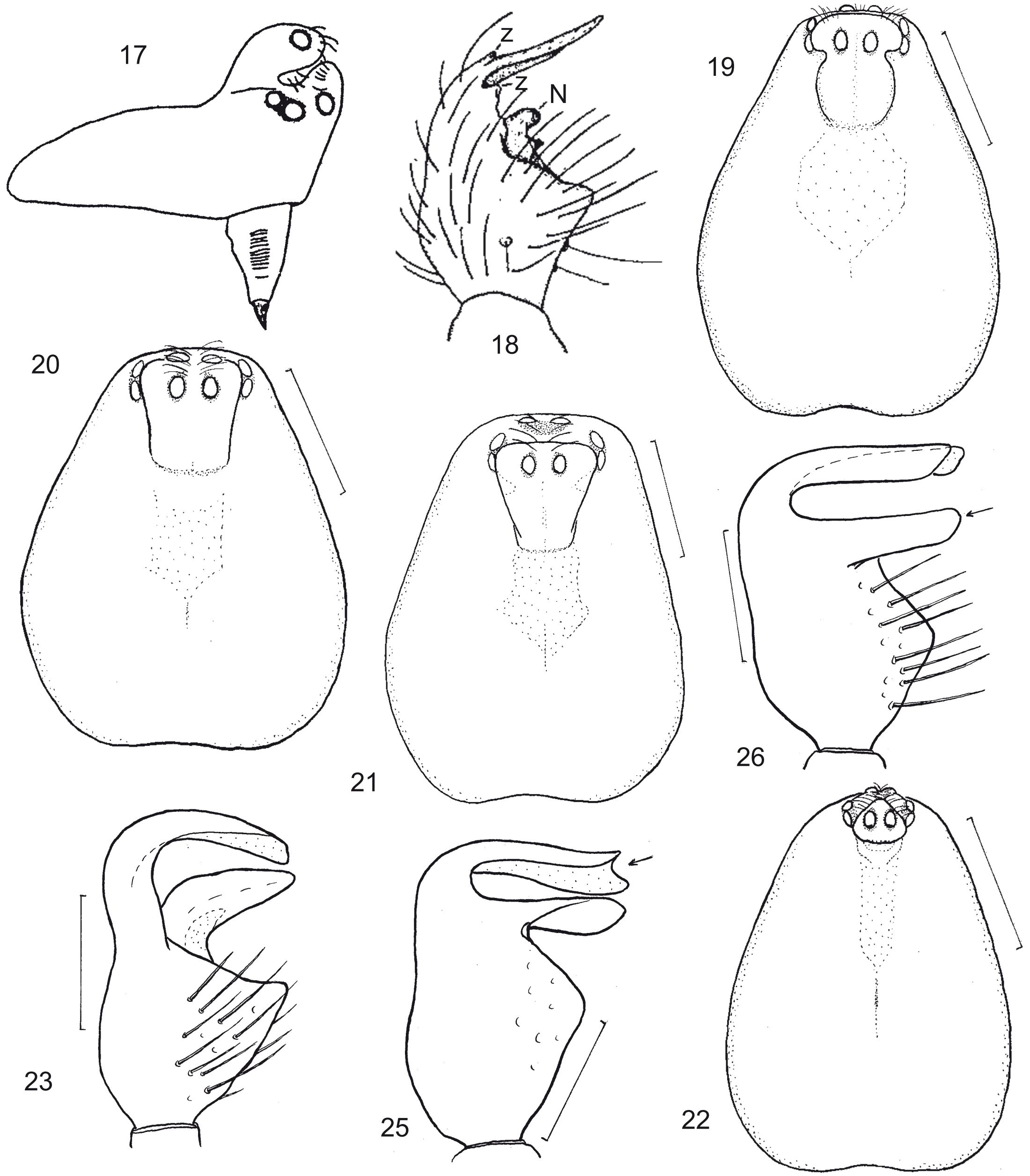
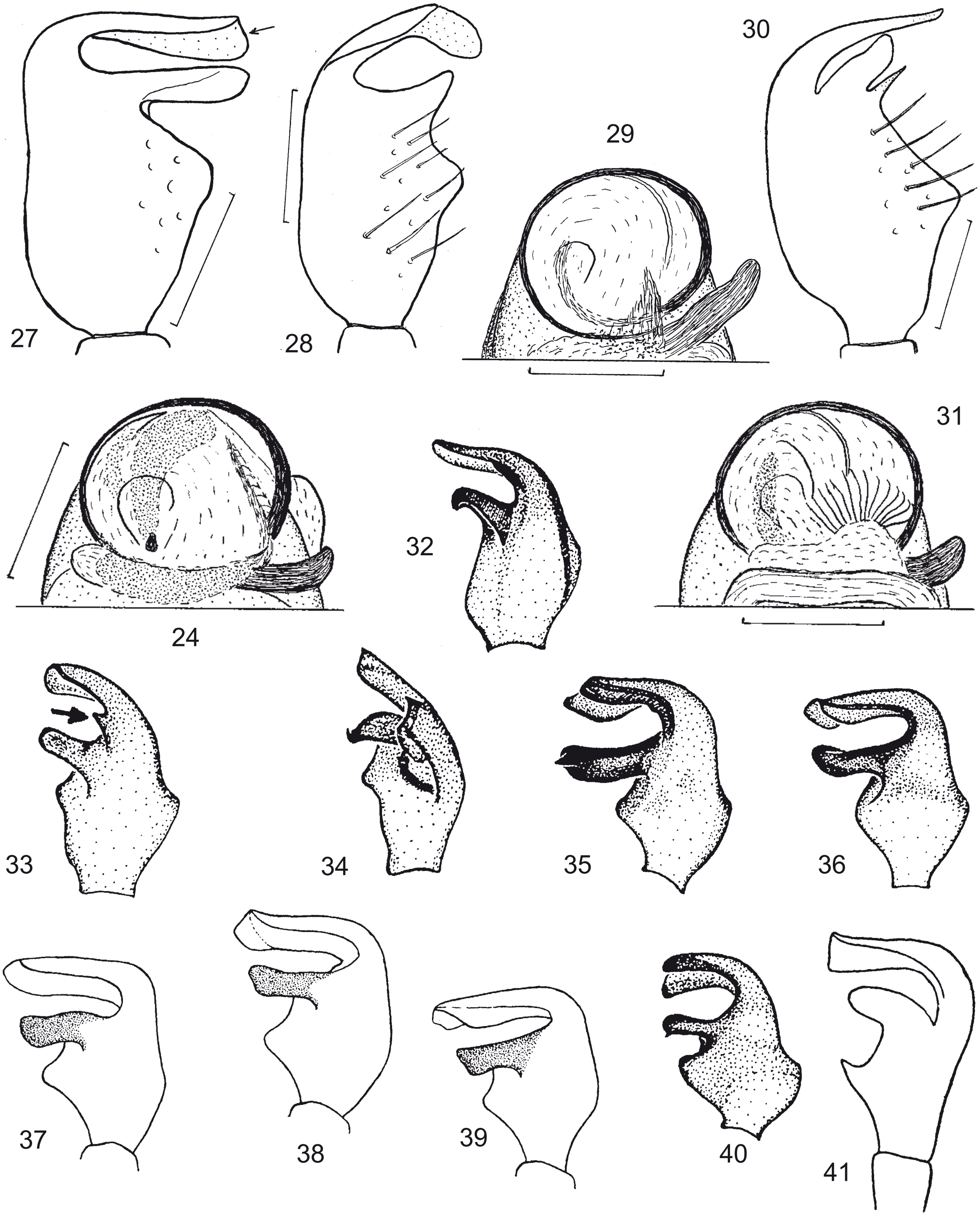


fig. 17-18: ?*Entelecara italica* THALER 1984, ♂; 17) lateral aspect of the prosoma; 18) dorsal aspect of the right pedipalpal tibia. Taken from THALER (1984);

figs. 19-22: ♂, dorsal aspect of the prosoma of: 19) *Entelecara cacuminum*, 20) *E. errata*, 21) *E. schmitzi*, 22) *E. turbinata*. Scale bars 0.2;

figs. 23, 25-28, 30: ♂, dorsal aspect of the right pedipalpal tibia of: 23) *Entelecara cacuminum*, 25) *E. errata*, 26) *E. media* (see fig. 39), 27) *E. media* (dorsal and slightly posterior), 28) *E. schmitzi*, 30) *E. turbinata*. Scale bars 0.1;



figs. 24, 29, 31: ♂, ventral aspect of the apex of the right bulbus of: 24) *E. cacuminum*; 29) *E. schmitzi*, 31) *E. turbinata*. Scale bars 0.1;

figs. 32-41: ♂: Dorsal aspect of the left pedipalpal tibia of: 32) *E. acuminata*; 33) *E. congenera*; 34) *E. flavipes*; 35) *E. erythropus*; 36-38) *E. errata*; 39) *E. media*; 40) *E. omissa*; 41) *E. aestiva*. Figs. 32-36, 40) are taken from ROBERTS (1987), 37-39) from LOCKET, MILLIDGE & MERETT (1974), 41) from SIMON (1926);

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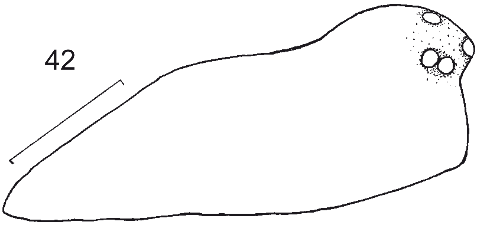

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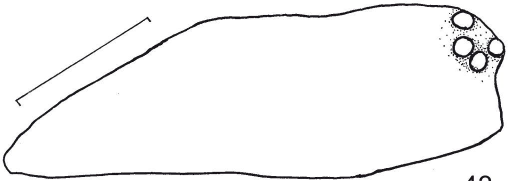

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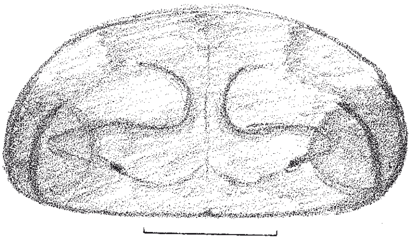

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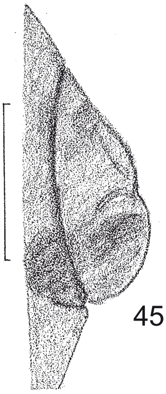

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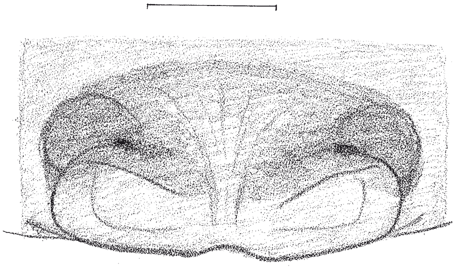

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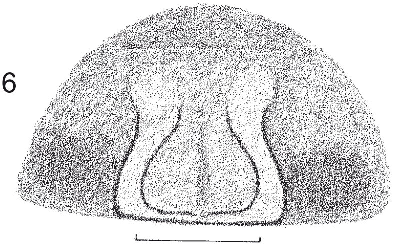

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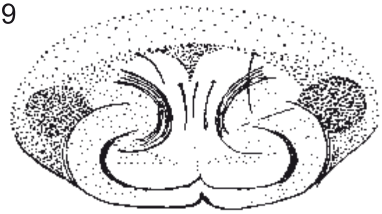

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fig. 42) ♀, lateral aspect of the prosoma of *E. cacuminum*; similar are *acuminata* and *flavipes*. Scale bars 0.2;

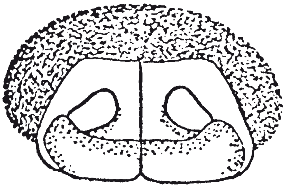
fig. 43) ♀, lateral aspect of the prosoma of *E. errata* and *omissa*; similar are *congenera, erythropus*, *media* and *schmitzi*. Scale bars 0.2;

figs. 44-45: *Entelecara cacuminum* DENIS 1954, ♀, ventral and lateral aspect of the epigyne. Scale bar 0.1;

fig. 46) *Entelecara congenera*, ♀, ventral aspect of the epigyne. Scale bar 0.1;

figs. 47-48) *Entelecara errata*, ♀, ventral and lateral aspect of the epigyne. Scale bar 0.1;

figs. 49-50) *Entelecara erythropus*, ♀, ventral and lateral aspect of the epigyne. Taken from WIEHLE (1960);



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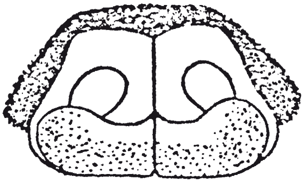

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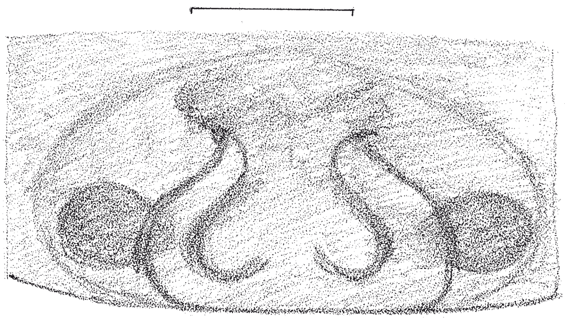

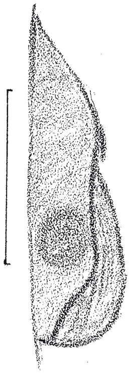

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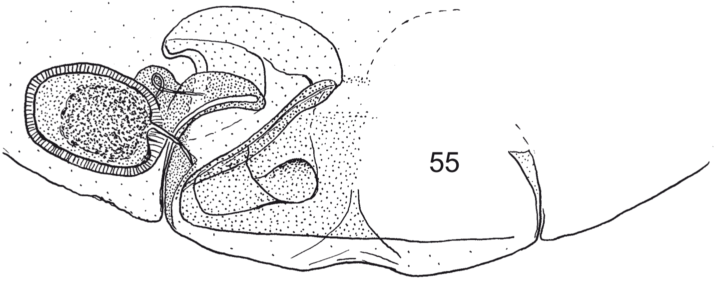

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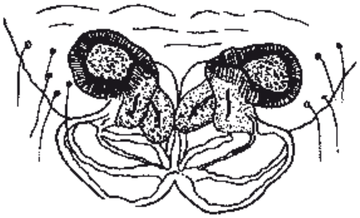

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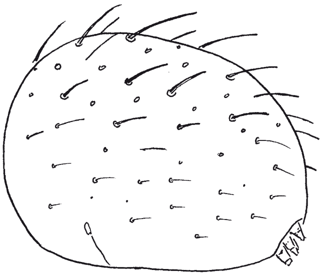

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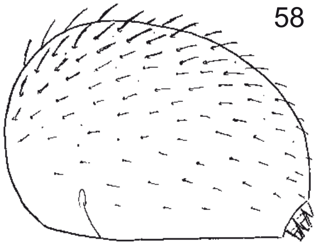


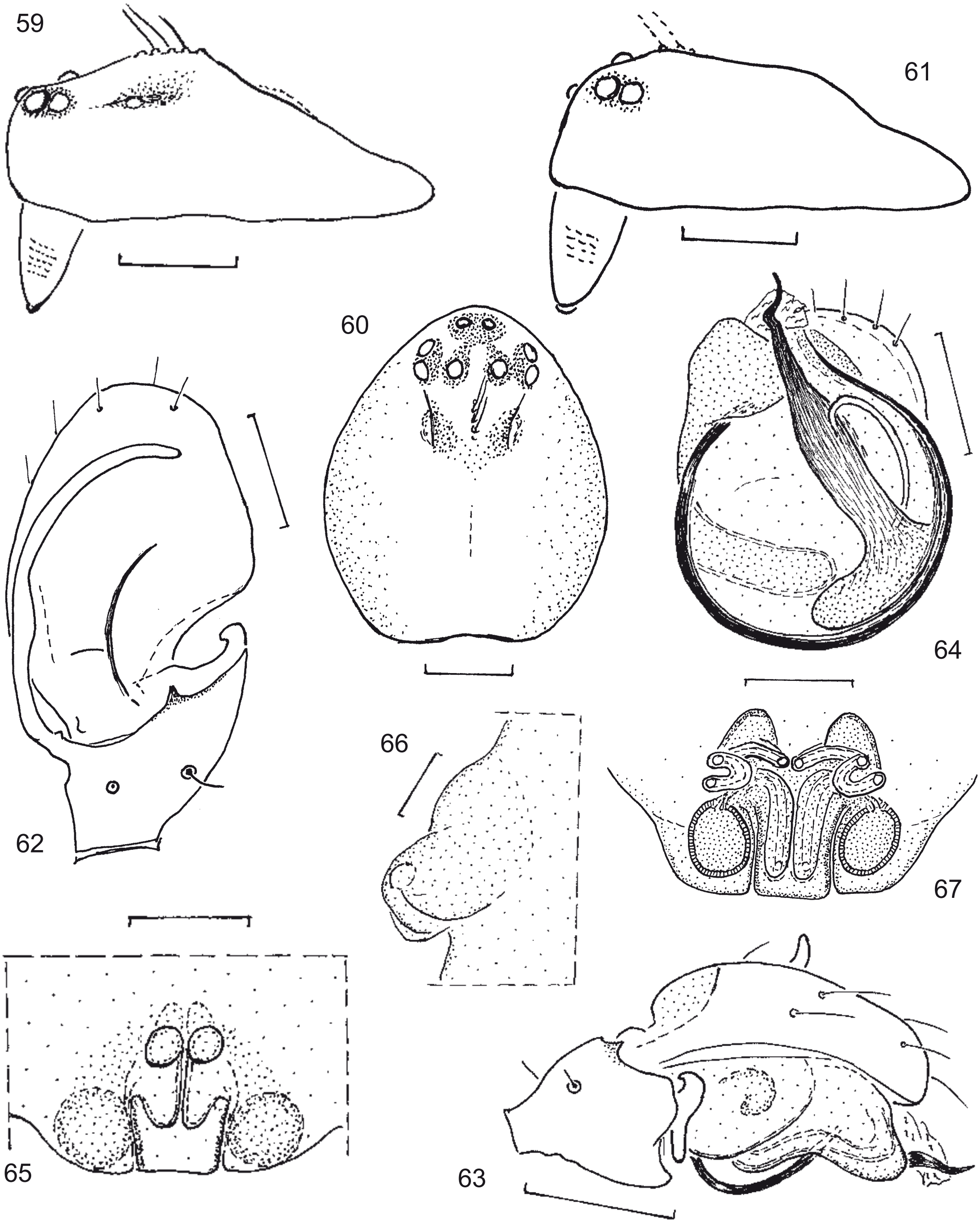
figs. 51-52) *Entelecara aestiva*, ♀, ventral aspect of the epigyne variability. Taken from DENIS (1954);

figs. 53-55: *Entelecara schmitzi*, ♀; 53-54: Ventral and lateral aspect of the epigyne; 55) right half of the vulva, dorsal aspect. Scale bars 0.1;

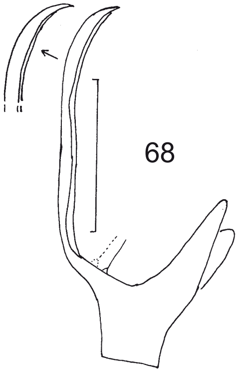
fig. 56) *Entelecara media* sensu DELTSHEV (1985), ♀, vulva. Taken from DELTSHEV (1985).

fig. 57) Lateral aspect of the opisthosoma of the subgenenus *Trichoncus* of *Trichoncus* SIMON 1884. Note the long and bristle-shaped dorsal hairs which partly are rubbed off. In this case their large bases are observable;

fig. 58) Lateral aspect of the opisthosoma of the subgenera *Obscurtrichoncus* and *Sulctrichoncus* of *Trichoncus* SIMON 1884. Note the short hairs.



figs. 59-67: *Trichoncus* (*Sulctrichoncus*) *ambrosii* **n. sp.**; 59-60) ♂ (holotype), lateral and dorsal aspect of the prosoma; note the lateral furrows/pits; 61) ♀, lateral aspect of the prosoma; 62-63) ♂ (holotype), dorsal and retrolateral aspect of the right pedipalpus; right dotted line in fig. 62: Variability in a male from Italy (Esino Lario); 64) ♂ (holotype), ventral aspect of the right bulbus; 65-66) ♀, ventral and lateral aspect of the epigyne (the structures are rather variable!); 67) ♀ from Switzerland, dorsal aspect of the vulva. Scale bars 0.2 in figs. 59-61 and 63), 0.1 in the remaining figs.;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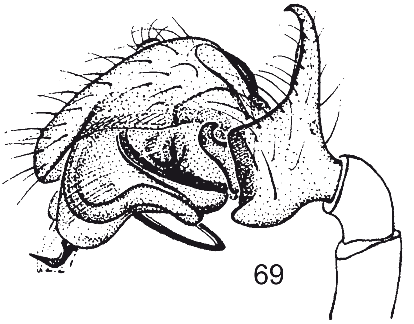
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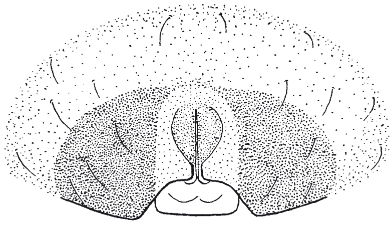
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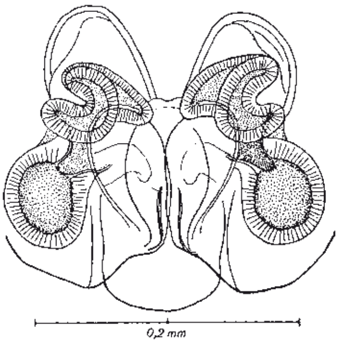

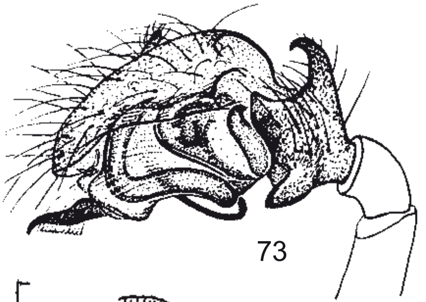
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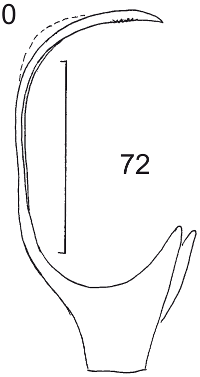
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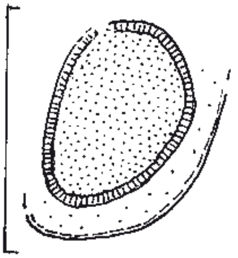
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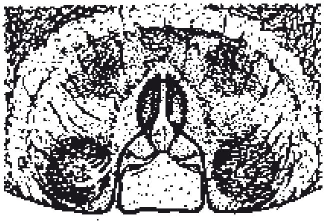
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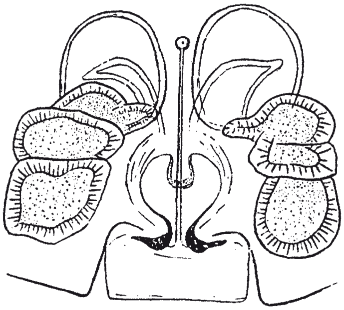
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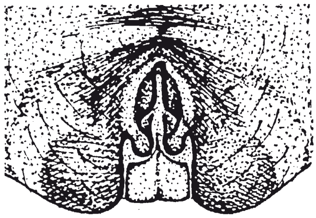
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figs. 68-71: <u>*Trichoncus* (*Obscurtrichoncus*) *affinis*</u> KULCZYNSKI 1894; 68) ♂, dorsal aspect of the right tibia, and variability; 69) ♂, retrolateral aspect of the left pedipalpus, taken from ROBERTS (1987); 70-71) epigyne and vulva, both taken from WIEHLE (1960); scale bar in fig. 68) 0.2;

fig. 71a) <u>*Trichoncus* (*Obscurtrichoncus*) *?affinis*</u> KULCZYNSKI 1894 sensu DENIS (1965: Fig: 63) (under *T. vasconicus*), ♀, ?ventral aspect of the vulva;

figs. 72-74b: <u>*Trichoncus* (*Obscurtrichoncus*) *saxicola*</u> (O. PICKARD-CAMBRIDGE 1861); 72) ♂, dorsal aspect of the tibia of the right pedipalpus; 73) ♂, retrolateral aspect of the left pedipalpus; 74-74a) ♀, epigyne; 74b) ♀, (England, ex coll. MILLIDGE), dorsal aspect of the left receptaculum seminis. Figs. 73-74a) are taken from ROBERTS (1987); scale bars in figs. 72 and 74b) 0.2 and 0.1;

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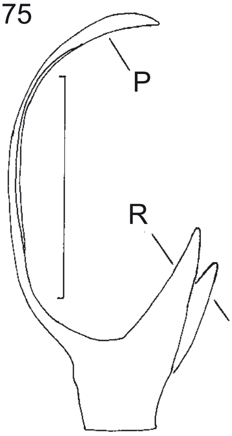

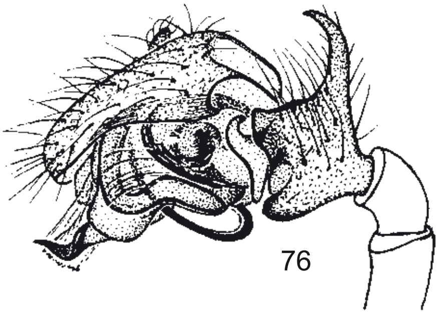

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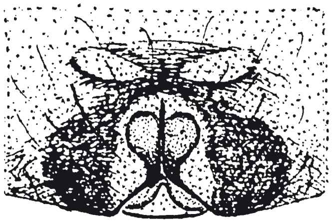

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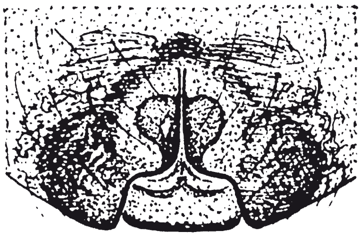

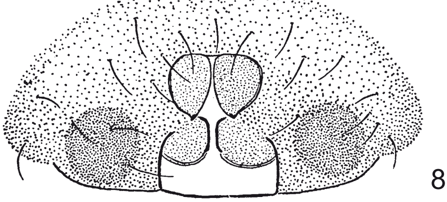

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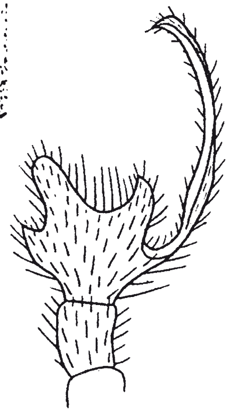

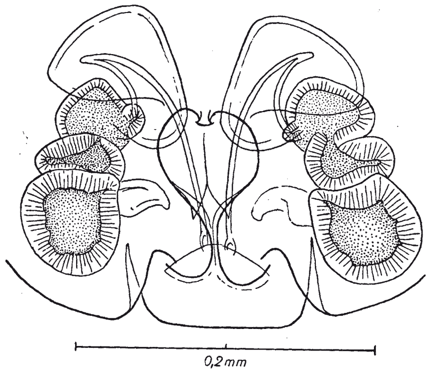

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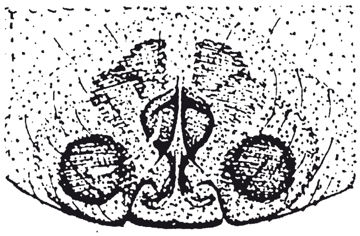

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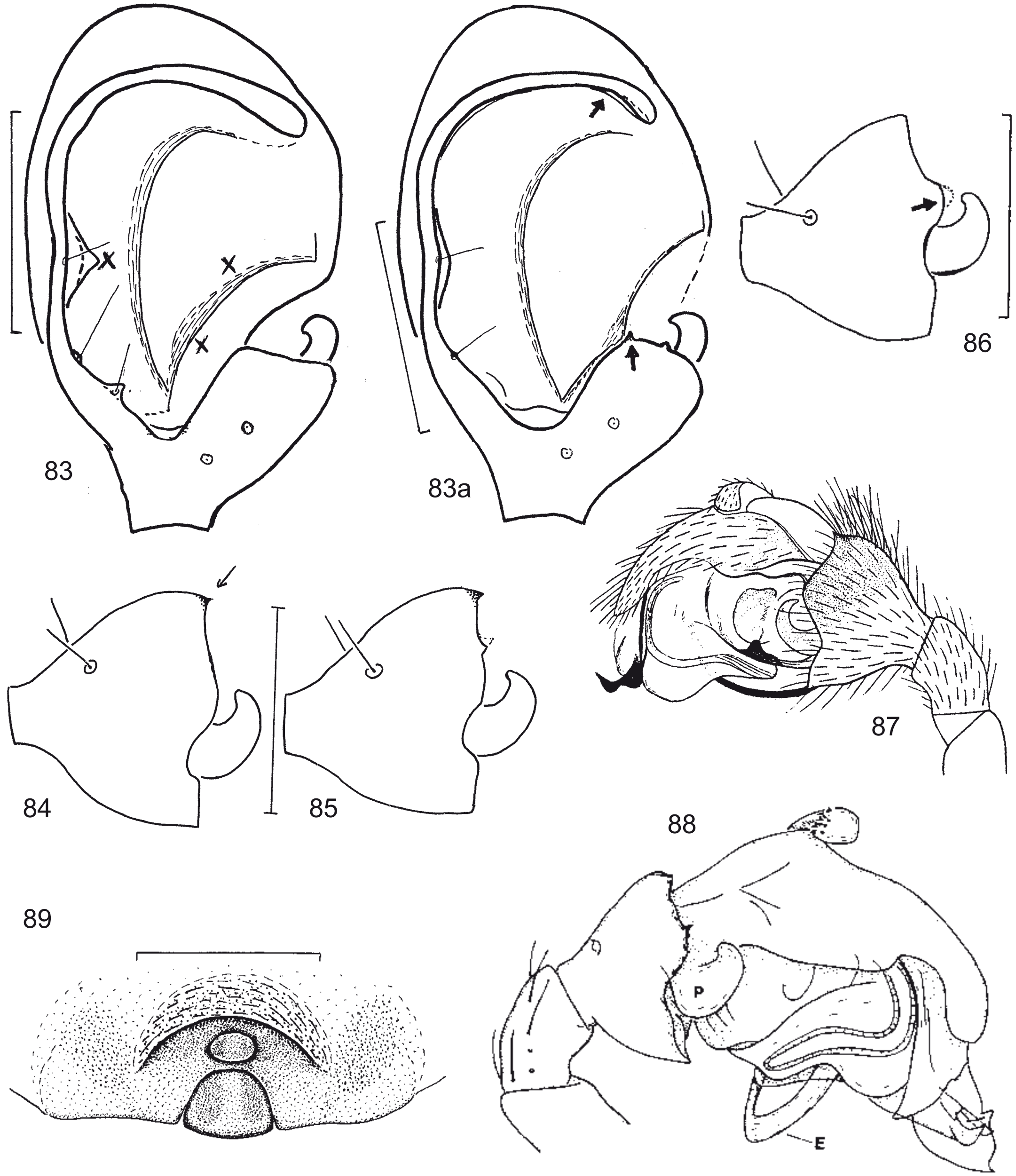
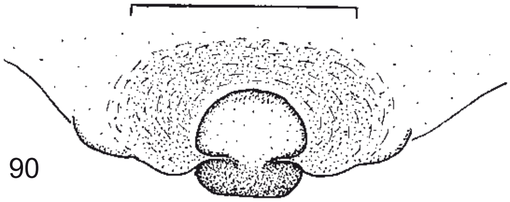
figs. 75-80: Trichoncus (Obscurtrichoncus) hackmani MILLIDGE 1955; 75) ♂, dorsal aspect of the tibia of the right pedipalpus (L = retrolateral tibial apophysis, P = prodorsal tibial apophysis, R = retrodorsal tibial apophysis); 76) ♂, retrolateral aspect of the left pedipalpus; 77-80) ♀, epigyne (variability); 81) ♀, vulva. Figs. 76-79 are taken from ROBERTS (1987) (sub *hackmani*), fig. 80) is taken from WIEHLE (1960); scale bar in fig. 75) 0.2;

fig. 81) Trichoncus (Obscurtrichoncus) sp. indet., ♀, vulva; taken from WIEHLE (1960: Fig. 583) (under *T. hackmani*);

fig. 82) Trichoncus (Obscurtrichoncus) similipes DENIS 1965, ♂, dorsal aspect of the tibia of the left pedipalpus. Taken from DENIS (1965);



figs. 83-95: *Trichoncus* (*Trichoncus*) *auritus* (L. KOCH 1869); 83-83a) dorsal aspect of the right pedipalpus, variability of the structures (X and arrows); 84-86) retrolateral aspect of tibia and paracymbium of the right pedipalpus (fig. 86: ♂ from Switzerland), variability; 87-88) retrolateral aspect of the left and right pedipalpus; 89-95): ♀, 89, 93-94) from Switzerland, 89-90) ventral aspect of the epigyne; 91-92) lateral aspect of the epigyne; 93) posterior aspect of the epigyne; 94-95) vulva (dorsal aspect in fig. 94), unknown aspect in 95). Fig. 87) taken from DENIS (1965), 88) from THALER (1991), 95) from MILLER (1947); scale bars 0.2 in figs. 83-94);



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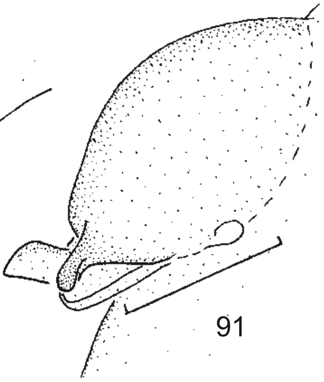

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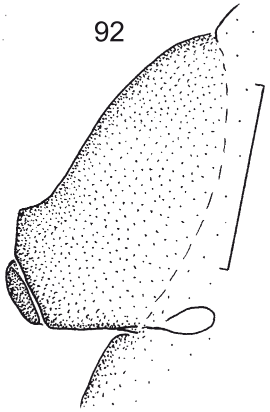

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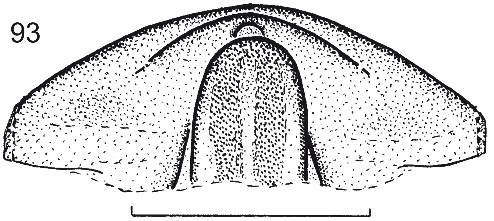

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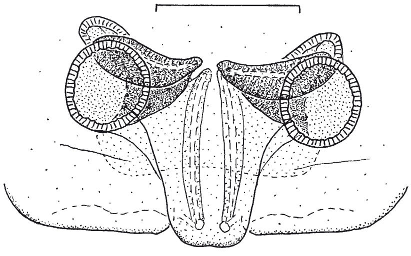

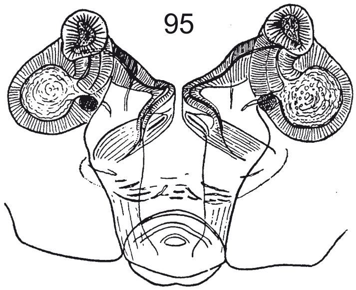

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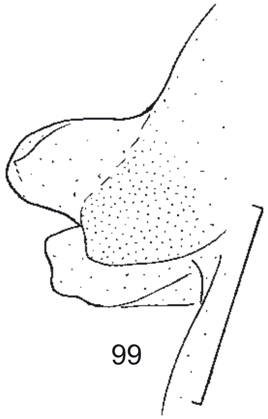

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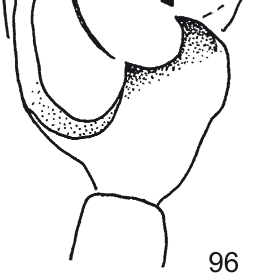

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figs. 96-99: *Trichoncus* (*Trichoncus*) *helveticus* DENIS 1965; 96) ♂, dorsal aspect of the right pedipalpus; 97) ♂, retrolateral aspect of the left pedipalpus; 98-99) ♀, ventral and lateral aspect of the epigyne. Figs. 96-98) are taken from DENIS (1965); scale bar in fig. 99) 0.2;

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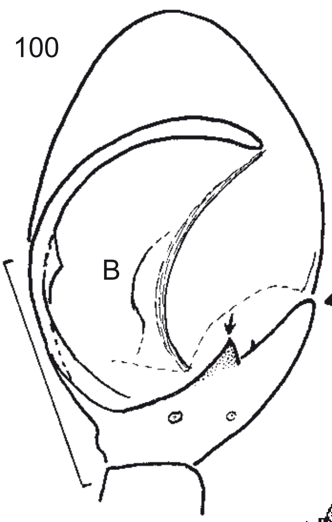

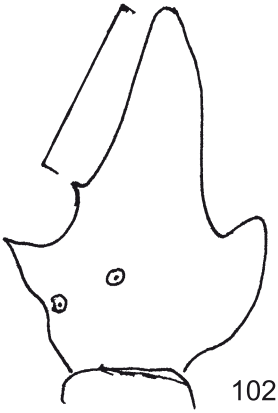

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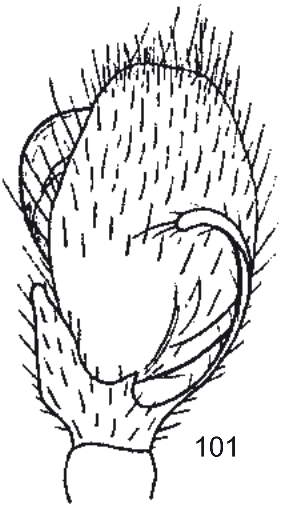

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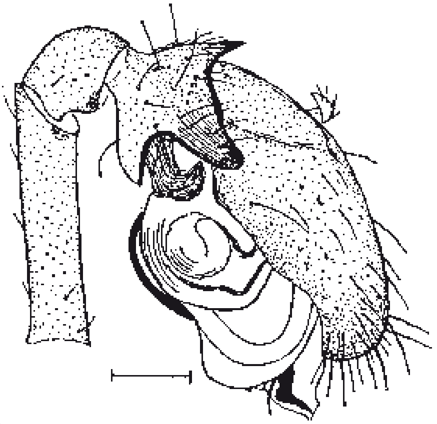

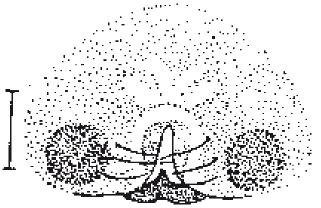

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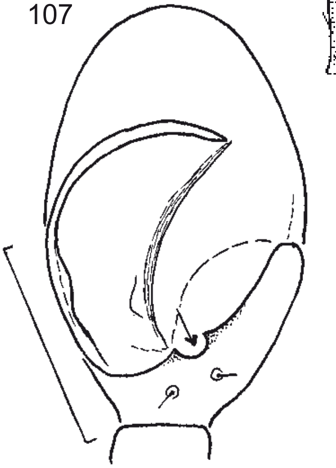

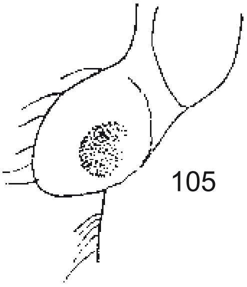

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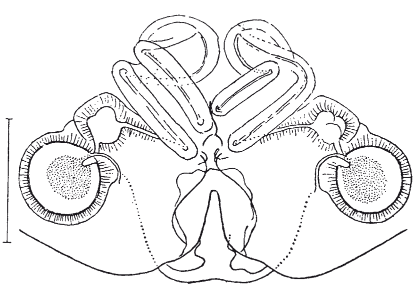

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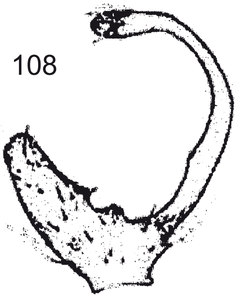
figs. 100-106: <u>*Trichoncus* (*Trichoncus*) *sordidus*</u> SIMON 1884; 100-101) ♂, dorsal aspect of the right and left pedipalpus, untypical shape in fig. 101); 102) ♂, retrolateral and slightly basal aspect of the right pedipalpal tibia; 103) ♂, retrolateral aspect of the right pedipalpus; 104-105) ♀, ventral and lateral aspect of the epigyne; 106) ♀, vulva. Fig. 101) is taken from DENIS (1965),103-106) from WIEHLE (1967); scale bars 0.2 in fig. 100, 0.1 in 102-106);

figs. 107-111: <u>*Trichoncus* (*Trichoncus*) *aurantiipes*</u> SIMON 1884); 107) ♂ (Mallorca), dorsal aspect of the right pedipalpus; 108) ♂, dorsal aspect of the left pedipalpal tibia; 109) ♂ (Mallorca), retrolateral and slightly basal aspect of the right pedipalpal tibia; 110-111) ♀, ventral aspects of epigyne and vulva. Figs. 108, 110, 111) are taken from BOSMANS (2007); scale bars in figs. 107 and 109) 0.2 and 0.1;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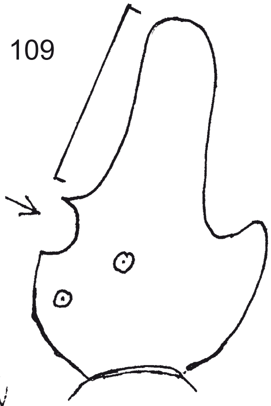
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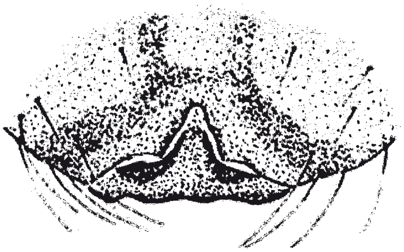
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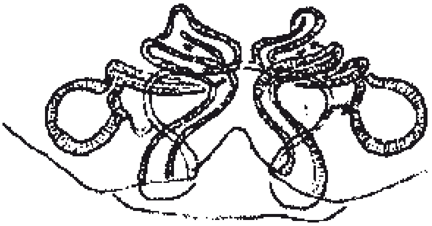
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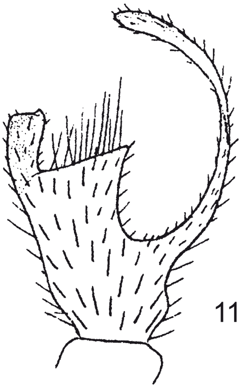
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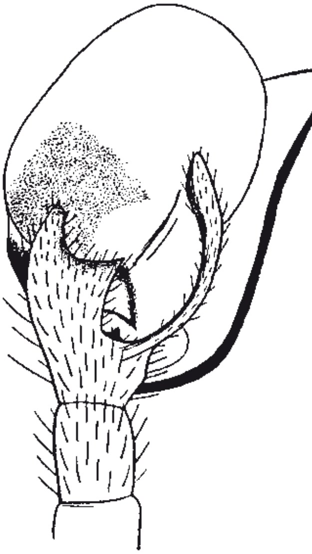
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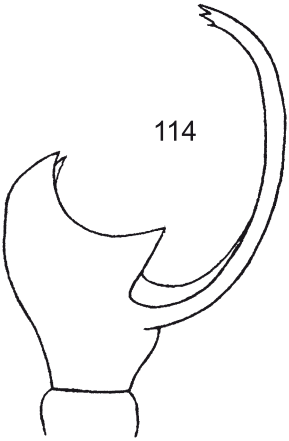
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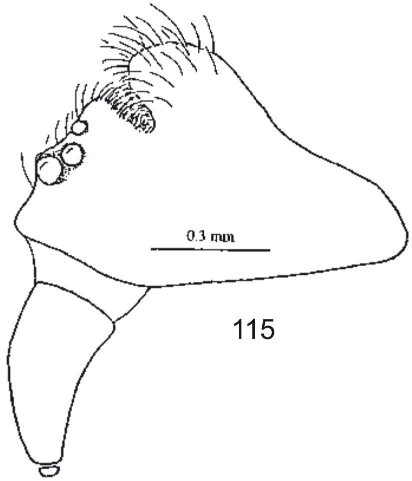
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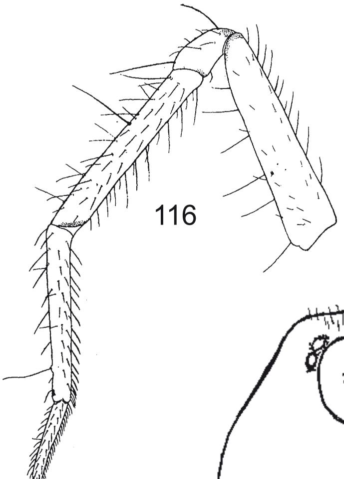
fig. 112) Trichoncus (Trichoncus) monticola DENIS 1965, ♂, dorsal aspect of the left pedipalpal tibia. Taken from DENIS (1965);

fig. 113) Trichoncus (Trichoncus) scrofa SIMON 1884, ♂, dorsal aspect of the left pedipalpus. Taken from DENIS (1965);

fig. 114) Trichoncus (Trichoncus) trifidus DENIS 1965, ♂, dorsal aspect of the left pedipalpal tibia. Taken from DENIS (1965);

fig. 115) Trichoncus (Tanatrichoncus) villius TANASEVITCH & PITERKINA 2007, ♂, lateral aspect of the prosoma. Taken from TANASEVITC H & PITERKINA (2007),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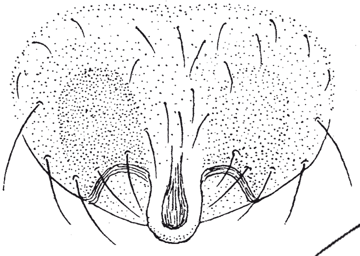
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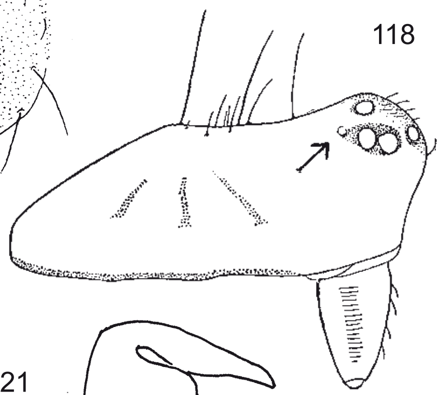
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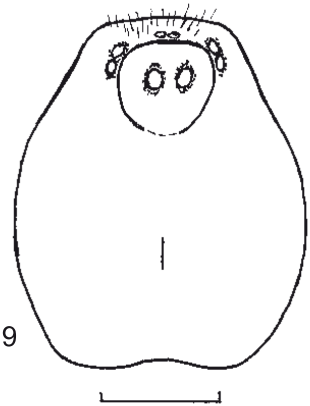
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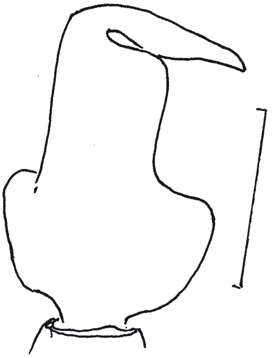
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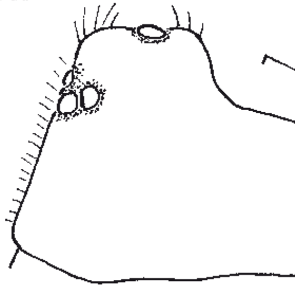
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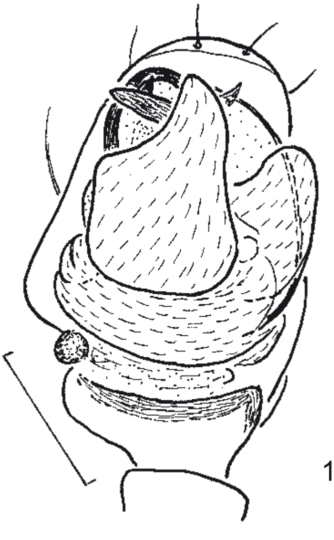
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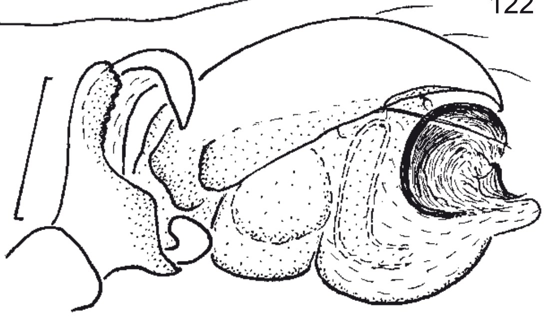
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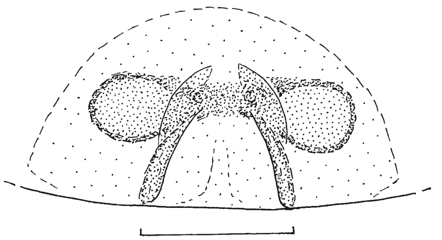
figs. 116-118: *Trichoncus* (*Lasiargus*) *hirsutus* (KULCZYNSKI 1894); 116) ♀, prolateral aspect of the left leg IV; 117) ♀, epigyne; 118) ♂, lateral aspect of the prosoma; the arrow indicates the small pit behind the posterior lateral eye. The figs. are taken from WIEHLE (1960);

figs. 119-125: *Saloca elevatum* **n. sp**.; 119-120) ♂, dorsal and lateral aspect of the prosoma; 121) dorsal aspect of the tibia of the right pedipalpus; 122-123) ♂, retrolateral and ventral aspect of the right pedipalpus; 124-125) ♀, epigyne and dorsal aspect of the vulva; scale bars 0.2 in figs. 119-120), 0.1 in the remaining figs.;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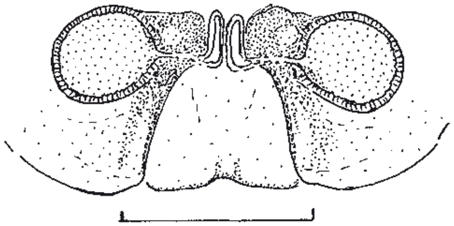
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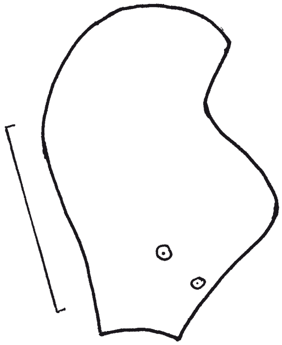
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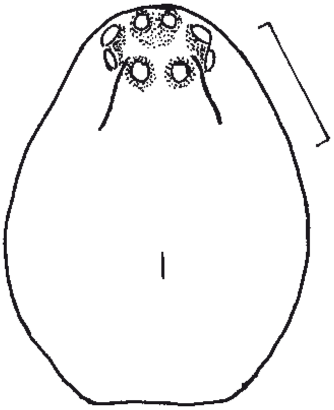
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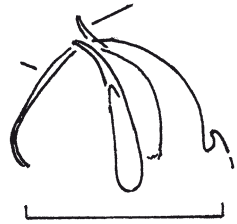
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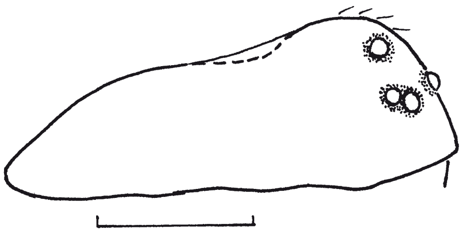
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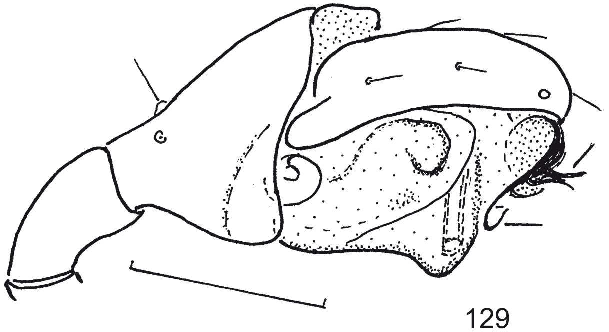
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figs. 126-130: *Diplocephalus toscanaenis* **n. sp**., ♂; 126-127) dorsal and lateral aspect of the prosoma; 128) dorsal aspect of the tibia of the right pedipalpus; 129) retrolateral aspect of the right pedipalpus; 130) proventral aspect of the distal sclerites of the right bulbus. E = embolus, O = outgrowth of the embolus. Scale bars 0.2 in figs. 126-127, 0.1 in the remaining figs.

FAMILY DICTYNIDAE

Abstract: A key is given to the European species of the genus *Nigma* LEHTINEN 1967 (Dictynidae: Dictyninae). *Dictyna gratiosa* SIMON 1881 (= *Ajmonia g.*) is transferred to *Nigma* (**n. comb.**).

Nigma (= *Ergatis*, *Heterodictyna*) is one of at least 8 or even 10 extant European genera of the subfamily Dictyninae, see the key in the book of WUNDERLICH (2008: 1430-1432) in which the not-European genera *Ajmonia* and *Chaerea* are not included.
Several structures of *Nigma* are not yet well studied; most papers are not helpful concerning the determination, the vulva has figured only of *flavescens* and *walckenaeri* – see WIEHLE (1953: Figs. 171b and 178b) – as well of *tuberosa*, see WUNDERLICH (1987: Fig. 601).
I know 5 European species of *Nigma*, see the key below, and one from the Canary Islands.
In my opinion *Nigma walckenaeri vulnerata* (SIMON 1914) (sub *Dictyna viridissima vulnerata*) (♂ unknown) may – according to the red dorsal opisthosomal patch – well be a junior synonym of *puella* but its vulva has never been investigated. The upgrading of *vulnerata* to species status by G. SCHMIDT – based on material from the Canary Islands where *N. puella* is not rare – was not at all founded by SCHMIDT but has been accepted by PLATNICK in his World Spider Catalog. *N. gratiosa:* See below

Diagnosis of *Nigma*: Opisthosomal colour (photo 87) mainly or partly greenish (*), leg bristles absent; ♂: Chelicerae anteriorly in the basal half with a blunt – usually MEDIAL – outgrowth or ledge (figs. 2-6), medially not diverging; pedipalpus: Patella with a retrodorsal outgrowth (fig. 13) or hook (fig. 14), tibia with a retrodistal outgrowth (figs. 13-14), cymbium usually with a probasal hook or outgrowth (*gratiosa*) (figs. 7-8, 15, 20; but see *puella,* fig. 9).

(*) See note (2) at the key below.

Further characters: Male caput distinctly convex, all metatarsi with a trichobothrium in the distal half; in both sexes the cribellum is well developed and usually divided (sometimes quite indistinctly divided), calamistrum very long; ♂: Petiolus with a large v-shaped sclerite in a ventral and lateral position, gnathocoxae usually with a retrobasal hump or bulging (fig. 1).

Relationships: In *Dictyna* s. l. the legs are also bristle-less, the metatarsi bear a single trichobothrium, the ♂-prosoma is strongly convex, the pedipalpal tibia possesses a dorsal apophysis, and the conductor has a similar shape but the body colour is not partly green, the male chelicerae bear a RETRObasal hook but not an anterior-medial hump or ledge, and are excavated medially in about the middle but not distally; furthermore CTENIDIA exist on the male pedipalpal tibial apophysis in almost all species, and a pedipalpal patellar apophysis is absent.

Key to the European species of *Nigma* (males, with notes on the females):

Notes: (1) The distribution may be helpful: On the Canary Islands occurs only *tuberosa* (endemic), *puella, gratiosa*, *hortensis* are retricted to Southern Europe, and in Central Europe occur *flavescens, puella* and *walckenaeria*. (2) At least in most living specimens of *N. puella, tuberosa* and *vulnerata* exist red patches on the opisthosoma which fades in alcohol.

1 ♂-pedipalpus (fig. 20): Tibia dorsally with a longitudinal keel besides a retrodistal outgrowth, cymbium with a large prodorsal outgrowth, embolus standing out (in an unnatural position?). Southern Iberian Peninsula . . . . *gratiosa*

- ♂-pedipalpus different, tibial keel absent, larger cymbial outgrowth existing in *tuberosa* 2

2 (1) Embolus (lateral aspect) in the distal part distinctly bent (fig. 10), tip of the conductor relatively long (fig. 17). Epigynal pits distinctly spaced, vulva with widely spaced anterior structures, see WIEHLE (1953: figs. 178-178b) (sub *Dictyna*). . . . . *flavescens*

- Distal part of the embolus (lateral aspect) almost straight (figs. 11-14). Epigyne variable 3

3(2) Embolus relatively short, cymbium probasally with a large hump (fig. 15). Epigyne with a large pit converging anteriorly, see WUNDERLICH (1987: Fig. 600). Endemic to the Canary Islands . . . . *tuberosa*

- Embolus longer (figs. 16-17), cymbial hook smaller or absent (figs. 7-9). Epigyne with a pair of pits which may be indistinct 4

4(3) ♂: Chelicerae MEDIALLY protruding with a margin/ledge in the anterior-basal part (figs. 2-3, 5), cymbium probasally with a tiny hook (fig. 7), apical part of the conductor very short (arrows in figs. 11, 16). ♀: Epigyne with a pair of large longitudinal pits which are close together, vulva with anterior structures close together, see WIEHLE (1953: figs. 171-171b) (sub *Dictyna*). . . . . *walckenaeri*

- ♂: Chelicerae not medially protruding, usually straight in this area, and not rarely laterally protruding (figs. 4, 6), cymbium probasally without a hook (fig. 9). ♀: Epigynal pits indistinct 5

5(3) ♂: Pedipalpal patella with a distinct dorsal outgrowth (fig. 13), apical part of the conductor shorter (figs. 13, 18). Central and Southern Europe. Photo 87. . . . . . .*puella*

- ♂: Pedipalpal patella without or with a tiny dorsal outgrowth, apical part of the conductor (arrow in fig. 19) long and directed prolaterally. Southern Europe . . . . *hortensis*

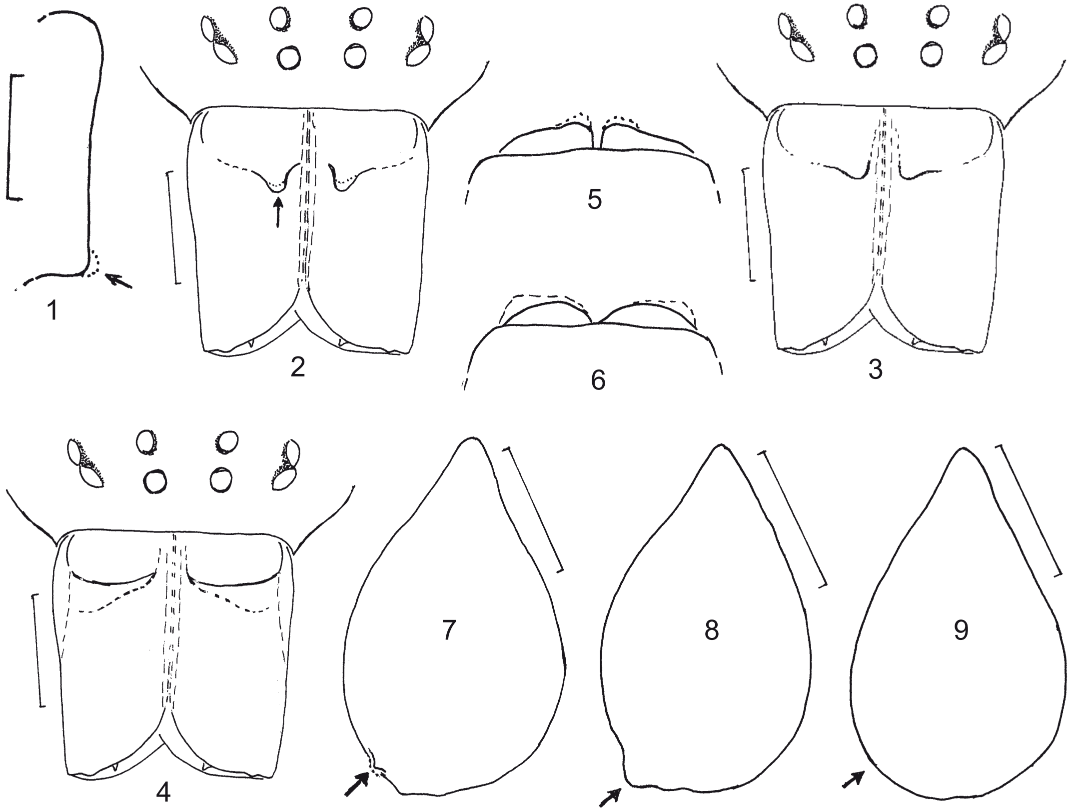

Fig. 1) Nigma sp., ♂, medial aspect of the left gnathocoxa, outline. Dotted: intrapopular variability of the retrobasal hump (arrow). Scale bar 0.2 mm;

fig. 2) Nigma flavescens (WALCKENAER) (similar: tuberosa), ♂, anterior-dorsal aspect of the chelicerae. Scale bars in figs. 2-4: 0.2;

fig. 3) Nigma walckenaeri (ROEWER), ♂, anterior-dorsal aspect of the chelicerae;

fig. 4) Nigma puella (SIMON) (similar hortensis), ♂, anterior-dorsal aspect of the chelicerae;

fig. 5) Nigma flavescens and walckenaeri, ♂, dorsal aspect of the chelicerae, variability dotted;

fig. 6) Nigma puella and hortensis (SIMON), ♂, dorsal aspect of the chelicerae, variability dotted;

fig. 7) Nigma walckenaeri, ♂, dorsal aspect of the right cymbium with the tiny hook (arrow) and its variability (dotted). Scale bar 0.2;

fig. 8) Nigma flavescens, ♂, dorsal aspect of the right cymbium. Scale bar 0.2;

fig. 9) Nigma puella, ♂, dorsal aspect of the right cymbium. Scale bar 0.2;

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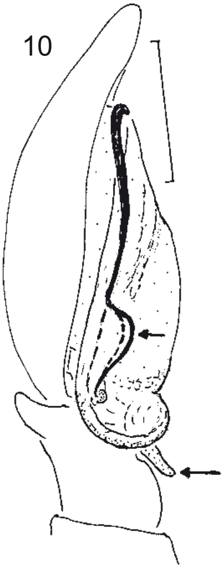

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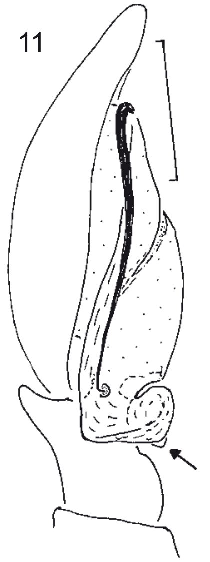

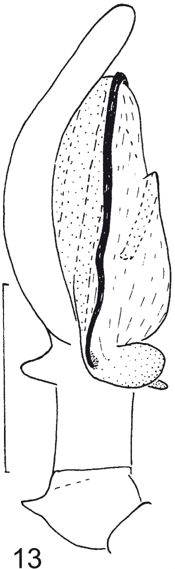

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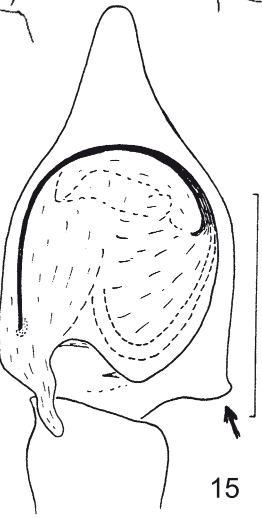

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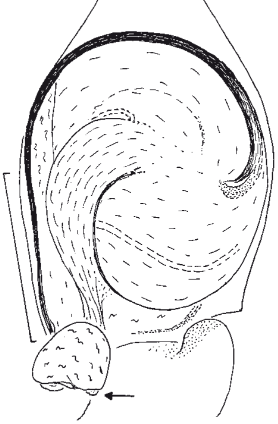

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fig. 10) *Nigma flavescens*, ♂, retrolateral aspect of the right pedipalpus. Dotted: Variablity of the shape of the embolus. Scale bar 0.2;

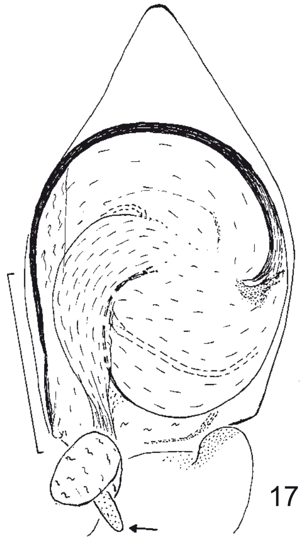
fig. 11) *Nigma walckenaeri* and *puella*, ♂, retrolateral aspect of the right pedipalpus. Scale bar 0.2;

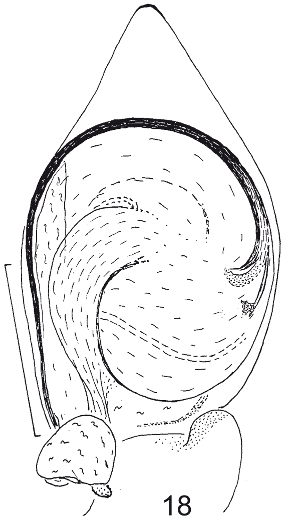
fig. 12) *Nigma walckenaeria, puella* and *hortensis*, ♂, variability of the shape of the right embolus; compare fig. 11. Scale bar 0.2;

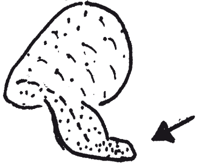
fig. 13) *Nigma puella*, ♂, retrolateral aspect of the right pedipalpus. Scale bar 0.1;

figs. 14-15) *Nigma tuberosa* WUNDERLICH 1987, ♂, retrolateral and ventral aspect of the right pedipalpus. Scale bar 0.1;

fig. 16) *Nigma walckenaeri*, ♂, ventral aspect of the right pedipalpus. Scale bar 0.2;







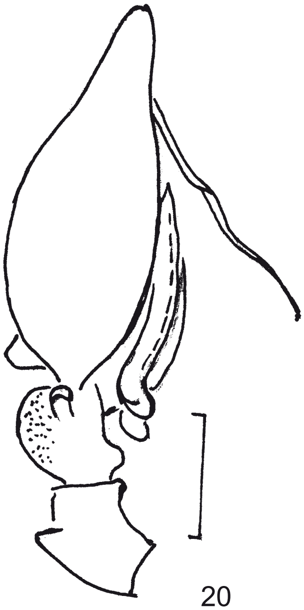


fig. 17) Nigma flavescens, ♂, ventral aspect of the right pedipalpus. Scale bar 0.2. The arrow points to the long apical part of the conductor;

fig. 18) Nigma puella, ♂, ventral aspect of the right pedipalpus. Scale bar 0.2;

fig. 19) Nigma hortensis, ♂ (Spain, Granada, MNHP AR 550), ventral aspect of the right conductor.

fig. 20) Nigma gratiosa (SIMON 1881), ♂ (S-Portugal)m, retrolateral aspect of the right pedipalpus. The embolus – away from the conductor – may have an unnatural position. Scale bar 0.2.

Nigma gratiosa (SIMON 1881) (**n. comb.**) (fig. 20)

Material: (1) Portugal, 1 ♂, 4 ♀, MNHNP AR 617; (2) Algeria, Constantine, numerous specimens, MNHNP AR 606.

This species was originally described under *Dictyna* and erroneously (with hesitation) transferred to *Ajmonia* CAPORIACCO 1934 by LEHTINEN (1967: 210), but all diagnostic characters (see above) are as in *Nigma*. Therefore I transfer *gratiosa* to *Nigma* (**n. comb.**)

FAMILY GNAPHOSIDAE

Abstract: *Drassyllus paroculus* (SIMON 1914) and *Trachyzelotes glossus* (STRAND 1915) (**n. comb**., from *Zelotes*) are reported from Turkey for the first time. The following taxa are described: *Nomisia excerpta* (O. PICKARD-CAMBRIDGE 1872) from Greece, *Latzelotes* **n. subgen**. of *Zelotes*, *Zelotes* (*Latzelotes*) *boluensis* **n. sp**. from Turkey, *Zelotes fuzeta* **n. sp**. and *Z. serratus* **n. sp**. from Portugal.

Drassyllus paroculus (SIMON 1914) (**n. comb**.) (from *Zelotes*)

Material: S-France, Provence, near Menton, 3♂ JW leg. in V. 2003, CJW.

Synonymy: I regard *Zelotes paroculus* SIMON 1914 is – according to the absence of an intercalary sclerite and the existence of ventral bristles on the male opisthosoma – as a member of *Drassyllus* CHAMBERLIN 1922 (**n. comb**.).

Distribution: S-France, Italy.

Nomisia excerpta (O. PICKARD-CAMBRIDGE 1872) (figs. 1-4)

2002 *Nomisia excerpta*, -- CHATZAKI et al., Rev. Suisse Zool., 109 (3): 583-584, figs. 49-50, 53-54, 83.
2010 *Nomisia excerpta*, -- CHATZAKI, Zootaxa, 2501: 6-9.

Material: Crete, near Ierapetra, 2♂ JW leg. in Spring ca. 1978, CJW. Further material (not seen): Numerous specimens, see CHATZAKI et al. (2002: 583) and CHATZAKI (2010: 6).

Diagnosis: See CHATZAKI (2010: 9).

The **intraspecific variability** is remarkable, see CHATZAKI (2010: 6).

Relationships: LEVY (1995: 933) synonymized *Pythonissa verneaui* SIMON 1889 (♂ unknown) from the Canary Islands with *Nomisia excerpta* (O. PICKARD-CAMBRIDGE 1872) from Israel and Northern Africa but *verneaui* is different, and most probably a synonym of *Nomisia musiva* (SIMON 1889), see the paper on spiders of the Canary Islands in this volume. See also CHATZAKI (2010: 6-9).

Distribution according to CHATZAKI (2010: 9): Grece, Israel, Syria, Lebanon.

***Latzelotes* n. subgen.** of *Zelotes*

Type species: *Latzelotes boluensis* n. sp. A further species is most probably *Zelotes bashaneus* LEVY 1998 from Israel.

Diagnosis: ♂-pedipalpus (figs. 5-9): Embolus wide, flattened in the distal half and bent in a right angle in the middle, terminal apophysis long, consisting of four parts. ♀: Epigyne (fig. 10) with two pairs of large pockets. Vulva (fig. 11) with a pair of circular, small and fairly thick-walled receptacula seminis in connection with a medial pair of sac-shaped structures.

Relationships: Like in other groups of *Zelotes* s. l. an intercalary sclerite exists but the embolus is thin in other groups, and the terminal apophysis is different and less complicated. *Latzelotes* may be regarded as a genus of its own after a revision and splitting of the “groups” of *Zelotes* s. l..

Distribution: Turkey and most probably Israel.

***Zelotes* (*Latzelotes*) *boluensis* n. subgen. n. sp.** (figs. 5-11)

Material: Turkey, Anatolia bor., Abant Mountains near Bolu, pit falls, 5♂2♀ HORST KORGE leg. in V 1976; holotype ♂ R71/AR/CJW, 4♂2♀ paratypes R72/AR/CJW; later probably SMF.

Diagnosis: See the diagnosis of the subgenus.

Description:
Measurements (in mm): Body length 6.0-6.5, prosoma: Length 2.8-3.0, width 2.2-2.3; leg I ♂: Femur 2.1, patella 1.1, tibia 1.5, metatarsus 1.3, tarsus 1.1, tibia II 1.45, tibia III 1.15, tibia IV 1.55; ♀ leg I: Femur 2.0, patella 1.2, tibia 1.5, metatarsus 1.2, tarsus 1.0, tibia IV 1.6.
Colour black brown, tarsi and most metatarsi medium brown, femur I prolaterally with a large light brown spot.

Prosoma 1.7 times longer than wide, almost smooth, thoracal fissure well developed, eyes small, posterior row straight or slightly procurved, posterior median eyes oval, spaced by ca. ¾ diameter. Basal cheliceral article anteriorly with some long hairs, fangs long, the anterior margin of the furrow bears 3-4, the posterior row 1-2 teeth. Labium free, ca. 1.15 times longer than wide, gnathocoxal depression well developed, coxae IV close together. – Claw of the ♀-pedipalpus large and toothed. – Legs rather stout, order IV/I/II/III; bristles of leg I-II: Femur dorsally 1/1 and 1 prodistally, tibia bristle-less, metatarsus usually with a pair (rarely a single) ventral-basal bristles. Hairs of the metatarsal III-IV comb long and thin. Tarsus and metatarsus I-II bear a scopula, spatulate hairs of the claw tufts exist. I did not find feathery hairs. – Opisthosoma covered with short hairs, with 3 pairs of sigillae, and in the male with a well developed dorsal scutum; ventrally without spines. – ♂-pedipalpus (figs. 5-9): Patella and tibia short and without bristles, tibia with a proventral outgrowth and a long, slender and blunt retrolateral apophysis; structures of the bulbus: See the diagnosis of the subgenus. – Epigyne and vulva: See above.

Relationships: In *Zelotes bashaneus* LEVY 1998 from Israel (♀ unknown) the shape of the embolus is similar to *boluensis*, and both are apparently congeneric; the shape of the terminal apophysis is quite different in both species.

Distribution: Turkey.

***Zelotes serratus* n. sp.** (figs. 12-15)

Material: S-Portugal, near Aljezur, under stones, 2♂ JW leg. in VIII 2009; holotype R69/AR/CJW, paratype (freshly moulted) R70/AR/CJW; later probably SMF.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 12-15): Median apophysis very long, in a more transverse position, and with a serrated base; embolus in a clockwise position in the left pedipalpus similar to most members of *Drassyllus*.

Description (♂):
Measurements (in mm): Body length 5.0, prosoma: Length 2.3, width 1.8; leg I: Femur 1.45, patella 0.9, tibia 1.1, metatarsus 0.9, tarsus 0.75, tibia II 1.0, tibia III 0.9, tibia IV 1.4, diameter of a posterior median eyes 0.07.
Colour dark grey brown, opisthosoma ventrally medium brown.
Prosoma 1.8 times longer than wide, fovea short, eyes small, field narrow, posterior row fairly recurved, posterior median eyes spaced by almost their diameter, smaller than the posterior lateral eyes. Basal cheliceral articles anteriorly with some long hairs, fangs long, anterior margin of the cheliceral furrow with 4 teeth, posterior row with a single tooth. Labium free, 1.7 times longer than wide, coxae IV close together. – Legs: Order IV/I/II/III, III only slightly shorter than II. Bristles: Femur I 1/1 dorsally and 1 prodistally, tibia I-II bristle-less like metatarsus I, metatarsus II bears a ventral basal bristle. Tarsi and metatarsi I-II bear a well developed scopula, the metatarsal III-IV preening comb is

well developed, the claw tufts are fairly well developed on I-II, weak on III-IV. – Opisthosoma dorsally and ventrally with normal hairs, the dorsal scutum is well developed. – Pedipalpus (figs. 12-15): Patella and tibia short, tibial apophysis slender, intercalary sclerite well developed, terminal apophysis large, median apophysis and embolus: See the diagnosis.

The **relationships** are unsure; I do not know a strongly related species. An intercalary sclerite exists like in other species of the genus *Zelotes* s. l.

Distribution: Portugal.

Zelotes fuzeta n. sp. (16-17)

Material: S-Portugal, E Faro and Fuzeta, sandy area near the beach, holotype ♂ JW leg. in V 2010, R125/AR/CJW.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 16-17): The embolus describes a large loop, its medium part is guided by a prominent part of the cymbium, and possesses pointed “spiny” precesses in its basal half.

Description (♂):
Measurements (in mm): Body length 2.8, prosoma: Length 1.15, width 0.75; leg I: Femur 0.73, patella 0.37, tibia 0.55, metatarsus 0.43, tarsus 0.35, tibiae II-IV 0.42/0.32/0.59.
Colour mainly dark brown, coxa, trochanter, metatarsi and tarsi light brown, opisthosoma ventrally medium brown.
Prosoma flat, 1.53 times longer than wide, anteriorly gradually smaller, fovea short but distinct, hairs indistinct; eyes fairly small but anterior lateral eyes large, posterior row slightly recurved, posterior median eyes oval, spaced by their radius. Basal cheliceral articles and fangs robust, anterior margin of the cheliceral furrow with three small teeth, posterior margin with two denticles, labium free and longer than wide, gnathocoxae long, not converging, ventral depressions well developed, the sternum is not elongated between the coxae IV. – Legs fairly stout, order IV/I/II/III, III distinctly the shortest, claw tufts and scopulae absent, preening comb on metatarsus III-IV well developed, the tarsal claws bear long teeth. Bristles thin on the femora I-II, lateral patellar bristles: Only a single retrolateral one on III, tibiae: I-II bristle-less, on III-IV numerous, metatarsus I bristle-less, II a single one retroventrally in the basal half, on III-IV numerous. – Opisthosoma oval, fairly flattened, hairs short, dorsal scutum reaching the middle of the opisthosoma, anteriorly only 1/3 as wide as the opisthosoma, the long anterior spinnerets are spaced by about 1 ½ of their diameter. – ♂-pedipalpus (figs. 16-17, see the diagnosis): The tibia bears two long dorsal trichobothria and a large retrolateral apophysis which is slightly bent dorsally, the cymbium is widened retrolaterally in the basal half and bears a prodistal bristle.

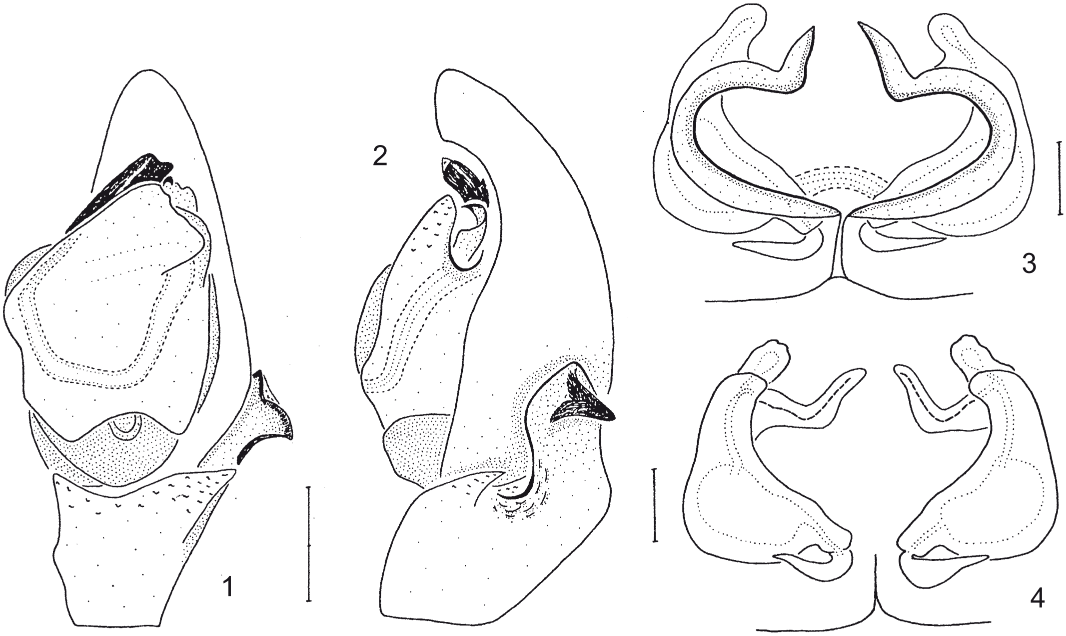
Relationships: A species of the *Zelotes caucasius* group, close to *incisupalpis* LEVY 1998 from Israel, in which the embolus also is retrolaterally partly guarded by the cymbium but different processes of the embolus exist, as well as a leaf-like transparent process distally of the embolus.

Distribution: S-Portugal.

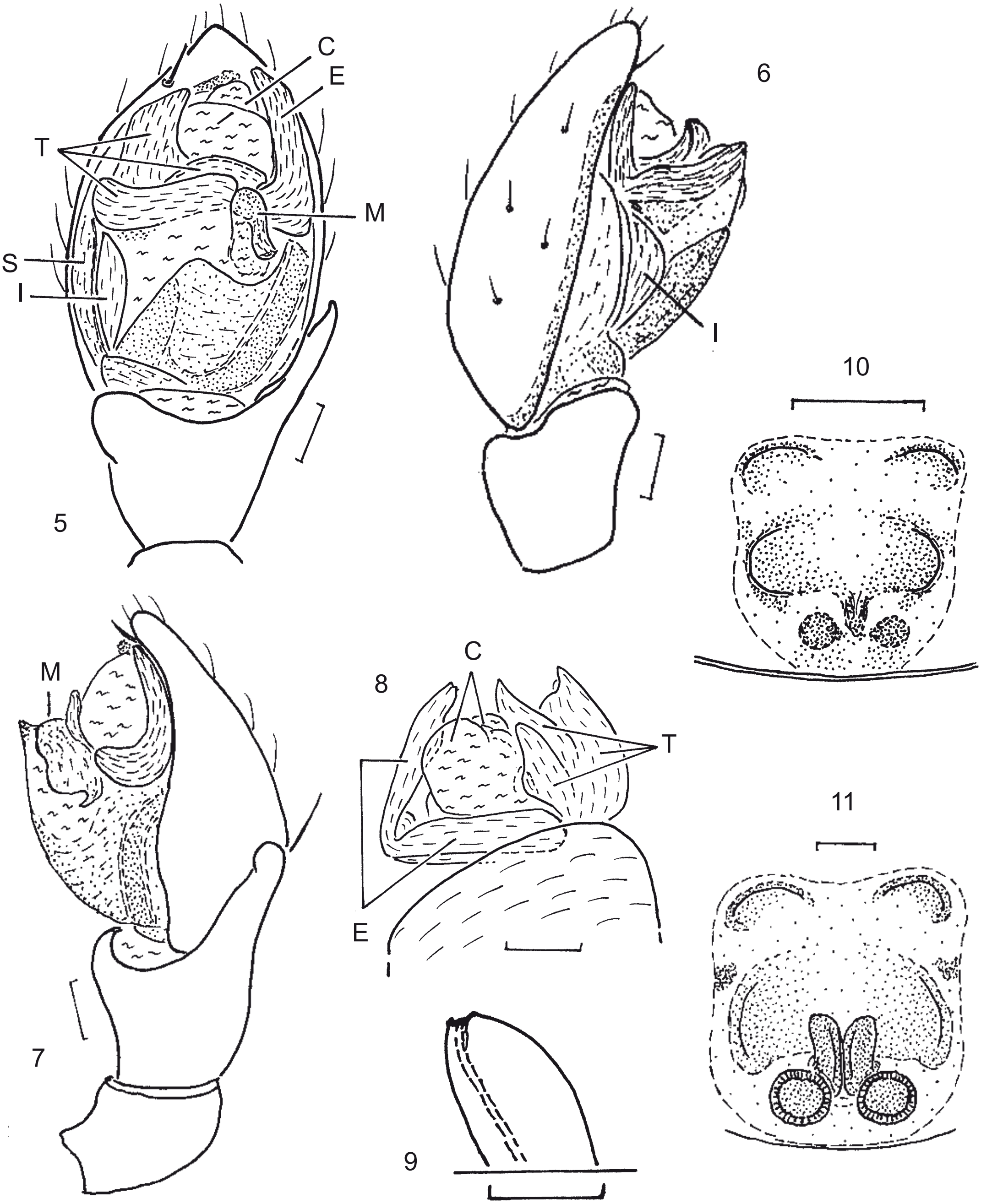
Trachyzelotes glossus (STRAND 1915)

Material: Turkey, near Artvin, 1♂ H. KORGE leg. ca. 1977, CJW.

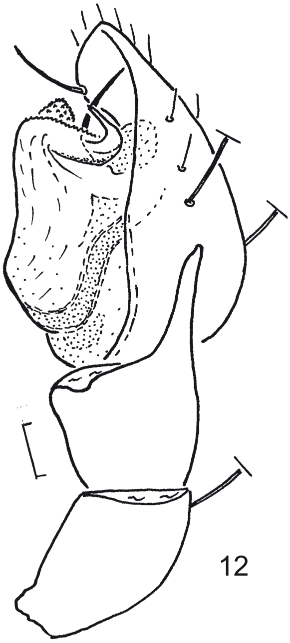
Distribution: (1) Type locality in Israel, see LEVY (1998: 109-110, figs. 29-30, ♂); (2) Turkey (new to this country).



Figs. 1-4: Nomisia excerpta (O. PICKARD-CAMBRIDGE 1872); 1-2) ♂, ventral and retrolateral aspect of the left pedipalpus; 3-4) ♀, epigyne and vulva; scale bars 0.2 mm in figs. 1-2, 0.1 in figs. 3-4. Taken from CHATZAKI et al. (2004);



figs. 5-11: Zelotes (Latzelotes) boluensis **n. subgen. n. sp**.; figs. 5-9) ♂; 5-7) ventral, prolateral and retrolateral aspect of the left pedipalpus; 8) dorsal aspect of the distal parts of the left bulbus; 9) ventral aspect of the flattened distal part of the left embolus; C = conductor, E = embolus, I = intercalary sclerite, M = median apophysis, S = subtegulum, T = terminal apophysis; 10-11) ♀, epigyne and dorsal aspect of the vulva. Scale bars 0.5 in fig. 10), 0.05 in fig. 9, 0.2 in the remaining figs.;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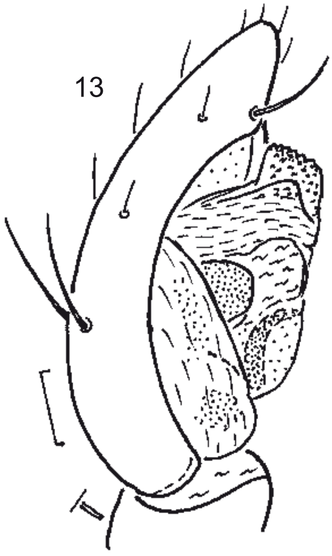
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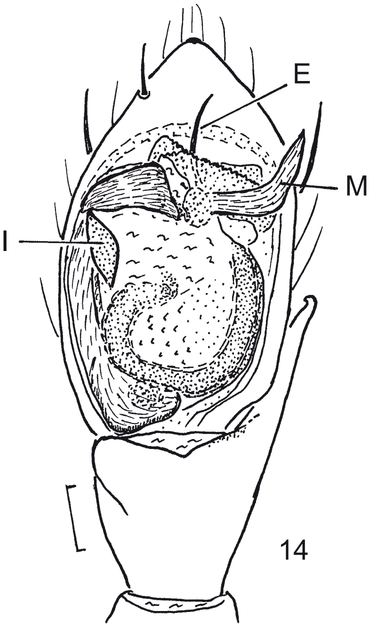

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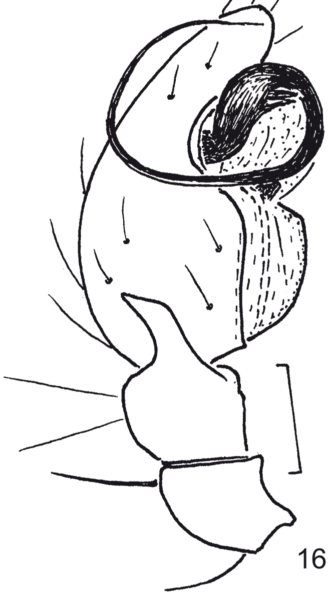
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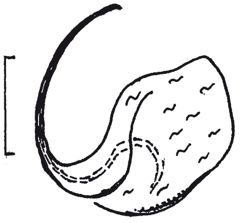
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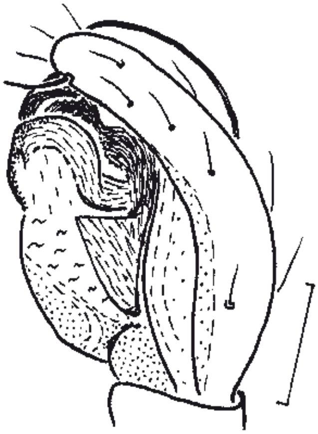
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figs. 12-15: <u>*Zelotes serratus*</u> **n. sp.**, ♂; figs. 12-14) retrolateral, prolateral and ventral aspect of the left pedipalpus; 15) retrolateral aspect of the embolus of the left expanded bulbus; E = embolus, I = intercalary sclerite, M = median apophysis. Scale bar 0.1;

figs. 16-17: <u>*Zelotes fuzeta*</u> **n. sp.**, ♂, retrolateral and prolateral aspect of the right pedipalpus. Scale bar 0.1.

FAMILY SPARASSIDAE

I thank very much PETER JÄGER for a discussion concerning the key to the genera.

The family Sparassidae has a mainly tropical distribution; the spiders are usually large and flattened, nocturnal, and possess laterigrade legs (when moving body and legs are close to the ground), but there are exceptions: The members of *Micrommata* are diurnal, and the position of their legs is prograde, see the key to the genera given below.

While 7 genera have been found in the Southern Mediterranean – Northern Africa, Israel: *Cebrennus, Cerbalus, Eusparassus, Heteropoda, Micrommata, Nonianus* and *Olios* – only 4 genera have been recorded from the European mainland (see the key below), and only a single species of *Micrommata* – *M. virescens* – spread to Central and even Northern Europe. Two genera are known from the Canary Islands (*Cerbalus* and *Olios*), *Olios* from Madeira, but none from the Azores.

Key to the European incl. Canarian and Madeiran genera of the family Sparassidae
With remarks on two genera from the Eastern and Southern Mediterranean, see LEVY (1989):

In *Cebrennus* from N-Africa and the Near East exists a large border of about half a dozen FUSED teeth on the cheliceral retromargin; in the remaining genera exist separate retromarginal teeth. – In *Nonianus* the clypeus is quite short, almost as short as the radius of the anterior median eyes. An only slightly longer clypeus exists also in *Olios*, in which the anterior median eyes are larger than the anterior lateral eyes in contrast to *Nonianus* in which the anterior median eyes are smaller than the laterals.

1 Chelicerae with 3 (rarely 4) promarginal teeth, posterior eye row strongly recurved, body distinctly flattened, legs laterigrade (see no. 2). . . . . *Heteropoda*

- Cheliceral promargin with 2 teeth, posterior eye row straight or procurved 2

2(1) Legs laterigrade (directed sidewards, I and II in an “embracing” crab-like position, their ventral side turned anteriorly), body flattened and while moving near to the ground; colour as well as embolus and conductor different. Southern Europe only 3

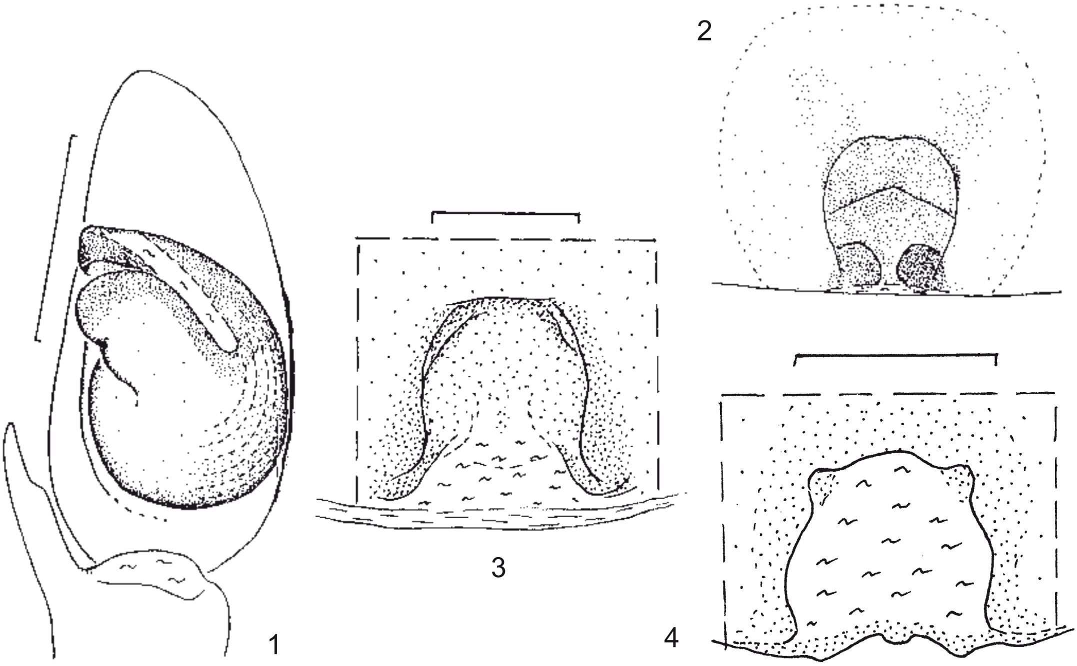
- Legs prograde (the usual position in spiders), body not flattened in contrast to typical Sparassidae, body and legs not near to the ground in moving spiders; adult living spiders have a mainly green colour (subadult males may have red opisthosomal bands), embolus and conductor build a spiral complex and bear denticles. Few species; southern to Northern parts of Europe: *virescens*, the only member of the family in this area. . . . . *Micrommata*

3(2) Chelicerae posteriorly near the fangs usually with a single bristle-shaped hair only (arrow in fig. 9), cheliceral furrow usually with several denticles, the forth pair of legs is the second longest pair . . . . *Eusparassus*

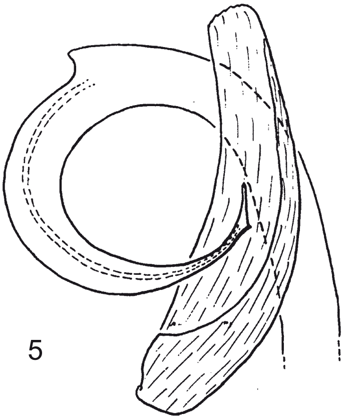
- Chelicerae in this position with a series of 6 or more bristle-shaped hairs (fig. 8), denticles in the cheliceral furrow absent, the first pair of legs is the second longest pair . .4

4(3) Patellae and opisthosoma ventrally darkened. Prosoma and field of the median eyes usually about 15% longer than wide, structures of the bulbus (fig. 1) relatively simple, embolus heavy, not pointed distally; epigynal structures (figs. 2-3) less sclerotised. The spiders live subterraneous in tubes in contrast to the other genera. Canary Islands, unknown from the European mainland. . . . . *Cerbalus*

- Legs yellow, ventral opisthosomal colour light. Prosoma and field of the median eyes about as long as wide, structures of the bulbus rather complicated, embolus (fig. 5) pointed distally and describing almost a circle, median epigynal margins strongly sclerotised (figs. 6-7). European mainland, Canary Islands and Madeira . . . . *Olios*



Figs. 1-4: *Cerbalus* (?) *verneaui* (SIMON 1889); 1) ♂ from Fuerteventura, ventral aspect of the right pedipalpus; 2) ♀ from Gran Canaria, epigyne; 3) ♀ from Lanzarote, epigyne. Note the skinny posterior area; 4) subad. ♀ from Fuerteventura, prae-epigyne with a large skinny field. Hairs are not drawn. Scale bar in figs. 1, 3 and 4 1.0 mm;



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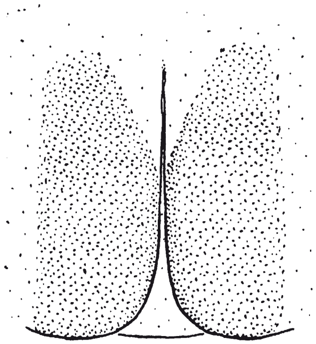

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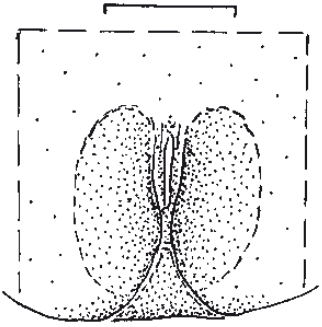

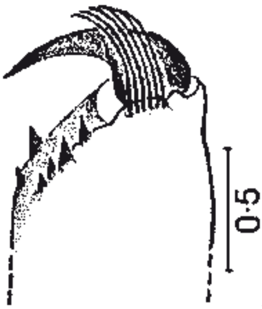

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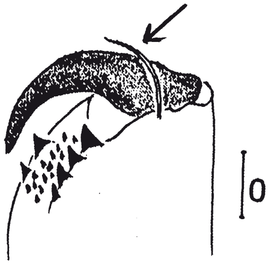

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fig. 5) Olios canariensis (LUCAS 1838), ♂ from La Gomera and Tenerife, ventral aspect of the distal part of the right embolus and conductor; 6) ♀ from La Palma, epigyne; 7) ♀ from Tenerife, epigyne. Scale bar in fig. 7) 1.0;

fig. 8) Olios suavis (O. PICKARD-CAMBRIDGE 1876), posterior aspect of the right chelicera. Taken from LEVY (1989);

fig. 9) Eusparassus walckenaeri (AUDOUIN 1827), posterior aspect of the right chelicera. The arrow points to the single bristle-shaped hair. Taken from LEVY (1989).

FAMILY THOMISIDAE

Ozyptila salustri n. sp. (fig. 1-4)

Material: Italy, S-Toscana, E Grosseto, ca. 15 km SE Roccastrada, near Campagnatico, Salustri, garden in a wine growing estate, in detritus under abush, 4♂ JW leg. in VIII 2010; holotype R141/AR/CJW, paratypes: 1♂ R142/AR/CJW, 1♂ Mus. Civico di science naturali "E. CAFFI" in Bergamo, Italy; 1♂ Mus. Civico di stori naturale Verona, Italy.

Remark: In the paratype R142/CJW the left leg IV looks like dried out, at the base of the femur a hard particle exists between femur and opisthosoma. The left legs I and II of this specimen are lost by autotomy.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 2-4): Patella ventrally-basally with a toothed hook (arrows), retrolateral tibial apophysis very large, bulbus with several apophyses, embolus with a seam, distally serrated.

Description (♂):
Measurements (in mm): Body length 2.1, prosoma: Length 1.15, width 1.1; leg I: Femur 0.85, patella 0.4, tibia 0.65, metatarsus 0.6, tarsus 0.4; tibiae II-IV: 0.5/0.35/0.4.
Colour: Prosoma dark brown, medially with a pair of yellow brown bands, lateral margin white, sternum medium brown, with yellow brown spots a bit similar to members of *Tegenaria* (Agelenidae), opisthosoma dorsally mainly dark brown, with tiny yellow brown spots, ventrally medium brown, legs brown, the femora as well as patellae and tibia I dark brown.
Prosoma slightly longer than wide, eyes: posterior row strongly recurved and small, posterior median eyes smallest, anterior lateral eyes large; fairly thickened bristles between the anterior median eyes. – Legs stout, order I/II/IV/III, tarsi II and I (more distinctly) slightly thickened; bristles: Femur I 1-2 prolaterally, femora II-III usually a single bristle near the middle, tibiae I-II ventrally 2 pairs, metatarsi I-II ventrally 3 pairs. Metatarsal trichobothria: All metatarsi 1/1 in the distal half (the distal one very long), all tarsi bear a single distal one. – Opisthosoma as wide as long, dorsally covered with bristles which are fairly club-shaped; the colulus is replaced by a pair of tiny hairs/bristles. – Pedipalpus (figs. 2-4, see also above): Tibia with 4 trichobothria, ventral tibial apophysis in an almost transverse position, retrolateral tibial apophysis undivided.

Relationships: A species of the *rauda*-group. *O. secreta* THALER 1987 (Switzerland, N-Italy) and *O. ladina* THALER & ZINGERLE 1998 (N-Italy) are strongly related; in *secreta* the pedipalpal tibial apophyses are different; a ventral hook of the pedipalpal tibia is absent in both species; a serrated embolus exists in *secreta*, too, but the sclerites of the bulbus are different.

Distribution: Italy, Toscana.

Pistius undulatus KARSCH 1879 (figs. 5-6) photos 89a-b

Material: Italy, Toscana, Salustri, ca. 40 km E Grosseto, in the garden of a wine growing estate, beaten from a bush, JW leg. in VIII 2010, CJW.

Up to now only a single species of *Pistius* – *truncatus* – has been reported from Europe. *P. undulatus* is widely distributed in the Holarctis Region from Europe/Italy (new to these regions) to Japan. Its prosoma and opisthosoma bear long and thick spine-shaped bristles, bent and short bristles exist on the prosomal margin.
Male pedipalpus: Fig. 5, epigyne: Fig. 6.


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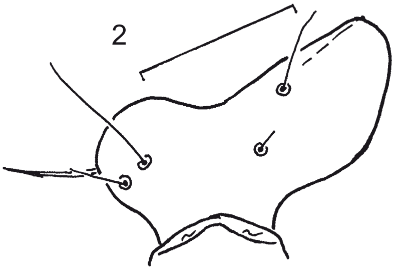
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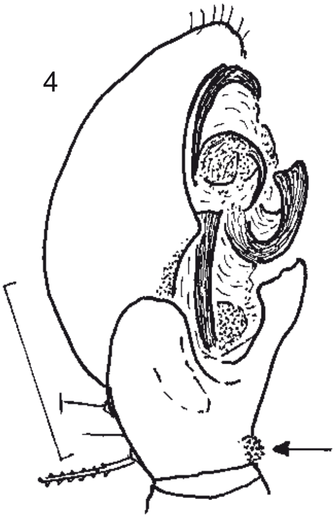
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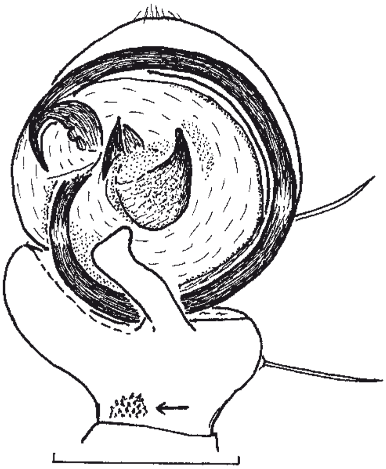
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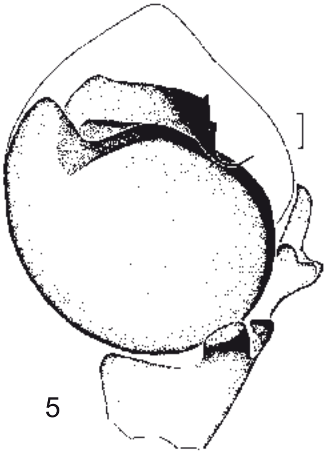
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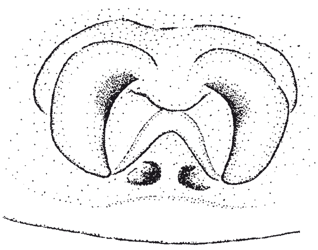
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Figs. 1-4: Ozyptila salustri **n. sp**., ♂; 1) ventral-anterior aspect of the paired hairs which replace the colulus; 2) dorsal aspect of the right pedipalpal tibia; 3-4) ventral and retrolateral aspect of the right pedipalpus. The arrows point to the toothed basal-ventral outgrowth of the tibia. Scale bars 0.02 mm in fig. 1, 0.2 in the remaining figs.;

figs. 5-6: Pistius undulatus KARSCH 1879: 5) ventral aspect of the ♂-pedipalpus; 6) ♀, epigyne. Taken from LEHTINEN (2004).

FAMILY SALTICIDAE

Icius lamellatus n. sp. (figs. 1-9)

Material: (1) Italy, S-Toscana, near Grosseto, holotype ♂ JW leg. in VIII 2010, R139/AR/CJW; (2) Portugal, S-Algarve, near Monchico, paratype ♂ JW leg. in VIII 2009, R140/AR/CJW.

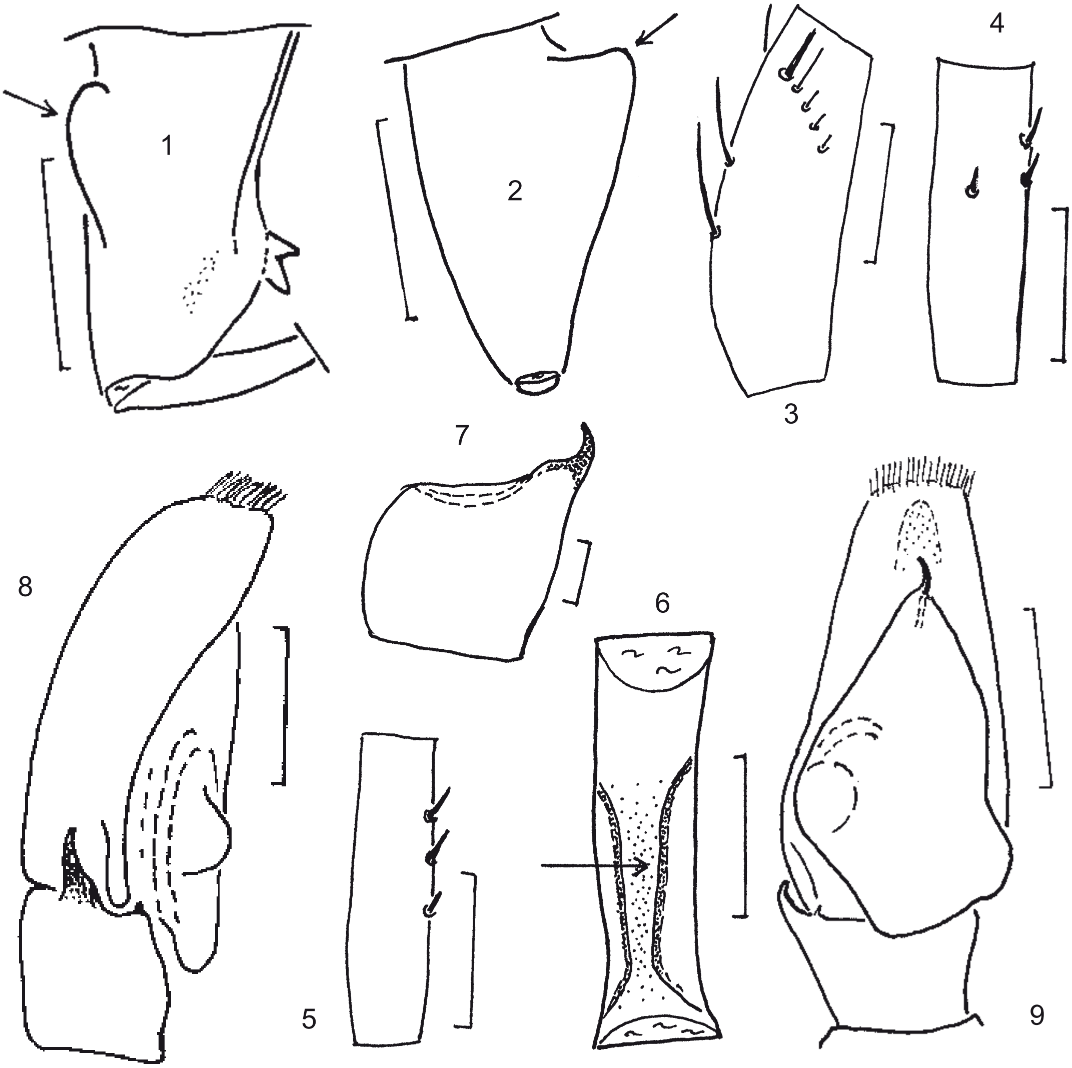
Diagnosis (♂; ♀ unknown): Chelicerae with a large retrolateral lamella (figs. 1-2), anterior margin of the cheliceral furrow with a bipartite tooth (fig. 1); pedipalpus (figs. 6-8): Tibial apophysis slender and strongly bent, embolus fairly short.

Remarks: (1) A longitudinal ventral furrow of the male pedipalpal femur (limited by fairly sclerotised margins) (fig. 6) may be a typical character of the genus *Icius* in contrast to *Pseudicius*, and this character may be added in the key of salticid genera given by WUNDERLICH (2008: 707). – (2) The intraspecific variability in the chaetotaxy is demonstrated by the figs. 4-5.

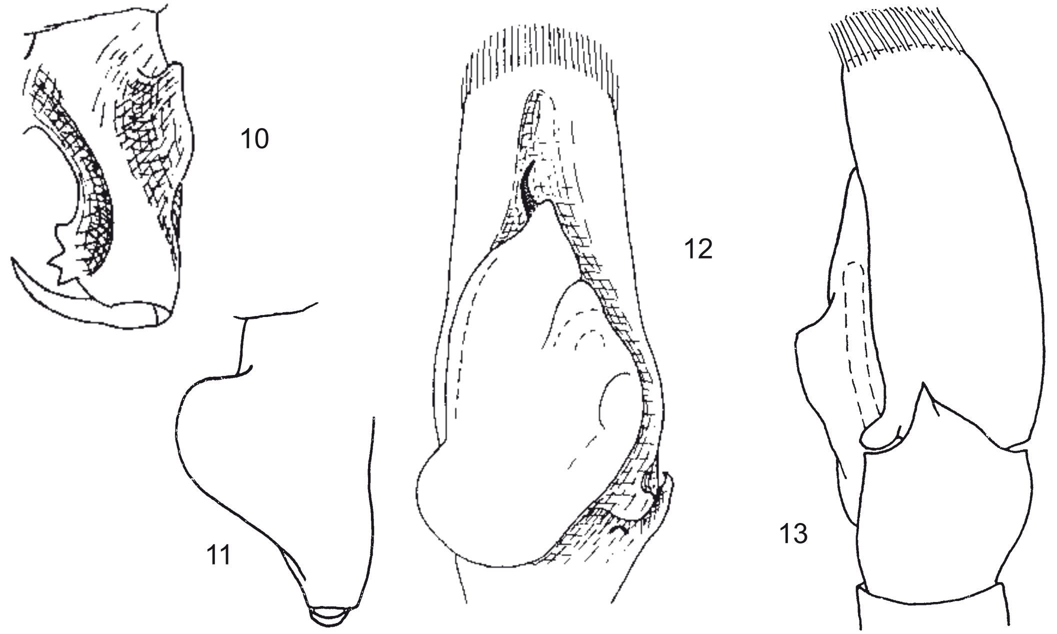
Description (♂):
Measurements (in mm): Body length 4.3, prosoma: Length 2.0, width 1.5; leg I: Femur 1.3, patella 0.65, tibia 0.85-1.0, metatarsus 0.65, tarsus 0.4, tibiae II-IV 0.6/ 0.55/0.8; length of the embolus 0.05.
Colour: Prosoma dark brown, laterally and posteriorly medially medium brown, the clypeus bears apically white hairs, sternum yellow brown with a black margin, mouth parts dark brown, legs II-IV light yellow brown, I mainly dark brown, tarsus and metatarsus medium brown, opisthosoma ventrally yellow to grey brown, medially darkened in the holotype, dorsally dark brown, with a light longitudinal medial band and light lateral bands, spinnerets dark grey, femur of the pedipalpus darkened in its basal part in the holotype.
Prosoma (figs. 1-2) 1.33 times wider than long, fairly flat, bearing hairs of medium length. Basal cheliceral articles large and diverging, bearing a large retrolateral lamella/crest, anterior margin of the cheliceral furrow with a large bipartite tooth, posterior margin with a single large tooth, fangs long. – Legs (figs. 3-5): Order I/IV/II/III, femur I distinctly, tibia I only fairly thickened. Number of bristles variable, femur I bears 3 thin dorsal bristles and a strong prodistal one as well as 4 thin bristles in a row, the distal one longer, patellae without bristles, tibia I bears 3 ventral bristles in a variable position, metatarsus I bears 2 ventral pairs, tibia II smooth or with a single ventral bristle, metatarsus II with 2 ventral pairs. Scopulae absent. All tarsi bear 2 trichobothria. – Opisthosoma 1.5 times longer than wide, densely covered with fairly short hairs. – Pedipalpus (figs. 6-8): Femur ventrally with a longitudinal furrow in the basal 2/3, tibia short, retrolateral apophysis slender, strongly bent and strongly sclerotised, tibia retroventrally apically with a short tooth-like structure like in most species of *Icius* (and other genera including some *Pseudicius* species), embolus short and distally bent.

Relationships: In *Icius insulatus* ALICATA & CANTARELLA 1993 from Algeria (figs. 10-13) exists also a large male cheliceral lamella and the embolus is short but the shape of the lamella is different, the pedipalpal tibial apophysis is wider and the embolus is shorter; the anterior cheliceral tooth is tripartite.

Distribution: Southern Europe: Italy, Portugal.



Figs. 1-9: *Icius lamellatus* **n. sp.**, ♂; 1-2) anterior and lateral aspect of the right chelicera. Note the large lamella/crest (arrows); 3) prolateral aspect of the left femur **I**; 4-5) retroventral aspect of the right tiba **I** of the holotype and of the paratype; 6) ventral aspect of the right pedipalpal femur. Hairs are not drawn. Note the longitudinal furrow (arrow); 7) dorsal aspect of the right pedipalpal tibia; 8-9) retrolateral and ventral aspect of the right pedipalpus. Only the apical cymbial hairs are drawn. Scale bars 0.5 mm in figs. 3-5, 7, 0.2 in the remaining figs;



figs. 10-13: *Icius insolitus* ALICATA & CANTARELLA 1993, ♂; 10-11) anterior and retrolateral aspect of the left chelicera; 12-13) ventral and retrolateral aspect of the left pedipalpus. Taken from ALICATA & CANTARELLA (1993).

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BEITR. ARANEOL., 6 (2011)

DESCRIPTION OF TWO NEW SPIDER SPECIES OF THE GENUS *SCUTPELECOPSIS* FROM IRAN AND TURKEY (ARANEAE: LINYPHIIDAE)

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Abstract: The spider (Araneae: Linyphiidae: Erigoninae) species *Scutpelecopsis median* **n. sp**. from Turkey, Anatolia and *S. procer* **n. sp**. from Iran are described. Both species are related to *S. krausi* (WUNDERLICH 1980) from Macedonia which originally has been described under *Pelecopsis* SIMON 1864.

Key words: Anatolia, Araneae, Erigoninae, Iran, Linyphidae, new species, Turkey.

The genus *Scutpelecopsis* and some new species have recently been desdribed by MARUSIK & GNELITZA (2009), see Arthropoda Selecta, 18 (1): 57-68. Thirty years ago the first species – *krausi* (WUNDERLICH 1980, figs. 1-5) – has been described under *Pelecopsis* SIMON 1864 (type species: *elongata* WIDER 1834) with the remark that this species is different from all other European species of *Pelecopsis*.

Scutpelecopsis is different from *Pelecopsis* and *Parapelecopsis* WUNDERLICH 1992 by (e.g.) having a tuberculate outgrowth of the embolic division, strong ventral opisthosomal scuta in both sexes as well the absence of lateral depressions and an elevated anterior part of the male prosoma; furthermore a distinct prosomal punctuation exist in numerous species of *Pelecopsis*, not only a rugose cuticula like in *Scutpelecopsis*. *Scutpelecopsis* has a wide distribution within the Palaearctic Region from Iran and Russia up to the European Eastern Mediterranen (Macedonia).

***Scutpelecopsis media* n. sp.** (figs. 6-8)

Material: Turkey, Anatolia, Abant Mountains near Bolu, pit fall, holotype ♂ H. KORGE leg. in V 1976; R24/AR/CJW (later most probably SMF).

Diagnosis (♂; ♀ unknown): Pedipalpus (fig. 6-8): "Tooth" of the medial tibial apophysis in a distal position, apical margin of the retrolateral tibial apophysis slightly CONCAVE, embolus almost s-shaped; opisthosoma laterally less sclerotized (light coloured).

Description (♂):
Measurements (in mm): Body length 1.5, prosoma: Length 0.67, width 0.6; leg I: Femur 0.52, patella 0.16, tibia 0.43, metatarsus 0.32, tarsus 0.29, tibia I 0.38, tibia III 0.32, tibia IV 0.5; basal width of the pedipalpal tibial "tooth" 0.003.
Colour: Body red brown, opisthosoma laterally lighter, legs yellow brown.
Prosoma very similar to *S. krausi* (fig. 1-2), dorsally and ventrally very finelly rugose, thoracal fissure absent, eyes only fairly large, posterior row slightly procurved, posterior median eyes spaced by their diameter, clypeus vertical and almost as long as the basal cheliceral articles which are of medium size, anterior margin of the cheliceral furrow with 4, posterior margin with 3 teeth, lateral files well developed and widely spaced, fangs fairly slender, labium fused to the sternum, both connected by a furrow, coxae IV spaced by more than their diamter. – Legs fairly short and slender, hairs short, order IV/I/II/III, bristles strongly reduced (weak tibial bristles as in *S. procer* on III-IV may be rubbed off); metatarsi I-III bear a trichobothrium, their position on I is in ca. 0.4. – The opisthosoma is scarcely covered with short hairs on a large dorsal and a large entire ventral scutum which surrounds the short spinnerets, a large weakly sclerotized light area exists laterally, the genital area is strongly protruding and bears anteriorly a sclerotized plate. – Pedipalpus (figs. 6-8): Patella slightly longer than wide, "tooth" of the medial tibial apophysis in a distal position, apical margin of the retrolateral apophysis slightly concave, embolus almost s-shaped, bearing a skinny seam.

Relationships: In *S. krausi* WUNDERLICH 1980 (Macedonia) – see MARUSIK & GNELITZA (2009), Arthropoda Selecta, 18 (1): 63-66, figs. 14, 27-28, 31-34 – the pedipalpal tibia is longer, and the "tooth" of the medial pedipalpal apophysis has a basal position (fig. 3). In *S. procer* n. sp. (Iran) the apical margin of the retrolateral pedipalpal tibial apophysis is distinctly convex (figs. 9-10), the "tooth" of the medial tibial apophysis is a bit larger and the shape of the embolus is more in a single level; the opisthosoma is laterally stronger sclerotized/darker.

Distribution: Turkey (Anatolia).

Scutpelecopsis procer **n. sp.** (figs. 9-11)

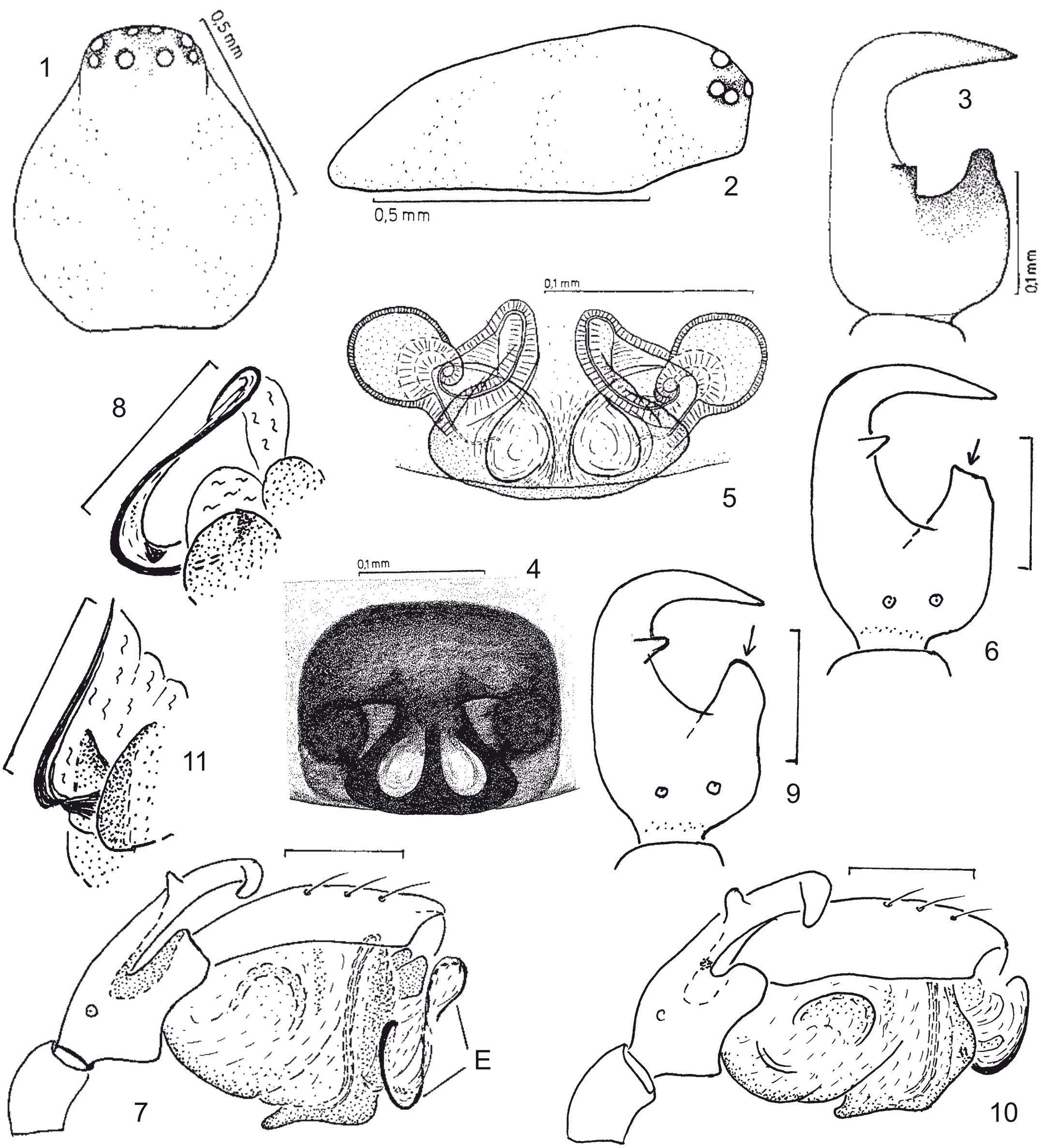
Material: Iran, 5 km E Novshar, holotype ♂ F. RESSL leg. 31. V. 1976, R25/AR/CJW (later most probably SMF).

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 9-11)"Tooth" of the medial tibial apophysis in a distal position, apical margin of the retrolateral tibial apophysis distinctly CONVEX, positon of the embolus in almost a single level, lateral area of the opisthosoma stronger sclerotized/dark.

Description (♂):
Measurements (in mm): Body length 1.6, prosoma: Length 0.72, width 0.65; leg I: Femur 0.5, patella 0.18, tibia 0.48, metatarsus 0.4, tarsus 0.37, tibia II 0.4, tibia III 0.3, tibia IV 0.5; basal width of the pedipalpal tibial "tooth" 0.004.
Colour: Body dark brown, opisthosoma laterally dark grey brown, legs yellow brown.
Prosoma similar to *S. media* n. sp. but number of the anterior/posterior teeth of the cheliceral margin 5/4, and coxa IV separated by almost 1 ½ diameters. – Legs quite similar to *S. media* (the tibial bristles III-IV may be different). – Opisthosoma quite similar to *S. media* but the lateral area of the opisthosoma is stronger sclerotized/dark in *procer*, and the genital area is less protruding. – Pedipalpus (figs. 9-11): Patella slightly longer than wide, "tooth" of the medial tibial apophysis in a distal position and blunt; apical margin of the retrolateral tibial apophysis distinctly convex, embolus fairly long, thin, in an almost circular position, bearing a skinny seam.

Relationships: In *S. krausi* the position of the "tooth" of the medial tibial apophysis is more basally and the pedipalpal tibial apophysis is longer. *S. media*: See above.

Distribution: Iran.



Figs. 1-5: Scutpelecopsis krausi (WUNDERLICH 1980); 1-2) ♂, dorsal and lateral aspect of the prosoma; 3) dorsal aspect of the right pedipalpal tibia; 4-5) ♀, epigyne and vulva;

figs. 6-8: ***Scutpelecopsis media*** **n. sp.**, ♂; 6) dorsal aspect of the right pedipalpal tibia. The arrow points to the slightly concave apical margin of the retrolateral apophysis; 7) retrolateral aspect of the right pedipalpus; 8) prolateral (slightly apical) aspect of the distal structures of the right pedipalpus. E = embolus. Scale bars 0.1 mm;

figs. 9-11: ***Scutpelecopsis procer*** **n. sp.**, ♂; 9) dorsal aspect of the right pedipalpal tibia. The arrow points to the distinctly convex apical margin of the retrolateral apophysis; 10) retrolateral aspect of the right pedipalpus; 11) prolateral (slightly apical) aspect of the distal structures of the right pedipalpus. Scale bars 0.1 mm.

BEITR. ARANEOL., 6 (2011)

A NEW TRIBE AND THREE NEW GENERA OF COBWEB SPIDERS (ARANEAE: THERIDIIDAE: THERIDIINAE) FROM MALAYSIA

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Abstract: Three monotypical spider genera (Araneae: Theridiidae: Theridiinae) are described from Malaysia: Cameronidiini **n. tribe**, *Camaronidion* **n. gen**. and its type species *C. punctalellum* **n**. **sp**., *Montanidion* **n. gen**. and its type species *M. kuantanense* **n. sp**., as well as *Tamanidion* **n. gen**. and its type species *T. multidenticuli* **n. sp**.

Key words: Araneae, Cameronidiini, Cobweb Spiders, Malaysia, new taxa, Theridiidae.

In this paper I describe three remarkable new spider genera of the family Theridiidae which I collected more than 30 years ago in Malaysia.
The Oriental tropical taxa of the subfamilyTheridiinae are still only insufficiently known, numerous species were – e. g. by THORELL, mainly under the genus name *Theridion* – described without any drawings. Although the spider fauna of Malaysia is not well-known descriptions of new species may turn out as junior synonyms which were described from other parts of SE-Asia. See also the description of the Borneotheridiini by DEELEMAN-REINHOLD & WUNDERLICH from Borneo in this volume.

The three new genera represent apparently an undescribed tribus of the subfamily Theridiinae. In the nominate genus some genital structures exist which are unusual within the Theridiidae.

CAMERONIDIINI n. trib.

Type genus (by monotypy): *Cameronidion* n. gen.. *Nesticodes*: See below.

Diagnosis: Epigyne at least in the type genus bearing a long and almost straight scape (fig. 8) which is not folded and bears no lateral furrows (the females of the remaining genera are unknown!).

Further characters: Opisthosoma long oval (about as wide as high) and VERTICAL (STEEP) POSTERIORLY in the type species (fig. 2); colulus and hairs in this position absent, teeth of the cheliceral retromargin absent, the promargin bears two teeth or, the anterior median eyes possess a red-brown pigment, sequence of the long tibial bristles 2/2/1/2, trichobothrium on metatarsus IV most probably absent, male epigaster not bulging (bulging epigaster: See WUNDERLICH (2008: Fig. 595)), paracymbium in an internal position (fig. 5).

Relationships: According to the absence of a colulus as well as hairs in this position, and the absence of retromarginal cheliceral teeth *Cameronidion* is a member of the subfamily Theridiinae. The combination of characters is different in the remaining taxa of the Theridiinae, e.g. in the four European tribes which are treated by WUNDERLICH (2008: 369) as well as in the genera *Neottiura* and *Rugathodes*. The male epigaster is not bulging in contrast to *Theridion* and otherTheridiini. – An epigynal scape exists also in the confamiliar genera *Echinotheridion* and *Tidarren* which are members of another tribe, the Echinotheridiini, see WUNDERLICH (2008: 369). In *Nesticodes* ARCHER 1950 a short epigynal scape exists, too, but the cymbium is not modified and a long straight embolus exists. – Redbrown eye pigments are not rare in members of the subfamily Episinae.
In the holarctic genus *Canalidion* WUNDERLICH 2008 the dentition of the cheliceral furrow and the chaetotaxy are as in the new tribe, and the cymbium is also modified but its modification is different (the depression is skinny and an aditional hump exists in *Canalidion*) furthermore an epigynal scape is absent. Because of the strong differences in their fine structure I regard both structures as convergently evolved.

Distribution: Malaysia.

Cameronidion **n. gen.**

The gender of the name is neuter.

Type species (by monotypy): *Cameronidion punctatellum* n. sp.

Diagnosis: ♂: Pedipalpus (figs. 3-7): The cymbium bears a retrobasal outgrowth as well as a hole prolaterally of this outgrowth; bulbus complicated, with long and bent sperm ducts within tegulum and subtegulum, large median and terminal apophyses, and a short hidden embolus. ♀: Epigyne (figs. 2, 8) with a long scape which stands out and bears a pair of wide introductory openings and ducts; vulva (fig. 9) with long ducts which surround the receptacula seminis which are thin-walled and have a circular outline.

Relationships: According to the shape of their opisthosoma, their chaetotaxy, the dentition of their cheliceral furrow, their wide eye field, the redbrown pigment of their anterior median eyes, and their flat male epigaster the new genera *Montanidion* and *Tamanidion* may be related, but the structures of their male pedipalpi are quite different from *Cameronidion*, and the existence of an epigynal scape is unknown in these two genera.– *Canalidion* WUNDERLICH 2008: See above.

Distribution: Malaysia.

Cameronidion punctatellum **n. gen. n. sp**. (figs. 1-9)

Material: Malaysia, Cameron Highlands, beaten from bushes, 3♂1♀ JW leg. in VIII 1980; holotype ♂ R33/AR/CJW, 2♂1♀ paratypes R34/AR/CJW, later most probably SMF.

Diagnosis: See the diagnosis of the genus.

Description:
Measurements (in mm): ♂: Body length 1.7-2.0, prosoma: Length 0.7-0.85, width 0.65-0.72; opisthosoma: Length 1.0, width and height 0.7; leg I: Femur 2.6, patella 0.45, tibia 2.5, metatarsus 3.2, tarsus 0.6, tibia II 1.3, tibia III 0.65, tibia IV 1.2; ♀: Length 0.7, width 0.65, tibia I-IV 2, 1, 0.5, 1.
Colour (bleached out in alcohol during 30 years) yellow brown, tibiae with black apical annulations, opisthosoma very variable bearing white and black patches, ♀ as fig. 2, ♂ usually more or less similar or with only 4 black dorsal-lateral pairs of patches.
Prosoma (fig. 1) not much longer than wide, fovea distinct, eyes large and in a wide field, posterior row straight, posterior median eyes spaced by their diameter, anterior

median eyes with remains of redbrown pigment, stridulatory field indistinct or even absent, clypeus long and straight, basal cheliceral articles long, the anterior/posterior margin of its furrow bears 2/0 teeth, fangs slender, gnathocoxae long and converging, labium slightly wider than long, not rebordered in both sexes, with a seam to the sternum, the sternum spaces the coxae IV by their diameter. – ♀-pedipalpus with long dorsal hairs, tarsal claw well developed. – Legs very long and slender, order I/I/IIV/III, I distinctly the longest, sequence of the tibial bristles 2/2/1/2, metatarsal IV trichobothrium most probably absent, its position on III in 0.6. Comb of tarsus IV existing. The three tarsal claws are small, the paired claws are toothed. – Opisthosoma (fig. 2) longer than wide or high, vertically posteriorly, dorsally bearing long hairs. Spinnerets well developed, a colulus or hairs in its area are absent. The male epigaster is not bulging. – ♂-pedipalpus (figs. 3-7) (see also the diagnosis of the genus): Patella slightly longer than wide, bearing dorsally a single basal bristle and a pair distally; cymbium long, the internal paracymbium is not a true hood but a longitudinal edge. – Epigyne/vulva: See the diagnosis of the genus.

Relationships: An undecsribed species from N-Borneo – Sabah (Crocker Range), Museum Leiden, coll. C. DEELEMAN, a kind loan, is apparently congeneric. In this species the cymbium is similar, the paracymbium and the structures of the bulbus are different, the pointed epigynal scape stands widely out similar to *punctatellum* but is concave anteriorly.

Distribution: Malaysia, Cameron Highlands.

Montanidion **n. gen**.

The gender of the name is neuter.

Type species (by monotypy): *Montanidion kuantanense* n. sp.

Diagnosis (♂; ♀ unknown): Prosoma (fig. 10) dorsally modified: In the posterior half with a pair of larger humps, medially more in front with a single hump, and behind the eye field with a further hump; large and touching pigmented strucures exist below the anterior median eyes (fig. 11); opisthosoma (fig. 12) longer than wide or high, posteriorly steep. Pedipalpus (figs. 13-16): The tibia stands dorsally widely out (erect), cymbium strongly widened by a translucent part (T in fig. 14), the embolus is guided by a long conductor.

Relationships: See *Cameronidion* and *Tamanidion*. In *Heterotheridion* WUNDERLICH 2008 the tibia of the male pedipalpus is elongated in a different way, the shape of opisthosoma and cymbium as well as the structures of the bulbus are also different.

Distribution: Malaysia.

***Montanidion kuantanense* n. gen. n. sp.** (fig. 10-16)

Material: East Malaysia, Kuantan, beaten from a tree, holotype ♂ JW leg. in VIII 1980, R31/AR/CJW, later probably SMF.

Diagnosis: See the diagnosis of the genus.

Description (♂):
Measurements (in mm): Body length 1.9, prosoma: Length 0.8, width 0.7; leg I: Femur 1.5, patella 0.35, tibia 1.3, metatarsus 1.45, tarsus 0.6, tibia II 0.67, tibia III 0.4, tibia IV 0.7; pedipalpal femur 0.45.
Colour (the spider is bleached out after lying for 30 years in alcohol) yellow to yellow brown, tips of the tibiae darkened.
Prosoma (figs. 10-11) 1.14 times longer than wide, the hairs are rubbed off, fovea deep and long; four distinct humps (see the diagnosis of the genus) exist within a pair of lateral margins. Eyes fairly large, in a very wide field which is as wide as the prosoma, posterior row slightly recurved, posterior median eyes spaced by almost two diameters, lateral eyes contiguous, the lenses of the anterior median eyes have almost the size of the posterior median eyes, they are spaced by their diameter; underlying structures large, contiguous, and bearing a redbrown pigment (fig. 11). Posterior stridulatory files indistinct or even absent, clypeus long, basal cheliceral articles not shorter, bulging anteriorly-basally, posterior margin of the cheliceral furrow toothless, anterior margin with a small tooth. Gnathocoxae large and strongly converging, labium slightly wider than long, with a seam to the sternum which is slightly longer than wide, and separates the coxae IV by their diameter. – Legs long and slender, order I/II/IV/III, I distinctly longest, sequence of the tibial bristles (most are lost) most probably 2/2/1/2, metatarsal IV trichobothrium absent, its position on I probably in ca. 0.4. Tarsal claws small, comb of tarsus IV fairly well developed. – Opisthosoma (fig. 12) long oval, longer than wide or high, epigaster not bulging, anterior stridulatory picks or bristles absent, colulus or replacing hairs absent. – Pedipalpus (figs. 13-16) (see also the diagnosis of the genus): Femur long and slender, patella short, bearing at least a single dorsal bristle, tibia with a short basal body and with a long and erect distal part which bears long hairs, bulbus protruding and complicated, terminal and median apophyses exist.

Relationships: See the genus.

Distribution: East Malaysia, Kuantan.

Tamanidion n. gen.

The gender of the name is neuter.

Tpe species (by monotypy): *Tamanidion multidenticuli* n. sp.

Diagnosis (♂; ♀ unknown): Opisthosoma long oval (as in fig. 12); pedipalpus (figs. 17-19): Cymbium apically with two outgrowths which bear denticles and a prodistal edge, internal paracymbium large and translucent, conductor denticulate, embolus sickle-shaped.

Relationships: In contrast to *Cameronidion* and *Tamanidion* the cymbium is apically modified and denticulate in *Tamanidion*.

Distribution: Malaysia.

Tamanidion multidenticuli n. gen. n. sp. (figs. 17-19)

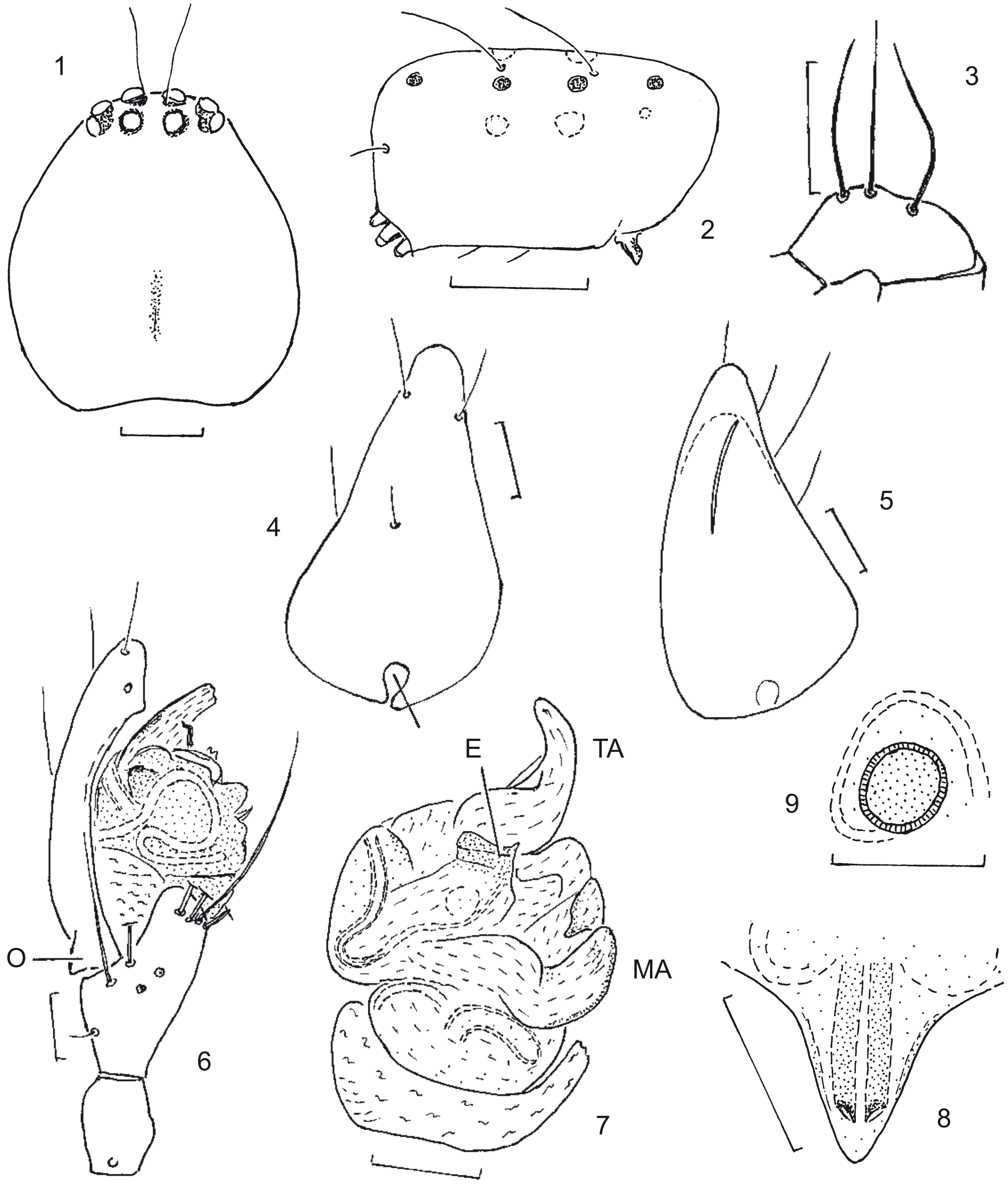
Material: Malaysia, Taman Negara National Park, beaten from a bush, holotype ♂ JW coll. in VIII 1980, R32/AR/CJW; later probably SMF.

Diagnosis: See above.

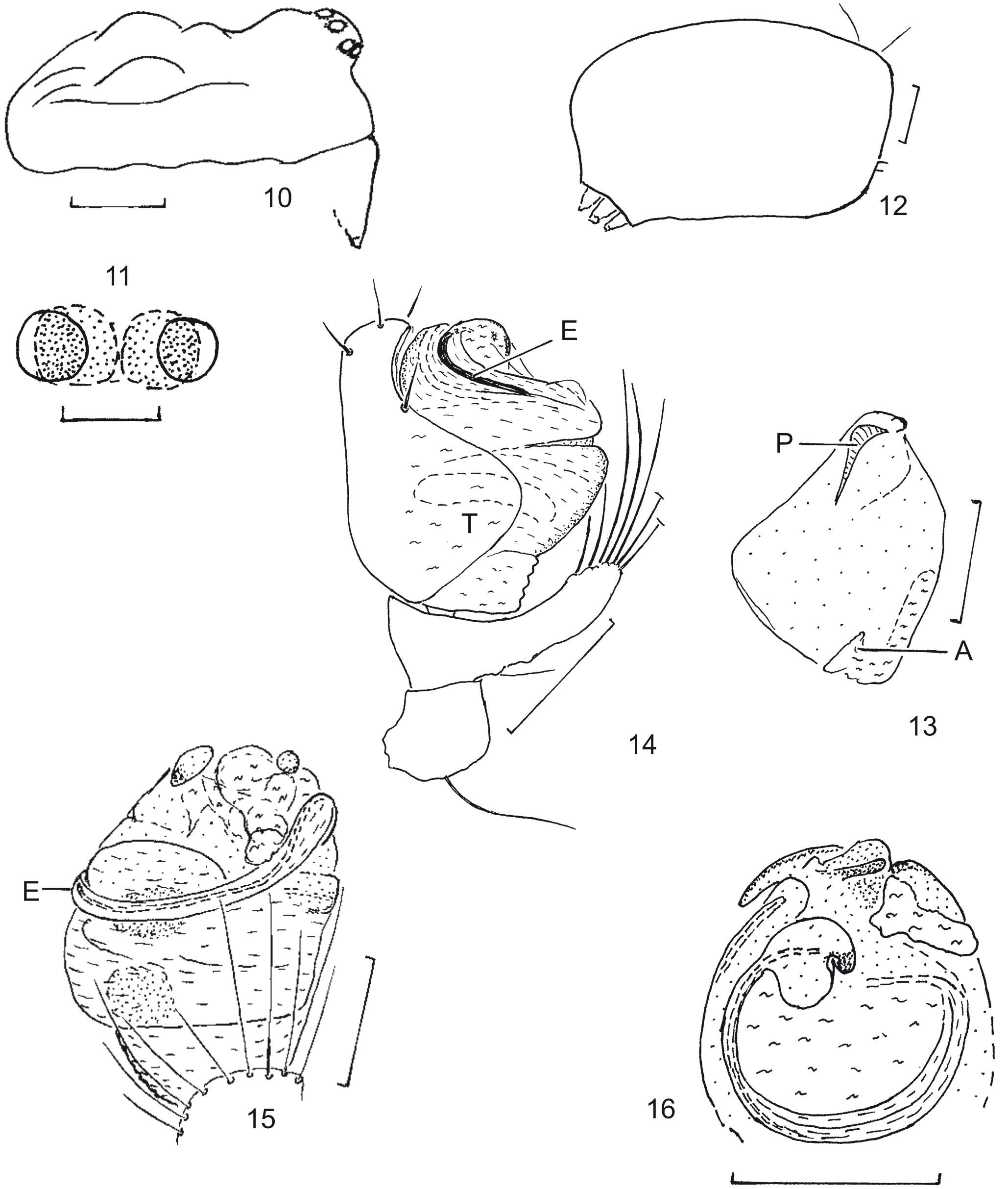
Description (♂):
Measurements (in mm): Body length 1.8, prosoma: Length 0.75, width 0.65; leg I: Femur 1.8, patella 0.4, tibia 1.7, metatarsus 2.0, tarsus 0.8, tibia II 0.8, tibia III 0.45, tibia IV 0.75.
Colour (bleached out after lying 30 years in alcohol) yellow brown, prosomal margin laterally small black, the opisthosoma bears tiny black spots: 3 pairs dorsally, 4 pairs laterally, and a single one posteriorly-dorsally.
Prosoma 1.15 times wider than long, fovea deep, eyes fairly large, field very wide, posterior row procurved, posterior median eyes spaced by about 1 ¼ diameter, lateral eyes contiguous, anterior median eyes as large as the posterior median eyes with redbwon pigment, underlying structures as in *Montanidion* absent. Clypeus long, slightly longer than the clypeus, the anterior margin of the furrow bears two small teeth, the posterior margin is smooth. Gnathocoxae, labium and sternum as in *Montanidion kuantanense*. – Legs except the position of the metatarsal trichobothria as in *Montanidion kuantanense*, metatarsal IV trichobothrium probably absent, its position on III in 0.6. – Opisthosoma: Shape, epigaster and area of the colulus as in *Montanidion*. – Pedipalpus (figs. 17-19) (see also above): Femur slender, patella short, bristles unknown, tibia with a short basal and a long distal part.

Relationships: See above.

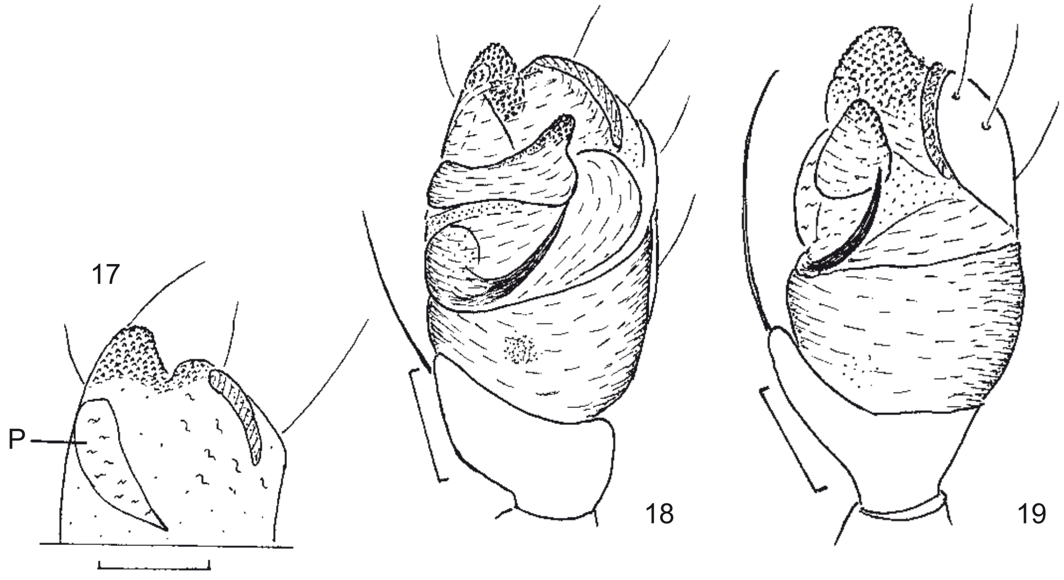
Distribution: Malaysia.



Figs. 1-9: *Cameronidion punctatellum* **n. gen. n. sp**.; 1) dorsal aspect of the ♂-prosoma; 2) lateral aspect of the ♀-opisthosoma. Only few hairs are drawn. Dotted: White patches. Note the epigynal scape which may be expanded in an unnatural position pointing anteriorly; 3) prolateral aspect of the right ♂-pedipalpal patella; 4-5) dorsal and ventral aspects of the right cymbium; 6) ♂, retrolateral aspect of the right pedipalpus; 7) ventral aspect of the right bulbus; 8) ♀, ventral aspect of the epigyne; 9) ventral aspect of the right receptaculum seminis and the introductory duct. E = embolus, H = cymbial hole, MA = median apophysis, 0 = cymbial outgrowth, TA = terminal apophysis. Scale bars 0.5 in fig. 2, 0.2 in fig. 1, 0.1 in the remaining figs.;



figs. 10-16: *Montanidion kuantanense* **n. gen. n. sp.**, ♂; 10) lateral aspect of the prosoma; 11) anterior aspect of the anterior median eyes with translucent medial internal structures. Strongly dotted: Redbrown pigment; 12) lateral aspect of the opisthosoma, outline. Only two hairs are drawn; 13) ventral aspect of the right cymbium; 14) retroventral aspect of the right pedipalpus; 15) proventral aspect of the right pedipalpus; 16) apical-ventral aspect of the right bulbus. A = alveolus, E = embolus, P = paracymbium, T = large translucent part of the cymbium. Scale bars 0.1 in figs. 11, 0.2 in the remainings figs.;



figs. 17-19: *Tamanidion multidenticulum* **n. gen. n. sp.**, ♂; 17) ventral aspect of the distal part of the right cymbium; 18) ventral aspect of the right pedipalpus; 19) prolateral aspect of the right pedipalpus. Only few hairs are drawn. P = paracymbium. Scale bar 0.1.

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BEITR. ARANEOL., 6 (2011)

CONTRIBUTION TO THE SPIDER (ARANEAE) FAUNA OF THE CANARY ISLANDS

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Abstract: New localities and synonyms of spiders (Araneae) of the Canary Islands are listed, some species are revised, especially from Gran Canaria. A key is given to the Canarian genera of the family Linyphiidae. – The following species are described: Oecobiidae: *Oecobius bumerang* **n. sp**., *O. duplex* **n. sp**., *O. infringens* **n. sp**., *O. parapsammophilus* **n. sp**., *O. psammophilus* **n. sp**., and *O. simillimus* **n. sp**.; Linyphiidae: *Micrargus parvus* **n. sp**., *Walckenaeria grancanariensis* **n. sp**., *W. subterranea* **n. sp**., and *W. tilos* **n. sp**., *Canariphantes palmaensis* **n. sp**., *Lepthyphantes styx* **n. sp**., and *Sintula pecten* **n. sp**.; Dictynidae: *Lathys pygmaea* **n. sp**., Gnaphosidae: *Nomisia gomerensis* **n. sp**., *Nomisia graciliembolus* **n. sp**., and *Scotognapha arcuata* **n. sp**. *Macarophaeus* **n. gen**. and *Setaphis murphyi* **n. sp**.: See the paper on the family Gnaphosidae in this volume. – First descriptions of single sexes: The male of *Titanidiops canariensis* WUNDERLICH 1992 (Idiopidae), the female of *Oecobius unicoloripes* WUNDERLICH 1992 (Oecobiidae), the questionable male of *Argenna* (= *Altella*) *pygmaea* (WUNDERLICH 1992) (Dictynidae), the male of *Agelena gonzalezi* SCHMIDT 1980 (Agelenidae), the male of *Apostenus grancanariensis* WUNDERLICH 1992 (Zoridae/Liocranidae), and the real female of *Scotognapha wunderlichi* PLATNICK et al. 2001 (Gnaphosidae) are described for the first time. – Biogeography: ?*Theridiosoma gemmosum* (L. KOCH 1877) (Theridiosomatidae), *Walckenaeria crocata* (SIMON 1884) (Linyphiidae), and *Zelotes scrutatus* (O. PICKARD-CAMBRIDGE 1872) (Gnaphosidae) are new to the Canary Islands. *Nomisia excerpta* (O. PICKARD-CAMBRIDGE 1872) (Gnaphosidae) is excluded from the fauna of the Canary Islands. Notes on Canarian members of the genera *Cerbalus* SIMON 1897 and *Olios* WALCKENAER 1837 (Sparassidae) are given.

<u>Synonymy</u>: Oecobiidae: *Oecobius marcosensis* WUNDERLICH 1992 is regarded as a junior synonym of *O. palmensis* WUNDERLICH 1987 (**n. syn**.), *Oecobius pinoensis* WUNDERLICH 1992 may be a synonym of *O. agaetensis* WUNDERLICH 1992 (**quest. n. syn**.). – Gnaphosidae: *Drassodes riedeli* SCHMIDT 1968 is regarded as a junior synonym of *D. lutescens* (C. L. KOCH 1839) (**n. syn**.), *Nomisia verneaui* (SIMON 1889) is regarded as a questionable synonym of *N. musiva* (SIMON 1889) (**quest. n. syn**.), *Zelotes teidei* SCHMIDT 1968 = *Z. manzae* (STRAND 1908) (**n. syn**.).

Key words: Araneae, Canary Islands, colonization, Gran Canaria, epigenetics ("evo-devo"), Gran Canaria, microcavernicolous, Tenerife, new species, spiders.

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CJW = collection of J. WUNDERLICH.

Main parts of the spider fauna of the Macaronesian Islands – including the Canary Islands – have been treated by the present author (1987, 1992, 1995); mainly members of *Dysdera* were added by other authors; a revision of the difficult and apparently mainly Canarian/Macaronesian genus *Macaroeris* (Salticidae) is still in preparation by D. LOGUNOV. Pronounced radiations – e.g. of the genera *Filistata* (Filistatidae) (only a single species exists in the continental Europe), *Dysdera* (Dysderidae), *Pholcus* and *Spermophorides* (Pholcidae), *Oecobius* (Oecobiidae), *Lepthyphantes* s. l. and *Walckenaeria* (Linyphiidae), *Alopecosa* (Lycosidae), *Scotognapha* (Gnaphosidae) (the genus is endemic to the Canary and Selvage Islands), *Xysticus* s. l. (*Psammitis*) (Thomisidae), and *Macaroeris* (Salticidae) – have been reported from the Canary Islands. It is remarkable to note that almost half of the genera in question are relatively archaic spiders – the first five ones which are extremely rare ballooners (!) – in contrast to the remaining more advanced families whose members are frequent aeronautics.

The spider fauna of several parts of the Canary Islands is not well studied, capturing by pit falls has been rare but was undertaken, e.g., by P. OROMI on Tenerife (Canadas) and by P. NABAVI and a co-worker on Gran Canaria during the years 1999-2000, and the present author on Tenerife. An unknown number of Canarian species is still waiting for their discovery.

In the present paper I report in this order on members of the families Idiopidae, Oecobiidae, Theridiosomatidae, Linyphiidae, Dictynidae, Clubionidae, Gnaphosidae, Prodidomidae, Zoridae/Liocranidae, and Salticidae.

Certain members of the family Gnaphosidae (e.g. of the genus *Macarophaeus* n. gen.) are treated in a different study – on the European genera of the Gnaphosidae – in this volume, p. 19ff

Notes on ECOLOGY and BIOGEOGRAPHY

As a result of the capturing by pit falls on Gran Canaria several pale spider species were captured which may possess reduced eye lenses as well a reduced body size. These species are not cave spiders but may well live microcavernicolous. Examples of such species are:

Lepthyphantes styx n. sp. and other congeneric species (Linyphiidae),
Micrargus parvus n. sp. (Linyphiidae),
Scotargus grancanariensis WUNDERLICH 1992 and other congeneric species (Linyphiidae),
Walckenaeria subterranea n. sp. (Linyphiidae),
Argenna (= *Altella*) *pygmaea* (WUNDERLICH 1992) (Dictynidae),
Lathys pygmaea n. sp. (Dictynidae),
Apostenus grancanariensis WUNDERLICH 1992 (Zoridae/Liocranidae),
Zimirina nabavii n. sp. (Prodidomidae),
Haplodrassus deserticola SCHMIDT & KRAUSE 1996 (Gnaphosidae),
Leptodrassus hylaestomachi BERLAND 1934 (Gnaphosidae).
(The last two species are Canarian endemics but not endemic to Gran Canaria).

COLONIZATION

It is not surprising that the most related species of several Canarian genera are known from Northern Africa and Southwestern Europe, from where the stem species apparently came from, see below: *Canariphantes*, *Micrargus*, *Walckenaeria*, *Scotargus, Sintula* (Linyphiidae), and *Titanidiops* (Idiopidae).

Family IDIOPIDAE

Titanidiops canariensis WUNDERLICH 1992 (figs. 1-3)

Titanidiops canariensis is the only species of the Mygalomorphae known from the Canary and Macaronesian Islands. This “trapdoor spider” is quite frequent on the Eastern

Canarian Islands (Fuerteventura and Lanzarote), I found/observed numerous specimens (mostly juveniles, several females) and their tubes in sunny/stony biotopes, and in my opinion it is one of the most frequent spider species on these islands, but their tubes in the ground and their covers are frequently overlooked, and the males are rare, most probably quite short-living like most other species of the Mygalomorphae.
The present author and PARWIS NABAVI had the idea more than ten years ago to collect specimens of this species during winter time by pit falls which were placed by PN on a selected locality on Fuerteventura, the mountain Pico Zarza.
The way of colonization of the Canarian Islands by a member of *Titanidiops* – these spiders are not known as ballooners – is quite enigmatic, like the existence of (the fossil eggs of) ostrichs (Struthionidae).

First description of the male. Female and its tube: See WUNDERLICH (1992: 280, figs. 1-4) and (1995: 417-418).

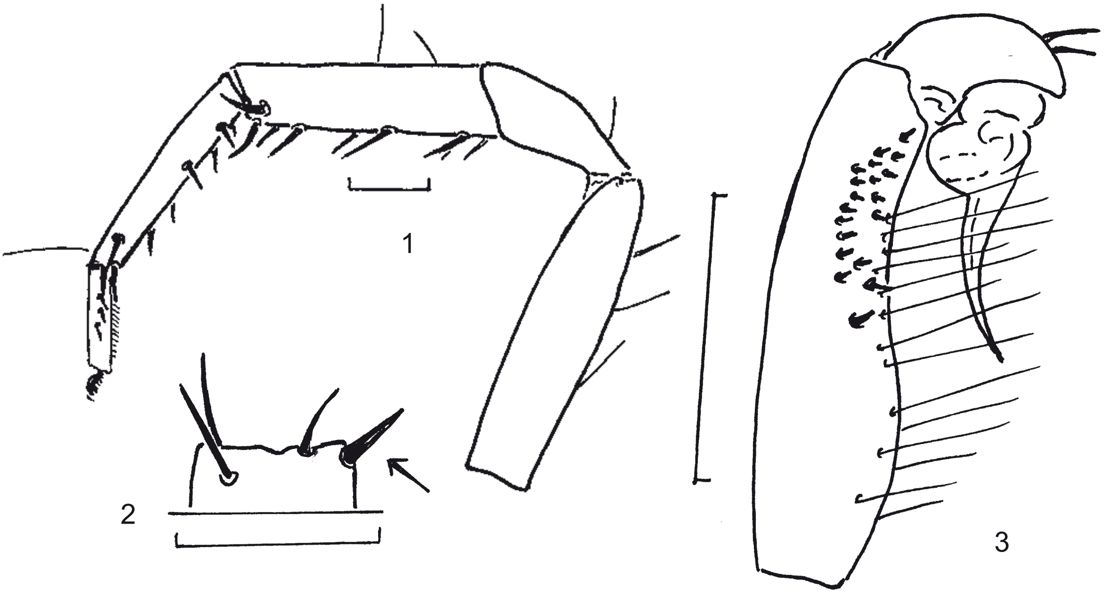
Material: Canary Islands, Fuerteventura, near the top of the Pico Zarza, 700-800 m, dry and stony locality with sparce vegetation 3♂ PARVIS NABAVI and JW leg. in pit falls 15. XI – 11. I 1999, CJW.

Diagnosis: Tibia I (figs. 1-2) with a large “clasping spine”) in a proapical position, without prolateral bristles/spines.

Description:
Measurements (in mm): Body length 9.3-11.0, prosoma: Length 5.2, width 4.5; leg. I: Femur 4.2, patella 2.25, tibia 3.0, metatarsus 3.0, tarsus 1.5, tibiae II-IV 2.6/2.0/ 3.5; basal cheliceral article: Length 1.5-2.3, width 0.8-0.9.
Colour: Prosoma and legs medium brown, opisthosoma grey brown.
Prosoma – including labium and gnathocoxae – similar to the female but chelicerae more slender, see above, the anterior and posterior margin of its furrow bear 5-7 teeth each. – Legs (figs. 1-2) stout, order IV/I/II/III; bristles/spines: Femora with thin bristles, 3 dorsally on I, patellae: I-II a pair of longer prolateral bristles, III 6-14 spines dorsally and prolaterally, IV ca. 6 prolateral spines in the basal half, tibia I-III with numerous spines, tibia IV with several long bristles; tibia I bears usually 15-17 bristles/spines and a proapical “clasping spine”, metatarsus I bears usually 13-17 ventral and lateral spines, the tarsi bear several ventral and lateral spines, tarsi I-II bear a weak pseudoscopula, the paired tarsal claws bear 7-9 long teeth. – Opisthosoma oval, hairs of medium size, anterior spinnerets small, lateral spinnerets large. – Pedipalpus (fig. 3): Femur with numerous long ventral hairs, retrolaterally with ca. 20 spines in the distal half, cymbium with 2 dorsal bristles, bulbus fairly small, embolus long.

Relationships: In the male of *T. maroccanus* SIMON 1909 from Morocco the tibia I bears prolaterally spines and the “clasping spine” is shorter; in the single knowm male spines of labium and gnathocoxae are absent in contrast to *canariensis*, and the embolus is stouter, see WUNDERLICH (1992; Figs. 4-5).

Distribution: Eastern Canary Islands (Fuerteventura and Lanzarote).



Figs. 1-3: ***Titanidiops canariensis*** WUNDERLICH 1992, ♂; 1) prolateral aspect of the right tibia I; 2) right tibia I, ventral aspect of the apical spines with the proapical “clasping spine” (arrow); 3) retrolateral aspect of the right pedipalpus; the bulbus is slightly expanded. Scale bars 0.1 mm.

Family OECOBIIDAE

The oecobiid taxa of the Canary Islands are members of the tribe Oecobiini sensu WUNDERLICH (2004: 829), and of the genus *Oecobius* LUCAS 1846 in a wide sense. The genus *Oecobius* s. l. includes currently the valid genera *Ambika* LEHTINEN 1967, *Maitreja* LEHTINEN 1967, and *Thalamia* HENTZ 1850, which all were synonymized with *Oecobius* but a splitting of this diverse genus may be a matter of the future, see BAUM (1974).

The present author described Macaronesian members of the genus *Oecobius* in 1987: 107-127, in 1992: 336-353 and in1995: 85 (list and distribution of the known species) as well as 421-423. The result of the quite unusual radiation of this genus on the Canary Islands is the evolution of more species (42) than known from the rest of the world. Almost all species are Canarian endemics, most species are island endemics, some are endemics of a single valley (barranco) only. Certain species of the Eastern Canary Islands – Fuerteventura and Lanzarote, partly Alegranza as well – are distributed on all of these islands because these islands were united in former times.

Most of the newly reported Canarian species are reported from Gran Canaria; furthermore described are *O. bumerang* n. sp. from Tenerife and Fuerteventura, *duplex* n. sp. from Fuerteventura, and *unicoloripes* WUNDERLICH 1992 from Lanzarote.
Oecobius is most diverse on Gran Canaria: 10 species were reported previously from this island, 8 of these are island endemics, *Oecobius navus* is cosmopolitical, *O. similis* is common to the Macaronesian Islands including Gran Canaria and St. Helena as well; 4 island endemics of Gran Canaria are added as new species in this paper: *O. infringens*, *parapsammophilus, psammophilus* and *simillimus*. 86% af the *Oecobius* species of Gran Canaria are island endemics.

Note: The occurrence of more than a single species at the same locality may cause problems in the determination.

Material: Most spiders were captured by PARWIS NABAVI (PN) with the help of pit falls in 1999-2000, others by the present author (JW).

Descriptions of the species

Oecobius aculeatus WUNDERLICH 1987 (figs. 1-3)

Material: Canary Islands, Gran Canaria, near El Palmital, numerous ♂♀ PN leg. in IV-VII, CPN and CJW.

The female was described by WUNDERLICH (1987: 120-121, figs. 303-304), the male by WUNDERLICH (1992: 337, figs. 249-252).

Relationships: *O. bumerang* from Tenerife and Fuerteventura is most related, see that species. – *O. agaetensis* (see below) is also related. Differences: ♂: The clearest difference is the shape of the terminal apophysis which is much longer and bent in *aculeatus*, and has a knee-shaped outgrowth as well as a distinct inclination (arrows in fig. 1) (compare fig. 5). Furthermore the sickle-shaped branch of the terminal apophysis is more pointed in *agaetensis* (arrow in fig. 7), and the terminal apophysis is partly furrowed (figs. 5-6). Additionally the radix apophysis bears a distinct inclination in *agaetensis* (arrow in fig. 4; compare fig. 3), and two teeth nearby which are separated. – ♀: In *O. agaetensis* the epigynal scape is more slender than in *aculeatus*, the copulatory openings and the structures of the vulva are different.

Distribution: Gran Canaria.

Oecobius agaetensis WUNDERLICH 1992 (figs. 4-10)

Material: Canary Islands, Gran Canaria, PN leg. 1999-2000 in pit falls; (1) Roque Bentaiga, 1230 m, 19♂5♀ leg. in IV-VII, CJW; (2) El Palmital, 500-700 m, 1♂5♀ leg. in IV-VIII, CJW; (3) 2 km NW Artenara, 1250 m, 4♂ leg. 23. V. – 5. VII 2000, CJW; (4) 2 km NW Mogan, 450 m, 1♂ leg. in IV 2000, CJW.

The female is described here for the first time:
Measurements (in mm): Body length 1.7-2.0, prosoma: Length 0.65-0.75, width 0.75-0.85, tibia I 0.6, tibia IV 0.63, length of the epigynal scape 0.2.
Colour and body as in the male. Position of the trichobothrium on metatarsus I-II in ca. 0.9. Epigyne (fig. 9) with distinct transverse furrows like in *O. pinoensis*, a long scape, separated copulatory openings which are directed posteriorly; vulva (fig. 10) with divided strongly sclerotized capsules in a position close together.

Relationships: See *O. aculeatus. O. caesaris* WUNDERLICH 1987 is close related; the terminal apophysis and the epigyne/vulva are different, the copulatory openings are directed more laterally in *caesaris*. *O. pinoensis* WUNDERLICH 1992 from Gran Canaria: Barranco Era del Pino, under the bark of a tree (♂ unknown) is also strongly related or probably synonym; in *pinoensis* the epigynal scape of the holotype is shorter than in *agaetensis* but its variability is unknown. In *O. psammophilus* n. sp. the radix apophysis bears only a single basal tooth, and the terminal apophysis is much longer and not divided.

Distribution: Canary Islands, Gran Canaria.

Oecobius bumerang n. sp. (figs. 11-13)

Material: Canary Islands, (1) SW Tenerife, S Los Gigantes, Playa de la Arena, right above the spray zone of the rocks, holotype ♂ (R113/AR/CJW) and 1♀ paratype (R114/AR/CJW) JW leg. in VIII; (2) Fuerteventura, coast, Aguas Verdes, 2♂ paratypes (one lacks its opisthosoma) (R115/AR/CJW), JW leg. in III.

Diagnosis: ♂-pedipalpus is quite similar to *O. aculeatus* WUNDERLICH 1987, see WUNDERLICH (1992: Figs. 249-251) but the radix apophysis (fig. 12) is stouter in *bumerang*, the terminal apophysis is bumerang-shaped (fig. 11) and without a “knee-shaped” outgrowth (long arrow in fig. 1). ♀: Epigyne (fig. 13) with a long, slender and pointed scape, and a pair of pointed structures in the middle which are directed laterally.

Description:
Measurements (in mm): Body length ♂ 1.8-1.9, ♀ 2.8, prosoma: Length ♂ 0.7, ♀ 0.9, width ♂ 0.9, ♀ 1.1; ti I ♂ 0.7, ♀ 0.9.
Colour, legs and body as in *O. aculeatus* WUNDERLICH 1987.

Relationship: In *O. aculeatus* (Gran Canaria) the ♂-pedipalpus is quite similar but the radix apophysis is more slender, the terminal apophysis is more compact, and has a "knee-shaped" outgrowth, see the diagnosis. The epigyne of both species is quite different but similar to *O. cumbrecita* WUNDERLICH 1987 from Tenerife in which a short epigynal scape exists.

Distribution: Fuerteventura and Tenerife.

***Oecobius duplex* n. sp**. (figs. 14-15)

Material: Canary Islands, Fuerteventura; (1) centrum, Agua de Bueyes, barranco (canyon), under stones, ♂♀ JW leg. in III ca. 1998, holotype ♂ R119/AR/CJW, 2♂4♀ paratypes R120/AR/CJW (a right ♂-pedipalpus and a vulva are separated); (2) SW Puerto del Rosario 6♂ paratypes JW leg. in V, R121/AR/CJW; (3) La Oliva, mountain Mudo 1♂3♀ 1juv. paratypes JW leg in III 1998, R122/AR/CJW; (4) near Betancuria, 3♂ paratypes, under stones, JW leg. in III 1998, R123/AR/CJW.

Diagnosis: Structures of the bulbus similar to *O. furcula* WUNDERLICH 1992 but prolateral branch of the terminal apophysis pointed (short arrow in fig. 14), prodistal branch of the terminal apophysis slightly directed to the tip of the cymbium (long arrow in fig. 14), compare fig. 16. ♀: Epigyne as in fig. 272: See WUNDERLICH (1992: 554 (*O. furcula*), with a short scape which is converging posteriorly. Vulva (fig. 15) with a pair of larger copulatory openings near the epigastral furrow, slender, bent, thin-walled and undivided sclerotized capsules, and large sac-shaped thin-walled receptacula seminis which are hard to observe.

Description:
Measurements (♂♀ in mm): Body length 1.5-1.7, prosoma: Length ca. 0.6, width ca. 0.7; tibia I 0.5/0.42 (♀), tibia IV 0.55/0.48 (♀).
Colour, body and legs as in *O. furcula* WUNDERLICH 1992. Position of the metatarsal I-II trichobothrium in ca. 0.9.
♂-pedipalpus, epigyne and vulva: See the diagnosis.

Relationship: In *O. furcula* WUNDERLICH 1992 (fig. 16) the probasal branch of the terminal apophysis is blunt, the prodistal branch is slightly bent posteriorly (to the pedipalpal tibia), and the radix apophysis has a hump in the middle (arrow in fig. 16)

Distribution: Canary Islands, Fuerteventura.

***Oecobius infringens* n. sp.** (figs. 17-19)

Material: Canary Islands, Gran Canaria, 2 km NW Mogan, 450 m, between gras and *Euphorbia*, pit falls, 2♂ PARWIS NABAVI leg. in III-V 2000; holotype R109/AR/CJW, paratype R110/AR/CJW.
Note: Three females (CJW) are collected with the males of *infringens*; they are members of two or three different species and have distinctly annulated legs, too; one may be conspecific with *infringens*, one has the epigyne as in *pinoensis* WUNDERLICH 1992 (:fig. 299); see also the questionable female of *O. parapsammophilus* n. sp.

Diagnosis (♂; ♀ unknown): ♂-pedipalpus (figs. 17-19): Radix apophysis wide, with a large medial outgrowth (fig. 18) and two basal teeth, terminal apophysis with a slender retrolateral branch in its distal part.

Description (♂):
Measurements (in mm): Body length 1.55-1.9, prosoma: Length 0.6-0.7, width 0.8-0.85; leg I: Femur 1.0, patella 0.3, tibia 0.85, metatarsus 0.8, tarsus 0.6, tibia II 0.9, tibia III 0.85, tibia IV 0.9.
Colour variabel, as in related species like *O. aculeatus*, legs distinctly annulated (fairly bleached out in one specimen). Prosoma, legs and opisthosoma like in *aculeatus*; all metatarsi bear a trichobothrium, its position is in ca. 0.9. – Pedipalpus (figs. 17-19, see the diagnosis): Cymbium with 3 apical bristles, terminal apophysis complicated, radix apophysis with a larger tooth in some distance from the origin of the apophysis, and a smaller tooth nearby, embolus long and sickle-shaped.

Relationship: The radix apophysis is wider in the distal part than in *O. aculeatus* WUNDERLICH 1987 from Gran Canaria and the terminal apophysis is different, the embolus is only slightly bent.

Distribution: Canary Islands, Gran Canaria.

Oecobius navus BLACKWALL 1859

Material: Canary Islands, Gran Canaria, P. NABAVI leg. in pit falls in 1999-2000, CJW and CPN; Barranco de Azuaje, numerous ♂♀, ♂ in III-V, ♀ in VII-VIII; Los Tilos, outside the Laurisilva, numerous ♂♀; Los Berrazales near Agaete, ♂♀; Dunas de Maspalomas, 50 m, dunes, 4♂4♀, together with *O. psammophilus* n. sp..

Distribution: Cosmopolitical; the most frequent species of *Oecobius* of the Macaronesian Islands and worldwide.

Oecobius palmensis WUNDERLICH 1987

New material: Canary Islands, Fuerteventura, Aguas Verdes, 2♀ JW leg. in III 1998, CJW.

According to their general structures I regard *Oecobius marcosensis* WUNDERLICH 1992 (locus typicus on Tenerife) as a junior synonym of *O. palmensis* WUNDERLICH 1987 (locus typicus on La Palma) (**n. syn**.). Probably members of this species were transported from the central island Tenerife by humans to La Palma and Fuerteventura as well.

Distribution: La Palma, Tenerife and Fuerteventura.

***Oecobius parapsammophilus* n. sp**. (figs. 20-23)

Material: Canary Islands, Gran Canaria, 3 km NW Mogan, 450 m, pit falls between bushes, *Euphorbia* and gras, 2♂1♀ P. NABAVI leg. 3. III. – 10. IV. 2000 together with specimens of *O. infringens* n. sp.; holotype ♂ R106/AR/CJW, 1♂ paratype R107/AR/CJW; probably conspecific ♀ R108/AR/CJW.

Diagnosis (♂; probably conspecific ♀): ♂-pedipalpus (fig. 20-21): Sickle-shaped (prolateral) branch of the terminal apophysis almost straight, retrolateral branch long and widened distally, length of the single basal tooth of the radix apophysis 0.05 mm, its tip blunt. Probably conspecific ♀: Epigyne (fig. 22) with a long scape which is widened in the anterior part. Vulva (fig. 23) with small, circular and thick-walled, sclerotized capsules.

Description:
Measurements (in mm): Body length ♂ 1.5-1.6, ♀ 1.9, prosoma (♂/♀): Length 0.6/ 0.85, width 0.82/0.9; leg I, ♂: Femur 0.8, patella 0.38, tibia 0.7, metatarsus 0.68, tarsus 0.5, tibia II 0.78, tibia III 0.7, tibia IV 0.77; ♀: Tibiae I-IV: 0.88/1.0/0.9/1.0.
Colour like in the related species in which the legs are also distinctly annulated; dorsal pattern of the opisthosoma very variable.
Prosoma, legs and opisthosoma as in *psammophilus* n. sp., ♀-pedipalpus slender.
♂-pedipalpus, epigyne and vulva: See the diagnosis.

Relationship: See *O. psammophilus* n. sp.. In *O. longiscapus* WUNDERLICH 1992 from Gran Canaria (♂ unknown) the the epigynal scape is more slender. In *O. linguiformis* WUNDERLICH 1995 from Gran Canaria (♂ unknown) the epigynal scape is wider in the posterior half.

Distribution: Canary Islands, Gran Canaria.

***Oecobius psammophilus* n. sp.** (figs. 24-30)

Material: Canary Islands, Gran Canaria, Dunas de Maspalomas, 50 m, pit falls in the dunes, 3♂1♀ P. NABAVI leg. 21. XI 1999 – 15. I 2000; holotype ♂ R103/AR/CJW, 2♂1♀ paratypes R104/AR/CJW.

Remarks: (1) In one of the male paratypes the right bulbus is expanded by the distal haematodocha (clockwise in the right pedipalpus), and stands strongly out (fig. 26).
(2) The epigyne of the single known female (figs. 29-30) is malformed; at the right margin apparently a terminal apophysis is fixed besides a sclerotized rim (which is absent on the left side of the epigyne), and which has broken off probably after an unsuccessful copulation. – Does an epigynal slit exist in a lateral position in which the male inserts a terminal apophysis to fix the pedipalpus (and the couple) during copulation?

Diagnosis: ♂-pedipalpus (figs. 25-28): Retrolateral branch of the terminal apophysis very long, in a transverse position, a medial long and club-shaped apophysis exists, the prolateral branch is strongly bent (sickle-shaped), basal tooth of the radix apophysis quite long. ♀: The epigyne (figs. 29-30) is malformed.

Description:
Measurements (in mm): Body length ♂ 1.5-1.8, ♀ 2.0; prosoma: Length ♂ 0.6-0.7, ♀ 0.85, width ♂ 0.75, ♀ 0.9; leg I ♂: Femur 0.78, patella 0.3, tibia 0.6, metatarsus 0.6, tarsus 0.45, tibia II 0.65, tibia III 0.6, tibia IV 0.65; ♀: Tibia I 0.65, tibia IV 0.7; length of the basal tooth of the radix apophysis 0.07 mm.
Colour: Prosoma yellow brown with three dark grey patches, medially and marginally darkened, sternum yellow, legs yellow, distinctly annulated, opisthosoma yellow brown, dorsally with dark grey patches, ventrally mainly yellow, in front of the spinnerets with a pair of large dark spots.
Prosoma almost circular, anteriorly protruding with a “nose” like in other congeneric species, fovea/thoracal fissure well developed, a pair of long hairs behind the eye field, eyes fairly large, some lenses of the lateral eyes are indistinct. Fangs and basal cheliceral articles slender, the labrum bears an anterior outgrowth (fig. 24) like in other congenerics. Sternum as wide as long, separating the coxae IV by less than their radius. – ♀-pedipalpus: The two distal articles are fairly thickened, the tarsal claw is large, bent, bearing long teeth. – Legs only fairly long, II longest, I > IV, III almost as long as I, bristles numerous, all metatarsi bear a long trichobothrium, its position on I-II is in 0.86-0.9. – Calamistrum well developed in the female, along 2/3 of the metatarsus IV, absent in the male. – Opisthosoma oval, cribellum large and undivided in the female, strongly reduced in the male. – ♂-pedipalpus: See above; the terminal apophysis is three-partite (like in related species), the medial part is club-shaped, the basal tooth of the radix apophysis is pointed, the embolus is almost straight, strongly sclerotized, well observable. – ♀: Epigyne malformed, bearing oblique furrows; a scape is absent, I did not find copulatory openings.

Relationship: In *O. parapsammophilus* – which is strongly related – the terminal apophysis is strongly widened distally, the sickle-shaped branch of the terminal apophysis

(S) is almost straight, the basal tooth of the radix apophysis is blunt and only 0.05 mm long.

Distribution: Canary Islands, Gran Canaria, dunes de Maspalomas.

***Oecobius simillimus* n. sp**. (figs. 31-32)

Material: Canary Islands, Gran Canaria, PARWIS NABAVI leg. in pit falls, (1) Los Berrazales near Agaete, 550 m, leg. in V-VII, holotype ♂ R116/AR/CJW; (2) Roque Bentaiga, 1230 m, 3♂ paratypes, leg. in IV-VII, R117/AR/CJW; (3) 3 km NW Mogan, 450m, 2♂ paratypes, leg. in IV 2000, R118/AR/CJW.

Diagnosis (♂; ♀ unknown): Legs yellowish, not annulated; ♂-pedipalpus (figs. 31-32) with the radix apophysis slender in its distal part, and a shovel-shaped terminal apophysis which is only weakly sclerotized, like in *O. similis* KULCZYNSKI sensu WUNDERLICH (fig. 35).

Description (♂):
Measurements (in mm): Body length 1.0-1.1, Prosoma: Length 0.55, width 0.65 (large male); tibia I 0.5, tibia II 0.52, tibia III 0.5, tibia IV 0.55.
Colour pale, prosoma medially and marginally black, opisthosoma variable, yellowish or fairly darkened dorsally.
Body and legs quite similar to *O. similis*. Prosoma ca. 1.18 times wider than long, eyes well developed. Legs fairly long; all metatarsi bear a long trichobothrium, its position is in ca. 0.9. – Pedipalpus: See the diagnosis. Cymbium and bulbus are quite slender, the cymbium bears 3 apical bristles.

Relationship: *O. similis* KULCZYNSKI 1909 (1♂, holotype?, Madeira, Baixo, coll. KULCZYNSKI, F880, Mus. Warsaw) is strongly related but larger the prosoma is 0.78 mm long and 0.87 mm wide, 0.7 x 0.8 mm in a male from Tenerife (SMF 76704). In *similis* sensu WUNDERLICH (1987, 1995) the sclerites of the bulbus are different, compare figs. 31 to 33-34, the radix apophysis of *similis* is distinctly wider in the distal part, compare figs. 32 to 35a, the terminal apophysis (retrolateral aspect) is as in *similis*, fig. 35. Remark on *O. similis* regarding the structures of the bulbus: The shape of the distal part/tip of the radix apophysis may be more slender and pointed more basally as in the figs., the position of the central structures of the bulbus are also varariable. – In *O. lampeli* WUNDERLICH 1987 (Eastern Canary Islands Lanzarote and Fuerteventura) – which is strongly related, too, – the radix apophysis is short and stout, see WUNDERLICH (1992: Figs. 280-281).

Distribution: Canary Islands, Gran Canaria. – Distribution of the related *O. similis*: Madeira (with the locus typicus), Azores, Western Canary Islands (La Palma, El Hierro, La Gomera), and Tenerife. Species of this group possess probably a vicariant distribution; probably not more than a single species exist on a given island.

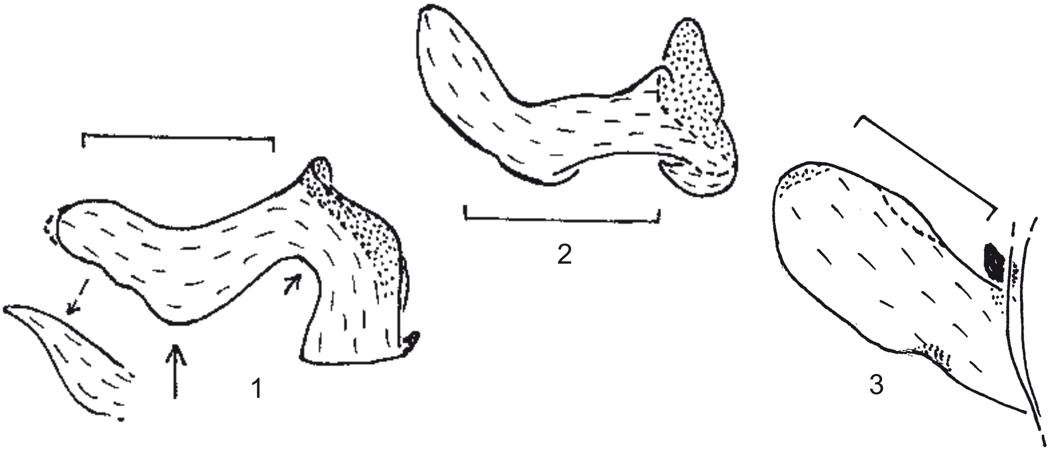
Oecobius unicoloripes WUNDERLICH 1992 (fig. 36)

Material: Canary Islands, Lanzarote, S Haria, mountains, small forest, under stones, 4♂1♀ JW leg. in IV ca. 1997, CJW.

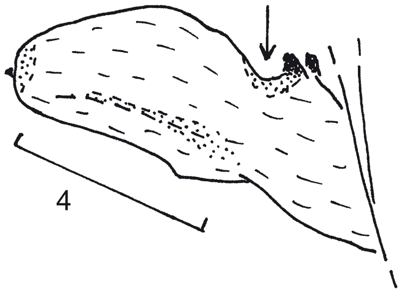
The female of this species is described here for the first time:
Measurements (in mm): Body length 2.0, prosoma: Length 0.7, width 0.8, tibia I/IV 0.58/0.6. The epigynal scape is 0.14 long.
The legs are weakly annulated like in some males. Epigyne/vulva (fig. 36) with a longer scape which is not narrowed posteriorly and ends far in front of the epigastral furrow; the copulatory openings are large, the sclerotized capsules of the vulva are apparently larger and distinctly spaced.

Relationships: In the related *O. lampeli* WUNDERLICH 1987 and *fuerterotensis* WUNDERLICH 1992 the epigynal scape reaches nearer to the epigastral furrow, see WUNDERLICH (1995: 437, figs. 43-44). In *O. minor* KULCZYNSKI 1909 the epigynal scape is distinctly shorter, see WUNDERLICH (1992: Fig. 297). In a questionable female of *O. minor* – see WUNDERLICH (1987: 116, fig. 284) – the scape is shorter than in *unicoloripes*.

Distribution: Lanzarote.



Figs. 1-3: ***Oecobius aculeatus*** WUNDERLICH 1987, right ♂-pedipalpus; 1) retrolateral and slightly ventral aspect of the terminal apophysis. Dotted: Intraspecific variability of the tip. The long arrow points to the knee-shaped outgrowth, the short arrow points to the strong inclination, the dotted arrow points to the distal part of the apophysis in a retroposterior aspect; 2) retrolateral aspect of the terminal apophysis; 3) prolateral aspect of the radix apophysis; dotted: Variability of its dorsal margin. Scale bar 0.2 mm;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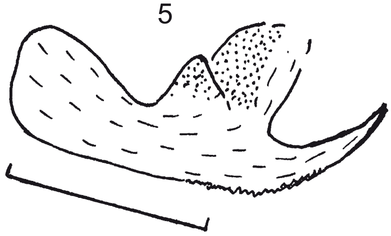
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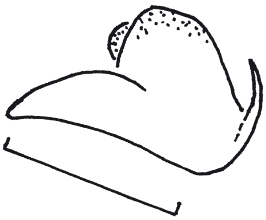
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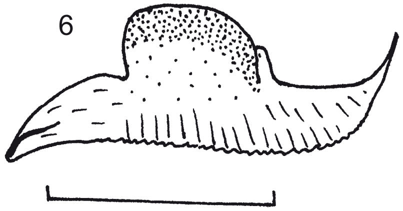
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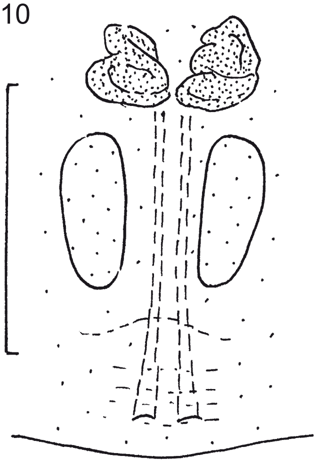
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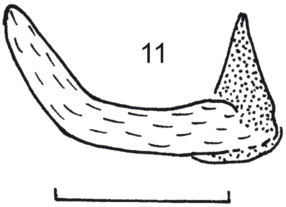
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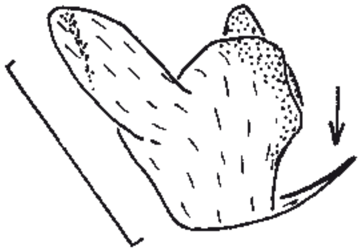
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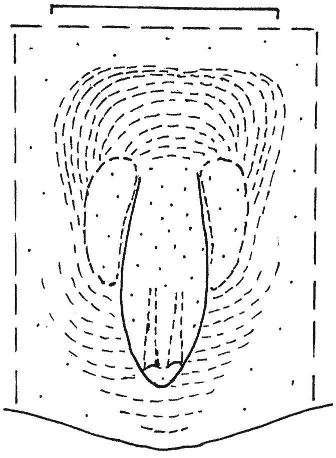
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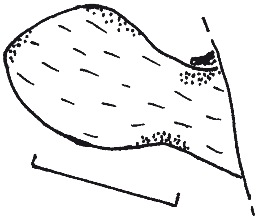
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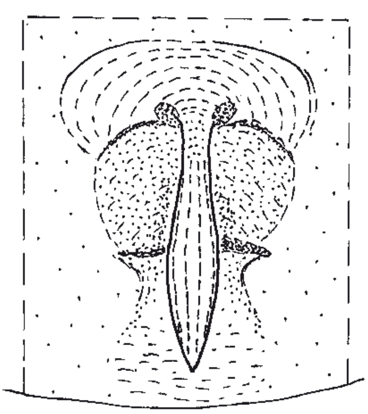
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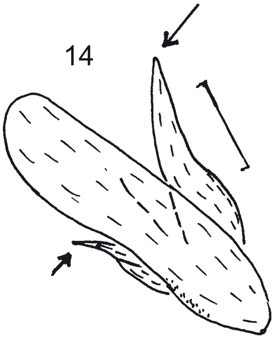
figs. 4-10: ***Oecobius agaetensis*** WUNDERLICH 1992; 4-7) right ♂-pedipalpus; 4) prolateral aspect of the radix apophysis. The arrow points to the dorsal inclination near two teeth; 5-6) ventral and retrobasal aspect of most parts of the terminal apophysis; 7) retrolateral and slightly ventral aspect of the terminal apophysis. The arrow points to the pointed tip of the sickle-shaped branch; 8) retrolateral aspect; 9-10) ♀, epigyne and dorsal aspect of most parts of the vulva. Scale bar 0.2 mm;

figs. 11-13: ***Oecobius bumerang* n. sp**.; 11-12) right ♂-pedipalpus; 11) retrolateral aspect of the terminal apophysis; 12) prolateral aspect of the radix apophysis; 13) ♀, epigyne. Scale bar 0.2;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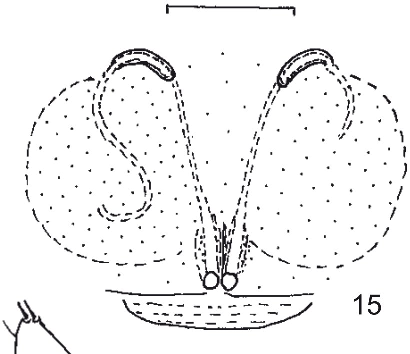
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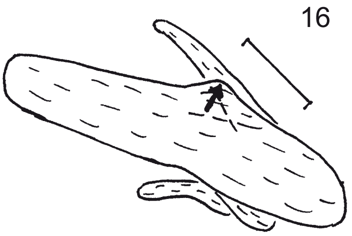
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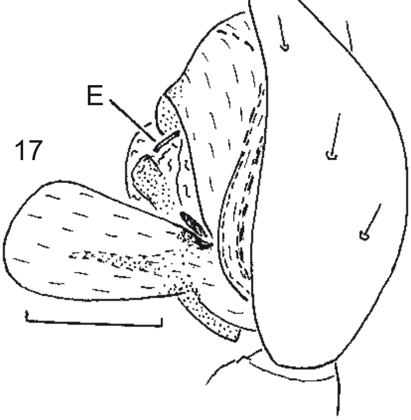

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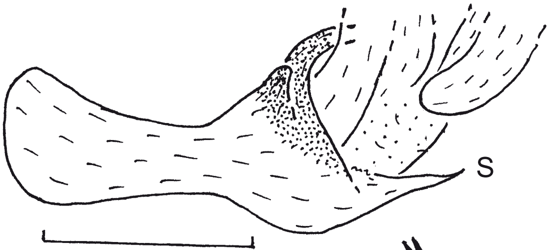

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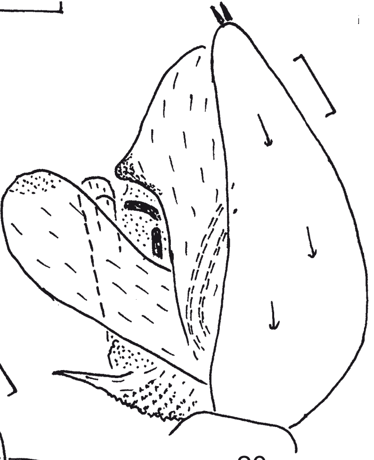
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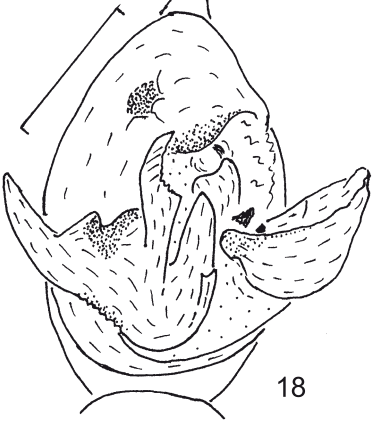
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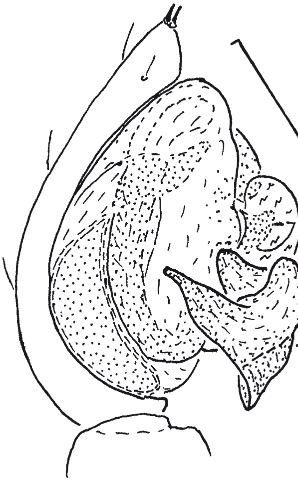
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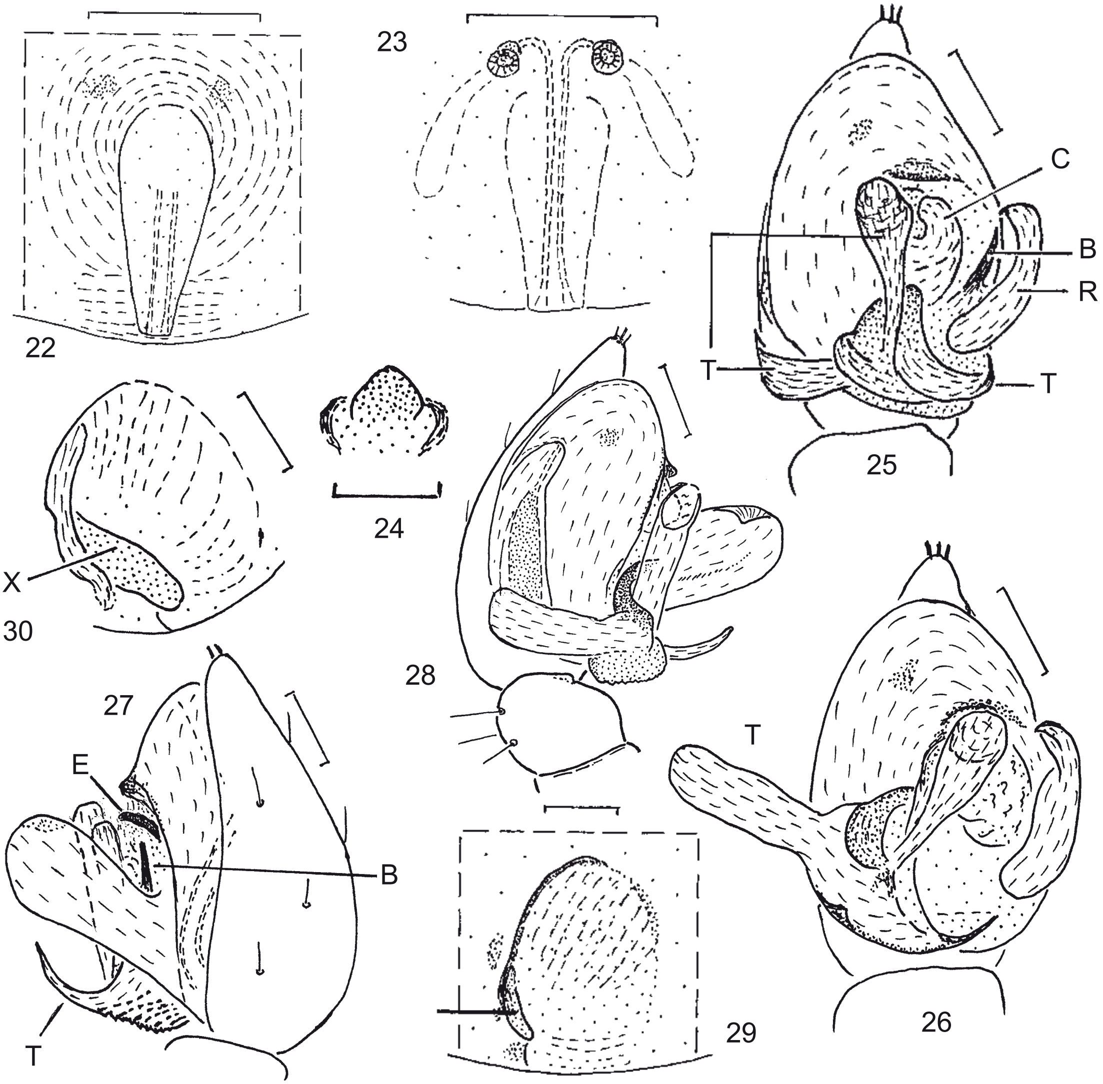
figs. 14-15: ***Oecobius duplex* n. sp.**;14) prolateral sclerites of the right ♂-pedipalpus; 15) ♀, dorsal aspect of the vulva. Scale bar 0.1;

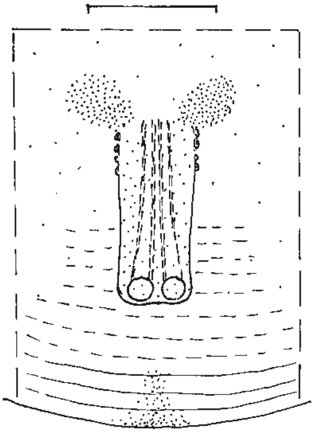
16) ***Oecobius furcula*** WUNDERLICH 1992, ♂ (holotype), prolateral sclerites of the right pedipalpus. Scale bar 0.1;

figs. 17-19: ***Oecobius infringens* n. sp.**, ♂, right pedipalpus, prolateral, ventral and retrolateral aspect. E = embolus. Scale bar 0.2;



figs. 20-23: ***Oecobius parapsammophilus* n. sp.**; 20) prolateral aspect of the right ♂-pedipalpus; 21) retroventral aspect of the terminal apophysis of the right ♂-pedipalpus and the base of the radix apophysis. The basal tooth of the radix apophysis is hidden in this position; 22-23) probably conspecific ♀, epigyne and dorsal aspect of the vulva. S = sickle-shaped apophysis. Scale bars 0.1 in fig. 20), 0.2 in figs. 21-23);

figs. 24-30: ***Oecobius psammophilus* n. sp**.; 24) ♀, ventral-anterior aspect of the labrum which bears a large anterior outgrowth; 25-28) right ♂-pedipalpus; 25-26) ventral aspect, partly expanded in fig. 26) in which the retrolateral branch of the terminal apophysis stands strongly out; 27-28) prolateral and retrolateral aspect of the right ♂-pedipalpus; 29-30) ♀, epigyne which apparently is malformed, ventral and ventral-right aspect. Note the oblique furrows. Hairs are not drawn. B = basal tooth of the radix apophysis, C ?= conductor, E = embolus, R = radix apophysis, S = sickle-shaped apophysis, T = terminal apophysis, X = questionable tegular apophysis of a ♂-pedipalpus fixed at the right margin of the epigyne. Scale bar 0.1;



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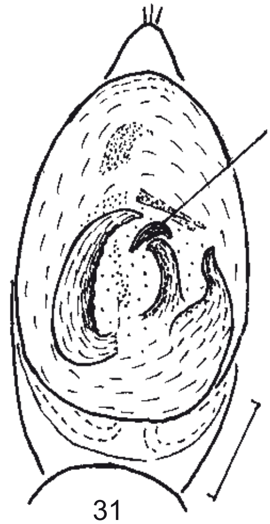

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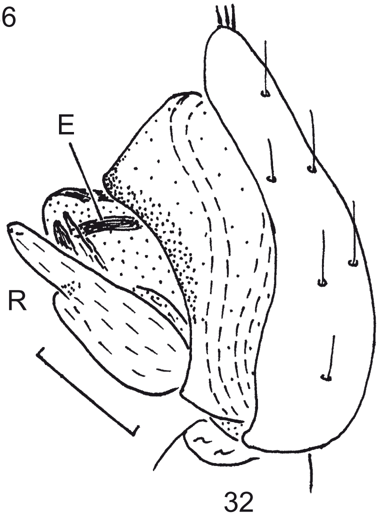

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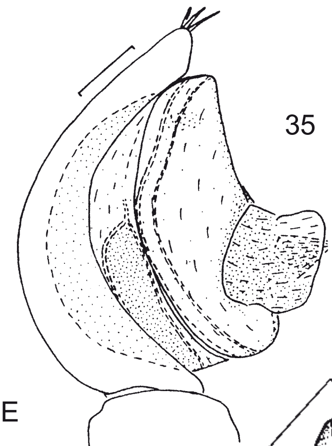

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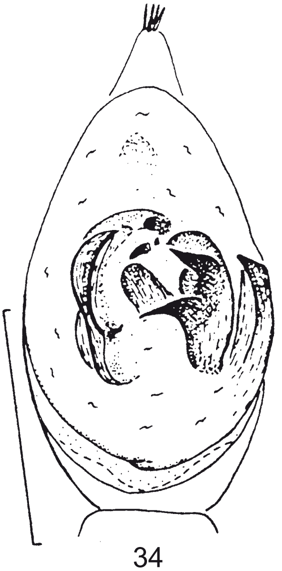

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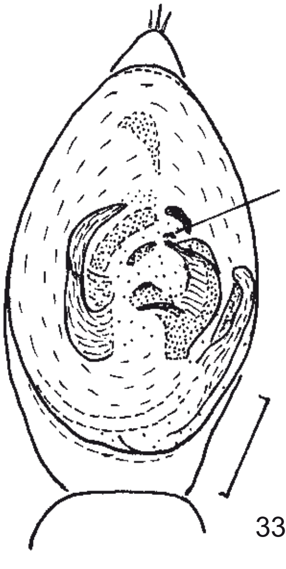

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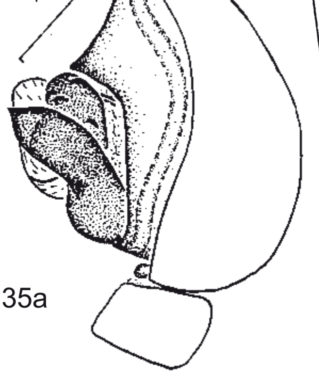

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fig. 31-32: ***Oecobius simillimus* n. sp.**, right ♂-pedipalpus, ventral and prolateral aspect. E = embolus, R = redix apophysis. Scale bar 0.1;

figs. 33-35a: ***Oecobius similis*** KULCZYNSKI 1908; right ♂-pedipalpus; 33-34) ventral aspect (fig. 33 is based on SMF 36704); 35) retrolateral aspect; 35a) prolateral aspect. E = embolus. Scale bars 0.2 in figs. 34, 35a), 0.1 in figs. 33 and 35);

fig. 36) ***Oecobius unicoloripes*** WUNDERLICH 1992, ♀ from Lanzarote, epigyne. Scale bar 0.1.

Family THERIDIOSOMATIDAE

?***Theridiosoma gemmosum*** (L. KOCH 1877)

Material: Canary Islands, Tenerife, Teno Mountains, SW Los Silos, Monte del Agua, Chupadero, 940 m, on *Laurus novocanarionsis*, 1 subad. ♀ J. ASTRIN leg. in X 2008 by tree fogging, CJW.

The body length of the spider is 1 mm, the opisthosoma is raised dorsally in front of the middle, probably slightly deformed, the colour of the legs is yellow, annulations are absent. An adult spider is needed for a sure determination.

The family Theridiosomatidae was unknown from the Canary Islands and even from the whole Macaronesian Islands up to now. *Theridiosoma gemmosum* is widely distributed in the Holarctic.

Family LINYPHIIDAE

Members of this family are recognizable, e. g., by the existence of lateral cheliceral stridulatory files, a free (movable) retrobasal paracymbium (e. g. fig. 6), and a frequent leg autotomy: Breaks between patella and tibia can happen easily. In numerous members of the subfamily Erigoninae exist prosomal modifications, see, e. g., figs. 21-22, 24-25.
Linyphiidae is – according to the number of genera – the most diverse Canarian spider family besides the Theridiidae.
Notes: (1) The genus *Lepthyphantes* has been split up to numerous genera; most of these genera should in my opinion regarded as subgenera, see WUNDERLICH (2008: 763-764) and below. – (2) I regard *Meioneta* – the two Canarian species are members of this taxon – as a subgenus of *Agyneta* s. l.

List of the Canarian subfamilies and genera of the family Linyphiidae

See WUNDERLICH (1992: 86-88).

Underlined are genera which include Canarian endemic species.

LINYPHIINAE: *Microlinyphia johnsoni* (a Macaronesian endemic).

MICRONETINAE: *Agyneta (Meinoneta), Canariphantes, Centromerus*, *Lepthyphantes* s. l. ((sub)genera *Improphantes, Lepthyphantes, Palludiphantes* and *Tenui-phantes*), *Scotargus, Sintula* and *Troglohyphantes*.

ERIGONINAE: *Canariellanum* (a Canarian endemic genus), *Erigone, Lessertia, Micrargus*, *Microctenonyx* (= *Aulacocyba*) *subitaneus*, *Minicia, Ostearius, Pelecopsis*, *Prinerigone* (= *Erigone*) *vagans, Styloctetor* (= *Sphecozone*) *romanus*, *Typhochrestus, Walckenaeria*.

Key to the subfamilies and genera of the Canarian Linyphiidae:

REMARKS: No clear cut exists regarding the chaetotaxy and certain other characters between the subfamilies Erigoninae and Micronetinae; the reasons are convergences and reversals in these characters:

Leg bristles:
(a) In most Canarian members of the Erigoninae tibia IV bears a single dorsal bristle but two bristles exist in *Ostearius* and certain species of the genus *Walckenaeria* (the *afur* species-group on Tenerife; see the key to the Erigoninae below and the variability within the genus *Walckenaeria*). In contrast to that in almost all members of the Micronetinae two bristles on tibia IV exist but in *Sintula* only a single one exists (the sequence of its dorsal tibial bristles is 2/2/1/1 like in most Erigoninae).
(b) In the Erigoninae all femoral and metatarsal bristles are absent in contrast to most Canarian Linyphiinae and Microteninae but femoral bristles are also absent in *Microlinyphia* and *Sintula* of the Linyphiinae and Micronetinae, and metatarsal bristles are additionally absent in Canarian members of *Agyneta (Meinoneta)* and *Centromerus*.
Trichobothria: In the Canarian members of the Linyphiidae a trichobothrium on metatarsus IV exists only in *Minicia* and *Walckenaeria* (Erigoninae). In the Canarian members of *Agyneta/Meioneta* (Micronetinae) a trichobothrium on metatarsus IV is absent in contrast to certain species of other regions.
The opisthosoma is unicoloured in almost all Canarian Erigoninae but not in *Ostearius* (fig. 37), *Minicia*, and some *Walckenaeria* species. In the Micronetinae the opisthosoma frequently possesses distinct dorsal markings but not in *Agyneta/Meinoneta*, *Canariphantes, Centromerus*, *Scotargus, Sintula, Troglohyphantes*, and in several *Lepthyphantes* s. l.
Tibial apophyses of the ♂-pedipalpus (e. g. figs. 5, 26) exist in almost all members of the Canarian Erigoninae but are absent in *Micrargus parvus* (fig. 32). Such apophyses are absent in most members of the Micronetinae but they exist in *Agyneta/ Meinoneta* (they may be indistinct), *Scotargus* (figs. 39-40), and *Sintula* (fig. 44).

1 Metatarsus IV bears a trichobothrium. Erigoninae part., see no. 5 of this key, and the the key to the genera of the Erigoninae below . . . . Minicia and Walckenaeria

- Metatarsal IV trichobothrium absent 2

2(1) Eyes strongly reduced or even absent (like in *Walckenaeria cavernicola*, Erigoninae). Cavernicolous or microcavernicolous spiders 3

- Eyes not (strongly) reduced. Epigaeic or microcavernicolous spiders 4

3(2) Eyes existing, anterior median eyes tiny, prosomal length ~ 0.6 mm, femoral, metatarsal and lateral tibial bristles absent (as in *Walckenaeria*). Fuerteventura. Only *C. fuerteventurensis*, ♂ unknown, see WUNDERLICH (1992: 373, fig. 391) . . . . .Centromerus

- Eyes strongly reduced, even absent in adult specimens, prosomal length > 1 mm, metatarsal bristles present; see WUNDERLICH (1992: 386, figs. 439-443). Caves on Tenerife. Only ?*T. oromii* (= *Lepthyphantes* oromii) . . . . .Troglohyphantes

4(2) Opisthosoma light (yellow) coloured but its tip black (fig. 37). Erigoninae part, see also the key below no. 2). Only the introduced *O. melanopygius*. . . . . Ostearius

- Opisthosomal colour different 5

5(4) See the remarks above.
Leg bristles: Tibia IV bears two dorsal bristles (a single one exists only in *Sintula*, no. 10), furthermore either femoral bristles (e. g., at least a prodistal one on I) and/or metatarsal bristles on I-II and/or III-IV, and/or lateral tibial I-II bristles exist, e. g., in *Sintula*. Distinct dorsal opisthosomal markings exist in certain members of *Lepthyphantes* s. l. and *Microlinyphia*. – LINYPHIINAE (*Microlinyphia*) and MICRONETINAE 6

- Leg bristlesTibia IV bears a single dorsal bristle (variability in *Walckenaeria*:See below and no.1), femoral, metatarsal and lateral tibial bristles as well as opisthosomal markings are absent. – Erigoninae (max. part; except *Minica* and *Walckenaeria*, see no. 1, and *Ostearius*, no. 4). See the key to the remaining genera of this subfamily below . . . . .ERIGONINAE

6(5) All femora bristle-less. 8

- At least femur I bears a bristle (in a prodistal position) 7

7(6) Opisthosoma unicoloured. Genital organs: Figs. 51-56. Few endemic Canarian species . . . . Canariphantes

- Opisthosoma unicoloured or with dorsal markings. Genital organs different. Numerous species. (Sub)genera see above . . . . .Lepthyphantes s. l.

8(6) Opisthosoma with distinct dorsal markings. Larger spiders, body length at least 3-4 mm. Genital organs see WUNDERLICH (1992: 434 a-c), ♂-pedipalpal tibial apophyses absent. Only *M. johnsoni*. . . . . Microlilyphia

- Opisthosoma unicoloured. Body length usually < 2.5 mm, slightly more than 3 mm in some members of *Scotargus* (no. 9) in which the opisthosoma is unicoloured, ♂-pedipalpal tibial apophyses existing (figs. 40, 43) which may be small in *Agyneta* 9

9(8) Sequence of the thin tibial bristles 2/2/2/2. Position of the metatarsal I-II trichobothrium in 0.28-0.43. ♂-pedipalpus (fig. 42): Embolus very long, black, and well observable . . . . *Scotargus*

- Sequence of the tibial bristles 2/2/2/2 (*Agyneta: Meioneta*) or 2/2/1/1 (*Sintula*). Position of the metatarsal I-II trichobothrium in less than 0.3. Embolus short/ indistinct 10

10(9) Sequence of the tibial bristles 2/2/2/2. Metatarsal and lateral tibial bristles absent in the Canarian species. ♂-pedipalpus: Cymbium dorsally +/- raised and with a basal hook (arrow in fig. 38). ♀-pedipalpus: At least some articles are darkened (similar to *Canariphantes*, in contrast, e. g., to *Sintula* and most *Lepthyphantes*. – *A. canariensis* (endemic) and *A. fuscipalpa* (introduced) . . . . *Agyneta (Meinoneta)*

- Sequence of the thin tibial bristles 2/2/1/1. Thin dorsal bristles exist on metatarsi I-II and retrodistally on tibia I-II. ♂-pedipalpus (figs. 43 – 46): Cymbium with a long posterior outgrowth which bears apical spines. ♀: Epigyne/vulva: Figs. 47-49. Only the endemic *S. pecten*. . . . . *Sintula*

(a) Subfamily ERIGONINAE

12 genera of this subfamily are known from the Canary Islands, see WUNDERLICH (1992: 87-88). These islands were colonized apparently 7 times during about 30 million years by such erigonine genera which developed endemic species; so every 4 million years in average one stem species of the genera in question colonized an island of this archipelago successfully.
In this paper I give a key to the erigonine genera of the Canary Islands, I describe a new species of the genera *Micrargus* and *Typhochrestus* as well as three new species of the genus *Walckenaeria* (which possesses a pronounced radiation on the Canary Islands) from Gran Canaria, and furthermore the hitherto unknown second sex of two species, of the genera *Pelecopsis* and *Typhochrestus*.

Key to the genera of the Erigoninae of the Canary Islands:

Note: *Metopobactrus cavernicola* WUNDERLICH 1992 is possibly a member of *Walckenaeria* (**quest. n. syn.**), see below.

1 Metatarsus IV bears a trichobothrium, its position is in 0.9-0.95. Tibia I-II bear long ventral bristles which are distinct in the female but may be weakly developed in the male. . . . . <u>*Minicia*</u>

- Metatarsus IV bears also a trichobothrium but its position is less than 0.8. Ventral tibial bristles absent. ♂-prosoma (e. g. figs. 14-15) modified . . . . <u>*Walckenaeria*</u>

- Metatarsal IV trichobothrium as well as ventral tibial bristles absent 2

2(1) Sequence of the tibial bristle 2/2/2/2 (unique in the Canarian Erigoninae). Opisthosoma usually light yellow but its tip plack (fig. 37). Only the introduced cosmopolitical *P. melanopygius* . . . . <u>*Ostearius*</u>

- Sequence of the tibial bristles 1/1/1/1. Small spiders 3

- Sequence of the tibial bristles 2/2/1/1 or 2/2/2/1 (*). Small or larger spiders 4

3(2) Cephalic part raised in both sexes, ♂: Prosoma without lateral furrows, opisthosoma with a dorsal scutum (unique in the Canarian Erigoninae). Darker coloured spiders . . . . <u>*Pelecopsis*</u>

- Cephalic part low, ♂: Prosoma with lateral furrows, opisthosomal scutum absent. Pale spiders. Only the introduced *M.* (= *Aulacocyba*) *subitaneus*. . . . . <u>*Microctenonyx*</u>

4(2) Prosomal length only 0.5-0.65 mm, sequence of the tibial bristles 2/2/1/1. Prosoma low and not modified in the male. Usually pale spiders, the opisthosoma may be darkened. Canarian endemic. See WUNDERLICH (1987: 187-190, figs. 510-524) . . . . <u>*Canariellanum*</u>

- Prosomal length only about 0.5 mm, sequence of the tibial bristles 2/2/1/1. Prosoma fairly low, bearing pits in the male (figs. 30-31). Tibia of the ♂-pedipalpus (fig. 32) in the Canarian species without an aopophysis, epigyne (fig. 35) with a large pit. Pale spiders. Only the endemic *M. parvus* n. sp. . . . . <u>*Micrargus*</u>

- Prosomal length only 0.5-0.7 mm, sequence of the tibial bristles 2/2/2/1 (*). Prosomal profile convex, distinctly in the male (e. g., figs. 24-25) in which it bears lateral furrows. . . . . <u>*Typhochrestus*</u>

- Larger and well pigmented spiders, prosomal length > 0.8 mm, cephalic part fairly convex (more distinct in the male), without furrows. Sequence of the tibial bristles 2/2/2/1. The femur of the ♂-pedipalpus bears distinct ventral spurs. Introduced taxa of related genera. (Members of *Eperigone* may soon reach the Canary Islands) . . . .<u>*Erigone*</u> and of <u>*Prinerigone*</u> (= *Erigone*) <u>*vagans*</u>

(*) In male *Typhochrestus* the tibial bristles are strongly reduced in contrast to females. *Typhochrestus* males possess a pair of prosomal furrows, see, e. g., figs. 24-25, and are usually not pale coloured.

Canariellanum albidum WUNDERLICH 1987

Material: Canary Islands, Gran Canaria, widely spread, pit falls, numeruos specimens, P. NABAVI leg. in XI. 1999-IV 2000, coll. NABAVI and CJW.

Remark: The smallest males are only 0.9 mm long, the colour of the opisthosoma is quite variable and may be dark grey.

Microctenonyx subitaneus (O. PICKARD-CAMBRIDGE 1875)

Material: Canary Islands, Fuerteventura, N. Betancuria, pit fall, 1♂ P. NABAVI leg in I 1999, CJW.

The holarctic species is new to Fuerteventura.

Walckenaeria BLACKWALL 1833

Distribution: This diverse genus is mainly distributed in the Northern Hemisphere, and shows a pronounced radiation on the Canary Islands: 13 named species were listed by WUNDERLICH (1992: 88), all are Canarian endemics as well as island endemics with the exceptions of *hierropalma* and *palmierro* which are known from the two westernmost islands El Hierro and La Palma. Most species (10) are endemics of Tenerife, one is known from La Gomera, none from Fuerteventura, Lanzarote and the smallest islands. The first (three) species from Gran Canaria are described in this paper, *W. grancanariensis* n. sp. is one of the most frequent Canarian species, W. tilos may be a local endemic.
One species – the North African W. crocata (SIMON 1884) – is new to the Canary Islands, and has been introduced to Fuerteventura probably only recently by man (3♂ JW and P. NABAVI leg. in I 1999 N of Betancuria, CJW).

Remark on the synonymy: I do not want to exclude that ?*Metopobactrus cavernicola* WUNDERLICH 1992 – based on a subadult male of a cave on Tenerife – (a) may really be a member of *Walckenaeria* (**quest. n. syn**.). In *cavernicola* only a single tibial bristle exists like probably in *W. cavernicola* WUNDERLICH 1992 which was based on a female, and which (b) may be a synonym (and a homonym as well).

Colonization and evolution: All Canarian species of *Walckenaeria* are (a) members of the subgenus *Prosopotheca* SIMON 1884 sensu WUNDERLICH (1972) and THALER (1984), and (b) – with the exception of the North African *crocata*, see above – all are Canarian endemics. All the endemics are finally (c) closely related to each other (subspecies may exist), and go – according to the modifications of the male "caput" and the extremely similar structures of bulbus and epigyne/vulva – apparently back to a single stem species. This hypothetical stem species is close to *W. crocata*. We can conclude that the Canary Islands were colonized two times by *Walckenaeria* species: (1) by the stem species of the Canarian endemics, and (2) by *W. crocata* which was probably introduced by man. The origin of the stem species may be Northern Africa: *W. crocata* is known from Algeria.

Radiation and the Canarian capturer of the stem species: Most *Walckenaeria* species (10) evolved on the large and diverse central island Tenerife which is the highest island of this archipelago, and which may have been the capturer of the stem species of the Canarian endemics.

Several members of the subgenus *Prosopotheca* are also known from North Africa – see BOSMANS & DE SMET (1993) – and from the Southern Hemisphere, e. g., from the East African mountains. They may be well aeronauts, and their stem species probably originated in North Africa; see the distribution of *W. crocata*.

Ecological separations exist e. g. in the cave species *W. cavernicola* on Tenerife and in the microcavernicolous species *W. subterranea* on Gran Canaria, see below (ecology) which is strongly related to the epigaeic *W. grancanariensis*. I did not find differences in the bulbi of both species which co-exist on several localities (collected in the same pit falls) on Gran Canaria. There is no indication of a cross. Subspecies may exist on Tenerife, see THALER (1984), and on Gran Canaria.

The unusual variability in the number of tibial bristles: The most frequent and apparently basic sequence of the tibial bristles in *Walckenaeria* is 2/2/1/1 but there are exceptions: In most of the species of Tenerife (except *cavernicola*) – the *afur* species-group sensu WUNDERLICH (1987: 178) – the sequence is 2/2/2/2, apparently a reversal to the plesiomorphic linyphiid sequence. In *W. cavernicola* the sequence is 1/1/1/1 like in another "island spider": *W. cyprusensis* WUNDERLICH from Cyprus. In the male of *W. tilos* n. sp. tibial bristles are completely absent. Island endemics of *Walckenaeria* show a sequence of the tibial bristles which is more diverse than in continental species and genera.

Ecology: Most species of *Walckenaeria* live epigaeic but *W. cavernicola* from Tenerife is cavernicolous – body and legs are depigmented, the eyes are distinctly reduced, the legs are very long). Spiders of *W. subterranea* n. sp. from Gran Canaria are also always strongly depigmented (pale), and the eye lenses are reduced. This may be a microcavernicolous species which has only rarely been captured in pit falls, e. g., 3 males together with 188 males of the related *W. grancanariensis* n. sp. of the same locality.

Key to the *Walckenaeria*-species of Gran Canaria:

1 Position of the metatarsal I-II trichobothrium in 0.68-0.72, prosomal length 1.1-1.2 mm, dorsal colour of the opisthosoma dark grey. ♂: Tibiae bristle-less, dorsal tibial hairs (fig. 20) short, cephalic lobe (figs. 21-22) large, with an almost horizontal area behind the posterior median eyes (arrow in fig. 21), space between the anterior and posterior eye lenses 0.22-0.24 mm, distal branch of the pedipalpal tibial apophysis distinctly bent as in *grancanariensis* (fig. 5). ♀: Space between the anterior and posterior median eyes ~ 0.1 mm, epigyne/vulva quite similar to *W. grancanariensis*, shape of the receptacula seminis circular (fig. 23). Los Tilos, probably a local endemic . . . . *tilos*

- Position of the metatarsal I-II trichobothrium in 0.45-0.62, prosomal length 0.8-1.0 mm, dorsal colour of the opisthosoma variable, yellow to dark grey. ♂: Dorsal tibial bristles present, their sequence 2/2/1/1, dorsal tibial hairs long (fig. 13), cephalic lobe large or small, no horizontal area or even a slope behind the posterior median eyes (figs. 1, 14-15: arrow), space between the anterior and posterior median eyes 0.12-0.18 mm. ♀: Space between the anterior and posteior median eyes ~ 0.06 mm, vulva figs. 19 and 23. Not Los Tilos 2

2(1) Colour of body and legs always pale yellow-white, position of the metatarsal I-II trichobothrium in ~ 0.45. ♂: Length of the basal tibial bristles I-II 1/2-4/5 tibial diameters, prosoma (figs. 14-17): Eyes small and widely spaced, posterior row strongly procurved (fig. 16), anterior row strongly recurved (fig. 17), “peak” between the posterior median eyes absent, hump in the field of the median eyes larger and more hairy (if they are not rubbed off). ♀: Epigynal plate wider, shape of the receptacula oval (fig. 19) *subterranea*

- Colour of body and legs very variable, opisthosoma yellow-white to dark grey, position of the metatarsal I-II trichobothrium in ~ 0.62. ♂: Length of the basal tibial bristles I-II about one tibial diameter, prosoma (figs. 1-4): Eyes large and less spaced, posterior row slightly procurved (fig. 2), anterior row slightly recurved (fig. 3), frequently exists a small or tiny “peak” between the posterior median eyes (arrow in figs. 1, 4) hump in the field of the median eyes smaller and less hairy. ♀: Epigynal plate more narrow, shape of the receptacula seminis circular (fig. 12). . . . . *grancanariensis*

***Walckenaeria grancanariensis* n. sp.** (figs. 1-12)

Material (all specimens besides the holotype are considered paratypes and were collected by P. NABAVI in pit falls about 10 years ago): Canary Islands, Gran Canaria: (1) Road Vallesco-Artenara, between bushes on Lapilli, 1350 m, 188♂21♀ leg. 21. XI. 1999-15. I. 2000; holotype ♂ R75/AR/CJW, 187♂21♀ R76/AR/CJW; 28♂ 27. VIII-27.

X. 1999, 42♂18♀ 16. I.-2. III. 2000, 44♀ 11. IV.-22. V., 1♂ 6♀ 3. III.-10.V. 2000, 10♀ 27. V.-5. VII, 3♂2♀ coll. P. NABAVI, remaining paratypes R78/AR/CJW. – (2) East coast, near Anden Verde, 400-600 m, sparce vegetation, 1♂ 1. X.-20. XI. 1999, R79/AR/CJW, 2♂1♀ 27. VIII 1999-10. IV 2000, R81/AR/CJW. – (3) Pico de Las Nieves and NW of it: Pine forest, bushes or weak vegetation, 1770-1950 m, numerous (> 700) ♂♀ leg. in 1999-2000, R80/AR/CJW. – (4) Tamadaba, Pine forest, 1250 m, ♂♀ leg. in I-XII 1999, R82/AR/CJW. – (5) 2 km NW Artenara, between gras and Pines, 1250 m, numerous ♂♀, R85/AR/CJW. – (6) Near Roque Nublo, 1200-1450 m, numerous ♂♀, R86/AR/CJW. – 7) Los Berrazales near Agaete, 400-600 m, 1♀, R88/AR/CJW.

Note: Remarkably one of the most frequent spider species of Gran Canaria (and probably of the whole Canary Islands) was undescribed until now.

Diagnosis: Position of the metatarsal I-II trichobothrium in ~ 0.62, colour of the opisthosoma white-yellow to dark gey. ♂: Prosoma (figs. 1-4) with a small hairy hump in the field of the middle eyes, and frequently with a small to tiny “peak”, pedipalpus (figs. 5-9): Distal branch of the tibial apophysis distinctly bent retrolaterally. ♀: Eyes (fig. 10) large, epigyne fig. 11, vulva (fig. 12) with circular receptacula seminis.

Description:
Measurements (in mm): Body length ♂ 1.7-2.1, ♀ 2.1-2.3, prosoma (♂♀): Length 0.8-1.0, width 0.7-0.8; leg I and tibiae II-IV (♂) as in *W. subterranea*, ♀: Femur 0.85, patella 0.3, tibia 0.75, metatarsus 0.63, tarsus 0.43, tibia II 0.7, tibia III 0.5, tibia IV 0.8.
Colour quite variable: Prosoma and legs yellow to white yellow, opisthosoma dorsally light to dark grey, ventrally medially light grey, epigaster and spinnerets almost white.
Prosoma (see the diagnosis, figs. 1-4, 10): 1.12-1.4 times longer than wide, thoracal fissure short, eyes large, posterior row slightly procurved in the male, straight in the female, posterior and anterior median eyes spaced by ~ 0.12 mm in the male and ~ 0.06 mm in the female, basal cheliceral articles large, bearing about 10 distinct and some indistinct lateral stridulatory files, the anterior margin of the cheliceral furrow bears 4-5 large teeth, the posterior margin about 5 small teeth. Labium wider than long, strongly rebordered; the sternum separates the coxae IV by less than their diameter. – Legs fairly long, order IV/I/II/III, sequence of the dorsal tibial bristles 2/2/1/1, length of the basal bristle on I-II about one tibial diameter; all metatarsi bear a trichobothrium, its position on I-II in 0.55-~0.62, on IV in 0.58-0.66. – Opisthosoma oval, covered with normal hairs. – ♂-pedipalpus: See the diagnosis. In one male I found a shortened radix apophysis which is strongly bent distally (fig. 9). – ♀: Epigyne/vulva (figs. 11-12) with the introductory openings near the middle and circular shaped receptacula seminis.

Phaenology: Adult whole the year, most frequent in autumn and winter (the main copulatory periods), ratio of males/females 42 : 1 in XI to mid I, 2.3 : 1 in mid I and II, no female in IX-X, no male in mid IV to the beginning of VII (57 females).

Relationships: *W. subterranea* n. sp. is strongly related (see the key) in which, e. g., size and position of the eyes and the cephalic modifications of the male are different; the distal branch of the male pedipalpal tibial apophysis is less bent in *subterranea*, and the position of its prolateral outgrowth is usually more basally (compare figs. 18 and 5, arrows).

Distribution: Gran Canaria (widely distributed).

***Walckenaeria subterranea* n. sp.** (figs. 13-19)

Material (all specimens besides the holotype are considered paratypes and were collected by P. NABAVI in pit falls about 10 years ago): Canary Islands, Gran Canaria: (1) Road Vallesco-Artenara, between bushes on Lapilli, 1350 m, pit falls, 3♂ (within 217 specimens of *W. grancanariensis* n. sp. at the same time), P. NABAVI leg. 21. XI. 1999 – 15. I. 2000; holotype ♂ R73/AR/CJW, 2♂ paratypes R74/AR/CJW; same locality, 1♂ paratype R77/AR/CJW. – (2) Tamadaba, pine forest, 1250 m, 4♂1♀ paratypes leg. 21. XI 1999 – 15. I. 2000, R82/AR/CJW (among 27♂4♀ of *W. grancanariensis*). – (3) 2 km NW Artenara, gras between some pines, 1250 m, 3♂ paratypes R84/AR/CJW. – (4) Near Roque Nublo, 1200-1470 m, 1♂ paratype leg. in I-II 2000, R87/AR/CJW. – (5) Berrazales neaer Agaete, 550 m, 2♂ paratypes leg. 21. XI. 1999 – 2. III. 2000, R89/AR/CJW.

Diagnosis: Very pale spiders. ♂: Prosoma (figs. 14-17) always without a “peak” between the median eyes (compare figs. 1-4) and with a distinct hairy hump in the field of the median eyes. Pedipalpus (fig. 18): Distal branch of the tibia almost straight, position of the prolateral outgrowth (arrow) usually basally of the distal tooth, median apophysis and embolic base slender as in *W. grancanariensi*. ♀: Epigynal plate (fig. 19) very wide, shape of the receptacula seminis oval.

Description:
Measurements (in mm): Body length ♂ 1.7-1.8, ♀ 2.0, prosoma (♂♀): Length 0.8-1.0, width 0.65-0.75; leg I ♂: Femur 0.75, patella 0.25, tibia 0.75, metatarsus 0.6, tarsus 0.4; tibia II 0.65, tibia III 0.5, tibia IV 0.75; leg I ♀: Femur 0.95, patella 0.27, tibia 0.85, metatarsus 0.7, tarsus 0.45, tibia II 0.8, tibia III 0.65, tibia IV 0.9.
Colour: Body and legs white yellow; in one male black pigments around the eyes are completely absent.
Prosoma ca. 1.2 times wider than long, thoracal fissure distinct or indistinct; eyes ♂ (figs. 14-17) fairly small, posterior row distinctly procurved (in the ♀ slightly recurved), posterior median eyes close together, allmost contiguous to spaced by their radius, in the ♀ not much smaller than in *grancanariensis* (fig. 10), posterior and anterior median eyes spaced by 0.15-10.18 mm in the male and ~ 0.06 mm in the female. ♂-prosoma always without a “peak” between the median eyes (compare figs. 1-4) and with a distinct hairy hump in the field of the median eyes, variable. – Legs fairly long, slender, with longer hairs (fig. 13), order IV/I/II/III, sequence of the thin tibial bristles 2/2/1/1, length of the basal bristle on Tibia I-II in the male 1/2-4/5 of the tibial diameter but about 1 diameter in the female; all metatarsi bear a trochobothrium, its position on I-II in ca. 0.45. – Opisthosoma slender, covered with normal hairs. – ♂-pedipalpus and ♀ epigyne and vulva: See the diagnosis; embolus and median apophysis as in *grancanariensis* (figs. 7-8).

Phaeology: Quite similar to *grancanariensis*.

Ecology: According to the reduced size of the eye lenses and the depigmented body and legs I regard *W. subterranea* as microcavernicolous. Members of *subterranea* have been captured much rarer in pit falls than *W. grancanariensis* (see above), and leave apparently only seldom their subterranean habitat

Relationships: The epigaeic *W. grancanariensis* n. sp. is strongly related, see the key and *grancanariensis*.

Distribution: Gran Canaria (widely distributed).

***Walckenaeria tilos* n. sp**. (figs. 20-23)

Material: Canary Islands, Gran Canaria, Los Tilos, 600-800 m, P. NABAVI leg. in pit falls, 5♂ leg. 21. XI. 1999 – 15. I 2000, 2♀ leg. 3. III – 10. IV 2000; holotype ♂ R90/ AR/ CJW, 4♂2♀ (1 vulva separated) R91/AR/CJW.

Diagnosis: ♂: Tibial bristles absent, dorsal tibial hairs short (fig. 20), cephalic lobe (figs. 21-22) large and hairy, with a high area behind the posterior median eyes (arrow in fig. 21). Pedipalpus as in *W. grancanariensis* (figs. 5-9). ♀: Epigyne/vulva (fig. 23) with circular receptacula seminis.

Description:
Measurements (in mm): Body length ♂ 2.3-2.5, ♀ 3.0-3.2, prosoma (♂♀): Length 1.2-1.3, width 0.9-1.1; leg I, ♂: Femur 1.45, patella 0.37, tibia 1.4, metatarsus 1.25, tarsus 0.85, tibia II 1.3, tibia III 1.1, tibia IV 1.45; leg I ♀: Femur 1.6, patella 0.4, tibia 1.5, metatarsus 1.4, tarsus 0.8, tibia II 1.45, tibia III 1.15, tibia IV 1.55.
Colour: Prosoma and legs light (orange to yellow-orange), opisthosoma dark grey, ventrally medially medium grey, epigaster, spinnerets and their surrounding light grey to white.
Prosoma: ♀-profile slightly convex in the middle, eyes large, posterior row straight or slightly procurved, posterior median eyes spaced by their largest radius, posterior and anterior median eyes spaced by 0.22-0.24 mm in the male and ~ 0.1 mm in the female. ♂ (figs. 21-22): Thoracal fissure fairly distinct, cephalic lobe well developed, erect and hairy, with a high area behind the posterior median eyes, eyes only fairly large, posterior row distinctly procurved, posterior median eyes almost contiguous. Basal cheliceral articles large, lateral files as in *grancanariensis*, the anterior margin of the cheliceral furrow bears 3-5 large teeth, the posterior margin usually 4 small teeth. Labium, gnathocoxae and sternum as in *grancanariensis*. – Legs long and slender, bristle-less in the male and with short dorsal hairs which are 0.05-0.06 mm long (fig. 20) in contrast to the female in which the sequence of the long tibial bristles is 2/2/1/1 and the dorsal tibial bristles and hairs are long. All metatarsi bear a trichobothrium, its position on I-II is in 0.68-0.72. – Opisthosoma long oval, covered with normal hairs. – ♂-pedipalpus as

in *W. grancanariensis*, epigyne/vulva (fig. 23) with circular receptacula seminis as in *grancanariensis*.

Relationships: *W. grancanariensis* and subterranea are strongly related and slightly smaller; see the key. In *tilos* the cephalic lobe is larger and bears a high area behind the posterior median eyes (arrow in fig. 21, compare fig. 1), tibial bristles are completely absent in the male and the dorsal tibial hairs are shorter (fig. 20; compare fig. 13); the pedipalpal tibial apophyses and the structures of the vulva are more similar to *grancanariensis* than to *subterranea*. I did not find differences in these species regarding the paracymbium and the bulbus.

Distribution: Gran Canaria (Los Tilos).

Typhochrestus SIMON 1884

In *Typhochrestus* the sequence of the tibial bristles is 2/2/2/1; the bristles are strongly reduced in the male sex.
Three species of *Typhochrestus* are described from the Canary Islands, see WUNDERLICH (1992: 88). In this paper I describe the male of *T. paradorensis* WUNDERLICH 1987 for the first time.

Typhochrestus paradorensis WUNDERLICH 1987 (figs. 24-29)

Material: Canary Islands, Gran Canaria, Pico de las Nieves and NW of it, 1770-1900 m, numerous ♂♀ P. NABAVI leg. in pit falls in 1999-2000, CJW and coll. P. NABAVI.

Diagnosis: ♂-pedipalpus (figs. 26-28): Tibia apically with 3 outgrowth, outgrowth of the embolus screw-shaped. ♀: Epigyne: See WUNDERLICH (1987: Fig. 490), vulva: Fig. 29.

Description of the hitherto unknown male:
Measurements (in mm): Body length 1.0-1.3, prosoma: Length 0.55-0.63, width 0.48-0.5; tibia I 0.42-0.5.
Colour as in the female: Prosoma medium brown, opisthosoma dark grey.
Differences to the female: Tibial bristles strongly reduced, only about 1/3 tibial diameters in contrast to the female in which their length is more than a tibial diameter. The prosoma (figs. 24-25) is distinctly raised and bears a pair of longitudinal furrows, Pedipalpus (figs. 26-28), tibia apically with three outgrowths, outgrowth of the embolus screw-shaped.

Relationships: According to the ♂-prosoma and the pedipalpal tibial apophysis *T. hesperius* THALER 1984 from Tenerife is most related; in *hesperius* the outgrowth of the embolus is not screw-shaped, the anterior wide parts of the introductory ducts of the vulva are longer and more close to the receptacula seminis. Certain species from North Africa are also related and may be closely related to the stem species of the two Canarian species, see BOSMANS & ABROUS (1990).

Distribution: Gran Canaria.

Micrargus DAHL 1886

The genus has a holarctic distribution and has been unknown from the Canarian and Macaronesian Islands up to now. Males of all members of *Micrargus* posses a pair of cephalic pits; like in several related erigonine genera the embolus is strongly bent backwards in its distal part. In some species the paracymbium has a peculiar posterior outgrowth (fig. 33).

***Micrargus parvus* n. sp.** (figs. 30-36)

Material: Canary Islands, Gran Canaria, 5♂1♀ P. NABAVI leg. in pit falls in 1999-2000.; (1) Road Vallesco – Artenara, 1550 m, between bushes on Lapilli, 2♂ leg. in X-XI, holotype R92/AR/CJW, paratype R93/AR/CJW; (2) 2 km NW Artenara, 1250 m, between gras and pines, 1♂1♀ paratypes eg. in III-IV, R94/AR/CJW; (3) Roque Bentaiga, 1250 m, leg. in X-XI, 1♂ paratype, R95/AR/CJW; (4) near Roque Nublo, 1470 m, leg. in I-II 2000, 1♂ paratype R96/AR/CJW.
Micrargus laudatus for a comparison: S-Portugal, Serra de Monchique, 1♂ A. COMELLINI leg. 13. IV. 1969, A. TANASEVITCH det., Mus. Geneve, dept. of Arthropodes and entomology I (P. J. SCHWENDINGER).

Diagnosis: Smallest known member of *Micrargus*, body length 0.8-1.1 mm, colour of body and legs pale yellow, ♂-pedipalpus (figs. 32-34): No distinct tibial apophysis, paracymbium with a distinct posterior outgrowth, embolus long, strongly bent in the distal part, conductor long; epigyne (fig. 35) with a large groove in the anterior part, vulva (fig. 36) with atria, receptacula seminis thin-walled, their shape almost circular.

Description:
Measurements (in mm): Body length 0.8-1.1, prosoma: Length ♂ 0.55-0.57, ♀ 0.48, width ♂ 0.45, ♀ 0.4; leg I: ♂: Femur 0.42, patella 0.15, tibia 0.35, metatarsus 0.27, tarsus 0.28, tibia II 0.3, tibia III 0.2, tibia IV 0.35; ♀: Femur 0.3, patella 0.15, tibia 0.3, metatarsus 0.23, tarsus 0.25, tibia II 0.28, tibia III 0.2, tibia IV 0.35.

Colour: Prosoma and legs light yellow, opisthosoma light grey.
Prosoma (figs. 30-31) smooth, not raised, thoracal fissure indistinct, eyes of medium size, ♂ with lateral furrows/pits, basal cheliceral articles relatively large, lateral stridulatory files existing, fangs long, anterior/posterior margins of the cheliceral furrow with 5/5 teeth, labium wide and free, gnathocoxae converging, sternum separating the coxae IV by about their diameter. – Legs slender, order IV/I/II/III, sequence of the tibial bristles 2/2/1/1, length on I about a tibial diameter, the distal one longer. Metatarsus I-III bear a trichobothrium, its position on I in 0.3-0.4. – Opisthosoma oval, covered with short hairs. – ♂-pedipalpus (figs. 32-34) (see the diagnosis): Patella with a dorsal-distal bristle, tibia with 3 trichobothria, without a true apophysis (only a hook exists). – Epigyne/vulva (figs. 34-35): See the diagnosis.

Ecology and phaenology: Mountain spiders which are captured between 1250 and 1470 m, leg. in X-IV. According to the pale colour of body and legs the spider may be microcavernicolous; the eye lenses are not reduced.
Remark: Members of the *M. cavernicolus* WUNDERLICH 1995 are known from a cave in Japan.

Relationships: According to the small (in *apertus*) or even the absence of a pedipalpal tibial apophysis and the presence of a posterior paracymbial outgrowth *M. laudatus* (O. PICKARD-CAMBRIDGE 1881) and *M. subaequalis* WESTRING 1851) are most related; these species are distinctly larger, body length 1.5-2 mm, body and legs are not pale; the paracymbial outgrowth is similar to *laudatus* and longer in *subaequalis*, the receptacula seminis are thick-walled in these species, and the anterior margin of the epigynal groove is elongated medially in the posterior direction. In *laudatus* furthermore the prosomal cuticula is finelly rugose, the male cephalic part is slightly convex, a small retrolateral pedipalpal tibial apophysis exists in contrast to *parvus*, see LOCKET & MILLIDGE (1953: Fig. 171 H); the shape of the paracymbium is like in *parvus*, the structures of the bulbus are quite similar in both species, the vulva is quite different, see WIEHLE (1963: Fig. 2).

Distribution: Gran Canaria.

(b) Subfamily MICRONETINAE

Agyneta HULL 1911 s. l.

Taxonomy: I follow SAARISTO who regardes *Agyneta* in a wide sense, and I regard *Meioneta* as well as *Microneta* (in which no metatarsal IV trichobothrium exists, and the ♂-chelicerae are quite large, diverging, and strongly toothed) and furthermore *Syedrula* (in which bristles exist on tarsi I-II, and very large posterior median eyes) as subgenera of *Agyneta*. The two species of the Canary Islands and Madeira – *canariensis* and *fuscipalpa* – are members of the subgenus *Meioneta*.

Agyneta (***Meioneta***) ***canariensis*** WUNDERLICH 1987 (fig. 38)

Material: (1) Archipelago of Madeira, Porto Santo, Pico de Castella, 200-400 m, 1♂ J. HENDERICKX leg. in I 1996, CJW; (2) Canary Islands, Fuerteventura, N Betancuria, 1♂3♀ JW leg. in 1999, CJW.

Distribution: Canary Islands; new to the Archipelago of Madeira.

Scotargus SIMON 1913

Characters of the genus: Thin leg bristles, their sequence on the tibiae dorsally 2/2/2/2, tibiae I-II bear additionally a retrodistal bristle in *S. pilosus* but this is absent in the Canarian species, see WUNDERLICH (1992: 383), metatarsi I-II bear a dorsal bristle, femoral bristles are absent, metatarsal IV trichobothrium absent, their position on I-II is in 0.33-0.45. Pedipalpal tibia (fig. 40) and bulbus (fig. 42) have a typical position, the epigyne is strongly protruding.

Relationships: According to the structures of the ♂-pedipalpus – e. g., the tibial apophyses – *Sintula* SIMON 1884 is strongly related; in *Sintula* the sequence of the tibial bristles is 2/2/1/1, the position of the metatarsal trichobothrium is more basally, the outgrowth of the cymbium is larger and bears spines, the embolus is shorter.

Distribution: Holarctic.

Three species of *Scotargus* were listed by WUNDERLICH (1992: 87), a single species each from La Gomera (♀), Tenerife and Gran Canaria (♀). Here I describe the hitherto unknown male of *S. grancanariensis* WUNDERLICH 1992.

Scotargus grancanariensis WUNDERLICH 1992 (figs. 39-41)

1887 *Scotargus grancanariensis* WUNDERLICH, Beitr. Araneol., 1: 384, fig. 437 (♀).

Material: Canary Islands, Gran Canaria, high mountains, 1350-1950 m, Tamadaba, surroundings of the Roque Nublo and Pico de las Nieves, several ♂♀, PARWIS NABAVI leg. in XI 1999-II 2000, CJW and coll. PN.

Description of the hitherto unknown male:
Measurements (in mm): Body length 1.6-1.8, prosoma: Length 0.7-0.9, width 0.8, length of tibia I 0.8, of tibia IV 0.85.
Colour pale yellow/brown. Body and legs similar to the female but position of the metatarsal I-II trichobothrium in 0.33-0.45. Eyes small, size of their lenses variable, fairly to distinctly reduced. Pedipalpus (figs. 39-41) with the shape of the embolus almost circular; compare *S. secundus* WUNDERLICH 1987, fig. 42.

Distribution: Gran Canaria.

Sintula SIMON 1884

Most species of this palaearctic genus were described/revised by BOSMANS (1991). In the present paper I describe the first Macaronesian member of this genus, *S. pecten* n. sp. from Gran Canaria.

Characters of the genus: Sequence of the thin dorsal tibial bristles 2/2/1/1 (a rather unusual sequence in the Micronetinae, similar to numerous Erigoninae), tibiae I-II bear an additional bristle in a retrodistal position, metatarsus I-II bear a single dorsal bristle, metatarsus I-III bear a trichobothrium, its position is usually less than 0.3, most often the pedipalpal tibia bears apophyses which may bear spines (figs. 43-44), the cymbium is strongly elongated posteriorly and bears spines in this position (figs. 44-45). The epigyne possesses a large scape which may be divided (fig. 47).

Remark: *Sintula iberica* BOSMANS 2010 from the Iberian Peninsula is – according to BOSMANS the existence of an additional PROlateral bristle on tibia I-II, the absence of a posterior cymbial outgrowth bearing spines, the tripartite epigyne with a median scape and a pair of additional projections – in my opinion not a member of the genus *Sintula* but probably the species of an unnamed genus.

Relationships: See *Scotargus*.

Distribution: Palaearctic.

***Sintula pecten* n. sp.** (figs. 43-49)

Material: Canary Islands, Gran Canaria, high mountains: Numerous ♂♀ PARWIS NABAVI leg. in pit falls; 1 km N Roque Nublo, 1200-1300m, sparce vegetation, 3♂3♀ leg. in I-II 2000; holotype ♂ R97/AR/CJW; 2♂2♀ paratypes (1♂ without opisthosoma) R98/AR/CJW, 1♀ paratype coll. P. NABAVI; Tamadaba, 1350 m, 4♂ paratypes leg. in XI 1999-I 2000, coll. P. NABAVI; road Valesco – Artenara, 1550 m, 1♀ paratype, leg. in I-II 2000, coll. P. NABAVI; Pico de las Nieves, 1900-1950 m, numerous ♂♀ paratypes leg. in XII 1999-I2000, R105/AR/CJW, 7 tubes, one epigyne has been separated.

Diagnosis: ♂-pedipalpus (figs. 43-46): Cymbium of medium length, only slightly bent, paracymbium ventrally in the middle with a blunt tooth, and posteriorly with an outgrowth, embolus large and blunt. ♀: Epigyne (figs. 47-48) with a large and divided scape, which stands fairly out, vulva (fig. 49): Copulatory openings and ducts close together. Lumps of sperm and secretion exist in sac-shaped structures (S) but the questionable receptacula seminis may have an anterior position.

Description:
Measurements (♂♀ in mm): Body length 1.6-1.8, prosoma: Length 0.7-1.0, width 0.65-0.7; leg I (♂): Femur 0.8, patella 0.28, tibia 0.77, metatarsus 0.6, tarsus 0.5, tibia II 0.75, tibia III 0.55, tibia IV 0.8; ♀: Femur 0.85, patella 0.28, tibia 0.7, metatarsus 0.55, tarsus 0.5, tibia II 0.6, tibia III 0.55, tibia IV 0.7.
Colour: Prosoma yellow brown, margin dark, sternum medium grey, legs yellow brown, leg I not darkened, opisthosoma dark grey.
Prosoma ca. 1.2 times longer than wide, thoracal fissure long, eyes large, posterior row slightly to strongly procurved, posterior median eyes spaced by slightly more than their radius, basal cheliceral articles fairly large, fangs thick. The anterior margin of the cheliceral furrow bears two larger teeth and a medial denticle, the posterior margin bears a single tooth, labium strongly rebordered, only fairly wider than long, gnathocoxae not converging. The sternum separates the coxae IV by ca. half of their diameter. – Legs only fairly long, slender, bristles as in the genus (see above), metatarsus I-III bears a trichobothrium, its position on I-II in 0.27-0.29. – Opisthosoma oval, covered with short hairs; colulus large, bearing ca. 5 hairs. – ♂-pedipalpus (figs. 43-46): Patella short, bearing a dorsal bristle in the distal half, tibia large, bearing 2 or 3 trichobothria and two apophyses, the large dorsal one bears ca. 7 spines, the proapical one bears 5 spines in an irregular row which reaches up to the base of the large apophysis. A translucent area exists in a more ventral position. Cymbial outgrowth of medium length only slightly bent, blunt, bearing half a dozen spines and strong bristles at and near its tip. Conductor and embolus large, embolus distinctly bent. Paracymbium, epigyne and vulva: See the diagnosis.

Relationships: In *Sintula pseudocorniger* BOSMANS 1991 from Algeria – which may be the closest relative – the pedipalpal patella bears an outgrowth, the cymbial outgrowth is longer, the shape of embolus and conductor are different.

Distribution: Gran Canaria.

Canariphantes WUNDERLICH 1992

The type species of *Canariphantes* – *C. alpicola* WUNDERLICH 1992 – has been described from the Canary Island Tenerife. During the last years some further congeneric species were described from the Western Palaearctic, see the catalog of spiders by PLATNICK. In this paper I describe a second congeneric Canarian endemic species, from La Palma.

Characters of the genus: Opisthosoma uniformly dark grey, the two distal articles of the ♀-pedipalpus darkened. Chaetotaxy: Femora: Only I bears a prolateral bristle, tibia I: 1/1 dorsally and a lateral pair in the distal half, metatarsi I-III bear a single dorsal bristle. ♂-pedipalpus (figs. 50-52): Cymbium without humps, paracymbium complicated, with a translucent apophysis, lamella long, slender and bipartite, embolus with a leaf-shaped apophysis. Epigynal scape (figs. 53-54) longer than wide.

***Canariphantes palmaensis* n. sp.** (figs. 50-55)

Material: Canary Islands, La Palma, 1♂4♀ JW leg. in III-IV 1995; holotype ♂ (the right pedipalpus separated) Barranco de Angostias, near Los Brecitos, ca. 800 m, between needles from a tree, R99/AR/CJW; paratypes: 2♀ Los Muchachos, 2400 m, below a stone, R100/AR/CJW; 1♀ Fuencaliente, R101/AR/CJW; 1♀ Cumbrecita, near a brook, R102/AR/CJW.

Diagnosis: ♂-pedipalpus (figs. 50-52) with the lamella bipartite, pointed and bent; ♀: epigyne (figs. 53-54) with a longer scape, vulva (fig. 55) with the receptacula seminis probably tripartite.

Description:
Measurements (in mm): Body length 1.3 (♂) – 1.8 (♀), prosoma: Length 0.6-0.7 (♀), width 0.5-0.55; leg I (♂/♀): Femur 0.6/0.7, patella 0.18/0.2, tibia 0.65/0.7, metatarsus 0.63/0.63, tarsus 0.5/0.5, tibia II 0.55/0.55, tibia III 0.43/0.47, tibia IV 0.65/0.7.
Colour: Prosoma medium brown, margin and sternum dark grey, legs orange brown, opisthosoma dark grey, the two distal articles of the ♀-pedipalpus darkened.
Prosoma 1.2-1.27 times longer than wide, thoracal fissure of medium length, eyes large, posterior row about straight, posterior median eyes spaced by their radius. Basal cheliceral articles large, lateral files fine and narrow, anterior margin of the cheliceral furrow with 3 large teeth, posterior margin with several (up to 7) denticles, fangs long. Coxae IV spaced by the sternum by their diameter. – Legs slender, bristles long, see the characters of the genus. Metatarsi I-III bear a trichobothrium, its position on I in 0.17. – Opisthosoma oval, covered with short and longer hairs. – ♂-pedipalpus (figs. 50-52)

(see the diagnosis): Patella with a dorsal bristle, tibia with 3 trichobothria, without a bristle, FICKERT's gland existing. – Epigyne/vulva: See the diagnosis.

Relationships: In *C. alpicola* WUNDERLICH 1992 from Tenerife both branches of the lamella are scattered distally and the margins of the epigynal scape possesses a parallel position or is slightly converging. In *C. homonymus* (DENIS 1934) from the Pyrenees the lamella is quite similar but the embolic division is different, and the epigynal scape is converging. The vulva is quite different in *palmaensis*.

Distribution: La Palma.

Lepthyphantes MENGE 1866 (s. l.)

Numerous species of this diverse genus are known from the Canary Islands; most species are endemics.

***Lepthyphantes styx* n. sp.** (fig. 56-58)

Material: Canary Islands, Tenerife, Las Canadas, Teide National Park, Canada Blanca, close to the Parador National, 2170 m (UTM: 28R 40312420); habitat: A scrub of *Spartocystisus supranubius* and *Descurainia boutgeana*; ♀ holotype N. ZURITA leg. 23. V. 1996, ULL Tenerife, 6 C/AN 6304.

Diagnosis (♀; ♂ unknown): Pale spiders with long and very slender legs, fairly reduced eyes, and very long leg bristles. Epigyne (figs. 56-58) protruding, with a distinctly sclerotized longitudinal medial structure on a larger plate.

Description (♀):
Measurements (in mm): Body length 1.55, prosoma: Length 0.6, width 0.53; leg I: Femur 1.0, patella 0.22, tibia 1.0 (diameter 0.08), metatarsus 0.9, tarsus 0.7, tibiae II-IV 0.85/0.6/0.9, largest diameter of a posterior median eye 0.04, bristle on tibia I 0.27 long.
Colour pale yellow, eye surroundings black.
Prosoma 1.13 times longer than wide, fovea lowe, eyes small, posterior row procurved, posterior median eyes spaced by slightly more than their diameter, basal cheliceral articles large, space of the lateral files of medium size, fangs long and slender, the sternum spaces the coxae IV by ca. ¾ of their diameter. – Pedipalpus spiny, claw ab-

sent. – Legs long and very slender, order I/IV/II/III; bristles long, femora: Only a single prolateral one on I, patellae a short basal and a long distal bristle, tibiae dorsally 2/2/2/2, I additionally a lateral-distal pair, II a single retrolateral one, metatarsi I-III bear a dorsal bristle in the basal half. Metatarsi I-III bear a trichobothrium, its position on I is in 0.15. – Opisthosoma 1.4 times longer than wide, covered with only fairly few long hairs. – Epigyne: See the diagnosis.

Relationships: The free-living *L. tenerifensis* WUNDERLICH 1992 is distinctly pigmented, the legs are more stout, the eyes are larger, and the epigynal scape is wider distally. *Lepthyphantes* (*Palludiphantes*) *tenerifensis* is probably not strongly related.

Distribution: Canary Islands, Tenerife.

Lepthyphantes ?***tenerifensis*** WUNDERLICH 1992

Material: Canary Islands, Gran Canaria, Los Tilos, outside the *Tilos* forest, 600 m, 2♂ P. NABAVI leg., CJW.

Remark: The two males are probably conspecific with *tenerifensis* which has been only known from Tenerife.

Distribution: Tenerife and probably Gran Canaria.

Figs. 1-12: <u>*Walckenaeria grancanariensis*</u> **n. sp**.; 1-9) ♂; 1) lateral aspect of the prosoma. The arrow points to the “peak” between the posterior median eyes which is small to tiny and may even be absent; the hair-bearing hump may be larger than in this specimen; 2) dorsal aspect of the anterior part of the prosoma; 3-4) anterior aspect of the prosoma, variability. The arrow points to the “peak” between the posterior median eyes (the “peak” may be absent); 5) dorsal aspect of the tibia of the right ♂-pedipalpus; 6) retrolateral aspect of the right pedipalpus; 7-8) widest aspect of the right embolus and median apophysis; slightly more dorsal position in fig. 7) (no difference to *subterranea* and *tilos*); 9) prodistal aspect of the radix apophysis of the right pedipalpus. Dotted: Tip of the shortened and bent apophysis of an aberrant male; 10-12) ♀; 10) dorsal aspect of the anterior part of the prosoma; 11-12) epigyne and dorsal aspect of the vulva. Scale bars 0.1 mm in figs. 5-9) and 11-12), 0.2 in the remaining figs.;


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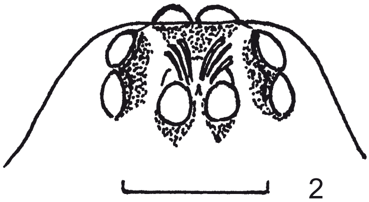
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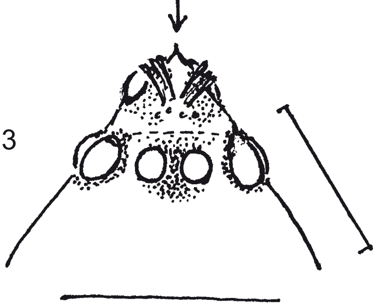
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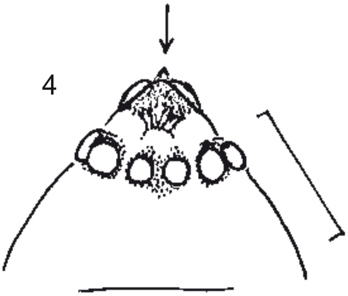
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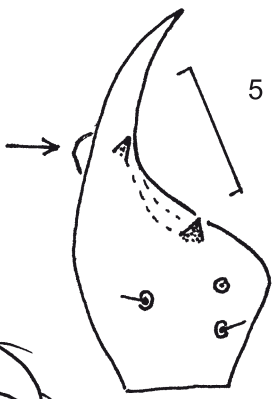
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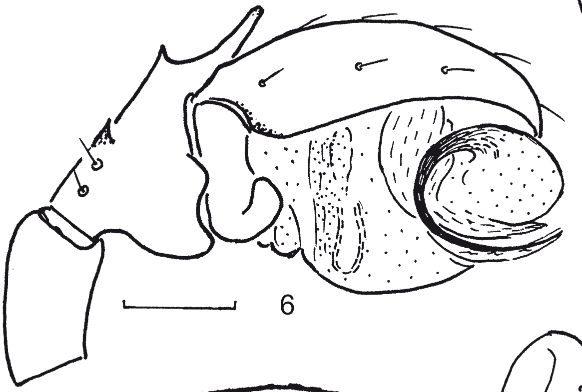
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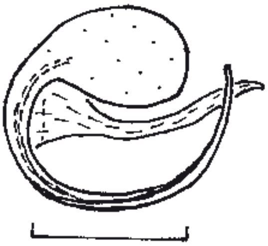
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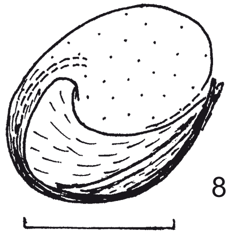
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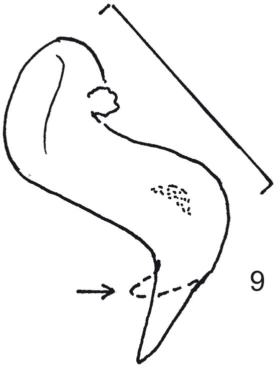
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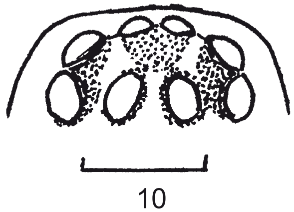
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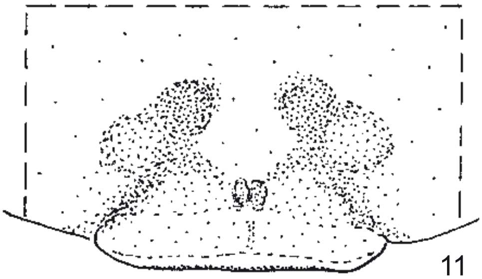
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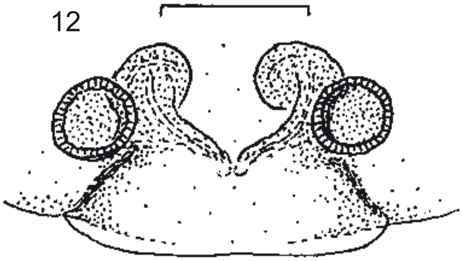
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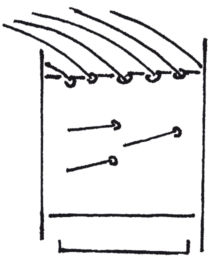

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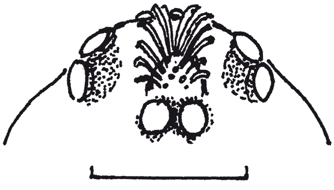

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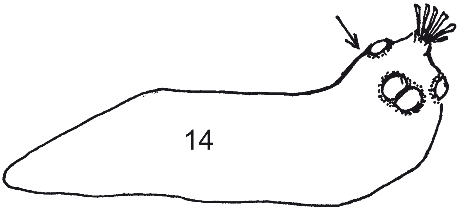

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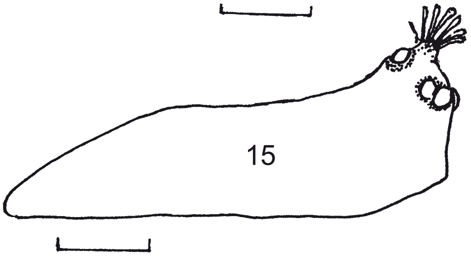

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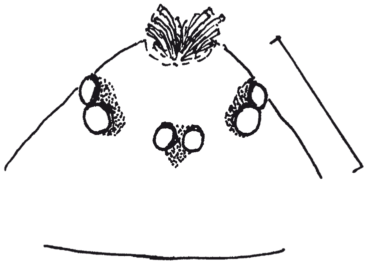

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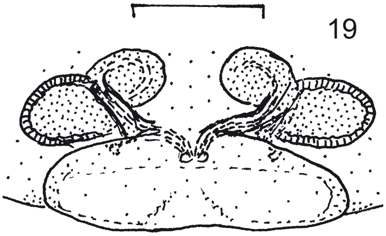

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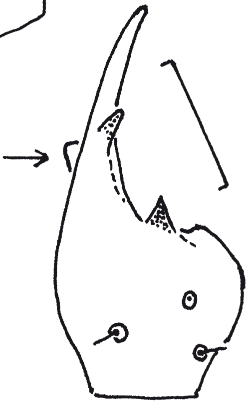

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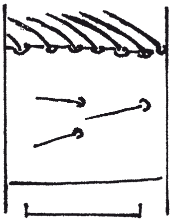

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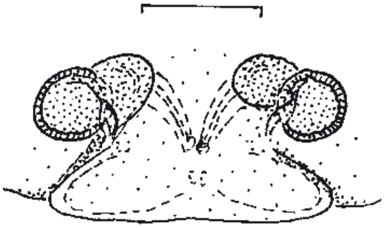

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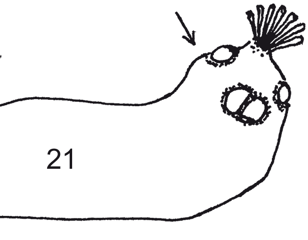

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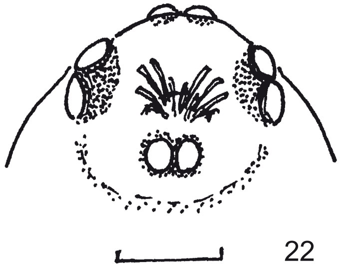

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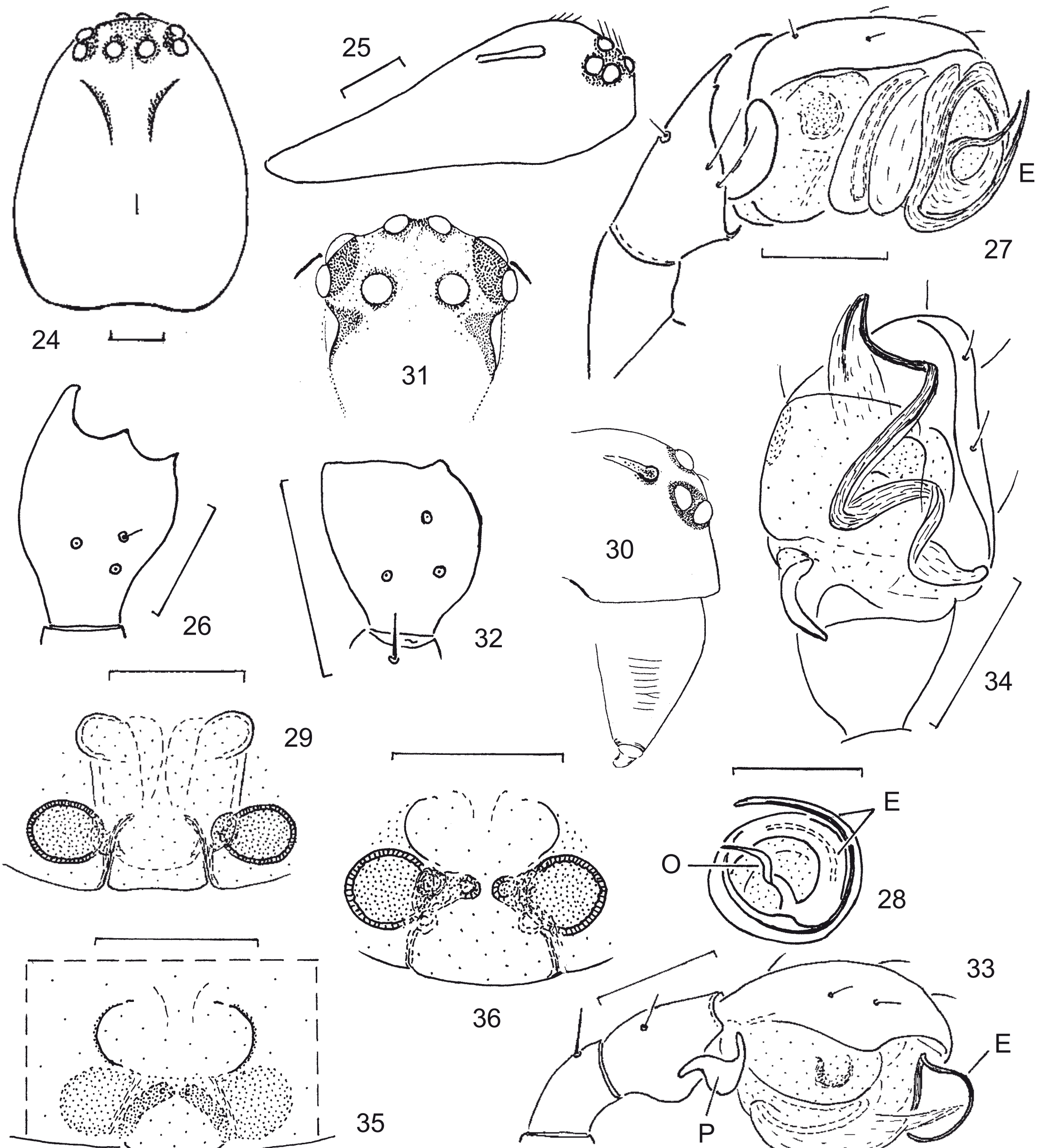
figs. 13-19: *Walckenaeria subterranea* **n. sp.**; 13-18) ♂; 13) some of the dorsal hairs of tibia I; only 3 prolateral hairs are drawn; 14-15) lateral aspect of the prosoma, variability. The hairy hump may be much smaller. The arrow points to the slope behind the posterior median eyes; 16-17) dorsal and anterior aspect of the prosoma; 18) dorsal aspect of the tibia of the right pedipalpus; 19) ♀, dorsal aspect of the vulva. Scale bars 0.1 in figs. 13) and 18-19), 0.2 in the remaining figs.;

figs 20-23: *Walckenaeria tilos* **n. sp.**; 20-22) ♂; 20) some of the dorsal hairs of tibia I; only 3 prolateral hairs are drawn; 21) lateral aspect of the prosoma; 22) dorsal aspect of the anterior part of the prosoma; 23) ♀, dorsal aspect of the prosoma. Scale bars: 0.1 in figs. 20) and 23), 0.2 in figs. 21-22);



figs. 24-29: _Typhochrestus paradorensis_ WUNDERLICH 1987; 24-25) dorsal and lateral aspect of the ♂-prosoma; 26-28) right ♂-pedipalpus, 26) dorsal aspect of the tibia; 27) retrolateral aspect, 28) retroapical aspect of the embolus; 29) ♀, dorsal aspect of the vulva. E = embolus, O = outgrowth of the embolus. Scale bars 0.1;

figs. 30-36: _Micrargus parvus_ **n. sp.**; 30-31) lateral and dorsal aspect of the male cephalic part; 32-34) right ♂-pedipalpus; 32) dorsal aspect of the tibia; 33-34) retrolateral and ventral aspect; 35-36) ♀, epigyne and dorsal aspect of the vulva. E = embolus, P = paracymbium. Scale bars 0.1. Figs. 30-31) modified after WIEHLE (1960) (under *M. subaequalis*);

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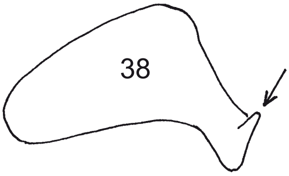

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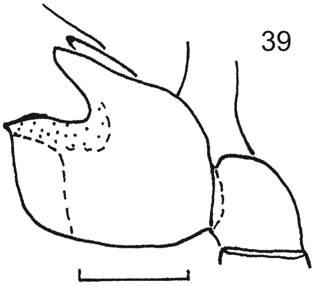

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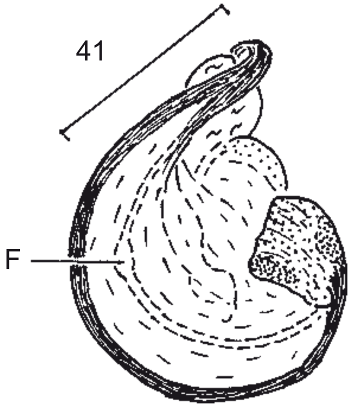

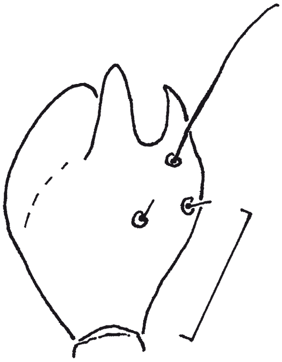

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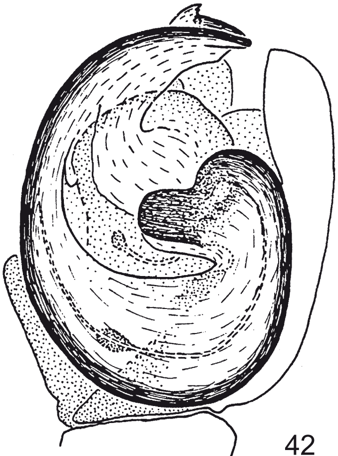

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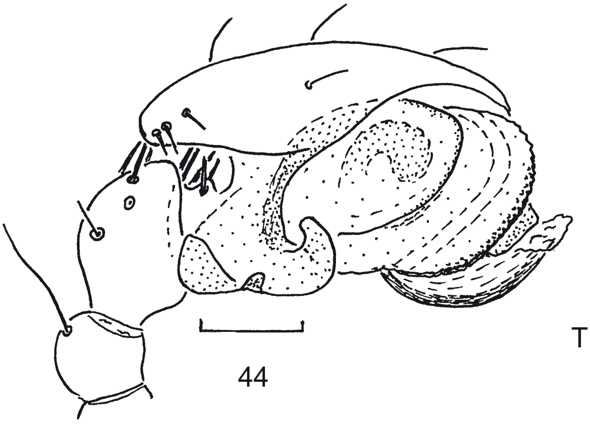

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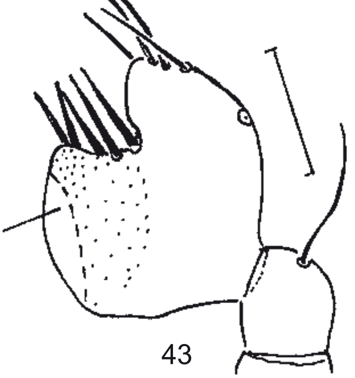

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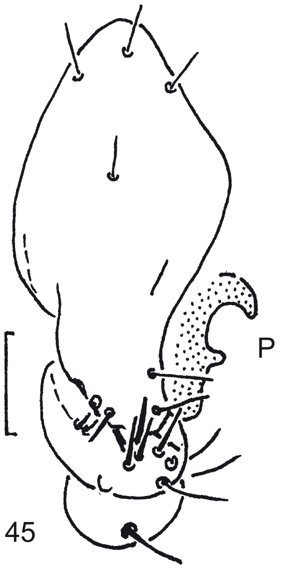
fig. 37) Ostearius melanopygius (O. PICKARD-CAMBRIDGE 1879), lateral aspect of the female; taken from ROBERTS;

fig. 38) Agyneta canariensis WUNDERLICH 1987, ♂, prolateral aspect of the right cymbium;

figs. 39-41: Scotargus grancanariensis WUNDERLICH 1987, ♂; 39-40) prolateral and dorsal aspect of the right pedipalpal tibia; 41) ventral aspect of the embolic division of the right pedipalpus (F = Fickert`s gland). Scale bars = 0.1;

fig. 42) Scotargus secundus WUNDERLICH 1987, ♂, ventral aspect of the right pedipalpus;



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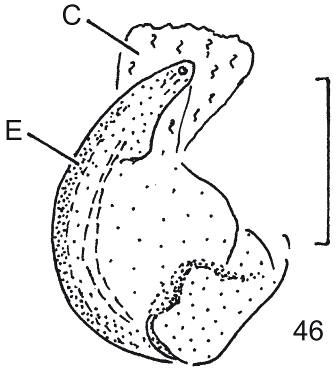

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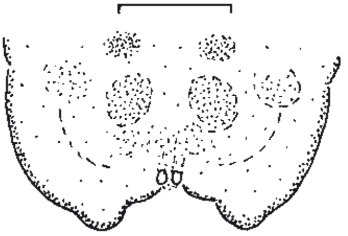

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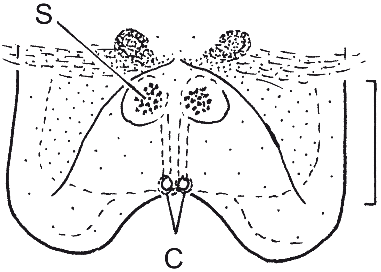

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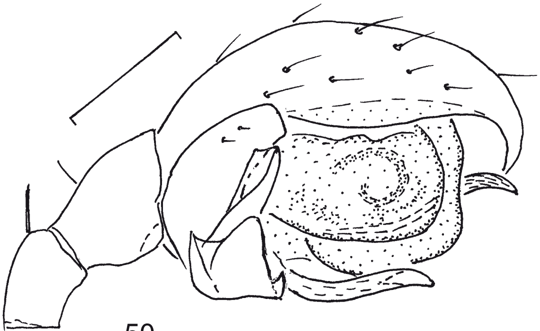

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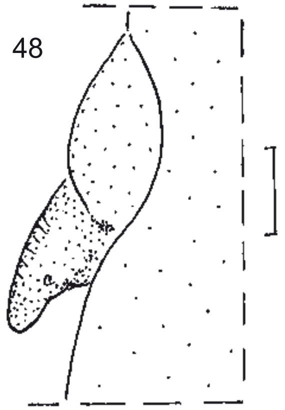

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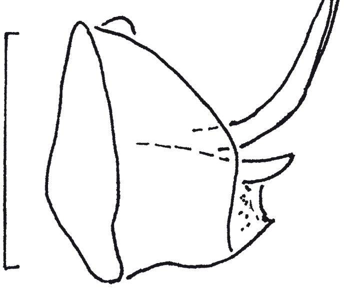

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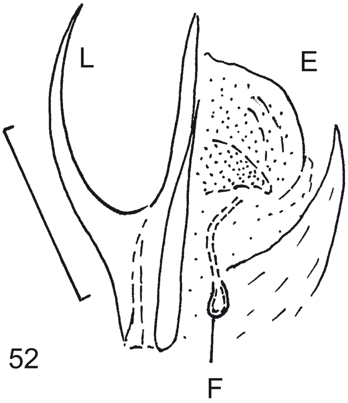
figs. 43-49: *Sintula pecten* **n. sp**.; 43) prolateral aspect of patella and tibia of the right ♂-pedipalpus; 44-45) retrolateral and dorsal aspect of the right ♂-pedipalpus; 46) anterior-ventral aspect of the embolic division of the right pedipalpus; 47-48) ♀, ventral and lateral aspect of the epigyne; 49) dorsal aspect of the vulva. P = paracymbium, T = translucent area of the prolateral tibial apophysis. Scale bars 0.1 mm;

figs. 50-55: *Canariphantes palmaensis* **n. sp**.; 50) retrolateral aspect of the right ♂-pedipalpus; 51) dorsal aspect of the right paracymbium and the lamella; 52) ventral aspect of the right embolic division; 53-54) ♀, ventral and lateral aspect of the epigyne; 55) dorsal aspect of the right half of the vulva. F = Fickert's gland, L = lamella. Scale bars 0.1;



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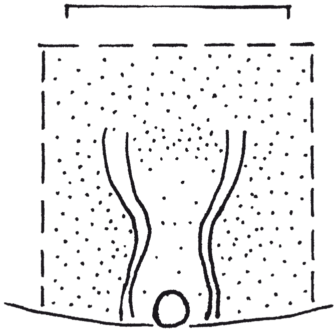

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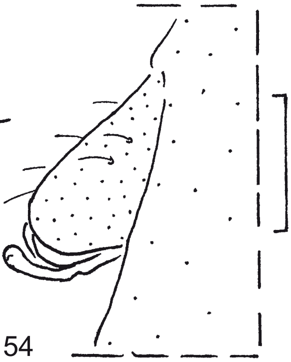

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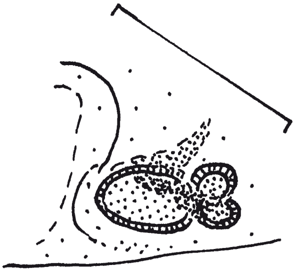

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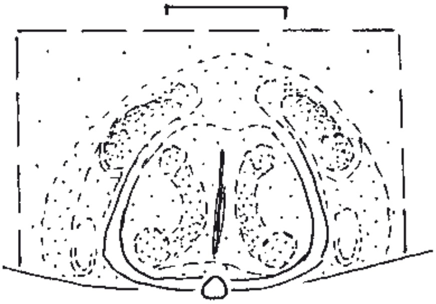

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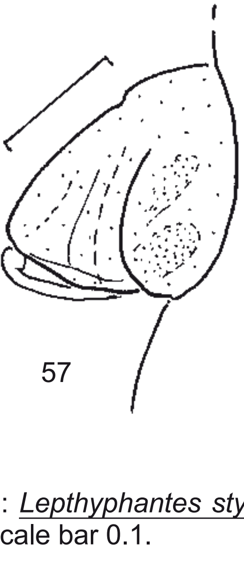

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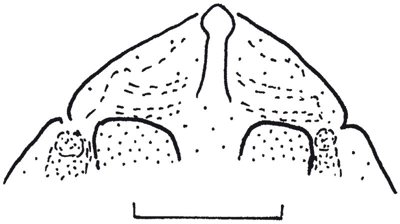

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figs. 56-58: Lepthyphantes styx **n. sp.**, ♀, ventral, lateral and posterior aspect of the epigyne. Scale bar 0.1.

Family DICTYNIDAE

Argenna ?***pygmaea*** (WUNDERLICH 1992) (fig. 1)

1992 (for 1991) *Altella pygmaea* WUNDERLICH, Beitr. Araneol.,1: 422, fig. 609 (♀).

Material: Canary Islands, Tenerife, Las Canadas, 1♂ A. CAMACHO leg. in XI 1995 at the base of Arenas Negras in the Siete Canadas trail, 2100 m, UTM: 28R47223062, pit fall, ULL Tenerife 10W/AN3453. Habitat with *Descuralnia bourgeauana* and *Spartocystisus supranubius*.

Argenna pygmaea (WUNDERLICH 1992) (under *Altella p.*) has originally been described in the female sex (a single ♀) from Gran Canaria. This female has a pale colour like the present male and is also tiny, prosomal length 0.5 mm. The leg bristles/spines are intraspecific variable and sexually dimorphic as well. The present male may be conspecific.

Description (♂):
Measurements (in mm): Body length 1.1, prosoma: Length 0.5, width 0.36, tibia I 0.24, tibia IV 0.24.
Colour yellow brown.
Body quite similar to the female.
Leg bristles/spines: Metatarsus I with 2/3 short ventral spines, tibia III with a long and strong bristle in the basal half. All patellae and tibiae bear a short dorsal bristle near the base of the article, more distinct on III-IV. All tibiae and metatarsi bear a long trichobothrium, position on I tibia I in 0.57, on metatarsus I in 0.77.
Pedipalpus (fig. 1): Conductor distally fairly pointing prolaterally, its tip bent.

Relationships: In *A. lucida* (SIMON 1874) (under *Argenna*) (Europe) the distal part of the conductor (pointing to the pedipalpal tibia) is less bent prolaterally.

Distribution: Canary Islands: Gran Canaria and Tenerife.

***Lathys pygmaea* n. sp**. (figs. 2a-b)

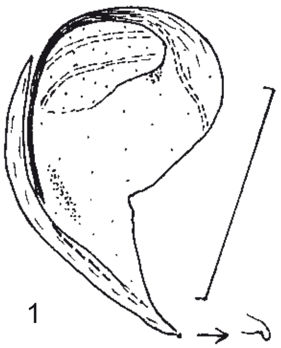
Material: Los Berrazales near Agaete, 550 m, dry and not compact Pine forest in a small valley, pit fall, holotype ♂ P. NABAVI leg. in X-XII 1999, R126/AR/CJW.
Note: The prosoma of the holotype is somewhat deformed, probably by drying out.

Diagnosis (♂; ♀ unknown): Smallest known species in the Western Palaearctic, body length 1.15 mm; pedipalpus (figs. 2a-b): Spiral apophysis with ca. three loops, ventral aspect of the bulbus as in *L. teideensis*, see WUNDERLICH (1992: Fig. 629).

Description (♂):
Measurements (in mm): Body length 1.15, prosoma: Length 0.6, width 0.5; leg I: Femur 0.55, patella 0.23, tibia 0.53, metatarsus 0.45, tarsus 0.3, tibiae II-IV 0.4/0.3/0.4; diameter of an anterior median eye 0.03, of a posterior median eye 0.055; length of the cymbium 0.55.
Colour: Prosoma and legs grey, legs annulated, opisthosoma dark grey, with 2 (posteriorly 3) longitudinal rows of white spots, ventrally medium grey.
Prosoma 1.2 times longer than wide, eyes: Posterior row procurved, anterior median eyes tinyl, posterior median eyes relatively large (see above), spaced by 4/5 of their diameter; basal cheliceral articles large, retrolaterally with 2-3 hair-bearing hooks, retromargin of the cheliceral furrow with about 4 teeth, fangs long, labium wide and free, gnathocoxae fairly converging. – Legs only fairly long, order I/II/IV/III, bristles thin and indistinct (partly rubbed off), hair-shaped on I-II, tibia III-IV bears a long dorsal-basal bristle. Few long hairs of the calamistrum. – Opisthosoma – apparently bearing a moulting cover – oval, dorsally bearing some long hairs; cribellum hidden/reduced. – ♂-pedipalpus: See the diagnosis.

Relationships: The ventral aspect of the bulbus is like in *L. teideensis* WUNDERLICH from Tenerife but the body length of *teideensis* is 2.2 mm in the male, and the pedipalpal tibia bears two erect apophyses, see WUNDERLICH (1992: Fig. 628). The body length of West Palaearctic males is at least 1.75 mm. *L. dentichelis* (SIMON 1883) is distinctly larger, the number of lateral cheliceral "teeth" and spiral loops of the pedipalpal tibial apophyses are higher.

Distribution: Canary Islands, Gran Canaria.



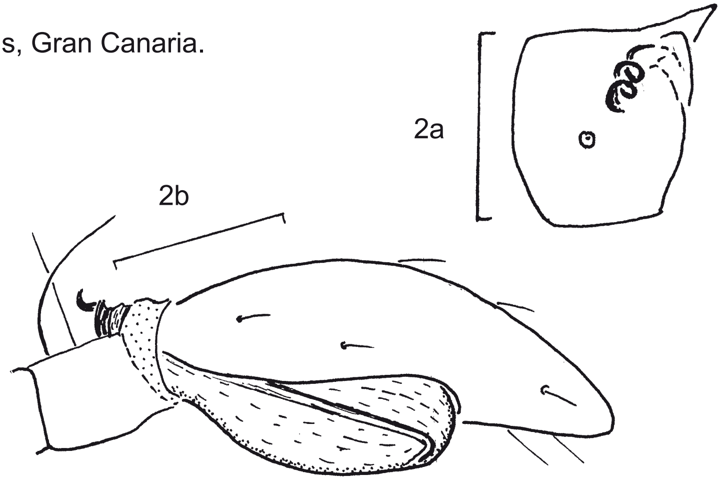


Fig. 1) Argenna (=Altella) ?pygmaea (WUNDERLICH 1992), ♂ from Tenerife, ventral aspect of the right bulbus. The tip of the embolus (arrow) is shown enlarged. Scale bar 0.1 mm.

figs. 2a-b): Lathys pygmaea **n. sp.**, ♂; 2a) dorsal aspect of the right pedipalpal tibia; 2b) retrolateral aspect of the right pedipalpus. Scale bar 0.1 mm.

Family AGELENIDAE

Agelena WALCKENAER 1805

Four species of *Agelena* are known from the Canary Islands, see WUNDERLICH (1992: 90, 431f). Most species are apparently island endemics; *A. gonzalezi* is known from Lanzarote (terra typica) and – in the female sex – probably from Fuerteventura. The male of *gonzalezi* (from the terra typica) is described here for the first time.

Agelena gonzalezi SCHMIDT 1980 (figs. 1-2)

1980 *Agelena gonzalezi* SCHMIDT, Zool. Beitr. (N. F.), 26 (3): 33 (part.: not figs. 2a, 2b; these are *A. gomerensis* WUNDERLICH 1992).

1992 *Agelena gonzalezi*, -- WUNDERLICH, Beitr. Araneol., 1: 433-435, figs. 645-648 (unsure determination in fig. 648).

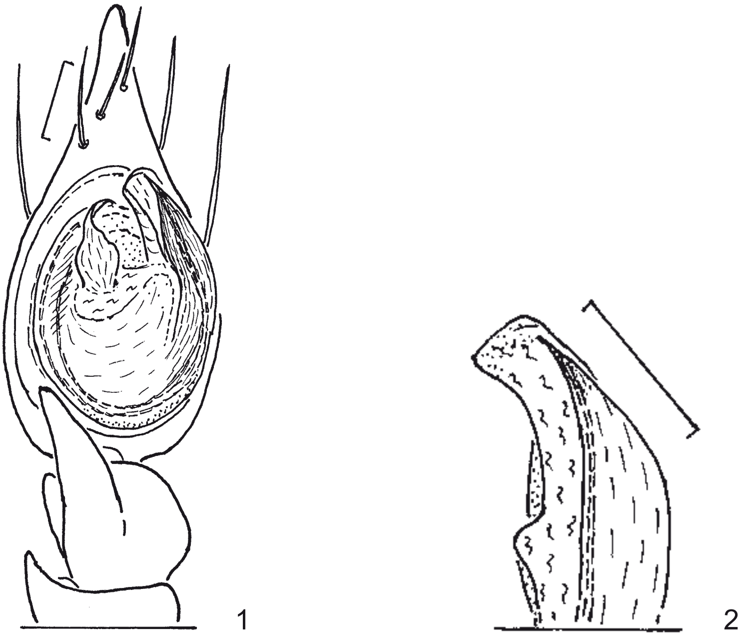
New material: Lanzarote, near Haria, below stones, 2♂ JW leg. in IV ca. 1996 (1 subad. ♂, adult in captivity in V); 1♂ CJW, 1♂ Naturhistor. Mus. Basel.

Remark: Terra typica of this species is Lanzarote. The conspecifity of a female from Fuerteventura – see WUNDERLICH (1992: 434, fig. 648) – is unsure; a male from Fuerteventura is still unknown.

Diagnosis of the male and relationships: Pedipalpus (figs. 1-2) with the cymbium distinctly longer than in the related species from the Canary Islands; the embolus is almost straight in its distal part.

Description (♂):
Measurements (in mm): Body length 7.0, prosoma: Length 3.2, width 2.2; leg I: Femur 3.9, patella 1.5, tibia 3.8, metatarsus 4.2, tarsus 2.4, tibiae II-IV 3.0/2.7/3.6; length of the cymbium 1.2.
Colour light brown, margin small black, laterally besides a light medial band a pair of longitudinal dark brown bands, sternum longitudinally with a dark medial band in the anterior half, and a darkened broadly margin, legs indistinctly annulated, opisthosoma: Two longitudinal band limit a wide medial band, ventral variable. – Body and legs as in *A. gomerae*, see WUNDERLICH (1992: 434), leg bristles long and thin. – Pedipalpus (see above): Figs. 1-2.

Distribution: Canary Island Lanzarote, and probably Fuerteventura as well.



Figs. 1-2: Agelena gonzalezi SCHMIDT 1980, ♂ (from Lanzarote); 1) ventral aspect of the right pedipalpus (hairs are not drawn); 2) retrolateral aspect of the right embolus and conductor. Scale bars 0.2 and 0.1 mm.

Family CLUBIONIDAE

Taxonomy: See the paper on the family Clubionidae in this volume.

The diverse genus *Clubiona* LATREILLE 1804 is apparently absent on the Canary Islands.
The following taxa are known from the Canary Islands, see WUNDERLICH (1992: 91-92):

Cheiracanthium C. L. KOCH 1839: At least 3 species (*canariense, pelasgicum* and *mildei*),
Porrhoclubiona LOHMANDER 1945 (published under *Microclubiona* by WUNDERLICH (1992), but under *Porrhoclubiona* by WUNDERLICH (1995: 424)): *decora, minor, pseudominor* and *vegeta* (= *tenerifensis*).

New material from the Canary Islands:

P. minor (WUNDERLICH 1987): (a) Near El Palmital, 500 m, pit fall, 1♂ P. NABAVI leg. 27. VIII.-27. X: 2000, CJW; (b) Bco. de Azuaje, 300-400 m, pit fall, 1♂ P. NABAVI leg. 21. XI. 1999-15. I. 2000, CJW.
Distribution: Tenerife, La Gomera?; new to Gran Canaria.

P. vegeta (L. KOCH 1874): Gran Canaria (P. NABAVI leg.; CJW and coll. NABAVI): (a) 2 km N Pico de las Nievas, 1900 m, leg. 27. VIII.-27. X. 2000; (b) road Vallesco – Artenara, 1550 m, 2♂; (c) 2 km NW Artenara, 1250 m, 1♂ leg. in III-IV.
Distribution: Southern Europe, Canary Islands: At least Gran Canaria (new to this Island) and Tenerife.

Family GNAPHOSIDAE

See the paper on the family Gnaphosidae in this volume with the descriptions of *Canariognapha parwis* n. gen. n. sp., *Macarophaeus insignis* n. gen. n. sp., and *Setaphis murphyi* n. sp.

List of genera and species: The following – about a dozen – genera of this family are known from the Canary Islands (more than ¼ of the European gnaphosid genera, *Canariognapha* and *Scotognapha* are endemic), see the list previously given by WUNDERLICH (1992: 92-93):

Canariognapha n. gen. (endemic to the Canary Islands, only *C. parwis* n. sp.),
Drassodes (at least two species: *lapidosus* and *lutescens* (= *riedeli*) (?= *alexandrinus*, see below),
Haplodrassus (probably three species: *dalmatensis, signifer, and* the endemic *deserticola*, see the paper on the family Gnaphosidae in this volume),
Leptodrassex (only the endemic *hylaestomachi*),
Macarophaeus n. gen. (the endemic species *varius* and *insignis* n. sp., see the paper on the Gnaphosidae),
Micaria (at least two species, *ignea* and the endemic *gomerae*, see below),
Nomisia (a radiation to 4 endemic species exists, see below), *musiva* (= *Callilepis moebi* BÖSENBERG 1995,= *verneaui* **quest. n. syn***.,* = *excerpta* auct.),
Scotognapha (the genus is endemic to the Canary and Selvage Islands, a radiation to more than a dozen species exists, see below),
(?*Scotophaeus* is not closer treated in this paper) (*),
Setaphis (a radiation to 5 endemic species exists on the Canary Islands, see below),

Trachyzelotes (only *lyonneti*),
Urozelotes (only *rusticus*),
Zelotes (5 species including the endemic *manzae*, see below).

(*) The genera *Gnaphosa* and most probably *Scotophaeus* (see *Macarophaeus* n. gen. in the paper on the Gnaphosidae) are absent on the Canary Islands; *Gnaphosa canaricola* STRAND 1911 has turned out as a member of *Scotognapha*). (*Scotophaeus blackwalli* has been reported from the Acores).

Biogeography:

(1) The genera *Canariognapha* (Gran Canaria) and *Scotognapha* are Macaronesian endemics;
(2) In 8 of the 11 genera evolved endemic species;
(3) The most pronounced radiations exist in *Scotognapha* (13 species on the Canary Islands, see below, a single one on the Islas Selvages); *Setaphis* evolved 5 endemic species, *Nomisia* 4.
36 species are known now from the Canary Islands, 28 (= 75%) are endemics.

Key to the gnaphosid taxa of the Canary Islands

The key which I (1992: 484-485) gave to the genera of the Macaronesian Islands has to complete and improve; (1) a thoracal fissure is short but not absent in *Setaphis*; (2) the genera *Canariognapha* n. gen. and *Macarophaeus* n. gen. have to add; (3) *Scotophaeus* has most probably to remove; (4) during the last decade(s) important papers were published by LEVY, MURPHY, as well as by PLATNICK et al. in which Canarian taxa are treated, see the paper on the family Gnaphosidae in this volume; (5) a key to the European gnaphosid genera – including the genera of the Canary Islands – is given in the paper on European Gnaphosidae in this volume.

Drassodes WESTRING 1851

At least two species of Drassodes exist the Canarian Islands which are not endemic: *lapidosus* and *lutescens*.

Remark on <u>*Drassodes assimilatus*</u> (BLACKWALL 1865) (under *Drassus*):

Terra typica of this species is St. Antonio on the Cape Verde Islands from where the male holotype has been described. SIMON (1885) described a allegedly conspecific female from the Canary Islands. According to the original description the length of the ♂-prosoma is only 0.5 mm, and a tibial apophysis of the ♂-pedipalpus is absent. I never saw such a small species of *Drassodes* on the Canary Islands; the smallest length of the ♂-prosoma has been reported from *D. lutescens/alexandrinus* (see below) as 1.9 mm by LEVY (2004: 16). Therefore in my opinion the name of this species – listed by me (1992: 92) – has to remove from the list of the Canarian spider fauna.

<u>*Drassodes lutescens*</u> (C. L. KOCH 1839) (figs. 4-7) (= *D. riedeli* SCHMIDT 1968 (**n**. **syn**.)
and
<u>*Drassodes alexandrinus*</u> (O. PICKARD-CAMBRIDGE 1874) (figs. 1-3) (?= *lutescens*)

Material: *D. lutescens* “forma” <u>*lutescens*</u>: (1) Spain, Canary Islands, (a) Fuerteventura, N Betancuria, 3♂ JW leg., CJW; (b) Gran Canaria, Anden Verde, 1♂ P. NABAVI leg., CJW; (2) Spain, Mallorca, 3♂, JW leg., CJW; (3) S-Portugal, 1♂ JW leg., coll. JW;
D. lutescens “forma” <u>*alexandrinus*</u> sensu LEVY (2004) (as a species of its own): Spain, Canary Islands, (a) Gran Canaria, a dozen males (and some females), near Agaete, Artenara and Los Tilos, P. NABAVI leg., CJW and coll. P. NABAVI; (b) El Hierro, near El Golfo and above Tabaique, 1♂1♀ 1 juv. G. SCHMIDT leg., SMF 29119 (under *Drassodes riedeli*).

Recently CHATZOPOULU & CHATZAKI (2009) – Contrib. Nat. Hist. Bern, <u>12</u>: 349-359 – synonymized *Drassus alexandrinus* O. PICKARD-CAMBRIDGE 1874 with *Drassodes lutescens* (C. L. KOCH 1839). These authors did not find clear differences in the structures of (e. g.) the male pedipalpus – see their figs. 3-6 -, in contrast to LEVY (2004) who separated both as distinct species, and regarded specimens from Greece as *alexandrinus*.
In the material studied by me from SW-Europe (see above) I found clear differences in both: (a) *alexandrinus*: the length of the embolus is usually 0.28 – 0.30 mm (0.35 mm in the male from El Hierro) in contrast to 0.18 – 0.20 mm in *lutescens*. The origin of the embolus is in the basal half in *alexandrinus* (figs. 1-2) but clearly in the distal half in *lutescens* (figs. 4-6). The shape of the sperm duct is quite constant in *alexandrinus* (fig. 1-2), but very variable in *lutescens* (figs. 4-6). I did not study more closely the epigyne/vulva which may be more similar to fig. 3 in *alexandrinus* and closer to fig. 7 in *lutescens* in which the epigynal septum usually is wider.
In the males frome Greece – see CHATZOPOULU & CHATZAKI (2009: Figs. 3-6) (in which the scale bars most probably are 0.1 mm but not 0.1 cm as published) – the embolus is about 0.3 – 0.38 mm long like in *alexandrinus*, its origin is usually near the middle of the bulbus (rarely slightly distally), and also the position of the sperm duct is as in – or very similar to – *alexandrinus*.

I only provisorically accept the synonymy of the two species in question and call both in this paper two “forms”, although several questions are still unsolved in this connection:
(a) Are *alexandrinus* and *lutescens* true taxa or only “forms” (see (d))?
(b) Are they species of their own in the sense of LEVY (2004) which may best be separated by the length of their embolus as the “key character”?
(c) Are both taxa only subspecies which hybridizise occasionally, e. g., in Greece?
(d) Is *D. lutescens* a polytypic or a polymorphic species? Do the taxa – according to the geographical region – behave/act differently as subspecies (including crossings) or as species of their own (e. g., on the Canary Islands)? Exist crossings or transitions or “forms”? Are the latter probably sympatric populations (as known from strongly related species of *Philodromus*)?

The status of *Drassodes riedeli* SCHMIDT 1968: Type material was not available; it has not been found in the SMF. I do not find differences between descriptions and the drawing of the male pedipalpus of *riedeli* given by SCHMIDT and *lutescens* from the Canary Island Fuerteventura and Southern Europe: A short embolus exists in a more distal position. In *D. alexandrinus* the origin of the embolus is more basally than in the holotype of *D. riedeli*, and the embolus is longer. Therefore I regard *Drassodes riedeli* SCHMIDT 1968 as a junior synonym of *D. lutescens* (C. L. KOCH 1874) (**n. syn**.) (“forma” *lutescens*).

Remark: The retrolateral pedipalpal tibial apophysis is strongly reduced in both “forms” of *D. lutescens* and may even be absent. Mediterranean species of *Drassodes* in which no retrolateral pedipalpal tibial apophysis exists are *serratistylus* – see the paper on the family Gnaphosidae in this volume – and the Southern European *luteomicans* which is closely related to *lutescens* – or a synonym of *lutescens* or of the “form” *alexandrinus*?

Biogeograpgy: Both species are widely distributed in the Mediterranean. *D. lutescens* has previously been reported from the Canary Islands but not the “form” *alexandrinus*. Both “forms” are quite similar and have previously most probably frequently mixed up.

Haplodrassus CHAMBERLIN 1922

The following species have been reported from the Canary Islands:

“*Haplodrassus*” *canariensis* SCHMIDT 1977 (according to the drawings of the genital organs of the types of both sexes this may be the member of a different genus). Material was not available, not found in the SMF,

H. dalmatensis (L. KOCH 1866) (= *pictus* THORELL) (sub *Drassus*) (= *insularis* DENIS 1962). New material: Gran Canaria, div. localities, e.g., near Pico de Nievas, P. NABAVI leg. in pit falls in 2000, CJW, *H. deserticola* SCHMIDT & KRAUSE 1996 (see the paper on the family Gnaphosidae), *(H. minor* (O. PICKARD-CAMBRIDGE 1879: See *H. deserticola*),

H. signifer (C. L. KOCH 1839). New material: Gran Canaria, diverse localities, numerous specimens P. NABAVI leg. in pit falls in 2000, CJW and coll. P. NABAVI.

Micaria WESTRING 1851

The number of *Micaria* species on the Canary Islands is still unsure. The small and widely distributed *M. ignea* O. PICKARD-CAMBRIDGE 1872 (= *judaeorum, pygmaea, todilla*, *trochilus*) occurs on the Eastern and Central Canary Islands (Lanzarote, Fuerteventura, Tenerife and Gran Canaria). At least a single further species – the endemic Canarian *M. gomerae* STRAND 1911 – exists on the Western and Central Canary Islands (El Hierro, La Palma, La Gomera, Gran Canaria and Tenerife).

M. gomerae: According to certain differences exist probably two species or subspecies on the Canary Islands: *M. gomerae gomerae* STRAND and *M. gomerae grancanariensis* WUNDERLICH – see WUNDERLICH (1979) – which possess different characters: The prosomal colour is light to medium brown rsp. dark to black brown, the saddle-shaped opisthosomal inclination is absent or weakly developed rsp. strongly developed, proventral bristles on the male tibiae I-II are usually (!) absent rsp. existing, and the spiders are usually associated with different species of ants, with *Lasius emerginatus* rsp. with *Camponotus* (*Tanaemyrmex*) *aethiops* which both are similar to the associated "forms" of spiders. I did not find differences in the genital organs of both "forms" (taxa?) of spiders.

New material of *M. gomerae grancanariensis* on Gran Canaria, leg. P. NABAVI in 2000: Numerous specimens in both sexes, CJW and coll. of P. NABAVI.

Tribe Zelotini: The following five genera, see the key.

In the following a key is given to the genera and most species (the 5 species of *Setaphis* are excluded) of the tribe Zelotini. In this tribe the metatarsi III-IV bear apically a transverse comb of stiff bristles (fig. 31).

1 The chelicerae bear anteriorly a conspicuous cluster of stiff (partly spine-shaped) bristles (fig. 32). Only *T. lyonneti* . . . . *Trachyzelotes*

- No cluster of such cheliceral bristles (a low number of longer hairs may exist) 2

2(1) Embolus strongly coiled (fig. 95 in the gnaphosid paper), epigyne as in fig. 96 of the gnaphosid paper or similar. Body colour yellow or light brown, rarely bicoloured (photo 90: *S. murphyi*). Five species, see PLATNICK & MURPHY (1996) . . . . *Setaphis*

- Embolus not coiled, epigyne different. Body colour usually medium to black brown, never bicoloured 3

3(3) ♂-pedipalpus (fig. 8) with a wide tegular apophysis, epigyne/vulva (figs. 9-10) very long, fairly similar to fig. 15. Three tiny teeth exist WITHIN the cheliceral furrow, see fig. 166 in the paper on the family Gnaphosidae in this volume. Only *C. parwis* . . . .*Canariognapha*

- ♂-pedipalpus and epigyne/vulva different; the epigyne is similar in *Z. laetus* 4

4(3) ♂-pedipalpus fig. 11, epigyne fig. 12. Only *U. rusticus* . . . . *Urozelotes* n. gen.

- Genital organs different. Five species of the genus *Zelotes*: *laetus* (Gran Canaria) and *manzae* (Gran Canaria and Tenerife) from the Central islands, *nilicola, scrutatus* and *tenuis* from the Eastern islands (Fuerteventura and Lanzarote). 5

5(4) ♂. 6

- ♀ 10

6(5) Body of the pedipalpal tibia (fig. 23) distinctly longer than wide. Eastern islands . . . . *tenuis*

- Body of the pedipalpal tibia about as long as wide, e.g. fig. 18 7

7(6) Structures of the bulbus pointing apically (fig. 13), embolus, and partly hidden by the cymbium. Gran Canaria . . . . *laetus*

- Structures of the bulbus not pointing apically (e.g. figs. 17, 20), embolus very long in *nilicola* 8

8(7) The embolus builds a long loop party lying ON the cymbium (figs. 20-21). Eastern islands . . . . *nilicola*

- Embolus distinctly shorter, not lying on the cymbium 9

9(8) Pedipalpus: Figs. 17-18, tibial apophysis long. Gran Canaria, Tenerife . . .*manzae*

- Pedipalpus: Figs. 25-26, 29-39, tibial apophysis short. Eastern islands. . . . .*scrutatus*

10(5) Epigyne (fig. 19) with a PAIR of anterior pockets. Gran Canaria, Tenerife .*manzae*

- Anterior pocket undivided (e.g. figs. 15, 26) but see fig. 22). 11

11(10) Epigyne in the middle with a wide W-shaped structure (fig. 24). Eastern islands . . . . *tenuis*

- No W-shaped epigynal structure. 12

12 (11) Receptacula seminis very large (figs. 27-28). Eastern islands . . . . . .*scrutatus*

- Receptacula seminis small (figs. 15, 22) 13

13(12) Epigyne (fig. 15) very long, anterior pocket narrow. Gran Canaria . . . . . . *laetus*

- Epigyne (fig. 22) shorter, anterior pocket(s) wide. Eastern islands. . . . . *nilicola*

Setaphis SIMON 1893

Canarian males of *Setaphis* are easily recognizable by the spiral shape of their embolus.
The following species are known from the Canary Islands; see PLATNICK & MURPHY 1996 (all are Canarian endemics):

Canariensis (SIMON 1883): Lanzarote,
gomerae (SCHMIDT 1981): La Gomera, La Palma, Gran Canaria and Tenerife,
murphyi n. sp.: Fuerteventura; see the paper on the family Gnaphosidae in this volume, photo 90,
walteri PLATNICK & MURPHY 1996: Fuerteventura, Lanzarote and Lobos,
wunderlichi PLATNICK & MURPHY 1996: La Gomera, La Palma and El Hierro.

Zelotes GISTEL 1848

5 species of this genus are known from the Canary Islands, see WUNDERLICH (1992: 92-93) and the key to the species above. *Zelotes gomerae* SCHMIDT 1981 is really a member of *Setaphis*, see PLATNICK & MURPHY (1996). – Remarks on the Canarian species:

Zelotes laetus (O. PICKARD-CAMBRIDGE 1872) (figs. 13-16)

Material: Gran Canaria, several localities, e.g., Los Berrazales, Roque Bentaiga, Roque Nublo, numerous specimens, P. NABAVI leg. in pit falls in 2000, CJW and SMF.

In some males from Gran Canaria the embolus is longer than shown in fig. 13), the epigyne (fig. 15) and the vulva (fig. 16) are also rather variable in this species. The epigyne is similar to Canariognapha parwis n. sp. (fig. 9) which also occurs on Gran Canaria, but the vulva and the cheliceral teeth are quite different, the anterior and posterior cheliceral margins bear only 2-3 (widely spaced) rsp. 0-1 teeth.

Distribution: Near East, Northern Africa, Southern France, Northern America; new to Gran Canaria and the Canary Islands.

Zelotes manzae (STRAND 1908) (figs. 17-19)

1908 *Prosthesima manzae* STRAND, Zool. Anz., 32 (25): 772 (♀).
1968 *Zelotes teidei* SCHMIDT, Zool. Beitr., 3: 402, fig. 5 (♀ from Tenerife) (**n. syn**.).

Material: Canary Islands, (1) *Prosthesima manzae* STRAND 1908, holotype from Tenerife (Aqua Manza), SMF 2873; (2) *Zelotes teidei* SCHMIDT 1968, holotype from Tenerife (Teide), SMF 28871; (3) Gran Canaria, several localities, e. g., near Artenara and Roque Nublo, numerous specimens P. NABAVI leg. in 1999 and 2000 in pit falls, SMF, CJW and coll. P. NABAVI.

Synonymy: I do not find differences in the epigynes of *manzae, teidei* (Tenerife), and females from Gran Canaria.

Diagnosis: Tibia and metatarsus I bristle-less. ♂-pedipalpus (figs. 17-18): Tibial apophysis long, distally bent in the dorsal direction, the embolus bears a large retrolateral outgrowth. ♀: Epigyne/vulva (fig. 19) long, with thin-walled receptacula seminis which are spaced by less than their diameter, and with a pair of widely spaced anterior pockets.

First description of the male:
Measurements (in mm; as in the female): Body length 3.0-5.5, prosoma: Length 1.6-2.8, width 1.2-2.2. Posterior eye row more or less straight, posterior median eyes relatively small, spaced by about their diameter. Order of the legs IV/I/II/III, scutum of the opisthosoma well developed, short; pedipalpus: See the diagnosis.

Relationships: The retrolateral tibial apophysis of the ♂-pedipalpus which is bent in the dorsal direction, the large outgrowth of the embolar base as well as the structures of the epigyne are different from the other species of the *subterraneus* species-group.

Distribution: Tenerife and Gran Canaria.

Zelotes nilicola (O. PICKARD-CAMBRIDGE 1874) (figs. 20-22): The species is known from the Eastern Canary islands. The present author and P. NABAVI collected both sexes in pit falls on Fuerteventura, N. Betancuria in III 1999, CJW and SMF.

Zelotes tenuis (L. KOCH 1866) (figs. 23-24): The species is known from the Eastern islands. Subspecies: See the paper on the family Gnaphosidae in this volume.

Zelotes scrutatus (O. PICKARD-CAMBRIDGE 1872) (figs. 25-30)

Material: Canary Islands, Fuerteventura, N Betancuria, pit falls, 6♂ 1♀ JW & PARWIS NABAVI leg. in I-II 1999, CJW.

Remarks: The size and the position of the posterior median eyes are quite variable in this species, they are usually oval but may be virtually circular. ♂-pedipalpus: Figs. 25-26, 29-30, epigyne: Figs. 27-28.

Distribution: Mediterranean, see LEVY (1998: 127); new to the Canary Islands: Fuerteventura.

Scotophaeus SIMON 1893

This genus is probably absent on the Canary Islands; more material including males from sure localities will allow a revision of the Canarian taxa.

Scotophaeus gridellii CAPORIACCO 1927: The description of this species is based on a juvenile spider; the deposition of the holotype is unknown to me. The single specimen was allegedly imported from a Canary Island (which one is unknown) to Italy. Its body length is 8 mm, metatarsus I is bristle-less. The relationships of the species are quite unsure.

Scotophaeus mauckneri SCHMIDT 1956 (♂ and type locality unknown): See *Macarophaeus insignis* n. gen. n. sp. in the paper on the family Gnaphosidae in this volume.

Scotophaeus varius DENIS 1941 and "*Scotophaeus*" *cultior* KULCZYNSKI 1899: See the paper on the family Gnaphosidae in this volume: *Macarophaeus* (n. gen.) *varius* (SIMON 1893).

Scotognapha DALMAS 1920

Males of this genus are recognizable by the strong outgrowth of their tegulum (arrow in fig. 35).

The genus *Scotognapha* – a member of the tribe Gnaphosini – is restricted to the Canary and Selvage Islands: *S. paivai* BLACKWALL 1864 (♂ unknown). 12 species were described by PLATNICK et al. (2001) from the Canary Islands, *S. arcuata* n. sp. is added in this paper. No other endemic Macaronesian genus has evolved such a high number of species. The largest number of species is known from the large and high islands Gran Canaria (5) and Tenerife (4) which are rich in mountains and valleys, and apparently in these valleys the speciation happened. Probably two species have been carried by man from their native island to other islands: (1) *S. atomaria* from Gran Canaria (in which the related *S. arcuata* n. sp. occurs) to Fuerteventura, and (2) *S. medano* from Tenerife in the western direction to El Hierro and in the eastern direction to Fuerteventura. No valley/locality is known having more than a single species.

Numerous published erroneus determination by G. SCHMIDT were corrected by PLATNICK et al. (2001). Without the help of this revision the biogeography of the species of this genus would be quite incorrect.

List of the Macaronesian species of *Scotognapha* and their distribution:

arcuata **n. sp**. (♂ unknown): Gran Canaria,
atomaria DALMAS 1920: Gran Canaria and Fuerteventura,
brunnea SCHMIDT 1980: Lanzarote,
canaricola (STRAND 1911): La Gomera,
convexa (SIMON 1883): Gran Canaria,
costacalma PLATNICK et al. 2001 (♂ unknown): Fuerteventura,

galletas PLATNICK et al. 2001: Tenerife,
haria PLATNICK et al. 2001: Lanzarote,
juangrandica PLATNICK et al.: Gran Canaria,
medano PLATNICK et al. 2001: El Hierro, Lanzarote and Tenerife,
taganana PLATNICK et al. 2001: Tenerife,
teideensis (WUNDERLICH 1991): Tenerife,
wunderlichi PLATNICK et al.: Gran Canaria (♀ see below).

***Scotognapha arcuata* n. sp.** (figs. 33-35)

Material: Gran Canaria, near Anden Verde, 400-600 m, steep declivity at the coast, pit fall, holotype ♂ P. NABAVI leg. 27. VIII.-27. X. 2001, R63/AR/CJW; later probably SMF.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 33-35) with the embolus long and distinctly bent in the retrolateral direction, the median apophysis has an anterior tooth.

Description (♂):
Measurements (in mm): Body length 7.5, prosoma: Length 4.2, width 3.2; leg I: Femur 3.1, patella 1.5, tibia 2.5, metatarsus 1.6, tarsus 0.8, femur IV 3.5, tibia II 2.1, tibia III 1.4, tibia IV 2.3, length of the opisthosomal scutum 1.3.
Colour: Prosoma and legs yellow brown, prosomal margin and border of the cephalic part and thorax distinctly darkened, anterior legs not darkened, opisthosoma light grey, ventrally yellow grey, scutum light brown.
Prosoma 1.3 times longer than wide, covered with short hairs, thoracal fissure long, most eyes small, posterior median eyes oval, spaced by their smallest diameter, mouth parts as in the genus, basal cheliceral articles anteriorly very hairy, coxae IV closely together. – Legs fairly stout, order IV/I/II/III, bearing numerous short hairs and long bristles, femur I 3 dorsally and 3-4 near the end, tibia I bears about a dozen bristles, metatarsus I about half a dozen, patellae III-IV bear a lateral pair. – Opisthosoma with long anterior hairs and a scutum which has an almost triangular shape. – Pedipalpus (figs. 33-35) (see above): Patella and tibia about as long as wide, patella with a dorsal-apical bristle, cymbium with numerous bristles, the basal ones are almost hair-shaped, the position of the long terminal apophysis is close to the median apophysis.

Relationships: In *S. atomaria* DALMAS 1920 and *S. juangrandica* PLATNICK et al. 2001 the embolus is long, too, but it is less and not strongly bent in the retrolateral direction.

Distribution: Canary Islands: Gran Canaria.

Scotognapha wunderlichi PLATNICK et al. 2001

Material: Gran Canaria, Los Berrazales near Agaete (locus typicus), numerous ♂♀ P. NABAVI leg. in VII-VIII 2000 in pit falls, CJW, coll. P. N., and 1♂1♀ SMF.

Note: Epigyne and vulva of the females of the locus typicus (figs. 36-39) are quite different from the descriptions/figures of *S. wunderlichi* sensu by PLATNICK et al. (2001, figs. 49-50). The female paratype ("allotype") of *S. wunderlichi* has not been taken from the type locality, the valley of Agaete, but the females of the new material were collected close to the type locality. The real female of *S. wunderlichi* has been collected together with the conspecific male; it has a body length of 5-8.2 mm, and a prosomal length of 2.7-3.7 mm, the epigyne (figs. 36-37) is variable sclerotized and has a wide medial pit which is variable low to deep, not narrowed in the middle as in *S. convexa*, the vulva (figs. 38-39) is quite variable, too, and possesses a transverse medial "bridge". – In the median epigyneal part of some females exists a light coloured plug.

Relationships: According to the structures of the ♂♀ genital organs *S. medano* from Tenerife, El Hierro and Lanzarote is most related.

Distribution: Gran Canaria, Barranco (valley) de Agaete.

Nomisia DALMAS 1921

In *Nomisia* the patella IV is usually bristle-less, rarely it bears a retrolateral bristle, the ♂- pedipalpus (e. g. figs. 43-46) bears a retrolateral apophysis which has a coniform and tapering outgrowth which usually stands out as well as an unsclerotized retroVENTRAL apophysis (arrows). A tegular and a terminal apophysis may be absent. The epigyne (e.g. fig. 54) possesses a large groove which may be divided. Probably not a monophyletic taxon.
The species of the Canarian Islands have not been revised up to now. Because of misidentifications especially by G. SCHMIDT the distribution of the Canarian species is unsure. ?*Nomisia teideensis* WUNDERLICH 1995 is a member of *Scotognapha*, see PLATNICK et al. (2001). *Nomisia excerpta* is unknown from the Canary Islands; misidentifications concern *N. musiva*, see below.
All *Nomisia*-species are Canarian endemics. Three of the four species (not *musiva*) are known from one sex only as adults.
Determination: The best way is to compare the genital organs of the species and their distribution.

List of Canarian species of *Nomisia* and their distribution:

fortis DALMAS 1921 (♂ unknown): La Gomera,
musiva (SIMON 1889) (= *verneaui* (SIMON 1889), *Callilepis moebi* BÖSENBERG 1895, *excerpta* auct.): Gran Canaria and probably other islands; according to DALMAS (1921: 281) also Tenerife and La Gomera,
gomerensis **n. sp**. (♀ unknown): La Gomera,
graciliembolus **n. sp**. (♀ unknown): Gran Canaria.

Nomisia fortis DALMAS 1921 (figs. 40-42)

1990 *Nomisia fortis*, -- SCHMIDT, Stuttgarter Beitr. Naturkunde, Ser. A (Biologie), 451: 11.

Material: Canary Islands, La Gomera, Garajonay and (!) Arure, 2♀,1 subad.♂, 1 juv.♀ G. SCHMIDT leg. 1977, SMF 29402.

The adult male of *N. fortis* is unknown. The prosomal length of the subad. male is 3.7 mm.

Description of the female:
Measurements (in mm): Body length 7.5-11.0 (according to DALMAS (1921: 283) 9-12), prosoma: Length 3.0-4.4, width 2.3-3.5.
Colour: Prosoma and legs medium brown, prosoma with dark markings, e.g. longitudinal bands of the cephalic part, opisthosoma light to medium brown.
The posterior eye row is distinctly recurved, the posterior median eyes are oval. Bristles of leg I: Femur dorsally 1/1 and a prodistal one, tibia ventrally usually 1/1 (rarely a single one), metatarsus usually a ventral pair in the basal half and a single one in the distal half; II: Tibia ventrally 2-4, metatarsus usually 2 ventral pairs. Opisthosoma with 3 pairs of sigillae and short hairs. Scopulae on I-II: Tarsi in their whole length, metatarsi in their distal half. Claw tufts of spatulate hairs. Epigyne (figs. 40-41) laterally with strongly sclerotized structures, vulva fig. 42.

Relationships: See *N. gomerensis* and *musiva* which are smaller.

Distribution: Canary Islands: La Gomera.

***Nomisia gomerensis* n. sp.** (figs. 43-46)

Material: Canary Islands, La Gomera, El Cedro, holotype ♂ G. SCHMIDT leg. 21. IX. 1977, and det. erroneously *Nomisia musiva*, SMF 30058.

Remark: The male has apparently dried out, its right pedipalpus and its left chelicera are missing, the eye region is damaged.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 43-46): Embolus distinctly bent in the distal half and pointing to the tip of the cymbium.

Description (♂):
Measurements (in mm): Body length 4.5, prosoma: Length 2.2, width 1.9; leg I: Femur 2.2, patella 1.2, tibia 1.9, metatarsus 1.85, tarsus 1.3, tibia II 1.4, tibia III 1.1, tibia IV 1.9.
Colour: Prosoma and legs medium brown, prosoma darkened at the margin and by two longitudinal bands, opisthosoma dark grey.
Prosoma: Thoracal fissure distinct, eyes (they are partly destroyed): Posterior row very slightly recurved, posterior median eyes spaced by more than ¾ of their diameter, anterior and posterior lateral eyes large, fangs stout, posterior cheliceral margin with a wide serrated keel. – Legs fairly long, order IV/I/II/III, scopula distinct only in the distal tarsal half, claw tufts of distinct spatulate hairs, bristles numerous: leg I: Femur dorsally 1/1 and a prodistal one, tibiae and metatarsi bristle-less; II: Femur like I, tibia and metatarsus a single ventral one near the middle, probably intraspecific variable. – The opisthosoma bears numerous long dorsal hairs in its whole length, the sigillae are indistinct. – Pedipalpus (figs. 43-46) (see also the diagnosis): Patella and tibia about as wide as long, retrolateral tibial apophysis wide, divided apically, median apophysis indistinct.

Relationships: *Nomisia fortis* (♂ unknown) is also known from La Gomera but this species (♀) is much larger, prosomal length 3.0-4.4 mm, the posterior eye row is distinctly recurved, and the opisthosomal hairs are short.

Distribution: Canary Islands: La Gomera.

***Nomisia graciliembolus* n. sp.** (figs. 47-49)

Material: Canary Islands, Gran Canaria, (1) East coast near Anden Verde, 400-600 m, fit falls, 2♂ P. NABAVI leg. 16. I. – 2. ÍII. 2000; holotype R66/AR/CJW, paratype R67/AR/CJW; (2) near Agaete, Los Berrazales, 400-600 m, dry locality with *Agava*, pit falls, 2♂ P. NABAVI leg. in 2000, paratypes R68/AR/CJW, later probably SMF.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 47-49) with a stout retrolateral tibial apophysis, and a slender and strongly bent embolus.

Description (♂):
Measurements (in mm): Body length 3.9-6.1, prosoma: Length 2.0-3.0, width 1.55-2.2; leg I (large ♂): Femur 2.7, patella 1.8, tibia 2.8, metatarsus 2.7, tarsus 1.75, tibia II-IV 2.0, 1.65, 2.55.
Colour: Prosoma and legs medium brown, prosoma variable darkened, leg I not darkened, opisthosoma dorsally dark grey, ventrally light grey.
Prosoma similar to *musiva*, posterior eye row slightly to fairly recurved, posterior median eyes smaller as the posterior lateral eyes or equal, spaced by 1/3 to 1/2 of their radius. – Legs fairly long, order IV/I/II/III. Bristles of leg I beyond the femur: Tibia none, metatarsus none or (rarely) a single ventral one in the basal half; patellae III-IV are bristle-less. – Opisthosoma covered not dense with long and strong hairs, with 3 pairs of sigillae. – Pedipalpus (figs. 47-49) (see above) with short articles and a fairly large median apophysis which is expended shown in fig. 48.

Relationships: In *Nomisia musiva* the retrolateral pedipalpal tibial apophysis is longer and more slender, the embolus is straight and stouter. In *N. gomerensis* the retrolateral tibial apophysis is quite different, the shape of the sperm duct is different, the embolus is less bent, and the median apophysis is larger.

Distribution: Canary Islands: Gran Canaria.

Nomisia musiva (SIMON 1889) (figs. 50-55)

Material: Canary Island Gran Canaria, several specimens of both sexes, e.g., near El Pamital, Roque Bentaiga and Pico de Las Nieves, pit falls, P. NABAVI leg. in 2000, CJW and coll. P. NABAVI; Playa del Ingles, 1♀ G. SCHMIDT leg. 1970, SMF 25223 (G. SCHMIDT det. *Nomisia verneaui*).

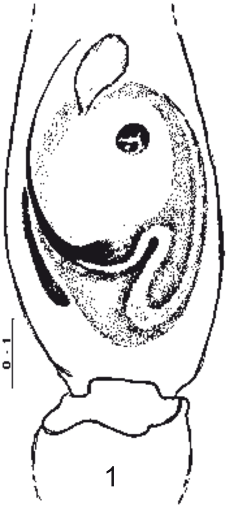
Synonymy: (1) *Callilepis moebi* BÖSENBERG 1895 has previously synonymized with *musiva*. The body length of the type material is up to almost 7 mm. (2) *Nomisia verneaui* (SIMON 1889) (under *Pythonissa*, ♀ from an unknown Canary Island, body length 6 mm) has been synonymized by LEVY (1995: 933) with *Nomisia excerpta* (O. PICKARD-CAMBRIDGE 1872) but it is more likely synonymous with *musiva* (**quest. n. syn**.), and according to its genital structures surely not a synonym of *excerpta* sensu LEVY (1995) from Israel and Northern Africa but not from the Canary Islands. I regard *Nomisia excerpta* sensu CHATZAKI et al. (2002) from Crete as a third species of this group: *N. cretaensis* n. sp., see the paper on Southern European spiders in this volume. – The epigyne of *verneaui* – see DALMAS (1921: Fig. 64, taken probably from the holotype) – is heart-shaped and quite similar to females from Gran Canaria (fig. 54). According to SIMON (1889: 303) the epigynal groove is more than three times wider than long in contrast to females from Gran Canaria in which it is only ca. 2 ½ times longer than wide in the ventral aspect. Probably SIMON observed the epigyne in a more posterior aspect.

Diagnosis: ♂-pedipalpus (figs. 50-53): Tibial apophysis relatively slender, embolus stout and almost straight. Epigynal groove (fig. 54) wide, vulva: Fig. 55, receptacula seminis in an oblique position.

Further characters: Body length most often 3.4 (♂) – 5 mm but occasionally larger, see above (synonymy). The colour of body and legs is also very variable, usually dark grey but in a single male (from Pico de Las Nievas) it is light yellow brown. The posterior eye row is fairly recurved, the posterior median eyes may be largest, almost contiguous, spaced up to ¾ of their diameter. Leg bristles: Tibia I-II 0-2 ventrally, metatarsus I-II 0, 1 or a pair in the basal half, none on patella III-IV (but always so?).

Relationships: See *N. graciliembolus*.

Distribution: Canary Islands: At least Gran Canaria but probably other Canary Islands, too; according to DALMAS (1921: 281) also Tenerife and La Gomera.



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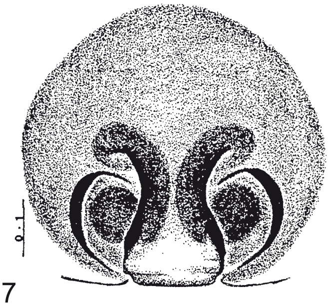

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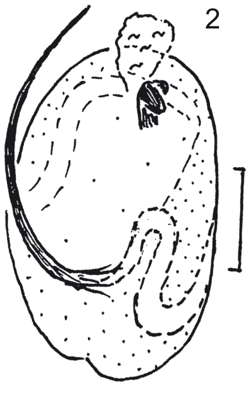

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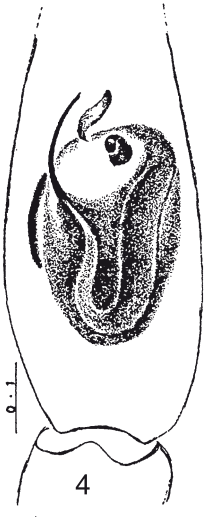

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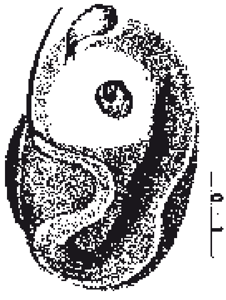

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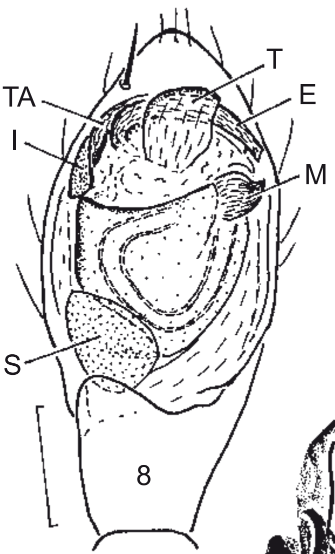
Figs. 1-3: *Drassodes lutescens* “forma” *alexandrinus* (O. PICKARD-CAMBRIDGE 1874); 1-2) ♂, ventral aspect of the left pedipalpus and bulbus, variability; 3) ♀, epigyne; 1) and 3) specimens from Israel, 2) from Gran Canaria;

figs. 4-7: *Drassodes lutescens* (C. L. KOCH 1839) (“forma” *lutescens*); ♂, 4-6) ventral aspect of the left pedipalpus and bulbus; fig. 7) ♀, epigyne; specimens from Israel;



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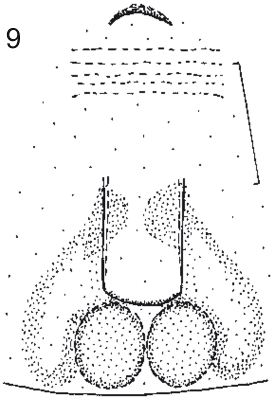

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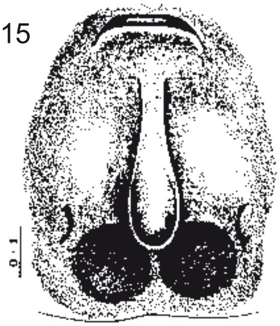

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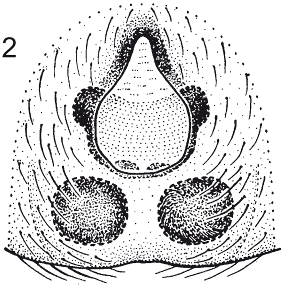

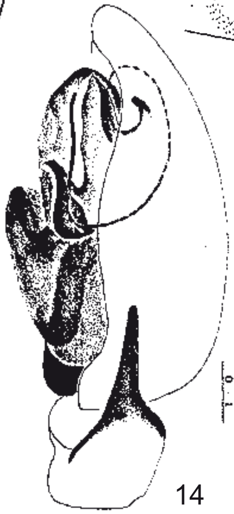

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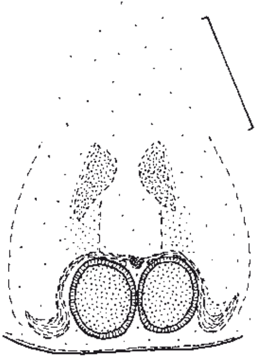

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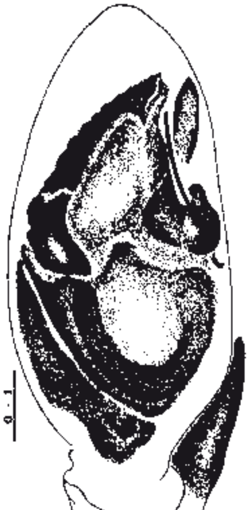

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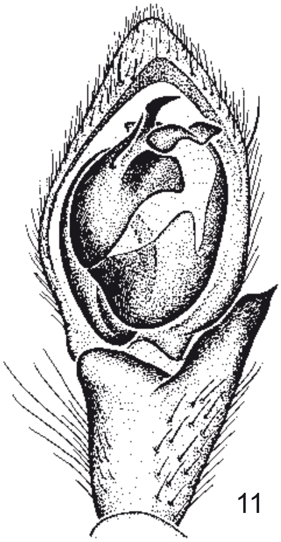

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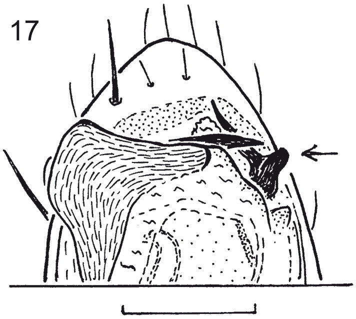
figs. 8-10: <u>Canariognapha parwis</u> n. gen. n. sp.; 8) ♂, ventral aspect of the left pedipalpus (E = embolus, I = intercalary sclerite, M = median apophysis, S = subtegulum, T = tegular apophysis, TA = terminal apophysis); 9-10) ♀, epigyne and dorsal aspect of the vulva;

figs. 11-12: <u>Urozelotes rusticus</u> (L. KOCH 1872), ventral aspect of the left ♂-pedipalpus and epigyne;

figs. 13-16: <u>Zelotes laetus</u> (O. PICKARD-CAMBRIDGE 1872); 13-14) ♂, ventral and retrolateral aspect of the left pedipalpus; 15-16) ♀, epigyne and dorsal aspect of the vulva;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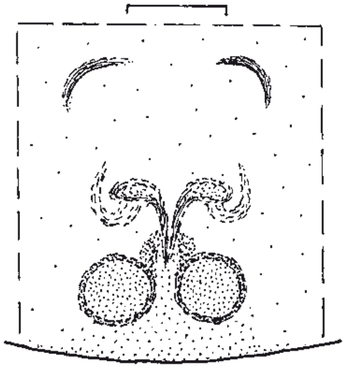
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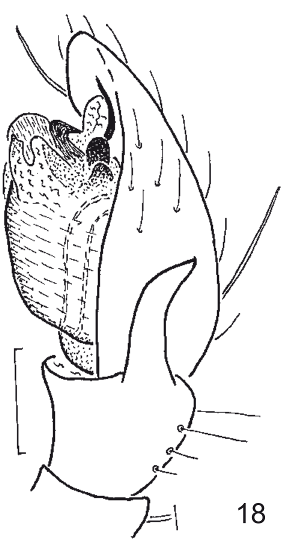
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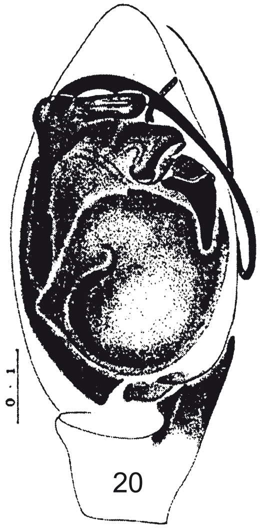

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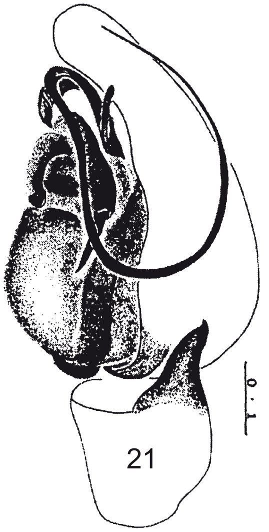

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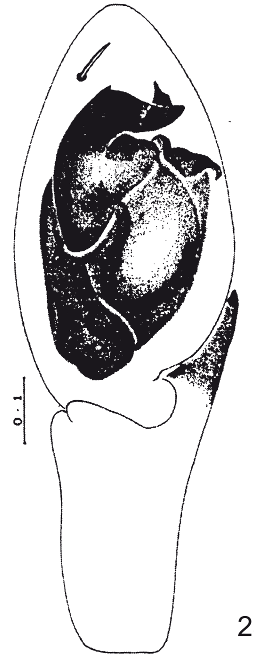

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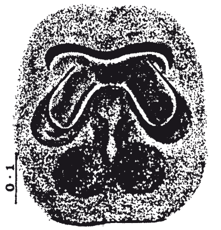

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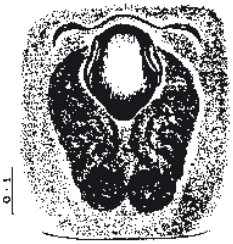

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figs. 17-19: <u>*Zelotes manzae*</u> (STRAND 1908); 17-18) ♂-pedipalpus; 17) ventral aspect of the distal structures, the arrow points to the retrolateral outgrowth of the embolus; 18) retrolateral aspect; 19) ♀, epigyne;

figs. 20-22: *Zelotes nilicola* (O. PICKARD-CAMBRIDGE 1874); 20-21) ♂, ventral and retrolateral aspect of the left pedipalpus; 22) ♀, epigyne;

figs. 23-24: <u>*Zelotes tenuis*</u> (C. L. KOCH 1866); ventral aspect of the left ♂-pedipalpus and epigyne;


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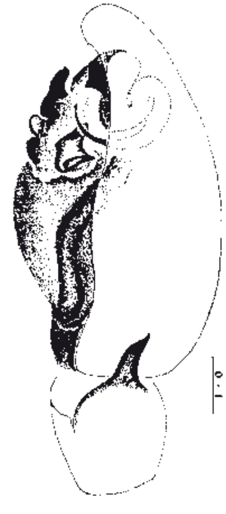
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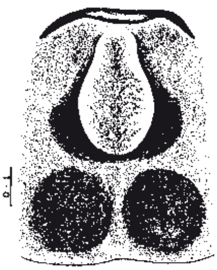
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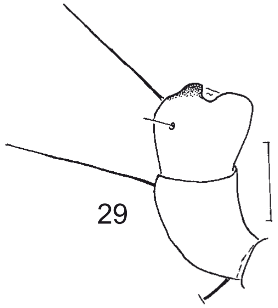
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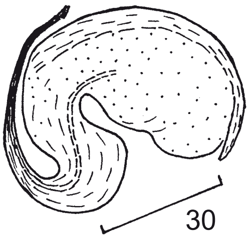
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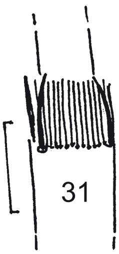
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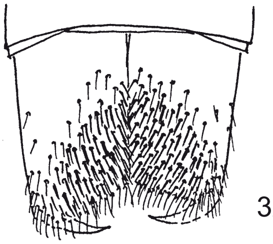
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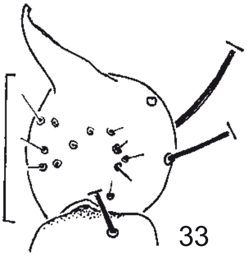
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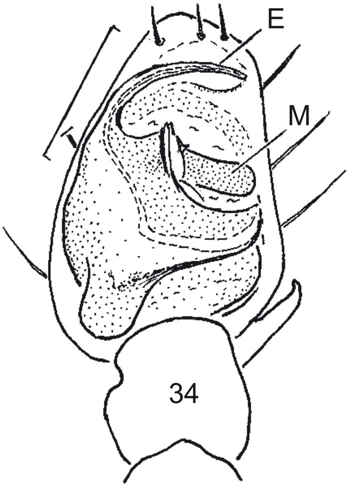
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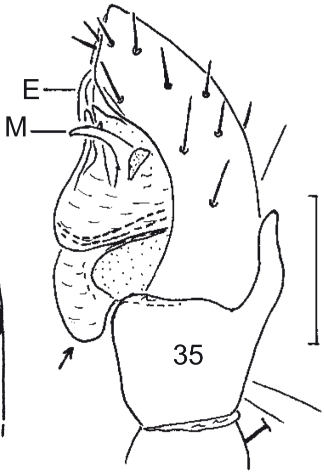
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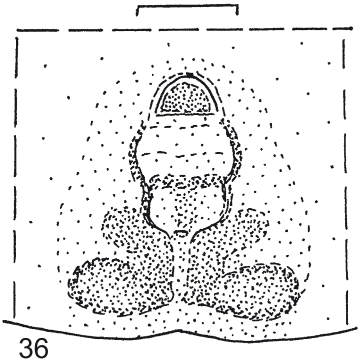
figs. 25-30: Zelotes scrutatus (O. PICKARD-CAMBRIDGE 1872); 25-26) ♂, ventral and retrolateral aspect of the left pedipalpus; 26-27) ♀, epigyne, variability; ♂, prolateral aspect of tibia and patella of the left pedipalpus; 30) ♂, retroanterior aspect of the embolus of the expanded left bulbus;

fig. 31) Zelotes sp., ventral aspect of the “preening comb” of metatarsus III at the end of the article;

fig. 32) Trachyzelotes sp., anterior aspect of the ♂♀-chelicerae. Note the cluster of stiff hairs;

figs. 33-35: Scotognapha arcuata **n. sp.**, ♂; 33) dorsal aspect of the left pedipalpal tibia. Note the high number of trichobothria; 34-35) ventral and retrolateral aspect of the left pedipalpus. E = embolus, M = median apophysis;



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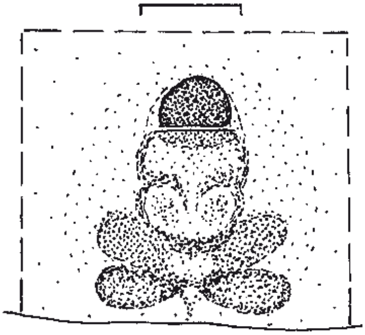

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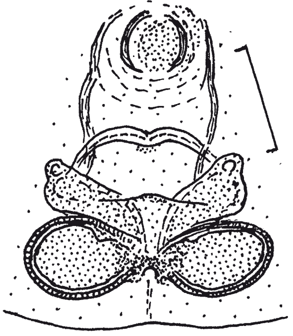

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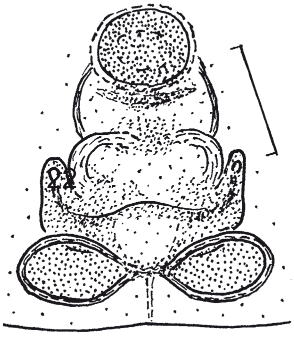

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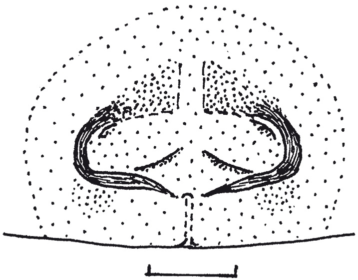

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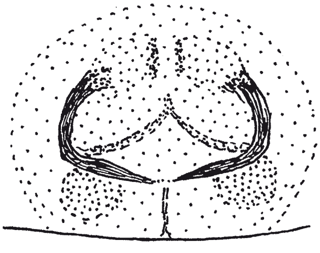

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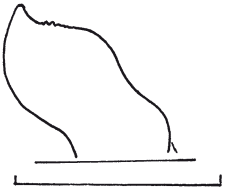

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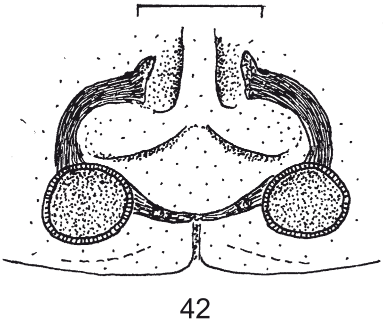

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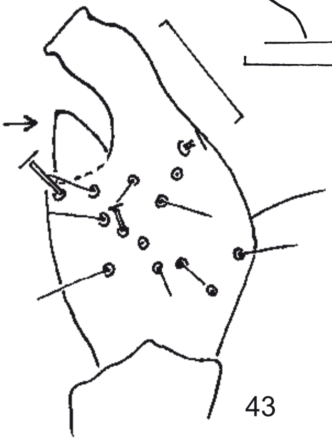

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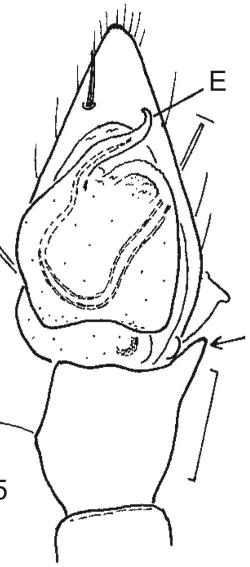

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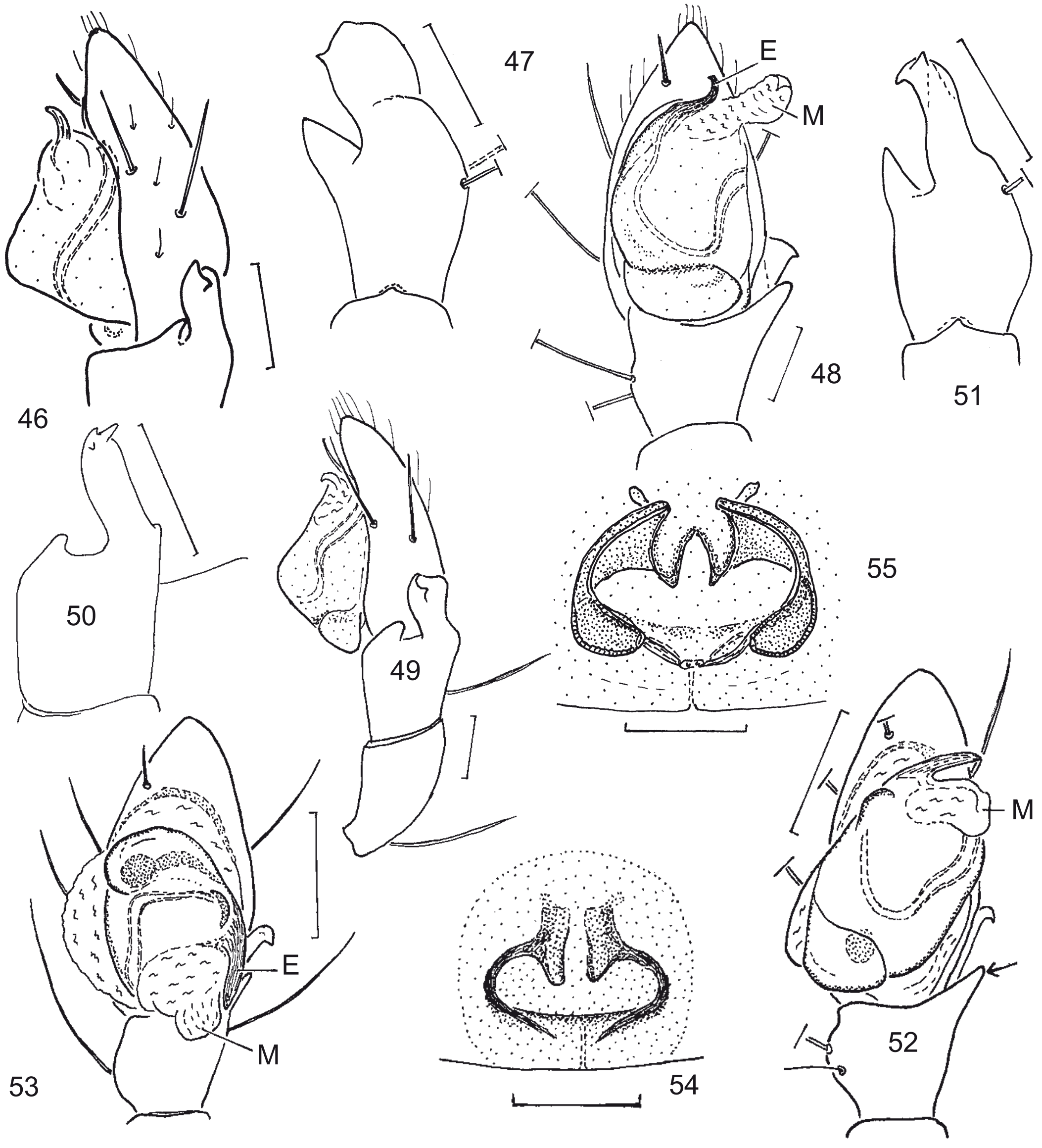
figs. 36-39: *Scotognapha wunderlichi* PLATNICK et al., ♀; 36-37) epigyne, forms (a) and (b); 38-39) dorsal aspect of the vulva, forms (a) and (b);

figs. 40-42: *Nomisia fortis* DALMAS 1921, ♀; 40-41) variability of the epigyne, forms (a) and (b); 42) dorsal aspect of the vulva of form (a);

figs. 43-46: *Nomisia gomerensis* **n. sp.**, ♂; 43) dorsal aspect of the left pedipalpal tibia. The arrow points to the retroventral apophysis; 44) retrodorsal aspect of the tibial apophysis of the left pedipalpus; 45-46) ventral and retrolateral aspect of the left pedipalpus. E = embolus;



figs. 47-49: *Nomisia graciliembolus* **n. sp.**, ♂; 47) dorsal aspect of the left pedipalpal tibia. Trichobothria are not drawn; 48-49) ventral and retrolateral aspect of the left pedipalpus with expanded median apophysis (M). E = embolus;

figs. 50-55: *Nomisia musiva* (SIMON 1889); 50-51) ♂, retrolateral and dorsal aspect of the left pedipalpal tibia (trichobothria are not drawn); 52-53) ventral aspect of the left ♂-pedipalpus, with the bulbus slightly expanded in fig. 52) and completely expanded in fig. 53) (E = embolus, M = median apophysis); 54-55) ♀, epigyne and dorsal aspect of the vulva.

Scale bars 0.5 mm in figs. 33-35, 0.1 in figs. 2, 30, 31, 0.2 in the remaining figs.

The figs. 1, 3-7, 13-16 and 21-28 are taken from LEVY (1998 and 2004), the figs. 11-12 are taken from PLATNICK & MURPHY (1984).

Family PRODIDOMIDAE

Only members of the genus *Zimirina* DALMAS 1918 are known from the Canary Islands, see the paper on the family Prodidomidae in this volume in which *Zimirina nabavii* n. sp. is described from Gran Canaria, and the possible synonymy of some species is discussed.

Family ZORIDAE/LIOCRANIDAE

Mesiotelus grancanariensis WUNDERLICH 1992 has been found in Portugal and can no longer be regarded as endemic to the Canary Islands, see the paper on the family Zoridae/Liocranidae in this volume.

Apostenus grancanariensis WUNDERLICH 1992 (figs. 1-2)

Material: Canary Islands, Gran Canaria, 2 km N Pico de Nieves, 1900 m, dry and not compact Pine forest, pit falls, 2♂ P. NABAVI leg. 21. XI 1999 – 15. I 2000, R127/AR/CJW.

The male of this species is decribed here for the first time.

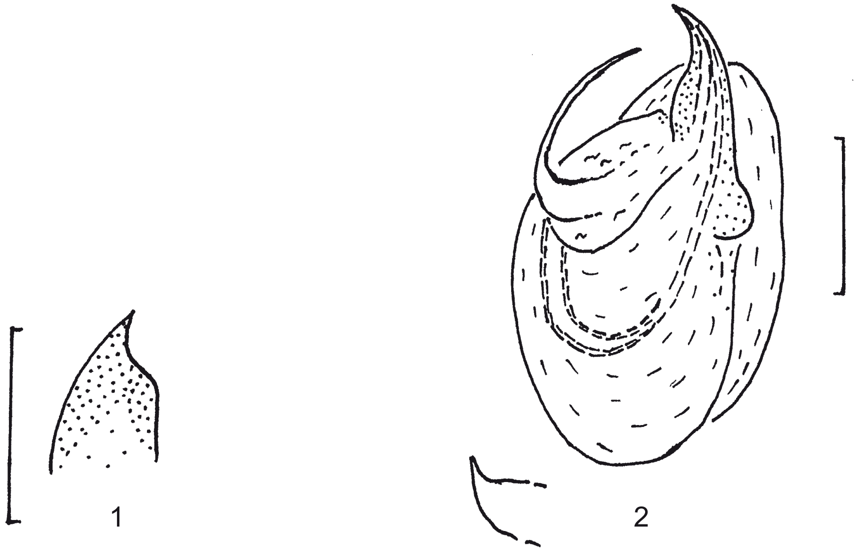
Diagnosis (♂): Smallest known species of the genus *Apostenus*, body length of the male 1.8 mm, colour of body and legs pale, legs not annulated; tibia I bears 5, metatarsus I bears 3 pairs of ventral bristles; ♂-pedipalpus (figs. 1-2): Tibial apophysis pointed, median apophysis long and slender, embolus fairly pointed.

Description (♂):
Measurements (in mm): Body length 1.8, prosoma: Length 0.9-0.95, width 0.7-0.72; leg I: Femur 0.7, patella 0.3, tibia 0.65, metatarsus 0.5, tarsus 0.45, tibiae II-IV 0.6/0.48/0.52; diameter of a posterior median eye 0.05.
Colour: Prosoma and legs pale yellow, opisthosoma dark grey with transverse light bands in the posterior half.

Prosoma and legs similar to the female, prosoma 1.28 times longer than wide. – Opisthosoma ventrally with a dense field of short stridulatory bristles/spines which are typical in this genus. – Pedipalpus: See the diagnosis. The tip of the embolus is slightly bent dorsally.

Relationships: All known congeneric species are larger, body length at least 2.5 mm (♂), and distinctly pigmented; the structures of the pedipalpus are also different.

Distribution: Canary Islands, Gran Canaria.



Figs. 1-2: Apostenus grancanariensis WUNDERLICH 1992, ♂; 1) retrolateral aspect of the right pedipalpal tibial apophysis; 2) ventral aspect of the right bulbus and the right tibial apophysis (left below). Scale bar 0.1 mm.

Family SPARASSIDAE

The family Sparassidae has a mainly tropical distribution; the spiders are usually large, nocturnal, and possess laterigrade legs (when moving body and legs are close to the ground), but there are exceptions: *Micrommata* is diurnal, and the position of its legs is prograde. See the key to the genera in the paper on West-Palaearctic spiders in this volume including all figures which are listed below.

While 7 genera have been found in the Southern Mediterranean – Northern Africa, Israel: *Cebrennus, Cerbalus, Eusparassus, Heteropoda, Micrommata, Nonianus* and *Olios* – only 4 genera have been recorded from the European mainland (see the tab. below). Two genera are known from the Canary Islands – including *Cerbalus* which is unknown from the European mainland -, but none from the Azores, see the tab. of the Western Palaearctic distribution below:

European mainland	Canary Islands	Madeira	Azores
	Cerbalus		–
Eusparassus *Heteropoda* *Micrommata*			
Olios	*Olios*	*Olios*	–

Cerbalus SIMON 1897

Members of *Cerbalus* live in sandy and stony biotopes; they dig tubes in the ground where they hide at daytime. Their subterranean lifestyle is a reason for their rareness in collections. The genus is known from the Southern Mediterranean and the Canary Islands but unknown from the European mainland. Two species have been reported from the Canary Islands but some more undescribed species may exists; a revision is needed.

,

Cerbalus ?*verneaui* (SIMON 1889) (figs. 1-4), and related species fom the Canary Islands:

The female of *C. algranzaensis* WUNDERLICH 1992 (from the island Alegranza) is still unknown, a questionable male of *C. verneaui* (SIMON 1889) was published by WUNDERLICH (1992: 491-492) but this male from Fuerteventura may well be the member of an unnamed species (♀ from Fuerteventura see below); the locus typicus of *verneaui* is on Gran Canaria.

Correction regarding the paper by WUNDERLICH (1992: 606):
(1) The numbers of the figs. 783 and 784 were erroneously exchanged,
(2) the legend of fig. 784 is correctly "distal part of the right pedipalpal tibia, dorsal aspect".

New material: (a) Lanzarote: Salinas de Janubio, pit fall, 1♀ (fig. 3), P. NABAVI leg. 15. XI. 1998 – 11. I. 1999, CJW; (b) Fuerteventura: Antigua, inside a house, 1 subad. ♀ (fig. 4) leg. S. EVORA-HÄNGGI before 1999, NHMBasel (without number).

Remark: The body length of both females is 1.7 cm. Epigynes: Figs. 2-4 (fig. 2 from the tarra typica Gran Canaria).

Olios canariensis (LUCAS 1838) (figs. 5-7)

New material: 1♂1♀ (body lengtn 1.7 cm), Tenerife, Esperanza, P. NABAVI, 1800 m, leg., CJW.

The terra typica (which one of the Canary Islands?) of this species is unknown.
A revision of the Canarian species is needed; the epigynes of two females from the Canary Islands La Palma and Tenerife are different, compare figs. 6 and 7.

INDEX to the supraspecific taxa of this paper

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BEITR. ARANEOL., 6 (2011)

NEW EXTANT TAXA OF THE SPIDER FAMILY THERIDIOSOMATIDAE (ARANEAE) FROM LAOS AND ON SOME FOSSIL TAXA

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Abstract: The following spider taxa of the family Theridiosomatidae (Araneae) are described: (1) extant from South East Asia: Luangnaminae **n. subfam**. with (a) Luangnamini **n. trib**.: *Luangnam discobulbus* **n. gen. n. sp**., and *Coddingtonia* MILLER et al. 2009, and (b) Chthonopini **n. trib**. with *Chthonopes cavernicolus* **n. gen. n. sp**., and *C. jaegeri* **n. gen. n. sp**., and probably with *C. assamensis* (FAGE 1924) (sub *Wendilgarda*, **quest. n. comb**.) as well. These SE-Asian spiders may be the most archaic members which are known of the family Theridiosomatidae; – Synonymy and ranks: Tecmessini SIMON 1895 is resurrected for *Chthonos* CODDINGTON 1986; Epeirotypinae ARCHER, Ogulniinae CODDINGTON 1986, and Platoninae CODDINGTON 1986 are downgraded to the rank of tribes (**n. stat**.) of the Theridiosomatinae. A provisional cladogram is presented for the subfamilies and tribes of the family Theridiosomatidae. – (2) fossil in Eocene Baltic amber: ?*Eotheridiosoma hamatum* **n. sp**. – (3) Fossil in Early Cretaceous rocks from Russia: *Eocoddingtonia eskovi* SELDEN 2010 may well be a member of the new subfamily Luangnaminae.

Key words: Araneae, Baltic amber, caves, Cretaceous, Eocene, fossils, Laos, Luangnaminae, palaeoendemics, Tecmessini, Theridiosomatidae, Theridiosomatinae.

Acknowledgements: I thank PETER JÄGER for leaving me the extant Theridiosomatidae from Laos for descriptions. The knowledge of these spiders was the initial motivation to undertake this study. I thank CHRISTINE ROLLARD (MNHNP) for the loan of type material of *Wendilgarda assamensis.*

Material: CJW = collection of J. Wunderlich,
SMF = Senckenberg-Museum Frankfurt a. M.
Material of ?*Wendilgarda assamensis* FAGE 1924 was unfortunately not available from the MNH in Paris (C. ROLLARD).

Remark: Just before the print of this paper I got the paper by SELDEN (2010) with the first description of an Early Cretaceous genus, *Eocoddingtonia*, which fits well in the new subfamily Luangnaminae, see below.

In this paper the first endemic members of the family Theridiosomatidae from Laos are described. Besides the two new genera – which are described below – P. JÄGER et al. collected some more species of different genera of the Theridiosomatinae in Laos and China (SMF); these taxa are still waiting for descriptions. Apparently the SE-Asian fauna of this family is much more diverse than known today. Interestingly all members of the new subfamily Luangnaminae are restricted to (South)east Asia, the Early Cretaceous genus *Eocoddingtonia* is reported from Russian Asia.
Today only a single genus and species of this mainly tropical family occurs in North America and Europe (*Theridiosoma gemmosum*) but from the Eocene European Baltic amber forest four genera were described by the present author in 2004. All fossil genera are extinct. A single fossil species is described in this paper.
Most Theridiosomatidae are troglophilous/ombrophilous; this preference may well be a disposition to cave-dwelling. Species of several theridiosomatid genera are actually cave-dwellers like *Chthonopes cavernicolus* n. sp., and less pronounced *C. jaegeri* n. sp. and *Luangnam discobulbus* n. sp. from Laos.
Although CODDINGTON (1986) published an important revision of the family Theridiosomatidae – the paper is mainly restricted to higher taxa and to lower taxa from the Americas -, numerous species, genera and even the rank of several tribus and the subfamilies remain not well studied; the chaetotaxy has not been investigated.

Theridiosomatidae is best diagnosed by its unique pair of sternal pits (*) (fig. 11) which are openings of glands; the spiders' clypeus is usually long (fig. 8) (in contrast to most Araneidae), their leg bristles are long and slender (in contrast to most Araneidae), the position of the tarsal organ is near the base of the article, the opisthosoma is usually overhanging the prosoma, their small to tiny paracymbium is situated with its POINTED tip PARALLELY and usually very near to the cymbium (figs. 2, 15), a scape of the epigyne (figs. 18d-e, 19) exists in numerous species. In almost all species – in the Theridiosomatinae (fig. 21) but not in the Luangnaminae n. subfam. (fig. 7) – the receptacula seminis are fused together (connate (**)). – In the Theridiosomatidae dorsal femoral and metatarsal bristles exist (most often) or are absent, the unpaired tarsal claw is very long and bent in a right angle, the tibial trichobothria are very long, a trichobothrium on metatarsus IV is absent; a distinctively modified orb capture web exists.

(*) The position of the pits is at the anterior margin of the sternum. They were overlooked in *Chthonos* by CODDINGTON (1986: 23) but tiny pits were observed by me in a male of *C.* sp. (a loan from J. CODDINGTON). Such pits existed probably already in the Early Cretaceous genus *Eocoddingtonia* SELDEN (2010: Fig. 13).

(**) (1) Because of the distinctly spaced receptacula in the subfamily Luangnaminae their fusion cannot be regarded as a diagnostic character of the whole family Theridiosomatidae but only of the Theridiosomatinae.
(2) In almost all members of the family Theridiosomatidae the receptacula seminis are fused together. The exceptions, in which the receptacula are clearly spaced are (a) the American species *Wendilgarda mexicana* KEYSERLING, see CODDINGTON (1986: Fig: 207) (is this female really a member of the Theridiosomatinae?), (b) three genera in South East Asia, and (c) the Early Cretaceous taxon *Eocoddingtonia eskovi* SELDEN 2010, see below. – (a) If *W. mexicana* is really a member of *Wendilgarda* I suppose that this case may be a reversal WITHIN this genus and subfamily. (b) Contrarily to this case the three genera of South East Asia may represent the plesiomorphic stage of this character – spaced receptacula seminis –; in my opinion they have not to be regarded as one or even three reversals of this character.

(1) DESCRIPTIONS OF SOME NEW EXTANT THERIDIOSOMATIDAE OF LAOS, with remarks on the Early Cretaceous genus *Eocoddingtonia* SELDEN 2010

LUANGNAMINAE n. subfam.

Type tribus: Luangnamini. Further tribe: Chthonopini n. trib.; the extinct genus *Eocoddingtonia* SELDEN 2010 fits also well in this subfamily and may represent the member of a third tribe, see below.

Diagnosis: SPACED (not fused together) RECEPTACULA SEMINIS (figs. 7, 18f, 19).

Further characters: Prosomal "shoulders" present (in the Luangnamini) or absent, epigynal scape present (in the Chthonopini) or absent, existence of strong and long prolateral leg hairs in an irregular position (figs. 1, 12) in the extant taxa but not reported from the Cretaceous genus *Eocoddingtonia*, cave dwellers or not (*Luangnam discobulbus* is most probably free-living and cave-dwelling as well). Femoral bristles are absent in the extant taxa but are reported from the Cretaceous genus *Eocoddingtonia*.

Relationships and phylogenetics: In the Theridiosomatinae – in my opinion the only other theridiosomatid subfamily, contra CODDINGTON (1986), see namely the tribes below – the receptacula seminis are fused together (fig. 21; a synapomorphic character of this subfamily), femoral and metatarsal bristles exist very often (they are lost convergently in certain taxa), strong prolateral leg hairs are frequently absent (prolateral SPINES of legs I-II exist in *Chthonos* (Tecmessini)).

Spaced receptacula seminis is a usual/plesiomorphic character of araneomorph spiders which also exists in the sister group of the Theridiosomatidae, the family Anapidae s. l.. My hypotheses (see also above): I suppose (a) the distinctly spaced receptacula seminis (figs. 7, 18f, 19) of the subfamily Luangnaminae to be a plesiomorphic character of the Theridiosomatidae which is known only from three SE-Asian genera which may be archaic relicts (*); and (b) fused receptacula seminis to be a derived character of all remaining taxa of the Theridiosomatidae which I unite in the subfamily Theridiosomatinae, see the provisonal cladogram below. Fused receptacula seminis is a rare character in araneomorph spiders.

I regard the evolutionary stage of the (secondary) male and of the female genital organs of the Luangnaminae as quite differing: The unusual/complicated structures of the bulbus as highly derived but the spaced receptacula seminis as an archaic/ plesiomorphic character. The specialized/derived structures of the male pedipalpus of *Chthonopes* and *Luangnam* indicate a long evolution of these spiders which evolved apparently earlier than the more advanced taxa in Eocene Baltic amber, see below.

(*) According to the widely spaced receptacula seminis the recently described Early Cretaceous *Eocoddingtonia eskovi* SELDEN 2010 may be a member of the Luangnaminae in which the structures of the complicated male pedipalpi are strongly derived (in contrast to the plesiomorphic state of the intern female genital structures), and strong prolateral leg hairs exist which are absent in *Eocoddingtonia*. SELDEN (2010: 78) regards *Eocoddingtonia* as “either a sister to all other theridiosomatids or to all except *Coddingtonia*.”. In my opinion *Eocoddingtonia* is really a primitive member of the family Theridiosomatidae which correspondent with its high geologically age.

Distribution: SE-Asia: Laos, China, probably India as well as Russian Asia (the extinct *Eocoddingtonia*).

LUANGNAMINI n. trib.

Type genus: *Luangnam* n. gen.. *Coddingtonia* MILLER et al. (♂ unknown) may be a further genus.

Diagnosis (see also the subfamily): ♂-pedipalpus (figs. 2-5): Cymbium long and very slender, retrobasally with a sclerotized outgrowth near to the small paracymbium, bulbus disc-shaped embolus thin and extremely long. Epigyne (fig. 6) protruding, scape absent, vulva (fig. 7) with distinctly oval receptacula which are widely spaced, and anteriorly with extremely long introductory ducts.

Further characters: Prosomal “shoulders” present, opisthosoma globular or egg-shaped, legs fairly stout.

Relationships: See the Chthonopini. Both tribes are mainly united by the existence of distinctly spaced receptacula seminis as well as strong prolateral leg hairs.

According to its widely spaced receptacula seminis, the long and coiled copulatory ducts and the absence of an epigynal scape the genus *Coddingtonia* MILLER, GRISWOLD & YIN 2009 from China (♂ and chaetotaxy unknown) is most probably also related.

Distribution: Laos.

Luangnam **n. gen.**

The gender of the name is masculine.

Type species (by monotypy): *Luangnam discobulbus* n. sp.

Diagnosis and relationships: See the diagnosis of the Luangnamini. In *Coddingtonia* from China (♂ unknown) exist also long copulatory ducts but the shape of the receptacula is almost globular, and the copulatory ducts are more heavily sclerotized just before joining with the receptacula seminis.

Distribution: Laos.

Luangnam discobulbus **n. gen. n. sp**. (figs. 1-7)

Material: Laos, Luang Nam Tha Province, Vieng Phou Kha, Phou Pasat, Tham Pasat Thia, inside cave, 705 m, N 20°46'37.2'', E 101°01'00.2''; 1♂ (holotype), 1♀ (paratype) P. JÄGER leg. 5. III. 2008; 1♂5♀ (paratypes) P. Jäger leg. by hand 4. III. 2008; SMF.

Diagnosis: See above.

Description:
Measurements (♂/♀) in mm): Body length 1.6/1.8-2.0, prosoma: Length and width 0.7/0.75; leg I: Femur 0.9/0.9, patella 0.32/0.33, tibia 0.8/0.65, metatarsus 0.65/0.53, tarsus 0.45/0.43, tibia II 0.7/0.65, tibia III 0.35/0.33, tibia IV 0.6/0.5.
Colour: Prosoma and legs medium to dark brown, caput darkened, also the tibiae may be darkened, opisthosoma medium to dark grey.
Prosoma as wide as long, "shoulders" fairly well developed, fovea low and indistinct (no fissure), eyes large, field wide, posterior row straight, posterior median eyes spaced by almost their diameter; all eyes have about the same size. Clypeus as long as the field of the median eyes. Basal cheliceral articles large, fangs of medium size, anterior margin of the cheliceral furrow with 3 large and few tiny teeth, posterior margin with few denticles. Labium wider than long, fused to the sternum, coxae IV spaced by their diameter, sternal pits well developed. ♀-pedipalpus slender, with long hairs on tibia and tarsus, tarsal claw absent. – Legs (fig. 1) only fairly stout, order I/II/IV/III, metatarsi an tibiae I-II bent, especially all metatarsi and tarsi bear long prolateral hairs (not in a regular row).

Bristles long (up to 0.5 mm) and thin, absent on all femora and metatarsi, patellae 2 dorsally, sequence dorsally on the tibiae 2/2/1/2, I bears additionally a prolateral one in the distal half. Metatarsi I-III bear a long trichobothrium, its position on I in ca. 0.25. Paired tarsal claws smooth, unpaired claw long. – Opisthosoma soft, egg-shaped to globular, scarcely covered with long hairs, length up to 0.5 mm. Colulus of medium size, bearing a pair of long hairs, occasionally with 1-2 short hairs. – ♂-pedipalpus (figs. 2-5) with short patella and tibia which do not bear distinct bristles, paracymbium very small, pointed, not T-shaped. The free part of the thin embolus is almost 3 mm long – almost twice the length of the body. Epigyne/vulva: See above.

Ecology: The spiders were captured inside a cave only near the entrance. According to the strong pigmentation of body end legs, and the large eye lenses these spiders are not true cave animals.

Relationships: See above. In *Coddingtonia eurypoides* MILLER et al. 2009 the shape of the receptacula is subspherical and the copulatory ducts are more heavily sclerotized just before joining with the receptacula seminis.

Distribution: Laos.

CHTHONOPINI n. trib.

Type genus: *Chthonopes* n. gen.

Diagnosis (see also above, the subfamily): ♂-pedipalpus (figs. 13-18c, 20): Paracymbium with a depigmented suture to the cymbium, tegulum with a large and flat basal apophysis, and a long and bent distal apophysis which stands out, embolus long, with a parembolic apophysis, both are accompanied by a conductor. ♀: The epigyne (figs. 18d-e, 19) possesses a scape (it originates at the ventral/anterior margin), the receptacula seminis are distinctlyly spaced (figs. 18f, 19). (*Wendilgarda assamensis* FAGE 1924 (figs. 19-20) is apparently strongly related to *Chthonopes* or even congeneric, see below).

Further character: Prosomal “shoulders absent, legs slender, I-II bearing long and strong prolateral hairs, shape of the opisthosoma variable, long oval or almost globular.

Relationships: Unusual within the Theridiosomatidae is the large and flat basal tegular apophysis. The hairy legs and the widely spaced receptacula seminis are similar to the Luangnamini, but in *Luangnam* prosomal “shoulders” exist, cymbium and paracymbium are quite different, the shape of the bulbus is discoid, the embolus is extremely long, an embolic apophysis and an epigynal scape are absent, the copulatory ducts of the vulva are extremely long – See *Chthonopes.*

Evolution and ecology: See below.

Distribution: SE-Asia: Laos and most probably China and India.

Chthonopes **n. gen**.

The gender of the name is masculine.

Type species: *Chthonopes jaegeri* n. sp.. – Further species: *Chthonopes cavernicola* n. sp., and probably "*Wendilgarda" assamensis* FAGE 1924 (India), see below.

Diagnosis and relationships: See also above. In *Wendilgarda* KEYSERLING 1886 (neotropical and probably Africa) exists also an epigynal outgrowth but it originates at the dorsal/posterior epigynal margin and has therefore to be called "parmula" in the sense of (e.g.) WIEHLE (1956: 13), a large/wide fovea exists, a paracymbial suture is absent, and the structures of the bulbus are different. In *Luangnam* an epigynal outgrowth is absent, long coiled copulatory ducts exist, the spaced receptacula seminis are distinctly oval, and the structures of the male pedipalpus are quite different.

Distribution: SE-Asia: Laos, probably India ("*Wendilgarda*" *assamensis* FAGE 1924) (apparently the member of an unnamed genus), and China.

Chthonopes cavernicolus **n. gen. n. sp**. (figs. 8-18)

Material: Laos, Khammouan Province, Tham Boumlou, inside cave, N17°46'34.8'', E104°47'13.4''; holotype ♂, H. STEINER leg. 12. II. 2004, sample 130/4, SMF.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 13-18): The tegulum bears a long distal apophysis which stands widely out, the basal tegular apophysis bears distally a tiny hook-shaped apophysis.

Description (♂):
Measurements (in mm): Body length ca. 1.7, prosoma: Length 0.75, width 0.65, opisthosoma: Length 1.3, width and height 0.8; leg I: Femur 1.0, patella 0.35, tibia 0.85, metatarsus 0.7, tarsus 0.6, tibia II 0.65, tibia III 0.53, tibia IV 0.6.
Colour pale yellowish, the eye lenses have black markings.
Prosoma (figs. 8-11) high, 1.15 times longer than wide, without "shoulders", profile convex, fovea low, eyes small, with reduced lenses (especially the posterior median

ones whose diamer is 0.035 mm), posterior row procurved. Basal cheliceral articles and fangs long and slender, the anterior margin of the cheliceral furrow bears about 6, the posterior margin bears about 5 denticles. The basal cheliceral articles bear posteriorly 3 or 4 thin long hairs in a longitudinal row. Labium wide, gnathocoxae large, sternum wide, sternal glands shining through the sternal surface, pits fairly distinct. – Legs (fig. 12): Order I/II/IV/III, tibiae and metatarsi covered with long and bristle-shaped hairs, femora and tarsi also hairy. Bristles absent on the femora and metatarsi, 2 are present dorsally on the patellae (the basal one is small), sequence of the long bristles on the tibiae dorsally 2/2/1/1 (the distal one is absent on III-IV; some hairs are bristle-shaped, and can easily mistaken for bristles), the metatarsi I-III bear long trichobothria, position on I in 0.24, the paired tarsal claws are smooth, the long unpaired claw is bent in a right angle. – Opisthosoma (fig. 8) oval, 1.6 times longer than wide or high, originally overhanging the prosoma, dorsally and laterally bearing very long bristles, the colulus bears a pair of hairs, the spinnerets are fairly short, the anteriors are thick. – ♂-pedipalpus (figs. 13-18, see above): Patella and tibia short, patella with a single dorsal-disal bristle, cymbium slender and blunt, pracymbium pointed, tegulum large.

Relationships: See *Chthonopes jaegeri* n. sp. – According to the description by BRIGNOLI (1981) *Wendilgarda assamensis* FAGE 1924 (figs. 19-20) from a cave in India, and reported – really conspecific? – from China, too, may well be congeneric (**quest. n. comb**.). In *assamensis* only the tarsi and metatarsi (according to BRIGNOLI not the tibiae; but I found such hairs in the lectotype (NMNHP) of *assamensis*) bear strong bristle-shaped hairs, and the genital structures are different (figs. 19-20). As already pointed out by BRIGNOLI (1981: 15) “This species does not appear to be related with the American *Wendilgarda*,...”. (“*Wendilgarda*” *sinensis* ZHU & WANG 1992 from China is – according to the structures of the vulva – not a member of *Chthonopes*). – The Eocene taxa: See WUNDERLICH (2004) and below. In the Eocene genus *Eotheridiosoma* WUNDERLICH 2004 bristles of the femora are absent, too, but the hairs of the legs and the structures of the bulbus are quite different.

Evolution and ecology: The pale colour of body and legs, the reduced eye lenses (figs. 8-10), the slender legs (compared with most free-living Theridiosomatidae), and – probably – the long, bristle-shaped hairs of the legs (fig. 12) are adaptations to cave-dwelling. The strong bristle-shaped hairs of the legs may be connected with the prey capture behaviour of the species. The position of these hairs is irregular in contrast to the theridiosomatid genus *Chthonos* CODDINGTON 1986 and members of the family Mimetidae, see WUNDERLICH (2008: 164, figs.). The position of these hairs is so different in the taxa in question that I regard them as convergently evolved. The leg hairs are similar in *Luangnam* n. gen. (fig. 1) but stronger developed in *Chthonopes*.

Distribution: Laos.

Chthonopes jaegeri **n. gen. n. sp**. (figs. 18a-f)

Derivatio nominis: This species is dedicated to my friend PETER JÄGER (SMF), who collected this new species in Laos (together with S. BAYER) as well as numerous other rare or unknown species.

Material: Laos, Bolikhansay Prov., Lak Sao, Tham Mang Kone, N 18°13'16.1'', E104°48'45.9'', 501 m, inside cave and cave entrance, at day, by hand, 4♂13♀23 sub-ad./juv., P. JÄGER & S. BAYER leg. 9. XI 2009, holotype ♂ and remaining paratypes SMF.

Diagnosis: ♂-pedipalpus (figs. 18a-c): Cymbium apically-ventrally with a pair of long and bristle-shaped hairs on a hump, distal tegular apophysis pointed and straight in its distal half, conductor apically rectangularly "cut". ♀: Epigyne (figs. 18d-e) weakly sclerotized, bearing a slender scape which originates on the vantral/anterior margin and is 0.15 mm long. Vulva (fig. 18f) with a v-shaped medial structure and thin-walled receptacula seminis which are almost globular and spaced by about their radius.

Description:
Measurements (in mm): Body length ♂♀ 2.2-2.4, prosoma: Length ♂/♀ 0.95/0.8-1.0, width 0.85/0.7-0.9; leg I: ♂: Femur 1.3, patella 0.5, tibia 1.2, metatarsus 1.1, tarsus 0.6, tibia II 1.0, tibia III 0.6, tibia IV 0.8; ♀: Femur 1.25, patella 0.45, tibia 1.05, metatarsus 0.9, tarsus 0.6, tibia II 0.85, tibia III 0.55, tibia IV 0.75.
Colour: Prosoma and legs light to medium brown, margin of peltidium and sternum not darkened, tibia, metatarsus and tarsus I-II may be darkened, opisthosoma usually dark grey, in a single juvenile light grey.
Prosoma 1.05 (♀) – 1.12 (♂) times longer than wide, eyes fairly small (larger than in *C. cavernicolus*), posterior row slightly procurved or straight, posterior median eyes spaced by 1 ¾ of their diameter which is 0.05 mm. Fangs, teeth of the cheliceral margins and sternal pits as in *C. cavernicolus*. – Legs: Bristles and hairs of the anterior ones as in *cavernicolus*, position of the metatarsal trichobothrium I-II in ca. 0.15, position of the tarsal organ I in 0.06. – Opisthosoma ca. 1.25 times longer than wide, bearing very long hairs, the colulus bears a pair of hairs. – Genital organs: See the diagnosis. The tibia of the ♂-pedipalpus is short and wide distally, it bears dorsally 2 trichobothria and long hairs.

Relationships: *C. cavernicolus* n. sp. is less pigmented, the eye lenses are reduced, the metatarsal trichobothria have a more distal position, the shape of the opisthosoma is long oval, the cymbium bears apically four tiny hairs which are not situated on a hump, the shape of the tegular apophysis and the structures of the embolus are different.

Distribution: Laos.

? *Chthonopes* sp. indet. from Laos:

Two females from caves (SMF) were collected in caves in Laos:
(1) Tham Chom Ong (F47-120-001), coll. W. ZILLIG 28. 01. 2010,
(2) Tham Na Thong (F47-120-003), coll. H. STEINER 26. 01. 2010.

Both may be members of *Chthonopes*. Their wide epigyne bears a short and blunt scape which is not sclerotized. Males are needed for further investigations.

(2) DESCRIPTION OF A NEW EOCENE THERIDIOSOMATID SPECIES IN BALTIC AMBER

The Eocene members of the Theridiosomatidae – see WUNDERLICH (2004: 998-1019) do not fit in any of the extant tribes (subfamilies sensu CODDINGTON (1986)), and they well may be members of an unnamed tribe of the Theridiosomatinae. According to the large bulbus and the long anterior legs this tribe may be the sister group to the Epeirotypini + Theridiosomatini or to the Theridiosomatini, in which a group of uniform retrobasal cymbial hairs occurs. Prosomal "shoulders" are absent in the Eocene spiders.

?***Eotheridiosoma hamatum* n. sp**. (figs. 22-24)

Material: Holotypus ♂ in Baltic amber and a separated piece of amber, F2165/BB/ AR/ CJW.

Preservation and syninclusions: The spider is completely and fairly well preserved in a yellow piece of amber which was heated; a bubble lies on the right side of the opisthosoma. Two fissures within the amber run through the spiders' body which is ventrally covered with a white emulsion. Few stellate hairs are preserved near the spider and in the separated piece of amber which contains also a tiny mite.

Diagnosis (♂; ♀ unknown): Femora bristle-less, bulbus (figs. 22-24) simple, questionable embolus in an apical position, tegulum retrobasally bearing a bifurcate pointed apophysis. Smallest member in Baltic amber.

Description (♂):
Measurements (in mm): Body length 1.0, Prosoma: Length 0.45, width almost 0.45; leg I: Femur ca. 0.45, patella 1.8, tibia 0.37, metatarsus 0.28, tarsus 0.2, tibia II 0.29, tibia III 0.15, tibia IV ca. 0.26.
Colour: Prosoma and legs medium brown, opisthosoma yellow brown.
Prosoma as wide as long, "shoulders" absent, high, with a long and protruding clypeus. Eyes fairly large, region distinctly protruding, posterior row procurved, the posterior median eyes are spaced by almost their diameter. The thoracal fissure is long. Most mouth parts and the sternal pits are hidden, the coxae IV are widely spaced. – Legs fairly stout, order I/II/IV/III, hairs indistinct, tibia I not modified. Few bristles: Femora and metatarsi apparently none, tibiae with long dorsal bristles, I with 2 dorsally and a single prolaterally. Position of the metatarsal trichobothria on I and III in 0.5; the tibial trichobothria are difficult to recognize because of the heating of the piece of amber. – Opisthosoma globular, most hairs are apparently lost. – Pedipalpus (figs. 22-24; see above): Patella and tibia about as long as wide, paracymbium pointed, cymbium without bristles or a retrobasal brush of hairs, bulbus fairly protruding.

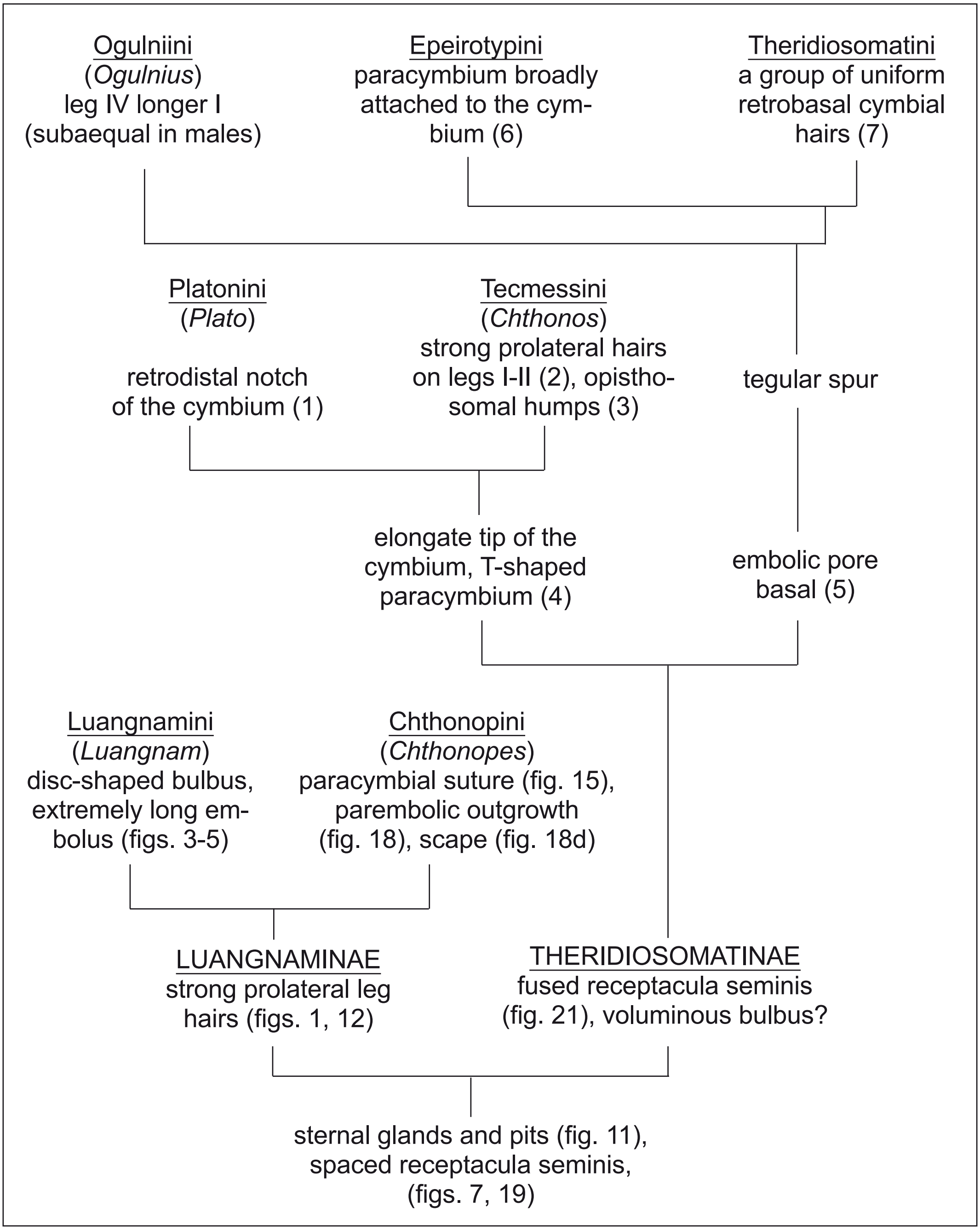
Relationships: Smallest known member of *Eotheridion* and of the fossil Theridiosomatidae. Femoral bristles are absent like in *Eotheridion* but the structures of the bulbus are apparently different, and I am in doubt that *hamatum* is really a member of *Eotheridion*.

Distribution: Eocene Baltic amber.

RELATIONSHIPS, TAXONOMY AND CLADOGRAM; SYNONYMY AND RANKS OF HIGHER TAXA OF THE THERIDIOSOMATIDAE

In this paper I distinguish only two subfamilies of the Theridiosomatidae – the Luangnaminae n. subfam. and the Theridiosomatinae –, and I prefer the use of tribes for most suprageneric taxa.
CODDINGTON (1986) treated no tribe of the Theridiosomatidae but four subfamilies: Epeirotypinae, Ogulniinae, Platoninae and Theridiosomatinae. This author was not satisfied with the trichotomy of his cladogram (p. 18). The monotypic Ogulniinae was regarded as rather strongly related to the Theridiosomatinae. Epeirotypinae, Ogulniinae and Platoninae are down-graded here to the rank of tribes (**n. stat.**) of the Theridiosomatinae because they are strongly related, see the cladogram below, which is only quite hypothetical and provisionally (several sister groups are unsure, e.g. Chthonopini and Luangnamini as well as Platonini and Tecmessini may not be sister groups). In this cladogram I used mainly selected rare/special characters which unlikely evolved several times independently/convergently, mainly the connate receptacula seminis of the Theridiosomatinae.

Tecmessini: Two genera were regarded as members of the Platoninae by/sensu CODDINGTON: *Chthonos* and *Plato*. The new genus *Chthonos* was introduced by CODDINGTON replacing *Tecmessa* O. PICKARD-CAMBRIDGE 1882 which is preoccupied. The taxon Tecmesseae SIMON 1895 was ignored by CODDINGTON but – if *Chthonos* and *Plato* are really genera of the same subfamily – the name Tecmessinae SIMON would have to use instead of Platorinae, and Tecmessini instead of Platonini; see IRZN: Art. 40.1. According to the different characters of *Chthonos* and *Plato* – e.g. the structures of the secondary genital organs, the shape of the opisthosoma, the spines of the anterior legs, see WUNDERLICH (2008: fig. 25 p. 164) – I am quite unsure that these genera have to unite in the same tribe or even subfamily. Therefore I do not synonymize the Platonini with the Tecmessini.



Provisional CLADOGRAM of the suprageneric taxa of the family Theridiosomatidae

REMARKS: See CODDINGTON (1986): (1) fig. 10, (2) fig. 33, (3) figs. 34, 36, (4) fig. 12, (5) figs. 162, 198, (6) fig. 72, (7) figs. 153, 186. The Early Cretaceous genus *Eocoddingtonia* SELDEN 2010 may be a member of the subfamily Luangnaminae.

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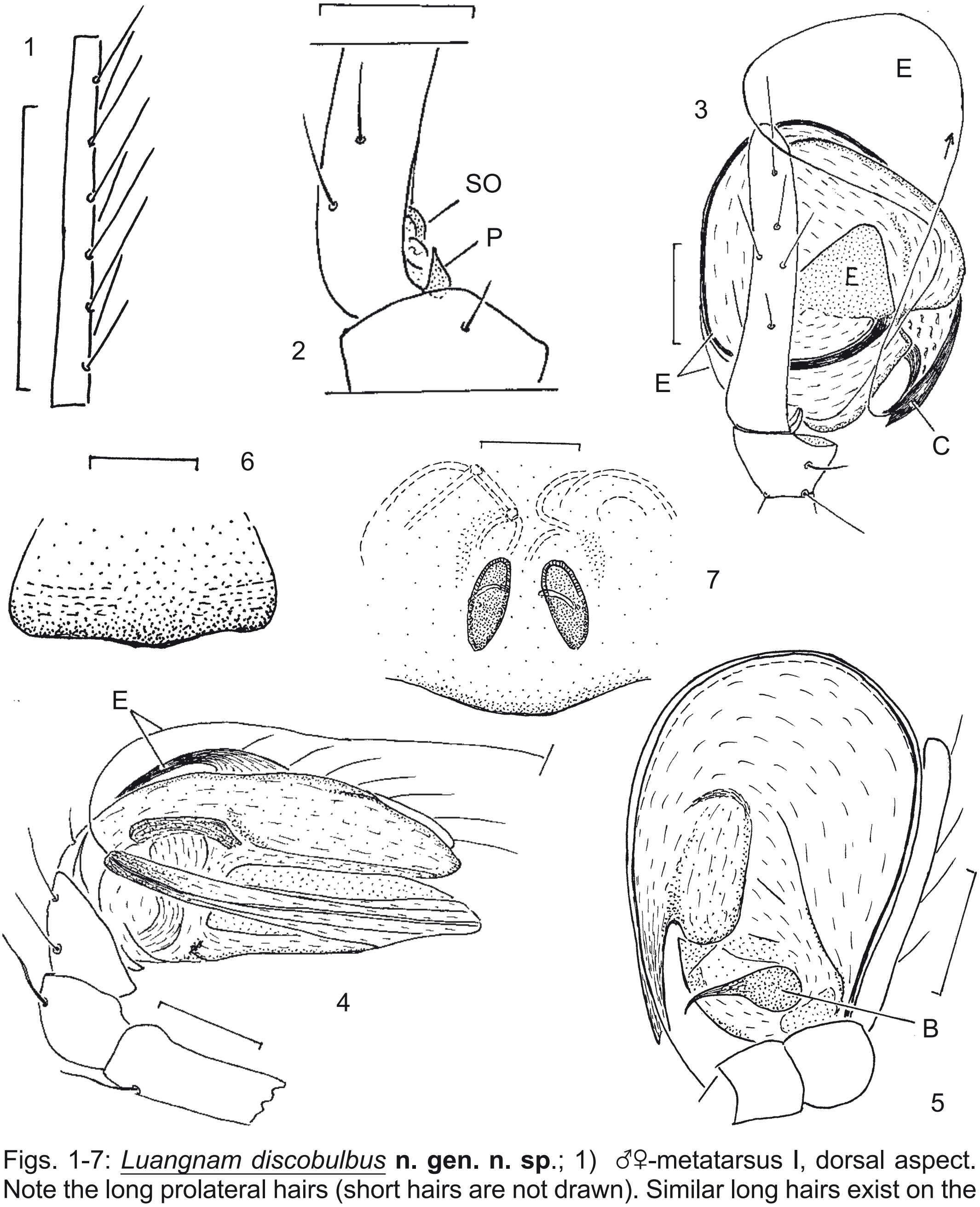
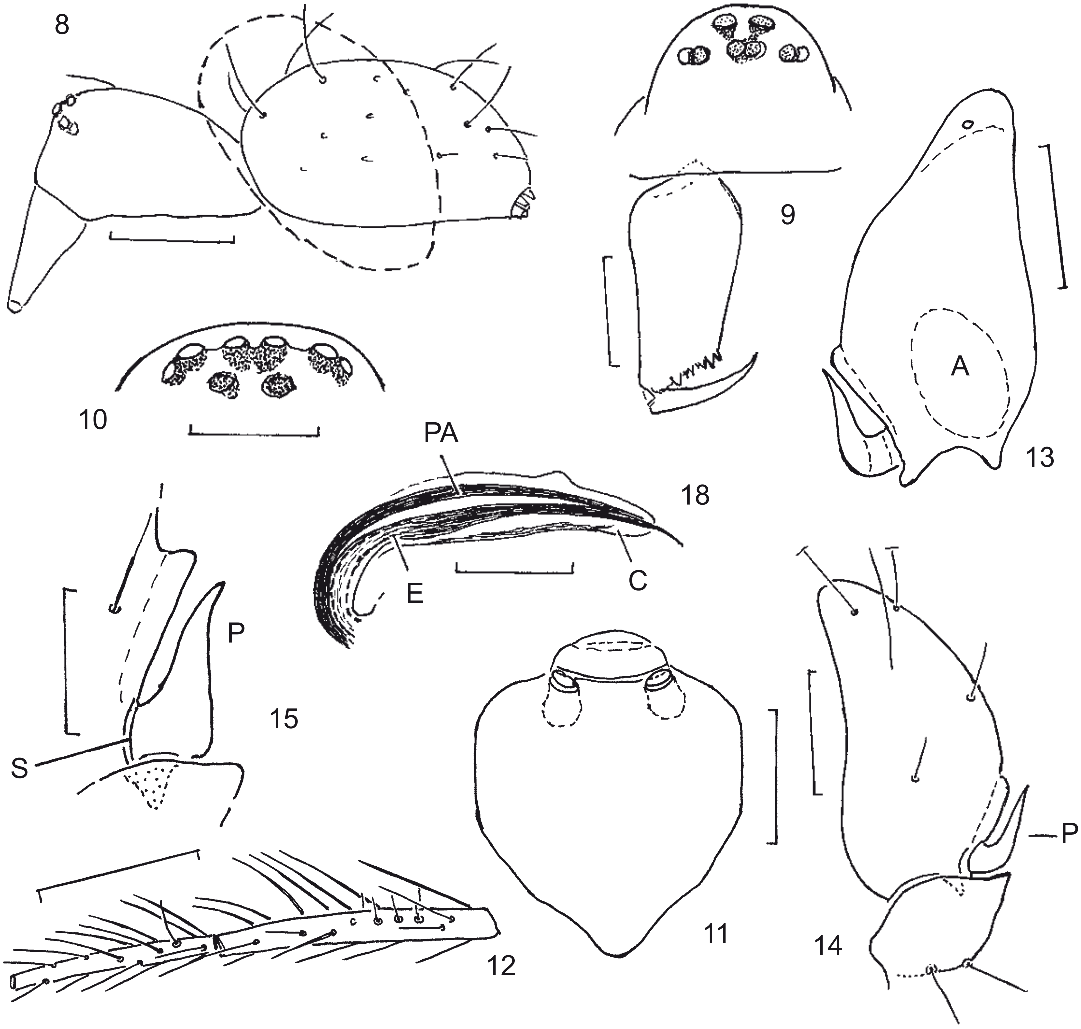
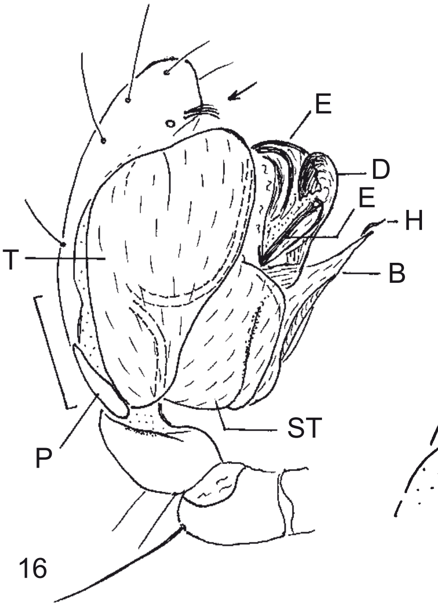


Figs. 1-7: *Luangnam discobulbus* **n. gen. n. sp.**; 1) ♂♀-metatarsus I, dorsal aspect. Note the long prolateral hairs (short hairs are not drawn). Similar long hairs exist on the remaining tibiae and metatarsi; 2) ♂, retrolateral aspect of the right pedipalpus: basal part of the cymbium and distal part of the tibia; 3) ♂, dorsal aspect of the right pedipalpus. The distal part of the extremely long embolus lies in an unnatural position; 4) ♂, retrolateral aspect of the right pedipalpus; 5) ♂, ventral aspect of the right pedipalpus; 6-7) ♀, epigyne and dorsal aspect of the vulva. Only parts of the thin and very long introductory ducts are drawn. The epigyne was put for half an hour in oil of pink. B = basal tegular apophysis, E = embolus, P = paracymbium, SO = sclerotized outgrowth. Scale bars 0.1 mm in fig. 7, 0.5 in fig. 1, 0.2 in the remaining figs.;



figs. 8-18: *Chthonopes cavernicolus* **n. gen. n. sp.**, ♂; 8) lateral aspect of the body. Only few hairs are drawn. The real position of the loose opisthosoma may be as shown in the dotted figure; 9) anterior aspect of the prosoma including the right chelicera; 10) dorsal aspect of the eyes (the lenses of the posterior median eyes are strongly reduced); 11) sternum. Note the pair of pits which opens to the anterior sternal margin, and the sac-shaped sternal glands showing through the sternum; 12) retrolateral aspect of the left anterior tibia and metatarsus. Most of the bristle-shaped hairs are drawn; 13) ventral aspect of cymbium and paracymbium of the right pedipalpus; 14) dorsal aspect of the right pedipalpal tibia, cymbium and paracymbium; 15) dorsal and slightly basal aspect of the right paracymbum. The arrow points to the 4 tiny apical cymbial hairs; 16) retrolateral aspect of the right pedipalpus; 17) ventral aspect of the right pedipalpus; 18) embolus, parembolic apophysis and conductor of the right pedipalpus, apical aspect. A = alveolus, B = basal tegular apophysis, C = conductor, D = distal tegular apophysis, E = embolus, P = paracymbium, PA = parembolic apophysis, S = suture, ST = subtegulum, T = tegulum. Scale bars 0.1 in figs. 13, 15 and 18, 0.5 in figs. 8 and 12, 0.2 in the remaining figs.;



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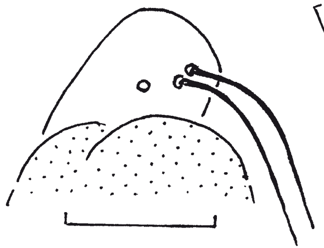
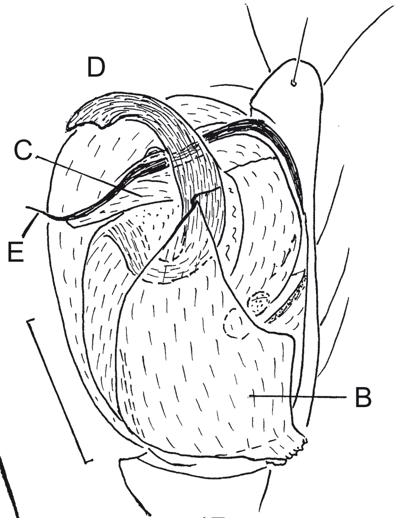


18a



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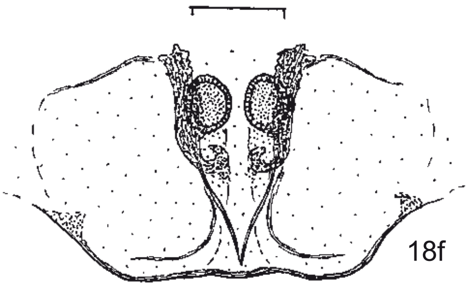

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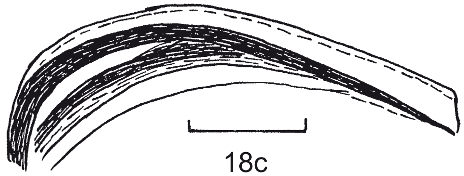

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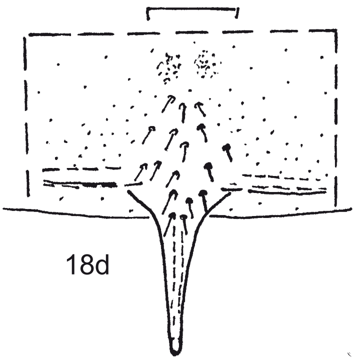
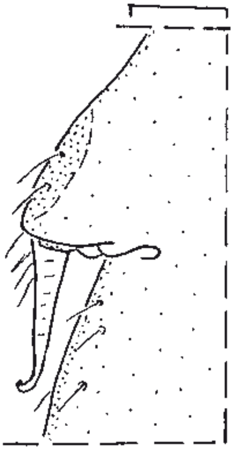
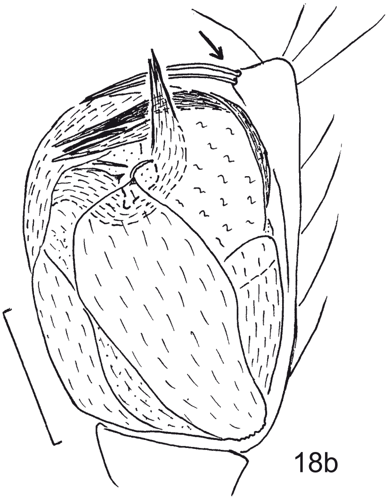


18d

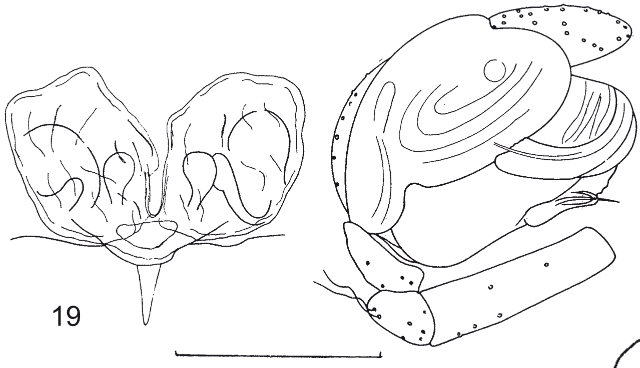


18e



18b

figs. 18a-18e: <u>*Chthonopes jaegeri*</u> **n. gen. n. sp**.; a) ♂, retrolateral aspect of the distal part of bulbus and cymbium which baers the tiny tarsal organ and two long, bristle-shaped hairs; b) ♂, ventral aspect of the right pedipalpus. Note the pair of bristle-shaped apical cymbial hairs on a hump (arrow); c) apical aspect of embolus and conductor of the right pedipalpus; d-e) ♀, ventral and lateral aspect of the epigyne and dorsal aspect of the vulva. Scale bars 0.2 in fig. b), 0.1 in the remaining figs.



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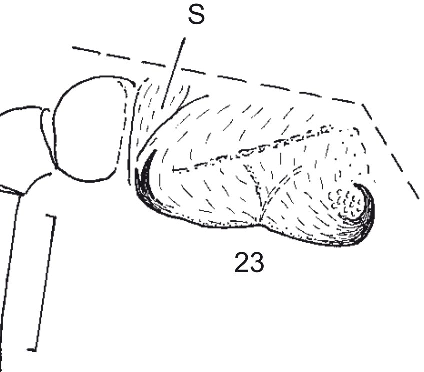

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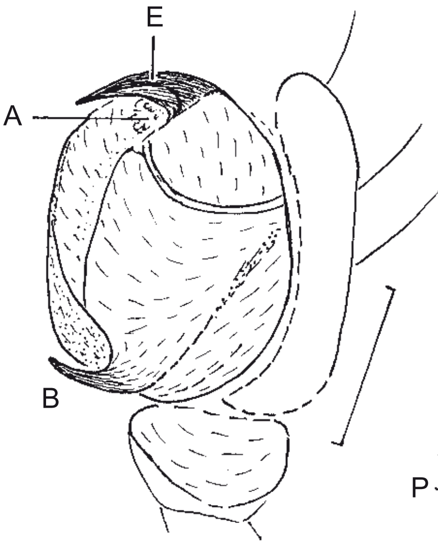

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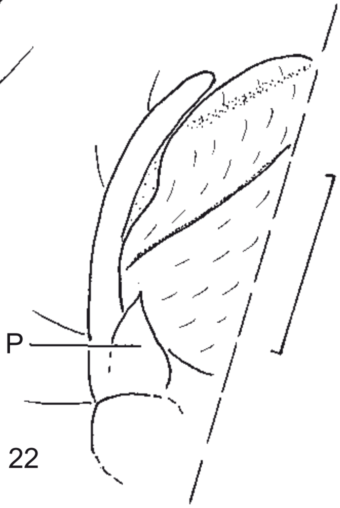

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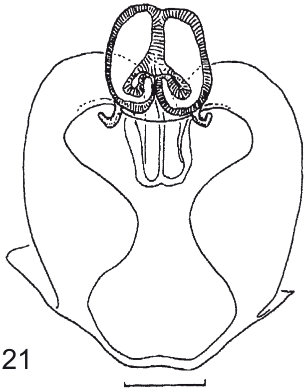

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figs. 19-20: "*Wendilgarda*" (questionable *Chthonopes*) *assamensis* FAGE 1924 (India); 19) ♀, dorsal aspect of the vulva; 20) ♂, retrolateral aspect of the right pedipalpus. Scale bar 0.5. Taken from BRIGNOLI (1981);

fig. 21) *Theridiosoma gemmosum* (L. KOCH 1878), ♀, dorsal aspect of the vulva. Scale bar 0.1. Taken from CODDINGTON (1986);

figs. 22-24: ?*Eotheridiosoma hamatum* **n. sp.**, ♂ in Baltic amber; 22) retrodorsal aspect of the right pedipalpus. The ventral part is hidden; 23) retrolateral aspect of the right pedipalpus which cymbium is hidden; 24) proventral aspect of the right pedipalpus which bulbus is apparently slightly expanded. A = artefact, B = basal tegular apophysis, E = questionable embolus, P = paracymbium, S = subtegulum. Scale bars 0.1.

BEITR. ARANEOL., 6 (2011)

SOME SUBRECENT SPIDERS (ARANEAE) IN COPAL FROM MADAGASCAR

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Abstract: The following subrecent taxa of spiders (Araneae) preserved in copal from N-Madagascar are treated: Hersiliidae: *Gorgorops jadis* BOSSELAERS 2004; Deinopidae: *Deinopis ?madagascariensis* LENZ 1886, Uloboridae: *Miagrammopes* sp. indet., Uloboridae indet.; Nephilidae: *Minutunguis silvestris* **n. gen. n**. sp.; Theridiosomatiae: Theridiosomatinae indet. (family new to Madagascar); Mysmenidae: *Mysmena copalis* **n. sp**.; Nesticidae: *Eidmanella pallida* (EMERTON 1875) (family new to Madagascar); Theridiidae: *Argyrodes* (*Ariamnes*) *resina* **n. sp**.; Corinnidae: ?Castianeirinae: *Palpiraptor myrmarachnoides* **n. gen. n. sp**. which possesses a pedipalpal "raptorial basket".

Key words: Araneae, Araneidae, Castianeirinae, copal, Corinnidae, Deinopidae, Hersiliidae, Madagascar, Mysmenidae, Nephilidae, Nesticidae, pseudo-orthognath, "raptorial basket", resin, spiders, Theridiidae, Theridiosomatidae, Uloboridae.

The **material** from N-Madagascar is kept in the collection of the author (CJW). Its age is quite different, few years up to hundreds or even thousands of years. Most pieces are enclosed with a thin layer of artificial resin but the pieces will soon be embedded in artificial resin (*) (see below), and later probably stored in the SMF.

(*) I observed that thin layers of artificial resin may loosen from the copal after few years; so such pieces are better preserved IN BLOCS of artificial resin.

Thanks to the professional work of HANS WERNER HOFFEINS in Hamburg most pieces of copal from Madagascar have been preserved/embedded in blocs of artificial resin. A problem is the heating of the pieces during the process of preservation which may endanger the inclusions.

Remark: In this paper I regard the taxa Mysmenidae (previously a subfamily of the Anapidae s. l.), and Nephilidae (previously a subfamily of the Araneidae s. l. or Tetragnathidae) as families of their own.

Some subrecent (subfossil) spiders in copal from Madagascar were described by WUNDERLICH (2004: 1830-1853), including the firstly described Copaldictynidae (regarded as a subfamily of the Dictynidae but probably a family of its own). The families Ononopidae: Orchestininae, Mysmenidae, Hahniidae (probably a subfamily of the Dictynidae s. l.) were reported from Madagascar for the first time, see the introduction in that paper from 2004. In this paper I treat a low number (from my large collection) of subrecent spiders from Madagascar of the families Hersiliidae, Deinopidae, Uloboridae, Nephilidae, Mysmenidae, and Theridiidae; the families Nesticidae and Theridiosomatidae are reported here for the first time for this island. Prodidomidae (new to Madagascar): See the paper on this family in this volume.

Madagscar is famous for its special and quite remarkable fauna which is typical for isolated islands, e. g. the Aye-Aye (*Daubentonia madagascariensis*); certain spider taxa are quite unusual, too, e. g., members of the subfamilies Archaeinae, of the Copaldictyninae, of *Minutunguis* n. gen. (Nephilidae), which probably possesses relationships to Eocene taxa in Baltic amber, as well as of the genus *Palpiraptor* n. gen. (Corinnidae), in which a quite unusual pedipalpal “raptorial basket” and a pseudo-orthognath cheliceral position evolved, see the descriptions, the figs., and the photos below.

Family HERSILIIDAE

Note: The species described under ?*Anyphops cortex* WUNDERLICH 2004 in copal from Madagascar has been synonymised with *Gorcorops jadis* BOSSELAERS 2004 in the meantime which was slightly earlier published.

New material of the family Hersiliidae in copal from N-Madagascar:

(1) a male which is well preserved, body length less than 4 mm, F2217/CM/AR/CJW. The 7 cm long piece of resin has been put in paraffin in XII 2005 and is well preserved. – I do not want to esclude that the male is a member of the genus *Fictotama* PETRUNKEVITCH 1973 – see the following paper of this volume – although the cephalic part is low; see the remarks on *Fictotama* and *Neotama*, WUNDERLICH (2004: 816) and (2008: 81). – Besides numerous other organic inclusions the following spiders exist a syninclusions: *Orchestina madagascariensis* WUNDERLICH 2004 (1♂) (Oonopidae), Pholcidae indet. (1♂), Theridiidae indet. (several ♂♀), Clubionidae indet. (1♂), Araneae indet. (juveniles).

(2) A well preserved male spider, body length 4 mm, F2221/CM/AR/CJW.

Family ULOBORIDAE photos 58a-c

The few uloborid members of Madagascar need a revision. The genera *Uloborus* and *Zosis* are known from this island since one and a half centuries; the genera *Miagrammopes* and *Octonoba* (determination unsure) are new to Madagascar to my knowledge.

Material in copal from N-Madagascar:

(1) *Miagrammopes* sp. indet., ♂, F2220/CM/AR/CJW, body length almost 3 mm, completely and well preserved in a light yellow piece of resin, hidden by several fissures of the resin. The eyes of the anterior row are absent like in other congeneric species.
(2) Uloboridae indet., ♂, F2219/CM/AR/CJW, body length 2 mm, well and almost completely preserved (the tips of the left tarsi I-II are cut off), together with a female of *Argyrodes* s. str. indet. I do not want to exclude that the spider may be a member of the genus *Octonoba* OPELL 1979 which is known from SE-Asia. Photos 58a-c.
(3) Uloboridae indet., ½ ♂, F2222/CM/AR/CJW, the opisthosoma and the posterior part of the prosoma are cut off. The male may be congeneric or even conspecific with the previously listed specimen. A male of the family Theridiosomatidae is present in the same piece of resin, see below.

Family DEINOPIDAE

Deinopis ?*madagascariensis* LENZ 1886 photos 59a-b

Material in copal from N-Madagascar: 1 juv., F2218/CM/AR/CJW.

The spider is fairly well preserved above a wasp together with numerous bubbles and arthropod inclusions. The body length of the spider is 2.8 mm, its "cephalic horns" are well developed, see the photo. The juvenile specimen may be conspecific with *D*. *madagascariensis*, the only confamiliar species from Madagascar, which is known from a 19 mm long male.

Family NEPHILIDAE

Nephilidae are not rare on Madagascar, members of the the genera *Clitaetra*, *Nephila*, and *Nephilengys* are known. These genera were earlier listed under Araneidae or Tetragnathidae.
In the following an unsusual species is described which I regard as a member of an unknown genus, and which is probably related to fossil genera of the Northern Hemisphere, namely genera of the Eocene Baltic amber forest, see below. If this relationship is correct the new genus *Minutunguis* cannot be regarded as a gondwanan taxon. The extinct Eocene taxa have to include in a family revision in the future.

Minutunguis **n. gen.**

The gender of the name is masculine.

Type species (by monotypy): *Minutunguis silvestris* n. sp.

Diagnosis (♂; ♀ unknown): Tarsal claws tiny, legs with long and slender bristles (fig. 14-15), tibia II dorsally additionally with some stout bristles (spines) (arrows in fig. 14); pedipalpus (figs. 16-17): Cymbium apparently with a large ventral outgrowth (O in fig. 17) (the real origin of this outgrowth is unsure), paracymbium large, complicated, standing widely out, with a large bulbal lateral, and a large flattened dorsal branch; embolus hidden by the conductor besides a secondary conductor/tegular apophysis anteriorly of a finger-shaped "median apophysis" (ventral tegular apophysis sensu KUNTNER (2006)).

Further characters: Posterior eye row almost straight, lateral eyes not widely spaced, legs long and slender, opisthosomal scutum existing.

The **relationships** are not sure. Unfortunately the mouth parts are partly hidden and the bulbus is not observable in the ventral aspect. The conformation of the structures of the bulbus and the position of the eyes are apparently similar to Eocene fossils in Baltic amber, the genera *Luxurionephila* WUNDERLICH 2004 and *Palaeonephila* WUNDERLICH 2004 in which stout bristles/spines of tibia II are absent, the tarsal claws are large, and the paracymbium is simple. All these genera – and also the Eocene genus *Eonephila* WUNDERLICH 2004? – may to be united in an unnamed subfamily of the Nephilidae in the future, besides the subfamilies Clitaetrinae and Nephilinae. More extant spiders of *Minutunguis* – including the female sex – are needed for further conclusions.

Distribution: N-Madagascar, copal, subrecent forest.

Minutunguis silvestris **n. gen. n. sp**. (figs. 14-17) photo 60

Material: Holotype ♂ in subrecent copal of N-Madagascar, F2226/CM/AR/CJW.

Preservation and syninclusions: The piece of copal has been embedded in a bloc of artificial resin by H. W. HOFFEINS in 2002. The spider is almost completely preserved (only the tip of the right tarsus II is cut off) but it is partly hidden by fissures within the resin at its right side, as well as bubbles, emulsions, and remains of a leaf directly under the spider. Gas bubbles are preserved above the left femora III and IV and behind the field of the eyes, a large bubble covers the ventral part of the opisthosoma. – In contact with ventral parts of the opisthosoma and the leaf a small winged insect – Psocoptera? Body length ca. 1 mm, probably a prey of the spider – is preserved, and is difficult to observe. Above the left metatarsus IV the tiny larva of an insect is preserved which is strongly articulated. A beetle (probably a parasite of wood, body length 1.65 mm) and 3 Diptera exist in the same piece of resin.

Diagnosis: See the genus.

Description (♂):
Measurements (in mm): Body length 2.7, prosomal length ca. 1.2, length of a basal cheliceral article 0.4; leg I: Femur 1.9, patella 0.7, tibia 1.6, metatarsus 1.7, tarsus unknown (distally hidden), leg IV: femur 1.6, tibia 1.1.
Colour yellow brown.

Prosoma (it is partly hidden) not raised, longer than wide, 8 eyes, anterior median eyes largest and protruding, posterior row apparently straight, posterior median eyes spaced by ca. their diameter, lateral eyes apparently close together, clypeus short, probably only as long as the diameter of an anterior median eye, basal cheliceral articles fairly long and large, other mouth parts and sternum hidden. – Legs long and slender, I longest, III distinctly the shortest; most bristles long and slender (figs. 14-15) but tibia II bears additionally short and strong bristles/spines (arrows in fig. 14); all femora bear several bristles, I 1/1/1; all patellae bear dorsally a short basal and a very long apical one, at least I additionally a retrolateral one; tibia I/IV: See the figs. 14-15; metatarsus I bears 3 basal bristles and a proventral one in the middle, metatarsus IV: See fig. 15. The position of the metatarsal trichobothria is unknown, the tarsal claws are tiny. – Opisthosoma oval, not widened basally, bearing short hairs, and a large dorsal scutum of ca. ¾ of its lengt (it is slightly lifted off from the opisthosoma); spinnerets fairly short (most spinnerets are hidden). – Pedipalpus (figs. 16-17) (see above): Patella and tibia short, both bear a long dorsal bristle, cymbium dorsally unmodified, the paracymbium may be a free sclerite or not (it is hard to decide), a translucent structure (or an artifact?) covers the apical part of the “median apophysis”.

Relationships and distribution: See the genus.

Family THERIDIOSOMATIDAE

To my knowledge the family Theridiosomatidae has never been reported from Madagascar.

Theridiosomatidae indet. photo 61

Material in copal from N-Madagascar: 1♂, F2222/CM/AR/CJW, together with ½ ♂ of Uloboridae indet. (see above), a beetle and a wasp. The spider is well and completely preserved, a thin emulsion covers the prosoma, its body length is 0.9 mm. I do not want to exclude that the specimen belongs to the genus *Wendilgarda* KEYSERLING 1886. The male of the West-African *W. atricolor* (SIMON 1907) is still unknown.

Family MSYMENIDAE

I describe here the second species of this family from Madagascar, see below ("relationships").

Mysmena (s. l.) copalis **n. sp**. (figs. 1-2) photo 62

Material: Holotype ♂ in copal of N-Madagascar, F2223/CM/AR/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved near the surface of the piece of resin above a 1 cm long beetle (Elateridae?), only the dorsal tip of the opisthosoma and the tip of the right tarsus IV are cut off, the opisthosoma is empty, the dorsal side of the spider is not observable through the resin. The piece of resin is full of syninclusions, e. g., a 2 cm long part of a Gecko, Acari, an ant and other Hymenoptera, numerous Diptera, hyphae and plant inclusions.

Diagnosis (♂; ♀ unknown): Metatarsus I with a strong ventral bristle in the middle (fig. 1), tibia I without ventral bristle, a slender functional conductor guides the distal part of the long embolus.

Remark: This is the smallest known spider species from Madagascar. Other tiny spiders from this island are *Orchestina madagascariensis* WUNDERLICH (Oonopidae), Theridiosomatidae indet. (see above) and certain species of the family Theridiidae.

Description (♂):
Measurements (in mm): Body length 0.5, opisthosomal width 0.3, metatarsus and metatarsus I ca. 0.15 each.
Colour medium grey, legs apparently annulated.
Prosoma (most parts are hidden): Fangs stout, labium free and wider than long, coxae IV spaced by the sternum by more than their diameter. – Legs fairly long and slender, I longest, tarsus I about as long as metatarsus I, metatarsus I (fig. 1) bears a long and strong ventral bristle in the middle, dorsal bristles thin, e. g. a long distal one on patella I, 1/1 on tibia I, position of the metatarsal trichobothria unknown. – Opisthosoma wide, spinnerets short. – Pedipalpus (fig. 2) (see above) with short patella and tibia, probably the elongated cymbium works as a conductor of the distal part of the embolus.

Relationships: *Mysmena* (s. l.) *dominicana* WUNDERLICH 1988 in copal from Madagascar is larger, tibia I bears 2 strong distal ventral bristles, and the embolus describes distally almost a circle. – The structures of the bulbus are similar at first sight with species of *Mysmena* s. l. in Eocene Baltic amber, see WUNDERLICH (2004: Figs. 120-132).

Distribution: Subrecent, in copal from N-Madagascar.

Family NESTICIDAE

Eidmanella pallida (EMERTON 1875) photo 63

Material in copal from N-Madagascar: 2♂, F2216/CM/AR/CJW.

Both males are completely preserved in a quite light piece of resin, one male is covered with a white emulsion, below the other one a subadult spider is preserved; two juvenile spiders exist in the same piece.
The family Nesticidae is new to Madagascar to my knowledge. The discovery of this cosmopolitan species on Madagascar is not a surprise.

Family THERIDIIDAE

Members of this family are most frequent in copal as well as in Tertiary ambers and in higher strata of the vegetation today. A larger number of specimens in copal is kept in my private collection and in the SMF.
The tropical subgenus *Ariamnes* (of *Argyrodes* s. l.) is new to Madagascar to my knowledge; it is frequently regarded as a genus of its own. The body shape of these spiders (photo) is unlike the shape of most spiders; they possess apparently a special kind of camouflage, mimesis, and may look similar to certain parts of plants.

Argyrodes (*Ariamnes*) *resina* **n. sp**. (figs. 3a-3b) photo 64

Material: Holotype ♀ in copal from N-Madagascar, F2227/CM/AR/CJW.

Preservation and syninclusions: The spider is very well and almost completely preserved in a light yellow piece of resin, only the tip of the left tarsus II is cut off, and the left tarsus III is lost. Syninclusions are a juvenile Crab Spider (Thomisidae), a beetle, some Hymenoptera and Diptera.

Diagnosis (♀; ♂ unknown): Opisthosomal part behind the spinnerets 6.5 times longer than the part in front of the spinnerets (photo), prosoma twice as long as the opisthosoma in front of the epigyne; epigyne (figs. 3a-3b) distinctly protruding, with a large median "scape" which is wider than long.

Description (♀):
Measurements (in mm): Body length 19.3, prosoma: Length ca. 1.3, width ca. 0.85, height 0.85; opisthosoma: Length 18.0, width and height in the middle 0.6; leg I: Femur 5.7, patella 0.6, metatarsus 5.4, tarsus 1.2.
Colour brown, the prosoma darker, the opisthosoma lighter, legs probably not annulated.
Prosoma slender and flat, 8 eyes in a narrow field, posterior row distinctly procurved. Basal cheliceral articles only fairly large, teeth hidden, gnathocoxae long, labium free, about as long as wide, bearing two tranverse furrows. Sternum long, small elongated between the coxae IV. The petiolus is strongly sclerotised and protruding ventrally. – Legs very long, order IV/I/II/III, bristles absent. – Opisthosoma veriform (photo), bent near its tip, apical spine absent, hairs tiny, spinnerets in a quite anerior position.

Relationships: In *A. jeanneli* BERLAND 1920 from East Africa the "scape" of the epigyne is longer than wide, the spinnerets possess a more anterior position.

Distribution: Subrecent, in copal of N-Madagascar.

Family CORINNIDAE: ?CASTIANEIRINAE

A singe species of the genus *Castianeira* of this subfamily has already been described from Madagascar. A second – quite unusual – species from Madagascar is described below, and regarded with some hesitation as a member of this subfamily.

Palpiraptor n. gen.

The gender of the name is masculine.

Type species (by monotypy): *Palpiraptor myrmarachnoides* n. sp.

Diagnosis (♂; ♀ unknown): Body, legs, articles of the pedipalpi and chelicerae very long and slender (figs. 4-9, photos 65-66), fangs longer than the prosoma, chelicerae in an "pseudo-orthognath" position, leg bristles exist only on the femora; pedipalpus "raptorial” (figs. 9-12): Articles spiny and strongly elongated, bulbus with several sclerites including a long conductor, a median apophysis, and an additional tegular apophysis; most parts of the – apparently long – embolus are hidden. See also the tab. below.

Relationships: In *Castianeira* KEYSERLING 1879 the cheliceral and pedipalpal articles are not strongly elongated or spiny. A spiny pedipalpal femur exists also in *Koppa doleschalli* DEELEMAN-REINHOLD 2001 (Corinnidae: Corinninae) and in *Medmassa diplogale* DEELEMAN-REINHOLD 2001 (Corinnidae: Castianeirinae) from SE-Asia, in which the anterior tibiae bear 7-10 pairs of ventral bristles, the chelicerae are stout, the articles of the ♂-pedipalpus are not strongly elongated, and the structures of the bulbus are quite different. In *Donuea* SIMON 1903 – Liocranidae, according to BOSSELAERS et al. (2010), probably Clubionidae according to BOSSELAERS (e-mail in XI 2010), but apparently strongly related to *Palpiraptor* which I regards as a member of the Corinnidae -, also from Madagascar, the structures of the bulbus are close to *Palpiraptor*, the chelicerae are also strongly protruding but diverging distally, the tibiae bear ventral bristles, and the pedipalpi are not raptorial. In a further taxon from Madagascar – related to *Donuea*, not yet published – the prosomal cuticula bears according to BOSSELAERS small pits – pits like in Corinnidae but not furrows like in the families Clubionidae and Liocranidae.

Ecology and behaviour: See below, the type species.

Distribution: N-Madagascar (subrecent in copal).

character	Corinnidae: ?Castianeirinae: *Palpiraptor*	Corinnidae, ?Castianeirinae: *Donuea*	Gallienellidae: *Gallienella, Legendrena*
shape of the prosoma and opisthosoma	distinctly longer than wide (photos)	fairly longer than wide	slightly longer than wide
opisthosomal scutum	+ fig. 8	--	-- (+) (*)
shape of the posterior median eyes	circular fig. 4	circular	oval/irregular/ flattened
obliquely depressed gnathocoxae	--	--	+
(ventral) tibial bristles	--	+	+/-
strongly elongated articles of the ♂-pedipalpus (“raptorial basket”)	+, figs. 5-6, photos	--	--

(*) See BOSSELAERS et al. (2010).

Differences of members of two spider families of Madagascar in which strongly protruding (more or less pseudo-orthognath or mygalomorph-like) chelicerae exist

Palpiraptor myrmarachnoides **n. gen. n. sp**. (figs. 4-12) photos 65a-b, 66a-c

Material: 2♂ in subrecent copal from N-Madagascar; holotype F2224/CM/AR/CJW, paratype F2225/CM/AR/CJW.

Preservation and syninclusions: The holotype is very well but incompletely preserved near the surface of a 2.3 cm long and light yellow piece of resin; the right side of its opisthosoma is longitudinally injured/inclined. The left pedipalpal patella and most leg articles are at least partly cut off, only the left legs III and IV are complete, the left legs I and II and the right leg II are lost beyond the coxa by autotomy. From the skinny dorsal area between the right coxa and trochanter I – as well as on the cuticula more distally – originate parts of a fungus, fine and branching hyphae (photo 66c). Probably this spider was captured by the resin being already dead. Directly on the left chelicera a beetle is placed which is 2 mm long, holds partly the spiders chelicerae with its legs, and is partly cut off dorsally-posteriorly. Below the beetle posteriorly and just above the spider's left patella III 2 Acari are preserved which are 0.25 mm long, flattened, and similar to a turtle. Further syninclusions: A tiny juvenile spider, a Hymenoptera, 4 Diptera (one with eggs behind its abdomen), and a tiny insect. – The paratype is is preserved in a yellow orange piece of resin which is 4 cm long and full of syninclusions; at one side of the resin the crust has not been removed. The spider is excellently preserved, only the left leg I is cut off near the base of the tibia. Syninclusions: Numerous Diptera, Hymenoptera and beetles, few Psocoptera, 2 ½ juvenile spiders, remains of insects, and a large leaf of *Hymenaea*, the "amber tree" of Madagascar.

Diagnosis (♂; ♀ unknown): See above.

Description (♂):
Measurements (in mm): Body length 5.0-5.3, prosoma: Length 1.7, width 1.3, height of the peltidium 0.3; length of the basal cheliceral articles and fangs each 2.6; opisthosoma: Length of the two males 3.3 and 3.7, width ca. 0.8, height ca. 0.5; leg I (paratype): Femur 7.0, patella 0.65, tibia II 2.2, tibia III 1.7, leg IV: Femur 4.5, patella 0.6, tibia 4.1, metatarsus 4.6, tarsus 1.4; pedipalpus: Femur 1.5, tibia 1.5, cymbium 1.0.
Colour light brown, legs not annulated.
Prosoma (figs. 4-6) 1.3 times longer than wide, low, fine corniculate, hairs short and indistinct, thoracal fissure well developed. The dorsal-posterior margin of the prosoma is distinctly inclined. Eye field wide, eyes small, lenses circular, posterior row slightly procurved, posterior median eyes spaced by probably 1 ½ diameters, clypeus fairly short, chelicerae strongly protruding, very long (similar to mygalomorph spiders but fangs in a more medial position, a "pseudo-orthognath" position), ventrally with 5 large teeth and additionally an apical pair, fangs also distinctly longer than the prosoma, corniculate, strongly bent at their end, labium free and distinctly longer than wide, gnathocoxae also distinctly longer than wide, very slightly obliquely inclined in the basal half, serrula apparently reduced, sternum long, not protruding between the coxae, and not elongated between the coxae IV. – Legs very long and thin, laterigrade, femur I 4.1 times longer than the prosoma, order I/IV/II/III, I distinctly longest, III distinctly shortest, two long and toothed tarsal claws as well as some spatulate hairs at the tip of the tarsi, scopoli absent, preening combs of metatarsi III-IV weakly developed, trochantera not notched.

Bristles few and short, existing only dorsally on the femora at least on II-IV (fig. 7). The tarsi bear several trichobothria in an irregular position. – Opisthosoma (photos, fig. 8) slender, ca. 4.47 times longer than wide, hairs short and indistinct, dorsal scutum well developed; posterior spinnerets slender, much longer than the remaining ones, with a fairly short and conical apical article. – Pedipalpus (photos, figs. 9-12) (see also above) apparently "raptorial", with long and slender articles and long bristles: Femora a ventral and a prolateral row, tibiae a ventral and a weaker dorsal row. The tibia bears an almost blunt retroapical apophysis and is bulging apically-ventrally, the cymbium is long and bristle-less.

Ecology and behaviour, supposed/concluded from the spider morphology and from the syninclusions:
The slender body as well as the strongly protruding chelicerae (photos) – which are similar to the myrmecomorphic salticid spider genus *Myrmarachne* – may indicate myrmecomorphy (Batesian mimicry) at first sight, but this suggestion appears not likely to me because no tripartition of the body exists, and the spider's legs are too long for fast running like myrmecomorphic spiders. The extremely long and slender legs as well as the quite slender and fairly flattened body indicate that the spiders prefer a "sit-and-wait-position", probably with a spread pedipalpal "raptorial basket" to capture (probably flying) insects. In direct contact with bark or twigs the spiders would be well camouflaged. – A leaf as a syninclusion near the paratype – which apparently originates from the "amber tree" (a member of the genus *Hymenaea*) – may indicate that this spider lived on such a plant. The existence of hyphae on a leg of the holotype may indicate that this spider was enclosed by the resin being already dead. This – apparently aged – spider possesses several autotomized legs.
The articles of the male chelicerae are greatly elongated, their basal articles and their fangs are longer than the prosoma and protruding in a parallel "pseudo-orthognath" RESTING position (figs. 5-6, photos), but the position of the fangs is more medially than in most mygalomorph spiders and the biting position is different: The fangs move/work more towards each other (fig. 6) in contrast to the Mygalomorphs in which the fangs move/work parallelly to each other, downwards from a raised position of the basal cheliceral articles. I call this a "pseudo-orthognath" position. To get an oblique/horizontal position of the fangs like in *Palpiraptor* (right fang in fig. 6) is impossible for mygalomorphs, see fig. 13). I regard the long cheliceral articles and the long pedipalpal articles – which function supposed as a "raptorial basket" – as co-evolved. If this suggestion is correct the unknown female should possess long chelicerae and a long and spiny pedipalpal "raptorial basket" like the male, but no sexually dimorphic short articles of these appendages.
Long ventral bristles of the pedipalpus like in *Palpiraptor* exist frequently in both sexes of the spider family Leptonetidae, see WUNDERLICH (2008: 755, figs. 3-4) but are probably not used as a "raptorial basket" in this family.

In *Liocranum variabilis* WUNDERLICH 2008 (Zoridae/Liocranidae) the basal cheliceral articles are also strongly protruding, and the articles of the male pedipalpus are also very long and slender – see WUNDERLICH (2008: 522, figs. 42-43, 45a), 45e) – but the pedipalpal articles are not spiny. In both taxa the cymbium and the bulbus are remarkably small/slender (fig. 9). If the pedipalpi are (also) used as "feelers" they have to be well movable, and large cymbium/bulbus would hinder their mobility.

In a whole arachnid order – the Amblypygi – a strong pedipalpal "raptorial basket" in both sexes evolved, including strong spurs on thick articles. In the Amblypygi the pedipalpi are spread and work towards each other (from the side) when capturing, and they function together with the fangs which bite from above in a parallel ("orthognath") movement. In contrast to the Amblypygi the pedipalpi of *Palpiraptor* work supposingly more parallel and more obliquely from above in a raised position, transporting the prey to the tips of the fangs which are spread in a HORIZONTAL position (fig. 6).

Relationships and distribution (see also above): From Madagascar *Castianeira majungae* SIMON 1896 (♀) has been described in which the anterior tibiae and metatarsi bear 2 pairs of ventral bristles and the chelicerae are "convex".

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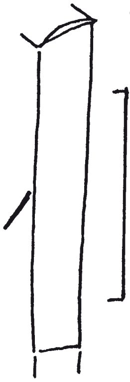
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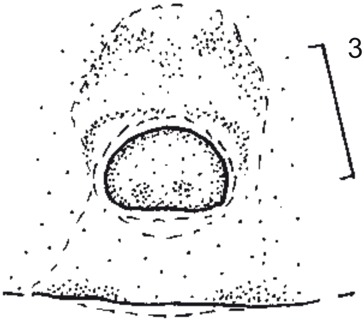
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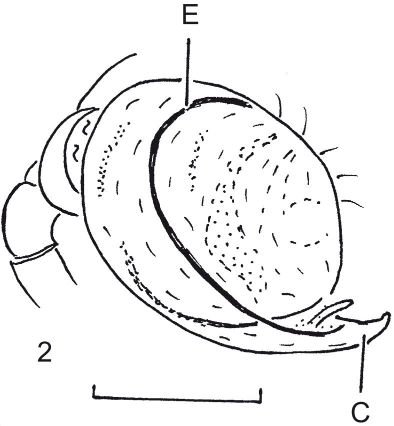

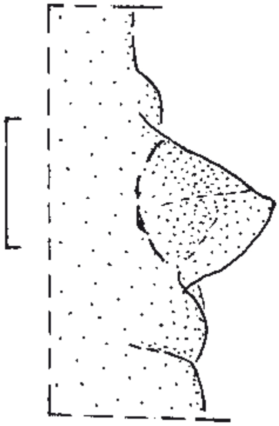
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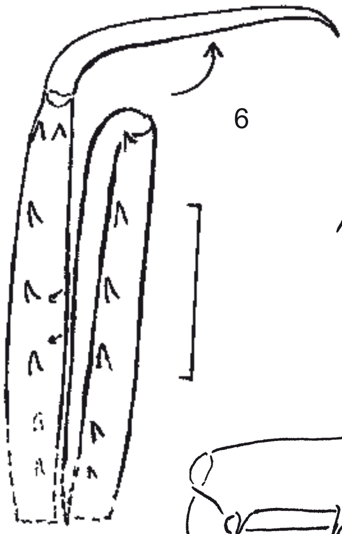

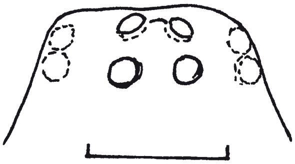
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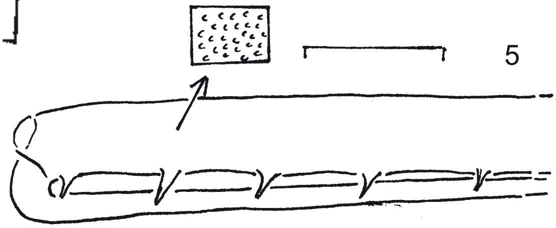
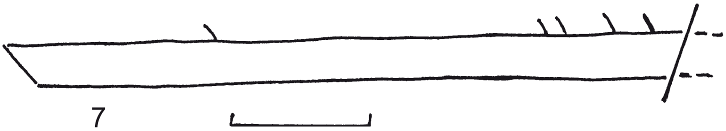
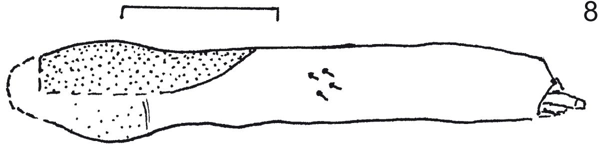


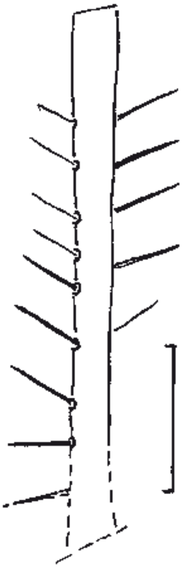
Figs. 1-2: Mysmena (s. l.) copalis **n. sp.**, ♂; 1) prodorsal aspect of the left metatarsus I. Hairs are not drawn; 2) retrolateral aspect of the right pedipalpus. C = conductor, E = embolus. Scale bars 0.1 and 0.05 mm;

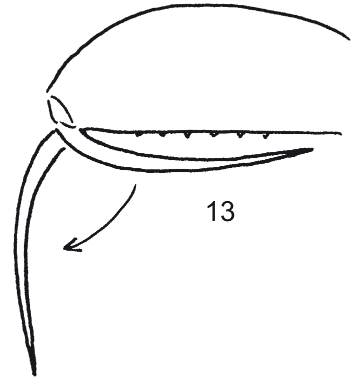
figs. 3a-b) Argyrodes (Ariamnes) resina **n. sp.**, ♀; ventral and lateral aspect of the epigyne. Scale bar 0.2;

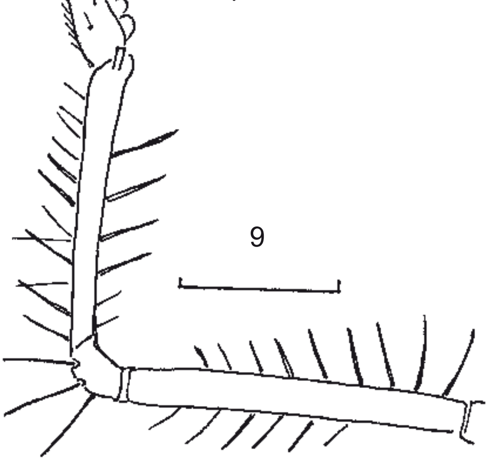
figs. 4-12: Palpiraptor myrmarachnoides **n. gen. n. sp.**, ♂; 4) holotype, dorsal aspect of the eye region (thin emulsions exist on the eye lenses); 5) paratype, retrolateral aspect of the left chelicera. The arrow points to an enlarged finally corniculate area which exists also on the fangs and on the prosoma; 6) holotype, ventral aspect of the chelicerae. The left fang (on the right side of the drawing) possesses its longitudinal pseudo-orthognath resting position but the right fang (arrow) has been moved to its horizontal "biting position" (!). The basal cheliceral articles have most probably still to spread for a definitive biting position; 7) holotype, prolateral aspect of the left femur IV which is hidden at its base. Note the weak dorsal bristles; 8) paratype, lateral aspect of the opisthosoma which is slightly deformed (in the holotype the epigaster is not bulg-

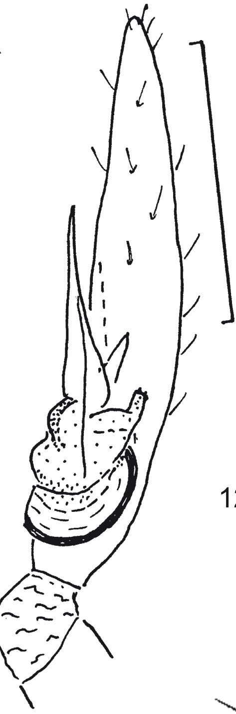


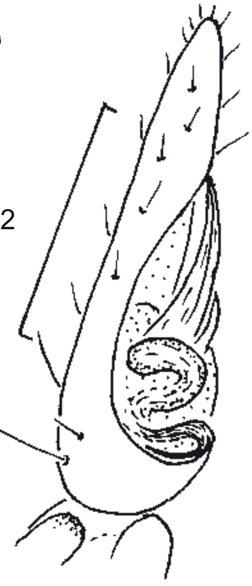






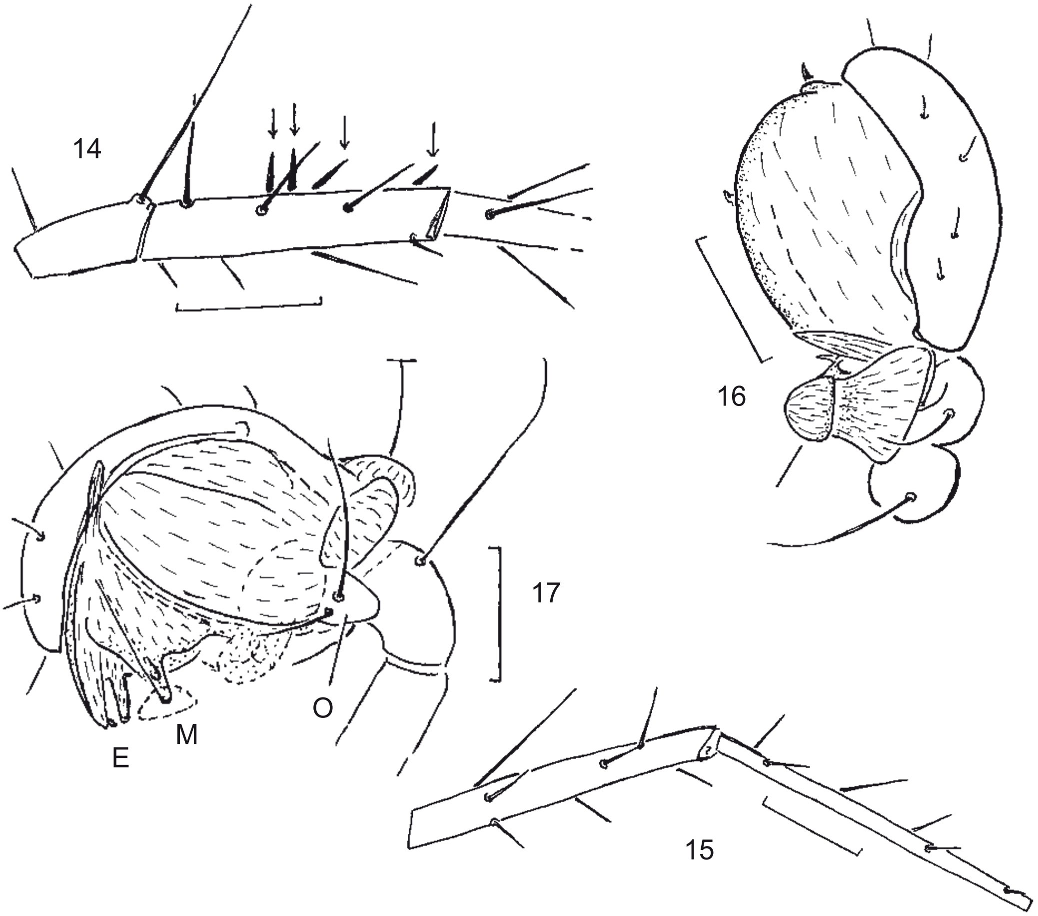






ing); 9) holotype, retrolateral aspect of the right pedipalpus; 10) holotype, ventral aspect of the right pedipalpal femur; 11) holotype, proventral aspect of the right pedipalpus; 12) holotype, retroventral and fairly apical aspect of the right pedipalpus. Scale bars 0.5 in figs. 4-5) and 10-12), 1.0 in the remaining figs.;

fig. 13) A mygalomorph spider, lateral aspect of the left chelicera. The arrow points to the movement of the right fang to its biting position. The tip of the fang moves to a ventral position but cannot move to a medial position like in fig. 6). No scale bar;



figs. 14-17: *Minutunguis silvestris* **n. gen. n. sp.** ♂; 14) retrolateral and slightly dorsal aspect of the right patella, tibia and basal part of the metatarsus of leg II. The arrows point to the strong tibial bristles/spines; hairs are not drawn; 15) prolateral aspect of the left tibia and metatarsus IV; 16) retrodorsal aspect of the left pedipalpus; 17) retrolateral aspect of the left pedipalpus. E = embolus and conductor, M = “median apophysis” (ventral tegular apophysis), O = questionable ventral outgrowth of the cymbium. Scale bars 0.5 in figs. 14-15), 0.2 in figs. 16-17).

BEITR. ARANEOL., 6 (2011)

SOME FOSSIL SPIDERS IN DOMINICAN AMBER (ARANEAE: HERSILIIDAE, THERIDIIDAE, GNAPHOSIDAE)

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Abstract: The following fossil – usually Miocene – spiders (Araneae) from the Dominican Republic (Hispaniola) are described: Hersiliidae: *Fictotama maculosa* **n. sp**., Theridiidae: *Episinus tibiaseta* **n. sp**., *Femurraptor dominicanus* **n. gen. n. sp**., and the hitherto unknown male of *Styposis pholcoides* WUNDERLICH 1988, as well as Gnaphosidae: *Scopoides dominicanus* **n. sp**.

Key words: Amber, Araneae, Dominican Republic, fossils, Gnaphosidae, Hersiliidae Hispaniola, Miocene, Oligocene, spiders, Theridiidae.

The **material** was bought from different dealers, its exact locality within the Dominican Republic is unknown. Most Dominican ambers originate from the Miocene, some of the late Oligocene, see PENNEY in PENNEY (2010: 22-23). The spiders are kept in the collection of the author (CJW).

Most spiders in Dominican ambers were described by WUNDERLICH (1988), some more taxa were described in the last two decades. In this paper I describe four new species of three families. Because of its raptorial anterior femora the new genus *Femurraptor* of the family Theridiidae is of special interest.

Family **HERSILIIDAE**

See the revision by RHEIMS & BRESCOVIT (2004).

Synonymy of the genera –, e. g. *Neotama* BAEHR & BAEHR 1993 = *Fictotama* PETRUNKEVITCH 1963 –: See WUNDERLICH (2004: 816) .

Two well preserved males (gen. indet.) are kept in the collection of ALEX BEIGEL in Würselen, coll. nos. DB-3 and DB-4.

Fictotama maculosa **n. sp**. (figs. 1-2) photos 48a-c

Material: Holotype ♂ in Miocene Dominican amber (*), enclosed now in artificial resin, and a separated piece of amber as well as remains of grinded amber, F2215/ DB/AR/ CJW.

(*) I bought this piece as “Dominican amber” from a dealer almost 20 years ago. According to the relatively soft grinding (and immediately soft – quickly hardening – remains of the grinding) I do not want to exclude that this may be a piece of relative young resin. After almost 20 years in contact with air the surface of the separated piece shows only weak fissures in contrast to most pieces of copal.

Preservation and syninclusions: The spider is well but incompletely preserved in a yellow-orange piece of resin, the body, the pedipalpi and the right leg III are completely preserved, most distal leg articles are cut off, the tip of the left anterior spinneret is cut off, the tip of the right posterior spinneret has been amputated and apparently healed, it is black now. The “loose” (cut off at both ends) long part of the left metatarsus IV is preserved behind the spider. Body and legs are covered with tiny bubbles.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 1-2): Cymbium with a pair of apical bristles, median apophysis tripartite, embolus spirally, probably two loops which are not wide.

Description (♂):
Measurements (in mm): Body length 5.0, prosoma: Length and width ca. 2.2; opisthosoma: Length 2.9, width 2.2, height 1.5; remaining part of the right femur I 2.2, remaining parts of the right metatarsus IV 6.5, tibia III 2.1, tibia of the ♂-pedipalpus 0.55.

Colour yellow brown with dark brown spots on prosoma and opisthosoma which may be caused by heating.
Prosoma (photos) about as long as wide, cephalic part strongly raised, fovea well developed, eyes large (some lenses are covered with an emulsion), both rows strongly recurved in the dorsal aspect, anterior lateral eyes smallest, anterior median eyes probably spaced by their radius, posterior median eyes spaced probably by less of their diameter. Clypeus long and vertical, longer than the diameter of the anterior median eyes, ventral margin straight. Basal cheliceral articles fairly small, teeth hidden, fangs fairly stout, sternum not prolongated between the coxae IV. – Legs (most parts are lost, only one of the third pair is completely preserved), bristles short, femur II (most parts are preserved, the distal part is cut off) bears about 10 bristles. A 6.2 mm long part of the undivided left metatarsus IV is preserved behind the spider. – Opisthosoma (photos) 1.3 times longer than wide, flattened, hairs short, two large and one small pair of sigillae are observable. Anterior spinnerets – especially the apical article – very long (their tips are lost) – Pedipalpus (figs. 1-2): Patella distinctly longer than wide, with 1/1 thin dorsal bristles, tibia twice as long as wide, bearing several long and thin bristles and some trichobothria, cymbium long, with a pair of apical bristles/claws, with a questionable retrobasal paracymbium (it is hard to observe and bears apparently few short bristles), median apophysis tripartite, embolus spirally, loops not wide.

Relationships: The bulbus structures of *Fictotama mexicana* (O. P.-CAMBRIDGE 1892) (extant, Mexico) are quite similar, see WUNDERLICH (1988: 272, fig. 171) but in *mexicana* the basal branch of the median apophysis is smaller. – Remark: The fossil type species of *Fictotama* has also been described from Mexico (!).

Distribution: ?Oligocene Dominican amber forest.

Family **THERIDIIDAE**

Theridiidae are frequent in higher strata of the vegetation and are the most diverse family in Dominican amber and copal. In the following I describe two new taxa.

Episinus tibiaseta **n. sp.** (figs. 3-4) photo 49

Material: Holotype ♂ in Miocene Dominican amber (locality unknown), F2213/DB/AR/CJW.

Remark: After the deposition of about 20 years in my collection the surface of the amber got few weak fissures. The fissures above the dorsal side of the spider were now cut off.

Preservation and syninclusions: The spider is completely and excellently preserved in a hard yellow-orange piece of amber, three larger gas bubbles exist near and between the left legs, a small Diptera is preserved left in front of the spider near the surface of the piece of amber. On a layer below the spider a dense plait of threads exists which may be part of a mycelium.

Diagnosis (♂; ♀ unknown): Position of the basal tibial bristle I, II and IV in the distal half (fig. 3), opisthosoma long and slender (photo), pedipalpus as in fig. 4.

Description (♂):
Measurements (in mm): Body length 2.65, prosoma: Length 0.85, width 0.8; opisthosoma: Length 1.65, width 0.6; leg I: Femur 1.9, patella 0.5, tibia 1.5, metatarsus 1.85, tarsus 0.5, tibia IV 1.2.
Colour light brown, legs probably not annulated.
Prosoma 1.06 times longer than wide, hairs of medium length, with a weak pair of hairs in the field of the median eyes. Fovea large, posterior stridulatory files well developed. Eyes large, posterior row slightly recurved, posterior median eyes spaced by their diameter, area of the anterior median eyes protruding. Basal cheliceral articles fairly large, teeth hidden, fangs slender. Labium wider than long, with a seam to the sternum; coxae IV spaced by almost their diameter. – Legs (fig. 3, photo) fairly long, order I/IV/II/III, I distinctly the longest, III distinctly the shortest, hairs and bristles not long, distal bristle of tibia I 1.4 times longer than the tibial diameter. The patellae bear 1/1 dorsal bristles, sequence of the tibial bristles 2/2/1/2, position of the basal bristle in the distal half (arrow in fig. 3). The ventral comb of tarsus IV is well developed, the position of the metatarsal trichobothrium II is probably in 0.5. Paired tarsal claws fairly long and toothed, unpaired claw shorter. – Opisthosoma (photo) slender, 2.75 times longer than wide, widest in front, dorsally scarcely covered with long hairs, spinnerets short, colulus small. – Pedipalpus (fig. 4) (see also above): Patella about as long as wide, bearing a dorsal bristle, tibia wide, conductor and embolus only fairly long.

Relationships: The position of the basal tibial in the distal half (fig. 4) is quite unusual in the Theridiidae, known to me from no other species of the genus *Episinus*.

Distribution: Miocene Dominican amber forest.

Femurraptor n. gen.

The gender of the name is masculine.

Type species (by monotypy): *Femurraptor dominicanus* n. sp.

Diagnosis (♂; ♀ unknown): Femur I bears a row of long prolateral raptorial bristles (fig. 5), comb of tarsus IV absent, paracymbium in an internal position, conductor very large (figs. 6-7).

Further characters: Position of the metatarsal I-II trichobothrium near the middle, sequence of the tibial bristles 2/2/1/2, opisthosoma oval, epigaster only slightly bulging, embolus long (figs. 6-7); existence of cheliceral teeth and colulus unknown.

Relationships: According to its characters – especially the chaetotaxy, the only slightly protruding epigaster, the wide prosoma with its deep fovea, and the oval opisthosoma – I regard *Femurraptor* as a member of the subfamily Episinae. In *Episinus* the tarsus IV bears a ventral comb of serrated and bent hairs, and proventral bristles on femur I are absent like in other Theridiidae. A bit similar – but quite stronger – raptorial bristles on femur I (and tibia and metatarsus as well) evolved convergently in the extant species *Proboscidula milleri* (Theridiidae: Pholcomminae), see WUNDERLICH (2008: 164, fig. 29).

Distribution: Miocene Dominican amber forest.

Femurraptor dominicanus n. gen. n. sp. (figs. 5-7) photos 51a-c

Material: Holotype ♂ in Miocene Dominican amber (the exact locality on Hispaniola is unknown) together with two separated pieces of amber, F433/DB/AR/CJW.

Preservation and syninclusions: The spider is completely and excellently preserved in a hard yellow-orange piece of amber which is 4 cm long; the spiders opisthosoma is slightly depressed behind the epigaster. In the same piece – but in a different layer – a 4 mm long adult Dermaptera and some spiders threads are preserved; in the smaller separated piece a beetle, in the larger separated piece a tiny ballet of insects excrement are preserved.

Diagnosis (♂; ♀ unknown): See the diagnosis of the genus.

Description (♂):
Measurements (in mm): Body length 2.0, prosoma: Length 0.8, width almost 0.8; leg I: Femur 2.0, patella 0.4, tibia 1.55, metatarsus 1.7, tarsus 0.75, tibiae II-IV 0.85/0.5/ 0.9. Colour light brown, legs not annulated.

Prosoma 1.25 times longer than wide, low, fovea large, eyes large, anterior median eyes largest and protruding, posterior row slightly recurved, posterior median eyes spaced by ca. their diameter, a pair of thin hairs exists in the field of the median eyes. Clypeus long, basal cheliceral articles and fangs of medium size, cheliceral articles hidden. The area of stridulatory files is hidden. – Legs hairy and fairly long, order I/IV/II/III, I distinctly the longest, III distinctly the shortest, sequence of the long tibial bristles 2/2/1/2, metatarsi I-III bear a trichobothrium, its position on I/III is in 0.5/0.4. Femur I bears a row of 6 long proventral raptorial bristles. Paired tarsal claws toothed, unpaired claw shorter. Comb of tarsus IV absend (ventral hairs not serrated and almost straight). – Opisthosoma 1.12 oval, times longer than wide, covered with short hairs, spinnerets short, area of the colulus hidden, epigaster only slightly bulging. – Pedipalpus (figs. 6-7) (see also above): Femur fairly short, patella about as long as wide, with long hairs (3 are bristle-shaped), tibia large/wide, with few trichobothria and long and almost bristle-shaped distal hairs, cymbium wide, subtegulum large.

Relationships and distribution: See above.

Styposis pholcoides WUNDERLICH 1988 (figs. 13-14) photo 50

1988 *Styposis pholcoides* WUNDERLICH, Beitr. Araneol., 2: 146, figs. 341-342, 738 (♀).

Remarks: The genus *Styposis* SIMON 1884 is unknown from the Dominican Republic and the whole island Hispaniola today. The male of this species is decribed here for the first time.

Material: 1♂ in Miocene amber of the Dominican Republic (exact locality unknown) and a separated piece of amber, F2228/DB/AR/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved in a light brown piece of amber which contains bands of numerous tiny bristles, and which smears by dry grinding. Its opisthosoma is dorsally inclined, its right leg II is cut off through the base of the metatarsus, loose articles of the left legs III and IV are preserved left of the spider. Hyphae exist left and above the spider's body. A Diptera: Nematocera and numerous particles of detritus are also preserved.

Description (♂).
Measurements (in mm): Body length 1.2, prosomal length 0.5; leg I: Femur 1.15, patella 0.25, tibia 1.12, metatarsus 0.92, tarsus 0.4, metatarsus III 0.38, tibia IV 0.55.
Colour mainly grey brown, legs annulated, the prosoma bears a yellow median and wide dark brown lateral bands.
Prosoma distinctly longer than wide; 6 eyes in two groups like in the female holotype, anterior median eyes largest, clypeus long, basal cheliceral articles relatively small, teeth and other mouth parts hidden. – Legs (photo) long, order I/II/IV/III, sequence of

the long and thin tibial bristles 2/2/1/2, tarsal IV comb well developed. – Opisthosoma 1.5 times longer than wide, covered with few hairs of medium length, spinnerets short. – Pedipalpus (figs. 13-14) (most parts are hidden or quite difficult observable): Patella as long as wide, tibia wider than long, embolus long.

Relationships: According to the long legs and the structures of the bulbus *S. clausis* LEVI 1960 from Panama may be most related.

Distribution: Miocene Domonican amber forest.

Family **GNAPHOSIDAE**

Most gnaphosid spiders live on the ground and are therefore extremely rare in fossil resins, see the paper on the Gnaphosidae in this volume. In the following the second member of this family in Dominican amber is described.

Scopoides dominicanus **n. sp**. (figs. 8-12) photos 52a-d

Material: Holotype ♂ in Miocene Dominican amber (exact locality unknown), F2214/DB/AR/CJW. The piece is enclosed now in artificial resin.

Preservation and syninclusions: The spider is completely and excellently preserved in a hard yellow-orange piece of amber. Some parts – e. g. the gnathocoxae, the left chelicera and the pedipalpi – are slightly deformed by (apparently natural) heating, a bent bubble of gas exists on the left side of the prosoma. A hole for yewellery exists in the small piece of amber.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 10-12): Tibial apophysis long and slender, median apophysis short, conductor existing, long, slender and in a retrolateral position. Smallest known species of the genus.

Description (♂):
Measurements (in mm): Body length 3.0, prosoma: Length 1.3, width 0.9, opisthosoma: Length 1.65, width 0.9; leg I: Femur ca. 0.8, patella 0.55, tibia 0.62, metatarsus 0.5, tarsus 0.35, tibiae II-IV 0.6/0.5/0.83, anterior spinnerets 0.3.
Colour: Prosoma, legs, opisthosomal scuta and spinnerets dark brown, opisthosoma light grey brown.

Prosoma 1.44 times longer than wide, flat, gradually narrowed anteriorly, with few hairs of medium length, fovea/thoracal fissure large, eyes (fig. 8) large, anterior medians largest, posterior row strongly procurved, posterior median eyes circular and spaced by almost their radius, clypeus short, basal cheliceral articles fairly slender, both margins of the cheliceral furrow bear apparently at least a single tooth (the posterior margin probably 2 or even 3), labium longer than wide, gnathocoxae strongly inclined, sternum not elongated between the coxae IV. – Legs fairly stout, order IV/I/II/III, hairs fairly stout, preening combs and scopulae absent, claw tufts existing, tarsal claws large, bearing long teeth, bristles numerous especially on III-IV; I-II: Femur dorsally 1/1 and 3 distally, patellae 1 hair-shaped dorsally-distally, tibiae 2/2/2 ventrally (probably less on I), metatarsi a ventral pair in the basal half; patellae III-IV bear a retrolateral bristle, tibia III bears (e.g.) a dorsal bristle. Metatarsi III-IV bear 5 strong apical bristles (fig. 9). – Opisthosoma (photo) 1.83 times longer than wide, covered with hairs of medium length, dorsal and epigastral scuta well developed, spinnerets long. – Pedipalpus (both pedipalpi are slightly deformed) (figs. 10-12): Femur slender, with a dorsal bristle in the distal half, patella longer than wide, bearing a dorsal-distal bristle, tibia with long hairs and a long and slender retrolateral apophysis, cymbium slender, bearing 2 long bristles, median apophysis slightly longer than wide, conductor long, slender and in a retrolateral position, embolus long, bearing a seam, s-shaped distally.

Relationships: The position of the eyes in combination with the long anterior spinnerets and the structures of the bulbus are as in *Scopoides* PLATNICK 1989 (= *Scopodes* CHAMBERLIN 1922). In the extant species the pedipalpal tibial apophysis and the median apophysis are distinctly shorter, and the conductor – if existing – is in a PROlateral position in contrast to the fossil species which apparently represents a species group of its own.

Distribution: Miocene Dominican amber forest. The genus *Scopoides* is unknown today from Hispaniola; the species in which a conductor exist like in *dominicanus* – in *catharius* and *kastoni* – are known from California. The proof of a member of this genus may indicate a land-bridge of Hispaniola to North or Central America in former times.

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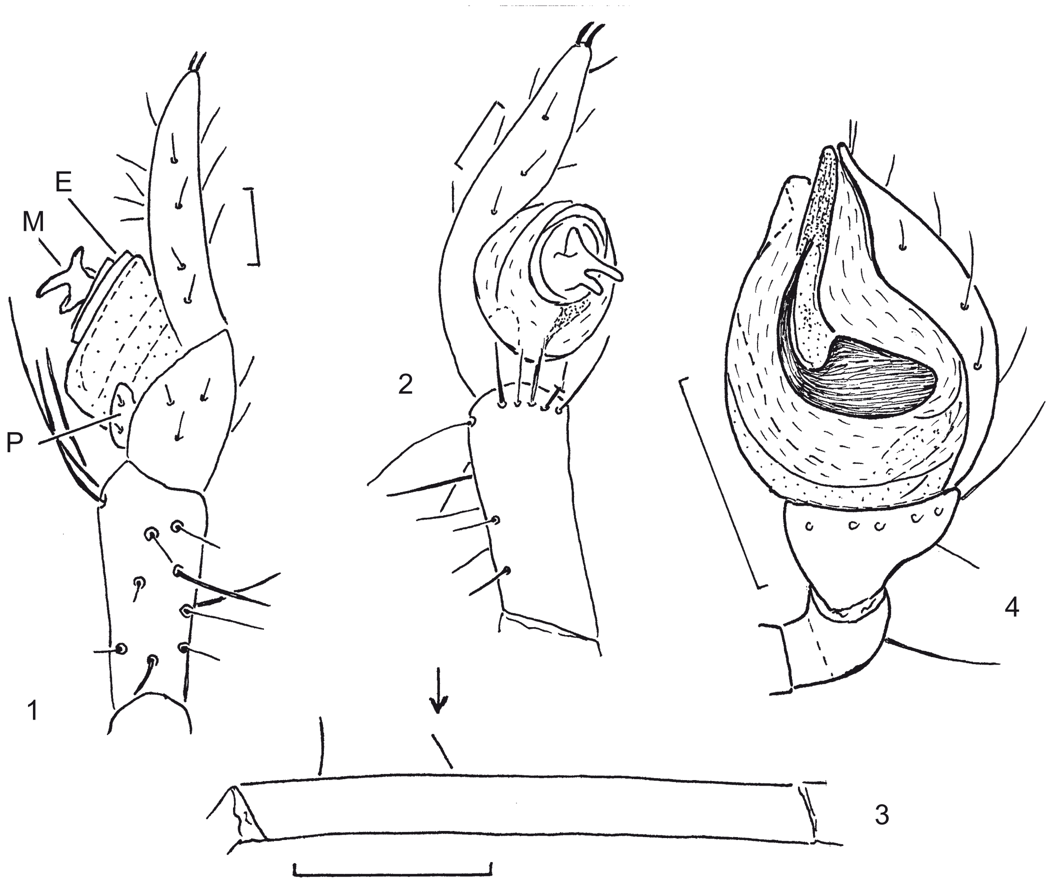
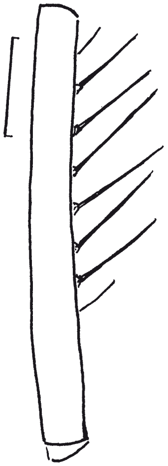


Figs. 1-2: *Fictotama maculosa* **n. sp.**, ♂; 1) retrodorsal aspect of the left pedipalpus: 2) retroventral aspect of the right pedipalpus. E = embolus, M = median apophysis, P = questionable “paracymbium”. Scale bar 0.2 mm;

figs. 3-4: *Episinus tibiaseta* **n. sp.**, ♂: 3) prolateral aspect of the right tibia I. Note the distal position of the basal bristle (arrow). Hairs are not drawn; 4) ventral aspect of the left pedipalpus. Only few hairs are drawn. Scale bars 0.5 and 0.2;



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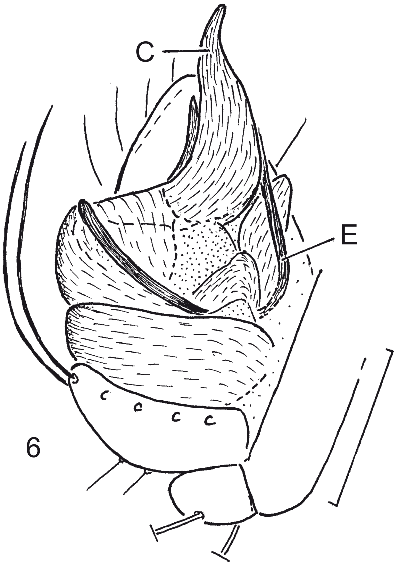

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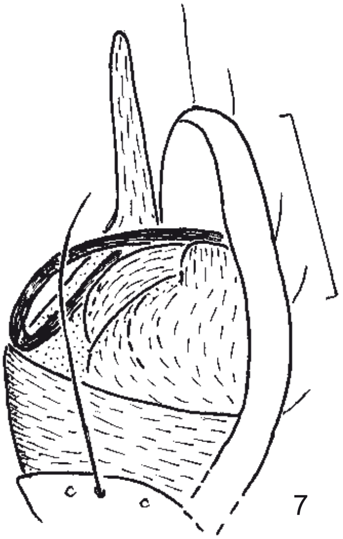

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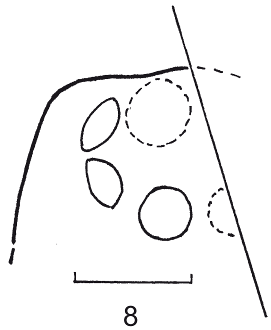

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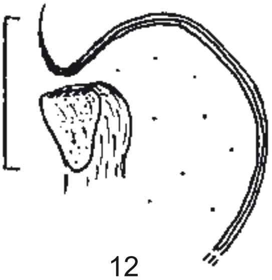

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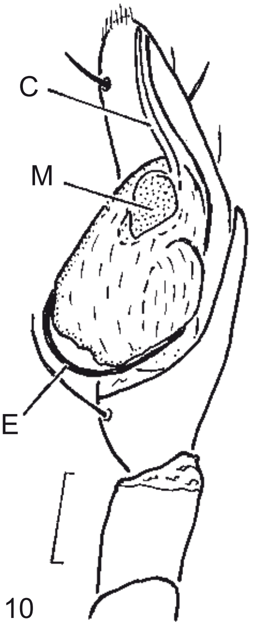

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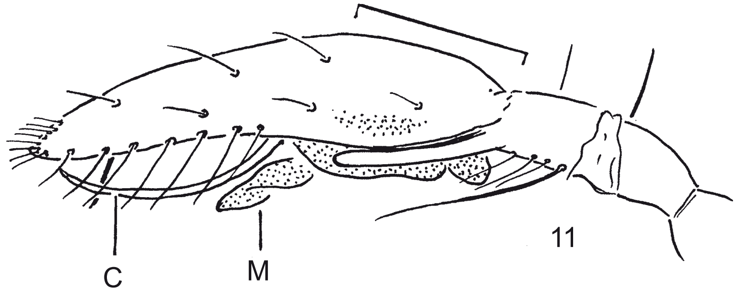

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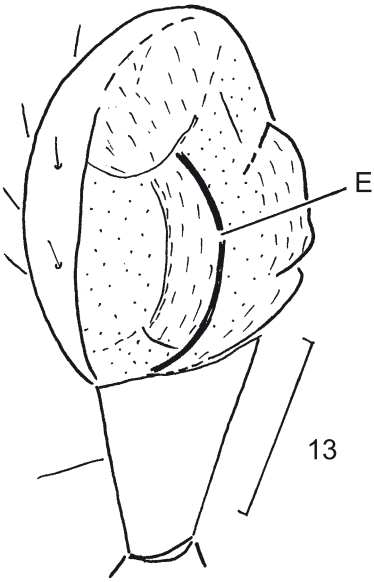

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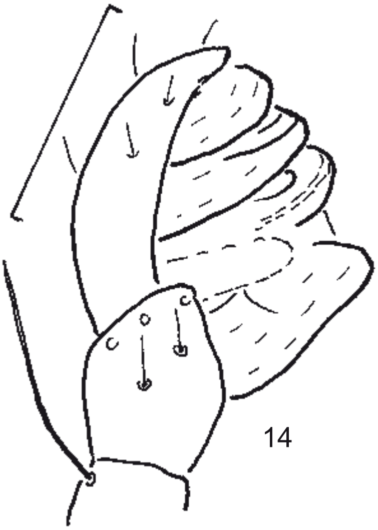

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figs. 5-7: *Femurraptor dominicanus* **n. gen. n. sp.,** ♂; 5) prodorsal aspect of the left femur I. Note the long prolateral bristles (normal hairs are not drawn); 6-7) ventral and retrolateral aspect of the right and left pedipalpus. Only few cymbial hairs are drawn. C = conductor, E = embolus. Scale bars 0.5, 0.2 and 0.2;

figs. 8-12: *Scopoides dominicanus* **n. sp**., ♂; 8) left half of the anterior part of the prosoma, dorsal aspect. The right half is hidden by the right tibia I; bubbles/emulsions cover parts of the eye lenses; 9) ventral aspect of the right metatarsus III. Hairs are not drawn; 10-11) retroventral (and slightly apical) aspect of the right pedipalpus and retrolateral aspect of the left pedipalpus; 12) ventral and slightly proapical aspect of the median apophysis and the distal part of the embolus of the right pedipalpus. C = conductor, E = embolus, M = median apophysis. Scale bars 0.1 in figs. 10) and 12), 0.2 in the remaining figs.;

figs. 13-14: *Styposis pholcoides* WUNDERLICH 1988, ♂; retroventral and retrobasal aspect of the right pedipalpus. Parts are hidden in fig. 13). Scale bar 0.1.

BEITR. ARANEOL., 6 (2011)

SOME FOSSIL SPIDERS (ARANEAE) IN EOCENE EUROPEAN AMBERS

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Abstract: The fossil (Eocene) and extant European spider (Araneae) faunas are compared on subfamily and family levels. Notes are given on taxa of several families and subfamilies as well as on the type species of *Spinitheridiosoma* WUNDERLICH 2004 (Theridiosomatidae). Comaromidae WUNDERLICH 2004 **n. stat**. (previously a subfamily of the Anapidae s. l.) is rised to family level. The family rank of the Mysmenidae, Nephilidae and Synaphridae – which all are known from Baltic amber – is accepted by the present author. – *Ero* (*Palaeoero*) *longipes* (WUNDERLICH 2004), a fossil Mimetidae with its probable spider prey is described. – The following Eocene European taxa of spiders in Baltic/Bitterfeld amber are treated: Atypidae (family new to the Baltic amber): Balticatypini **n. trib.**: *Balticatypus* **n. gen**. with *B. beigeli* ***n. sp.**, B. juvenis* **n. sp**., and *B. spinosus* **n. sp**. The family Ctenizidae is reported from the Bitterfeld deposit for the first time. The extinct genus *Clostes* MENGE is regarded as a member of the family Hexathelidae (subfamily Macrothelinae) but not of the Dipluridae; Dysderidae: *Harpactea longibulbus* **n. sp**., Oonopidae: *Orchestina* (*Baltorchestina*) *rectangulata* n. sp. and *O. forfex* **n. sp**.; Leptonetidae: *Eoleptoneta multispinae* **n. sp**., *E. pseudoarticulata* **n. sp**., and *Oligoleptoneta cymbiospina* **n. sp**.; Tetragnathidae: *Balticgnatha* **n. gen**. with *B. projectens* **n. sp**.; Mimetidae: Protomimetinae **n. subfam**.: *Protomimetus* **n. gen**., *P. longiclypeus* **n. sp**. and ?*P. breviclypeus* **n. sp**., remarks are given on fossil mimetid taxa, Anapidae: *Fossilanapis multispinae* **n. sp**., Comaromidae: *Balticoroma damzeni* **n. sp**.; the SE-Asian species of *Comaroma* BERTKAU 1889 are transferred to *Balticomaroma* WUNDERLICH 2004 (**n. comb**.); Mysmenidae: *Mysmena curvata* **n. sp**., Salticidae: *Gorgopsina rectangularis* **n. sp**.

Key words: Anapidae, Araneae, Atypidae, Baltic and Bitterfeld amber, Balticatypinae, Bitterfeld amber, Comaromidae, Cyatholipidae, Dysderidae, Eocene, Hersiliidae, Hexathelidae, Leptonetidae, Macrothelinae, Micropholcommatidae, Mimetidae, Mygalomorpha, Mysmenidae, Nephilidae, Oecobiidae, Oonopidae, Palaeogene, Protheridiidae, Protomimetinae, Salticidae, Selenopidae, Spatiatoridae, spiders, Synaphridae, Tetragnathidae.

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The **material** – if not otherwise noted – has most probably collected in the Kaliningrad (Königsberg) region, and is still kept in the collection of the present author, collection JOERG WUNDERLICH (CJW), later most probably given to the SMF.

The discovery of unknown taxa in Baltic/Bitterfeld amber is going on like an endless story. Even an extinct new tribe and an extinct new subfamily – of the famlies Atypidae and of the Mimetidae – were discovered and are described in this paper. Members of families like Gnaphosidae and Thomisidae – which are mainly dwellers on the ground/soil in sunny areas – were rarely captured in in the sticky resin as adults, but some ballooning juveniles of the families Thomisidae – see WUNDERLICH (2004 and in prep.) – and Atypidae – apparently quite rare, see below – were captured. Members of the ground-living European families Nemesiidae and Theraphosidae may be found in Baltic amber in the future, and may raise the number of spider families in this kind of amber to more than 55 – the number as known today.
In this paper I treat Eocene European spider taxa in amber (*) of several families, see the abstract and the key words. Certain Eocene spiders in Baltic amber are described in different papers in this volume, see the papers nos. (2) (Araneidae: Mangorini), (3) (Gnaphosidae), and (11) (Theridiosomatidae).
A revision of further families – e. g. Clubionidae, Corinnidae, Philodromidae, and Thomisidae – in Baltic/Bitterfeld amber is in preparation by the present author.

(*) Remarks on spider taxa of the Lowermost Eocene from France, the Oise amber deposit from the Paris Basin, especially on the first reports of the families Micropholcommatidae and Selenopidae:
Remarkably not a single member of the family Salticidae has been found in this kind of amber. This family was diverse in the Baltic and Rovno (Ukrainean) amber forests which are only some – about ten? – million years younger.

PENNEY (2007 b) described a member of the genus *Orchestina* SIMON (Oonopidae) from this kind of amber, *O. parisiensis*, which was placed in the new subgenus *Gallorchestina* by WUNDERLICH (2008: 68).

PENNEY (2007 a) furthermore described taxa of the familiy Pholcidae and allegedly of the family Selenopidae: *Selenops* sp. indet., which “clearly belongs to *Selenops*”. Although the legs are called “laterigrade” the photos 4-5 show that they are clearly prograde in contrast to the leg position of the Selenopidae, leg bristles are apparently absent and the trochanters III-IV are probably quite long (measurements were not published). Mainly according to the leg position I doubt the correct determination of this taxon which is based on an “extremely juvenile” specimen. The posterior median eyes may be quite indistinct in juvenile spiders of various families, e. g. in members of the genus *Sosybius* (Trochanteriidae) in Baltic amber.

PENNEY et al. (2007) described a male spider as a member of the family Micropholcommatidae: Textricellinae, *Cenotextricella simoni* PENNEY 2007. Today this family is restricted to the Southern Hemisphere like Archaeidae, Cyatholipidae and most Synotaxidae which all were diverse in the Eocene Baltic amber forest. This forest existed only few million years later than the amber forest of the Paris Basin, and was situated not so far away. Micropholcommatidae was synonymized with the Anapidae by SCHÜTT (2003); members of the Anapidae were quite diverse in the Baltic amber forest, and according to its characters – e.g., the long leg bristles – *Cenotextricella* is most likely a member of the Anapidae: Anapinae in my opinion. In the Micropholcommatinae and Textricellinae (both may be regarded as tribes of the Anapidae) leg bristles are absent or quite short in contrast to the long leg bristles of *Cenotextricella*.

FAUNISTIC, DIVERSITY, DISTRIBUTION

A comparison of the spider faunas on family and subfamily level in Eocene Baltic/Bitterfeld amber and in Europe today is of interest, see the additional notes below. The number of European Eocene spider families captured in amber is the same as the today’s fauna of Europe. The fauna captured in the sticky resin mainly originates from higher strata of the vegetation, and I suppose the real Eocene fauna to be up to 20 % higher on family level than the fauna of today. Of special interest is the ABSENCE of certain European higher taxa in Baltic/Bitterfeld amber. The taxa are listed in alphabetical order within their infraorders:

(a) Spider families – and selected/most subfamilies – known from Baltic/Bitterfeld amber but **not from Europe today**:

INFRAORDER MYGALOMORPHA:
(The genus *Clostes* MENGE 1869 (*) is more likely a member of the family Hexathelidae: Macrothelinae than of the Dipluridae in which it usually has been listed. Macrothelinae is known from Europe today in contrast to the Hexathelidae).

INFRAORDER ARANEOMORPHA:
Acrometinae (extinct): Subfamily of the Synotaxidae,
Archaeidae (*), Baltsuccinidae (extinct),
Borboropactidae (*) (probably a subfamily of the Thomisidae),
  (Cheiracanthinae: See Eutichurinae of the Clubionidae),
  Cocalodinae (*): Subfamily of the Salticidae,
Cyatholipidae (*),
Deinopidae (*),
  ?Diphyinae: Subfamily of the Tetragnathidae,
  Eotrechaleinae (extinct), probably a subfamily of the Pisauridae,
Ephalmatoridae (extinct),
  Eutichurinae (= Cheiracanthinae): Subfamily of the Clubionidae,
?Insecutoridae (extinct; probably part of the Pisauridae),
  Leucauginae: Subfamily of the Tetragnathidae (**),
  Miraraneinae (extinct): Subfamily of the Araneidae,
  Mizagallinae (extinct): Subfamily of the Dictynidae,
  Mizaliinae (extinct): Subfamily of the Oecobiidae,
Nephilidae (*),
Plectreuridae (*),
Protheridiidae (extinct),
  Protomimetinae (extinct): n. subfam. of the Mimetidae,
Spatiatoridae (extinct),
  Storenomorphinae (*): Subfamily of the Zodariidae,
Synotaxidae (*),
Tetrablemmidae (*),
?Trechaleidae: See Eotrechaleinae,
Trochanteriidae (*): The family is not known from Europe but a single species of the genus *Platyoides* occurs on the Canary Islands.

(*) = taxa which are extinct in Europe TODAY, and have mainly a tropical distribution. The families Archaeidae, Cyatholipidae, and almost all Synotaxidae are restricted to the Southern Hemisphere today. Their presence in the Eocene of Europe demonstrate their very wide distribution in the Palaeogene and may doubt their Gondwanan origin.

(**) A single leucognathine species of the genus *Sancus* TULLGREN 1910 (= *Leucognatha* WUNDERLICH) occurs on the Acores.

Remark: Most of these taxa have a mainly tropical distribution.

(b) Spider families (underlined) – and selected/most subfamilies (§)– known from Europe today but **not from Baltic/Bitterfeld amber**:

INFRAORDER MYGALOMORPHA:
Cyrtaucheniidae,
Nemesiidae,
Theraphosidae.
(Idiopidae: A single species of the genus *Titanidiops* occurs on the Canary Islands).

INFRAORDER ARANEOMORPHA:
§ Argiopinae and other subfamilies of the Araneidae,
§ Argyrodinae: Subfamily of the Theridiidae,
Agyronetidae: (= Cybaeidae),
§ Castianeirinae of the Corinnidae
Cithaeronidae (*),
Filistatidae,
Eresidae,
§ Gnaphosinae: The advanced subfamilies like Gnaphosinae,
§ Erigoninae: Subfamily of the Linyphiidae,
Lycosidae,
§ Oecobiinae (tribes Oecobiini and Urocteini): Subfamily of the Oecobiidae,
Palpimanidae,
Philodromidae,
Phyxelidae (*),
Prodidomidae,
§ Salticinae and other advanced subfamilies of the Salticidae; see below,
Sicariidae: Loxoscelinae,
§ Stemonyphantinae: Subfamily of the Linyphiidae,
Symphytognatidae (*),
§ Tetragnathinae: Subfamily of the Tetragnathidae,
§ Theridiinae: Subfamily of the Theridiidae: Questionable proof in Baltic amber,
Titanoecidae,
§ Trachelinae: Subfamily of the Corinnidae,
§ Zorinae: Subfamily of the Zoridae/Liocranidae s. l.,
§ Zoropsinae: Subfamily of the Zoropsidae.

(*) = relict taxa in Europe which are extremely rare in this region; each family is represented in Europe by a single species only. – The first European member of the family Symphytognathidae was recently discovered in caves of Portugal. The family is mainly distributed in the tropics and in the Southern Hemisphere but extremely rare in the Holarctic Region. Further relict taxa may be the Loxoscelidae (probably a part of the Sicariidae), and the Stemonyphantinae (Linyphiidae) which each are present with a single genus in Europe.

Remarks:

(1) Several of these (sub)families may be relatively young in the geological sense, quite advanced as well, and today extremely diverse, especially Linyphiidae: Erigoninae, Lycosidae, certain Salticidae (various subfamilies, see below), Theridiidae: Theridiinae, and certain Thomisidae like Thomisinae.

(2) Members of the ancient suborder Mesothele (the family Liphistiidae), and of the ancient family Hypochilidae have not (yet?) been found in Baltic amber, and are absent from Europe today. Members of the ancient families Eresidae and Filistatidae occur in Europe but they live mainly outside of forests, and are hardly captured by resin.

Notes regarding the list of spider faunas which was given by WUNDERLICH (2004: 207-209) which are preserved in selected kinds of amber and of Europe today:
In this list the families Atypidae and Hexathelidae have to be added for Baltic amber (this paper) and Europe today, the family Dipluridae – Macrothelidae is a subfamily of the Hexathelidae but not of the Dipluridae – has to remove from the list of Baltic amber spider families as well as the family Philodromidae. The families Comaromidae (n. stat.), Mysmenidae, Nephilidae, and Synaphridae – previously regarded as subfamilies – have to add to the list of the Baltic amber fauna; Comaromidae, Mysmenidae and Synaphridae are excluded from the Anapidae s. l., and have also to add to the extant spider fauna of Europe, the Hahniidae are excluded from the Dictynidae s. l.: Hahniinae. The family Symphytognathidae, and the subfamily Castianeirinae of the Corinnidae (a single species each from Portugal rsp. Spain) have to add to the European fauna. Loxoscelinae is regarded as a part of the Sicariidae. *Platyoides* of the family Trochanteriidae, and *Titanidiops* of the family Idiopidae are known from the Canary Islands which are a part of the Western Palaearctic Region; Idiopidae is unknown from the Baltic amber, and both families are unknown from Europe. The proof of the subfamily Micronetinae of the Linyphiidae is sure now but the proof of the Theridiinae of the Theridiidae is still unsure. At least *Anniculus* PETRUNKEVITCH 1942 – and probably *Zodariodamus* WUNDERLICH 2004 – are apparently members of the subfamily Storenomorphinae of the Zodariidae.

THE FOSSIL TAXA

A. Infraorder MYGALOMORPHA

Fossil mygalomorph spiders may easily be recognized by their powerful and strongly prolongated chelicerae (fig. 2, photos 1-4); if adult they are usually large spiders, but most specimens in Baltic amber are juvenile and only few mms long. Their two pairs of lungs and their sternal sigillae are frequently difficult or not observable in fossils in amber.

Up to now only members of the families Hexathelidae (*) (subfamily Macrothelinae, previously usually listed under Dipluridae – with the extinct genus *Clostes* MENGE 1869) – and Ctenizidae – the genera *Baltocteniza* ESKOV & ZONSTEIN 2000, *Electrocteniza* ESKOV & ZONSTEIN, and *Ummidia* THORELL 1875 – have been published from Baltic amber, see WUNDERLICH (2004: 602-612, 621) and below. In the present paper I add the family Atypidae as new to the Eocene European amber forests, with an extinct genus which I place in a new tribe. It is based on two small spiderlings which are excellently preserved and show important taxonomic characters which allow a differentiating diagnosis.

Mygalomorpha has still not reported from the Bitterfeld deposit and from Ukrainian Rovno amber.

I regard the relationships of *Electrocteniza* (published under Ctenizidae) as unsure, see the key below. The only surviving mygalomorph genus of the Baltic/Bitterfeld amber forest is *Ummidia* (Ctenizidae).

Members of the family Hexathelidae (*Clostes*) in Baltic amber are not so rare as other mygalomorph spiders which live subterraneously in tubes: The Trapdoor Spiders (Ctenizidae) whose tube is closed by a cover, and the Purseweb Spiders (Atypidae) whose European members build – besides a subterraneous tube – a finger-shaped blind tube above/on the surface of the ground today. This life style is apparently the reason for the rarity of fossil Atypidae and Ctenizidae in the fossil resin. We do not know the life style of the fossil spiders but the stout spines on patellae III-IV (in *Balticatypus*) and the basal hooks on their fangs – frequent in spiders of today which possess a burrying behaviour – may indicate a subterraneous life of the fossil Atypidae, too.

The fossil members of the families Atypidae (*Balticatypus*) and Hexathelidae (Macrothelinae: *Clostes*) are simply known from juvenile spiders up to now; only the Ctenizidae are known from adults (males).

The proof of fossil members of the family Atypidae may be a great surprise at first sight but small juvenile Atypidae of today are known as pronounced aeronautics (ballooners), and the three tiny atypid spiders which are described below – all possess about the same body size – were probably captured by the sticky fossil resin while “flying” as ballooners, i. e. drifted by the wind.

(*) The single known species – *Clostes priscus* MENGE 1869 – is only known from juveniles and may be a “sampling species”. PETRUNKEVITCH (1946) regarded *Clostes* as a member of the subfamily Macrothelinae (in former times regarded as a member of the family Dipluridae) which is now placed in the Hexathelidae, and I agree with this opinion, see WUNDERLICH (1986: 236-237, photos 291-292), although Dipluridae and Hexathelidae are probably not monophyletic taxa. If Macrothelinae really is a member of the Hexathelidae the family Dipluridae has to remove from the list of families in Baltic amber, as well as the “Dipluridae sp.” sensu WUNDERLICH (2004: 607-608) (= members of the family Hexathelidae).

Diversity: Three mygalomorph families are known from the Eocene European amber forests: Atypidae, Ctenizidae, and Hexathelidae (Macrothelinae) but six families from Europe today (see the paper on West-Palaearctic spiders in this volume): Atypidae, Ctenizidae, Cyrtaucheniidae, Hexathelidae, Nemesiidae, and Theraphosidae. With the exception of the genera *Clostes* (which may be a sampling taxon) and *Ummidia* most species – and even genera – of the Mygalomorpha in Baltic amber are only known by a single specimen. This distribution (and the double number of extant mygalomorph families in this area) may indicate that the real number of taxa and even families of the – mainly subtropical! – Eocene European forests has been much higher than known actually.

Comparison of the mygalomorph spider families which are known from extant taxa and from Eocene (Baltic/Bitterfeld) amber forests:

Extant	Eocene
Atypidae	Atypidae
Ctenizidae	Ctenizidae
Cyrtaucheniidae	–
Hexathelidae	Hexathelidae
Nemesiidae	–
Theraphosidae	–

Key to the mygalomorph families in Eocene European ambers:
(which are known up to the end of 2010) (Extant families: See p. 162)

1. Prosoma wrinkled in the known spiders in Baltic amber, see WUNDERLICH (2004: fig. 4). Fovea strongly developed and u-shaped (procurved). Tibia III bears in the taxa in Baltic amber usually – except in *Electrocteniza* (*) – a distinct dorsal depression (fig. 1). Chelicerae with an apical rastellum (fig. 18) except in *Electrocteniza*. Legs with numerous very strong/stout bristles/spines, except in *Electrocteniza*. Gnathocoxae not prolongated. Two pairs of spinnerets, the posteriors short. 3 genera, see WUNDERLICH (2004: 210). The most frequent members of the genus *Ummidia* possess club-shaped tarsal trichobothria at least on the legs I-II, see WUNDERLICH (2000.) (**). . . . . Ctenizidae

- Prosoma not wrinkled (wrinkled in a questionable member of the Dipluridae, see WUNDERLICH (2004: 604)). Fovea narrow. Depression on tibia III and rastellum absent. Leg spines absent (Hexathelidae) or existing (in some Atypidae) (figs 12, 15). Gnathocoxae short or prolongated: in the Atypidae (figs. 3, 4, 7, 14). 2 or 3 pairs of spinnerets, the posteriors of medium length (figs. 2, 8-9) or very long (fig. 17). Cub-shaped trichobothria absent. 2

2(1) Posterior spinnerets long (fig. 17, photo), longer than the chelicerae, they may be as long as the width of the prosoma, see WUNDERLICH (1986: Photos p. 236-237 and 2004: Photos 7, 10). Chelicerae shorter than half of the width of the prosoma (same photos, and photo 1). Opisthosomal scutum absent. Prosoma oval (same photos). Gnathocoxae short, not strongly prolongated. 2 pairs of spinnerets. Subfamily Macrothelinae (see above): *Clostes priscus* MENGE, apparently the most frequent mygalomorph spider genus and species in Baltic amber. Photo 1 . . . . Hexathelidae

- Posterior spinnerets fairly short (figs. 2, 8- 9, 16, photos 2-4), shorter than the powerful and very long chelicerae which are almost as long as the prosomal length in adult spiders (fig. 2), in juveniles at least half of the prosomal length (photos). Opisthosoma with a dorsal scutum (figs. 2, 8, photo) which may be indistinct especially in juveniles but usually distinct in adult males. Prosoma wide or even widest anteriorly (fig. 2, photo). Gnathocoxae strongly prolongated (figs. 3-4, photo) in contrast to other members of Mygalomorpha. 3 pairs of spinnerets (fig. 9). *Balticatypus* n. gen., quite rare . . Atypidae

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(*) Because of several unusual characters – e. g. the absence of a cheliceral rastellum and different leg spination – I regard *Electrocteniza* as a doubtful taxon of the family Ctenizidae.

(**) See the paper on West-Palaearctic spiders in this volume (p. 162) in which a key to the extant European families and genera is given. The club-shaped trichobothria must not be mistaken for tiny droplets which may be present at the tip of some normal hairs.

Family ATYPIDAE

Atypidae is surely recognizable by its unique elongated gnathocoxae, see figs. 3, 4, 7, photos 2b, 3c, but in fossil spiders the ventral side of the body is frequently covered with a white emulsion, and so this character may be hidden in contrast to the well preserved fossils in Baltic amber which are described below.
The main family characters are listed in the key above; the function of the prolongated gnathocoxae is unknown. I may add that 3 tarsal claws and 8 eyes on a raised field exist (fig. 6), the apical articles of the anterior median spinnerets end truncate in extant taxa but conical in the Balticatypini (figs. 9, 16, photo 4c), club-shaped leg trichobothria and tarsal scopulae are absent, the labium is fused to the sternum (fig. 7), spines (so- called cuspules) on labium and gnathocoxae are absent in adult spiders, but gnathocoxal spines may exist in extant juvenile spiders in a large ventral field (figs. 4, 14); the European spiders live subterraneously and build usually masket TUBES LYING ON THE GROUND (different in the not-European genus *Calommata*).

Three extant genera of the subfamily Atypinae are known, see below.

Fossils: Two taxa have been described under Atypidae (both are based on a single juvenile rsp. female in stone, and are not well preserved):

(1) *Eoatypus woodwardi* MCCOOKE 1888 (Palaeogene, Great Britain) is now listed under "Opisthothelae incertae sedis" in the World Spider Catalog by PLATNICK (DUNLOP); its prosomal shape is different from the Atypidae.

(2) *Ambiortiphagus ponomarenkoi* ESKOV & ZONSHTEIN 1990 (Cretaceous: Zentral Mongolia). For this species the authors introduced the new subfamily Ambiortiphaginae of the Atypidae. The taxon has some atypid characters like the raised eye field, but the chelicerae are shorter than in members of (extant) Atypidae, and the prosoma is not widest anteriorly but in the middle (like in *Calommata*), the spinnerets are unknown. The most important character of the family Atypidae – the prolongated gnathocoxae – is unknown in *Ambiortiphagus.* Therefore I regard this taxon as a dubious taxon of the Atypidae, probably to be excluded from this family, probably related to the Antrodiaetidae. I regard the taxon described below as the only sure fossil proof of this family; Atypidae is actually doubtless known only since the Eocene.

Description of the new taxa:

BALTICATYPINI n. trib.

Type genus (by monotypy): *Balticatypus* n. gen.

Diagnosis (based on juv., nymphs): Anterior (lateral) spinnerets not much smaller than the medians which end convex (fig. 16, photos 2b, 3c). Labrum with a spur at least in *B. juvenis* (fig. 7).

Relationships: The character of body, legs and eyes, as well as the existence of prolongated gnathocoxae (fig. 7, photos) are as in extant Atypidae but in the extant members of the three known genera of the Atypidae (members of the Atypini) the articles of the anterior (lateral) spinnerets are distinctly reduced (fig. 3a) – see the paragraph on mygalomorph spiders in the paper of West-palaearctic spiders in this volume p. 160 –, the apical articles of the median spinnerets end truncate (fig. 3a) in contrast to the fossil Eocene spiders (fig. 16), and a labral spur (fig. 6) is absent to my knowledge. A field of spines on the gnathocoxal outgrowth in juvenile spiders (figs. 7, 14, photos) exists in extant and in fossil spiders as well.

Distribution: Eocene Baltic amber forest; still unknown from the Bitterfeld deposit, and unknown from the Ukrainean Rovno amber, too.

Balticatypus n. gen.

The gender of the name is masculine.

Type species: *Balticatypus juvenis* n. sp.; further species: *B. beigeli* n. sp., and B. *spinosus* n. sp.

Diagnosis: See above.

Relationships (see also above): In *Atypus* LATREILLE 1804 (Holarctic and SE-Asia, see SCHWENDINGER (1991)), *Calommata* LUCAS 1837 (Israel, S-Africa and SE-Asia), and *Sphodros* WALCKENAER 1835 (North America) the same differences of the Atypini exist as listed above. In *Calommata* the cephalic part is furthermore strongly raised and the anterior margin of the sternum is slightly inclined (concave) medially – see LEVY (2007: figs. 1, 8) –, the shape of the prosoma is more oval (widest near the middle), the first leg pair is rather stout in the female, the tibia of the male pedipalpus is strongly enlarged, and the capture tube is different.

Behaviour and ecology: The existence of stout spines on the legs II-IV (fig. 12) and the hook on the fangs (fig. 7) indicate a burrowing behaviour of these spiders. The extreme rarity of *Balticatypus* may be a hint that these spiders lived not inside the close Baltic amber forest; the present juvenile spiders were probably captured by the sticky fossil resin while “flying” as ballooners, i. e. drifted by the wind. A similar behaviour is known from extant small juvenile Atypidae.

Distribution: Eocene Baltic amber forest.

***Balticatypus juvenis* n. gen. n. sp.** (figs. 6-12) photos 2a-b

Material: Holotype juv. in Eocene Baltic amber, F2229/BB/AR/CJW; later probably SMF.

Preservation and syninclusions: The spider is completely and very well preserved emulsions are absent. The two distal articles of the left pedipalpus are swollen artificially (by decomposing gas?) in contrast to the articles of the right pedipalpus, the left gnathocoxa is spread to the side so that the labrum is observable. Threads are preserved which originate from the posterior spinnerets. The “sweet” smell during dry polishing indicates that the piece of amber was not heated; so apparently the sun has cleared the piece from all sides. Syninclusions are absent.

Diagnosis (juv.): The legs II-IV bear some short strong bristles (fig. 12), the gnathocoxal outgrowth bears only tiny cuspules (fig. 7), the basal cheliceral articles bear dorsally some thin hairs in an irregular position (photo).

Description (juv.):
Measurements (in mm): Body length 1.25, prosoma: Length 0.6, width 0.5, length of the basal cheliceral articles 0.33; femora I-IV 0.27/0.28/0.28/0.29; leg I: Patella 0.13, tibia 0.15, metatarsus 0.15, tarsus 0.17, tibia IV 0.15.
Colour: Prosoma and legs medium brown, opisthosoma light brown.
Prosoma (figs. 5-7, photos) 1.2 times longer than wide, smooth and glittering, anteriorly widest, fovea a tiny circular “hole”, 8 small eyes on a raised and protruding wide field, lenses hard to recognize, anterior medians spaced by almost their diameter, anterior laterals largest and widely spaced from the medians. Chelicerae powerful, raised dorsally-basally, basal articles retroventrally basally with a large field of tiny denticles (observable in the holotype, and also existing in other fossil congenerics), teeth well developed, fangs large, bearing a dorsal-basal hook, labium small, fused to the sternum (a furrow exists), labrum larger, bearing an apical spur, gnathocoxae strongly prolongated (the left one is hidden in the papatype, its right one is 0.35 mm long), spines are absent, sternum slightly longer than wide, fairly wide posteriorly, margin not folded,

sigillae not observable. The large pedipalpal claw of the paratype bears 2 long teeth and a short tooth. – Legs (figs. 11-12, photos) stout, IV longest, tibiae and metatarsi bear long bristle-shaped hairs; few short and strong bristles/spines exist on the legs II-IV beyond the femur. Scopulae and tarsal trichobothria absent, tibial trichobothria very long, the retroclaw IV is smooth (fig. 11), the proclaw bears apparently 1 or 2 large teeth. – Opisthosoma (figs. 8-10, photos) oval, with a small dorsal scutum anteriorly dorsally with short and some quite long hairs. Spinnerets: The anterior medians stout, bipartite, apical article conical; 3 spigots are observable, laterals long and slender, posteriors tripartite, only fairly wide spaced, fairly stout, apical article conical. Openings of the book lungs slit-like. Anal tubercle fairly large, undivided.

Relationships: See *B. spinosus* n. sp.. – In *B. beigeli* n. sp. the legs are completely bristle-less, and the basal cheliceral articles bear dorsally a row of long and erect hairs.

Distribution: Eocene Baltic amber forest.

***Balticatypus beigeli* n. gen. n. sp.** (fig. 13) photos 3a-d

Derivatio nominis: This species is dedicated to my friend ALEX BEIGEL in Würselen, who considered the specimen of his private collection which is described below to be a member of the family Atypidae.

Material: Holotype juv. in Eocene Baltic amber and a separated piece of amber, F2261/BB/AR/CJW, ex coll. ALEX BEIGEL BB-202, later probably SMF.

Preservation and syninclusions: The spider is completely and very well preserved in a piece of amber which was slightly heated; emulsions and further inclusions are absent, a gas bubble exists below the mouth parts, the opisthosoma is ventrally longitudinally fairly compressed.

Diagnosis (juv.): Legs completely bristle-less, basal cheliceral articles dorsally with a row of long and erect hairs (photo).

Description (juv.):
Measurements (in mm): Body length 1.6, prosomal length 0.8, length of a basal cheliceral article 0.4; femur I ca. 0.6, leg II: Tibia ca. 0.2, metatarsus 0.25, tarsus 0.25.
Colour as in *B. juvenis* n. sp..
Prosoma (photo) ca. 1.3 times longer than wide, similar to *B. juvenis* so far observable, but basal cheliceral articles dorsally with a row of long erect hairs. Fovea indistinct, transverse (?). Most ventral mouth parts are hidden, the right strongly prolongated gnathocoxa is well observable, spines are absent, the sternal sigillae are not recognizable, sternum slightly longer than wide, it spaces the coxae IV by almost their diameter. – Legs (fig. 13, photo) fairly stout, completely bristle-less, bearing long hairs and tricho-

bothria, tarsal trichobothria absent, paired and unpaired tarsal II claws with at least a single large tooth. – Opisthosoma similar to *B. juvenis*, the three pairs of spinnerets are well preserved and well observable, the posterior spinnerets are a bit more slender than in *B. juvenis*.

Relationships: See *B. juvenis* n. sp.

Distribution: Eocene Baltic amber forest.

***Balticatypus spinosus* n. gen. n. sp**. (figs. 14-16) photos 4a-c

Material: Holotype juv. in Eocene Baltic amber, coll. FRIEDHELM EICHMANN Ar. 80, later probably Geol.-Palaeontol. Inst. Univ. Hamburg.

Preservation and syninclusions: The spider is completely and very well preserved, white emulsions are absent, only the left sides of sternum, labium and left gnathocoxa are covered with an emulsion. A white "cloud", 1 cm long and partly cut off (probably remains of an egg sac) within threads of spiders silk are preserved behind the spider; some threads reach forward near to the holotype and bear few stellate hairs. Further syninclusions: ½ small juv. three-clawed araneomorph spider of the RTA-clade, ½ Diptera, and ½ insect indet.; all are partly cut off.

Diagnosis (juv.): Spines exist on the gnathocoxae and on some legs (figs. 14-15).

Description (juv.):
Measurements (in mm): Body length 1.6, prosoma: Length 0.85, width 0.8; length of the basal cheliceral articles ca. 0.6, length of the fangs ca. 0.55; leg I: Femur 0.45, metatarsus 0.27, tarsus 0.25, femur III 0.43.
Colour dank brown.
Prosoma (photos) not much longer than wide, wide anteriorly, smooth and glancing, cephalic part only fairly raised, distinctly inclined laterally between cephalic part and thorax, fovea low and wide, eye field 0.25 mm wide, eyes similar to *juvenis*, chelicerae powerful, ventrally finelly corniculate, fangs also very long, only four teeth are observable retrolaterally of the fangs, labium wider than long, fused to the sternum, anterior gnathocoxal outgrowth prolongated and spiny (fig. 14), sternum slightly longer than wide, apparently not elongated between the coxae IV; one or two indistinct sigillae are observable near the right margin. – The large pedipalpal claw bears 2 large and probably 2 tiny teeth. – Legs stout, IV longest, III slightly shorter thah II. Few thick bristles, femora none, patellae none besides a thin prolateral one on III, metatarsi with few strong bristles especially on II (fig. 15). Trichobothria: Tarsi none, metatarsi with a long one near the middle. The paired tarsal claws bear at least 2 long teeth. – Opisthosoma (photos) oval and fairly short, bearing dorsally few shorter hairs, dorsally-anteriorly with a short and weakly developed scutum. Two pairs of lung covers are observable. Three pairs of rather stout spinnerets (fig. 16), the anteriors (laterals) are pseudoarticulated,

not much smaller than the medians which end conically; posterior spinnerets relatively long, 3 articles, the apical one longest. Anal tubercle large.

Relationships: The legs bear few stronger bristles like in *B. juvenis* n. sp.; in *juvenis* the patella III bears some spines (fig. 12), the gnathocoxal outgrowth bears only weak/ indistinct spines (fig. 7), and the number of cheliceral teeth may be higher.

Distribution: Eocene Baltic amber forest.

Family CTENIZIDAE

?*Ummidia* sp. indet.

Material: 1♂ in Eocene amber from the Bitterfeld deposit, coll. HEINRICH GRABENHORST Ar-38. A piece of amber has beeen separated, no. Ar-38a), which includes a rare mite. Its description is in preparation.

The spider is captured and spun in in a three-dimensional spiders web, and has apparently been sucked out by an unknown spider. Some ?sticky droplets are present on the threads but not near the spider. The spider's legs are fixed near its body by the threads. The length of the sternum is about 1.5 mm, the prosoma is corniculate dorsally, the tarsi bear some club-shaped trichobothria like in *Ummidia* but the tibia III is almost straight in contrast to *Ummidia*. Most parts of the pedipalpi are hidden, their tibiae are very long. – Further syninclusions: A part of a small spider's exuvia originates probably from a member of the family Theridiidae. 1 Collembola and some stellate hairs exist in the same piece of amber.

This is the first record of a member of the genus *Ummidia* THORELL 1875 as well as of the family Ctenizidae in amber from the Bitterfeld deposit.

Family HEXATHELIDAE, sufamily MACROTHELINAE

Relationships: See above.

New material: A beautiful preserved juvenile spider is stored in the coll. of CARSTEN GRÖHN in Hamburg, no. 5946, now Geolog. Inst. Univ. Hamburg no. 4487. Photo 1.

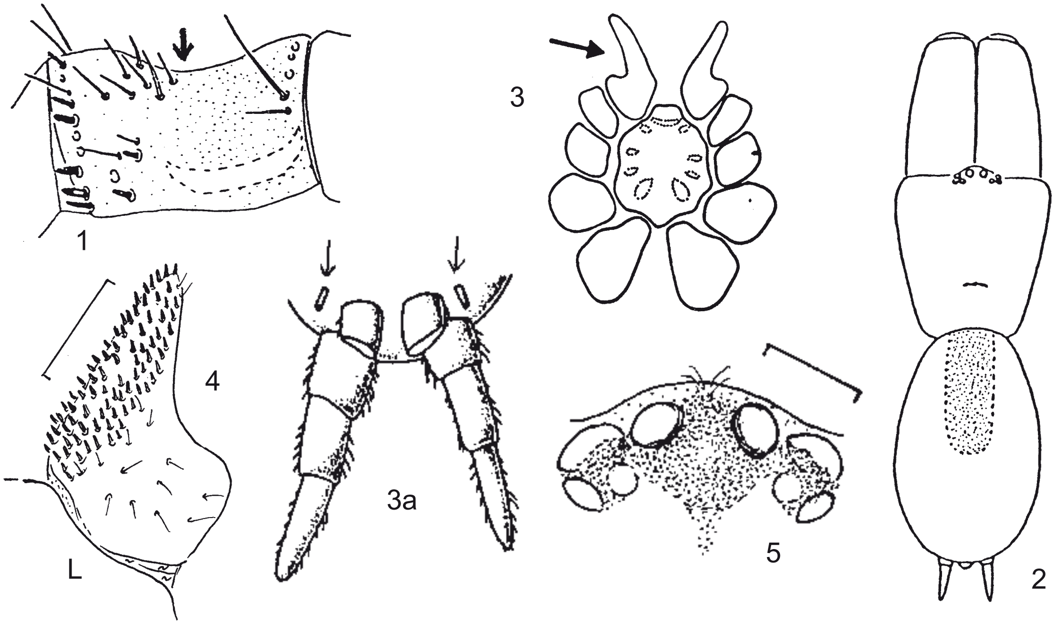


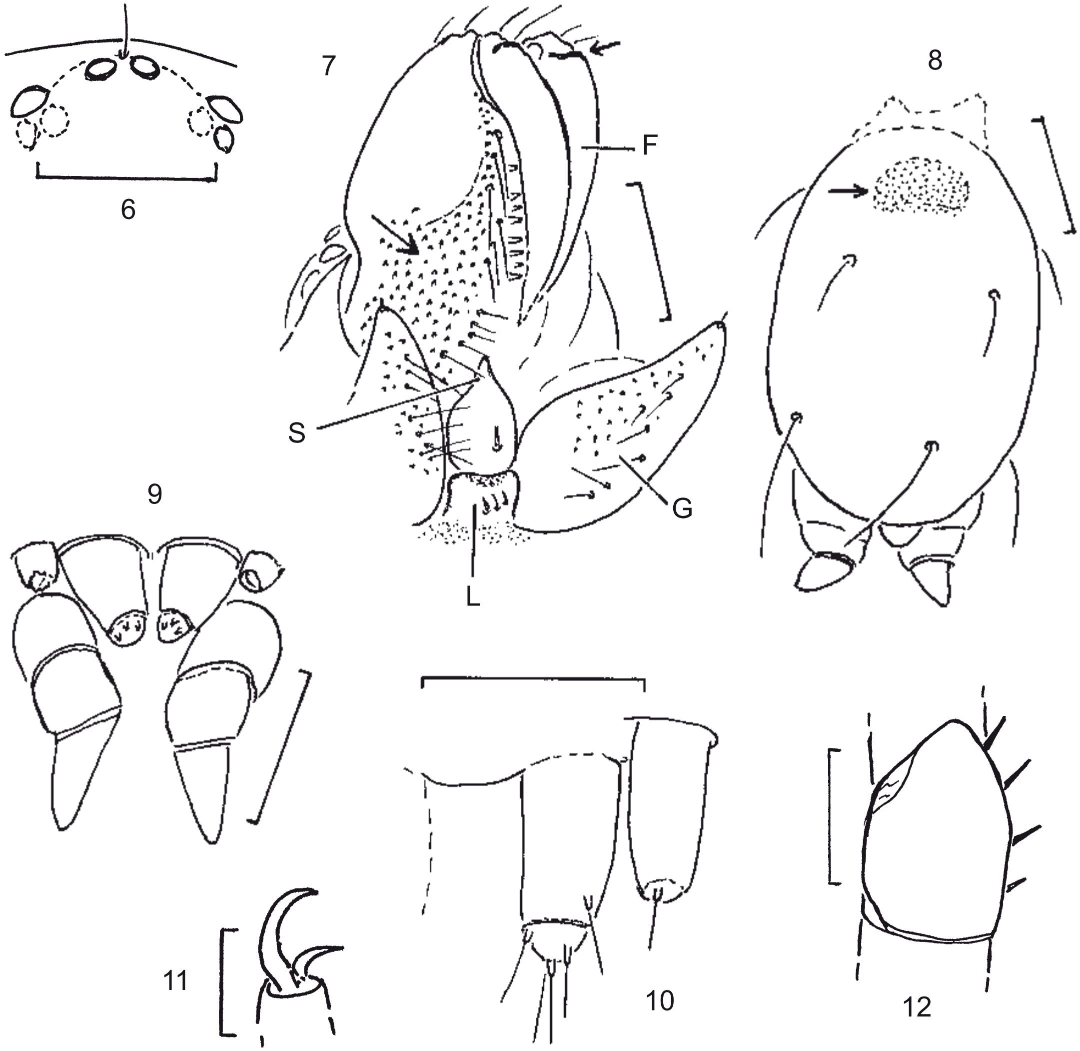
Fig. 1) *Ummidia* sp. (Ctenizidae), lateral aspect of tibia III. Note the dorsal depression (arrow);

fig. 2) *Atypus* sp., extant adult specimen, dorsal aspect of the body; the scutum may be much larger in adult males;

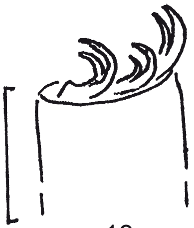
fig. 3) Atypidae sp., extant adult specimen, ventral aspect of the prosoma. The arrow points to the right strongly prolongated gnathocoxa. Taken from DIPPENAAR-SCHOEMAN & JOCQUE (1997);

fig. 3a) Atypidae sp., extant adult specimen, ventral aspect of the spinnerets. The arrows point to the very small anterior lateral spinnerets. Taken from DIPPENAAR-SCHOEMAN & JOCQUE (1997);

figs. 4-5: *Atypus piceus* (SULZER 1776), extant, juvenile specimen, body length 5.5 mm; 4) ventral aspect of the left gnathocoxa. Note the dense field of spines which are absent in adult extant spiders (fig. 3), and in juvenile Eocene spiders in Baltic amber , too (fig. 7). Juvenile spiders may use these spines for eating in contrast to adult spiders; 5) dorsal aspect of the eyes. The anterior lateral eyes are distinctly smaller in adult spiders;



figs. 6-12: <u>*Balticatypus juvenis*</u> **n. gen. n. sp**., extinct, juvenile specimen in Baltic amber, body length 1.25 mm; 6) dorsal aspect of the eyes. The size of the eye lenses may be quite different in adult spiders; 7) ventral-right (and slightly anterior) aspect of the mouth parts. The long arrow points to the field of the right basal cheliceral article, the short arrow points to the basal hook on the left fang; the left gnathocoxa – which is strongly prolongated in all members of the family Atypidae – is spread laterally in an unnatural position in this fossil in contrast to the right gnathocoxa; 8) dorsal aspect of the opisthosoma. Note the small scutum (arrow); 9) ventral-posterior aspect of the spinnerets; 10) ventral aspect of the left anterior and median spinnerets. Hairs are not drawn; 11) retroventral aspect of the tip of the right tarsus IV, showing the unpaired claw and one of the paired claws; 12) retrodorsal aspect of the left patella III. Note the four prolateral strong bristles. Hairs are not drawn. F = left fang, G = left gnathocoxa which bears weak cuspules, L = labium, S = anterior spur of the labrium. Scale bars 0.5 mm in fig. 4), 0.05 in fig. 11), 0.1 in fig. 12), 0.2 in the remaining figs.;



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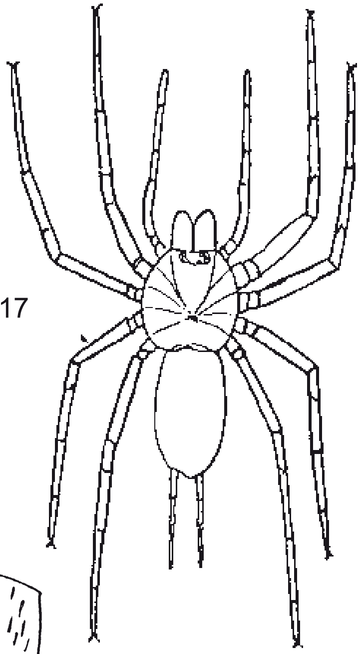

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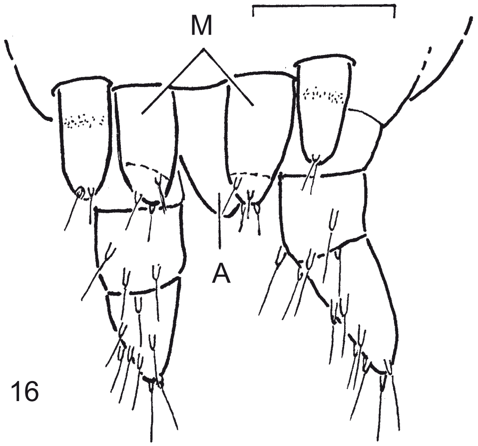

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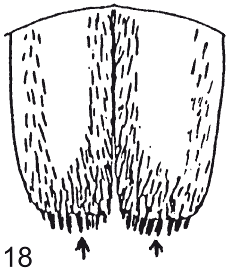

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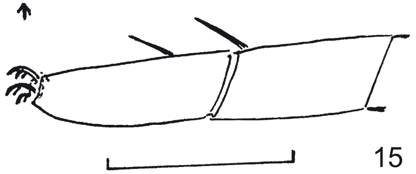

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fig. 13) Balticatypus beigeli **n. gen. n. sp**., extinct, juvenile specimen in Baltic amber, body length 1.6 mm; retrolateral (slightly dorsal-distal) aspect of the tip of the left tarsus II. The paired claws as well as the unpaired claw possess apparently a single large tooth. Hairs are not drawn. Scale bar 0.05;

figs. 14-16: Balticatypus spinosus **n. gen. n. sp**., extinct, juvenile specimen in Baltic amber; 14) ventral aspect of the left gnathocoxa. Hairs are not drawn; 15) proventral aspect of the right metatarsus and tarsus II. Note the strong bristles; hairs are not drawn; 16) ventral aspect of the spinnerets and the anal tubercle (A). Hairs are not drawn but most spinules. M = median spinnerets. Scale bar 0.2;

fig. 17) Clostes priscus MENGE 1869, dorsal aspect of a juvenile spider, body length including chelicerae 4.5 mm, reconstruction with correct positions and proportions of the legs. Taken from PETRUNKEVITCH (1946);

fig. 18) Ctenizidae sp., anterior aspect of the chelicerae with apical spines (rastellum) (arrows).

B. Infraorder ARANEOMORPHA

Family DYSDERIDAE

Harpactea BRISTOWE 1939

Members of the genus *Harpactea* are rare in Baltic/Bitterfeld amber like other Dysderidae, see WUNDERLICH (2004: 681-683). Here I describe a third species in Baltic amber.

Harpactea longibulbus n. sp. (fig. 1) photos 5a-e

Material: Holotype ♂ in Eocene Baltic amber (most probably from the area of Kaliningrad), F2232/BB/AR/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved in a piece of amber which was slightly heated; its right legs IV and left leg I are lost beyond the coxa by autotomy, distal parts of the right legs I-II are cut off, ventral parts of the prosoma are covered with a white emulsion. – Two phoretic mites – body length 0.22 mm – are attached with their posterior part: One medially on the epigaster (photo), the other ventrally on tibia IV.

Diagnosis (♂; ♀ unknown): Femur I bears at least a single prolateral bristle; pedipalpus (fig. 1): Bulbus very long and slender, ventrally-apically with a lobe, embolus and conductor slender, of medium length.

Description (♂):
Measurements (in mm): Body length 3.5, prosoma: Length 1.8, width ca. 1.65; tibia I 1.35, metatarsus I 1.1, tibiae II-IV 1.15/0.8/1.1; length of the cymbium 0.38.
Colour mainly light to medium brown, prosoma darkened probably by heating.
Prosoma 1.1 times longer than wide, distinctly wrinkled, anteriorly abruptly narrowed, fovea absent, eyes large, field narrow, posterior row slightly procurved, posterior median eyes almost touching, anterior median eyes largest, spaced by 1.75 of their diameter. Basal cheliceral articles corniculate, other mouth parts hidden, sternum small prolongated between the coxae IV. – Legs fairly long, anterior tarsi fairly thickened,

hairs short, femur I (it is incomplete) proapically with a least a single bristle, tibia and metatarsus I-II bristle-less, femora III-IV bristle-less, tibia III-IV bear a pair of ventral-apical bristles, no other bristles exist on tibia and metatarsus III-IV. All metatarsi bear a trichobothrium, its position on I/IV is in 0.8. The metatarsal III-IV preening comb is well developed. – Opisthosoma oval, covered with short hairs, shrunked with longitudinal lateral and transverse posterior furrows. Margin of the genital opening sclerotized, spinnerets short. – Pedipalpus (fig. 1): Patella and tibia about as twice as long as wide, bulbus long and slender, see above. Tiny particles at the tip of the questionable embolus may be sperm.

Relationships: Bulbus, embolus and conductor are similar to the "androtype" (!) of *H. extinctus* PETRUNKEVITCH 1957 in which the bulbus is distinctly shorter, see WUNDERLICH (2004: 687, fig. 6j). The holotype of *H. extincta* is a juvenile female, and the conspecifity of its "androtype" is nothing else than a speculation.

Distribution: Eocene Baltic amber forest.

<u>Harpactea</u> sp. indet.: An incompletely male, body length 2.5 mm, partly covered with a white emulsion is preserved in amber from the Bitterfeld deposit, coll. H. GRABENHORST AR-66. The bulbus appears stouter than in the species which are described in Baltic amber; it may be the member of an unnamed species.

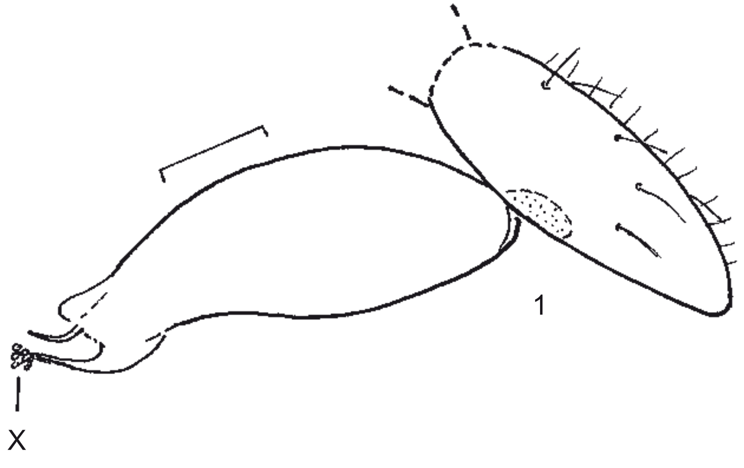


Fig. 1) *Harpactea longibulbus* **n. sp.**, ♂, prolateral aspect of the left pedipalpus. Scale bar 0.1 mm. X = questionable sperm.

Family OONOPIDAE

Subfamily ORCHESTININAE

Orchestina SIMON 1882

Orchestina is the most diverse genus in European ambers, about 20 species are known; it has treated by me for 30 years, see WUNDERLICH (1981). Members of the Orchestininae are also known from several Cretaceous ambers. Besides, e. g., *Ariadna* (Segestriidae) *Orchestina* is – in the geological sense – one of the oldest known genera of araneomorph spiders known in amber.
All species of this genus in Baltic/Bitterfeld amber are provisionally placed in the subgenus *Baltorchestina* WUNDERLICH 2004 but in a revision the genus *Orchestina* may has to split.

According to my investigation the percentage of specimens of *Orchestina* – about 1/3 of all adult specimens – in amber from Bitterfeld and from Kaliningrad (Baltic amber s. str.) is the same.

New material of *Orchestina* (*Baltorchestina*):

Orchestina sp. indet., ♂ with a prey, a dissected Diptera: Nematocera below its body and partly between its legs, Bitterfeld deposit, coll. H. GRABENHORST no. Ar-172.

Orchestina imperialis PETRUNKEVITCH 1963: (a) 1♂, Bitterfeld deposit, coll. H. GRABENHORST, no number. – (b) Baltic amber from Kaliningrad, 1♂, F2238/BB/AR/CJW. In the relatively large spiders of this species the clypeus bears only two pairs of long bristles, and the opisthosoma bears very long hairs, see the photo. Its pedipalpal femur is thicker than in other known Eocene/Oligocene species. Photo 6.

Description of two new species:

***Orchestina* (*Baltorchestina*) *rectangulata* n. sp**. (fig. 1) photo 7.

Material: Holotype ♂ in amber from the Bitterfeld deposit, coll. H. GRABENHORST, in the future Geol.-Palaeontol. Inst. Univ. Hamburg.

Preservation and syninclusions: The spider is well preserved in a piece of amber which apparently has been slightly heated; its right leg II and left leg IV are lost by autotomy beyond the coxa. Only a small white emulsion exists ventrally between prosoma and opisthosoma. The tip of the left tarsus IV is cut off, the left leg I is cut off through the femur.

Diagnosis (♂; ♀ unknown): Clypeus with 3 pairs of bristles. Pedipalpus (fig. 1): Tibia very thick, embolus also thick and bent rectangular near the middle in the dorsal direction (its tip is hidden).

Description (♂):
Measurements (in mm): Body length 1.1, prosoma: Length 0.6, width 0.5; leg I: Femur 0.6, patella 0.15, tibia 0.5, metatarsus 0.5, tarsus 0.25, leg IV: Femur: Length 0.53, height 0.15, patella 0.18, tibia >0.4, metatarsus 0.5, tarsus 0.22.
Colour: Prosoma and legs medium to dark brown, opisthosoma light brown.
Prosoma 1.2 times longer than wide; 6 eyes which are fairly large, clypeus with 3 pairs of bristles, basal cheliceral articles slender, remaining mouth parts hidden, coxae IV widely spaced by the sternum. – Legs fairly long, I longest, femur IV distinctly thickened, bristles apparently absent, position of the metatarsal IV trichobothrium near the end of the article. – Opisthosoma oval, scarcely covered with longer hairs. – Pedipalpus (see the diagnosis): Femur fairly stout.

Relationships: The embolus is fairly similar and thick in *O.* (*Baltorchestina*) *cochlembolus* WUNDERLICH 1981 in which the clypeus bears 5 pairs of bristles.

Distribution: Oligocene Bitterfeld amber deposit.

***Orchestina* (*Baltorchestina*) *forfex* n. sp**. (figs. 2-3)

Material: Holotype ♂ in Baltic amber, F2237/BB/AR/CJW.

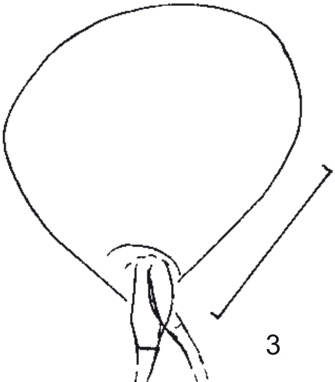
Preservation and syninclusions: The spider is preserved in a small piece of amber which was slightly heated, and which has numerous marginal fissures; its legs are bent below the body, tibia IV is amputated at its end, fissures hide parts of body and legs.

Diagnosis (♂; ♀ unknown): The clypeus bears probably three pairs of hairs; pedipalpus (figs. 2-3): Femur slender, patella and tibia medium thick, embolus and conductor slender, their shape is LIKE A SHEAR.

Description (♂):
Measurements (in mm): Body length about 1.3, metatarsus I and IV 0.37, tarsus I and IV 0.2, length of the posterior opisthosomal hairs 0.1.
Colour: Prosoma and legs medium brown, opisthosoma light brown.
Prosoma (most parts are hidden): Labium similar to *O. cochlembolus*, see WUNDERLICH (2004: 700, fig. 88). – Legs only fairly long, metatarsal trichobothria in a quite distal position. – Opisthosoma oval, hairs of medium length. – Pedipalpus: See above.

Relationships: In *O.* (*B.*) *forceps* WUNDERLICH 1981 embolus and conductor are distinctly shorter and the pedipalpal tibia is thicker.

Distribution: Eocene Baltic amber forest.



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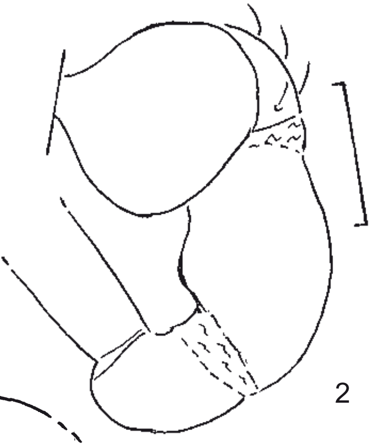

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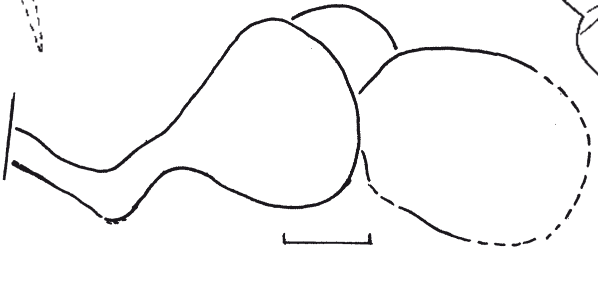

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Fig. 1) *Orchestina* (*Baltorchestina*) *rectangulata* **n. sp.**, ♂, retrolateral aspect of the left pedipalpus. Note the strong embolus on the left which is bent in a right angle and hidden distally. Scale bar 0.1 mm;

figs. 2-3: *Orchestina* (*Baltorchestina*) *forfex* **n. sp.**, ♂; 2) retrolateral aspect of the left pedipalpus. The embolus is hidden; 3) retrolateral and slightly apical aspect of the right bulbus. Scale bars 0.1 mm.

Family SCYTODIDAE

Members of this family – especially adult males – are very/extremely rare in Baltic amber, see WUNDERLICH (2004: 706-711). Only the extant genus *Scytodes* LATREILLE 1804 is known from Eocene European ambers forests. This genus has to split up according to LEHTINEN (person. commun.).

Scytodes s. l.

New material in Baltic amber:

(1) A probably adult ♀, F2239/BB/AR/CJW, is preserved in a piece of amber which was slightly heated. The spider is almost completely preserved on a layer within the amber, only the left tibia I is amputated beyond the middle and lost; the opisthosoma is covered with a white emulsion on all sides. The prosoma is strongly domed (photo) and bears numerous strong hairs. Measurements (in mm): Body length 1.7, prosomal length 1.2, tibia I 1.0. The female may be conspecific with *S. weitschati* WUNDERLICH 1993. Photos 8a-b.

(2) A probably adult ♀, coll. ALEX BEIGEL BB-70 is preserved in a piece of amber which was probably slightly heated; its tarsus I is cut off. ½ Diptera is preserved in the same piece of fossil resin. – Measurements (in mm): Body length 2.4, prosomal length 1.2; leg I: Femur 2.4, patella 0.3, tibia 2.4, metatarsus 2.7, tarsus unknown; leg IV: Femur 2.0, patella 0.28, tibia 1.6, metatarsus 1.8, tarsus 0.6. Two tarsal claws.
The prosoma is only fairly high (photo), the legs are very long (see above), femur and tibia I each are twice as long as the prosoma. This female may well be the member of an undescribed species. The legs are as long as in the juv. Scytodidae sp. indet. 2 sensu WUNDERLICH (2004: 709, fig. 12e), F174/BB/AR/CJW, but the prosoma is more convex (domed). Photo 9.

Family PHOLCIDAE

Like other haplogyne families members of the Pholcidae are rare very in Baltic/ Bitterfeld amber. A single genus of this family has been reported from the Eocene Baltic amber forest by WUNDERLICH (2004: 736-742): *Paraspermophora* WUNDERLICH 2004, besides two juveniles, gen. indet. 1, and gen. indet. 2 (now SMF).
In contrast to the members of the six-eyed genus *Paraspermophora* also a single eight-eyed spider in Baltic amber has been reported previously: Gen. indet. 1 sensu WUNDERLICH (2004: 738, 741, 745, figs. 17 l-m), an adult or juvenile female, F452/BB/AR/CJW, now SMF. During the last years I got two further quite similar very long-legged spiders in Baltic amber which may be congeneric or even conspecific: F1450/BB/AR/CJW and F2128/BB/AR/CJW. The position of their eyes is like in fig. 17 l sensu WUNDERLICH (2004: 745), their leg III is relatively long. With the specimen no. 2128 (photos 10a-b) a dragline is preserved; F1450 has some legs broken within the fossil resin. For a closer investigation of this rare taxon an adult male is needed.

Paraspermophora WUNDERLICH 2004

Two species of this genus are known, one is preserved in amber from the Bitterfeld deposit. Male chelicerae: See fig. 1. A well preserved female is described below:

Paraspermophora sp. indet. (photos 11a-b)

♀, F2144/BB/AR/CJW, fairly well preserved in a clear yellow piece of amber which was slightly heated, body and legs are fairly darkened by heating, some leg articles are cut off. Measurements (in mm): Body length 1.3, prosomal length 0.6, tibia IV 0.9, width of the genital area 0.4. The triangular genital area is distinctly bulging.

Further new material, four males in Baltic amber:

F2233/BB/AR/CJW: The spider is completely and well preserved but darkened by heating.

F2234/BB/AR/CJW: The spider is very well and completely preserved; I recognize only two pairs of cheliceral outgrowths (fig. 1) while in the strongly related extant genus *Spermophorides* WUNDERLICH 1991 three pairs exist. I do not observe lateral stridulatory files. Photos 12a-b.

F2235/BB/AR/CJW is fairly well preserved, parts of the legs are cut off, the left side of the opisthosoma is partly covered with a white emulsion. The well preserved structures of the pedipalpi show that the male is closely related to *P. perplexa* WUNDERLICH 2004 or even conspecific with it.

F2236/BB/AR/CJW. The male is well and completely preserved, a bubble (gas?) covers parts of the deformed pedipalpi.

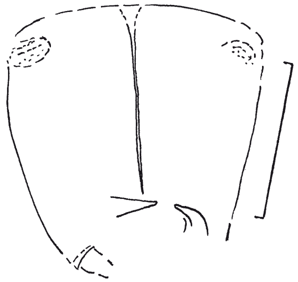


Fig. 1) *Paraspermophera sp indet.*, ♂, (F2234), obliquely right-apical aspect of the chilicerae. Parts are hidden by an emulsion.

Family LEPTONETIDAE

Fossil Leptonetidae are rare, see WUNDERLICH (2004: 712-720). The genera *Eoleptoneta* WUNDERLICH 2004 and *Oligoleptoneta* WUNDERLICH 2004 are known from Baltic amber. In this paper I describe three new fossil species.
The relatively high number of 7 species compared to the relatively low number of 8 determined specimens may indicate a high diversity as well as various undiscovered species of this family of the Eocene European amber forests.

Diagnosis of the family: See WUNDERLICH (2004: 713). Here I add: Articles of the ♂-pedipalpus including the cymbium slender (in contrast to other members of the "Haplogynae"), egg-carrying behaviour absent.

The relationships of the family are dubious; see the papers on Cretaceous amber spiders and on reversals in this volume.

Oligoleptoneta WUNDERLICH 2004

***Oligoleptoneta cymbiospina* n. sp**. (fig. 1) photos 13a-b

Material: Holotype ♂ as well as a large and a small separated piece of amber, F772/ BB/AR/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved, only the tip of the left tarsus I is cut off; ventral parts are covered with a white emulsion, parts of questionable spider's threads without droplets are preserved near the spider. In the same piece of amber exist a mite, a Diptera: Nematocera, a Collembola as well as stellate hairs. In the large separated piece a Myriapoda is preserved. In the second (smaller) piece of amber few Diptera and a small Cicada are preserved.

Diagnosis (♂; ♀ unknown): Pedipalpus: Cymbium with a well developed erect retrodorsal-apical bristle (short arrow in fig. 1) .

Description (♂):
Measurements (in mm): Body length 1.3, prosoma: Length 0.7, width 0.64; leg I: Femur 1.3, patella 0.24, tibia 1.4, metatarsus 1.5, tarsus ca. 0.7; longest bristle on tibia IV 0.35.
Colour: Opisthosoma and legs light brown, prosoma medium brown.
Prosoma (photo) 1.1 times longer than wide, almost hairless, fovea low, 6 eyes similar to fig. 13m given by WUNDERLICH (2004: 719), the four eyes of the anterior row are raised (partly covered with emulsions), clypeus distinctly concave, not strongly protruding like in Eoleptoneta (probably a diagnostic character of the genus Oligoleptoneta), only fairly long, basal cheliceral articles long, their teeth and the other mouth parts are hidden; coxae IV widely spaced by the sternum. – Legs (photo) long and slender, I distinctly the longest, III distinctly the shortest, hairs fairly short; femora and metatarsi are bristle-less, all patellae bae a single dorsal-apical bristle which is about as long as the article on patella IV, all tibiae bear 2 dorsal bristles (no laterals); the position of all metatarsal trichobothria near the middle, a tarsal pseudoarticulation is not observable. – Opisthosoma oval, hairs indistinct, spinnerets short. – Pedipalpus (fig.1): Articles slender, cymbium with a distinct dorsal inclination (long arrow in fig. 1) and a well developed erect retrodorsal-apical bristle (short arrow).

Relationships: In *O. altioculus* WUNDERLICH 2004 the metatarsi are also bristle-less and the area of the anterior eyes is raised but the tibial bristles are shorter, the pedipalpal tibia bears a retrolateral bristle, and a retroapical cymbial bristle is absent.

Remark: The length of the bristle of tibia IV do not separate *Oligoleptoneta* from *Eoleptoneta*, see WUNDERLICH (2004: 713).

Distribution: Eocene Baltic amber forest.

Eoleptoneta WUNDERLICH 2004

Key to the species of *Eoleptoneta* in Baltic/Bitterfeld amber (♂):

Remark: *E. curvata* WUNDERLICH 2004 and *E. kutscheri* WUNDERLICH 1991 are only known from the Bitterfeld deposit, see the key no. 5.

1 Femur I bears a prolateral bristle near the middle (fig. 1). Cymbium retrolaterally near the middle with a strong bristle/spine (fig. 5). . . . . *multispinae*

- Femur I without a bristle in this position. Cymbium without a spine in this position, with a thin retroBASAL bristle in *E. kutscheri*, see WUNDERLICH (2004: 718, fig. 13d). (Compare also figs. 8-9 of *E. pseudoarticulata* in which the pedipalpal TIBIA bears a strong bristle). 2

2(1) The pedipalpal tibia bears retrolaterally two strong bristles/spines, see WUNDERLICH (2004: 719, fig. 13k) . . . . *duocalcar*

- No or only a single retrolateral bristle of the pedipalpal tibia (figs. 8-9) 3

3(2) Femur I longer than the body. 4

- Femur I shorter than the body. Up to now only in amber from the Bitterfeld deposit . . 5

4(3) Tarsi distinctly pseudoarticulate (fig. 7, photo), femur I with few thin (hair-shaped) prolateral bristles (fig. 6), cymbium with an apical outgrowth (arrow in fig. 8) . . . . *pseudoarticulata*

- Tarsi indistinctly pseudoarticulated, femur I without such bristles, cymbium without such an outgrowth . . . . *similis*

5(3) Pedipalpal tibial bristle strongly bent, see WUNDERLICH (2004: 720, fig. 13r) . . . . *curvata*

- Pedipalpal tibial bristle slightly bent, see WUNDERLICH (2004: 718, figs. 13d-e) . . . . *kutscheri*

***Eoleptoneta multispinae* n. sp.** (figs. 2-5) photos 14a-b, 15

Material: 2♂ in Baltic amber: Holotype F2241/BB/AR/CJW, paratype: F687/BB/AR/CJW.

Preservation and syninclusions: The holotype is well and almost completely preserved in a piece of amber which was slightly heated, dorsal and ventral parts are covered with a white emulsion. The prosoma is artificially in an upwards position in contact to the opisthosoma. Stellate hairs are absent. – The paratype is well preserved, the ventral side of the body and some leg articles are covered with a white emulsion, parts of the right legs I and II are cut off, the left metatarsus IV is slightly broken. Few stellate hairs but no larger syninclusions.

Diagnosis (♂; ♀ unknown): Eye field (photo) relatively short, femur I bears a prolateral bristle near the middle (fig. 3), basal cheliceral articles medially-distally with long hairs (fig. 2). Pedipalpus: fig. 5) with a strong cymbial bristle near the middle; a retrobasal tibial spur is absent.

Description (♂; based mainly on the paratype, except the pedipalpus):
Measurements (in mm): Paratype: Body length 1.5, prosoma: Length ca. 0.8, width 0.7; leg I: Femur 1.6, patella 0.25, tibia 1.6, metatarsus + tarsus 3.2, tibiae II-IV 1.35/0.95/1.45. Holotype: Body length ca. 1.6, femur I 1.5, tibia I 1.65.
Colour Prosoma and legs medium brown, opisthosoma light brown.
Prosoma (photo, fig. 2) smooth, posteriorly apparently artificially inclined, eye field compact, eyes (they are covered with a thin emulsion) close together, clypeus strongly protruding, longer than the length of the eye field. Basal cheliceral articles long and slender, slightly diverging, teeth not observable but long hairs existing (fig. 2), fangs long, other mouth parts hidden. – Legs (photo, figs. 3-4) long and slender, tarsi pseudoarticulate, bristles long, femora: A single prolateral one in the middle, all patellae a dorsal-distal one, all tibiae dorsally 1/1, apical as well as some lateral bristles exist, metatarsi with a pair of bristles just before the middle, position of the trichobothrium on metatarsus II in 0.43, tarsal claws small. – Opisthosoma oval, hairs fairly short, ventral side and spinnerets hidden by a white emulsion. – Pedipalpus (fig. 5, photo) with slender articles, spurs on tibia and cymbium absent, cymbium with a strong retrolateral bristle near the middle and long apical hairs, embolus apparently short, a translucent conductor exists.

Relationships: See the key. In the remaining known Eocene species femur I bears no prolateral bristle in this position.

Distribution: Eocene Baltic amber forest.

***Eoleptoneta pseudoarticulata* n. sp.** (figs. 6-10) photos 16a-b

Material: Holotype ♂ in Eocene Baltic amber, F2159/BB/AR/CJW, separated from F2147/BB/CJW in which includes several insects, a spider (*Custodela* sp.), some Acari, and a ?*Siro* sp. (Opiliones).

Preservation and syninclusions: The spider is well and almost completely preserved in a thin yellow piece of amber which was not heated, its ventral side is covered with a white emulsion, the left leg II is lost beyond the tibia by autotomy, the left metatarsus I is broken beyond its middle, the prosoma is deformed (inclined laterally). Within two layers in the amber above the spider exists an artificial structure similar to pieces of a puzzle, caused probably by the use of bencylbencoat. Syninclusions (see also "material"): Some Nematoda: Rhabditida, stellate hairs, pollen grains as well as small parts of detritus.

Diagnosis (♂; ♀ unknown): Legs very long (photo), tarsi strongly articulated (fig. 7), femur I (fig. 6) prodistally with few long hairs (or hair-shaped bristles?). Pedipalpus (figs. 8-10): Tibia retrolaterally with a strong bristle/spine near its middle, cymbium with a proapical outgrowth (arrow in fig. 8).

Description (♂):
Measurements (in mm): Body length 1.3, prosoma: Length ca. 0.55, width 0.53; leg I: Femur 1.5, patella 0.23, tibia 1.6, metatarsus 1.35, tarsus ca. 0.7, tibia III 0.8, tibia IV 1.2.
Colour: Prosoma and legs medium brown, opisthosoma light brown.
Prosoma (it is deformed) slightly longer than wide, posterior eyes touching each other, clypeus long and protruding, basal cheliceral articles of medium size, teeth hidden, labium free, wider than long, gnathocoxae very long. – Legs (figs. 6-7, photo) very long and slender, femur I longer than the body, tarsi strongly pseudoarticulated (fig. 7), bristles short on I-II, hair-shaped on the anterior femora, long on III-IV; leg I: Femur 3 thin prolateral ones in the distal half (fig. 6), all tibiae bear 2 dorsal bristles, metatarsus III bears a pair of long bristles just before the middle. Position of the metatarsal III trichobothrium in 0.3. – Opisthosoma oval, bearing short hairs. – Pedipalpus (figs. 8-10; see the diagnosis): Cymbium inclined dorsally-distally, with large apical bristles.

Relationships: See the key. The legs are very long, and the pseudoarticulation of the tarsi are stronger developed than in the other known fossil species.

Distribution: Eocene Baltic amber forest.

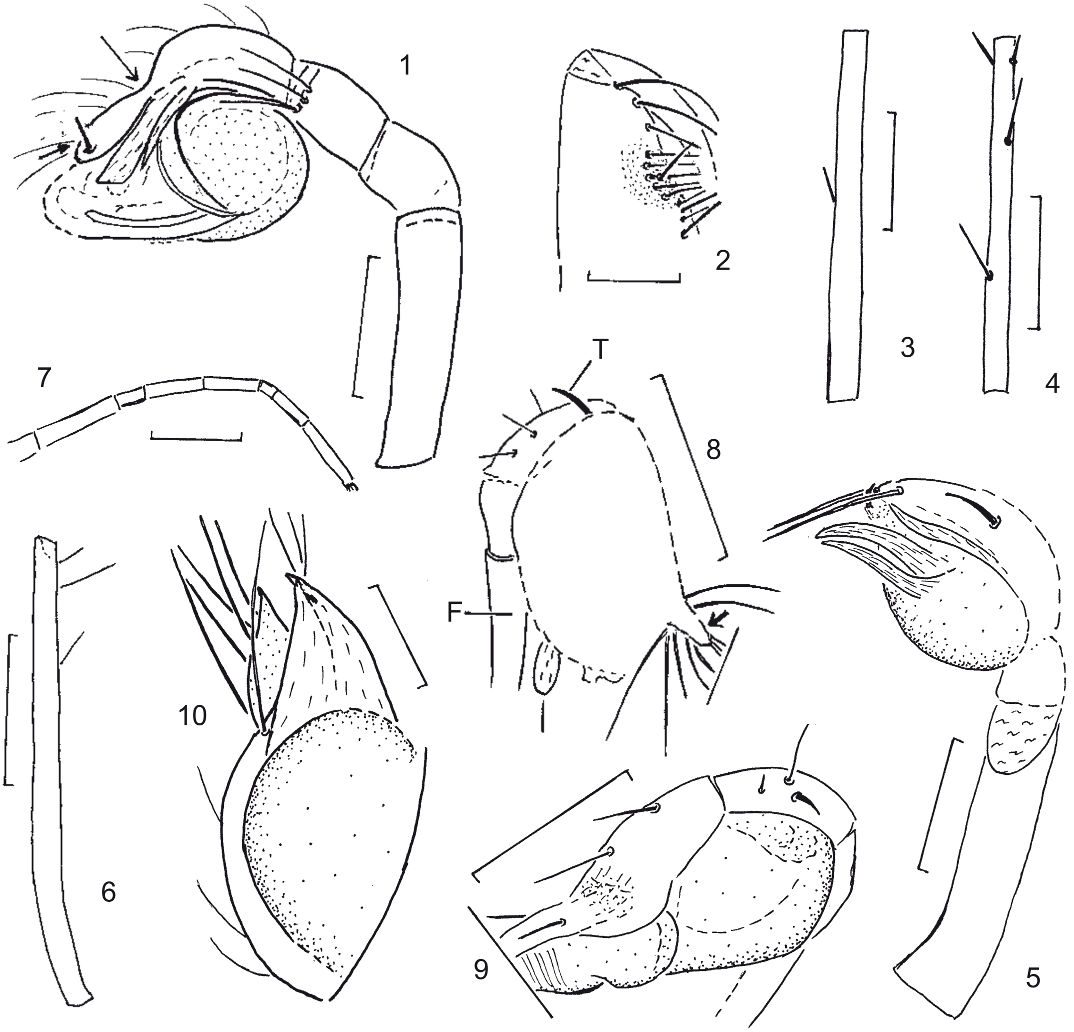


Fig. 1) <u>*Oligoleptoneta cymbiospina*</u> **n. sp.**, ♂, retrolateral aspect of the left pedipalpus. A bubble covers apical parts. The long arrow points to the dorsal cymbial inclination, the short arrow points to the strong apical cymbial bristle. Scale bar 0.2 mm;

figs. 2-5: <u>*Eoleptoneta multispinae*</u> **n. sp.**, ♂; 2) anterior (and slightly medial-basal) aspect of the left chelicera. Long hairs but no teeth are observable near the anterior cheliceral margin; 3) dorsal aspect of the right femur I; 4) dorsal aspect of the left tibia IV; 5) holotype (the remaining figs: Paratype), retrolateral (and slightly apical) aspect of the left pedipalpus. Scale bars 0.1 mm in fig. 2, 0.2 in fig. 5, 0.5 in figs. 3-4;

figs. 6-10: <u>*Eoleptoneta pseudoarticulata*</u> **n. sp.**, ♂; 6) ventral aspect of the right femur I; 7) retrolateral aspect of the distal part of the pseudoarticulate left tarsus I; 8) dorsal-apical aspect of the right pedipalpus which is largely covered with an emulsion; 9) retrodorsal aspect of the left pedipalpus. The bulbus is basally deformed, its distal part is hidden; 10) ventral aspect of the left pedipalpus. Parts are hidden by pedipalpal articles. F = femur, T = strong tibial bristle, U = unknown structure. Scale bars 0.1 in fig. 10, 0.2 in the remaining figs.

Family SPATIATORIDAE

Spatiator caulis WUNDERLICH 2008 photos 17a-b

Material: 1♂ in Baltic amber and a separated piece of amber, heated, F2230/BB/AR/CJW.

Only the holotype of this species is known.
The spider is completely preserved, its body length is 4 mm, the cymbium is densely covered with bristle-shaped hairs, a secretion of apical parts of both bulbi (of the emboli?) is preserved.

Spatiator sp. indet.

Material: 1♂ and 2 separated pieces of Baltic amber, F2231/BB/AR/CJW.

The spider is completely and fairly well preserved, its body length is 3 mm, parts of the body are dorsally covered with a white emulsion. The structures of the bulbi are partly hidden, apical secretions exist like in the male of *S. caulis*, see above.

Family OECOBIIDAE, subfamily MIZALIINAE

A single and extinct subfamily (Mizaliinae) and a single genus (*Mizalia* KOCH & BERENDT 1854) are known from Baltic/Bitterfeld amber as well from Ukrainian (Rovno) amber. *Mizalia* possesses a very large ("fleshly") colulus ("pseudocribellum"), a calamistrum is absent in both sexes. – A female of a *Mizalia* sp. indet. (F1857/BB/AR/ CJW) is preserved rogether with two ants nearby as possible prey (one of the ants is shown in the photo no. 18).
The mizaliine spiders were probably already ant eaters similar to extant members of this family, see the photo 18.

New material:

F2264/BB/AR/CJW: *Mizalia* sp. indet., most probably from the Kaliningrad area, ♂. Photos 20a-b.
Both pedipalpi are loose – separated by autotomy? – and placed near the spinnerets of the spider. The spider has probably been the prey of an insect or a spider.

F2265/BB/AR/CJW: *Mizalia* sp. indet., most probably from the Kaliningrad area, ♂. Photo 19.
The pedipalpi of the spider are well observable, the cribellum is hidden by a fold.

Mizalia sp. indet., 1♂, in amber from the Bitterfeld deposit according to R. POLAND, coll. R. POLAND in Berlin (seen). This male is the first report of the genus *Mizalia* as well as of the subfamily Mizaliinae and the family Oecobiidae from the Bitterfeld deposit.

Family HERSILIIDAE

Only few specimens of this – mainly tropical – family have been found in Baltic amber, see WUNDERLICH (2004: 816f).

Gerdiorum inflexum WUNDERLICH 2004 photos 21a-c

Material: 1♂ in Baltic amber, F2242/BB/AR/CJW.

Recently I got a very well and almost completely preserved male of this species, see the photos. Its body length is 3.5 mm, both bulbi are well observable in the ventral aspect. Long threads are originating from the posterior spinnerets. The ventral and left sides of the spider are covered with a white emulsion, the left leg I is lost after the patella by autotomy.

Family ULOBORIDAE

Eomiagrammopes WUNDERLICH 2004

Four species of this extinct genus were described by WUNDERLICH (2004). Here I describe a further species of this genus as well as the second known male of *E. spinipes.*

Eomoagrammopes spinipes WUNDERLICH 2004 (fig. 1) photos 23a-b

Material: 1♂ in Eocene Baltic amber, F2243/BB/AR/CJW.

The spider is completely and very well preserved near the border of a clear and large (ca. 4 x 4 x 2.2 cm) piece of amber which apparently was slightly heated; parts of its dorsal and right sides are covered with a white emulsion; all legs are directed forward. – In a distance of ca. 3 cm in a different layer thin ecribellate threads of a spider's capture web are preserved. Furthermore a juvenile spider, 1 Acari, 1 Diptera: Nematocera, 1 Collembols and some stellate hairs are preserved in the same piece of amber.
Measurements of the spider (in mm): Body length 5.2, prosomal length 1.75; leg I: Femur 2.8, patella 0.65, tibia 1.9, metatarsus 2.4, tarsus 0.95, tibiae II-IV 0.95/0.75/1.55. – Tibia I bears half a dozen long retrolateral bristles (fig. 1) besides dorsal ones; trichobothria of femur III: See fig. 3; pedipalpus: See fig. 4.

Relationships: See *E. semiapertus* n. sp.

***Eomiagrammopes semiapertus* n. sp.** (figs. 2-4) photos 22a-d

Material: Holotype ♂ in Eocene Baltic amber, F2263/BB/AR/CJW, ex coll. ALEX BEIGEL BB-129, later probably SMF.

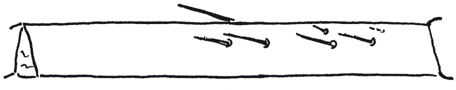
Preservation and syninclusions: The spider is placed in a small and flat piece of clear yellow amber; its left side is completely and well preserved but the right half of the prosoma as well as the anterior part of the opisthosoma and the right part of the left leg I are cut off, distal parts of the left leg IV and basal parts of the right leg IV are also cut off. – A fly is preserved in front above the spider, stellate hairs exist also, e. g. in a lump – which is mixed with detritus – on the left side of the spider between pro- and opisthosoma.

Diagnosis (♂; ♀ unknown): Metatarsus I only slightly thickened, bearing ca. 13 retrolateral bristles, tibia I bears only a single retrolateral bristle (fig. 2); the conductor is stout (fig. 4).

Description (♂):
Measurements (in mm): Body length 5.3, prosomal length 1.7; leg I: Femur 2.75, patella 0.65, tibia 1.8, metatarsus 2.4, tarsus 0.7; tibiae II-IV 0.75/ca. 0.45/1.5.
Colour yellow brown.
Prosoma flat and long, shape and eyes – so far observable in the lateral aspect – as in *E. spinipes*, see WUNDERLICH (2004: 879, figs. 12-13); the eyes of the anterior row are strongly reduced. – Legs (figs. 2-3): I distinctly longest, III distinctly shortest, metatarsus I slightly thickened. Bristles on I: Femur none, tibia a single one each dorsally and retrolaterally, metatarsus 13 retrolaterally. Femoral trichobothria: II ca. a dozen retroventrally/laterally in a single row in the basal two thirds, III: fig. 3. Metatarsus IV is straight similar to fig. 18 in WUNDERLICH (2004: 880), and bears a dense calamistrum. – Opisthosoma (photo) long and slender. – Pedipalpus (fig. 4) with a large and raised tibia, a stout conductor and a longer embolus.

Relationships: In *E. spinipes* WUNDERLICH 2004 the ♂-metatarsus I is slightly stronger thickened, leg I bears much more bristles: The metatarsus much more than 40 and the tibia half a dozen retrolaterally (fig. 1), the conductor is longer, see WUNDERLICH (2004: 881, figs. 23, 25; in fig. 25 the distal half of the embolus has an unnatural position).

Distribution: Eocene Baltic amber forest.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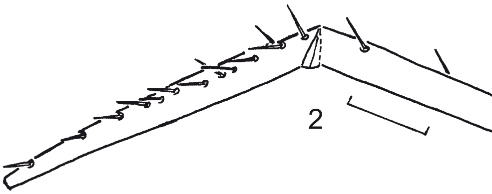
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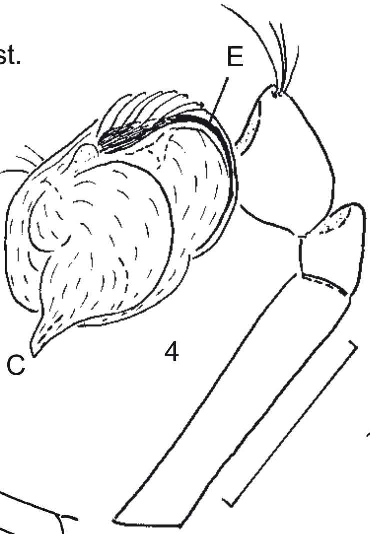

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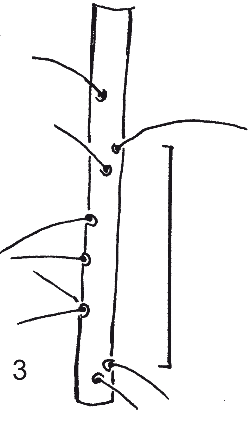
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Figs. 1) *Eomiagrammopes spinipes* WUNDERLICH 2004, ♂ F2243/BB/AR/CJW, retrolateral aspect of the left tibia I. Scale bar 0.5 mm;

figs. 2-4: *Eomiagrammopes semiapertus* **n. sp.**, ♂; 2) retrolateral aspect of the left tibia and metatarsus I. Hairs are not drawn; 3) prodorsal aspect of the left femur III. Only few of the long trichobothria are preserved; 4) retrolateral aspect of the left pedipalpus. C = conductor, E = embolus. Scale bars 0.2 in fig. 4, 0.5 in figs. 2-3.

Family TETRAGNATHIDAE

Fossil Tetragnathidae are rare and relatively large spiders. Their Eocene European subfamilies are mainly related to extant taxa of tropical regions, Metinae is an exception. The proof of the Diphyinae in these kinds of amber is not sure in my opinion.
The fossil tetragnathid members in these ambers were revised by WUNDERLICH (2004: 899-924) and (2008: 84-97); five genera were treated, all are extinct, a further extinct genus, *Balticgnatha* of the subfamily Diphyinae (?) is described below besides a new species of *Praetermeta* which is a subgenus of *Meta* (Metinae). *Praetermeta* was downgraded from the genus level by WUNDERLICH (2008).

Balticgnatha keyed out within no. 4 of the generic key given by WUNDERLICH (2004: 911) as following:

“- Metatarsus I-II as in *Corneometa*. Short ventral spines on legs I-II and a dorsal cymbial horn are absent. . . . .*alticgnatha*”

Note regarding the tab. in the book by WUNDERLICH (2004: 909) after the study of new material (CJW):
In all genera in question the metatarsus I-II bear A PAIR of dorsal-basal bristles – see WUNDERLICH (2004: 942, figs. 4, 10, 19) – except *Meta* (*Praetermeta*), see the same paper: 947, fig. 31, and below.
Note regarding the fig. 26 in WUNDERLICH (2004: 946): The position of the pedipalpus is prolaterally but not retrolaterally.

The Cretaceous genus *Macryphantes* SELDEN 1990 is treated by WUNDERLICH (2004: 854) but not p. 858 as noted by WUNDERLICH (2004: 904).

(1) Subfamily DIPHYINAE

Balticgnatha **n. gen**.

The gender of the name is feminine.

Tape species (by monotypy): *Balticgnatha projectens* n. sp.

Diagnosis (♂; ♀ unknown): Ventral thorns on legs I-II absent, femur and metatarsus I bent (photo 24). Pedipalpus (figs. 1-3): Tibia with an apical retrodorsal apophysis (arrow in fig. 3), cymbium without a dorsal horn, basally wide and flat, and prolaterally strongly widened, paracymbium undivided, ?tegular apophysis present, embolus strongly bent beyond the tip of the narrow cymbium.

Relationships: According to the existence of a pedipalpal tibial apophysis probably a member of the Diphyinae. *Eometa* WUNDERLICH 2004 and *Priscometa* WUNDERLICH 2004 may be most related but the structures of the ♂-pedipalpus are different, the tibia, the cymbium and the bulbus are different, and in *Priscometa* exists ventral thorns or spines in the distal half of legs I-II.

Distribution: Eocene Baltic amber forest.

Balticgnatha projectens **n. gen. n. sp**. (figs. 1-4) photo 24

Material: Holotypus ♂ in Eocene Baltic amber, F2252/BB/AR/CJW.

Preservation and syninclusions: The spider is completely and very well preserved in a 3.5 mm long clear piece of amber which was slightly heated. The right legs I and II are stretched forward, the right side is partly covered with a white emulsion, the left side of the opisthosoma is depressed and covered with a white emulsion. – Anteriorly above the spider are an ant and a small four-winged insect preserved, some stellate hairs are also present.

Diagnosis: See the diagnosis of the genus.

Description (♂):
Measurements (in mm): Body length 3.9, prosomal length ca. 1.3; leg I: Femur 4.0, patella 0.9, tibia 3.8, metatarsus ca. 4.3, tarsus 1.2, tibiae II-IV 2.6/1.0/1.9, pedipalpal tibia 0.65.
Colour medium brown.
Prosoma low, bearing short hairs, two wide eye rows, lateral eyes almost contiguous, posterior median eyes spaced by almost their diameter, mouth parts hidden, sternum hairy, not elongated between the coxae IV. – Legs (photo) long and slender, order I/II/IV/III, I distinctly longest, III distinctly shortest, femur I slightly, metatarsus I distinctly bent, tibia and metatarsus I-II with long ventral hairs, metatarsal trichobothria unknown. Bristles long and numerous, leg I: Femur 9, patella dorsally a short basal and a long distal one, tibia about 8, metatarsus a dorsal-basal pair and a retrolateral one in the basal half. – Opisthosoma 1.72 times longer than wide, bearing very short hairs; spinnerets hidden. – Pedipalpus (figs. 1-3, see also the diagnosis): Patella short, with a long dorsal bristle, tibia long, conductor large.

Relationships and distribution: See the genus.

(2) **Subfamily METINAE**

Meta C. L. KCH 1836: Subgenus ***Praetermeta*** WUNDERLICH 2004

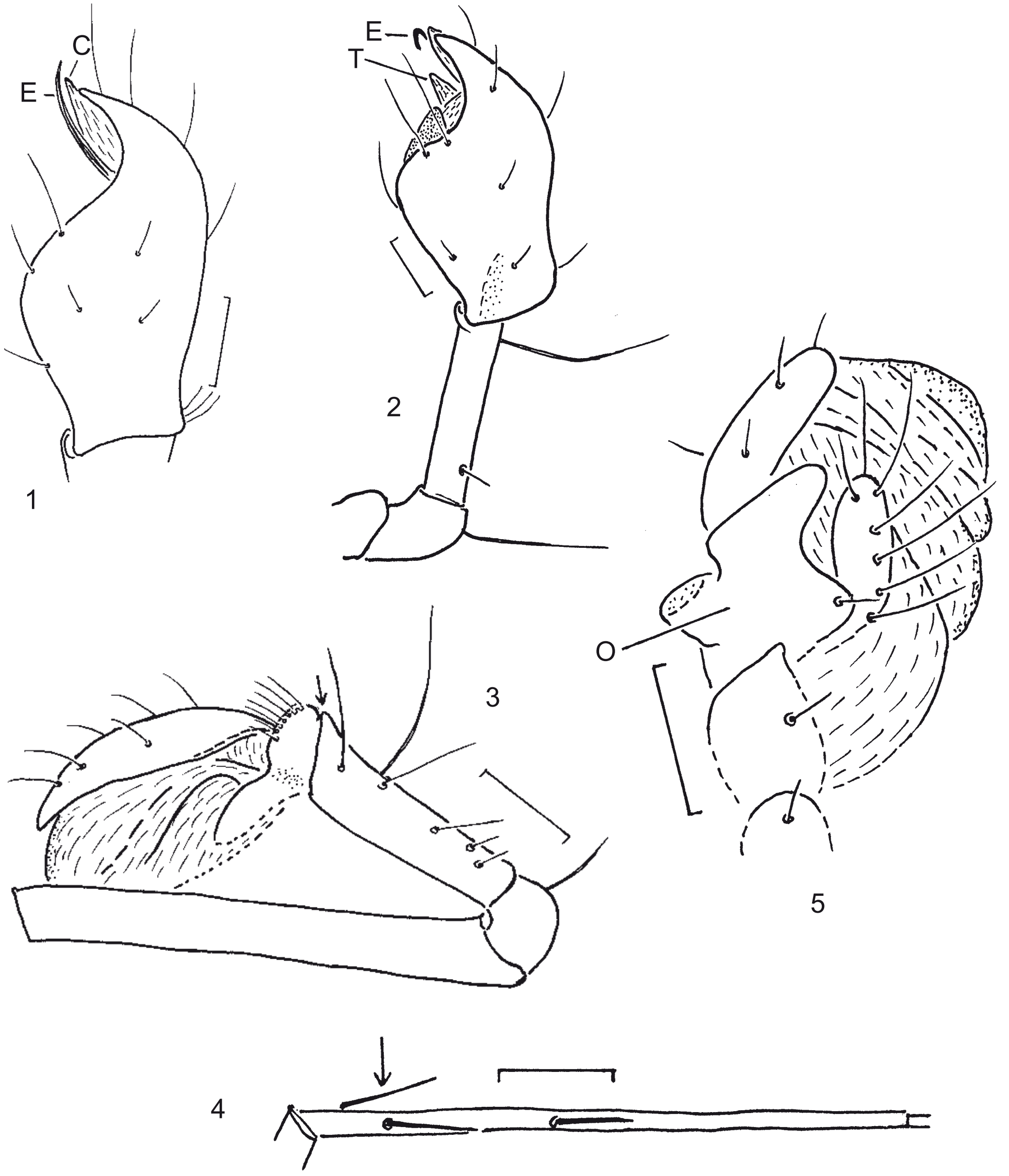
Meta s. l. is a fairly diverse genus which contains 7 extant subgenera and the extinct Eocene subgenus *Praetermeta*, see WUNDERLICH (2008: 89-98). *Praetermeta* is the only tetragnathid taxon in Baltic amber in which metatarsi I-II bear only a single retro-dorsal-basal bristle (arrow in fig. 4); members of the the remaining genera bear A PAIR of dorsal basal bristles. Metatarsi I-II may bear lateral bristles (*maculosa*) or not (or they are probably not preserved) in other congeneric species, the bulbus is turned from the ventral to the retrolateral side (fig. 5) similar to the Araneidae.
Here I describe a male which probably is conspecific with a species described few years ago:

Meta (*Praetermeta*) ?*maculosa* WUNDERLICH 2008 (figs. 4-5)

Material: 1♂ in Eocene Baltic amber, F2253/BB/AR/CJW.

Preservation and syninclusions: The spider is placed on a layer which has been deformed by the spider; it is fairly well preserved in a piece of amber which was heated, the left legs III and IV are cut off through their femora. Some stellate hairs are also preserved.

The body length of the male is ca. 5 mm, the dorsal outgrowth of the paracymbium is strongly widened at both sides (fig. 5), metatarsus I bears a single, metatarsus II bears two prolateral bristles in the basal half (fig. 4).



Figs. 1-3: Balticgnatha projectens **n. gen. n. sp.**, ♂; 1) prodorsal aspect of the right pedipalpus. (Only few hairs are drawn); 2) retrodorsal and slightly anterior aspect of the right pedipalpus; 3) retrolateral aspect of the left pedipalpus. Ventral parts of the bulbus are hidden. C = conductor, E = embolus, T = tegular apophysis. Scale bar 0.2;

figs. 4-5: Meta (Praetermeta) ?maculosa WUNDERLICH 2008, ♂; 4) prolateral aspect of the left metatarsus II. (Hairs are not drawn); 5) dorsal aspect of the right pedipalpus. Parts are hidden by an emulsion. O = dorsal outgrowth of the paracymbium. Scale bars 0.5 and 0.2.

Family NEPHILIDAE

This family has previously most often been treated as a subfamily of the Araneidae by most authors (rarely of the Tetragnathidae), and was rised to family rank by KUNTNER (2006). PAN et al. (2004) stated in their molecular study: “We suggest that the genus *Nephila* should be transferred back to the Araneidae.”.
Nephilidae possesses only exceptionally a tibial apophysis of the ♂-pedipalpus in contrast to the Araneidae.

Family THERIDIOSOMATIDAE

Notes regarding the type species of *Spinitheridiosoma* WUNDERLICH 2004:

The type designations are contradictory in the original paper (see pp. 998, 1003, 1006, 1008). This indicates a printer’s error. According to IRZN Art. 32.5 the original and also present author states: As originally indicated, the nominal species *Eotheridiosoma tuber* WUNDERLICH 2004 is the type species of the genus *Eotheridiosoma* WUNDERLICH 2004. The designation of the nominal species *S. volutum* WUNDERLICH 2004 as type species of the genus *Spinitheridiosoma* WUNDERLICH 2004 proves to be an invertent error. This nominal species is previously listed under *Eotheridiosoma* (see pp. 998, 1003). Accordingly and until now there is no valid type designation for the genus *Spinitheridiosoma*; three originally included species are eligible: *balticum* WUNDERLICH 2004, *bispinosum* WUNDERLICH 2004, and *rima* WUNDERLICH 2004. The originally intended nominal species *balticum* is herewith selected to be the type species of *Spinitheridiosoma* by subsequent designation.

Family COMAROMIDAE (n. stat.)

Comarominae WUNDERLICH 2004 (= Balticorominae WUNDERLICH (2004: 1907), nomen nudum) was included as a subfamily in the family Anapidae s. l. by WUNDERLICH (2004) and is raised here to family rank, Comaromidae (**n. stat**.). In contrast to previous publications – e. g. in 2004 – I now regard Comaromidae, Mysmenidae, Symphytognathidae and Synaphridae as families of their own, but not as subfamilies of the Anapidae s. l., see the key, and the cladogram given by WUNDERLICH (2004: 1031 and 1033), although their family rank may be a matter of opinion. The taxon Micropholcommatidae (including the nominal subfamilies Micropholcommatinae and Textricellinae) has probably to add to this group of families if it is not regarded as part of the Anapidae, see above.

<u>Diagnosis and relationships of the Comaromidae</u>: See WUNDERLICH (2004: 1034) under Comarominae. In the family Comaromidae exists a fairly low prosoma which cuticula is not wrinkled, an armoured opisthosoma which is depressed dorso-ventrally, a (retro)dorsal outgrowth of the cymbium, a small labral spur, the tendency to modifications (thickened articles) of the anterior male legs within the fossil species of the genus *Balticoroma*, see fig. 1 and photo 27 (*) and WUNDERLICH (2004: Fig. p. 1036), the tarsi are only as long as the metatarsi. An armoured opisthosoma and certain other characters – like a LARGER labral spur – are similar in the Anapidae s. str. but the opisthosoma is usually high, and the prosomal cuticula is usually strongly wrinkled. Clasping leg spines are absent in the Comaromidae, the prosoma is not strongly raised and not wrinkled, the labral spur is only small, and apophyses of articles of the ♂-pedipalpus are absent in contrast to most members of the Anapidae. Bulbus see Beitr. Araneol., <u>3</u>: 1088, fig. 14.

(*) Nothing is known about the function of the thickened leg articles.

The family Comaromidae includes two genera: *Comaroma* BERTKAU 1889 (extant), and *Balticoroma* WUNDERLICH 2004 (extant and fossil). *Comaroma* in the sense of PLATNICK's Spider Catalogue is not a monophyletic taxon:

(a) ***<u>Comaroma</u>*** BERTKAU 1889

<u>Type species</u>: *Comaroma simoni* BERTKAU 1889 (extant, Europe).

Diagnosis: Six eyes, retrodistal paracymbium existing, all articles of the male leg I slender.

Relationships: See *Balticoroma*.

Distribution: Extant; Europe: *Simoni*, and most probably USA: *Comaroma* (= *Archaerius*) *mendocino* (LEVI 1957), see also LEVI & LEVI (1962: 62-63, figs. 292-294) (with hesitation under Theridiidae).

Dubious species (extant) which is listed under *Comaroma*: *C. tongjunca* ZHANG & CHEN 1994 from China may be a member of the familiy Theridiidae but not of the Anapidae or Comaromidae; a revision is needed.

(b) ***Balticoroma*** WUNDERLICH 2004

Type species: *Balticoroma reschi* WUNDERLICH 2004 (Eocene Baltic amber forest).

Diagnosis: Eight eyes (eyes reduced, and anterior medians even lost only in *hatsushibai*); IN THE FOSSIL SPECIES – e. g. as in fig. 1, also WUNDERLICH (2004: 1036), *gracilipes* is an exception – certain articles of the male leg I are most often thickened (all articles are slender in the extant species).

Relationships: In *Comaroma* exists also a (retro)dorsal outgrowth of the cymbium (figs. 2-3) but only six eyes (the anterior medians are lost); a retroDISTAL paracymbium exists (in *Balticoroma hatsushibai* exists a retroBASAL paracymbium), and all articles of the male leg I are slender (like in few members of *Balticoroma*) without an exception.

Distribution: (a) Fossil: Eocene European Baltic/Bitterfeld amber forests (6 species, see WUNDERLICH (2004) and *B. damzeni* n. sp.) (*); (b) extant: Two or three species in SE-Asia: *Hatsushibai* (ONO 2004) (under *Comaroma*) (***n. comb***.), *maculosa* (OI 1960) (under *Comaroma*) (n. comb. by WUNDERLICH (2004: 1035)), and probably *Comaroma nakahirai* YAGINUMA 1959 (**quest. n**. **comb**.).

(*) *Balticoroma wheateri* PENNEY & MARUSIK 2011 in Baltic amber is surely not a member of *Balticoroma* according to the raised cephalic part, the chaetotaxy (two dorsal bristles on tibiae I-II), the long tarsi, and the high opisthosoma. In my opinion this species represents the member of an undescribed/unnamed genus.

Evolution within the genus *Balticoroma*: In the Eocene European Baltic/Bitterfeld amber forests evolved the double number of species – see WUNDERLICH (2004: Fig. p. 1036) and the species described below – compared with the two or three extant species like *maculosa*, which survived in SE-Asia, see above (*). According to their slender leg articles the few extant species like *maculosa* possess a plesiomorphic character compared to the strongly modified legs (e. g. fig. 1) of the fossil species besides the slender-legged fossil *B. gracilipes*. Outside of the Eocene Baltic amber forest lived probably an unknown number of further extinct species of *Balticoroma* – and *Comaroma* as well? –, and so the few extant species may be only relicts of a high number of extinct comaromid taxa which occurred in the Palaeogene at least within the Holarctic Region.

(*) Is'nt it exciting to follow the results of "the game of evolution" in the genus *Balticoroma* by the "window to the past" which is presented by the Baltic/Bitterfeld ambers, as well as the remarkable convergently evolved characters in *Comaroma* and *Balticoroma*?

New fossil material of *Balticoroma*:

B. ?*gracilipes* WUNDERLICH 2004: A male in Baltic amber, F2244/BB/AR/CJW, is ventrally thickly covered with a white emulsion. The articles of its leg I are slender as in *B*. *gracilipes* but a bristle of femur I is apparently absent, probably broken off.

Description of a new species:

***Balticoroma damzeni* n. sp**. (fig. 1) photo 27

Derivatio nominis: With pleasure I name this species after JONAS DAMZEN in Vilnius (Lithunia) who brought me the single known specimen of this species.

Material: Holotype ♂ in Eocene Baltic amber, F2146/BB/AR/CJW.

Preservation and syninclusions: The spider is completely and fairly well preserved in a flat piece of amber, its left side is hidden by a layer within the amber, parts like the opisthosoma are covered with a white emulsion. Syninclusions are absent.

Diagnosis (♂; ♀ unknown): Leg I (fig. 1): Femur and metatarsus strongly enlarged, tibia slightly thickened in the distal half, tarsus distinctly thickened in the basal half.

Description (♂):
Measurements (in mm): Body length 1.2, prosomal length 0.6; leg I: Femur 0.42, patella 0.16, tibia 0.32, metatarsus 0.25, tarsus 0.25; femur I 0.16 high and 0.14 wide, metatarsus I 0.135 high.
Colour dark brown.
Prosoma and Opisthosoma: Most parts are hidden; the opisthosoma bears a large dorsal scutum. – Legs (most articles are covered with a white emulsion) only fairly long; leg I (fig. 1, photo 27): See the diagnosis and the measurements, tarsus as long as the

metatarsus, tibia and metatarsus bear a long trichobothrium, the patella bears an apical bristle, tibia I a single thin dorsal bristle. – Pedipalpus (most parts are hidden by a white emulsion): Cymbium with a genero-typical dorsal outgrowth like in fig. 2.

Relationships (see the cladogram given by WUNDERLICH (2004: 1036): According to the strongly thickened femur I *B. damzeni* is most related to *B. ernstorum* and *B. serafinorum* in which tarsus and metatarsus I are not distinctly thickened in contrast to *B. damzeni*.

Distribution: Eocene Baltic amber forest.

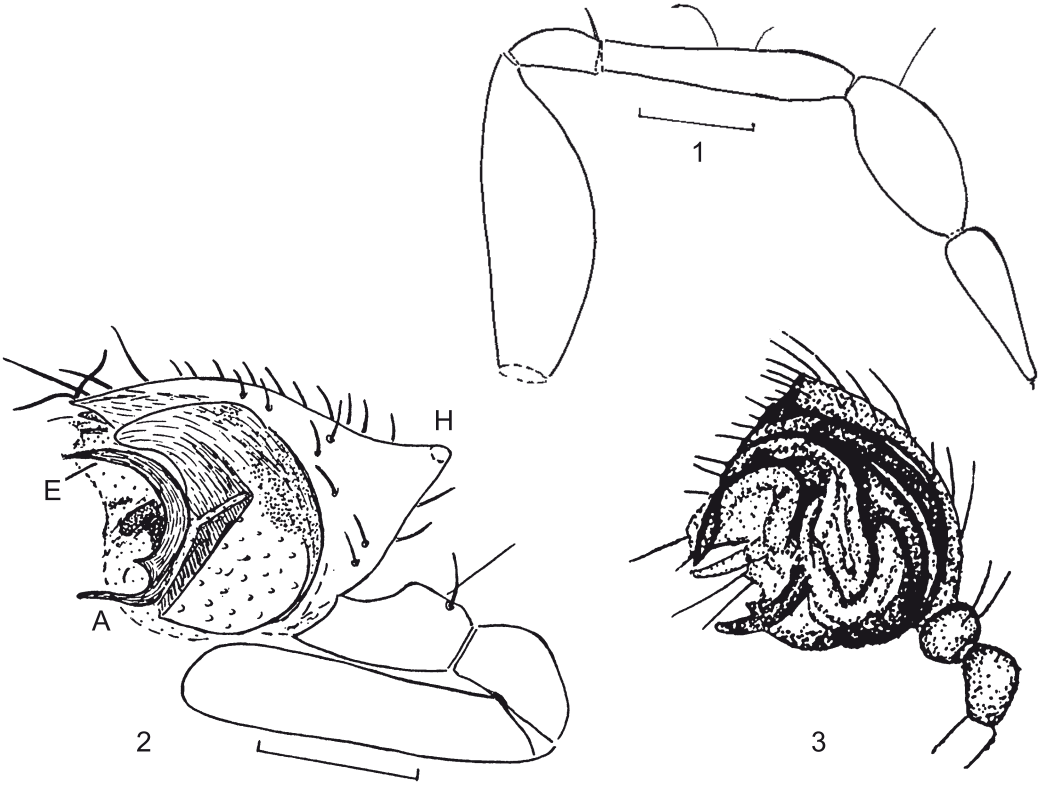


Fig. 1) Balticoroma damzeni **n. sp.**, ♂, extinct, Baltic amber, prolateral aspect of the left leg I. Scale bar 0.2 mm;

fig. 2) Balticoroma reschi WUNDERLICH 2004, ♂, extinct, Baltic amber, retrolateral aspect of the left pedipalpus. A = basal tegular apophysis, E = embolus, H = cymbial outgrowth. Scale bar 0.1 mm;

fig. 3) Balticoroma maculosa (OI 1960) (under *Comaroma m.*), ♂, extant, SE-Asia, retrolateral aspect of the left pedipalpus. Taken from ONO (2009).

Family ANAPIDAE s. str.

Ruganapis scutata WUNDERLICH 2004

New material: 3♂: 1♂ in amber from Bitterfeld, coll. H. GRABENHARORST Ar-170; 1♂ from Bitterfeld, F2247/BB/AR/CJW; 1♂ (strongly heated and deformed) from the Kaliningrad region, F2248/BB/AR/CJW.

Distribution: The species and genus have been described in Baltic amber from the Kaliningrad region; the species is new to the Bitterfeld deposit.

Fossilanapis WUNDERLICH 2004

Members of this genus represent the most tiny fossil spiders of the Anapidae s. str. in Baltic amber besides *Dubianapis* WUNDERLICH 2004 (which is closely related to *Fossilanapis*) and *Saxonanapis* WUNDERLICH 2004; their body length is only 0.7-1.1 mm. Their femur IV (fig. 2, photo) is thickened similar to *Orchestina* SIMON (Oonopidae) in most species, femur I is thicker than II. Members of the extinct genus *Fossilanapis* were probably jumping spiders like *Orchestina*.
In the following a new species of *Fossilanapis* is described, and some new material is added to the specimens which were described by me (2004).

Fossilanapis sp. indet. photos 29a-b

Material: 1♀ in Eocene Baltic amber from the Bitterfeld deposit, F2250/BB/AR/CJW.

The spider is completely and well preserved, few emulsions exist mainly dorsally.
Measurements (in mm): Body length 0.7, prosoma: Length ca. 0.63, height above the legs 0.3; leg I: Tibia 0.17, metatarsus and tarsus ca. 0.12 each, tibia IV ca. 0.17.
Like in the probably congeneric female – see WUNDERLICH (2004: 1064) – the opisthosoma is completely covered with a large dorsal scutum without a lateral margin, the

femora IV are not thickened, the pedipalpus is reduced, a prolateral bristle on tibia I exists as in congeneric males, the genital area is hidden by a white emulsion.
Fossilanapis saltans WUNDERLICH 2004 photo 28

Material: 1♂ in Eocene Baltic amber, F2249/BB/AR/CJW.

The spider is completely and well preserved. Its body length is 0.85 mm, the openings of the clypeal glands are probably observable. I do not find differences to the original description of this species.

***Fossilanapis multispinae* n. sp.** (figs. 1-3)

Material: Holotype ♂ in Eocene Baltic amber, F2251/BB/AR/CJW.

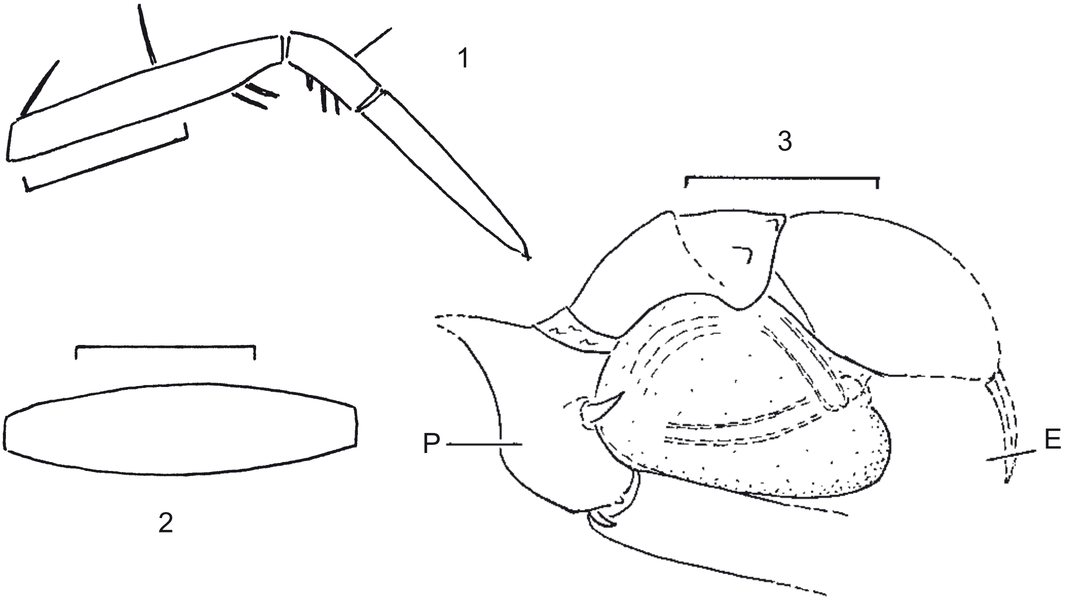
Preservation and syninclusions: The spider is completely and fairly well preserved in a yellow piece of amber which was slightly heated, its ventral side is thickly covered with a white emulsion, a large fissure hides parts of the opisthosoma. – A particle of detritus, 1 Diptera: Nematocera, and 1 Acari are preserved in front of the spider, stellate hairs are absent.

Diagnosis (♂; ♀ unknown): Tibia and metatarsus II bear ventral spine-shaped bristles, metatarsi much shorter than the tarsi (fig. 1), the pedipalpal patella (fig. 3) bears a bent basal as well a retroventral “thorn” besides the large dorsal-distal outgrowth.

Description (♂):
Measurements (in mm): Body length ca. 0.9, prosomal length ca. 0.55; leg I: Femur 0.45, patella 0.16, tibia 0.35, metatarsus 0.16, tarsus ca. 0.35, femur IV 0.38, tibia IV 0.27, height of femora I/II/IV 0.11/0.08/0.18.
Colour dark brown.
Prosoma (it is partly hidden) high, distinctly wrinkled, eyes large, posterior medians largest, anterior medians smallest, lateral ones contiguous. – Legs fairly short, I longest, III shortest, hairs fairly short, femur IV (fig. 2) distinctly thicker than II, all tibiae bear 1/1 long dorsal bristles (fig. 1), I additionally a prolateral one in the basal half, and leg II bears ventral spine-shaped bristles (fig. 1): Tibia 2 distally, metatarsus 3; position of the metatarsal II trichobothrium in 0.6. – Opisthosoma dorsally covered with a large scutum which bears short hairs, and has a sharp edge to its ventral part. – Pedipalpus (fig. 3): Patella bent, with a long dorsal-distal apophysis, a small bent basal-dorsal and a retroventral “thorn” in the middle, tibia long and strongly bent, bulbus large, parts of the sperm duct are observable, embolus in a distal position like in the related species.

Relationships: *F. multispinae* is the first known member of the genus in which tibia and metatarsus II bear ventral bristles. A basal outgrowth of the pedipalpal patella exists also in *F. saltans* WUNDERLICH 2004 and probably in other related species.

Distribution: Eocene Baltic amber forest.



Figs. 1-3: *Fossilanapis multispinae* **n. sp.**, ♂; 1) prolateral aspect of the distal articles of the left leg II. Note the ventral spines. Hairs are not drawn; 2) prodorsal aspect of the thickened right femur IV. Leg IV is apparently a jumping leg in this genus; 3) retrolateral aspect of the right pedipalpus. Part are hidden (dotted). P = paracymbium. Scale bar 0.2 in figs. 1-2, 0.1 in fig. 3.

Family MYSMENIDAE

Mysmena SIMON 1894 s. l.

Two species of the genus *Mysmena* s. l. are known from the Baltic/Bitterfeld amber forests: *M groeni* WUNDERLICH 2004 and *M. grotae* WUNDERLICH 2004; here a third member of this genus is described which is preserved in Baltic amber, too:

Mysmena curvata **n. sp**. (figs. 1-4) photo 30

Material: Holotype ♂ in Eocene Baltic amber and two separated pieces of amber, F2246/BB/AR/CJW.

Preservation and syninclusions: The spider is completely but only fairly well preserved in a piece of amber which was heated, its ventral side is covered with a white emulsion and a larger bubble below the opisthosoma, fissures and bubbles exist on most legs which are most probably caused by heating.

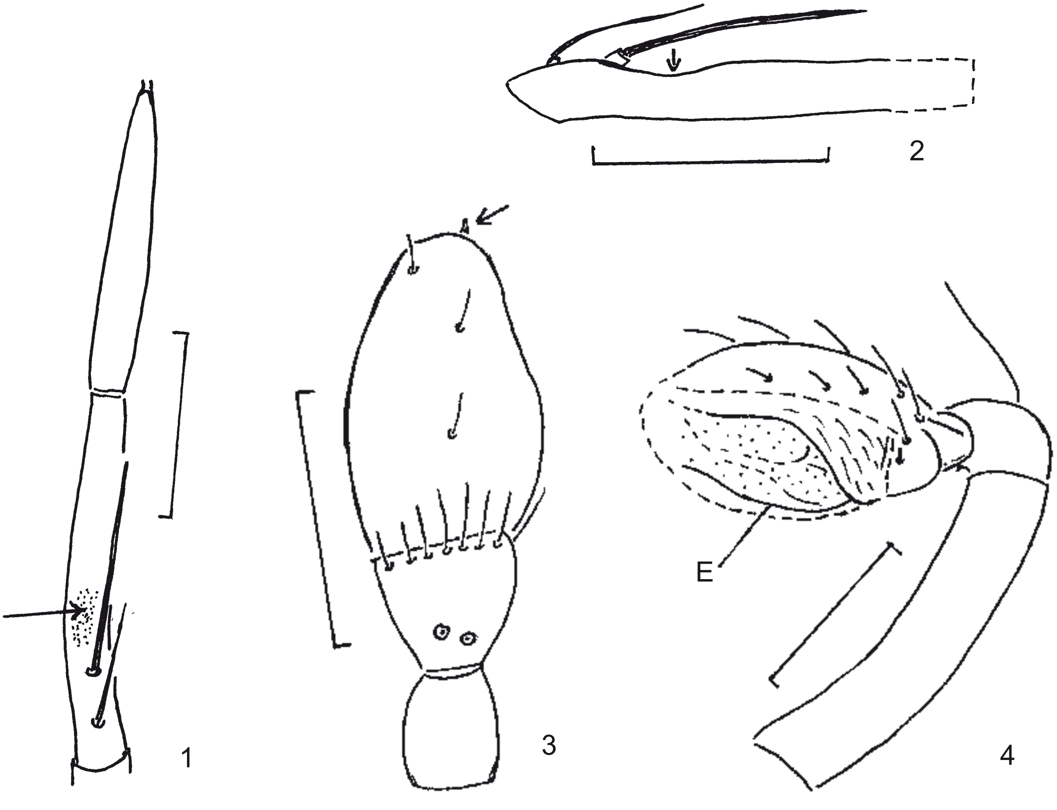
Diagnosis (♂; ♀ unknown): Metatarsus I (figs. 1-2) bent, with a dorsal depression in the basal half, and bearing a long dorsal-basal bristle besides a thin proximal bristle-shaped hair, tarsus I distinctly shorter than metatarsus I. Pedipalpus (figs. 3-4): Femur bent, cymbium wide and not modified, embolus fairly long.

Description (♂):
Measurements (in mm): Body length 1.2, prosomal length and width ca. 0.5, height anteriorly above the legs ca. 0.25; leg I: Femur ca. 0.5, patella 0.2, tibia 0.37, metatarsus 0.4, tarsus 0.3, femur IV 0.45, tibia IV 0.35.
Colour dark brown (darkened by heating).
Prosoma about as wide as long, only fairly high, 8 eyes (covered with an emulsion) on a raised area, clypeus long and protruding, basal cheliceral articles fairly long, other mouth articles and sternum hidden. – Legs (figs. 1-2) fairly short, I longest, tarsus I slightly thickened and distinctly shorter than metatarsus I, metatarsus I with a distinct dorsal depression in the basal half, with a very long and strong dorsal bristle originating in the basal third, and a thin bristle-shaped hair in a more basal position. Further bristles: Femora none, patellae a long dorsal-apical one, probably all tibiae with 2 dorsal bristles which are longer than the tibial diameter, position of the metatarsal II trichobothrium in ca. 0.3. – Opisthosoma egg-shaped, hairs indistinct, ventral side hidden. – Pe-

dipalpus (figs. 3-4, see the diagnosis) with a short patella and tibia, tibia with at least 2 trichobothria, apical cymbial “thorn” indistinct.

Relationships: *M. groehni* and *M. grotae* in Baltic amber are only 0.6-0.8 mm long, their metatarsus I is straight, and the position of the metatarsal I bristle is laterally.

Distribution: Eocene Baltic amber forest.



Figs. 1-4: Mysmena curvata **n. sp.**, ♂; 1) dorsal aspect of the right tarsus and metatarsus I. The arrow points to the metatarsal depression. Hairs are not drawn; 2) retrolateral aspect of the right metatarsus I. Note the dorsal depression (arrow); 3) dorsal aspect of the right pedipalpus. Note the apical cymbial “thorn” (arrow); 4) retrolateral and slightly apical aspect of the left pedipalpus. Mainly apical and ventral parts of the bulbus are hidden by a white emulsion. E = embolus. Scale bar 0.2 mm.

Family PROTHERIIDAE WUNDERLICH 2004

A few years ago I described the remarkable new and extinct spider family Protheridiidae which includes the tribes Protheridiini (the genus *Protheridion*) and Praetheridiini (the genus *Praetheridion*), see WUNDERLICH (2004). Both taxa share plesiomorphic araneoid characters like numerous leg bristles including femoral bristles, a long clypeus, and a paracymbium which stands out and is fused to the cymbium. The eye field is wide in these taxa and a DENTICULATE TEGULAR APOPHYSIS exists, the prosomal profile is convex, and the paired tarsal claws are most probably toothless in all taxa.

During the last years I got two more members of the Protheridiini, genus *Protheridion*, which probably are conspecific with *P. tibialis* WUNDERLICH 2004, CJW.

A (related) member of this – apparently archaic – family (as well as of the Protomimetinae, see below) probably survived in the tropics; the spider faunas of the tropical regions are still not well studied. Related taxa may be found in Cretaceous ambers as well, whose study is still at the beginning.

Family MIMETIDAE

Remarks on the family diagnosis:

In their diagnosis of the family Mimetidae HARMS & DUNLOP (2009: 779) write erroneously: "... spiders with raptorial spines on the metatarsus and tarsus of legs I-II". In the description of the family this error is corrected to "tibia and metatarsus". These authors furthermore noted in the description of the Mimetidae that "Three serrated tarsal claws ..." exist but actually the paired tarsal claws are toothed and not serrated.

If the members of the new subfamily Protomimetinae is regarded as a taxon of the Mimetidae the family diagnosis has to be enlarged and has to include the simple shape and arrangement of the strong metatarsal/tibial hairs as shown in the figs. 2a-b and 9 below.

In Baltic and Bitterfeld amber forests the derived and surviving mimetid genera *Ero* and probably *Mimetus* (see the discussion below) of the subfamily Mimetinae existed. In the following I describe two species of the extinct Eocene new genus *Protomimetus* which I regard (with some hesitation) as related to the Mimetinae, and – according to its simple and strong "semi-raptorial hairs" of the legs I-II (figs. 2a-b, 9) – as related to the ancestor of todays Mimetidae, probably its sister group.

(1) Subfamily PROTOMIMETINAE n. subfam. Photos 31-32

Type genus (by monotypy): *Protomimetus* n. gen.

Diagnosis (♂): Metatarsi I-II (figs. 2a-b) – in one species tibiae I-II, too (fig. 10) – bear a regular row of strong prolateral almost bristle-shaped – semi-raptorial – hairs, tarsal claws situated on a structure similar to an onychium (figs. 4-4a), numerous leg bristles (figs. 2a, 3, 10) on femora, patellae, tibiae and metatarsi; ♂-pedipalpus (figs. 5-8a): Paracymbium flat, wide and standing out, tegulum with a long retrobasal apophysis which stands widely out, a long terminal apophysis, a short central (?= median) apophysis, and a long embolus exists in a wide loop, guided by a pointed conductor. ♀: Epigyne of the probably conspecific female (fig. 11) fairly protruding, with a bent transverse sclerotised border.

Further characters: Ecribellae, clypeus long (*longiclypeus*) or short (*breviclypeus*), prosoma dorsally fairly low, small eyes in a wide field, posterior eye row recurved (fig. 1), paired tarsal claws toothed. Nothing is known about a basal fusion of the chelicerae or cheliceral “peg teeth” as well as the kind of leg autotomy (see below: ?*P. breviclypeus*).

Relationships: Due to its characters Protomimetinae is a member of the superfamily Araneoidea. It does not fit well in any extant or fossil spider family. The chaetotaxy excludes it from the “spineless femur clade”, Tetragnathidae have more simple structures of the bulbus, in the Zygiellidae and most Araneidae and Tetragnathidae the clypeus is short in contrast to the generotype, the eye position is different, the leg bristles are stouter, the paracymbium is different (the bulbus is twisted in the Araneidae). In the Protheridiidae the prosoma is convex, the paired tarsal claws are smooth, a denticulate tegular apophysis exists, strong metatarsal I-II “semi-raptorial hairs” are absent, and the tip of the tarsi is not modified. In the Malkaridae – in which the hairs/bristles of the anterior metatarsi may be similar – the opisthosoma is scutate and the chaetotaxy is different. The chaetotaxy of the Protomimetinae is similar to the “linyphiid branch” sensu WUNDERLICH (2008: 117) in which the tip of the tarsi is not modified, retrolateral cheliceral files are frequent and the leg autotomy occurs (with exceptions?) between patella and tibia. A patella-tibia autotomy in the Protomimetinae appears unlikely: In the holotype of *P. breviclypeus* all legs are completely preserved although the spider has been captured on the surface of a drop of resin, and has most probably tried to get free. Fossil specimens of Linyphiidae in Baltic amber frequently lost a part of their leg beyond the patella, the paracymbium is a free sclerite in almost all taxa. In the family Pumiliopomidae WUNDERLICH 2008 strong metatarsal hairs are absent, the paracymbium is two- or threepartite and a retrobasal tegular apophysis is absent.
Some taxa of the superfamily Araneoidea which possess raptorial hairs and bristles on their legs were treated by WUNDERLICH (2008: 162-165) but their fine structures and their relationships are different from the Protomimetinae. In *Mimetidion furca* WUNDERLICH 2008 (Theridiidae, Baltic amber) the prolateral bristles of metatarsus I are stronger, fewer and wider spaced (see p. 453: Fig. 441), the chaetotaxy is different.

Excluding other relationships the Mimetidae MAY be related to the Protomimetinae or may include this taxon. With some hesitation – the existence of cheliceral "peg teeth" and of basally fused chelicerae are unknown – I regard the new genus *Protomimetus* as related to the Mimetinae. In the Protomimetinae the anterior median eyes are not the largest and are not situated on a common tubercle in contrast to the Mimetinae, and the bristles/hairs of metatarsus I-II have not evolved to two different kinds, long as well as short ones between the long ones. According to its simple and almost strong "semi-raptorial" hairs of the legs I-II (figs. 2a-b, 9) Protomimetinae may be related to the ancestor of todays Mimetidae, probably being its sister group. In this case it may even to be regarded as a family of its own.

Distribution: Eocene Baltic amber forest.

***Protomimetus* n. gen.**

The gender of the name is masculine.

Type species: *Protomimetus longiclypeus* n. sp.

Diagnosis, relationships and **distribution**: See above. Eyes (figs. 1, 9) small at least in the type species, field wide, posterior median eyes spaced by one to almost two diameters (in the type species), the pedipalpal patella and tibia are short and bear a single dorsal bristle each in the type species (the male is unknown in the second species).

***Protomimetus longiclypeus* n. gen. n. sp.** (figs. 1-8a) photo 31

Material: Holotype ♂ in Baltic amber, F2166/BB/AR/CJW.

Preservation and syninclusions: The spider is completely and well preserved in a piece of amber which was fairly heated; ventrally exists a weak white emulsion, a gas bubble is preserved right below the sternum, a layer/fissure covers lateral parts of body and legs which margin is darkened by heating, 3 stellate hairs are preserved right of the spider.

Diagnosis (♂; ♀ unknown): Eyes (fig. 1) small and widely spaced, clypeus longer than the field of the median eyes, pedipalpus as in the figs. 5-8.

Description (♂):
Measurements (in mm): Body length 2.0, prosoma: Length and width 0.9, height ca. 0.4; leg I: Femur 1.1, patella 0.45, tibia 0.85, metatarsus 1.05, tarsus 0.4, tibia II 0.63, tibia III 0.45, tibia IV 0.65.
Colour: Prosoma and legs light brown, opisthosoma yellowish grey.
Prosoma (fig. 1) as long as wide, low, cuticula squamate, dorsally not distinctly convex, fovea well developed, short, few dorsal hairs, eyes small and widely spaced, field wide, posterior row recurved, posterior median eyes spaced by about two diameters, anterior median eyes not protruding and not on a common tubercle, clypeus long (partly hidden), longer than the field of the median eyes, basal cheliceral articles of medium size, not longer than the clypeus, condylus and lateral files absent, its teeth hidden by an emulsion ("peg teeth" may be absent), labium free, rebordered, wider than long, pointing anteriorly, gnathocoxae not strongly convex, without lateral outgrowth, coxae IV widely spaced. – Legs (figs. 2-4a) fairly slender, order I/II/IV/III. Metatarsi I-II bear a regular prolateral row of strong – almost bristle-shaped – "hairs" (macrosetae). Bristles long, slender and numerous on femora, patellae, tibiae, and metatarsi. The femora bear dorsally a long one in ca. 0.65 and a short proapical one, patellae dorsally 2 long ones, I-II additionally a retrolateral one near the middle, tibiae dorsally and laterally with bristles (8 on I, 5 on IV), metatarsi I-III bear a dorsal bristle in the basal half, and at least a retrolateral one (2 on I-II). Metatarsal preening hairs are absent. Metatarsi I-III bear a long trichobothrium, its position on I is in 0.78. Tarsal claws of medium size, situated on a structure similar to an onychium (figs. 4-4a), the paired claws are most probably toothed, the unpaired claw is shorter, coxal outgrowths and a comb of serrated hairs of tarsus IV are absent. – Opisthosoma (fig. 1) oval, soft, widest in front of the middle, dorsally scarcely covered with long hairs, spinnerets short, colulus fairly large, spiracles hidden. – Pedipalpus (figs. 5-8a, see above) with short patella and tibia which, both are about as long as wide and bear a single doral-distal bristle, cymbium not modified, paracymbium fused to the cymbium, flat, wide and standing out, tegulum with a long retrobasal outgrowth which stands widely out, a short and a long pointed tegular apophyses exist, the long and pointed conductor has a distal position, the embolus (parts are hidden) is long and has a counterclockwise position in the right pedipalpus; an indistinct denticulate tegular apophysis is hard to observe.

Relationships: In ?*Protomimetus breviclypeus* n. sp. the clypeus is much shorter (fig. 9) and – besides the metatarsi I-II – also the tibiae I-II bear an anterior row of strong hairs (fig. 10); the position of the metatarsal trichobothria and the length of the unpaired tarsal claw are also different.

Distribution: Eocene Baltic amber forest.

?***Protomimetus breviclypeus*** **n. gen. n. sp**. (figs. 9-11) photo 32

Material: Holotype ♀ in Eocene Baltic amber, F2212/BB/AR/CJW.

Preservation and syninclusions: The spider is preserved in a yellow piece of amber which is 3 ½ cm long, was slightly heated, and has some brown crusts on its surface. It is almost completely preserved, only the left tarsus IV is cut off, dorsal and right parts of the spider are covered with a white emulsion. At its ventral side the spider is partly attached to the surface of a large drop of the fossil resin within the amber. Also preserved are numerous stellate hairs, some directly below the mouth parts of the spider. Numerous tiny particles – including pollen grains – are preserved on the surface of the enclosed drop of fossil resin.

Diagnosis (♀; ♂ unknown): Clypeus (fig. 9) short, metatarsi AND tibiae I-II (fig. 10) with a row of strong prolateral hairs, epigyne (fig. 11) fairly protruding, bearing a bent transverse sclerotized rim; the receptacula seminis are probably shining throught the opisthosomal cuticula.

Description (♀):
Measurements (in mm): Body length ca. 2.4, opisthosoma: Length 1.7, height ca. 0.8; femur I 1.5, tibia I 1.0, tibia III 0.5, tibia IV 0.9, length of a basal cheliceral article 0.45.
Colour: Light to medium grey brown.
Prosoma (fig. 9): 8 eyes which are covered with a white emulsion, clypeus short compared with the anterior median eyes, basal cheliceral articles fairly long, (peg) teeth are not observable/hidden. – Legs (fig. 10) long and slender, I longest, III distinctly shortest. Thin and partly long bristles exist on femora, patellae, tibibiae and metatarsi (some are hidden), e. g.: Femur I dorsally 1 in the basal half and 1 retrodistally, all patellae 1/1, tibia II dorsally 1/1, prolaterally 1/1, retrolaterally-distally 1, ventrally 1 in the distal half, all metatarsi bear a single basal-lateral pair, metatarsus III: Only the left one bears additionally 2 dorsal bristles near the middle, metatarsus IV: A single additional bristle. Metatarsi I-II and – less distinct tibiae I-II – bear a row of prolateral almost bristle-shaped hairs, the metatarsal trichobothria are hard to detect, metatarsus III bears a trichobothrium in a position of less than 0.2. The tarsal claws are apparently situated as in *P. longiclypeus*, the unpaired tarsal claw is long and strongly bent. – Autotomy: The spider has been captured – most probably alive – on a drop of the fossil resin similar to a fly catcher, and had surely tried to get free, but all legs are complete. The kind of autotomy between patelly and tibia, which is frequent in members of the Linyphiidae in Baltic amber, is not likely in my opinion. – Opisthosoma 2.1 times longer than wide, covered with short hairs, spinnerets short. – Epigyne: See the diagnosis.

Relationships: See *P. longiclypeus*. The distinctly different length of the clypeus may indicate that both species probably are not congeneric.

Distribution: Eocene Baltic amber forest.

(2) Subfamily MIMETINAE

In Baltic and Bitterfeld ambers existed the derived and surviving Mimetinae genera *Ero* and probably *Mimetus* (see the discussion below). During the last years I got a dozen males of these taxa in Baltic amber which are not yet determined except a single male of *Ero* (*Palaeoero*), see below.

HARMS & DUNLOP (2009) treated the fossil taxa of the family Mimetidae which are preserved in amber, and synonymised *Palaeoero* WUNDERLICH 2004 (Mimetinae) (see below) as well as *Succinero* WUNDERLICH 2004 – both extinct genera are preserved in Baltic amber – with *Ero* C. L. KOCH 1837. These synonymisations may be justified or not; see below: The "chaotic" taxonomical situation in "*Mimetus*" which may be similar in *Ero*; or (in my opinion) both may be to regarded as subgenera of *Ero*. – Furthermore these authors regarded *Praeoarces* WUNDERLICH 2004 (1) not as a member of the subfamily Oarcinae but of the Mimetinae (the biogeographical relationships of the family Mimetidae to South America have to delete, see WUNDERLICH (2004: 240)), and (2) as a nomen nudum. I agree with the transfer of *Praeoarces* to the Mimetinae but – according to its peculiar characters – blunt bristles as well as a flattened shape of tibia I – I regard *Praeoarces* not as a nomen nudum but as a "good" genus, see IRZN: § 75.5. – During the last few years I got two further juvenile females of this genus (CJW) but a male is still unknown.

The German name "Spider Eater" for the Mimetidae – in English they are called "Pirate Spiders" – is based on the usual prey of these spiders: Capture web building spiders of other families like Theridiidae and Linyphiidae. Mimetidae fed on spiders already in the Eocene like the members of the family Archaeidae, see WUNDERLICH (2004: 94, 98, photo 626: *Archaea* sp.). In the following I describe a further fossil mimetid spider and its possible prey in amber:

Material: A female Mimetidae, probably *Ero* sp. indet., and a male *Acrometa* ?*cristata* PETRUNKEVITCH (Synotaxidae) in a piece of Eocene Baltic amber which is 6.5 mm long, F2028/BB/AR/CJW.
Syninclusions are remains of a capture web (probably of the *Acrometa* sp.), a Diptera, a Trichoptera, and numerous Acari, mainly larvae.
Description: The mimetid spider is 3 mm long and has a protruding and strongly sclerotised epigyne. In the same layer of amber, in a distance of 4 mm, the synotaxid spider is preserved. It has a prosomal length of 1 mm and crumpled legs in an unnatural position quite near its body.
Because of the shape of the synotaxid spider and its position not far away from the Mimetidae it seems likely that the former spider was the prey of the latter spider.

Ero C. L. KOCH 1837

Ero carboneana PETRUNKEVITCH 1958

New material: 1♂ in Baltic amber, F2148/BB/AR/CJW.

Ero (*Palaeoero*) *?longitarsus* (WUNDERLICH 2004) (figs. 12-13) photos 34a-b

Material: 1♂ in Baltic amber, F2023/BB/AR/CJW.

Measurements (in mm) and pedipalpus:
Body length ca. 2.1, prosomal length 1.1, leg I: Femur 1.3, metatarsus 0.8, tarsus 1.15.
Pedipalpus (figs. 12-13): The embolus describes at least half a circle, the "terminal apophysis" is divided. The figs. document how different the bulbi of the same male may appear in slightly different aspects, and bearing emulsions.

Relationships: The tarsi are distinctly longer than the metatarsi as in the holotype of *longitarsus* but in the holotype the bulbus is not observable in the ventral aspect. Therefore the conspecifity of both males is not quite sure. I do not know a species of *Ero* in which the tarsi are distinctly longer than the metatarsi; in the European species the tarsi are distinctly shorter, see THALER et al. (2004).

Distribution: Eocene Baltic amber forest.

Mimetus HENTZ 1832

The limits, the diagnosis as well as the relationships of *Mimetus* are quite unsure; *Mimetus* is most probably not a monophyletic taxon – see HARMS & DUNLOP (2009: 792) -, and its American generotype is probably not congeneric with some extant or with the fossil species which are listed under *Mimetus*.

Remarks on the paper by HARMS & DUNLOP (2009) on fossil Mimetidae:

Following BRIGNOLI (1984) the authors (p. 792) characterised *Mimetus* as a "... dump-heap of unrelated species" and called it an "undoubtedly paraphyletic" group but they list Baltic and Rovno amber taxa under *Mimetus* without a question mark (I originally published *M. longipes* and *M. brevipes* as questionable members of *Mimetus* adding a question mark to the genus name). The diagnosis of *Mimetus* by these authors (p. 792) is unsatisfactory: Which extant and fossil species are included? An allegedly diagnostic cymbial "shovel" and a "vexillum" are unknown to me in the fossil ?*Mimetus brevipes* and ?*M. longipes*. According to the genus diagnosis the bulbus possesses (only) the sclerites S2-S5 but (p. 793) S1 exists in Central and North American species as well as in the fossil ?*M. brevipes*. A distally widened pedipalpal patella of *brevipes* and *longipes* is called (p. 795) unique in *Mimetus* but the same shape exists in the extant European *Mimetus laevigatus* as well. A "compact male bulb" is noted as a diagnostic character of *Ero* in the first place (p. 786) but a compact bulbus exists also in several species of "*Mimetus*" like *brevipes*, and a single pedipalpal patellar bristle exists not only in *Ero* but in several species of "*Mimetus*", too.

The authors in question (p. 795) are irritated about the names of ?*Mimetus brevipes* and ?*M. longipes* because the pedipalpal (!) femur and tibia are longer in *brevipes* than in *longipes*. These authors overlooked that the names of these species refer to the legs ("-pes") but not to the pedipalpi. In *brevipes* the pedipalpal articles are longer than in *longipes* but the situation is reversed in the length of the legs of these species.

Several authors distinguish *Ero* and *Mimetus* due (1) to the length of their clypeus compared with the width of the field of their median eyes, (2) to the shape of the basal cheliceral articles; but there are transitions in the Eocene taxa, and (3) to the existence of an anteriormesal-distal cheliceral bristle in *Mimetus* which allegedly is absent in *Ero*. Contrarily I found such – distinct – bristle in members of *Ero aphana*, but not in the fossil ?*M. longipes* in this position.

In summery: A worldwide revision of the extant and fossil taxa of the Mimetinae is still needed.

?*Mimetus* ?*longipes* WUNDERLICH 2004 (fig. 14) photos 34a-b

The description of this species was based on a single male. The female which is described below may be conspecific according to its long legs and relatively large body size (the male is 4.1 mm long).

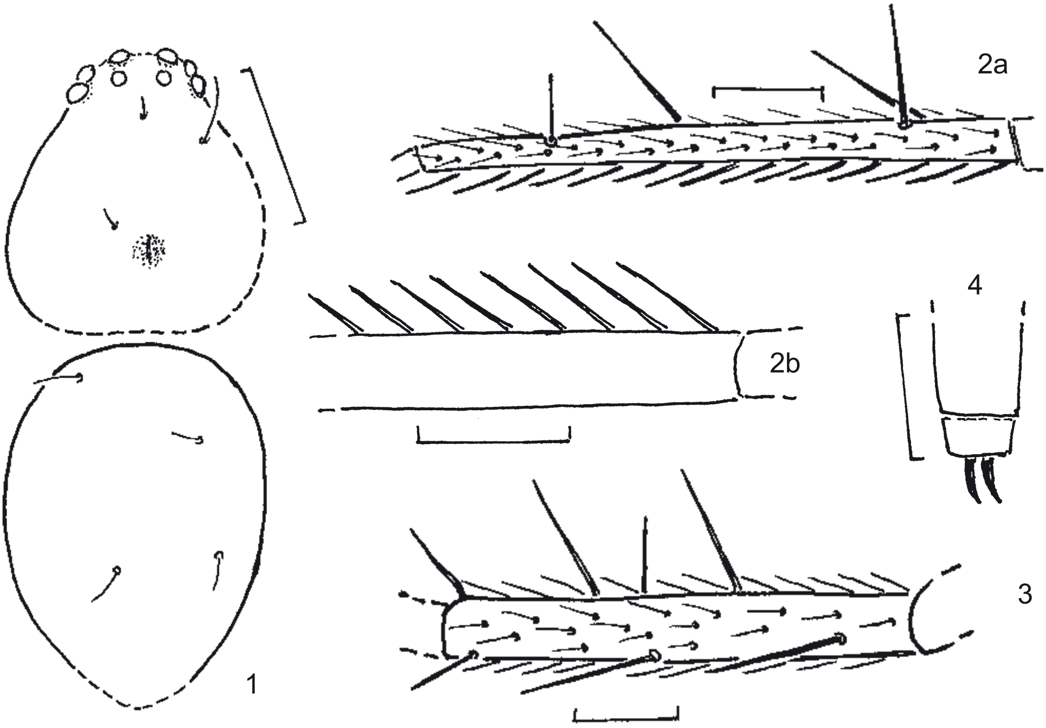
Material: 1♀ in Eocene Baltic amber, F 2245/BB/AR/CJW.

Preservation and syninclusions: The spider is well preserved, the right leg I is cut off through the metatarsus, the tip of the right tarsus II is “cut off” within the amber. A large leg of a Blattaria is preserved directly below the spider and hides partly the epigyne.

Diagnosis (♀): Opisthosoma only 1.3 times longer than wide, epigyne (fig. 14; is is difficult to observe) with a strongly sclerotized and protruding structure which is distinctly wider than long.

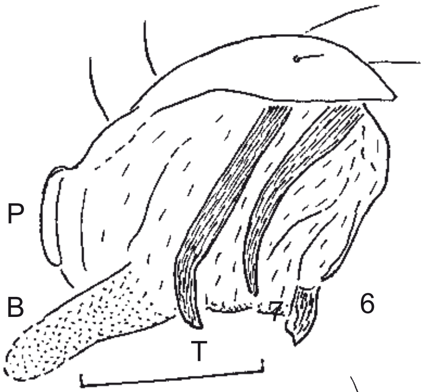
Description:
Measurements (in mm): Body length 5.5, prosoma: Length 2.5, width almost 2.5, tibia I 3.4.
Opisthosoma (photo) 1.3 times longer than wide, distinctly widest in front of the middle, without humps, covered with short hairs. – Epigyne: See the diagnosis.

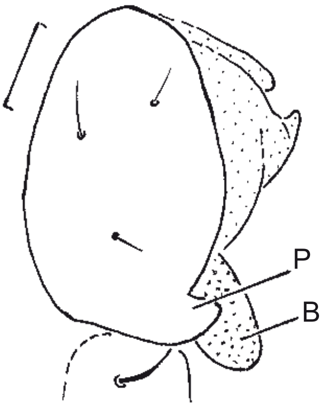
Distribution: Eocene Baltic amber forest.



Figs. 1-8a: Protomimetus longiclypeus **n. gen. n. sp.,** ♂; 1) Dorsal aspect of the body. Only few hairs are drawn; 2a) dorsal and slightly prolateral aspect of the right metatarsus I. Note the regular prolateral row of strong hairs; 2b) dorsal aspect of the basal section of the left metatarsus II. Bristles and normal hairs are not drawn; 3) dorsal aspect of the left tibia I; 4) retrodorsal aspect of the tip of the left tarsus I. Hairs and the unpaired claw are not drawn; 4a) retrolateral aspect of the left tarsus II. Hairs are not drawn; 5) dorsal aspect of the left pedipalpus. Only the basal part of the long patellar and tibial bristles are drawn. The large basal tegular apophysis is punctuated; 6) retrodistal-ventral aspect of the right pedipalpus; 7) ventral aspect of the right pedipalpus which


4a

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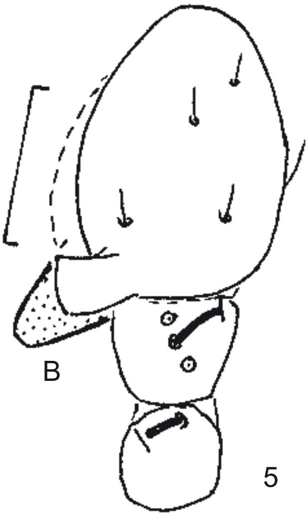

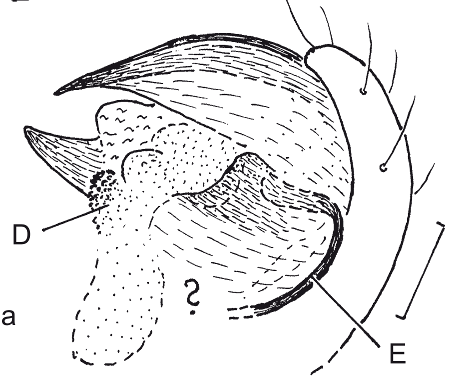
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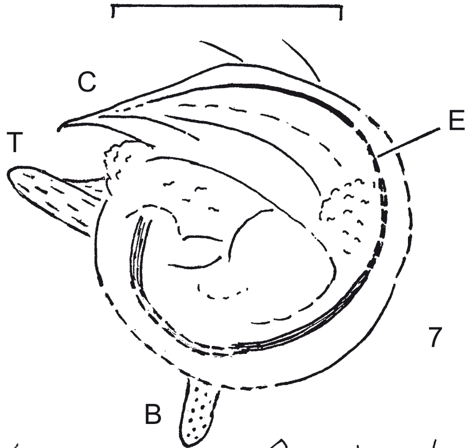

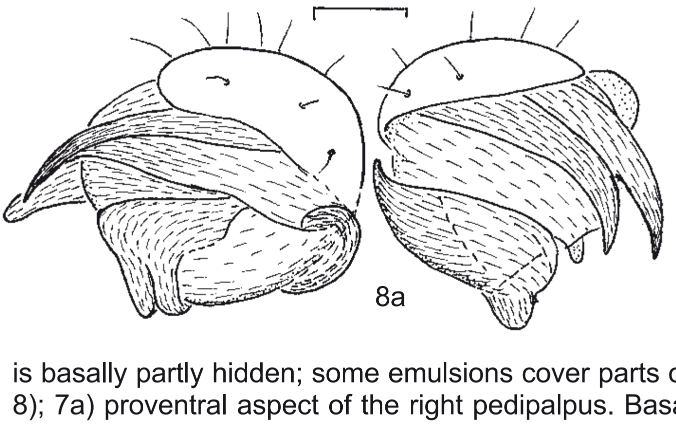
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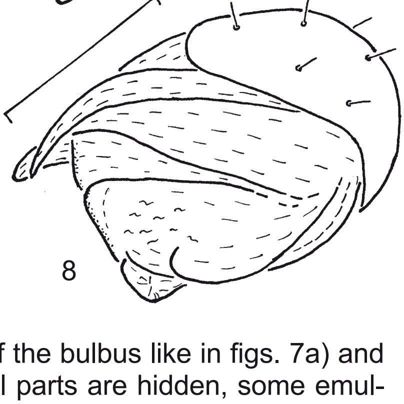
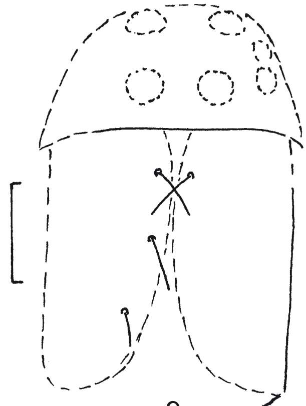


is basally partly hidden; some emulsions cover parts of the bulbus like in figs. 7a) and 8); 7a) proventral aspect of the right pedipalpus. Basal parts are hidden, some emulsions exist on the bulbus; 8) prodistal aspect of the right pedipalpus. Most parts of the embolus and the basal tegular apophysis are hidden in this position; 8a) apical aspect of both pedipalpi which possess fairly different positions. Scale bars 0.1 mm in figs. 4), 5a), 7a), 8a), 0.5 in fig. 1), 0.2 in the remaining figs. A = central apophysis of the bulbus, B = basal tegular apophysis, C = condurtor, D = denticulate apophysis, E = embolus, P = paracymbium, T = terminal apophysis;



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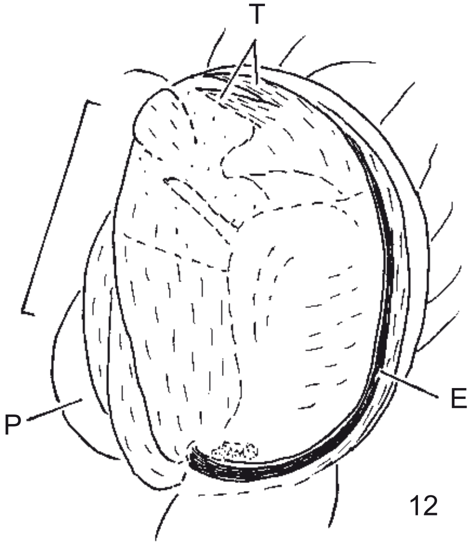

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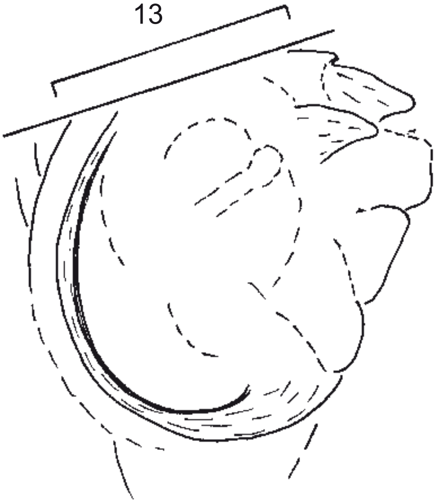

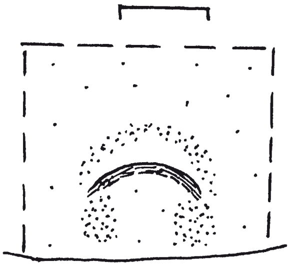

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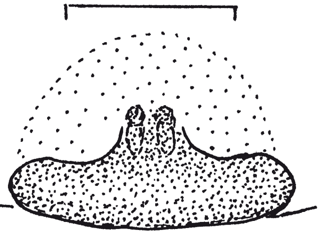


figs. 9-11: ?*Protomimetus breviclypeus* **n. gen. n. sp.**, ♀; 9) anterior aspect of the prosoma. Most parts are covered with a white emulsion, the eyes with enlarging bubbles, too; 10) prodorsal aspect of the left tibia II and the basal part of the metatarsus. Not all hairs are drawn; 11) ventral-left aspect of the epigyne which is partly hidden and not exactly observable. Scale bars 0.1 in fig. 11), 0.2 in figs. 9-10);

figs. 12-13: *Ero* (*Palaeoero*) ?*longitarsus* (WUNDERLICH 2004), ♂, two slightly different ventral aspects of the right and left pedipalpus which is distally partly hidden in fig. 13. Thin emulsions hide parts of the bulbi. E = embolus, P = paracymbium, T = terminal apophysis. Scale bar 0.2;

fig. 14) ?*Mimetus* ?*longipes* WUNDERLICH 2004, ♀, epigyne, which is not well observable. Scale bar 0.2.

Family SALTICIDAE

The Eocene fauna of the family Salticidae in Baltic/Bitterfeld amber was revised by WUNDERLICH (2004: 1761-1819). 8 extinct genera were reported which were all regarded as taxa of the subfamily Cocalodinae. The relationships of the Cocalodinae to the Hisponinae, Spartaeinae and Gorgopsininae PETRUNKEVITCH 1955 – as well as their possible synonymy – are not clear up to now. Open questions are:

(1) How often has the median apophysis been lost?
(2) Are all "median apophyses" homologue structures?
(3) How often were the – apparently basically large – posterior median eyes reduced?
(4) Is the cephalic constriction a basic character of the family Salticidae?
(5) How often has this constriction been lost – or did it evolve several times?
(6) Is the subfamily Cocalodinae – see WUNDERLICH (2004) – the sister group to the advanced Euophrydinae + Salticinae etc.?

The study of new material (but more material is needed!) lead me to the conclusion that Cocalodinae were dominant, and probably members of four different higher taxa (subfamilies?) are preserved in Baltic/Bitterfeld ambers, quite more than thought previously:

(1) Bulbus with a true (tegular) median apophysis, see WUNDERLICH (2004: 1807: Figs. 10-11), cephalic inclination existing, posterior median eyes small: *Almolinus* PETRUNKEVITCH 1958: Subfamily indet. The existence of a median apophysis may indicate relationships to an ancient subfamily like the Spartaeinae. – Material: 2♂ F2255/BB/AR/CJW (photos 46a-c), and F2256/BB/AR/ CJW.

(2) Apophyses of the bulbus unknown (absent?), cephalic inclination probably existing, posterior median eyes large: *Paralinus* PETRUNKEVITCH 1942, Subfamily indet. – Remark: The apical structure of the bulbus may in reality be a median apophysis, and the structure between cymbium and bulbus may be the long embolus, see WUNDERLICH (2004: 1818, fig. 79). – Material: A questionable ♂ of *Paralinus crosbyi* in a heated piece of amber, partly covered with a white emulsion, F2254/BB/AR/CJW, photo 47. The pedipalpal tibial apophysis of this male is ca. 1/5 shorter than in the holotype.

(3) Most probably no median nor subtegular apophysis, cephalic inclination absent, posterior median eyes small: Gen. indet. (fig. 1) in which the tegulum is strongly elongated basally (!): Subfamily indet., probably the member of an advanced taxon like Euophrydinae. – Material: 2♂ F2257/BB/AR/CJW and F2258/BB/AR/CJW.

(4) Median apophysis absent but subtegular apophysis existing (figs. 4-5), see WUNDERLICH (2004: 1808-1817, figs. 18, 26, 55,74) (subtegular apophysis under "median apophysis"), prosomal constriction existing or absent, posterior median eyes large or

small: Subfamily Cocalodinae: The remaining genera in Baltic/Bitterfeld amber (*Calilinus, Distanilinus, Eolinus, Gorgopsidis*, *Gorgopsina*, and *Microlinus*).

In the following I treat few already known species and describe a new species of the genus *Gorgopsina* which is not rare in Baltic amber, and are also known from Ukrainean amber from Rovno.

Gorgopsina PETRUNKEVITCH 1955

WUNDERLICH (2004) described 7 species of this genus in Baltic/Bitterfeld ambers and a single species – *G. fractura* – in Rovno amber, see below.

New material:

Gorgopsina fractura WUNDERLICH 2004 (fig. 2)

Material: 1♂ in Eocene Rovno amber from the Ukraine (IZNASU, E. PERKOVSKY) no. K-1983; compared with the ♂ holotype D-1918.

The male K-1983 is only partly preserved in a piece of amber which was heated, but the right bulbus is very well preserved and observable in the retroventral aspect (fig. 2). Its pedipalpal tibial apophysis is not well observable and the tip of the embolus is hidden. *Gorgosina flexuosa* WUNDERLICH 2004 is strongly related according to the shape of the embolus, and I do not want to exclude the synonymy of both species.

Gorgopsina expandens WUNDERLICH (2004) (fig. 3)

Material: 1♂ in Eocene Baltic amber, F2259/BB/AR/CJW.

The spider is difficult to observe within layers in the amber and white emulsions, but the right pedipalpus is well recognizable in the ventral aspect. Its embolus is quite similar to the holotype of *expandens*, the embolus is a bit more slender (fig. 3).

Gorgopsina rectangularis **n. sp**. (figs. 4-5)

Material: Holotype ♂ in Eocene Baltic amber and 2 separated pieces of amber, F2260/BB/AR/CJW.

Preservation and syninclusions: The spider is almost completely and fairly well preserved in a small clear yellow piece of amber which apparently was slightly heated, its right leg I is lost beyond the coxa by autotomy, white emulsions cover dorsal and ventral sides of the spider. Parts of a Diptera exist left of the spider, particles of detritus are preserved in the three pieces of amber.

Diagnosis (♂; ♀ unknown): Embolus long and thin in its distal part, strongly and abruptly bent in the middle.

Description (♂):
Measurements (in mm): Body length 4.6, prosomal length 2.0; leg I: Femur 1.5, patella 0.6, tibia ca. 1.35, metatarsus 1.2, tarsus 0.6, tibiae II-IV ca. 1.0/0.8/1.2.
Colour: Prosoma and legs medium to dark brown, opisthosoma light grey.
Prosoma and legs like in the genus (partly hidden by an emulsion), see WUNDERLICH (2004: 1791f). – Opisthosoma 1.8 times longer than wide, densely covered with thin hairs, dorsal scutum absent. – Pedipalpus (see above) with short patella and tibia, retrolateral tibial apophysis partly hidden, apparently two-partite, standing fairly out.

Relationships: In *G. flexuosa* WUNDERLICH 2004 and *G. fractura* WUNDERLICH 2004 the embolus is not abruptly strongly bent.

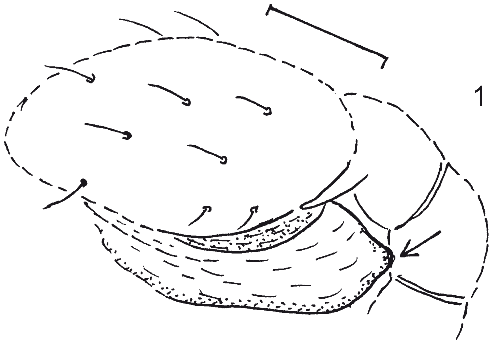
Distribution: Eocene Baltic amber forest.

Fig. 1) Salticidae indet., ♂, F2258/BB/AR/CJW, retrolateral aspect of the left pedipalpus. Parts are hidden. The arrow points to the basally elongated bulbus;

fig. 2) *Gorgopsina fractura* WUNDERLICH 2004, ♂ (IZNASU no. K-1983), retrolateral and slightly apical aspect of the right pedipalpus;

fig.3) *Gorgopsina expandens* WUNDERLICH 2004, ♂, ventral and slightly apical aspect of the distal part of the right pedipalpus;

figs. 4-5: *Gorgopsina rectangularis* **n. sp**., ♂; 4) ventral and slightly apical aspect of the left pedipalpus; 5) retrolateral aspect of the right pedipalpus. Only few hairs are drawn.
E = embolus, EM = emulsion, S = subtegular apophysis. Scale bar 0.2 mm.



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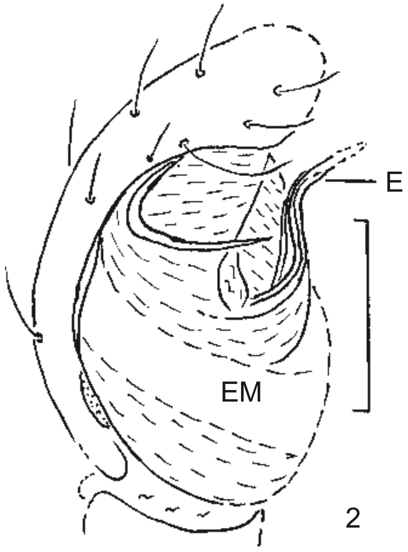

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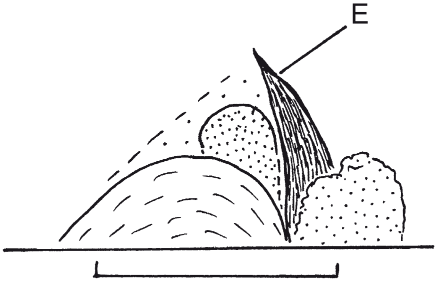

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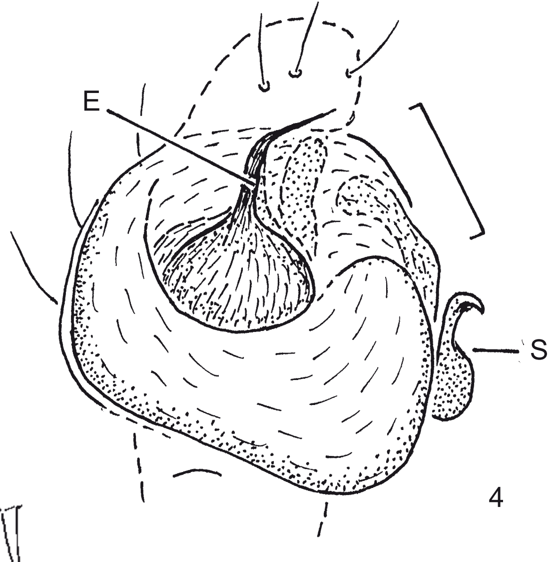

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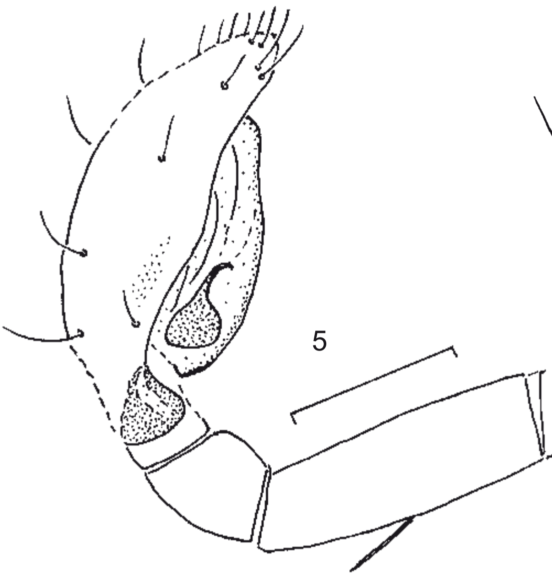

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BEITR. ARANEOL., 6 (2011)

SOME FOSSIL SPIDERS (ARANEAE) IN CRETACEOUS AMBERS

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Abstract: The following fossil spider taxa (Araneae: Araneomorpha) in Cretaceous ambers are described: ?*Ariadna amissiocoli* WUNDERLICH 2008 (Segestriidae) in Jordanian amber, *Burmesiola cretacea* **n. gen. n. sp.** (Hersiliidae) in amber from Burma (Myanmar), *Eoscaphiella ohlhoffi* **n. gen. n. sp**. (Oonopidae) in amber from Burma, *Jerseyuloborus longisoma* **n. gen. n. sp**. (Uloboridae) in North American amber from New Jersey, Plumorsolidae indet. in amber from Burma, and *Praeterleptoneta tibialis* **n. sp**. (Praeterleptonetidae) in amber from Burma. The relationships of the enigmatic family Praeterleptonetidae as well as the proof of several spider families like Linyphiidae in Cretaceous ambers are discussed. – The Cretaceous and Eocene (Baltic amber) as well as the extant European spider faunas of the Haplogynae and Entelegynae are compared. It seems that the whole Cretaceous was still part of the "age of the Haplogynae" but the Palaeogene was already the "age of the Entelegynae", especially of the superfamily Araneoidea. The "Palaeogene explosion" of the number of spider taxa – their diversity – was probably the most important evolutionary event during the entire history of the order Araneae, comparable to the radiation of orchids, gras, ants, singing birds, and placental mammals.

Key words: Amber, Araneae, Araneoidea, Burma, Cretaceous, Entelegynae, fossils, Haplogynae, Hersiliidae, Jordan, Linyphiidae, Myanmar, New Jersey, Oonopidae, Plumorsolidae, Praeterleptonetidae, RTA-clade, Segestriidae, spiders, Uloboridae.

Material: Most of the material has been bought from several dealers, except ?*Ariadna amissiocoli*, see below. The fossil spiders are actually kept in the collection JOERG WUNDERLICH (CJW).

During the last years a greater number of fossil spiders in various Cretaceous ambers has been described, see, e. g., SELDEN & PENNEY (2010) and WUNDERLICH (2008). Most important Cretaceous amber deposits are treated by PENNEY (2010) but as a pity the Jordanian and Siberian ambers are excluded in this book as well as the new large deposits in Africa and India.

The study of Cretaceous spiders is still at its beginning. Recently reported from Cretaceous ambers are allegedly juv. spiders of the families Huttoniidae (determination questionable in my opinion; adult spiders are needed for sure conclusions) (preserved in Canadian amber as well as in amber from New Jersey: unpublished, juv., CJW), Mecysmaucheniidae (questionable in my opinion), Micropholcommatidae (most probably = Anapidae s. l. in the sense of SCHÜTT (2003); the synonymy is doubted by PLATNICK (2004) because of the limited taxa included in her analysis (!)); Hersiliidae from the Cretaceous are reported for the first time in this paper. The key to the spider families which are known from Cretaceous ambers – see WUNDERLICH (2008: 564-567) – has to complete.

Recently SELDEN (2010) reported the first Cretaceous member of the family Theridiosomatidae (it is not preserved in amber but in rocks, from Russian Asia); see the paper on the family Theridiosomatidae in this volume. This is a further Early Cretaceous proof of the old orb-weaving branch of the superfamily Araneoidea. A sure proof of a not orb-weaving araneoid spider taxon from the Cretaceous is unknown to me.

Several determinations by certain authors of – and conclusions on – fossil spiders are questionable or even clearly wrong, see WUNDERLICH (2008: 537-540). Such doubts and corrections are not discussed and even ignored in most parts, e. g. by SELDEN & PENNEY (2010: 182, 192): The alleged existence of taxa of the families Linyphiidae and Pisauridae in Cretaceous ambers is still reported: The “family identifications (by SELDEN and PENNEY) are, on the whole, most probably correct” in contrast to the findings of the present author.

Recently the first allegedly member of the Linyphiidae has been “tentatively assign<ed>” in Cretaceous amber from Africa, see SCHMIDT et al. in DILCHER (ed.) (2010: 17). A suprategulum and an “intersegmental paracymbium” (e. g.) of this species are reported although the study of the sclerites of the bulbus are still not finished (P. SELDEN, person. commun. in X. 2010). Leg autotomy is reported between patella and tibia. – Comment: This kind of leg autotomy is known from several extant families like Hersiliidae, Leptonetidae, Linyphiidae, Oecobiidae (part.), and Pimoidae – how many Cretaceous spider families may have had the same kind of autotomy? A sickle-shaped paracymbium (figs. 4-5) is (also) known from the Cretaceous Praeterleptonetidae in which the leg autotomy is unknown.

SELDEN & PENNEY (2010) suppose that the newly – by WUNDERLICH (2008) – established Cretaceous spider families may be nothing else than "stem taxa" of "crown taxa" of extant families. – Furthermore these authors (p. 183) are apparently "irritated" that the relationships of certain taxa are published as unsure: The tribe Furcembolusini WUNDERLICH 2008 was regarded only as a QUESTIONABLE taxon of the extinct family Eopsilodercidae WUNDERLICH 2008 by the present author. In my opinion it is best to openly admit the unsure relationships of a taxon. A change of a taxonomical position is not so rare, even in extant higher taxa, see e. g. the recent change of the Pentastomidae from a former subfamily of the Eresidae to another superfamily (!) or the unclear family position of the genus *Cheiracanthium*. (Science would be inexistent without new hypotheses!).

Because of erroneous determinations and from a methodical point of view I doubt that the published "ghost lineages" – see, e. g., SELDEN & PENNEY (2010: 184, fig. 2), WUNDERLICH (2004: 270-271) (2008: 540): "lines of phantasy" – correctly reflect the branchings in the evolution of spiders: The oldest proof of a fossil taxon – which may have a long evolutionary lineage – must not be identical with the origin of its sister group which evolutionary lineage may be much shorter; e. g., a certain dinosaur sister group of the birds may be the "stem group" of the birds but nevertheless birds are regarded as taxon (class) of its own. (Furthermore because of practical reasons birds are not transferred to dinosaurs). – Designers of evolutionary trees must be extremely careful; we may know a "stem group" but do not know the stem SPECIES which would be most important! – An extinct species of the spider family Pimoidae may be part of the "stem group" of the Linyphiidae (and the Linyphiidae its "crown group") but both are regarded today as families of their own (and sister groups) – in a subjective point of view? – The conditions in quite another group of animals (and another level) – fossil humans (the genus *Homo*) – show that the oldest proof of a fossil *Homo sapiens* is about 200 000 years younger than the oldest (!) known *H. heidelbergensis* and almost ten times younger than the oldest proof of *H. erectus*. Both extinct species are candidates for being the sibling or stem species of *Homo sapiens*. Has *H. sapiens* to be regarded only as a "crown group"?

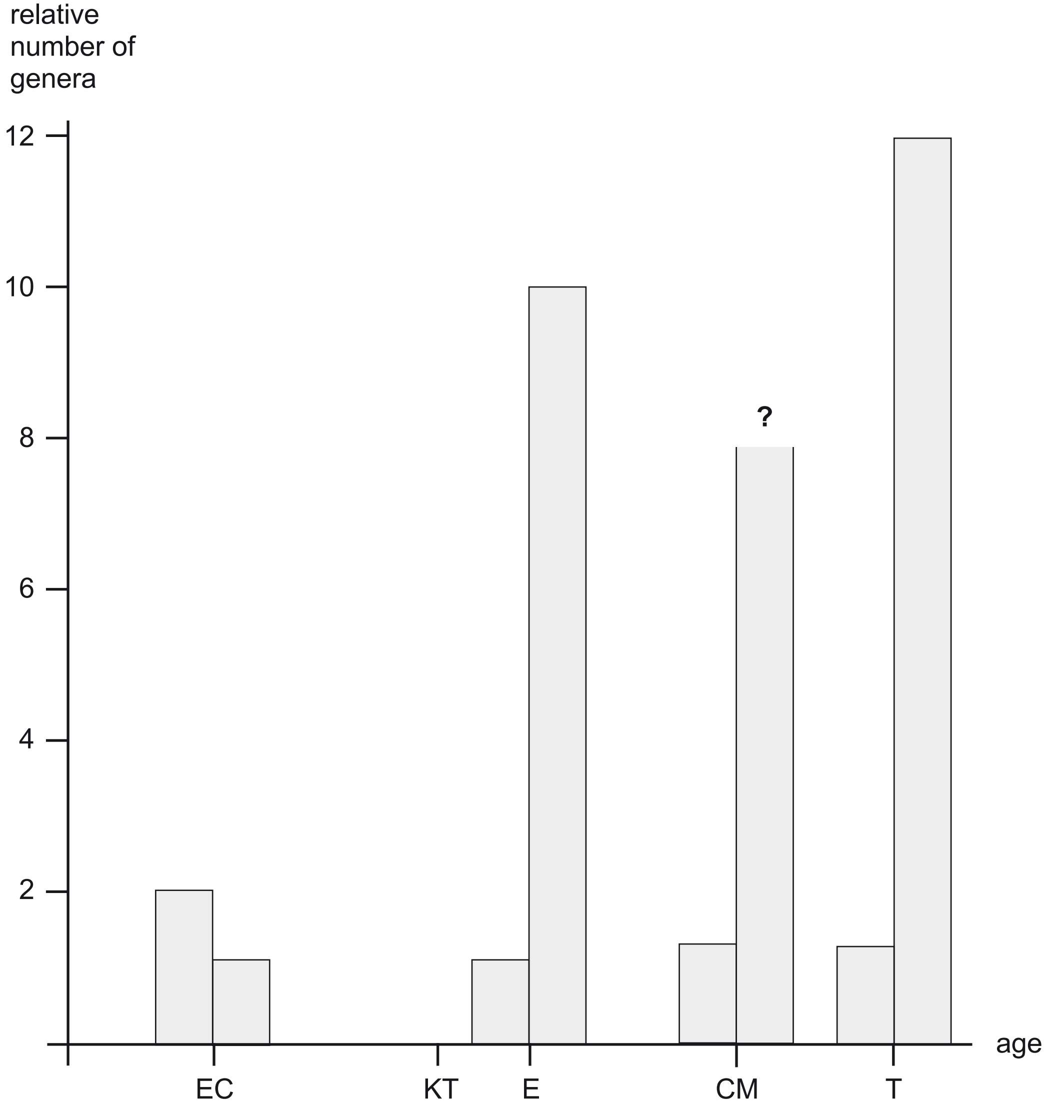
I am far from being sure that the extinct Cretaceous family Praeterleptonetidae is really strongly related to (or even identical with) the stem group of the family Leptonetidae (Eocene and extant), the position of their eyes is quite different, but – due to today's knowledge – they MAY be not so far away. Hopefully more fossils will be found in the future for closer investigations of known and of further characters. – During the Early Cretaceous probably diverse taxa of the Praeterleptonetidae lived – more than today? – (we known only a tiny "window to the past"), and we probably will never know the stem species of taxa which survived. Are the six-eyed Leptonetidae (their geological proof is much lower than the proof of the Praeterleptonetidae!) nothing else than derived ("crown"-) members of the eight-eyed ("stem"-) taxon Praeterleptonetidae? In my opinion there exists no indication for the correctness of this relationship: There are too many different characters between both families.

The mesozoic evolution of the araneomorph spiders has probably more similarities with the evolution of the Tetrapoda than with the evolution of insects. Certain "key innovations" of the "punctuated" evolution of araneomorph spiders have been discussed by the present author (2008), e.g. the "hiding sacs" of numerous spider groups – e. g. Clubionidae and Salticidae – which may spiders protect during inactive periods, moulting etc., although also certain Haplogynae like some *Dysdera* species may hide in closed webs, see COOKE (1965: 181). Several spider families which are quite diverse today have – quite remarkably – (still) not (or not surely) reported from the Cretaceous, e. g. Linyphiidae, Lycosidae, Salticidae and Theridiidae, see WUNDERLICH (2008: 553).

It seems that the whole Cretaceous was still part of the "age of the Haplogynae and of orb-weaving ("plesiomorphic") branch of the Araneoidea" (*). The "Pangean explosion" – during the Palaeocene and the Eocene – the enormous increasing diversity/ number of taxa was probably the most important evolutionary event during the entire history of the araneomorph spiders. This event appears similar to a sprinter of 400 m who starts his finish 50-60 m before the finishing line. Unfortunately exists a gap in the fossil documentation (of fossil amber spiders) exactly in the important period between 10-15 million years before and after the the great impact at the end of the Cretaceous but it seems that the enormous radiation of the "not orb-weaving Araneoidea" and of the RTA-clade happened apparently quite late in the geological sense.

(*) ROSS et al. in PENNEY (2010: 228) list the spider families Corinnidae (under Myrmeciidae) and Thomisidae of the RTA-clade from Burmese amber besides some families which are listed with a question mark like Linyphiidae. Members of both families were only reported from juveniles in Cretaceous ambers, only "roughly" determined, and I strongly doubt the correct determinations of these families; their proof in Cretaceous is still standing out. See also above.

One may call the Cenozoicum the "age of the enlegegyne spiders", of the RTA-Clade and the superfamily Araneoidea (especially their not orb-weaving taxa) because of the enormous diversification of these branches during the last 65 million years, see the diagram below. The Mesozoicum was apparently the "age of the haplogyne spiders" although the diverse haplogyne family Pholcidae evolved probably relatively late.



Development of the **relations** of araneomorph spider genera during the last 140 million years which are known from diverse Cretaceous ambers (EC; younger than 140 ma) and Eocene Baltic amber (E; age ca 45 ma) compared to genera in young resin (copal) from Madagascar (CM, personal investigations) and today (T). Bar diagram, showing the two higher groups of spiders: The Haplogynae on the left, and the Entelegynae. Note the enormous difference before (double number of Haplogynae) and after the Cretaceous-Tertiary border (KT) 65 million years ago. See WUNDERLICH (2008: 544-552).

In this paper I describe few taxa (Hersiliidae, ?Plumorsolidae indet. and Praeterleptonetidae) in Burmese amber, one in New Jersey amber (Uloboridae), and I redescribe a questionable *Ariadna* sp. of the family Segestriidae in Jordanian amber. A sure proof of the Segestriidae in Burmese amber is still outstanding, see WUNDERLICH (2008: 574).

Description of the new and doubtful taxa as well as revisions:

FAMILY SEGESTRIIDAE

Segestriidae is – in the geological sense – one of the oldest araneomorph spider families. A single specimen has been described from Jordanian amber: The holotype of ?*Ariadna amissiocoli* WUNDERLICH 2008. In the exuvia which is described below the eyes are preserved in contrast to the holotype of *amissiocoli* which may be congeneric or even conspecific.

?***Ariadna amissiocoli*** WUNDERLICH 2008

Material: ♀ exuvia in Cretaceous Jordanian amber from the Zarqua river canyon, ex coll. H. KADDUMI, F2205/JB/AR/CJW.

Preservation and syninclusions: The exuvia is well and completely preserved, its peltidium lies behind the deformed remains of the crumpled opisthosoma. Numerous particles of detritus are also preserved.

Description (♀ exuvia):
Measrurements (in mm): Body length ca. 3 mm, length of the prosoma (peltidium) 1.45; leg I: Femur 1.0, patella 0.4, tibia 0.85, metatarsus 0.75, tarsus 0.4, tibiae II-IV 0.8/0.55/0.62.
The position of the median eyes is almost between the posterior lateral eyes, they are probably spaced by less than their radius. The basal cheliceral articles are of medium size, apparently without a condyle, the retromargin bears a single tooth, the fangs are stout, the pedipalpal articles are fairly stout. The legs are not long; bristles: Femora 2-3 dorsally, tibia I ventrally 2 pairs + 1 + an apical pair, metatarsus I 2 ventral pairs + an apical pair.

Relationships: See WUNDERLICH (2008: 572). This species may be conspecific with ?*Ariadna amissiocoli*, and is likely a member of *Ariadna*: The position of the eyes, the stout fangs and the single tooth of the cheliceral retromargin are all like in this genus.
Remarks on the description of the holotype: (1) The body length of the male holotype of ?*A. amissiocoli* is really ca. 0.4 mm, the length and the width of the male are ca. 1.8 and 1.6 mm. (2) Fig. 5 in WUNDERLICH (2008: 658) shows leg IV but not leg I.

Distribution: Cretaceous amber from Jordan.

Family OONOPIDAE: GAMASOMORPHINAE

Oonopidae are small to tiny six-eyed spiders, members of the Gamasomorphinae possess an armoured opisthosoma.
Almost all described fossil Oonopidae are members of the subfamily Orchestininae – see WUNDERLICH (2004: 692-701) -, which live on the ground an in higher strata of the vegetation as well. Fossil Gamasomorphinae are extremely rare; from the Cretaceous only *Eogamasomorpha nubila* WUNDERLICH 2008 has been described from Burmese amber. In the following I describe the second Cretaceous member of this subfamily.

Eoscaphiella **n. gen.**

Type species (by monotypy): *Eoscaphiella ohlhoffi* n. sp.

Diagnosis (♂; ♀ unknown): Pedipalpus (fig. 1) very simple: Cymbium and bulbus fused together without a seam, stridulatory files of the bulbus absent, embolus needle-like, without a thickened base, standing out from the bulbus in a right angle.

Further characters: Cheliceral macrosetae absent, leg bristles absent, opisthosoma 1.27 times longer than wide.

Relationships: In *Escaphiella* PLATNICK & DUPERRE 2009 cheliceral macrosetae are absent like in *Eoscaphiella* but the base of the embolus is thickened. In the most related genus *Scaphiella* SIMON 1891 the chelicerae bear macrosetae and the position of the embolus is usually close to the bulbus, almost parallel. In contrast to the fossil genus the bulbus bears prolateral stridulatory files in *Scaphiella* and *Escaphiella*. A seam between cymbium and bulbus is absent in the three genera in question.

Distribution: Mid Cretaceous Burmese amber forest.
The proof of a fossil member in South East Asia documents a much wider distribution of this group of related genera in the Mid Cretaceous; today *Escaphiella* and *Scaphiella* are known only from the Americas.

***Eoscaphiella ohlhoffi* n. gen. n.** sp. (fig. 1) photo 56; see photo 57

Remark: A reconstruction of the fossil spider would probably be very similar to the male of an extant spider of the same genus, see the photo 57.

Derivatio nominis: This species is dedicated to RAINER OHLHOFF (Saarbrücken), the former owner of this remarkable piece of Burmese amber.

Material: Holotype ♂ in Mid Cretaceous Burmese amber, ex coll. R. OHLHOFF, F2211/BU/AR/CJW.

Preservation and syninclusions: The spider is preserved in a muddy piece of amber, size 3 x 2 x 0.8 cm, it is completely and well preserved, its dorsal side is hidden by the amber, the legs are partly deformed by natural pressure, bubbles are preserved on parts of the sternum. In the same piece of amber exist several particles of plants, some mites, ½ arachnid, 3 Coleoptera, some Diptera, 2 Thysanoptera, 2 Psocoptera, tiny Hymenoptra and the larva of an insect.

Diagnosis (♂; ♀ unknown): Embolus (fig. 1) S-shaped at its end.

Description (♂):
Measurements (in mm): Body length 1.1, prosoma: Length 0.5, width 0.4, opisthosoma: Length 0.7, width 0.55; leg I: Femur 0.45, metatarsus 0.2, tarsus 0.25, leg IV: Femur ca. 0.4, patella ca. 0.15, tibia ca. 0.25, metatarsus 0.25, tarsus 0.23.
Colour dark brow.
Prosoma 1.25 times longer than wide, most parts of the dorsal side are hidden, cuticula apparently smooth, basal cheliceral articles and fangs stout, macrosetae absent, labium distinctly wider than long,, gnathocoxae strongly converging, coxae IV separated by about their diameter. – Legs fairly stout, order IV~I/II/III, bristles absent, tarsi longer or shorter than metatarsi, position of the metatarsal IV trichobothrium in 0.4. – Opisthosoma 1.27 times longer than wide, dorsal side hidden, strongly armoured, ventrally, too, spinnerets short. – Pedipalpus (fig. 1): See above; the femur is only slightly thickened, bent.

Relationships and **distribution**: See above.

Family PLUMORSOLIDAE WUNDERLICH 2008

?Plumorsolidae indet.

Material, preservation and syninclusions: Remains of a partly decomposed and probably juvenile female spider are preserved in a piece of Cretaceous Burmese amber, size 4 x 2.5 x 0.7 mm, F2204/BU/AR/CJW. The piece contains numerous insect and plant remains which were heated and partly decomposed. A long-legged larva of a parasitic mite and several spider threads are preserved near the spider right in front and below.

Description (?juv. ♀):
Measurements (in mm): Body length 2.6; leg I: Femur 1.2, patella ca. 0.25, tibia ca. 1.1, metatarsus 0.9, tarsus 0.8, metatarsus IV ca. 1.0.
Body and legs are translucent.
Prosoma observable only in the ventral aspect, basal cheliceral articles stout, lateral files most probably absent, fangs short, other mouth parts deformed; the pedipalpal tarsus bears a claw. – Legs: Order I/II/IV/III, II almost as long as I, III distinctly the shortest. Bristles numerous, femora at least 2 dorsally in the basal half, and a distal pair, patellae 2 dorsally, tibiae few long bristles dorsally and laterally, metatarsus I bears 2 dorsal-basal bristles, tarsi none. Two tarsal claws and a claw tuft which is fairly developed. The family Plumorsolidae is to my knowledge the only Cretaceous spider family of the Araneomorpha in amber in which the unpaired tarsal claw has been lost. – Opisthosoma oval, spinnerets short.

Relationships: According to the absence of an unpaired tarsal claw and the existence of claw tufts the spider may be a member of the family Plumorsolidae although I do not find feathery leg hairs like in another questionable spider of this family in Burmese amber, see WUNDERLICH (2008: 597).

Distribution: Mid Cretaceous Burmese amber forest.

Family PRAETERLEPTONETIDAE WUNDERLICH 2008

The **relationships** of this family – only known from Burmese amber up to now, and only in the male sex – are enigmatic; I do not know a spider family which has similar structures of the bulbus or a similar combination of characters. Some light on its relationships is thrown by the study of the excellently preserved holotype of the quite remarkable new species, *Praeterleptoneta tibialis*. – According to the existence of a retrolateral paracymbium, the absence of a pedipalpal tibial apophysis and the trichobothriotaxy Praeterleptonetidae is not a member of the RTA-clade. – According to the position of the eyes in two rows (no triads), the existence of a retrolateral paracymbium as well as the large/wide cymbium, the slender articles of the male pedipalpus and the more complicated structures of the bulbus at least the Praeterleptonetini and the Pholcochyrocerini are likely not to be members of the classical Haplogynae but probably related to the Araneoidea and/or to the Leptonetidae. The position of the paracymbium – a retroBASAL paracymbium is a basal/diagnostic character of the superfamily Araneoidea – is AWAY from the base of the cymbium in the Praeterleptonetidae, and thus this structure may have evolved convergently in both taxa. The existence of sticky droplets in the capture web is a basic character of the Araneoidea, is probably also existing in the Praeterleptonetinae – see WUNDERLICH (2008: 588) – but unknown from the Leptonetidae. (The Palaeohygropodini is probably not a member of the Praeterleptonetidae; a paracymbium is apparently absent in this taxon, only a strong spine exists in a retrobasal position). In the Praeterleptonetidae a tarsal onychium, a cheliceral lamella, and thickened articles of the male pedipalpus are absent like in the six-eyed and basicly cribellate (*) Leptonetidae in which also a long clypeus exists (protruding ventrally in contrast to the Praeterleptonetidae), as well as a row of cheliceral teeth (questionable in the Praeterleptonetidae, see fig. 2), and relatively complicated structures of the bulbus; a spine-bearing retrobasal outgrowth of the cymbium – which one may call "paracymbium" – exists e. g. in *Leptoneta comasi*. – Leptonetidae is apparently – like the Praeterleptonetidae – not a member of the "classical Haplogynae" in which usually a cheliceral lamella exists, see BRIGNOLI (1979), LEDFORD & GRISWOLD (2010) and not a member of the Scytodoid branch (**). – The combination of characters may give hints that Praeterleptonetidae + Leptonetidae (***) are perhaps members of a superfamily of its own, and probably this taxon is the sister group of the Araneoidea (see also the general discussion above). In my opinion the large number of different characters as a whole is surely to high for uniting Leptonetidae and Praeleptonetidae in a single family; see also the discussion in the introduction.

(*) See LEDFORD & GRISWOLD (2010).

(**) = the "egg-carrying branch" sensu WUNDERLICH (2004: 645); according to COKENDOLPHER (2004) the egg-sac is attached to the substrate but not carried by the female in the Leptonetidae.

(***) The loss of the anterior median eyes and the protruding shape of the clypeus are derived characters of the Leptonetidae compared with the Praeterleptonetidae; the existence of a wide cymbium, a true paracymbium and probably of sticky droplets in the capture web are derived characters of the Praeterleptonetidae.

Notes on additional diagnostic characters of the family Praeterleptonetidae, taken mainly from the newly described *Praeterleptoneta tibialis* (see WUNDERLICH (2008: 586): Chelicerae anteriorly probably with a row of teeth (fig. 2), colulus existing, retroLATERAL paracymbium (figs. 4-5) existing which is fixed to the cymbium, sickle-shaped, standing out (*), and originating more away from the cymbial base than in the Araneoidea, clypeus long, not protruding, bulbus protruding, bearing a long tegular apophysis in a distal position, the (probable) embolus is needle-shaped (fig. 5).

Praeterleptoneta tibialis **n. sp**. (figs. 2-5) photos 55a-b

Material: Holotype ♂ and a larger sawed off piece of Mid Cretaceous Burmese amber, F2210/BU/AR/CJW.

Preservation and syninclusions: The spider is well and completely preserved in a clear yellow-orange piece of amber which includes numerous tiny droplets. Only few parts of the spider are deformed by natural pressure, namely the eyes; both tibiae I are thickened IN THE SAME PART of their basal half (fig. 3), and thus these thicknesses are not artefacts. The dorsal-anterior part of the opisthosoma has been cut off at the surface of a layer within the amber (it is open dorsally), a smaller bubble (apparently gas) is preserved within a larger bubble within the opisthosoma. 0.3 mm below the opisthosoma on the surface of a different layer of the fossil resin a structure of irregular threads is preserved which I regard as an attachment disc of the spider; a moss mite, body length less than 0.3 mm, is preserved below the spider. A member of the Diptera: Nematocera, legs of another Diptera, and tiny droplets in a row (probably from a capture web) exist in the same piece of amber. In the separated piece of amber few remains of plants are preserved including some questionable stellate hairs.

Diagnosis (♂; ♀ unknown): Tibia I thickened in its basal half (fig. 3) (this is not an artefact because it exists in the same part of both tibiae and in no other tibia), pedipalpus (figs. 4-5) with a large, sickle-shaped paracymbium which stands widely out, and a short needle-shaped embolus, and at least a single longer and strongly sclerotized tegular apophysis.

Description (♂):
Measurements (in mm): Body length 1.3, prosoma: Length 0.7, width 0.6; leg I: Femur 0.9, patella 0.3, tibia 0.6, metatarsus 0.63, tarsus 0.3, tibiae II-IV 0.35/0.2/0.33; opisthosoma: Length 0.9, width 0.7.
Colour medium brown.

(*) I now regard the retrolateral “cymbial spine” of *Praeterleptoneta spinipes* WUNDERLICH (2008: Figs. 29-30) as a paracymbium which is stronger sclerotized, see fig. 6 in the present paper. (The holotype of *spinipes* has apparently been deformed and partly darkened under high natural pressure in the Cretaceous amber).

Prosoma 1.17 times longer than wide, profile fairly convex, covered with few hairs, cuticula smooth, 8 large eyes in two rows of medium width (they are fairly deformed), posterior row straight, posterior medium eyes spaced by ca. their diameter, clypeus high, slightly longer than the basal cheliceral articles, not protruding ventrally; no medial lamella of the basal cheliceral articles, retrolateral files probably absent, cheliceral teeth hard to observe, probably with a row of several teeth (fig. 2) (or artefacts?), fangs fairly stout, labium and most parts of the gnathocoxae are hidden, sternum not protruding between the coxae IV. – Legs (fig. 3) fairly long, order I/II/IV/III, I distinctly the longest, few short hairs, tibia I thickened in the basal half, autotomy unknown, bristles fairly long, existing on femora, patella and tibiae, femora with a variable number: I 1 dorsal basal of the middle, a prodistal one, a retrolateral one near the tip, and a short apical dorsal one, the other femora bear fewer bristles, patellae with a long dorsal-apical bristle, a tiny dorsal-basal bristle may also exist; tibiae: Sequence of the dorsal bristles 2/2/1/2, 3 apical ones exist as well a prolateral one on I. The metatarsi bear a single trichobothrium, its questionable position on I is in 0.2. A tarsal IV comb is absent. Three small tarsal claws, an onychium and tarsal trichobothria are absent. Tibial glands are not observable. – Opisthosoma oval, fairly depressed dorso-ventrally, covered with short hairs, lung covers existing, tracheal spiracle apparently not far from the short spinnerets, colulus existing, of medium size, existence of a “triad complex” unknown. – ♂-pedipalpus (figs. 4-5) with slender articles, patella raised apically, bearing here a stronger proapical bristle and some longer hairs, tibia widened, with ca. 4 dorsal trichobothria, cymbium large, its tip not modified, retrolaterally with a sickle-shaped and stronger sclerotised paracymbium away from the cymbial base, bulbus with a protruding tegulum, a large and pointed tegular apophysis, and a short and needle-shaped embolus.

Relationships: *Praeterleptoneta spinipes* is strongly related but tibia I is not thickened, and the structures of the bulbus are different.

Distribution: Mid Cretaceous Burmese amber forest.

Family HERSILIIDAE

Hersiliidae from the Cretaceous were unknown up to now in contrast to the Palaeogene (Baltic amber). Its sister group, the Oecobiidae, is already known from Cretaceous amber, see WUNDERLICH (2008: 619-623) and (2004: 836). Therefore the proof of a member of the Hersiliidae in a Cretaceous amber is not unexpected. In its undivided metatarsi exist the plesiomorphic state of the family.

***Burmesiola* n. gen.**

The gender of the name is feminine.

Type species (by monotypy): *Burmesiola cretacea* n. sp.

Diagnosis (juv.): Large anterior lateral eyes (fig. 7), clypeus shorter than the field of the median eyes, posterior median eyes largest, all metatarsi undivided, flexible tarsal and metatarsal zones absent, anterior spinnerets (fig. 9) at least 2/3 as long as the opisthosoma, the apical article longer than the basal article.

Relationships: The key given by WUNDERLICH (2004: 815) to the hersiliid genera lead to the genus *Hersiola* which is distributed from the Mediterranean to Afghanistan today. In *Hersiliola* the posterior spinnerets are distinctly stouter, the clypeus is much longer, size and position of the eyes are different. In *Gerdiorum* WUNDERLICH 2004 in Eocene Baltic amber the legs are much longer and the lateral eyes are tiny.

Distribution: Mid Cretaceous Burmese amber forest.

***Burmesiola cretacea* n. gen. n. sp.** (figs. 7-9), photos 53a-b

Material: holotype, juv. female? in Burmese amber, F2206/BU/AR/CJW.

Preservation and syninclusions: The spider is partly deformed and incompletely preserved at the margin of a yellow-orange and mainly clear piece of amber. The prosoma is dorsally inclined on both sides, the left legs I-II are deformed and darkened by natural pressure. The distal parts of legs I-II are cut off.

Diagnosis (juv.): See the diagnosis of the genus. Leg IV: Fig. 8.

Description (juv.):
Measurements (in mm): Body length 2.9, prosomal length and width ca. 1.3, opisthosomal length and width ca. 1.5, femur IV 1.6, diameter of an anterior median eye 0.06, of a posterior median eye 0.13.
Colour light brown.
Prosoma (it is deformed) about as wide as long, eyes large (fig. 7), posterior row distinctly recurved, posterior median eyes largest, spaced by less than their diameter, anterior lateral eyes relatively large, clypeus slightly shorter than the field of the median eyes, basal cheliceral articles partly hidden, deformed. – Pedipalpus with a large claw which bears tiny teeth in the basal half. – Legs (fig. 8) only fairly long, femur I ca. 20 % longer than the prosoma, order IV/I/II/III, III distinctly the shortest, all metatarsi uniarticu-

late, tarsi short, 3 tarsal claws, the unpaired claw long. Trichobothria hard to recognize. Bristles numerous and partly long, on femur and tibia I ca. 0.32 mm long, femur I-II bear 3 dorsal and 1 prodistal one, tibia I (it is incomplete) at least 6, metatarsus I at least 3 basally, 1 dorsally, 2 laterally near the middle, and 2 apically, metatarsus III at least 3 ventrally, 2 dorsally and 3 near the end. Feathery hairs exist. – Opisthosoma as wide as long, posterior spinnerets at least 2/3 as long as the opisthosoma, distal article longer than the basal article (fig. 9), feathery hairs exist.

Relationhips and **distribution**: See above.

Family ULOBORIDAE

The cribellate members of the family Uloboridae are dwellers of higher strata of the vegetation; they are known from Tertiary ambers as well as from Cretaceous ambers, see WUNDERLICH (2008: 632-639) (3 genera). In the following I describe the first member of the family Uloboridae from North American amber, from New Jersey (Upper Cretaceous).

<u>Jerseyuloborus</u> **n. gen.**

<u>Type species</u>: *Jerseyuloborus longisoma* n. sp.

Diagnosis (juv. ♀): Eyes (fig. 10) in two wide rows which are large in the recurved posterior row, body (fig. 11) slender, femoral bristles absent, opisthosoma distinctly elongated beyond the spinnerets.

Relationships: According to the elongated opisthosoma and the position of the eyes *Burmuloborus* WUNDERLICH 2008 (Mid Cretaceous Burmese amber) is most related; tarsal bristles are absent in *Burmuloborus*, and femoral trichobothria are reduced. In the extant genera *Polenecia* and Sybota the posterior opisthosomal projection extends also beyond the spinnerets but in *Polenecia* the opisthosoma is stout and the posterior lateral eyes are not placed on tubercles; in *Sybota* (Central and South America) the opisthosoma is stouter, the anterior eye row is distinctly recurved in the dorsal aspect.

Distribution: Upper Cretaceous amber from New Jersey (USA).

***Jerseyuloborus longisoma* n. gen. n. sp**. (figs. 10-17), photos 54a-b

Material: Holotype juv. ♀ in Lower Cretaceous amber from New Jersey, F2207/NJ/ AR/ CJW.

Preservation and syninclusions: The spider is preserved in a yellow brown piece of amber (the colour is similar to Baltic amber), 1 cm long, which has been rolled, placed on the surface of a drop of amber within the amber. It is almost completely preserved, only the tip of the right tarsus I is absent. Most parts of the body and few parts of the legs are covered with a white emulsion. Questionable remains of a thread of silk exist, too, stellate hairs are absent.

Diagnosis (juv. ♀): See the genus. Right patella and tibia IV: Fig.12, right femur III: Fig. 14.

Description (juv. ♀):
Measurements (in mm): Body length 1.8, prosoma: Length 0.7, width 0.55; leg I: Femur 0.75, patella 0.25, tibia 0.55, metatarsus 0.62, tarsus 0.27; tibiae II-IV 0.35/0.2/ 0.45, opisthosoma: Length 1.5, width 0.35, length of the pedipalpus 0.55.
Colour: Prosoma and legs light brown, the opisthosoma is hidden in most parts, apparently light brown.
Prosoma 1.27 times longer than wide, wide anteriorly, bearing tiny “warts” and some feathery hairs, with a wide eye field (fig. 10), posterior row recurved, its eyes large, anterior row very slightly recurved in the dorsal aspect, fovea wide and slightly procurved, posterior lateral eyes on tubercles, mouth parts hidden, coxae IV spaced by less than their diameter. – Articles of the pedipalpus slender, tarsal claw slender. – Legs (figs. 12-17) only fairly long, order I/IV/II/III, hairs fairly long, few bristles of medium size: Femora none, patellae dorsally 1/1, tibiae dorsally 1/1 (no further ones), metatarsi: I bears a dorsal and a prolateral bristle near the base and a prolateral bristle near its end, II and III a ventral one near the base, IV 2 ventral ones; tarsi: III at least a single ventral bristle, IV 3 ventral ones. Femoral trichobothria long, at least 4 prodorsally on III, few are observable on IV. Tibia IV bears some trichobothria in the basal half. Metatarsus IV depressed retrodorsally, calamistrum restricted to the basal half. Tarsal claws fairly small. – Opisthosoma 4.3 times longer than wide, covered with relatively few short hairs, distinctly protruding the 3 pairs of short spinnerets; a layer of emulsion covers the cribellum.

Relationships and **distribution**: See above.

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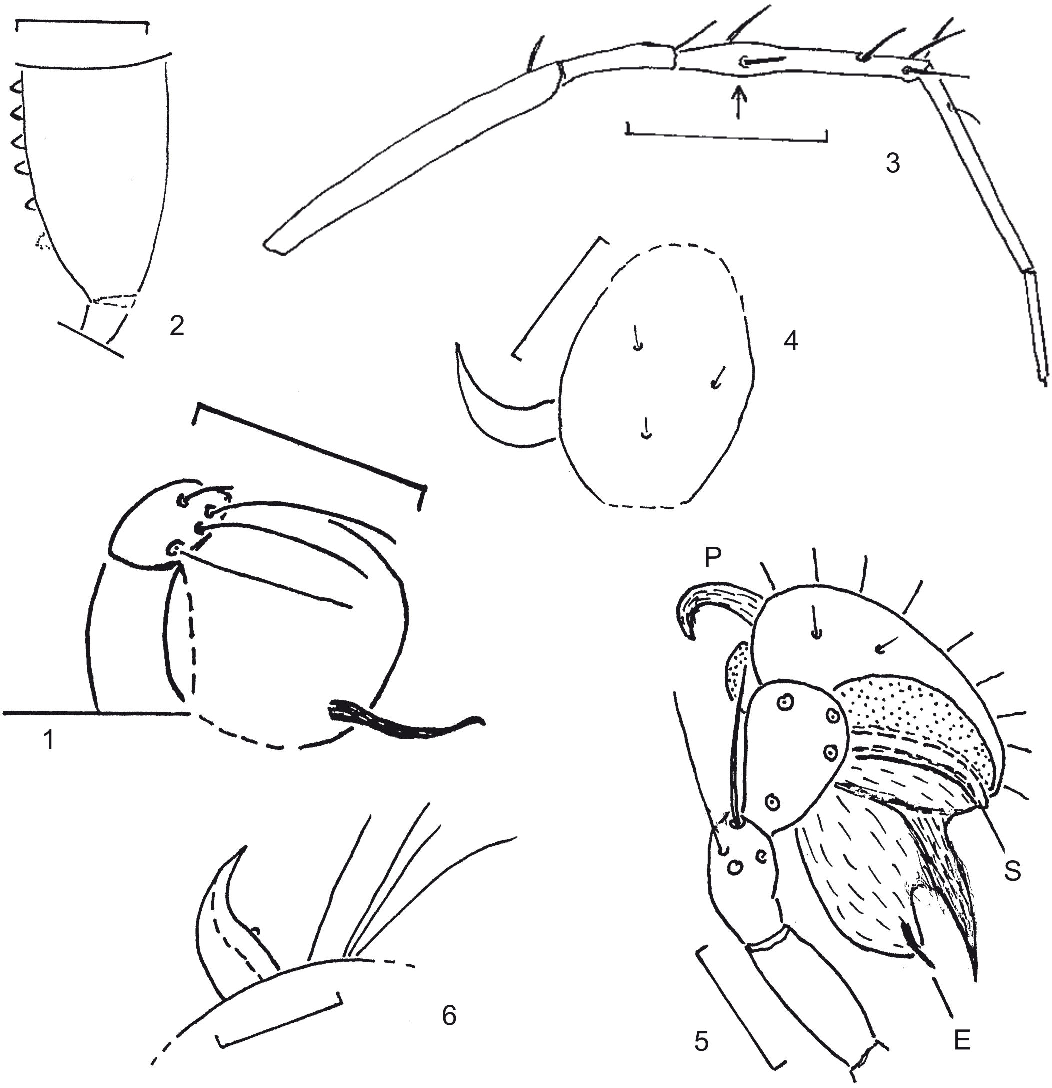
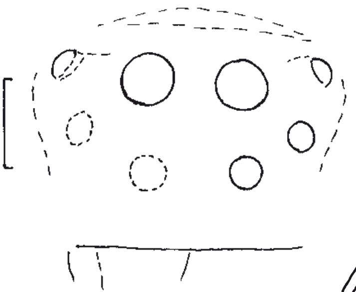


Fig. 1) <u>*Eoscaphiella ohlhoffi*</u> **n. gen. n. sp.**, ♂, prolateral-apical aspect of the left pedipalpus. Note the needle-shaped embolus. The ventral part of the bulbus is hidden by the left chelicera. Scale bar 0.1 mm;

figs. 2-5: <u>*Praeterleptoneta tibialis*</u> **n. sp.**, ♂; 2) anterior aspect of the left chelicera. The existence of true cheliceral teeth is not quite sure; 3) prolateral and slightly dorsal aspect of the left leg I. The arrow points to the thickened part of the tibia; 4) dorsal aspect of the left cymbium and the sickle-shaped paracymbium; 5) prodorsal-basal aspect of the left pedipalpus. E = embolus, P = paracymbium, S = sperm duct. Scale bars 0.5 in fig. 3, 0.1 in the remaining figs;

fig. 6) <u>*Praeterleptoneta spinipes*</u> WUNDERLICH 2008, ♂ holotype, ventral aspect of the margin of the hairy cymbium and the sickle-shaped paracymbium of the deformed right pedipalpus. Scale bar 0.05;



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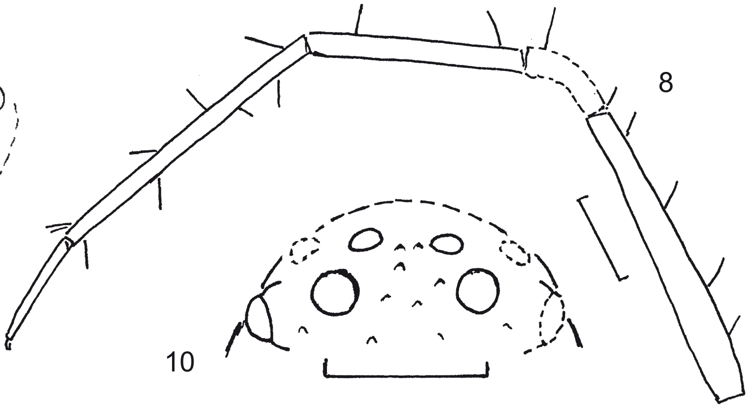

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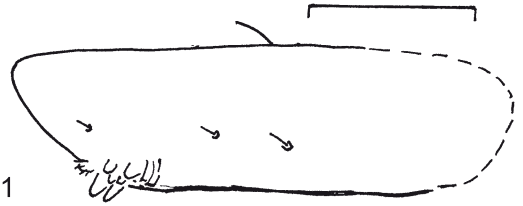

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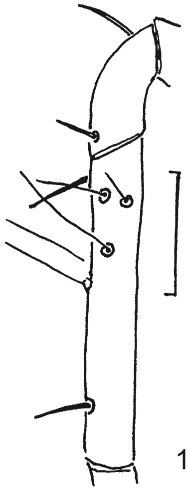

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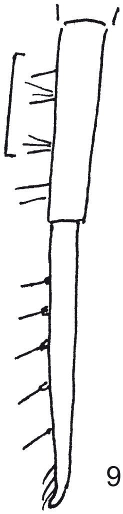

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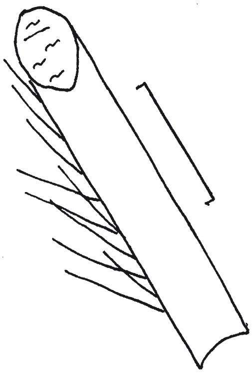

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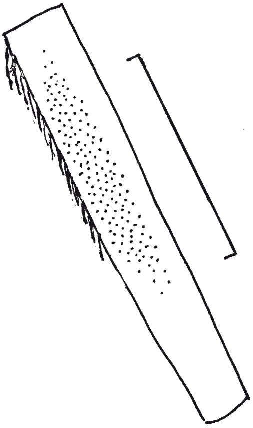

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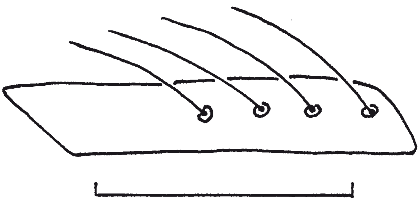

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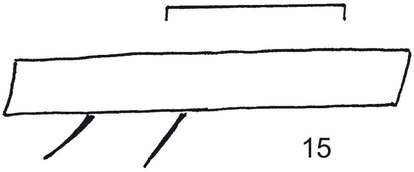

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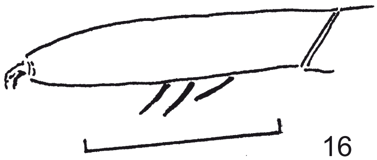

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figs. 7-9: *Burmesiola cretacea* **n. gen. n. sp.**, juv.; 7) anterior (slightly dorsal) aspect of the prosoma. The prosoma and some eye lenses are deformed; 8) about prolateral aspect (the tibia is shortened perspectively) of the left leg IV. Trichobothria are not drawn; 9) dorsal aspect of the right posterior spinneret. Not all spigots are drawn; some may be shrunked by the preservation. Scale bars 0.5 in fig. 8, 0.2 in the remaining figs.;

figs. 10-17: *Jerseyuloborus longisoma* **n. gen. n. sp.**, juv. ♀; 10) dorsal aspect of the eyes. Note the tiny "warts" (not all are drawn). Some eye lenses (dotted) are hidden; 11) lateral and slightly ventral aspect of the opisthosoma. Anterior parts are hidden by an emulsion; 12) retrolateral aspect of the right patella and tibia I; 13) ventral aspect of the right femur II. The more erect "hairs" are trichobothria; 14) prolateral aspect of the right femur III. Note the long trichobothria; 15) prolateral aspect of the left metatarsus IV. Note the two ventral bristles. Hairs are not drawn; 16) prolateral aspect of the left tarsus IV. Note the three ventral bristles. Hairs are not drawn; 17) prodorsal aspect of the right metatarsus IV. Note the adpressed hairs of the calamistrum and the dorsal depression (punctuated). Long normal hairs in the distal half are not drawn. Normal hairs are not drawn. Scale bars 0.5 in fig. 11), 0.2 in the remaining figs.

BEITR. ARANEOL., 6 (2011)

EVIDENCE OF WOUND REPAIR/HEALING EVENTS IN SPIDERS (ARANEAE)

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Abstract: Injuries and healing events of wounds of the body, as well as of articles of legs and a spinneret (amputaions) and male pedipalpi of some extant spiders and a fossil spider are documented and compared with healing events in some insects.

Key words: Agglutination, Araneae, cuticula, healing events, healing processes, healing systems, injuries, insects, leg amputations, plugs, spiders, spinneret, wound repair.

The **material** is kept in the collection of the author (CJW), and will probably go to the SMF later. – I thank JONAS ASTRIN (Bonn) and P. NABAVI (Freiburg) (both for leaving me spiders from the Canary Islands), THEO BLICK (Hummeltal) from Bavaria, and P. BORGES from the Azores.

Injuries and healing events of extant and fossil spiders were published by the present author in 2004 and 2008. BEATTY (1970: 441) reported injuries and healed wounds of American members of the genus *Ariadna* (Segestriidae) AFTER MOULTINGS. Healings after AUTOTOMY – which is frequent in spiders – or caused by moulting are not included in this paper (with the possible exception of ?*Nomisia* sp. indet. and *Porrhoclubiona minor*) but morphological effects of amputations THROUGH leg articles and of repaired wounds of the opisthosoma are treated.

FREQUENCY: Injuries and healing events of body and legs of spiders are apparently not rare but are usually overlooked or ignored by arachnologists. No systematical study on this matter is known to me in the Araneae. I personally observed such cases in extant and fossil spiders in a large number. If looking more carefully one may find at least one or several such events within a hundred or a few hundreds of spider specimens. Ant hunters like Zodariidae show even quite more leg amputations and opisthosomal injuries, see WUNDERLICH (2004: 152-157) in a study of fossil spiders and below.

DISTRIBUTION of healings within the Araneae: Healing events have been well documented by me up to now in the following families: Clubionidae, Filistatidae, Gnaphosidae, Linyphiidae, Pimoidae (*), Segestriidae (**), Sparassidae, Tetragnathidae, Theridiidae, Zodariidae (frequent), Zoropsidae, and Zygiellidae.

(*) the fossil pimoid species *Pimoa liedtkei* WUNDERLICH 2004 (p. 155) has erroneously been called a member of the family Linyphiidae.
(**) See BEATTY (1970: 441) (*Ariadna* sp.).

CAUSES/ORIGINS OF WOUNDS IN SPIDERS: Spiders as predators do not rarely have to fight against other predators, e.g. other spiders and insects like beetles and ants, see e.g. WUNDERLICH (2004: 561, figs. 351, 606-610). Ant hunters like Zodariidae have relatively frequently amputations and opisthosomal injuries (occasionally more than a single one), see WUNDERLICH (2004: 152-157). In the Zodariidae leg autotomy is usually absent; this absence is probably the reason for the well developed healing system in members of this family (and vize versa?). – Remarks: (1) Spiders captured by hand or in traps or by fogging indicate that the healing effects shown below happen IN LIVING spiders but are not a subsequent result of preservation. – (2) Wounds of spiders caused by ectoparasitic mites should exist but are unknown to me and not reported in this paper.

LOCATIONS AND KINDS OF HEALING EVENTS IN SPIDERS: Leg and spinnerets amputations (1 below) may induce events/reactions different to injuries of the leg cuticula (2) of of the opisthosoma (3) in which the cuticula is only weakly sclerotized. Two different kinds of “healing systems” exist, see directly below.

MECHANISMS OF HEALING POCESSES (WOUND REPAIR) IN SPIDERS are completely unstudied to my knowledge. The “plugs” of the wounds – see figs. 1-2, photos – look similar to certain kinds of spider’s epigynal plugs or the agglutinated scabs in Mammalia at first sight. – The mechanisms of healing of injuries – of wounds which are incised artificially – have been reported IN INSECTS for a long time – see, e.g., WIGGLESWORTH (1937) – in contrast to spiders. WIGGLESWORTH reported, e.g., migration of epidermis cells, accumulation of haematocytes, plugs, and secretion of new cuticula in *Rhodnius* (Hemiptera) (fig. 3). Plugs of “amber-coloured material (cuticulin)” may close wounds (compare figs. 1-3, photos). On *Rhodnius* see also two papers by LAI-FOOK, and on a wax-moth a paper by ROWLEY & RATCLIFFE: “... the hemolymph coagulated forming vast networks of strand-like material attached to the haemocytes underlying the wound.” Apparently at least two different kinds of processes exist in these arthropodes (fig. 3): (a) coagulating haemolymph which may build a plug after some time (quite similar to the stumps of spider’s legs and opisthosomal scabs as well), and (b) cells which

are able to build a new cuticula (including spider's opisthosoma). It is interesting to note that strong similarities to Vertebrates in this matter exist in which also two different kinds of "healing mechanisms" exist (besides the contraction of blood vessels and of the margins of wounds). ("Mammal's scars" in spiders or insects are unknown to me).
According to my observations the existence of healing systems in spiders which correspond to the systems in other arthropods like insects appears quite likely to me; investigations are wanted. In contrast to the cited papers on insects I studied wound repairs in free-living specimens of spiders which were not wounded artificially.

Descriptions of some healing events in spiders (figs. 1-2, photos 48c, 68-77)

(1) Amputations of legs or pedipalpi through various articles and a spinneret

Fictotama maculata n. sp. (Hersiliidae) (photo 48c)

Material: Holotype ♂ in Dominican amber, F2215/DB/AR/CJW.

The right posterior spinneret has been amputated near its end; the tip of the stump is black now and apparently is healed. See the description and photos of the new species in this volume, the paper on fossil spiders in Dominican amber.

Meta (Metellina) minima DENIS 1953 (Tetragnathidae)

Material: Canary Islands, La Gomera, El Cedro, ♂, J. ASTRIN leg. by fogging in X 2008, R54/AR/CJW.

Measurements (in mm): Body length 7.2, prosomal length 3.5
The femur of the spider's right pedipalpus has been amputated through the middle of the length, 0.6 mm from the femur's base (the left femur is 1.25 mm long). The distal part of the stump is strongly darkened, 0.1 mm long, and apparently encloses a plug which has a diameter of almost 0.25 mm.

Zygiella minima SCHMIDT 1968 (Zygiellidae) (photo 70)

Material: Canary Islands, La Gomera, Los Acevinos, ♂, J. ASTRIN leg. by fogging in X 2008, R29/AR/CJW.

Measurements (in mm): Body length 3.6, prosomal length 1.8, length of the left pedipalpal tibia 0.33.
The spider's right pedipalpal tibia has been amputated irregularly 0.12-0.2 mm beyond its base. A ring-shaped darkened structure exists distally, apically-proventrally parts of the original cuticula are protruding. The apical part is filled with a dark brown mass, a plug.

Zoropsis spinimana (DUFOUR 1820) (Zoropsidae) (photo 72)

Material: Canary Islands: Tenerife, ♀, J. ASTRIN leg by fogging in X 2008, R56/AR/CJW.

Measurements (in mm): Body length 13.2, prosomal length 7.3, length of the left metatarsus IV 7.3.
The right metatarsus IV of the spider is amputated 4 mm from its base, the apical part of the cuticula is irregularly and obliquely "cut" off, and closed by an almost smooth dark plug.

Porrhoclubiona minor (WUNDERLICH 1987) (Clubionidae)

Material: Canary Islands, Gran Canaria, near El Palmital, ♂, pit fall, P. NABAVI leg. in 2000.

Measurements (in mm): Body length 3.3, prosomal length 1.6, both metatarsi IV 1.15.
The left leg IV has been lost beyond its metatarsus similar to a case of autotomy, but autotomy in the family Clubionidae is only known beyond the coxa. Darkenings on the stump are absent.

Trachyzelotes lyonneti (AUDOUIN 1826) (Gnaphosidae) (photos 76-77)

Material: (a) Azores, 1♂, P. BORGES leg. in 2009, CJW; (b) 1♂ Canary Island Gran Canaria, R53/AR/CJW.

(a) The left metatarsus I has been amputated near its end, the remaining part is 1.25 mm long, the right metatarsus I is 1.3 mm long. A strongly darkened – sclerotized? –structure exists at the tip of the article. Photo.

(b) Measurements (in mm): Body length 4.5, prosomal length 2.3. The spider's left pedipalpus is complete but the right one is broken off – by an amputation or by autotomy? – beyond the patella, and this part is lost. A dark brown and smooth plug exists at the apical margin of the patella which is 0.08 mm long. Photo

Philodromus bistigma SIMON 1870 (Philodromidae)

Material: S-Portugal, E Faro, ♂, JW leg. in V 2010, R129/AR/CJW.

Prosomal length 1.3 mm.
A straight amputation through the left tarsus III in 0.82 of its length (compared with the right tarsus). The stump is closed, not sclerotized, similar to a member of the Zodariidae, see Wunderlich (2008: 793, photo 7), Beitr. Araneol., 5.

(2) Injuries and repair of leg cuticula

Ariadna canariensis WUNDERLICH 1995 (Segestriidae) (photo 69)

Material: Canary Islands, Lanzarote, juv., JW leg., R138/AR/CJW.

Prosomal length 3 mm.
On the right coxa I (length 0.8 mm) an irregular dark brown structure exists which is almost 0.7 mm long, and which may be the result of an injury and healing process. Parts of this structure lie within the cuticula, other parts are standing out from the cuticula.

Ruborridion musivum (SIMON 1873) (= *Theridion m.*) (Theridiidae) (photo 85)

Material: S-Frankreich, Hyeres, ♂, JW leg. in V 2005, R130/AR/CJW.

Prosomal length 0.6 mm.
A strongly sclerotized irregular prominent and almost circular structure, diameter 0.1 mm, exists ventrally-basally on the left femur II. It may be the result of a healing – or necrotic? – effect.

Drassodes alexandrinus (O. PICKARD-CAMBRIDGE 1874) (Gnaphosidae) (photo 75)

Material: Canary Island Gran Canaria, road Valesco-Artenara, pit fall, ♂, P. NABAVI leg. in 2000, R58/AR/CJW.

Measurements (in mm): Body length 5.0, prosomal length 2.6.
A dark brown structure exists slightly basally-ventrally on the left femur I, size 0.25 x 0.35 mm, which is fairly protruding and has an irregular margin; marginal parts are lying under the cuticula, a thin small plant-like structure originates distally on the dark brown structure. I regard this structure as a possible injury but probably not as a healing event.

Microclubiona marmorata (L. KOCH 1866) (Clubionidae) (photo 73)

Material: 1♀, Bavaria, coll. T. BLICK.

The left coxa IV bears a larger (0.7 mm long) and a small strongly darkened (apparently sclerotized) area which may be the result of injuries and healing.

(3) Wound repair of the opisthosoma

Pritha pallida (KULCZYNSI 1897) (Filistatidae) (photos 68a-b)

Material: Azores, ♀, CJW.

Body length 2.3 mm.
Some dark brown protruding structures exist ventrally on the left side of the opisthosoma which are quite similar to the agglutinated scab of *Drassodes lapidosus* (see below and figs. 1-2).
Furthermore the apical part of the left tibia IV (diameter 0.2 mm) is strongly darkened and (strongly sclerotized?) and may have been injured.

Walckenaeria sp. indet. (Linyphiidae) (photo 71)

Material: Canary Islands, La Gomera, ♀, J. ASTRIN leg by fogging in 2008.

Measurements (in mm): Body length 3.2, prosomal length 1.2.
On the right ventral half of the opisthosoma just behind the epigastral furrow and near the epigyne exists a dark brown scab which is 0.4 mm long, hairless, divided medially, fairly and irregularly standing out in some parts.
Remark: The tarsal claws are quite long in member of the genus Walckenaeria; these claws are strongly shortened at the left legs II-III and the right legs I-III of this specimen in contrast to the claws of the remaining legs.

Drassodes lapidosus (WALCKENAER 1802) (Gnaphosidae) (figs. 1-2)

Material: Turkey, Elbistan, ♀, B. KUNT leg. in V 2008, R55/AR/CJW.

Measurements (in mm): Body length 17.0, prosomal length 6.3.
On the left ventral side of the opisthosoma not far behind the epigastral furrow a darkened structure exists (figs. 1-2); its quite dark brown central part – the protruding plug (P) – is regarded as an agglutinated scab which bears no hairs; it is surrounded by a fairly darkened ring-shaped structure, and I do not want to exclude with certainty that this may be a regenerated cuticula although it bears (short) hairs. Only few hairs are drawn on the part around the healed structure.

Cheiracanthium mildei L. KOCH 1864 (Clubionidae) (photos 74a-b)

Material: S-Portugal, E Faro, ♂, JW leg. in V 2010, R128/AR/CJW.

Prosomal length 2.5 mm.
On the ventral side of the opisthosoma (left) a dark brown and slightly prominent structure exists, size 0.7 x 0.15 mm, which may be the result od an injury and a healing effect.

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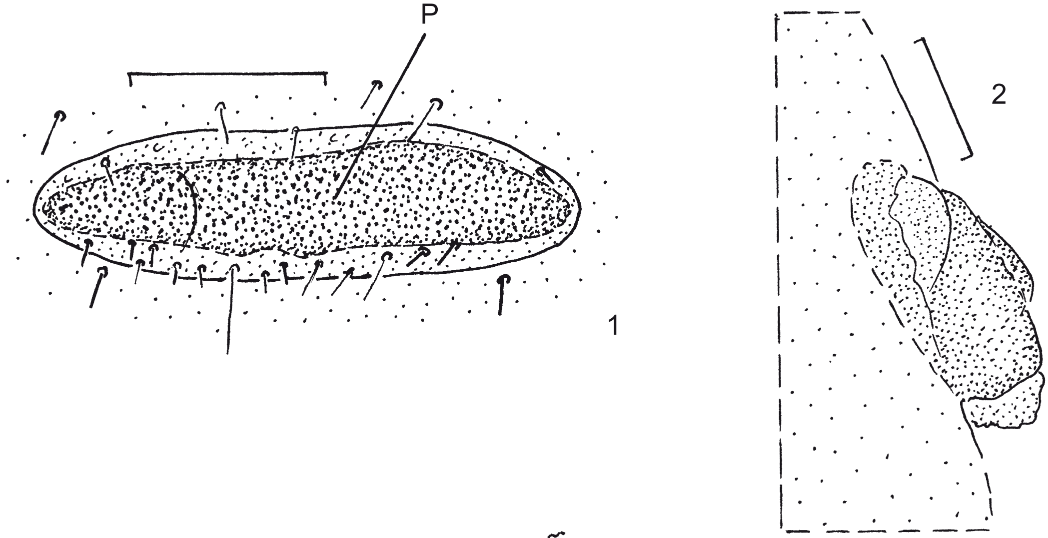

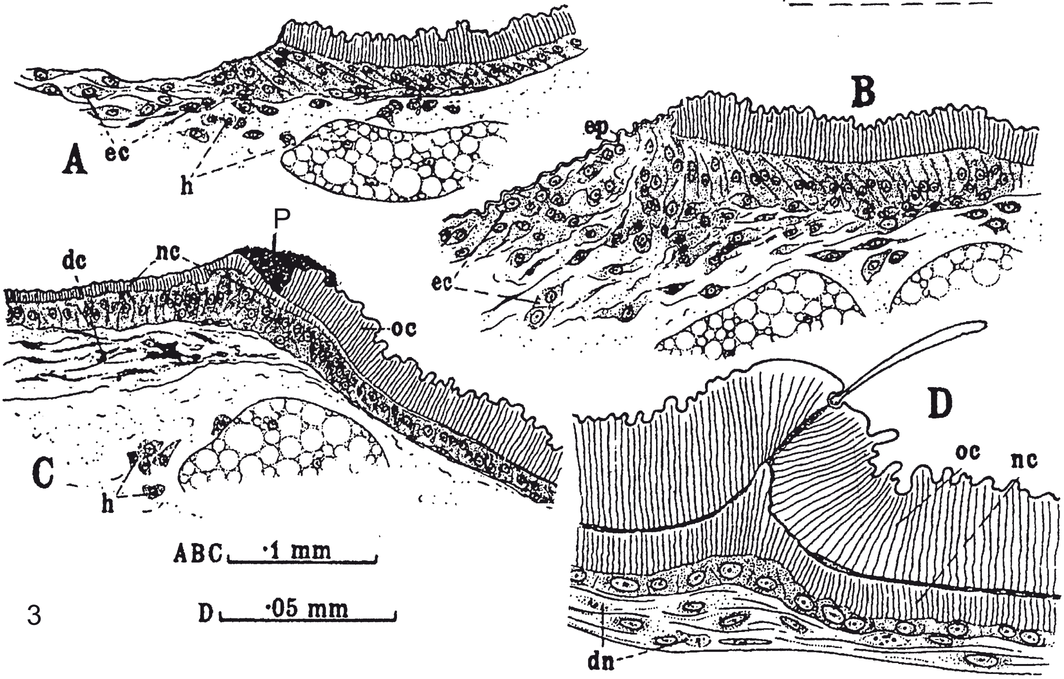

Figs. 1-2: A healed wound on the opisthosomal venter of a female spider specimen of *Drassodes lapidosus* (WALCKENAER 1802) (Gnaphosidae); ventral and lateral aspect. The dark brown central part – the protruding plug (P) – is regarded as an agglutinated scab which bears no hairs, the fairly darkened surrounding ring bears short hairs, and I do not want to exclude with certainty that it may be a regenerated cuticula although it bears (short) hairs. Only few hairs are drawn on the part around the healed structure. Scale bars 0.5 and 0.2 mm;

fig. 3) Wound healing in progress of *Rhodnius prolixus* (Insecta: Hemiptera), taken from WIGGLESWORTH (1937: Fig: 6); P = plug is added by the present author.

BEITR. ARANEOL., 6 (2011)

REVERSALS OF STRUCTURES IN THE EVOLUTION OF SPIDERS (ARANEAE), WITH REMARKS ON THE PLAGIOGNATHY, AS WELL AS THE TAXA URARANEIDA SELDEN ET AL. 2008, AND LEPTONETIDAE

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Abstract: (a) Reversals: Different meanings and causes of the term “reversal” (“character reversion”), “reappearances”, and “pseudo-reversal” are shortly debated. Selected possible as well as quite likely character reversals in spiders (Araneae) taxa – as well as within a single species – are listed and discussed. – (b) Taxonomy: I PROPOSE to downgrade the “plesion” (= ”Stammgruppe”) Uraraneida SELDEN et al. 2008 – erected as an order – to the level of a suborder of the Araneae s. l., and as the sister group to the suborder Araneida (the name Araneida in a new sense). The relationships of the family Leptonetidae are shortly discussed.

Key words: Araneae, Araneida, Araneoidea, Araneomorpha, Archoleptonetinae, atavisms, bristles, capture webs, Caponiidae, character reversal, cribellum, epigenetics (“evo-devo”), evolution, eyes, Filistatidae, flagellum, Hypochilidae, Leptonetidae, Linyphiidae, losses, lungs, Mesothelae, Mygalomorpha, Opisthothelae, poison gland, plagiognathy, Praeterleptonetidae, reversal, reversion, RTA-clade, sex roles, silk gland, size dimorphism, spinnerets, stridulatory organs, Tetragnathidae, Theridiidae, tracheae, trichobothria, Uloboridae, Uraraneida.

A (character) reversal is usually roughly called “the return to an ancestral condition in a taxon through the loss of an evolutionary novelty (apomorphy)”, but the term “reversal” is not clear; such events may point to several very different phenomena and processes, and numerous open questions exist, e.g.:

What does exactly “ancestral condition” in a given case mean?
In which different ways may ancestral conditions evolve?
May specific losses be considered as reversals?
Which reversals are revisions (“back mutations” in which the ancestral nucleotid sequence is restored)?
Which “reversals” are newly (secondarily/analogous/convergently) evolved structures which may be quite similar to the ancestral structures like most probably the haplogyne stage in some Tetragnathinae and the cribellate stage of certain Leptonetideae? I call such patterns – they may be simplified – “seemingly reversals”.
Do “reversed reversals” exist?
Can we find dislocations of structures like bristles on different leg articles based on genetic reasons? (See below: Femoral bristle in *Balticoroma*).
What are the molecular bases of “reversals”? Which role do “evo devo”, epigenetical processes, gene-silencing/suppression and gene-reactivation play?

Without doubt the (genetic) causes of “reversals” are diverse and frequently still quite unclear. Some interpretations are only speculations although the facts may be sure. Therefore I use the term “reversal” in this paper only in a “descriptive sense”. (1).

Questionable reversals of characters in spiders have not yet been studied more closely to my knowledge; I want to draw the attention to these phenomena which – at least in spiders – apparently have been widely ignored and may cause doubtful conclusions concerning the phylogeny of higher spider taxa. I am far from sure about some of my suggestions; most are quite hypothetical.

A “reversal” may concern few or a single specimens within a species or (e.g.) a morphological pattern (an organ, a genital or non-genital structure, a behaviour, the distribution, and an ecological adaptation) of one or several species within a taxon.

Such – questionably or really – reverted characters of (supra)specific taxa may cause important problems in taxonomy, and therefore have to be discussed intensively; important examples are the trichobothriotaxy as well as the existence/absence of a cribellum, of a haplogyne condition or of feathery hairs. See also problems regarding the flagellum (fig. A).

In this paper I focus on questionable reversals/reversions of selected structures like leg trichobothria. NOT TREATED ARE SIMPLE LOSSES like those of poison glands (2) or of the cribellum (losses exist in numerous taxa like the non-cribellate branch of the superfamily Araneoide s. l. or certain members of the family Dictynidae, see fig. 1) or of the capture web (losses exist, e. g., in numerous taxa like the family Mimetidae of the Araneoidea – in this case the loss is connected with the loss of the spinneret`s “triplett” – or the subfamilies Argyrodinae – including certain reversals? – and the Hadrotarsinae of the family Theridiidae) (3), or the loss of epiandrous gland spigots in several taxa, or the loss of the laterigrade leg position in some Thomisidae, as well as the peculiar loss of the jumping behaviour in the genus *Ballus* of the Jumping Spiders (family Salticidae).

In the following I discuss – questionable or likely reversals as well as of pseudo-reversals -, examples of the secondary existence of regained structures after their losses, and – quite controversial and doubtful – the origin(s) of leg trichobothria in certain taxa, see fig. 1. Most remarkable is the existence of a cribellum within the family Leptonetidae (*Archoleptoneta*)).

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(1) Atavisms (character reversals of a single specimen within a larger number of conspecific specimens) – like the existence of eight eyes instead of six in the genus *Orchestina* SIMON

(Oonopidae), see WUNDERLICH (2004: 690) – or other abnormal patterns OF SINGLE SPECIMENS are not treated more closely in this paper. An example of an atavism is reported from the Jumping Spider (Salticidae) *Macarophaeus insignis* WUNDERLICH n. gen. n. sp. which is described in the paper on the family Gnaphosidae in this volume (see the left drawing in fig. 66 in that paper): Within about a dozen of specimens of this species only a single one (a male paratype) possesses a denticle on the retromargin of the cheliceral furrow on both sides; in the other specimens exists a smooth margin. In all known (more than half a dozen) specimens of the related *Macarophaeus varius* SIMON 1883 a denticle exists in this position, but in other related species it is absent. An (atavistic) reversal in the single specimen in question appears most likely to me.

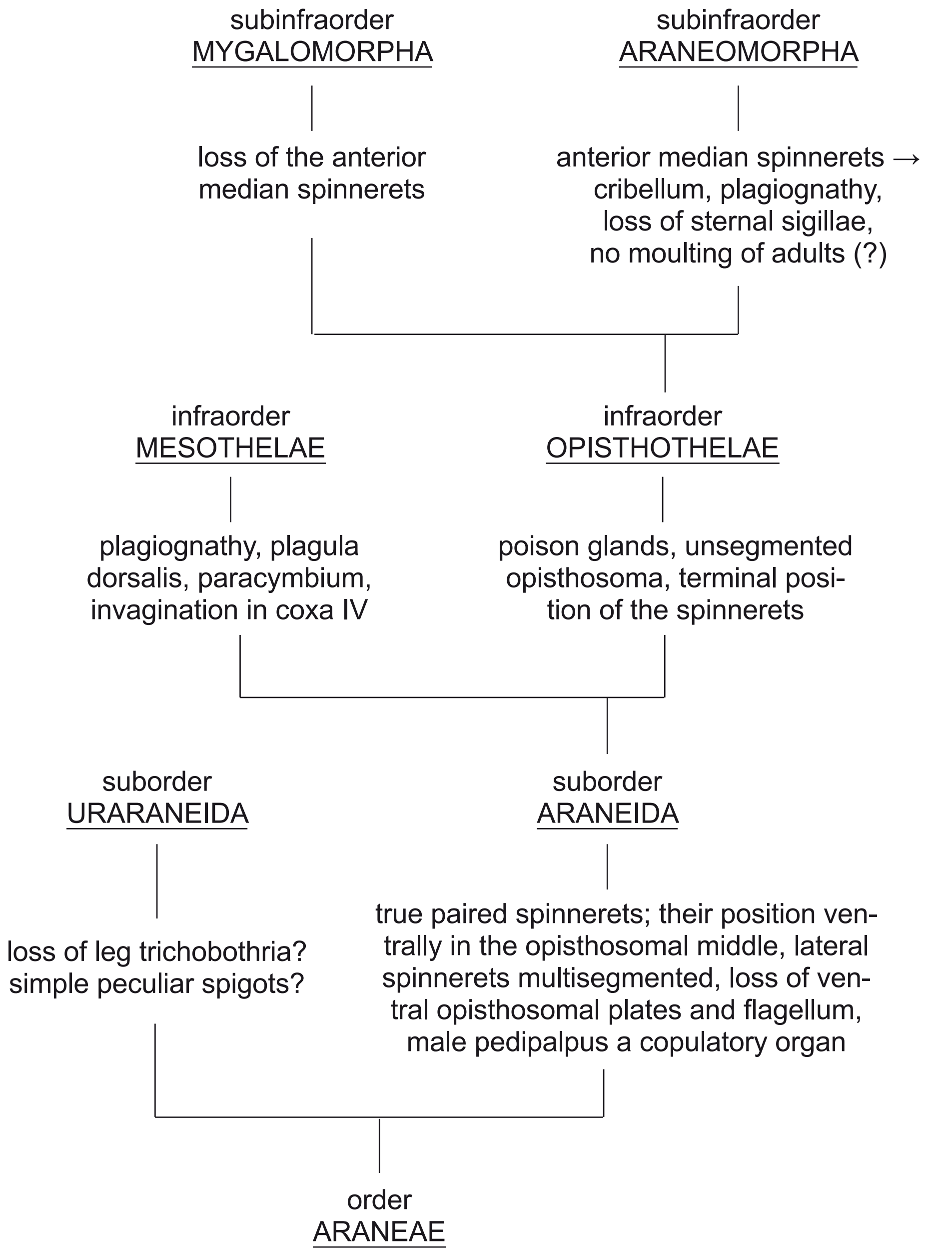
(2) Poison glands exist in almost all spiders. They are only absent in the Mesothelae and in the Uloboridae as well as in the extinct Uraraneida. The absence of such glands (a) in the Uloboridae is surely a loss (a "functional loss") because Uloboridae is a family within numerous related families which all possess poison glands. -- (b) Mesothelae: This is the most primitive taxon of extant Araneae of a high level. In the spider's possible sister group Amblypygi – besides the ancient Uraraneida, see below and fig. A -, poison glands are absent, too. Therefore I regard the existence of poison glands as an apomorphic character of the Opisthothele (fig. A) which never existed in the Uraraneida nor in the Mesothelae; in this case I agree with the opinion of SELDEN et al. (2008: 20784). If this is true the poison glands have no longer to be regarded as an apomorphic character of spiders (Araneae).
Remark: What are the autapomorphic (unique) characters of the Araneae s. l. (see below)? They may be:

a) A spinning apparatus: Opisthosomal spinning glands,
b) a labium originating from the gnathocoxae,
c) probably (realy basically and in the oldest known fossils, too?) the male pedipalpi functioning as secondary copulatory organs.

In the related Amblypygi a spinning apparatus is absent, the labium originates from sternites of the legs, and the pedipalpi are functioning as a capturing basket.

(3) The existence of a capture web in certain tropical members of the family Salticidae – in contrast to its absence in the hugh number of more evolved Jumping Spiders – is probably a plesiomorphic character.

Discussion: The "non-reversibility of evolution" is a biological "law" in general but exceptions may exist. A questionable example is the existence of teeth in the lower jaw of the amphibian genus *Amphignathodon* which is unique in the Hylidae or other Anura. But this reversion does not necessarily entail a "re-evolution"; a reversion as a "phyletical atavism" or the re-activation of "sleeping genes" – epigenetical phenomena – have probably not be excluded. – Questionable – or even quite doubtful – regained functional wings are reported by WHITING et al. (2003) from certain insects (Phasmatodea). This case is not accepted as a reversal by G. BECHLY (e-mail in XI 2009) but is accepted by SELDEN et al. (2008: 20784) in the sense of suppressed and reactivated genes.



apomorphies (see also above): Opisthosomal silk glands; position of the spigots ventrally-laterally? Setae-less fangs.

plesiomorphies: Petiolus, segmented opisthosoma, sternal sigillae, unsegmented spinnerets, opisthosomal flagellum, orthognathy.

Fig. A. Possible cladogram of the higher taxa of the order Araneae s. l. Only selected characters are used which are of special taxonomical value.

Remarks on the taxon Uraraneida: SELDEN et al. (2008) erected the extinct order Uraraneida of the class Arachnida "for a plesion" (!). Probably the loss of leg trichobothria and the existence of simple peculiar spinnerets/spigots are advanced diagnostic characters. The Devonian genus *Attercopus* (380 M.a.) has been chosen as the type genus, the Permian genus *Permarachne* (275 M.a.) is regarded as the only further genus of this taxon.

Notes: (1) The flagellum of *Permarachne* has been mistaken in the original description as a spinneret by ESKOV & SELDEN (2005), and *Permarachne* has been regarded as a member of the Mesothelae. (2) A ventral-distal artefact on the cheliceral fang of *Attercopus* has been originally mistaken as an opening of a poison duct (such opening is situated DORSALLY on the fang in (extant) spiders). (3) The orthognath position of the chelicerae is well ducumented in *Permarachne* (fig. 12), the existence of spinnerets is well documented in *Attercopus*.

Discussion:

As diagnostic characters of the Uraraneida – if I interpret correctly – are reported (a) an opisthosomal flagellum, (b) unsegmented spinnerets with a single spigot "arranged at the edges of <ventral opisthosomal> plates", and (c) a segmented opisthosoma. Poison glands are absent, a petiolus apparently exists, the chelicerae possess an orthognath position, leg trichobothria are apparently absent at least in *Attercopus*, the existence of an anal tubercle is unknown.

Two opisthosomal structures of the Uraraneida – as well as the position of the chelicerae – are of special interest, and their apomorphy/plesiomorphy has to be discussed: The flagellum as well as the spigots which indicate the existence of silk glands. (The absence of poison glands is doubtlessly not an apomorphy, see above).

(1) The FLAGELLUM (see fig. 11) is regarded by SELDEN et al. as either a plesiomorphic character or an apomorphic character (probably a "reappearance"), convergently evolved in other arachnids, see the phylogenetic tree of the arachnids in DUNLOP & SELDEN (2009: Fig. 1) and compare fig. A in the present paper. A reversal ("reappearance") similar to wings of insects – see WHITHING et al. (2003) and above – seems quite unlikely to me. Compared with other orders of the Arachnida the plesiomorphic character of the opisthosomal flagellum appears most likely, and the flagellum can hardly be regarded a sure apomorphic character of the taxon Uraraneida.

(2) OPISTHOSOMAL SILK GLANDS/SPIGOTS are unique within the Arachnida, existing (as a synapomorphy) only (a) in the Uraraneida (reported from *Attercopus*) and (b) in the Araneae (Araneae sensu SELDEN & DUNLOP) (rsp. Araneida in the present paper). Uraraneida "had silk glands and other characteristics typical of true spiders." (DUNLOP & SELDEN (2009)). Because of the peculiarity/uniqueness of these glands/spigots I regard the value of this character as very high and propose (not introduce) to unite Uraraneida and Araneae (Araneae at this level as "Araneida" for a taxon at this level) as sister groups and suborders of the single order Araneae s. l. (fig. A). Mesothelae and Opisthothelae – traditionally regarded as suborders by most authors – may have to be downgraded to infraorders if the relationships of the high arachnid branches are regarded according to my proposal; and Mygalomorpha as well as Araneomorpha may have to be downgraded to the level of subinfraorders (fig. A).

Following the "Phylogenetic tree of the arachnids and their relatives" by DUNLOP & SELDEN (2009: Fig. 1) the opisthosomal silk glands evolved either two times separately (in the Uraraneida and in the Araneae) or only once (as synapomorphy of the Uraraneida + its sister group), and are lost in this case by the ancestor of the diverse sister group (four orders) of the Araneae (Araneae s. str. in the sense of these authors). Both of these options appear quite unlikely to me compared to the single origin of these glands as a synapomorphy of the Araneae s. l. (Uraraneida + Araneida). I consider the Uraraneida as close to the stem species of the Araneae (s. l.) but the relationships of sister groups proposed by DUNLOP & SELDEN (2009) appear hard to accept.

I suppose that a functional connection between the existence of an opisthosomal flagellum and the structure – as well as the position – of the spinnerets exists: The evolutionary succession of the spinning apparatus might have evolved from a simple structure of unsegmented spinnerets – which bear a single spigot only – in a lateral (?) position of the opisthosoma in the flagellum-bearing Uraraneida (a) to multisegmented and well movable (!) spinnerets in a more compact group ventrally just posterior to the epigastral furrow – after the loss of the flagellum (b) – and finally (most advanced) to a terminal opisthosomal position of less segmented spinnerets and diverse spigots in the Opisthothelae (c).

(3) The CHELICERAE (*). KRAUS & KRAUS (1993) regarded orthognathy and labidognathy as derived from plagiognathy, see fig. 9). According to these authors (p. 581) "... it must be assumed that orthognathy in the Araneae is a different <to the outgroups> and thus independent secondary development within the mygalomorph spiders. There is no question but (**) this contradiction needs some further examination.". – Besides the orthognath Amblygygi – which are closely related to the Araneae and probably even its sister group – the ancient Uraraneida are also close relatives of the Araneae, and (doubtless Permarachne, fig. 12) are orthognath, too. If the plagiognath stage is assumed as plesiomorphic in the Araneae s. l. the orthognath stage has to be regarded as a "functional reversal" (fig. 9). In agreement with KAESTNER I regard the orthognathy as a plesiomorphic character of the order Araneae s. l. (figs. A and 10), and the plagiognathy of the Mesiothelae, few Mygalomorpha (Actinopodidae, Migidae) as well as basicly the Araneomorpha (Hypochilidae) as derived, and as evolved separately; contra KRAUS & KRAUS (1993). See (the indication of) the origin of the labidognathy in figs. 1 an A. Three convergent evolutions of an advanced pattern – the fangs are working against each other (!) in the labidognath stage – appear more likely to me than a single "functional reversal" to an ancient stage. See also fig. 10a).

KRAUS & KRAUS pointed at connections between the cheliceral morphology, the ecology and the behaviour of spiders: In orthognath spiders the fangs penetrate the prey usually against the substrate/the ground, in araneomorph spiders the origin of labidognathy may be correlated with the origin of capture webs in which a substrate as a counterpart of the biting chelicerae is lacking, and opposing fangs may cause a more efficient bite.

Remark: As pointed out by KRAUS & KRAUS (1993: 581) orthognathy in Amblypygi may be different from orthognathy in spiders.

Regarding fossil and extant taxa DUNLOP (1997: 76) wrote: "To achieve orthognathy and/or labidognathy from palaeognathy via plagiognathy requires reversals in the basal segment position. Tracing the evolution of the chelicerae in tetrapulmonate arachnids remains an interesting line of future research."

(*) The "plagula dorsalis" as an autapomorphic character of the Magylomorphae: See fig. A and HOMANN (1985).

(**) In my opinion "that" may make sense in this connection and not "but"; JW.

In the following I treat few examples of more or less questionable "reversals" in/of.....

(1) leg trichobothria,
(2) the cribellum,
(3) the haplogne condition,
(4) feathery hairs,
(5) leg bristles,
(6) epigynal scapes and position of the receptacula seminis,
(7) eyes: Number, position, size of the lenses,
(8) the cheliceral size,
(9) opisthosomal pattern,
(10) lungs,
(11) spermatophores,
(12) sex roles and size dimorphism,
(13) moulting of adult spiders,
(14) aquatic life.

Remarks: Of greatest interest is the possible CONNECTION OF SEVERAL of such characters (see fig. 1).
Unsolved are the problems regarding the possible reversal(s) of leg autotomy within the superfamily Oecobioidea, see WUNDERLICH (2004: 835). See also the existence of a cribellum in certain members of the family Leptonetidae, see no. (2) below.

(1) Leg trichobothria

Trichobothria are specialised ancestral arthropod hairs which exist in insects and most arachnids (except Opiliones, Ricinulei and Solifugae of the Arachnida). They exist basicly in spiders on the following leg articles: Tibiae, metatarsi and tarsi, and in certain taxa also on other leg articles like femora (Uloboridae, some Leucauginae and Tetragnathinae) or trochanters (certain Uloboridae and probably certain Prodidomidae, see the paper on this family in this volume).
The function of trichobothria is diverse; most leg trichobothria are air movement receivers, see REISSLAND & GÖRNER (1985).

LEHTINEN (1980: 494) provided an important overview over the types of spiders trichobothrial patterns on leg I on which I will give some comments:

(1) The author claimed that the absence of TARSAL trichobothria is a plesiomorphic pattern in spiders but in my opinion – because of their presence in the Mesothelae and most Mygalomorphae (except Anthrodiaetidae and Atypidae) – they are more likely basicly present in the Araneae.
(2) According to LEHTINEN tarsal trichobothria are absent in the family Dictynidae but in some taxa of this family tarsal trichobothria exist, see WUNDERLICH (2004: 1385).
(3) Hersiliidae (superfamily Oecobioidea) possesses usually ONE OR TWO PAIR(S) of metatarsal trichobothria – in some taxa even more to B. BAEHR in litt. – instead of a single trichobothrium only, like in the sister family Oecobidae, see WUNDERLICH (2004: 835, 841, fig. 5) ("several apical trichobothria"). This is a family character of the family Hersiliidae. See the remark below.
(4) LEHTINEN (p. 493) wrote "However, in groups with normally a single metatarsal trichobothrium, a larger number of metatarsal trichobothria is extremely rare (only *Allomengea*, a genus of Araneoidea ... is known to have two), and a reduction of this single trichobothrium is restricted to the fourth leg only...". See the remark below.
   (a) I found that a number of more than a single metatarsal trichobothrium in *Allomengea* STRAND 1911 (Linyphiidae) exists only in a single species, *A. scopigera* (GRUBE): Several trichobothria exist, the number is not constant even in the same specimen (two ones occur occasionally, and not only on metatarsus I);
   (b) in some genera/species of the family Therididae a trichobothrium is absent on metatarsus III, too, see WUNDERLICH (2008: 191, 375). (The trichobothriotaxy of spiders in general is still not well-known).

Remark on (3) and (4a): The larger number of metatarsal trichobothria in the Hersiliidae – they may be paired – and in *Allomengea* (Linyphidae) (variable in number, and in an irregular position (!)), may be caused by a simple gene mutation (multiplication).

Fig. 1 (below). Few questionable reversals and losses as well as origins of selected characters during the evolution of spiders, shown by a simplified possible cladogram

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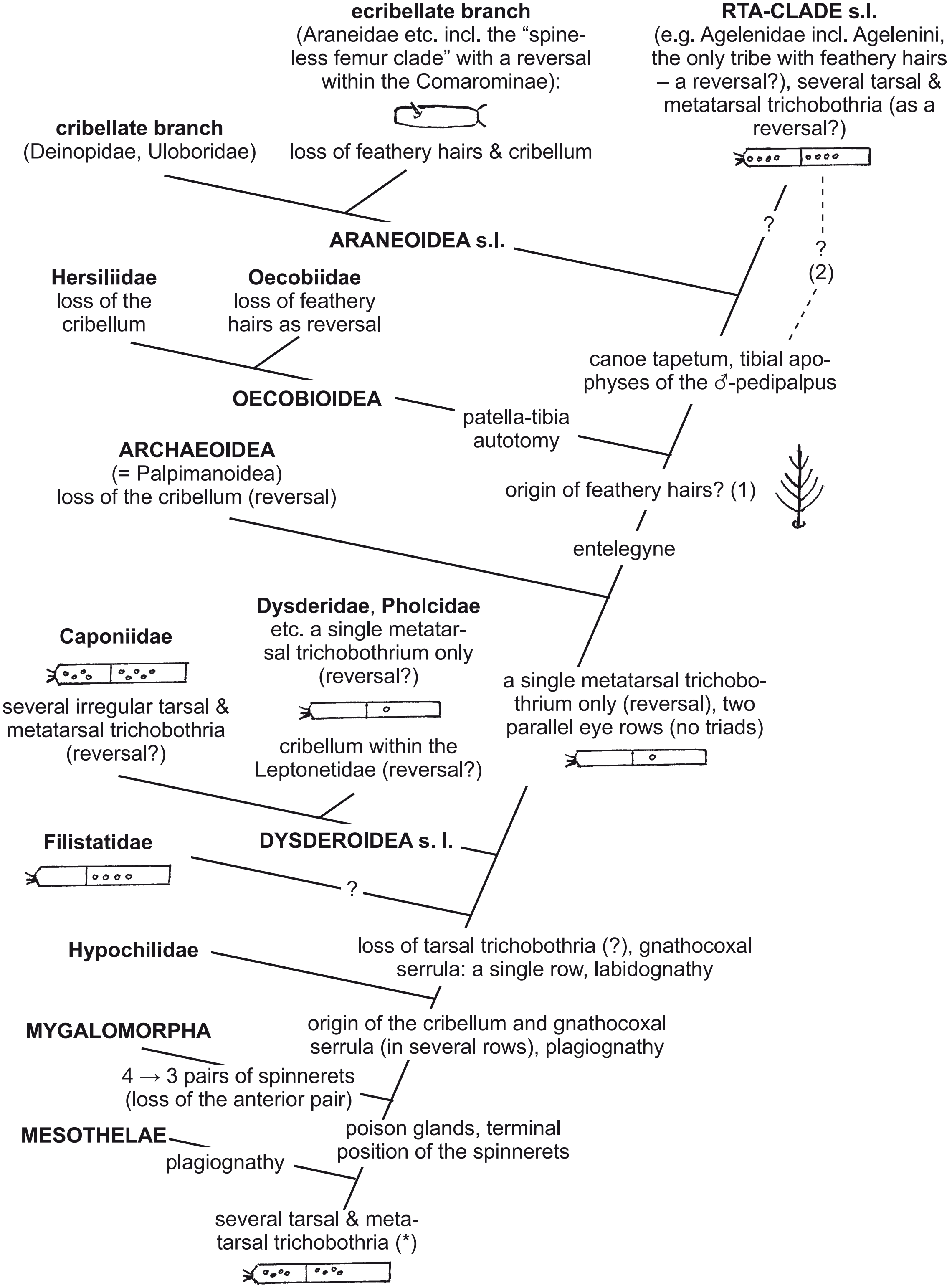
(*) The intrafamiliar number of trichobothria may be variable if more than a single one exists on a leg article.

(1) According to LEHTINEN (1967: 283) the origin of feathery hairs already happened before the branching of the Hypochilidae but my findings are different, see the remark (1) above, and below.

(2) I am waiting for the discovery of a fossil – Jurasic or Cretaceous – a "missing link", a "connecting taxon/family". Or can the extant family Nicodamidae be considered such a "connecting link"?

Observations and discussion (see the remark on *Allomengea* and the family Hersiliidae above as well as fig. 1):


ecribellate branch
(Araneidae etc. incl. the “spine-less femur clade” with a reversal within the Comarominae):
loss of feathery hairs & cribellum
RTA-CLADE s.l.
(e.g. Agelenidae incl. Agelenini, the only tribe with feathery hairs – a reversal?), several tarsal & metatarsal trichobothria (as a reversal?)
cribellate branch
(Deinopidae, Uloboridae)
?
ARANEOIDEA s.l.
?
(2)
Hersiliidae
loss of the cribellum
Oecobiidae
loss of feathery hairs as reversal
canoe tapetum, tibial apophyses of the ♂-pedipalpus
OECOBIOIDEA
patella-tibia autotomy
ARCHAEOIDEA
(= Palpimanoidea)
loss of the cribellum (reversal)
origin of feathery hairs? (1)
entelegyne
Dysderidae, Pholcidae
etc. a single metatarsal trichobothrium only (reversal?)
cribellum within the Leptonetidae (reversal?)
Caponiidae
several irregular tarsal & metatarsal trichobothria (reversal?)
a single metatarsal trichobothrium only (reversal), two parallel eye rows (no triads)
Filistatidae
DYSDEROIDEA s. l.
?
Hypochilidae
loss of tarsal trichobothria (?), gnathocoxal serrula: a single row, labidognathy
MYGALOMORPHA
origin of the cribellum and gnathocoxal serrula (in several rows), plagiognathy
4 → 3 pairs of spinnerets (loss of the anterior pair)
MESOTHELAE
poison glands, terminal position of the spinnerets
plagiognathy
several tarsal & metatarsal trichobothria (*)

I regard the ancestral pattern of trichobothria of the two distal leg articles similar to the ancestor of the Mesothelae (fig.1) as follows: Several tarsal as well as metatarsal trichobothria exist. A loss of tarsal trichobothria probably happened before the branching of the ancestral Filistatidae in which several metatarsal trichobothria still exist. Remarkable after this hypothetical loss is the existence of tarsal trichobothria (a) in the Caponiidae and (b) in the RTA-clade – as reversals? The presence of several tarsal and metatarsal trichobothria in the RTA-clade – which may be a relatively young branching – is probably a reversal which is connected with a "return" of several metatarsal trichobothria in both branches. A reduction (?) to a single metatarsal trichobothrium probably happened twice: (a) at the base of the Dysderoides s. l. (except the Caponiidae), and (b) before the branching of the Archaeoidea (= Palpimanoidea). The high number of metatarsal trichobothria (a) in the ancestral Filistatidae may be a basal pattern but (b) in the Caponiidae a basal pattern OR a reversal; the latter appears more likely to me because Caponiidae seems to be a more advanced family.

The tarsal and metatarsal trichobothrial pattern of the family Nicodamidae is of special interest: It is as in the Araneoidea and previous branches (no tarsal, a single metatarsal one; see fig. 1) and remark (2) below this figure). The basic existence of a cribellum, the simple structures of the bulbus, the absence of a retrolateral pedipalpal tibial apophysis and their distribution (the family is restricted to the Australian Region) may all point to their long evolution, a relict state, and probably a connecting position between the RTA-clade and an extinct – Cretaceous or Jurassic? – taxon.

In the following I report two losses as well as subsequent possible "returns" of trichobothria in the evolution of taxa of the superfamily Araneoidea in which a metatarsal IV trichobothrium basicly exists:

(1) Family Therididae:

A trichobothrium of metatarsus IV exists basicly in the family Theridiidae, has been lost in the subfamily Asageninae but exists – in my opinion as a reversal – in the genus *Asagena* SUNDEVALL 1833, which is not an ancestral genus, see WUNDERLICH (2008: 191).

(2) Family Tetragnathidae:

In almost all species of the genus *Pachygnatha* SUNDEVALL 1823 a trichobothrium on metatarsus IV is absent but in *P. clercki* SUNDEVALL 1823 it exists. *P. clercki* is surely not an ancestral species of this genus, and therefore I regard the existence of a trichobothrium on metatarsus IV in this species as a reversal.

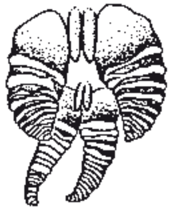
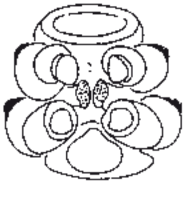
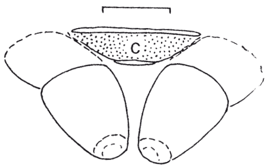
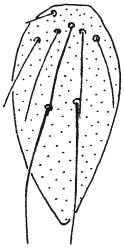
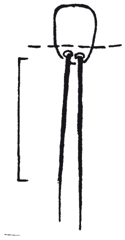
structure	figs.	examples as models
a pair of anterior spinnerets		Mesothelae: Liphistiidae
cribellum		Hypochilidae (first); Oecobiinae, Uloboridae, Dictynidae etc.
large wide colulus (“pseudocribellum”)		Oecobiidae: Mizaliinae
large “fleshly” hairy colulus		Theridiidae: Asageninae
reduction to a tiny hairy structure		Theridiidae: Anelosiminae
complete loss	–	Therididae: Theridinae
cribellum (very questionable reversal)	+	Leptonetidae: Archoleptonetidae

Fig. 2. Transformations of the ancestral anterior pair of spinnerets to the cribellum, the colulus, a complete loss and a supposedly reversal within spider’s phylogeny. The figure is conceived as a model. Few examples are selected with special reference to the family Theridiidae

(2) Cribellum and colulus

The cribellum is a "spinning plate" of numerous spider taxa slightly in front of the spinnerets (fig. 2), which has a spinning function in connection with a longitudinal "comb" or field of bent retrodorsal hairs on metatarsus IV which draw out the special dry and sticky cribellate threads from the cribellum. In spider's taxonomy this very important structure has been controversially discussed for a long time as the "Cribellate problem". "Most arachnologists agree that cribellate spiders are monophyletic, that is, that they all are descendants of a common ancestor", see FOELIX (1996: 274). The cribellum apparently evolved in the ancestor of the Hypochilidae as a transformation of the anterior pair of spinnerets which – as a plesiomorphic fourth pair – are only known from the infraorder Mesothelae (the family Liphistidae s. l.), see figs. 1, 2. Most arachnologists agree that the cribellum has been transformed numerous times, and lost much more than 30 or even 50 times in numerous families, see below. "Loss" basicly means simply that a cribellum is absent; most often it is replaced by a hairy structure, the colulus, only rarely has it been completely lost without any remains, e.g., in the most advanced subfamily Theridiinae of the Theridiidae, see fig. 2. The cribellum may be undivided or divided longitudinally (both forms exist, e.g., in the Didictynidae: Dictyninae); the colulus may be undivided or divided apically (in the family Agelenidae). In the extinct subfamily Mizaliinae (Oecobiidae) an extremely large structure exists which may be a colulus or a funtionless cribellum ("pseudocribellum", see figs. 2, 3). (A calamistrum is absent in this taxon, see WUNDERLICH (2004: 845, fig. 11), in which this structure erroneously is called "calamistrum").
A cribellum exists in about two dozen spider families and has been lost in certain taxa within more than a dozen families (different opinions exist on the limits of families): Amaurobiidae, Amphinectidae, Ctenidae, Desidae, Dictynidae s. l. (*), Gradungulidae, Leptonetidae (see below), Miturgidae, Nicodamidae, Oecobiidae (*), Stiphidiidae, Tengellidae and Zoropsidae s. l. (including Zorocratidae) (*).

(*) See WUNDERLICH (2004).

The family haplogyne Leptonetidae and their relationships are of special interest in this connection: Certain characters of this family are quite unusual within the "Scytodoid branch" of the classical "Haplogynae" and may exclude the family from this group of spiders, and from relationships with the Telemidae: A cheliceral lamina, an onychium, thickened articles of the ♂-pedipalpus as well as a female egg-carrying behaviour are absent, the bulbus is fairly expandable.
The question of a "basical" or a "regained" CRIBELLUM or its independent/convergent evolution – has to be discussed within the family Leptonetidae (fig. 2 and fig. below): All taxa of the diverse subfamily Leptonetinae are ecribellate but one of two known genera of the leptonetid subfamily Archoleptonetinae (*Archoleptoneta*) – which survived only in North America – is cribellate like the ancestral more basal family Filistatidae, see fig. 1. LEDFORD & GRISWOLD (2010) preferred the hypothesis that "leptonetids are sister to

the remaining Haplogyneae" and discussed their relationships (a) to the Haplogynae – which share the fusion of tegulum and subtegulum – and (b) to the Entelegynae. Fossil taxa like the ecribellate Cretaceous Praeterleptonetidae WUNDERLICH 2008 are not included in this study.
Are the – really basically cribellate? – Leptonetidae (and probably strongly related taxa, see the figure below) the sister group to the remaining Haplogynae which are ecribellate without a single exception besides the doubtless basal Filistatidae? In the following I discuss some characters of the Leptonetidae and certain related families:

(a) The structure of the cribellum in the subfamily Archoleptonetinae is quite unusual: it bears peculiar long and hair-shaped "strobilate" spigots.
(b) Given a basal position of the Archoleptonetinae within the classical "Haplogynae" the cribellum should have been lost more than half a dozen times: In the Leptonetinae within the Leptonetidae, in the genus *Darkoneta* within the Archoleptonetinae, in the extinct Praeterleptonetidae (which may be strongly related to the Leptonetidae or be its sister taxon), in the Telemidae, in the "pholcoid branch" sensu WUNDERLICH (2004: 645), in the "Scytodoid hunters branch", in the Dysderoid branch and in the Segestroid branch.
(c) Supposing a basal position of the Leptonetidae within the classical "Haplogynae" further cribellate taxa within this group would be expected but they are absent/ unknown.
(d) Fossils: All known taxa of the Leptonetidae in the Eocene taxa in Baltic amber are ecribellate, see WUNDERLICH (2004). As is known up to now also the fossil haplogyne taxa which are described from the Cretaceous are ecribellate, e. g., members of the family Praeterleptonetidae WUNDERLICH 2008 which is probably related to the Leptonetidae and probably to the superfamily Araneoidea, see WUNDERLICH (2008: 586f) and this volume (paper on Cretaceous spiders).

Taking together all these arguments a "regain" of the cribellum in *Archoleptoneta* appears possible to me – see the position of the Leptonetidae in the possible cladogram given by WUNDERLICH (2004: 645), and the Cretaceous Praeterleptonetidae which are ecribellate – but appears NOT likely. The provisorical conlusions by LEDFORD & GRISWOLD are appear logical.

Possible regains in other families: SPAGNA & GILLESPIE (2008: 364) do not want to exclude the "regain" (reversal) of a cribellum ("cribellate atavism") in *Tengella* DAHL 1901 (Tengellidae), a "regain" may also exist within the family Ctenidae, see SILVA DAVILA (2003). So we PROBABLY have a "regain" of the cribellum three times or more, (with)in the families Ctenidae, Leptonetidae and Tengellidae. Compare also the unclear conditions in fossil and extant taxa of the family Oecobiidae in which probably a further "regain" exists; see WUNDERLICH (2004: 836-837).

Most remarkable are the transformations and reductions of the COLULUS within the family Theridiidae (fig. 2) which is a member of the ecribellate branch of the superfamily Araneoidea s.l.
The sister group of this ecribellate branch is the cribellate deinopid branch within this superfamily, see fig. 1. Within the family Theridiidae we find all stages from a large/"fleshly" colulus up to a complete loss of this structure. Not a single reversal to a cribellum is known to exist in the ecribellate branch.

(3) The haplogyne condition

Haplogynae is a group of “primitive” spider families in which – in contrast to the Entelegynae except such taxa which possess secondary simplified structures – the male and female genital organs are simple; usually a sclerotized epigyne, a large cymbium which covers dorsal parts of the bulbus, and usually complicated structures of the bulbus are absent, but more important are the differences in the kind of movement of the bulbus – see HUBER (2004) – and the absence of fertilization ducts in the vulva which usually (!) exist in the advanced group, the Entelegynae, see fig. A (Eresidae etc.). Furthermore the spermatozoa are different in both groups and a larger number of receptacula seminis exists in the Haplogynae.

Simplified secondary male genital organs of entelegyne spiders (called by me “pseudo-reversals”) are not rare; they exist, e.g., explicitely in the male sex of certain members of the family Theridiidae like *Paratheridula* (fig. 4) and *Theridula* which are clearly members of the advanced subfamily Theridiinae (their vulva is entelegyne, an internal paracymbium exists, etc.), as well as in taxa of the family Tetragnathidae, e.g. in the Tetragnathidae: Tetragnathinae like *Tetragnatha* (the genital organs are simplified in both sexes in this genus, and an unpaired receptaculum-like structure exists similar to *Dysdera*, Dysderidae). Both families are members of the entelegyne superfamily Araneoidea. “Haplogyne female genitalia occur in several families within the Entelegynae (e.g., Uloboridae, Tetragnathidae, Anapidae), and are easily explained by the secondary loss of the copulatory ducts.” HUBER (2004).

A true reversal from the entelegyne to the haplogyne condition is unknown to me. Palpimanoidea has been considered by certain authors basicly entelegyne, and their ♂♀-genital structures regaining from an entelegyne condition, but this is nothing else than a “pseudo-reversal”. “It is hard to imagine the palpimanoid bulb derived from an entelegyne bulb...”; HUBER (2004: 8).

<u>Note</u>: It seems not unlikely to me that the entelegyne condition in the Eresidae evolved convergently to other entelegyne spiders; the simple structure of the bulbus, the absence of feathery hairs (see below), and moulting of adult females are ancient characters of this family which do not exist in other entelegyne families in this combination.

(4) Feathery hairs

Feathery hairs – see the small drawing in fig. A – are flat (two-dimensional) feather-like branchings which are wider basally than distally; see LEHTINEN (1967: 286, figs. 8-9) They are mistaken for plumose hairs by numerous authors; Such hairs exist on body and/or legs.

LEHTINEN (1967: 283, fig. 1) placed the origin of feathery hairs before the branching of the family Hypochilidae but to my knowledge – I may be wrong – their origin is only after the branching of the family Eresidae, see above (the haplogyne condition).

Feathery hairs exist in certain taxa of numerous families, and losses are not rare, e.g., within the family Gnaphosidae. In certain branchings – e.g. the ecribellate branch of the superfamily Araneoidea s.l. (called “Orbiculariae” by certain authors) they have been lost.
In almost all members of the family Agelenidae – a family of the RTA-clade – feathery hairs are absent, only in the few genera of the tribe Agelenini such hairs exist. If Agelenini is not a basal taxon of this family – my supposition – the existence of their feathery hairs may be (a) reversal(s).

(5) Leg bristles/spines

(a) Family Anapidae s. l.

The family Anapidae s. l. is (1) a member of the superfamily Araneoidea (in which femoral bristles basicly exist), and (2) a member of the “spineless femur-clade” (*) within this superfamily, a set of families, in which femoral bristles have been completely been lost (**). Theridiidae (Combfooted Spiders) is a well-known family of this clade.
I know only a single species of the spineless femur-clade, *Balticoroma gracilipes* WUNDERLICH 2004, an extinct Eocene member of the family Comaromidae WUNDERLICH 2004, in which a (single prolateral) femoral bristle exist (fig. 5). Eleven specimens are known from this species. The bristle is restricted to the anterior femur. A femoral bristle is absent in the remaining seven species of the genus *Balticoroma* as well as in all other related taxa, and therefore I suppose its existence in this species is a reversal.

(*) More precisely the femora bear bristles but no spines although according to certain authors this difference is not of interest.
(**) Metatarsal and lateral tibial bristles have also been lost.

(b) Family Linyphiidae: Linyphiinae

In the subfamily Linyphiinae of the Linyphiidae at least a single metatarsal bristle exist basicly. In all of the dozen Central European species of the genus *Porrhomma* SIMON 1884 a metatarsal bristle is absent with the single exception of *P. errans* (BLACKWALL 1841). In my opinion a reversal is the most simple explanation for the existence of this metatarsal bristle.
Note: In members of the Linyphiidae: Micronetinae tarsal bristles are absent like basicly in the superfamily Araneoidea, but in *Agyneta* (*Syedrula*) *innotabilis* (O. PICKARD-CAMBRIDGE 1863) bristles exist exceptionally on the tarsi I-II. I do not know an explanation for the existence of these tarsal bristles.

(c) Family Linyphiidae: Erigoninae

In the higher taxa of the subfamily Erigoninae of the Linyphiidae tibia IV bears basicly only a single bristle, so in almost all species of the diverse genus *Walckenaeria* BLACKWALL 1833 (and related genera), too, but in very few species exist two bristles: In *W. afur* THALER 1984 and in *W. denisi* THALER 1984. It is remarkable that (1) both are endemic “island species”, known only from the Canary Island Tenerife, and (b) that in 3 of 5 males from a special locality tibial bristles are completely absent. This absence has been regarded a mutation by WUNDERLICH (1992: 400). I suppose the existence of a second bristle on tibia IV may be a reversal to the basic condition of the family Linyphidae.

(d) Family Segestriidae

In *Ariadna europaensis* n. sp. (see the paper on Western Palaearctic spiders of the genus *Ariadna* (Segestriidae) in this volume: Fig. 19) exists a remarkable variability within the same population: The proapical metatarsal clasping structure may possess the shape of a normal bristle but in other specimens a blunt and shortened (club-shaped) structure exists like in the middle of the metatarsus. The normal bristle-like shape of this proapical structure may be a reversal of the club-shaped one – or are both metatarsal clasping structures (the middle and the apical one) connected with each other by a single genetical information?

(e) Family Huttoniidae

Most leg bristles are – apparently basicly – lost in the superfamily Archaeoidea/ Palpimanoidea but bristles exist on the legs III-IV in the family Huttoniidae probably as a reversal, see WUNDERLICH (2004: 761).

(6) Epigynal scape and position of the receptacula seminis

(A) EPIGYNAL SCAPE

(a) Linyphiidae. An epigynal scape is a basic structure of the family Linyphiidae and most probably of the whole superfamily Araneoidea as well. In almost all members of the higher taxa of the subfamily Erigoninae an epigynal scape is absent, apparently basicly lost as an apomorphy, but in very few species a “scape” exists: (1) In the fairly diverse genus *Trichoncus* SIMON 1884 s. l., the subgenus *Lasiargus* KULCZYNSKI 1894, in *T. hirsutus* (*MENGE* 1869), see the paper on European spiders: Linyphidae in this volume. (2) Within the diverse genus *Walckenaeria*, in *W. dysderoides* (WIDER 1834) an epigynal scape exists (fig. 6), too.

Both scapes evolved within genera in which a scape usually/otherwise is absent, and the structure of these scapes is quite different from the scape which basicly exists in the family Linyphiidae. Therefore I regard the "scapes" of the two species in question as convergently evolved "pseudo-reversals".

(b) Theridiidae. An epigynal scape is basicly absent in the family Theridiidae (Araneoidea); a single or a paired groove exists usually. In few genera evolved a scape apparently secondarily – see WUNDERLICH (2008: Figs. 257, 507-508, 536-537) – (which structure is different from the primitive scape, e.g., of the families Araneidae or Linyphidae): In *Echinotheridion, Nesticodes*,*Tidarren* and in *Cameronidion* n. gen. (all are members of the subfamily Theridiinae): See the paper on three new genera from Malaysia in this volume (fig. 8), as well as in the extinct *Lasaeola communis* WUNDERLICH 2008 (Hadrotarsinae).

(B) POSITION OF THE RECEPTACULA SEMINIS

In almost all members of the family Theridiosomatidae the receptacula seminis are fused together. The exceptions in which the receptacula are clearly spaced are (a) the American species *Wendilgarda mexicana* KEYSERLING, see CODDINGTON (1986: Fig: 207) and (b) three genera in South East Asia, see the paper on Theridiosomatidae from Laos in this volume. – (a) If *W. mexicana* is really a member of *Wendilgarda* I suppose that this case may be a reversal WITHIN this genus. (b) Contrarily to this case the three genera of South East Asia represent apparently the plesiomorphic stage of this character – spaced receptacula seminis – ; the existence of one or even three reversals appears unlikely to me.

(7) Eyes

I will shortly discuss two quite different cases which concern the number of eyes and the size of the eye lenses.

(a) The number of the eyes

In most families of the superfamily Scytodoidea (Pholcoidea) within the classical "Haplogynae" – or the superfamily Dysderoidea s. l. sensu WUNDERLICH (2004) – only 6 eyes exist (*), see WUNDERLICH (2004: 643-645; the fig. p 651 has to be regarded as a model), and the tendency to the reduction or even the loss of the anterior median eyes may be a basic pattern (apomorphic character) of this diverse "sampling group". In the – compared to Filistatidae, Plectreuridae or Segestriidae – advanced family Pholcidae 6 or 8 eyes exist (in the Caponiidae 8 eyes or less, up to 2), and one may ask if in one of these two families (or in both) a reversal happened compared to the condition of the ancient Filistatidae (etc.) which have the plesiomorphic number of 8 eyes. Is the family Caponiidae a basal branch of its superfamily in which (a) tarsal trichobothria, (b) several metatarsal trichobothria, and (c) partly 8 eyes are still persisting? Numerous losses of the anterior median eyes appear more likely to me but regains may exist, too (*).

(*) Atavistic 8 eyes rarely occur in few members of the Oonopidae, the genus *Orchestina*.

(b) The position of the eyes

The basic (plesiomorphic) eye pattern of the Araneae has been characterized by KRAUS & KRAUS (1993) as lateral triades plus a pair of – frequently small – median eyes like (e.g.) in most members of the Pholcidae. In “higher” spiders – e.g., the superfamily Araneoidea – exist usually two eye rows in a more or less parallel position, but exceptionally exist triades, e.g. in the genus *Pholcomma* THORELL 1869, as a “pseudo-reversal”.

(c) The size of the eye lenses

Cybaeodes SIMON 1878 is a genus of the families Gnaphosidae or Zoridae/ Liocranidae, see the paper on the Gnaphosidae in this volume, and WUNDERLICH (2008: 504-505, 521, figs. 33-41) which is distributed in Southern Europe and North Africa. *C. molara* (ROEWER 1960) is one of the cavernicolous species. According to the pale colour of all congenerics I do not want to exclude that other species have a microcavernicolous life style. 7 of 8 species of this genus possess tiny or small eyes (fig. 7) but in *C. mallorcensis* WUNDERLICH 2008 the eyes are large (fig. 8), not reduced. Probably these large eyes have to be regarded as a reversion of the large eyes of the ancestor of this genus which changed its habitat. There is no indication that *C. mallorcensis* is stronger relatad to the stem species of this genus than other species.

(8) The cheliceral shape and size

(a) In *Palpiraptor* n. gen. (Corinnidae: ?Castianeirinae from Madagascar) the articles of the male cheliceral articles are greatly elongated, their basal articles and their fangs are longer than the prosoma and protruding in a parallel “orthognath” RESTING position, but the position of the fangs is more medially than in most mygalomorph spiders and the biting position is different: The fangs move/work more towards each other from SPREAD basal cheliceral articles in contrast to the Mygalomorphs in which the fangs move/work parallelly to each other, down from a raised position of the basal cheliceral articles. Because of these differences the cheliceral position in *Palpiraptor* is surely not a “true” reversal, and thus I call it a “formal reversal”. See the paper on spiders in copal from Madagascar in this volume.

(b) Hadrotarsinae (family Theridiidae) is characterized (e.g.) by small basal cheliceral articles but – as rare exceptions – in certain members of *Coscinida* SIMON 1895, like *tibialis* SIMON 1895, these cheliceral parts are large, see WUNDERLICH (2008: 281-

282, 439, fig. 327; compare fig. 326a!). A “reversal” exists apparently at least in *tibialis* within the genus *Coscinida*.

(9) Opisthosomal pattern

(a) Pattern in the Segestriidae: In *Ariadna* the opisthosoma is uniformly grey in almost all species – apparently the basic pattern – but in *A. mollis* (HOLMBERG) exists a distinct dorsal pattern, see BEATTY (1970: Fig. 1). In the second extant segestriid genus, *Segestria*, exists contrarily usually a distinct dorsal pattern – apparently the basic character – but in *S. florentina* (ROSSI) the opisthosoma is uniformly grey. In both genera exists probably a reversal in the opisthosomal pattern.

(b) Shape in the Theridiidae: In *Heterotheridion nigrovariegatum* (SIMON 1873) a dorsal hump of the opisthosoma has been unknown up to now but within ca. 20 conspecific specimens I found a single female which has a dorsal hump in the center of the opisthosoma (fig. 13) similar, e.g., to members of the genus *Achaearanea* STRAND 1929. Is the extraordinary existence of this hump a “reversal” which may allow conclusions on the relationships of this enigmatic genus?

(10) Lungs

Lungs are plesiomorphic structures in spiders. According to results by LOPARDO & HORMIGA (2010: 257) – Book of Abstracts, 18th Internat. Congress Arachnol. 2010, Siedlce, Poland – within the spider “symphytognathoids” “... reduced book lungs have originated at least twice from its homologous tracheal system. Furthermore our data suggest that structurally similar book lungs might have evolved from different pathways of tracheal transformation.” – Such reversals appear not likely to the present author.

(11) Spermatophores

Spermatophores are an “old” character in the Arachnida and Araneae, and they exist, e.g., in the Amblypygi which is strongly related to the Araneae. True spermatophores have apparently been lost as an apomorphy of the Araneae but they exist in the haplogyne family haplogyne Telemidae (tiny, mainly cave-dwelling spiders) as a “behavioural regain”.

(12) Sex roles and size dimorphism

In by far most spider species the males are smaller than the females, in certain species even tiny. Exceptions – “reversals” – are for example some members of the family Linyphiidae like certain species of *Centromerus* s. l., as well as *Argyroneta aquatica* (Argyronetidae) in which even the prosoma is larger in the male sex.
According to AISENBERG et al. (2010: 55) – Book of Abstracts, 18th Internat. Congress Arachnology 2010, Siedlce, Poland – in the family Lycosidae “Previous studies proposed a reversal in sex roles and sexual size dimorphism for both *Allocosa* species.”. In these spiders the males donate more or less deep and stable burrows to the females which use it for oviposition and dispersal of spiderlings.

(13) Moulting of adult spiders

Moulting of adult spiders is a plesiomorphic character of the order Araneae, existing in the “primitive” Mesothelae and Mygalomorpha which are known for their longevity (unknown in the extinct Uraraneida). This character has been lost most probably as an apomorphy of the Araneomorpha (fig. 1). Most extant spiders are members of this taxon. This character occurs in two families of the Araneomorpha, in the female sex only: (a) in the haplogyne and long-living Filistatidae and (b) in the entelegyne Eresidae (excl. the Penestomidae, see MILLER et al. (2010)). While this character probably persistents in the ancient Filistatidae it regained probably in the Eresidae which is quite more advanced (see fig. 1) – or its entelegyne stade evolved independently from all other Entelegynae.

(14) Aquatic life

The return to an aquatic life mode of the “Water Spider” *Argyroneta aquatica* (and other “Water Spiders)” is connected with peculiar structures and behaviour. These structures and the behaviour are surely quite different from its aquatic ancestor. Such an “ecological regain” occurs in various groups of animals e. g. certain in mammals like in wales.

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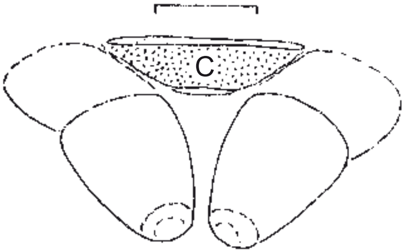

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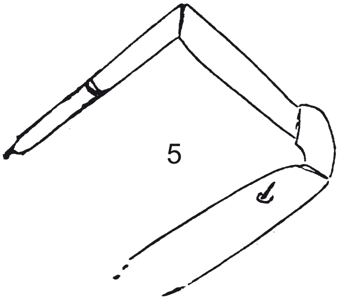

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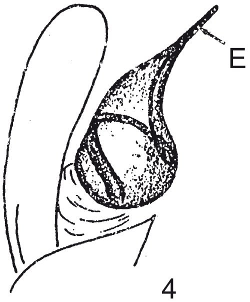

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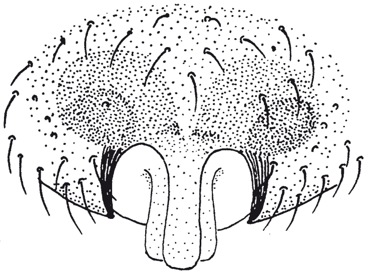

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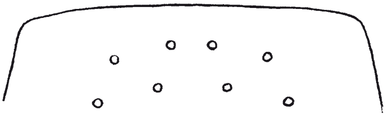
Fig. 3) Mizalia sp. indet. (Oecobiidae: Mizaliinae) (extinct), ♀, spinnerets and “pseudocribellum” (C). Scale bar 0.2 mm;

fig. 4) Paratheridula perniciosa (KEYSERLING 1886) (Theridiidae: Theridiinae), ♂, prolateral aspect of the left pedipalpus. E = embolus. Taken from LEVI & LEVI (1962);

fig. 5) Balticoroma gracilipes WUNDERLICH 2004 (Comaromidae) (extinct), ♂, prolateral aspect of the right leg I. Note the femoral bristle;

fig. 6) Walckenaeria dysderoides (WIDER 1834) (Linyphiidae: Erigoninae), ♀, epigyne. Taken from WIEHLE (1960) (sub *Wideria fugax*). Note the shape;



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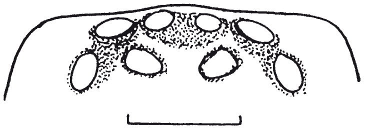

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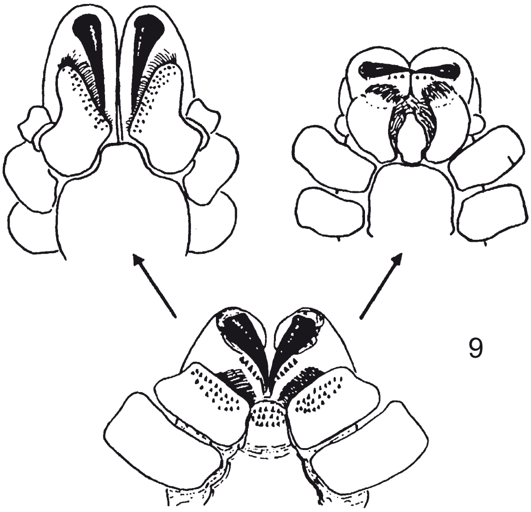

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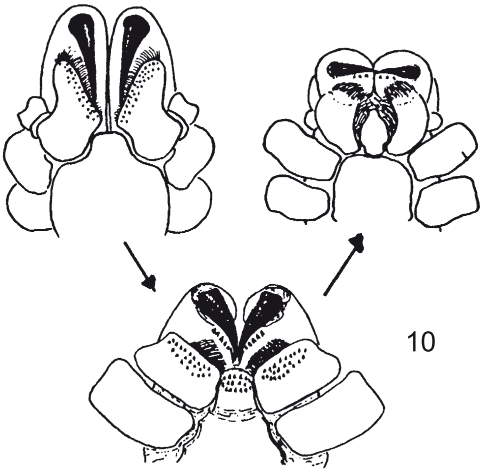

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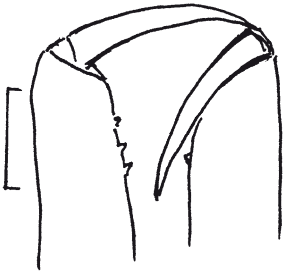

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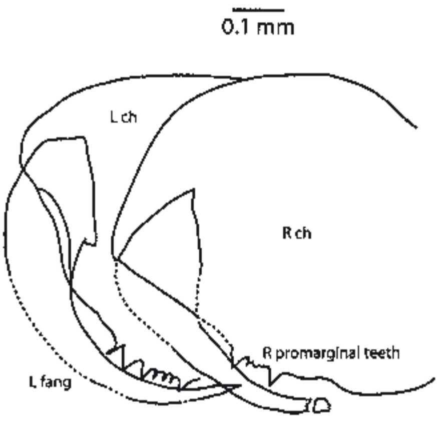
fig. 7) Cybaeodes molara (ROEWER 1960) (Gnaphosidae?), dorsal aspect of the eyes. Taken from ROEWER (1960);

fig. 8) Cybaeodes mallorcensis WUNDERLICH 2004, ♂, dorsal aspect of the eyes. Scale bar 0.5 mm;

figs. 9-10a) Stages and the direction of evolution of the cheliceral position in spiders (Araneae s. l.), ventral aspect of the anterior part of the prosoma; 9) hypothesis by KRAUS & KRAUS (1993: Fig. 3): Orthognathy (left) and labidognathy (right) as apomorphic character stages derived from plagiognathy (bottom); 10) hypothesis of the present author: Orthognathy (left) as plesiomorphic stage of the Uraraneida and most Mygalomorpha, plagiognathy (bottom) (an intermediate stage between orthognathy and labidognathy) – of Mesothelae (Liphistiidae), few Mygalomorpha (Actinopodidae, Migidae), as well as Hypochiloidea – as "functional links", labidognathy (right) of the remaining spiders – the Neocribellatae, e.g. Filistatidae, Araneidae, Salticidae – as the most derived stage. Exceptions are some examples of semi-orthognathous spiders like *Dysdera* sp. (Dysderidae) (fig. 10a) in which the protruding – almost orthognathous – basal cheliceral articles bear fangs (shown in different positions) which are working against (!) each other. One may call such stages "pseudo-reversals" because their pattern is different from true orthognathy;



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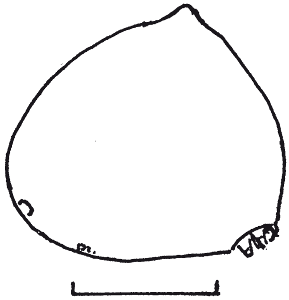

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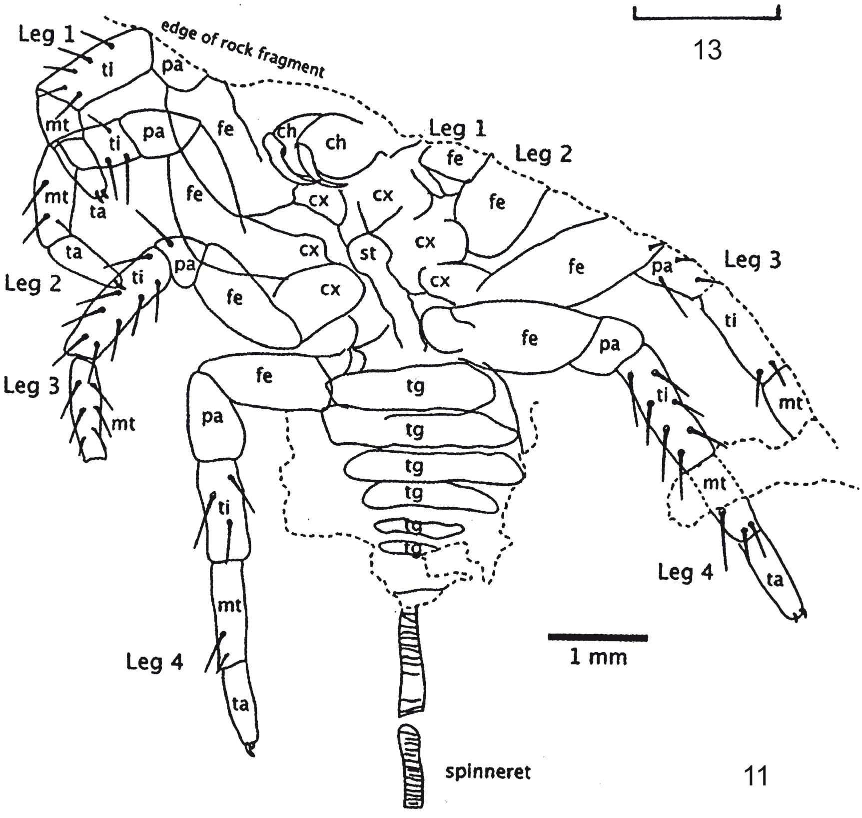

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figs. 11-12: <u>*Permarachne novokshonovi*</u> ESKOV & SELDEN 2005 (Uraraneida); 11) ventral aspect of the body; the “spinneret” is really the flagellum; 12) chelicerae enlarged. Taken from ESKOV & SELDEN (2005);

fig. 13) <u>*Heterotheridion nigrovariegatum*</u> (SIMON 1873), ♀ from Germany, outline of the opisthosoma, lateral aspect. Note the dorsal hump in the centre which is absent in other specimens of the same population (ca. 20 spiders were studied). May this hump be regarded as a “reversal” which allows conclusions on the relationships of the taxon? Scale bar 1.0.

BEITR. ARANEOL., 6 (2011)

SPIDERS IN THE IDEOLOGY OF TWO CREATIONISTS

JOERG WUNDERLICH, D-69493 Hirschberg.

Abstract: Misinterpretations of the idea of evolution by two creationist authors – see the concoctions 1-3 below – are exemplarily demonstrated by the fossil history of spiders. The dangers of creationism in education are shortly discussed.

Key words: Araneae, Baltic amber, creationism, Darwin, education, evolution, fakes, fossils, “intelligent design”, SCHEVEN, spiders, YAHYA.

Acknowledgements: I thank YURI MARUSIK for sending me helpful literature.

I am reporting here as a specialist of spiders, their diversity, evolution and palaeontology – see my books (2004 and 2008) –, and I review three publications by SCHEVEN and YAHYA which include large parts on fossils including spiders in amber. Summaries are available via internet, Wikipedia, too, see below.

While H. YAHYA is a broken Turkish student the other writer, Dr. J. SCHEVEN, is a graduated German biologist. In contrast to the “Old-Earth Creationist” H. YAHYA the other writer – J. SCHEVEN – has to be to regard as a “Young-Earth Creationist” who believes in the origin (“creation”) of the earth and life only less than six thousand years ago.

Both writers deny the evolution of organisms from one species to another species, and believe in the direct creation of all species by God. YAHYA refers to the theory of evolution as “illusory, a lie, a deception” and a “perverted ideology.”. He takes the view that 9/11 was a direct consequence of “Darwinism” and “materialism” (!). He denounces anti-semitism and terrorism, which he says are products of Darwinism, not religious fanaticism (*). SCHEVEN (p. 153) calls evolutionism a superstition. Against this background these publications cannot be regarded as harmless, simple-minded or only stupid; see KRAUS (ed.) (2009:141-143, Dangers of creationism in education).

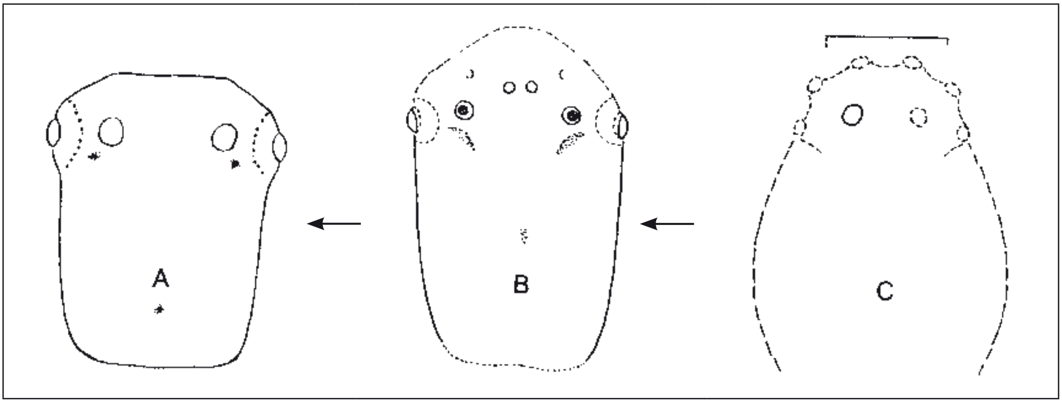
(*) According to wikipedia.org/wiki/Harun_Yahya “On May 2008 Oktar and 17 other members of his organization were sentenced to 3 years in prison.”

YAHYA offered a prize of ten trillion Turkish lira (4.4. trillion British pounds, according to Wikipedia) to anyone who could find an intermediate fossil between two species. Actually numerous connecting fossils have been published but they have all been ignored by YAHYA. Recently I published an example of fossil uloborid spiders, see WUNDERLICH (2008: 558, repeated here as figs. A-C) in which a fossil spider in Baltic amber is – according to its very special eye position, fig. B – the connecting member between a much older species in Jordanian amber (fig. C) and a spider of today (fig. A). According to their somatic characters – e.g. the existence of special sensory hairs (trichobothria) on their femora – these spiders are members of the same family. According to their different genital organs they are surely different species, see WUNDERLICH (2004, 2008).

H. YAHYA: As you can easily recognize I doubtlessly have won your prize! Thank you in advance for the money! I would like to split this huge amount of money in the following way:

(a) giving H. YAHYA – and some more Moslems – the opportunity to a well-founded scientific education in biology, palaeontology and in the theory of biological evolution,
(b) spend food for all hungry children of the world.

Remark: Brave H. Y. – how long has this man to work to earn so much money!
H. Y. has been accused of illegal enrichment and probably sexual affairs as well, and – if put to prison in the future – he may have the opportunity to work for that money.



todays spiders:
eyes reduced to four

(most evolved spiders)

related species which lived
ca. 45 million years ago:
six + two tiny eye lenses
("connecting link")

related species which lived
ca. 130 million years ago and
had eight eyes
(model of an ancestral
species)

Figs. A-C: Anterior part of the body with the position of the eyes in three uloborid (Hackled band orbweaver) spiders, seen from above. (The dotted are parts which are difficult to observe in the fossils); (C) a fossil and extinct spider species (genus *Paramiagrammopes*) which is preserved in amber from Burma, about 100 million years old. In this species the ancient eight eyes exist in which the eye lenses are not reduced like in most spiders; (A) a today's spider (genus *Miagrammopes*) in which only the four eyes of the posterior row still exist, the four eyes of the anterior row are completely lost; (B) a fossil and extinct spider species which is preserved in Baltic amber (genus *Eomiagrammopes*), and which lived about 45 million years ago. In this species the four eye lenses of the posterior row are well developed in contrast to the ones of the anterior row: the lenses of the anterior median eyes are reduced and the anterior lateral eyes are almost lost, only remains of their lenses still exist. The shape of the prosoma and the enlarged posterior median eyes possess also an intermediate position between the old (fig. C) and today's species (fig. A). Thus this spider (B) has to be regarded as a "connecting link" between the old eight-eyed species in Burmese amber and the spider of today in which four of eight eye lenses are completely lost.

All the three publications by SCHEVEN and YAHYA are pseudo-scientific and full of errors, mistakes and nonsense; most of the errors are recognizable only by specialists. In the following I will present a few examples:

(a) The concoction of SCHEVEN:

pp. 5, 6 and other pages: Absence of "missing links" in Baltic amber e.g. to eusocial insects (ants, bees). Although most species in Baltic amber (less than 50 million years old) are too young for such fundamental "missing links" – true social life originated already in the Cretaceous in ants and bees – examples of "missing" (better "connecting") links are *WELL-KNOWN* in several groups of spiders, insects and other groups of animals, see e.g. WUNDERLICH (2004: 258-266; e.g. the evolutionary adaptation of peculiar beetles (Paussinae) to the life in ants nests) and above: figs. A-C.

p. 42: Statement that all spider families existed in the Eocene Baltic amber forest. SCHEVEN ignored that several of the today's spider families (besides numerous subfamilies) have never been found in Baltic amber, e.g. the – also in Europe – very diverse Wolf Spiders (family Lycosidae). (Contrarily: about five families which are reported from the Baltic amber forest (= 10% of the spider fauna) are completely extinct, see WUNDERLICH (2004: 253)).

p. 43: SCHEVEN mixed photos of *Archaea* and *Eoarchaea* (below left and probably in the middle); the genus *Baltarchaea* – described more than 150 years ago – is absent in the list of genera in Baltic amber (two further genera of the Archaeidae in Baltic amber were added by WUNDERLICH (2004)).

pp. 10, 19, 77, 114 and other pages: Claim that fossil species in Baltic amber still exist today: Not a single species in Baltic amber is really known from today; a single species – *Fannia scalaris* has turned out to be the fake of an extant fly.

p. 100, the peculiar courtship behaviour in Odonata (in connection with the special structure of their genitalia) "which separates them from all other insects.". Note by the present author: Fossil archaic Odonata were described which possessed similar genital structures as certain other insects like Ephemeroptera.

(b) The concoctions of YAHYA:

(b1) "The Miracle in the Spider":

p. 106: The photo shows a secondary male genital organ but not a "spider's leg".

p. 120: "Let us consider a species of insect which we shall imagine as the ancestor of all spiders. Let us imagine that this creature is deaf and almost blind, like many spiders today. In such a state it should be unable to hunt anything and immediately die of hunger.". – These suggestions are quite funny: No serious biologist will imagine an insect as the ancestor of a spider! If an insect was the ancestor of spiders, Darwin might well be the ancestor of Aristoteles. Only relatively few spiders are blind today (certain cave spiders), and even these spiders are good hunters that do not need eyes, and do not die of hunger!

p. 121 we have to learn that spider's spinnerets are situated "on its back legs" (!).

p. 122: H. Y. cannot understand the inborn spinning behaviour of spiders although no one had to teach him (H. Y.) or other humans as a baby how to weep or to laugh.

p. 125 and other pages: "The theory of evolution claims that everything emerged by coincidence, ...". This is untrue, a misunderstanding of the theory (and the term "coincidence") or even an intended lie; it is not at all included in the theory of evolution that "everything emerged by coincidence". Apparently H.Y. never studied a serious publication on the theory of biological evolution!

p. 127ff: The climax of ignorance in "The Miracle in the Spider" are the author's "three basic topics". For example H. Y. (p 135-136) completely ignores the well-known published fossil intermediate forms; see above.

(b2) “The Atlas of Creation”:

The background of this concoction is basically the same as of “The Miracle in the Spider”, see above.

p. 19: According to H. Y. “none of the intermediate form fossils that DARWIN expected... has actually been unearthed. The idea that the fossil record is ‘inadequate’ is now no longer part of the Darwinists credo, because the Earth has yielded up almost all existing specimens.”. – (a) As said above a really huge number of intermediate species (“forms”) have been published, see exemplarily the figs. A-C. (b) According to most experts more that 99% of the fossil/extinct species are still unknown. The present author has recently described several hundred extinct spider species for the first time, see WUNDERLICH (2004, 2008). According to my suggesting there are hundreds of thousands of unknown extinct species of spiders; only a low percentage has already been described, see WUNDERLICH (2008: 524-674). Most of these species have disappeared without any trace simply because they have not been preserved.

Some remarks regarding spiders and other arachnids of the “Atlas”:

p. 379: The alleged springtail in the red circle is a mite, and there is no similarity to the extant springtail at the right above. (Why did the creator give such bad eyes to that author?).

p. 394: (a) According to the shape of the body and – mainly – of its long and slender legs the fossil spider is not a Jumping Spider. – (b) “Not a single fossil exists to indicate that spiders developed from a primitive to a more advanced stage,...”. Numerous examples have been published in this matter, see e.g. the figs. A-C above.

p. 395: The fossil spider in amber is apparently a juvenile member of Crab Spiders but the extant spider below is a member of a quite different family, probably cribellate.

p. 397: “The 50-million year-old spider fossil pictured is one piece of evidence showing that spiders never evolved, but have always existed as spiders. There is no difference between spiders that lived 50 million years ago and spiders living today.”. H. Y. here tells us a funny story: The fossil “spider” is really a springtail and the extant “spiders” are mites. H. Y. regards this as an example in the sense “that the theory of evolution is a figment of the imagination, and that God has created all living things.”. – Jesus changed water into wine, and H. Y. changed spiders into springtails and mites – a great wonder of this time!

p. 406. The citation regarding fossils in amber “It is if they had died yesterday” undoubtedly means the excellent preservation but nothing is said about the relationships of the fossils. This is one more example in which H. Y. tries to make a fool of the readers.

p. 459: “It can be seen that the 45-million-year-old... two spiders in Baltic amber are no different from their counterparts alive today.”. In reality the extant spider is a linyphiid spider (family Linyphiidae), probably of the genus *Linyphia* (which has never been found in Baltic amber), and the fossil spiders are juveniles, according to their body shape and legs members of an unrelated family. It seems mysterious that H. Y. regards the extant spider and the fossils as being “no different”.

I think that no God will be amused about such books – full of errors and misunderstandings -, which are dedicated to “HIM”, although YAHYA writes: “To the reader” “these books ... are written solely for the good pleasure of Allah.”. – Good pleasure!?

Selected blockings of Internet sites in Turkey (according to wikipedia.org/wiki/Harun_ Yahya):
“On September 19, 2008, a Turkish court banned internet users in Turkey from viewing the official Richard Dawkings Web site after Oktar claimed its contents were defamatory, blasphemous and *insulting religion*, arguing that his personality was violated by this site. ... Then one week later a complaint by Oktar led to the banning of the internet site of the Union of Education and Scientific Workers. ... This was followed by a block of the country’s third-biggest newspaper site, *Vatan*, in October.”

SUMMING UP:

(1) I do not know other publications on fossils which contain so many errors and mistakes as these ones by SCHEVEN and YAHYA.
(2) The main creationist’s attack against the existence of evolution and the theory of evolution is the claim that species living today are pretty much identical to fossil species. SCHEVEN and YAHYA compare fossil and extant species which are *SUPERFICIALLY* partly *SIMILAR* and repeatedly conclude their conspecifity although close investigations show that these conclusions are wrong, see e.g. WUNDERLICH’s (2004, 2008) comparative studies on fossil and extant spiders.
(3) In contrast to the claim of both creationist writers a stringent sequence of fossils exists; numerous “missing links” and other transitions are known. The age of most fossils has been documented as more than three billion years. The history of spider evolution shows, e.g., that (a) in the earliest time of spider evolution only the most archaic group (Segmented Spiders, Mesothele) existed, and that (b) the most successful/diverse families of spiders – as Jumping Spiders, Wolf Spiders, Cobweb Spiders and Dwarf Spiders – evolved or diversified only after the Cretaceous, in the Paleogene (after the extinction of the Dinosaurs), see WUNDERLICH (2004, 2008).
(4) Regarding the “extremely perfect organs” – “Intelligent Design” in the sense of creationists like the human eye: See DAWKINS (2007: 168f).
(5) Publications like the ones of SCHEVEN and YAHYA are at first sight not worth a discussion in regard to their contents, but (a) 8 million books of the “Atlas of Creation” have been sent (for free!) to numerous schools e.g. in Denmark, France and Switzerland, which may mislead people, and (b) a number of simple people – like (e.g.) the former American president BUSH – unfortunately the leader of the most powerful country in the military/nuclear sense -, the former German president of Thuringia, ALTHAUS, and the Turkish minister of education CELIK (“darwinism is a weapon of materialists and godless”) – are creationists; they have power over people and therefore they cannot at all be regarded as harmless (*). Such people try to move back mankind to the Middle Ages and they try to ban the theory of evolution – one of the best founded scientific theories at all – from the biological curriculum in schools and even universities! This seems to be a fundamental problem in this matter: Limited or simple minded people clamour for attention and publish numerous papers but most of the *responsible* humans unfortunately keep silent because of their scientific “higher point of view”! One of the exceptions is R. DAWKINS (2007: e.g. 167-178, 460f, 529) who criticizes that a school

in NE-England – the Emmanuel College in Gateshead – got 20 million Pounds from the British government (and yearly costs as well) although creationism is taught. According to DAWKINS (2007: 461) TONY BLAIR was responsible for this matter.
(6) My personal opinion: Religion is an affront to every independent thinking. As a freethinker I prefer the consequent view and argumentation of DAWKINS who has been difamed e.g. by GUDO & WARNECKE in KRAUS (2009: 39ff) as a "fundamental atheist" but I doubt that such a term makes sense at all. (Contrarily "fundamental creationist" better applies to creationists terms).
The archaic – even child-like – basic (existential) "angst" of man is often regarded as an important reason for religious need. In reality this basic "angst" has successfully been abused since primeval times by representatives of different religions as a means of power and the formation of an elite (schamans, priests, popes). Creationism makes people stupid in various aspects, even more than the dominant religions do. The delivering age of Enlightment did not reach such people. Political and religious fundamentalisms have very similar roots. "Irrational belief is a dangerous phenomenon" (CHOMSKY).
Manipulations of humans by religious authorities is not a new phenomenon; it has apparently survived since the Stone Age. A result today: About half of the US citizens believe that an evolution of life never has existed but the earth and humans were created only few thousand years ago.

(*) In Romania the theory of evolution has been removed from school books, in Italy in 2004 this theory has been removed from the curriculum; see KRAUS in KRAUS (2009: 139). – The step from creationism to scientology – see the movie star Tom Cruise – appears not so wide in some respect.
See also (a) KUTSCHERA (2008), (b) BRASSEUR in KRAUS (2009: 119-126), and (c) the text in KRAUS (2009: 141–143) on the dangers of creationism in education, resolution 1580 of the Council of Europe (2007).

Supplement/Nachtrag: (15. I. 2011):

Im Januar 2011 fand ich bei GOOGLE – oberhalb einer Sure des Korans – unter www.islamaufdeutsch.de/deutsch_islam/.../bernstein3.htm – den folgenden Text: "Darwinismus: Die verdrehteste Religion der Geschichte". Und über fossile Gliederfüßer im Bernstein: „Diese kleinen Tiere haben sich in den vergangenen 200 Millionen Jahren nicht verändert. ... Es gibt Millionen klare Beweise der Schöpfung, dass die Starrköpfe dies in ihrem fanatischen Darwinismus – der primitivsten und verdrehtesten Theorie der Geschichte – ignorieren, ist ein erstaunliches Phänomen."

Nach A. EINSTEIN sind zwei Dinge unendlich: Der Kosmos und die menschliche Dummheit. Beim Kosmos war er sich allerdings nicht ganz sicher ...

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Remark: The publications of SCHEVEN and YAHYA are not available in shops.

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BEITR. ARANEOL., 6 (2011)

CORRECTIONS AND SUPPLEMENTS CONCERNING VOL. 5 OF THE BEITR. ARANEOL. (2008)

J. WUNDERLICH, 69493 Hirschberg.

The number in brackets indicates the nos. of papers, see the contents in WUNDERLICH (2008: p.5ff).

Contents (p. 6): Orchestininae is not a “new” subfamily; see p. 54 in that paper.

(3) (Therididae), p. 381, no. 13, and p. 396 (*Theridion*): The median apophysis may be small in *Theridion* and does not stick out in some species.

(4) (Zoridae/Liocranidae) p. 504, Cybaeodes/Brachyanillus: According to J. BOSSELAERS (person. commun. in X. 2008) *Brachyanillus* SIMON 1913 (reported from N-Africa and S-Spain) is a junior synonym of *Cybaeodes* SIMON 1878. – *Cybaeodes* is transferred here to the family Gnaphosidae, see the paper on this family in this volume.

(5) (Extinct families), pp. 544ff, 560-561: In the insect order Coccinea a high percentage of extinct families exists similar to spiders; see KOTEJA (2008), Prace Muzeum Ziemi, 49: 19-5: Reports of 5 of 7 families in Eocene Baltic amber are regarded as extinct in that paper. – From Lower Cretaceous amber of New Jersey, see KOTEJA (2000), in GRIMALDI (ed.), Studies on Fossils in Amber...: 147-229 reports 4 of 7 coccinid families as extinct. (The question rises: Is the – high – percentage of extinct families in arthropods a matter of opinion of the particular author?).

p. 564. Add. to the key of ARANEOMORPH spider families in Cretaceous ambers at least the families Plectreuridae and Hersiliidae; see above, the paper on Cretaceous spider families.
p. 565, key no. 7(6): Add "Metatarsus III bears a ventral-distal "preening comb".". no. 7(6) – : Add "No "preening comb"."
p. 572, measurements of ?*Ariadna amissiocoli*: The body length is 4 mm, the prosoma is ca. 1.8 mm long and ca. 1.6 mm wide.
p. 587 (Praeterleptonetidae): See the revision in this volume (spiders from the Cretaceous).
p. 593: The species name is *guttulaeque* but not *guttulaequae*.

(8) (Key Salticidae) no. 34 p. 707: Distinguishing *Aelurillus* and *Phlegra* is difficult in certain species: In *Phlegra* the tip of the embolus is usually longer and/or thicker, and sclerotized epigynal "wings" are absent in contrast to *Aelurillus*. See also PROSZYNSKI (1998), Israel J. Zol., 4 (2): 161.

(12) (Functions of the male pedipalpus). p. 742f; (a) courtship behaviour: In some taxa certain parts of the male pedipalpus bear stridulatory files, e. g. in *Scaphiella* SIMON 1893 (Oonopidae) prolaterally on the bulbus which is fused in this genus to the cymbium, see PLATNICK & DUPERRE (2010), and – questionable stridulatory – files on a branch of the paracymbium in *Meta* (*Merianmeta*) *merianae* (SCOPOLI 1763) (Tetragnathidae), see WUNDERLICH (2008: 95, figs. 19a-b, photo 140). – (b) prey capturing behaviour: In *Palpiraptor* n. gen. (Corinnidae) the articles of the male pedipalpus are greatly elongated and evolved a special spiny "capturing basket", see the paper on spiders in copal from Madagascar in this volume.

(13) (Intraspecific variability/subspecies), pp. 765ff: (a) The exact intraspecific variability of the male cheliceral teeth is unknown in certain European species of the genus *Tetragnatha* LATREILLE (Tetragnathidae). According to my investigation of the intraspecific variability some questionable subspecies are junior synonyms, e. g. *T. obtusa intermedia* KULCZYNSKI and *obtusa major* KULCZYNSKI = *obtusa* C. L. KOCH (quest. n. syn.), and *T. obtusa proprior* KULCZYNSKI = *dearmata* THORELL (quest. syn.).
(b) The coloured forms of the body of *Scytodes velutina* HEINEKEN & LOWE: See WUNDERLICH (1987: 100, Fig. 706), Die Spinnen der Kanarischen Inseln und Madeiras.

p. 869: Agrofaecini (misspelling) = Agroecini. – Spinitharini: p. 342 (not 243).
p. 869: Spinitharini: p. 343, not p. 243.

LIST OF NEW SUPRAGENERIC SPIDER TAXA WHICH ARE DESCRIBED BY WUNDERLICH IN THIS VOLUME

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BEITR. ARANEOL., 6 (2011)

A NEW TRIBE OF COBWEB SPIDERS (THERIDIIDAE: THERIDIINAE) FROM BORNEO, MALAYSIA

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Abstract: The monotypical Cobweb Sider (Theridiidae) tribe Borneoridiini **n. trib**. with *Borneoridion spinifer* **n. gen. n. sp**. is described from Borneo, Malaysia. Special cheliceral teeth quite similar to typical “peg teeth” are reported from the family Theridiidae.

In this paper we describe taxa of a remarkable new tribe of Cobweb Spiders (Theridiidae) from Borneo which are regarded as members of the subfamily Theridiinae.
See also the paper above on a new tribe of Cobweb Spiders from Malaysia.

BORNEORIDIINI n. trib.

Etymology: A combination of Borneo (the location of the locus typicus of the type species), and “ridiini” taken from the family name Theridiidae.

Type genus (by monotypy) (*): *Borneoridion* n. gen.

Diagnosis: The anterior cheliceral margin bears long bristles (fig. 3) which are quite similar to "peg teeth" (but not blunt in contrast to most true "peg teeth" – e.g. of the Mimetidae – and more slender in the distal half), opisthosoma dorsally with spurs which bear long hairs (figs. 1-2), ♂-pedipalpus (figs. 4-6): Paracymbium completely absent, median apophysis long and pointed, terminal apophysis bipartite, the circular conductor guides the almost circular distal part of the long embolus. Epigyne (fig. 7) with a larger groove which is anteriorly and posteriorly bordered by a sclrotized edge, vulva (fig. 8) with very long copulatory ducts.

Further characters: Leg I distinctly longer than I, sequence of the tibial bristles 2/2/1/2, metatarsi I-III bear a trichobothrium, its position on I-II is in ~ 0.25, the male epigaster is sclerotized and only fairly bulging.

Relationships: According to the absence of a colulus as well as replacing hairs and the absence of an ectal paracymbium we regard the new tribe as a member of the subfamily Theridiinae. Only few tribes of the Theridiinae have been described up to now, see WUNDERLICH (2008: 369). I do not know other described theridiid taxon (*) in which such unusual cheliceral teeth exist which are similar to the "peg teeth" of the family Mimetidae. Furthermore in members of the tribe Theridiini the male epigaster is strongly protruding, opisthosomal spurs are absent, and an internal paracymbium exists.

Distribution: Borneo, Malaysia.

(*) According to C. DEELEMAN (in litt. in XII 2010) exist some more undescribed species of this genus in SE-Asis (coll. C. DEELEMAN). – I observed similar long cheliceral bristles in females from Laos (SMF, P. JÄGER), and in females of another species from S-China, taken from the canopy of trees, Inst. Zool. Beijing (SHUQUIANG LI). Males of both taxa are needed for a closer determination.

Borneoridion **n. gen.**

Type species (by monotypy): *Borneoridion spinifer* n. sp.

Diagnosis and relationships: See the new tribe. The prosomal profile is distinctly convex.

Distribution: Borneo, Malaysia.

***Borneoridion spinifer* n. gen. n. sp.** (figs. 1-9)

Material: Malaysia, Borneo, CR Ulu Senagang, N521.914 E 11601.565, 595 m, canopy fogging from a tree of *Polyalthia* sp., 2♂2♀ 1 subad ♂ ANDREAS FLOREN leg. 17. VIII. 2009; holotype ♂ (right pedipalpus separated) and 1♀ paratype (epigyne/vulva separated) and a subad. ♂ paratype RMNH (= Naturalis) Leiden, Netherlands; 1♂1♀ paratypes coll. C. DEELEMAN-REINHOLD in Ossendrecht, Netherlands.

Diagnosis (see also above): Pattern of the body as in fig. 1), genital organs as in figs. 4-9).

Description:
Measurements (♂/♀ in mm): Body length 2.0/2.7, prosoma: Length 0.8/0.95, width 0.65/0.7; leg I: Femur 0.8/0.85, patella 0.25/0.27, tibia 0.6/0.65, metatarsus 0.6/0.62, tarsus 0.4/0.47, tibiae II-IV 0.62/0.6, 0.5/0.52, 0.85/0.93.
Colour: Prosoma and legs light brown, eye field black, opisthosoma (fig. 1) yellow, dorsally and laterally bearing white guanine spots, posteriorly with a pair of oval spots of black pigment.
Prosoma (figs. 1, 3) 1.23 – 1.32 (♀) times longer than wide, profile distinctly convex, dorsally with long hairs, fovea lowe, eyes of medium size, posterior row slightly procurved, posterior median eyes spaced by their radius, wider spaced from the lateral eyes, anterior median eyes slightly the largest; posterior files absent, basal cheliceral articles and fangs fairly large, anterior margin of the cheliceral furrow bearing at least 4 long bristles which are quite similar to "peg teeth", and few short bristles as well, posterior margin with 2 teeth. Gnathocoxae strongly converging above the triangular labium which is not rebordered, sternum not elongated between the coxae IV. – Legs fairly long, order IV/I/II/III, IV distinctly the longest, sequence of the very long tibial bristles 2/2/1/2, position of the metatarsal I-II trichobothria in ca. 0.25, metatarsal IV trichobothrium absent, ventral hairs of tarsus IV straight and smooth in 150x magnification. – Opisthosoma (figs. 1-2) long oval, dorsally with spurs which bear long bristles. – ♂-pedipalpus (figs. 4-6, see also above): Articles short, patella dorsally-distally with a long bristle, tibia retrolaterally strongly elongated (like in other members of the Theridiidae), terminal apophysis bipartite. ♀: Epigyne (figs. 7-8, see also above) a fairly sclerotizd plate; the position of the copulatory openings is probably in the middle. Vulva: Fig. 9.

Relationships: See above.

Distribution: Borneo, Malaysia.

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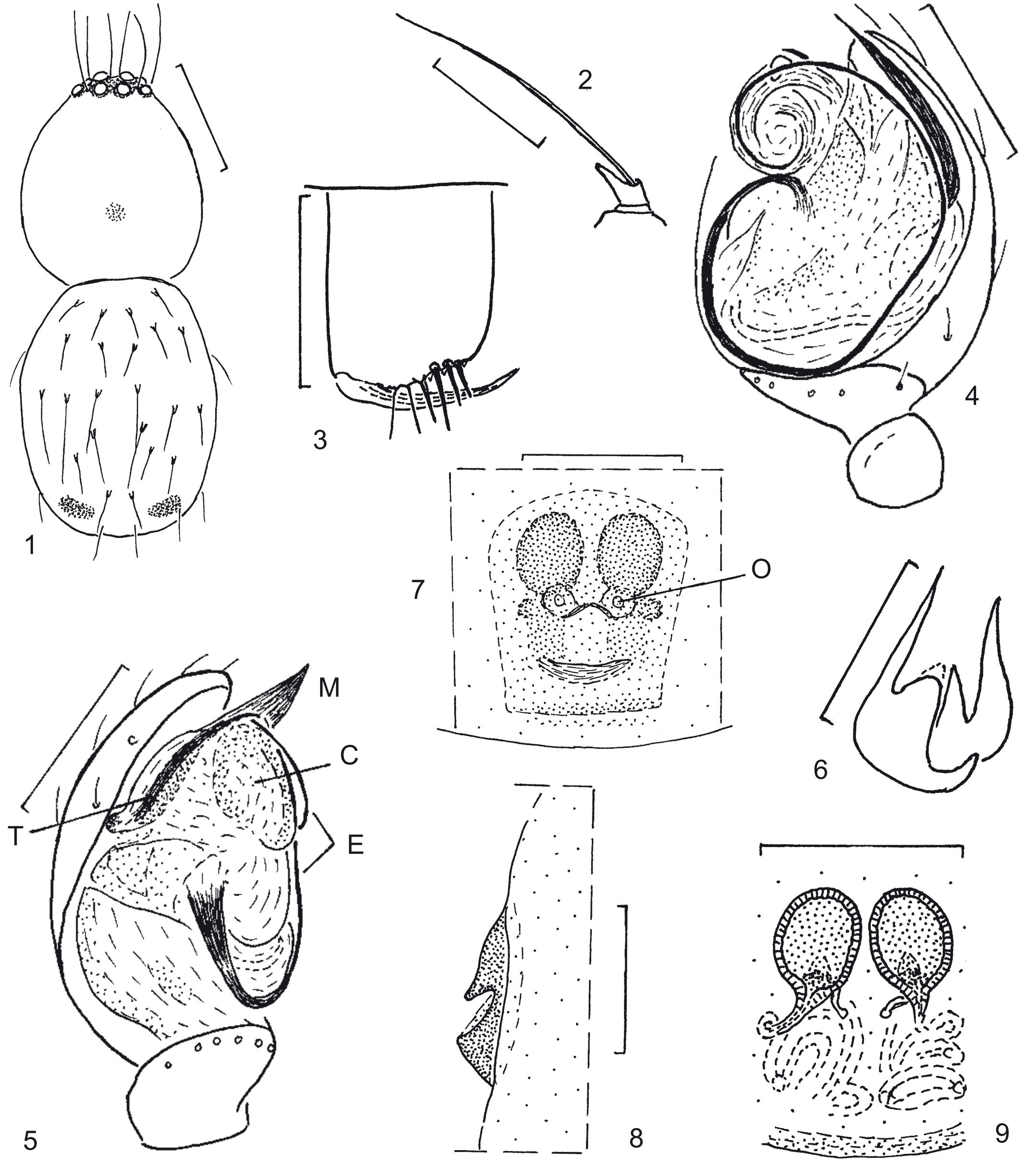

Figs. 1-9: <u>*Borneoridion spinifer*</u> **n. gen. n. sp**.; 1) Dorsal aspect of the body. Only few hairs – escpecially of the prosoma – are drawn; 2) bristle-bearing spur of the dorsal part of the opisthosoma, lateral aspect; 3) anterior aspect of the right ♂♀-chelicera with bristles which are quite similar to typical "peg teeth"; 4-5) proventral and retrolateral aspect of the right ♂-pedipalpus; 6) retrolateral aspect of the median apophysis (left side) and the bipartite terminal apophysis, drawn from the expanded right ♂-pedipalpus; 7-8) ♀, ventral and lateral aspect of the epigyne; 9) ♀, dorsal aspect of the vulva. The copulatory ducts are partly hidden. C = conductor, E = embolus, M = median apophysis, O = questionable copulatory opening, T = terminal apophysis. Scale bars 0.5 in fig. 1, 0.2 in the remaining figs.

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