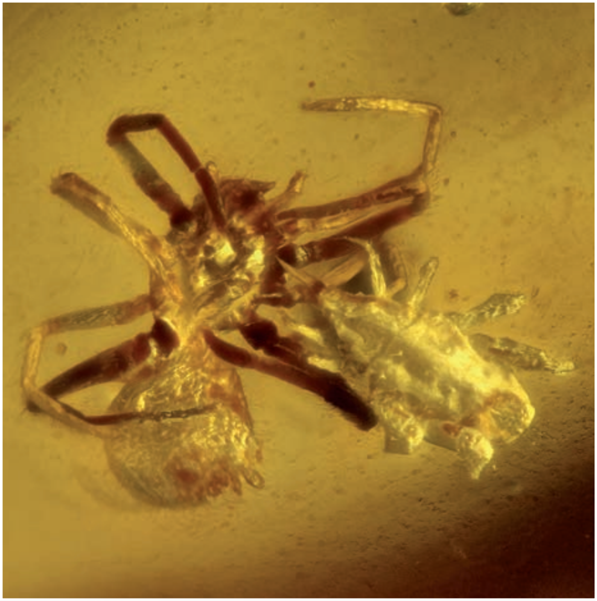
BEITR. ARANEOL., 10 (2017)

Joerg Wunderlich (ed.)

TEN PAPERS ON FOSSIL AND EXTANT SPIDERS



BEITR. ARANEOL., 10 (2017)

BEITRÄGE ZUR ARANEOLOGIE, 10 (2017)

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TEN PAPERS ON FOSSIL AND EXTANT SPIDERS (ARANEAE)

JOERG WUNDERLICH (ed.)

The photos on the book cover show:

AT THE TOP LEFT: *Eresus* sp., Eresidae, extant, Europe, male in alcohol, body length 9 mm. Note the striking red opisthosomal “warning colour” which is restricted to the male sex. (See photo 131).

AT THE TOP RIGHT: *Adonea algarvensis* n. sp., Eresidae, extant, Europe (Portugal), two males in alcohol, body length 5 and 7 mm. Note the quite variable dorsal pattern of the opisthosoma. (See photo 130).

AT THE BOTTOM LEFT: Attack of a spider (family Oonopidae) by a mite (family Bdellidae) in 100 million years old Burmese amber: ventral aspect of the spider (at the left), dorsal aspect of the mite. In this quite remarkable “frozen behaviour” the mite is sucking out the tiny female spider which is only 0.8 mm long. Note the “snout, sucking tube” (proboscis) of the mite in the centre of the photo which kindly was taken by MAX KOBBERT. See the paper “Frozen behaviour ...” and the photo no. 3 in this volume.

AT THE BOTTOM RIGHT: Dorsal aspect of the hairy arachnid *Hirsutisoma* sp. indet. of the unusual order Ricinulei in Mid Cretaceous Burmese amber, male, body length 4 mm. (See photo 23).

Personal notes by a biologist (nobody is nothing but a biologist):

People who know humans love spiders.

My favourite fossil spiders are the fascinating members of the diverse extinct family Lagonomegopidae, see p. 190–202 and the photos 97–103.

Born shortly after the discovery of the nuclear fission in 1938 in Berlin and born in this city, too, I must note that less than 80 years later 450 nuclear power stations worldwide produce more and more deadly radioactivity and material for today's already ten thousands of atomic bombs. Our offsprings of this absurd world will cure us for our carelessness but there is no way to call to account dead persons ....

After publishing on a diverse peculiar group of animals – extant and fossil spiders and their kin – for half a century, and observing the numerous CHANGES IN THE WORLD DURING A SINGLE LIFE SPAN – of actually 77 years – I must note: We are living in a "crazy world" (ASTRID LINDGREN) (see also the appendix p. 355):

- the number of humans on earth increased from two to more than seven billions,
- the number of atomic weapons increased from zero to probably ten thousand,
- the number of atomic power stations increased from zero to more than 300; remains will burden an unknown number of human generations in the future,
- ca. 30 000 children die every day, many by starvation,
- the actual number of wars one can be summed up to a real Third World War,
- according to CHOMSKY & VLTCHEK (2014): "Der Terrorismus der westlichen Welt" hundreds of millions of people were murdered by western wars or interventions after the Second World War; hundreds of millions of persons are migrants or refugees from wars or are actually driven away from their land by powerful corporations,
- the incredible number of modern wage slaves is still increasing,
- the destruction of landscape, decreasing of natural forests, loss of drinking water and extinction of species – hundreds every day – is going on and is still increasing,
- most "mainstream media" exert censorship inconspicuously by holding back information, presenting it in a falsified way or at a hidden place.

What about "positive thinking"?

- Never before has the number of billionaires been as large as today,
- never before people in the Northern Hemisphere were so well-fed (fat), and have been able to buy so many (superfluous) articles,
- never before could so many people be sure to be well-observed (in an ORWELLian manner), and could tell their friends all details of their last meal,
- the Internet offers quite new possibilities: facts and publications and news (partly filtered or useless) as well as "selfies",...
- without difficulty OBAMA orders killing persons thousands of kilometers away without a time consuming court procedure (he is supported by "willing Germans" in Ramstein).

What about the future looking back at a scientific work of several decades? What will persist? Will we know all species on earth – but most of them only in alcohol and by genes? Have biologists/entomologists really fought strongly enough for saving the endangered environment?

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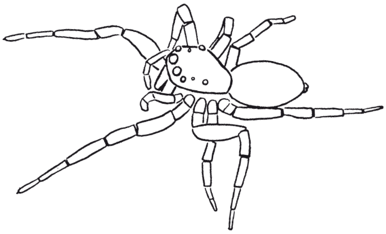

TEN PAPERS ON FOSSIL AND EXTANT SPIDERS (ARANEAE)

JOERG WUNDERLICH (ed.)

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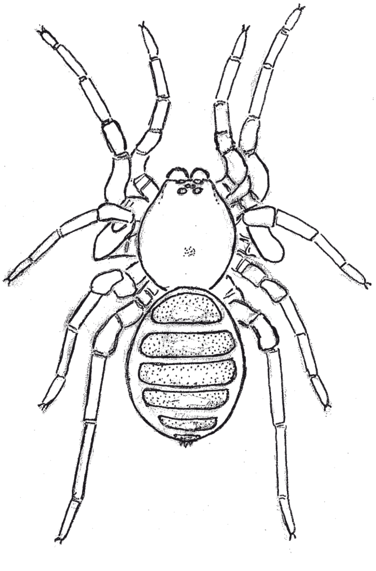
BEITR. ARANEOL., 10 (2017)

INTRODUCTORY REMARKS

Like the last four volumes of Beitr. Araneol. the present – and probably final – one mainly contains papers on fossil spiders (Araneae) and few other arachnids (Acari and Ricinulei). Fascinated by the diversity, ecology and evolution of this "megaorder" of arthropods (as well as the behaviour of certain species and island biology) I spent incredibly much time on the investigation of these animals during a period of half a century, and a HUGE amount of personal funds, mainly for buying fossils (up to several thousand Euros for certain extraordinary inclusions), for collecting, and for publishing books on the material. Thanks to the help of numerous collectors I got many new exciting findings, results and insights of vanished worlds – a splendid kind of satisfaction –, and I enjoyed inspiring discussions with colleagues on fossil arachnids. It is a great pity – and hard to understand – that during the last two centuries only very few arachnologists (e. g. A. MENGE and A. PETRUNKEVITCH) investigated fossil spiders more closely, and still only a very small and inadequate number of students work on these animals worldwide, although not rarely are spiders in amber excellently preserved and present a wide field of new discoveries!



Reconstruction of a juvenile fossil mesothele spider (the first fossil report of the „segmented spiders" in amber (suborder Mesothelae, family Cretaceothelidae: *Cretaceothele lata* n. gen. n. sp.) in 100 million years old Burmese amber from Myanmar, body length 1.6 mm, dorsal aspect. The adult spider would probably have been more than two cms long. Note the dorsal opisthosomal plates of this ancient spider in which a distinct opisthosomal segmentation has been retained in contrast to all „advanced" spiders. Therefore these peculiar spiders may be called „living fossils"; they are restricted to the tropics today. See p. 87 f in this volume.

BEITR. ARANEOL., 10 (2017)

CONTENTS

BEITR. ARANEOL., 10 (2017: 7–9)

A NEW *THANATUS* C. L. KOCH 1837 (ARANEAE: PHILODROMIDAE) FROM AFRICA (NIGERIA)

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Abstract: *Thanatus nentwigi* **n. sp**. (Araneae: Philodromidae) is described from Africa (Nigeria).

Key words: Africa, Araneae, Nigeria, Philodromidae, spiders.

Among a collection of spiders – collected by WOLFGANG NENTWIG in Nigeria in 1981 – four specimens of an unknown species were found; the species is described below.

***Thanatus nentwigi* n. sp**. (fig. 1-4) photos 1-2

Derivatio nominis: It is a pleasure for me to dedicate this species to Prof. WOLFGANG NENTWIG, Institute of Ecology and Evolution, University, Bern, Switzerland, who collected the spiders of the new species 36 years ago.

Material: Nigeria, Yobe State, East of Potiskum, direction to Maiduguri, pitfall traps in sandy soil, grassy and dry vegetation (see below), 2♂2♀ W. NENTWIG leg. 10. I. 1981; holotype ♂ and 1♀ paratype Univ. Bern; 1♂1♀ paratypes Senckenberg, Frankfurt a. M.

Diagnosis: ♂-pedipalpus (figs. 1-2): Tibia with a large retrolateral apophysis which is bent prolaterally near its end, a conductor of medium size, and a fairly short embolus. Epigyne/vulva (figs. 3-4) with a long light median area and large receptacula seminis in a longitudinal position.

Further characters: Pale and small spiders, legs not annulated, prosomal length (♂/♀) 1.2/ 1.7 mm.

Description:

Measurement (in mm): ♂: Body length 2.4-2.7, prosoma: Length 1.2, width 1.1; leg I: Femur 2.6, patella 0.65, tibia 2.5, metatarsus 2.2, tarsus 1.45, tibia II 2.9, tibia III 2.7, tibia IV 3.3; ♀: Body length 3.7-4.5, prosoma: Length and width 1.7; leg I: Femur 2.8, patella 0.7, tibia 1.8, metatarsus 1.9, tarsus 1.2, tibia II 2.2, tibia III 1.8, tibia IV 2.9.

Colour (photo) mainly pale, prosoma dorsally with a pair of wide dark brown bands, legs not annulated, dorsal lanceolate marking distinct, body ventrally white yellow.

Prosoma (photo) as wide as long or slightly longer than wide, fovea absent, eyes small, both rows strongly recurved, anterior median eyes distinctly wider spaced than from the laterals, posterior eyes spaced equidistantly, fangs stout, fang furrows smooth. – Legs (photo) long and slender, order IV/II/III/I, bristles (most are rubbed off) thin and numerous, femur I with ca. 5-8 bristles, tibia I e. g. with 3 pairs of ventral bristles, metatarsus I with 2 pairs of ventral bristles, tarsal scopula well developed, claw tufts strongly developed. – ♀-pedipalpus scopulate in the distal third, tarsal claw well developed. – Opisthosoma (photo) 1.3-1.6 times longer than wide, most of the short hairs are rubbed off, spinnerets short and strongly converging. – ♂-pedipalpus and epigyne/vulva: See above.

Relationships: Characters of the genus *Thanatus*: See WUNDERLICH (2012). According to their copulatory organs I regard *T. nentwigi* as a member of the subgenus *Paratibelloides* JEZEQUEL 1964 (a type species has not been designated). The bulbus structures of *T. nentwigi* are similar to *T. pinnatus* JEZEQUEL 1964 in which the tibia apophysis of the ♂-pedipalpus and the epigyne are different. In *T. meronensis* LEVY 1977 from Israel the structures of epigyne and bulbus are similar but vulva and pedipalpal tibial apophysis are quite different. Before a revision of the genus *Thanatus* I prefer to call the related species the *pinnatus* species-group. In this group a ventral tibial apophysis of the ♂-pedipalpus is absent.

Habitat: Typical Sudan savannah with single baobab and other trees, thorny shrubs, dry grassy vegetation, often with bare soil.

Distribution: Nigeria.

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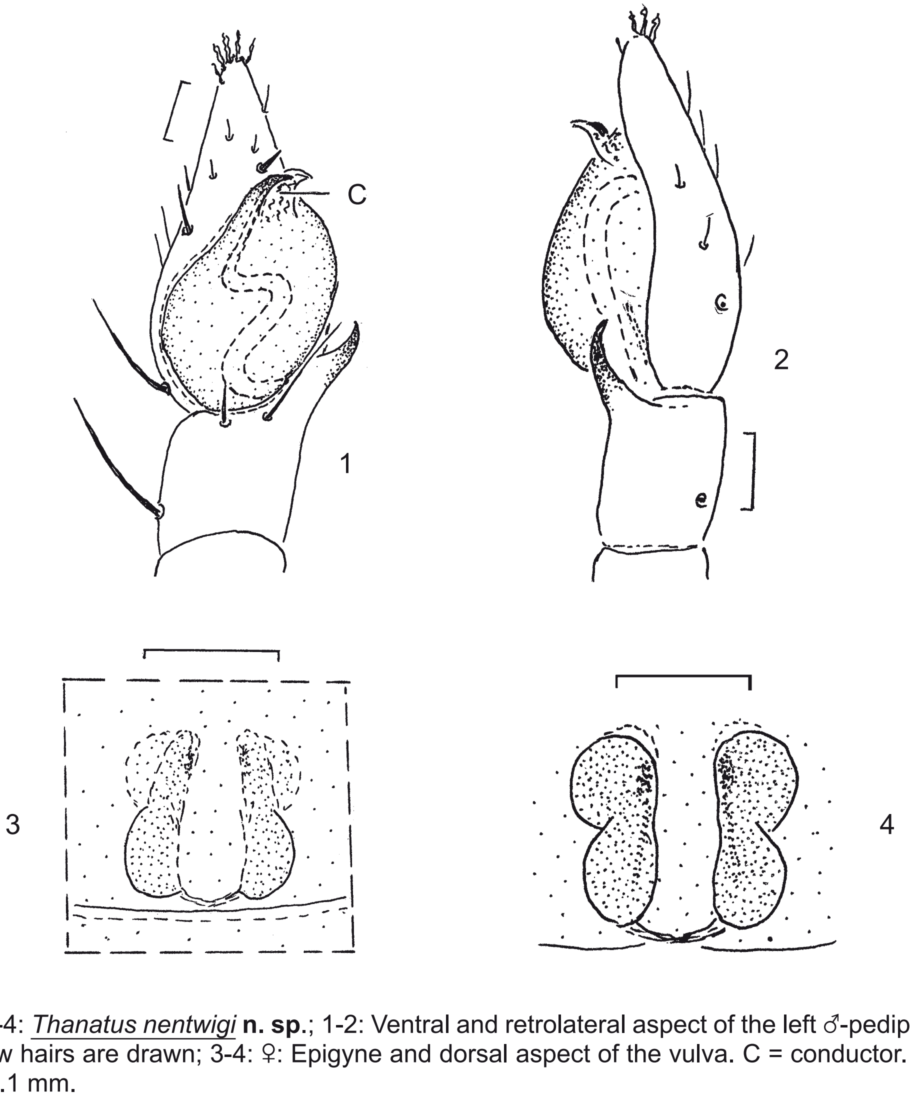

Figs. 1-4: *Thanatus nentwigi* **n. sp.**; 1-2: Ventral and retrolateral aspect of the left ♂-pedipalpus, only few hairs are drawn; 3-4: ♀: Epigyne and dorsal aspect of the vulva. C = conductor. Scale bar = 0.1 mm.

BEITR. ARANEOL., 10 (2017: 10–13)

FROZEN BEHAVIOUR: THE OLDEST KNOWN ATTACK OF A FOSSIL SPIDER BY A PREDATORY MITE IN MID CRETACEOUS BURMESE AMBER (ARANEAE: OONOPIDAE AND ACARI: BDELLIDAE)

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Abstract: The interaction of a pair of predatory fossil arachnids (Acari: Bdellidae and Araneae: Oonopidae: Orchestininae) in Mid Cretaceous Burmese amber is shortly described and discussed: A mite attacked, spun in and apparently sucked out an oonopid spider. This is the geologically oldest report of such a behaviour. These fossil arachnids demonstrate that spiders were the prey of mites already 100 million years ago, and a peculiar spinning ability and capturing behaviour of the family Bdellidae already existed at this time like in today’s mites.

Key words: Acari, antagonistic behaviour, Araneae, Bdellidae, Burmite, *Burmorchestina*, Cretaceous, fossil, Oonopidae, Orchestininae, palaeoecology, palaeobehaviour, predator, prey, spinning behaviour.

Acknowledgment: I thank GERD ALBERTI very much for helpful discussions and informations regarding the predatory behaviour of the Bdellidae.

Material: The piece of Mid Cretaceous Burmese amber which includes the two fossil arachnids – Araneae: Oonopidae: ?*Burmorchestina* sp. and Acari: Bdellidae indet. – is kept in the private collection of the author, inv.no. F2887/BU/CJW.

Introduction

Certain extant predatory mites are known to be enemies of certain spiders and in reverse: Arachnids of both groups may be enemies as well as prey by each other. Fossil interactions of this kind are only very rarely reported. WUNDERLICH (2002) reported a struggling pair of a mite – a questionable member of the Labidostommatidae (sub Labidostemmidae – and a spider (Theridiidae) in Eocene Baltic amber. The present pair is the first proof of Cretaceous arachnids which shows this peculiar behaviour.

Preservation of the fossils (photo 3): The spider and the mite are completely and very well preserved in a small bloc of yellow amber. In contrast to most of the previously known spiders in Burmite the present one is not deformed.

The fossil arachnids and their characteristics (photo 3):

(1) The mite: The body length of the eight-legged and apparently adult specimen is 0.5 mm. – Members of the family Bdellidae are recognizable by their strongly snout-shaped mouth parts. Extant members are predators of small skinny animals which are fixed by threads and sucked out. To my knowledge not a single named species of this family has been described from Burmese amber up to now.

(2) The spider: The body length of the juv. or adult female is 0.8 mm. Its prosoma is strongly raised similar to *Burmorchestina pulcher* WUNDERLICH 2008.
Members of the vagile (not capture web building) genus *Burmorchestina* WUNDERLICH 2008 – like other taxa of the six-eyed spiders of the subfamily Orchestininae – are easily recognizable by the disctinctly thickened femur of their jumping leg IV. Most extant members of the subfamily Orchestininae are ground living, others are dwellers of higher strata of the vegetation; they are known to feed on small arthropods. Only a single species of this subfamily has previously been described in Burmite: *B. pulcher*, see WUNDERLICH (2008: 68-71, figs. 34-46, photos 66-70); two new species in Burmite are described in the present volume.

Capturing and feeding behaviour of extant Bdellidae

Many extant mites are known to feed on small arthropods including mites and spiders, and many spiders feed on arthropods including mites and spiders. Predatory Bdellidae – “Snout mites” in English, “Schnabelmilben” in German – are well known to feed on small and usually skinny (not armoured) arthropods (*) like Collembola or other mites, see ALBERTI (1973) who studied animals in captivity. ALBERTI reported that the Bdellidae studied by him used a sticky thread-like secretion – which originates from their “supraösophageal organ” (a kind of glands of the mouth parts) – to fix their prey to a substrate. After that the tip of the gnathosoma is introduced into the body of the prey, and probably after an extraintestinal digestion the prey is sucked out.

(*) Probably certain small spider taxa evolved a strongly armoured opisthosoma to protect predatory mites. Besides numerous scutate taxa of extant spider families certain ground-dwelling armoured members of the Burmese amber forest like Burmascutidae and Tetrablemmidae existed.

Position and behaviour of the fossil arachnids

The mite is placed ventrally of the spider (photo), both animals ventral side to ventral side. Apparently the mite pricks through a skinny area between the sternum and the right coxae I-II. I suppose that the mite was sucking out the spider when captured by the fossil resin. The spider was spun in by the mite: A thread of secretion originates at the left base of the long mouth parts and runs in the direction of the right coxa III of the spider. A second thread runs from the tip of the mite's mouth parts to an area probably near to the labium in front of the sternum, probably to a skinny seam where the tip of the gnathosoma is located. A study by the micro-CT method may varify this suggestion.

Discussion/conclusions

The present fossil arachnids are preserved – apparently in action – in a piece of Burmese amber, 100 million years old. To my knowledge both groups of animals were not rare in the Burmese amber forest: *Burmorchestina* (Oonopidae: Orchestininae) – several ♂♀ are kept in the private collection of the author; see also WUNDERLICH (2008) and this volume –, and Bdellidae: specimens of several taxa are kept in the private collection of the author, too.

The spider may have been fixed by the mite's secretions, apparently not fixed at a substrate, and the mite was probably disturbed during sucking out its prey when captured by the fossil resin.

The present pair of arachnids represents the first proof of such antagonistic behaviour of the Cretaceous and its oldest geological report as well. A spider's prey of Bdellidae is still unknown to G. ALBERTI (person. commun. in I 2016).

The fossil arachnids demonstrate that ...

- spiders were the prey of mites already 100 million years ago,
- a peculiar spinning ability of the family Bdellidae exists at this time like in today's mites,
- the way of prey capturing – fixing their prey with the help of a thread-like secretion – by Bdellidae in the Mid Cretaceous was like in extant relatives,
- the jumping ability of the spider was not helpful to prevent being captured in this case.

The present unique piece of amber is comparable to a tiny "window to the past". Has the present pair of arachnids to be regarded as an "exceptional accident" or does it allow more and quite important general conclusions? Our restricted knowledge – and the report of relatively few Cretaceous fossils only – represent a quite minute sector of arachnid's behaviour during the Mid Cretaceous. The behavioural observations outside of captivity are also quite restricted. So – in my opinion most likely – the interaction of these fossils indicates that certain mite and certain spider species (members of two "megaorders" of animals!) have been antagonistic animals for at least 100 million years, most probably much longer.

Note on the prey capturing of another arachnid: Members of the Spitting Spiders (Araneae: Scytodidae) – known as fossils in Burmite, too – also fix their prey to a substrate. These arachnids do not use threads of their spinnerets but a secretion produced by their prosomal venom glands, and spit out – forming threads – through the openings of their cheliceral fangs.

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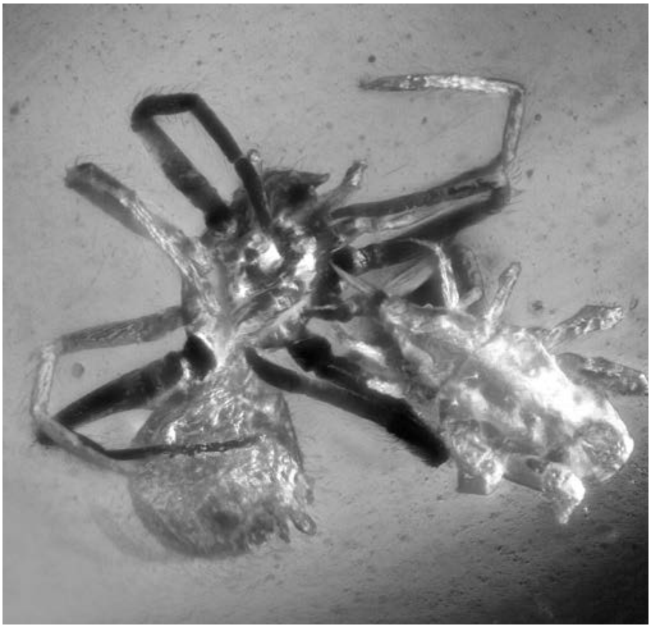

Attack of a spider (family Oonopidae) by a mite (family Bdellidae) in 100 million years old Burmese amber: ventral aspect of the spider (at the left), dorsal aspect of the mite. In this quite remarkable "frozen behaviour" the mite is sucking out the tiny female spider which is only 0.8 mm long. Note the "snout, sucking tube" (proboscis) of the mite in the centre of the photo which kindly was taken by MAX KOBBERT. See the paper "Frozen behaviour ..." and the photo no. 3 in this volume.

BEITR. ARANEOL., 10 (2017: 14–47)

NEW FOSSIL SPIDERS OF THREE FAMILIES IN EOCENE BALTIC AND BITTERFELD AMBER, WITH NOTES ON PYHLOGENY AND RELATIONSHIPS OF THE ZOROPSIDAE (ARANEAE: ANAPIDAE, SPATIATORIDAE AND ZOROPSIDAE)

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Abstract: The following fossil spider (Araneae) taxa in Eocene Baltic and Bitterfeld amber are described: (1) Spatiatoridae: *Spatiator bitterfeldensis* **n. sp**.; (2) Anapidae: The genus *Balticonopsis* WUNDERLICH 2004 is revised, *B. distalis* **n. sp**., *dunlopi* **n. sp**., *ludwigi* **n. sp**. and *metatarsalis* **n. sp**., are described; *Balticonopsis perkovskyi* WUNDERLICH 2004 is excluded from the genus *Balticonopsis*; (3) Zoropsidae: Cymbioropsiini **n. trib**., *Cymbioropsis palpussutura* **n. gen. n. sp**., Pseudoeoprychiini **n. trib**., *Pseudoeoprychia triplex* **n. gen. n. sp**.; the genus *Eoprychia* PETRUNKEVITCH 1958 is revised, *Eoprychia clara* **n. sp**. is described. – Remarks are given regarding the relationships and some characters of the families Agelenidae, Amaurobiidae and Ctenidae as well as of the superfamilies Zoropsoidea and Lycosoidea. – Informations regarding “clasping spines” (mainly in the genus *Balticonopsis* WUNDERLICH 2004) and on the increasing of the body size of certain spider taxa during the Neogene are provided. – The present material unterline the importance of Eocene fossils for conlusions on phylogenetic reconstructions. The fossils are considered to be a key for understanding the phylogeny of the family Zoropsidae.

Key words: Acanthoctenidae, Amaurobiidae, Anapidae, Araneae, Baltic amber, *Balticoropsis*, Bitterfeld amber, body size, clasping spines, Ctenidae, Cymbioropsini, Eocene, Eomatachiini, Eoprychiini, Griswoldiini, “palaeontologically/phylogenetically founded diagnosis”, Psechridae, Pseudoeoprychiini, Selenopidae, Spatiatoridae, spiders, Tengellidae, Zoropsidae.

If not otherwise noted the **material** is kept in the private collection of the author (CJW). It will probably given to Senckenberg in the future.

The new species are described in the order of the families Spatiatoridae, Anapidae and Zoropsidae.

Numerous spider taxa in Baltic and Bitterfeld amber have been described, mainly by PETRUNKEVITCH (1958) and WUNDERLICH (mainly 2004), but these very diverse Eocene faunas are still not known completely (and apparently never will be known completely) as documented by the taxa described below: Members of strange extinct tribes and genera of the families Anapidae and Zoropsidae. Eocene taxa of the family Agelenidae need also a revision; members of several undescribed genera are kept in my private collection.
In this study I will focus on taxa of the family Zoropsidae. Their investigation is a great challange; the main reasons are (1) that some important structures – like the existence of a grate-shaped tapetum of the seconary eyes – are not recognizable in the fossil spiders with the help of a light microscope, and (2) that the relationships of most extant higher taxa of this family and the limit of this family are quite unsure.
The Eocene fossil spiders are considered to be a key for understanding the phylogeny of the family Zoropsidae, and has not to be ignored by computer cladists or workers on extant taxa. Apparently Eocene fossils: the oldest known fossils of the Zoropsidae – and numerous (!) further spider families – are not too young for being important in solving phylogenetic questions, e. g. regarding spider taxa of the RTA-clade.

Family SPATIATORIDAE (superfamily Archaeoidea (= Palpimanoidea))

The extinct Cretaceous and Eocene family Spatiatoridae PETRUNKEVITCH 1942 (superfamily Archaeoidea (= Palpimanoidea)) is known from two genera: (1) from *Spatiator* PETRUNKEVITCH 1942 in Eocene Baltic amber:, see WUNDERLICH (2004: 767-768), (2006), (2008: 79-80), (2011: 503) and (2015: 17, 29), and (2) from *Vetiator* WUNDERLICH 2015 in Mid Cretaceous Burmese amber, see WUNDERLICH (2015: 269-271). In this kind of amber I also described *Spatiator putescens* in 2015. Here I add a further Eocene species of *Spatiator*, the first species of this genus in Bitterfeld amber.
Most members of the superfamily Archaeoidea feed on spiders, most even exclusively, and at least since 45 million years: Spiders as a prey of Eocene Spatiatoridae (*Spatiator*) – as well as a member of the family Archaeidae – has recently been documented by WUNDERLICH (2015: 17, 29).

Spatiator bitterfeldensis **n. sp**. (fig. 1)

Etymology: The species is named after its deposit, the amber from Bitterfeld in Germany.

Material: Holotype ♂ in Miocene amber from Bitterfeld, F2864/BI/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved in a flat piece of amber, the ventral side is covered with a white emulsion, some parts of the right leg articles are cut off. – Syninclusions: The part of a spider web including sticky droplets (not in contact with the spider), 1 small Coleoptera, 1 Diptera, 1 Collembola, 2 Acari; a scale of a gymnosperm seed includes a small insect idet. in its cavity.

Diagnosis (♂; ♀ unknown): Embolus of medium length, distinctly bent ventrally (fig. 1).

Description (♂):
Measurements (in mm): Body length 4.0, prosomal length 1.9; leg I: Femur 1.5, patella 0.5, tibia 1.1, metatarsus 0.8, tarsus 0.65, tibia IV 1.4, metatarsus IV 1.1.
Colour dark grey brown.
Prosoma distinctly punctuated, hairs indistinct, cephalic part strongly raised, fovea indistinct, 8 eyes in a quite narrow field, anterior median eyes large, chelicerae and mouth parts hidden. – Legs only fairly slender, as in related species, bristles absent, prolateral spatulate hairs of leg I existing. – Opisthosoma almost twice as long as wide, hairs of medium length. – Pedipalpus (fig. 1) with fairly stout articles, cymbium distinctly covered with strong hairs, embolus distinctly bent, only fairly long, guided by a conductor of the same length.

Relationships: *Spatiator caulis* WUNDERLICH 2008 in Baltic amber is closely related but its embolus is longer and almost straight. Size and position of embolus and conductor of *S. martensi* WUNDERLICH 2006 are quite different.

Distribution: Eocene Bitterfeld amber forest.

Family **ANAPIDAE** (superfamily Araneoidea)

The family Anapidae SIMON 1895 of the superfamily Araneoidea was quite diverse in the Eocene Baltic and Bitterfeld amber forests, see WUNDERLICH (2004: 1043-1069, under Anapinae): 7 genera were described. The small to tiny Eocene species possessed a large dorsal opisthosomal scutum (photo), prosomal wrinkles (fig. 11), and 8 eyes (the anterior median eyes may be small); the male leg I is modified and spiny (e. g.

figs. 3, 9), see the paragraph “clasping leg spines” below. In this family at least one of the articles of the male pedipalpus bear an apophysis (figs. 7, 8, 13) in contrast to the related family Comaromidae, see WUNDERLICH (2012: 108), which is known in Eocene European ambers and from Eurasia today.
Today exists in (the South of) Europa 3 anapid species only of the genus *Zangherella* DI CAPORIACCO 1949.

Balticonopsis WUNDERLICH 2004

This extinct taxon is the most diverse genus of the family Anapidae in Baltic and Bitterfeld amber: including four new species ten species are known, two species – *bitterfeldensis* and *ludwigi* – from Bitterfeld amber only, the remaining species from Baltic amber.
Possible cladogram of the previously known species: See WUNDERLICH (2004: 1046). – The “clasping leg spines”: See below.
Diagnosis of the genus: See WUNDERLICH (2004: 1047).

Note on the relationship of *Balticonopsis perkovskyi* WUNDERLICH 2004 in Rovno amber from the Ukraine (fig. 2):

In 2004: 1828, figs. 2-3 I mistook a basal inclination of the ♂-metatarsus I for the suture between metatarsus and tarsus but the inclination beyond the middle is the real limit of the long metatarsus to the shorter tarsus of *perkovskyi*, see fig. 2. The structures of the bulbus of *perkovskyi* are also quite different from the genus *Balticonopsis*; therefore this species has to be excluded from *Balticonopsis*; it may well be the member of an unnamed genus.
A quite short metatarsus I similar to *Baltoconopsis* exists also in *Saxonanapis* WUNDERLICH 2004 in Bitterfeld amber in which tarsus and metatarsus I are straight and the structures of metatarsus I are quite different.

“Clasping leg spines” of members of the genus *Balticonopsis,* and **phylogenetics**

Mating leg (*) spines/spurs are not rare in spiders and other arthropods. Male spiders of numerous taxa use such sexual-dimorphic structures to grasp females during copulation.

The existence of spines, spurs or bristles of this function has documented this behaviour in members of the superfamily Araneoidea at least since the Mid Cretaceous, see below; in members of the Mygalomorpha clasping leg spines are already known from the Triassic. Usually such leg spines occur on one or two articles of the male leg I (rarely on II). Their position – most often prolaterally or proventrally on the tibia or the metatarsus –, their size and/or shape are specific for each species, and therefore they are important taxonomical structures. Frequently these leg articles are additionally still otherwise modified: thickened, bent and/or quite hairy, see the figs. They are the best characters for the determination of the members of the extinct genus *Balticonopsis*.

In males of several species of *Balticonopsis* – of *B. distalis* and of the *B. dunlopi* species-group – a huge proventral clasping spine exists on the anterior tibia (besides short spines), see e. g. the figs. 9, 12 and the photos. Such a spine is absent in congeneric females, see WUNDERLICH (2008: 1096, fig. 609), and they are also absent in both sexes of the *metatarsalis* species-group in which only short spines exist (figs. 3, 5). Therefore the mating behaviour of species of this group may have been different from the remaining species.

According to the huge ventral spine of the ♂-tibia I and the elongated cymbium (figs. 12-13) the *dunlopi* species-group is most derived; in the basal *metatarsal* species-group a huge tibial spine is absent and the cymbium is short (figs. 4, 7-8, 10). *B. distalis* possesses an intermediate position: a huge tibial spine has been developed but the cymbium “still” is short. Because of its huge tibial clasping spine *distalis* is placed here in the *dunlopi*-group.

Mating leg spurs/spines are widely spread within spider families of Mygalomorpha and Opisthomorpha, rare in haplogyne spiders, and also known from fossils, e. g. *Phyxioschemoides collembola* WUNDERLICH 2015 (Cretaceous, Dipluridae), *Fossilcalcar praeteritus* WUNDERLICH 2015 (Cretaceous, Fossilcalcaridae), *Palaeoplectreurys baltica* WUNDERLICH (Eocene, Plectreuridae), *Balticonopsis* WUNDERLICH 2004 (Eocene, Anapidae; this paper and WUNDERLICH (2004) and related families), as well as various Cyatholipidae (Eocene and extant; see WUNDERLICH (2004: 1155 ff)).

Interestingly clasping leg spines are known particularly from various taxa of most families of the superfamily Araneoidea (orb weavers and their relatives); they are so frequent in this superfamily (**) that I consider the disposition of this character as an apomorphy of the Araneoidea.

(*) Clasping spines exist furthermore on male PEDIPALPAL articles of certain taxa – e. g. of *Palaeohygropoda myanmarensis* PENNEY 2004 (Praeterleptonetidae) –: see WUNDERLICH (2015: 380, fig. 163).

(**) Such spines are unknown to me in certain araneoid families like Linyphiidae, Mimetidae, Nephilidae, Nesticidae and Pimoidae.

The **specie-groups** of *Balticonopsis*

Two species-groups exist which are based on the male sex. I regard the strongly thickened ♂-metatarsus I of *bulbosa* and *metatarsalis* as convergently evolved.

(1) The dunlopi-group (*bitterfeldensis* WUNDERLICH 2004, *ceranowiczi* WUNDERLICH 2004, *distalis* n. sp., *dunlopi* n. sp., and *holti* WUNDERLICH 2004): Cymbium strongly elongated, embolus in a longitudinal position, guided by the retrolateral margin of the cymbium (fig. 13 and WUNDERLICH (2004: Figs. 52, 59)) (*distalis*, fig. 10, is an exception); besides some short spines the strongly thickened tibia I bears a huge ventral clasping spine (figs. 9, 12). The ♂-metatarsus I may be distinctly thickened (*bulbosa*). The known species are reported in Baltic amber.

(2) The metatarsalis-group (*bispina* WUNDERLICH 2004, *bulbosa* WUNDERLICH 2004, *ludwigi* n. sp., *metatarsalis* n. sp., and *thomasi* WUNDERLICH 2004): Cymbium short, distal part of the embolus describing a transverse loop (figs. 4, 8); the (more) slender tibia I bears two rows of short pro- and retroventral spines (figs. 3, 5). The ♂-metatarsus I may be distinctly thickened (*metatarsalis*, fig. 6). The species are reported in Baltic and Bitterfeld amber.

Key to the species of *Balticonopsis* (♂):

Figs. of the previously described species: See WUNDERLICH (2004: 1093-1096, figs. 39-60).

Tibia I with a huge ventral spine besides short spines (figs. 9, 12) 2

- Tibia I with short spines only (figs. 3, 5) 5

2(1) Metatarsus I distinctly bent (fig. 12) 3

- Metatarsus I straight 4

3(2) Free part of the embolus ca. half as long as the cymbium (fig. 13). Position of the long ventral tibial I spine basally of the middle, tibia I relatively stout (fig. 12). . . *dunlopi*

- Free part of the embolus less than a quarter of the cymbial length, see WUNDERLICH (2004: 1096, fig. 59). Position of the long ventral tibial I spine distally of the middle, tibia I relatively slender (figs. 54-55). . . . . *holti*

4(2) Position of the strong ventral spine of tibia I in the basal half (fig. 48). Cymbium strongly elongated (fig. 52) . . . . *ceranowiczae*

- Position of the strong ventral spine of tibia I in the distalal half (fig. 9). Cymbium not elongated (fig. 10) . . . . *distalis*

5(1) Metatarsus I slender (fig. 3) 6

- Metatarsus I distinctly thickened (fig. 6) 7

6(5) Position of the ventral spines of tibia I in the distal half, two pairs of ventral metatarsal I spines (fig. 39). Baltic amber . . . . *thomasi*

- Ventral spines reaching the basal half, two single metatarsal I spines only (fig. 3). Bitterfeld amber . . . . *ludwigi*

7(5) Metatarsus I at least 3 times longer than wide (fig. 6), tibia I with 4 ventral spines (fig. 5), tarsus I straight (fig. 5). . . . . *metatarsalis*

- Metatarsus I ca. twice as long as wide, tibia I with up to 3 ventral spines, tarsus I bent or straight (figs. 44, 45, 47) 8

8(7) Tibia I with 3 ventral spines (fig. 44). Bitterfeld amber . . . . *bitterfeldensis*

- Tibia I with 2 ventral spines. Baltic amber 9

9(8) Tarsus I bent (fig. 47) . . . . *bulbosa*

- Tarsus I straight (fig. 42) . . . . *bispina*

Balticonopsis ludwigi **n. sp**. (figs. 3-4) Photo 4.

Derivatio nominis: This species is named after WALTER LUDWIG who kindly send me this interesting piece of Bittelfeld amber which includes two males of a hitherto unknown species.

Material: 2♂ in the same piece of Eocene amber from Bitterfeld, holotype (not covered with a white emulsion) and paratype (distinctly covered with a white emulsion), F2869/ BI/ CJW.

Preservation and syninclusions: The deformed spiders are preserved in a clear yellow piece of amber which was heated; the holotype is completely preserved, not covered with a white emulsion, the body and most leg articles are depressed laterally. The paratype is also completely preserved, most parts are covered more or less with a white emulsion. – Syninclusions: A larger fly, a tiny mite, the small leg of a spider and a stellate hair.

Diagnosis (♂; ♀ unknown): Tibia I with a proventral row of 4 spines and with 2 short retroventral spines (fig. 3), metatarsus I with 2 short prolateral spines. Pedipalpus (fig. 4): Cymbium fairly elongated, bearing few long apical hairs which apparently guide the long embolus.

Description (♂):
Measurements (in mm): Body length 1.5, prosomal length 0.6; leg I (holotype): Femur 0.9, patella 0.35, tibia 0.85, metatarsus 0.43, tarsus 0.43; tibiae II-IV (paratype): 0.57/0.35/0.48.
Colour dark brown (darkened by heating).
Prosoma (photo; most parts are deformed and heated) apparently quite similar to *B. dunlopi* but cephalic part probably less raised. – Legs (fig. 3) fairly long, order I/II/IV/III, III distinctly the shortest, tarsus I as long as metatarsus I; spines: See the diagnosis. – Opisthosoma (most parts are hidden or deformed) dorsally completely covered with a large scutum which bears short hairs. – Pedipalpus (fig. 4): The femur bears a long apophysis, cymbium fairly elongated, bearing long apical hairs which apparently guide the long embolus.

Relationships: See the key.

Distribution: Eocene Bitterfeld amber forest.

<u>*Balticonopsis metatarsalis*</u> **n. sp**. (figs. 5-8) Photo 5

<u>Etymology</u>: The species name refers to the modified metatarsus I of this species.

Material: Holotype ♂ in Eocene Baltic amber and two separated pieces, F2868/BB/CJW.

Preservation and syninclusions: The spider is completely and well preserved in a yellow piece of amber which was heated; a white emulsion covers the ventral and anterior dorsal parts of the opisthosoma. – <u>Syninclusions</u>: An Acari and few small Diptera.

Diagnosis (♂; ♀ unknown): Leg I (figs. 5-6): Metatarsus thickened, quite hairy distally, spines are probably absent; tibia with a row of 4 proventral spines, embolus guided by a large conductor.

Description (♂):
Measurements (in mm): Body length 1.6; prosoma: Length 0.8, width 0.65; opisthosoma: Length 1.0, width 0.8; leg I: Femur 1.0, patella 0.35, tibia 0.8, metatarsus 0.47, tarsus 0.47; tibia II 0.6, tibia III 0.4; leg IV: tibia 0.5, metatarsus 0.35, tarsus 0.42.
Colour mainly dark brown, opisthosomal scutum red brown.
Prosoma (photo) quite similar to *B. dunlopi* but posterior eye row slightly recurved, basal cheliceral articles about as long as the clypeus, most mouth parts hidden, gnathocoxae wide. – Legs (figs. 5-6) only fairly long, I distinctly the longest, III distinctly the shortest, hairs partly long, tarsi longer than metatarsi or (I) both equal in length, metatarsus I distinctly thickened, probably without spines, tibia I fairly thick, bearing a proventral row of short spines and a thin and long prolateral bristle, all tibiae bear 2 long dorsal bristles,

all patellae bear 2 long dorsal bristles. Position of the right metatarsal I trichobothrium in 0.45, 3 small tarsal claws. – Pedipalpus: See the diagnosis. The tibia bears a retrolateral apophysis which may also exist – but is probably hidden – in related species.

Relationships: See the key.

Distribution: Eocene Baltic amber forest.

Balticonopsis distalis **n. sp**. (figs. 9-10)

Etymology: The species name refers to the position of the large ventral tibial I spine beyond the middle of the article; lat. distare = distance.

Material: Holotype ♂ in Eocene Baltic amber, F2866/BB/CJW.

Preservation and syninclusions: The spider is completely and only fairly well preserved in a piece of amber which was heated, several parts are covered with a white emulsion; two fissures exist above the spider's body and legs. – Syninclusions: Parts of a questionable small arthropod leg.

Diagnosis (♂; ♀ unknown): Tarsus I longer than metatarsus I, metatarsus I bears a single – ventral-apical – spine, position of the strong ventral spine of tibia I beyond the middle (fig. 9), cymbium not elongated (fig. 10).

Description (♂):
Measurements (in mm): Body length almost 1.5; leg I: Tibia 0.6, metatarsus 0.43, tarsus 0.5, cymbium 0.24.
Colour dark brown (darkened by heating).
Prosoma and opisthosoma (most parts are hidden) probably quite similar to *B. dunlopi* n. sp. – Legs (fig. 9) only fairly long, bristles probably as in *B. dunlopi*, tarsi longer than metatarsi, metatarsus I with a single ventral-apical spine, tibia I: Position of the large ventral spine beyond the middle of the article, 4 further short spines and a long and strong prolateral bristle beyond the middle of the tibia. – The opisthosoma is covered with a white emulsion. – Pedipalpus (fig. 10): Femoral apophysis well developed, patella long, cymbium short, conductor probably existing, free observable distal part of the embolus almost straight.

Relationships (see the key): In *B. ceranowiczia*e WUNDERLICH 2004 the position of the strong ventral tibal I spine is basally of the middle of the article, the position of the short tibial I bristles is different and the cymbium is strongly elongated.

Distribution: Eocene Baltic amber forest.

Balticonopsis dunlopi **n. sp**. (figs. 11-13) Photos 6-7

Derivatio nomonis: It is a pleasure to me to name this nice spider after the renowed and quite productive aracnologist JASON DUNLOP.

Material: Holotype ♂ in Eocene Baltic amber, F2865/BB/CJW, later on MNB.

Preservation and syninclusions: The spider is completely and well preserved at the corner of a clear yellow piece of amber, its ventral part and the dorsal part of the opisthosoma are covered with a white emulsion. – Syninclusions: Two juv. Araneae indet., both 0.8 mm long, one is covered with a white emulsion, the questionable part of an insect's antenna, insect's excrement and stellate hairs.

Diagnosis (♂; ♀ unknown): Body length 2.0 mm, leg I (fig. 12): Tibia with a huge long ventral spine in a position basally of the middle of the length of the article and five short spines. Pedipalpus (fig. 13, photo 7): Cymbium strongly elongated, embolus very long, guided by the long cymbium and long apical cymbial hairs.

Description (♂):
Measurements (in mm): Body length 2.0, prosoma: Length 0.9, width 0.7, hight above chelicerae 0.5; opisthosoma: Length and width ca. 1.2; leg I: Femur ca. 1.3, patella 0.5, tibia 0.65. metatarsus 0.55, tarsus 0.55; length of the pedipalpal femur (without apophysis) 0.4.
Colour mainly medium to dark grey, legs not annulated, opisthosomal scutum darker.
Prosoma (fig. 11, photo 6) ca. 1.3 times longer than wide, finelly wrinkled, cephalic part strongly raised, hairs absent, fovea absent or indistinct, 8 large eyes, posterior row slightly procurved, posterior median eyes almost contiguous, anterior median eyes smallest, clypeus long, basal cheliceral articles as long as the clypeus, fangs long and distinctly bent, fang furrow covered with an emulsion, sternum wrinkled, longer than wide, distinctly elongated between the coxae IV which bear no outgrowth. – Legs (fig. 12, photo). fairly long, order I/II/IV/III, I distinctly the largest, bristles long and thin, patellae 2 dorsally (the basal one is tiny), tibiae 2 dorsally; leg I: Tibia stout and thickened, metatarsus and tarsus equal in length, metatarsus distinctly bent, bearing 2 prolateral and 2 ventral (probasally and retroapically) spines, tibia with 5 short and a huge ventral spine slightly in the basal half, with a long prolateral bristle in the middle. 3 tarsal claws which are fairly short. – Opisthosoma (most parts are covered with a white emulsion) about as wide as long, dorsally completely covered with a scutum which bears tiny hairs. – Pedipalpus (fig. 13, photo 7) (parts of patella and tibia are covered with an emulsion): Femur with a long and pointed apophysis which is directed foreward, tibia with a long dorsal-basal trichobothrium, cymbium strongly protruding, embolus basally large, long and strongly bent distally, describing more than one loop, distally guided by the slender cymbium and some long hairs.

Relationships: Largest named species of the genus; congeneric members are only 1.4-1.6 mm long. See the key. In *B. holti* WUNDERLICH 2004 metatarsus I and pedipalpal articles are similar but the embolus is distinctly shortr and less bent distally.

Distribution: Eocene Baltic amber forest.

Family ZOROPSIDAE s. l. (Zoropsoidea)

With notes on the families Acanthoctenidae, Agelenidae, Amaurobiidae, Ctenidae Psechridae, Udubidae and (other) Lycosoidea.

After the recent discovery of new material – including two new genera of the Eocene Zoropsidae – the fossils of this diverse family have to be revised again; see the previous paper by WUNDERLICH (2004: 1489-1522). The Eocene fossil spiders are considered to be a key for understanding the phylogeny of the family Zoropsidae.

The present state of the taxonomy of certain superfamilies of spiders – e. g. Amaurobioidea, Dictynoidea, Lycosoidea and Zoropsoidea – appears still chaotic to me; the opinions on their relationships, their diagnoses and their limits have changed/ changes rapidly, see the new papers listed below. Here I give some remarks on few disputable examples which were recently published by POLOTOW et al. (2015):

- the family Thomisidae is placed close to the – in my opinion not closely related – family Oxyopidae (cladogram),
- the genus *Cheiracanthium* (Clubionidae or Eutichuridae) is placed close to the genus *Metaphidippus* (Salticidae) (cladogram),
- the diagnosis of the family Zoropsidae is based on the existence of a ventral pedipalpal tibial process which is absent (e. g.) in the type genus *Zoropsis* and most Eocene genera as well as on a retrolateral cymbial process which is absent in certain zoropsid taxa but exists in several members of the family Amaurobiidae, too. A brush of cymbial hairs is also absent e. g. in the Eocene zoropsid taxa except *Eoprychia*.

What is amazing to me is the alleged position of the family Tengellidae: it is regarded as a junior synonym of the Zoropsidae by POLOTOW et al. (2015) but it is – based on its type genus – regarded as a branch basally of families like Psechridae and Lycosidae by PIACENTINI et al (2013: Fig. 1). The genus *Austrotengella* is (under Tengellidae) placed near to the Zoropsidae by these authors and as a member of the Tengellidae by RAVEN (2012).
Quite remarkable to me appears the "finding" that – according to PIACENTINI et al. (2013: 567) – "the cribellum shows up as primitively present, WITH THREE LOSSES AND FOUR INDEPENDENT AQUISITIONS, ...".
Surprising to me is the placing of *Griswoldia urbensis* basally to *Acanthoctenus* by BOSSELAERS (2002: 146), contra e. g. POLOTOW et al. (2015).

Questionable in spiders – in the Zoropsidae and other families – appears to be the number of CONVERGENT evolutions/losses (see also below, the paragraph "Characters of the family Zoropsidae and intrafamiliar variability"), e. g. of ...

- a grate-shaped tapetum of the secondary eyes, (probably lost in certain Zoropsidae),

- a SINGLE row of tarsal trichobothria as a character of the family Zoropsidae was erroneously published by JOCQUE & DIPPENAAR-SCHOEMAN (2007: 272); in Eocene fossils as well as in extant *Zoropsis* I found more than a single row of tarsal trichobothria. (A single row of tarsal trichobothria exists e. g. in the families Amaurobiidae (really in all taxa?) and – to my knowledge – in the Philodromidae and Psechridae),
- losses of the tibial suture within the Zoropsidae (see below),
- losses/origins of epigynal teeth which are regarded as an apomorphic character of the subfamily Coelotinae (Agelenidae, previously frequently regarded as a member of the Amaurobiidae). Such teeth exist also in other related families like certain Amaurobiidae: Amaurobiinae: *Amaurobius fenestralis*, Tengellidae: *Austrotengella* RAVEN 2012, in the Zoropsidae like the extant genus *Cauquenia* PIACENTINI et al. 2013, in the extinct Eocene genus *Eomatachia* sp. indet. (fig. 20),and in *E.* sp. indet., F2880/BB/CJW (photo).
- a loss of the conductor exists in *Akamesia*. (A similar case is known from the genus *Psechrus* within the family Psechridae).

Remarks on the Eocene zoropsid taxa as well as alleged and questionable Amaurobiidae (see no. 3):

(1) Because of their later publications the families Amaurobiidae THORELL 1870 and Zoropsidae BERTKAU 1882 could not be included in the early classical work by KOCH & BERENDT (1854) on Baltic amber spiders. Alleged members of the family Amaurobiidae – the genus *Amaurobius* C. L. KOCH 1837 – were treated in this work (3 species, under Drassodidae < now Gnaphosidae >, p. 56-58); they were erroneously placed in this genus and family and regarded as nomina dubia, see WUNDERLICH (2004: 1499). In my opinion *Amaurobius spinimanus* is a member of *Eomatachia* PETRUNKEVITCH 1942 (Zoropsidae) (see below), the short and weak description does not allow a determination to the species level, type material is most probably lost. The remaining species – *A. faustus* and *A. rimosus* – are based on the female sex, probably not adult, not well preserved, and their family relationships appear unsure to me.
(2) The genera *Amaurobius* and *Auximus* in the sense of PETRUNKEVITCH in Baltic amber: See WUNDERLICH (2004: 1378 and 1498-1499). – Psechridae in the sense of PETRUNKEVITCH (1958: 125): See WUNDERLICH (2004: 1375) (= *Eomatachia*, Zoropsidae). The zoropsid genus *Eoprychia* PETRUNKEVITCH 1958 has erroneously been described as a member of the family Sparassidae – see WUNDERLICH (2004: 1510) –, although leg scopulae and a metatarsal trilobate membrane are absent.
(3) A single juvenile spider of the “Amaurobiinae gen. & sp. indet.” has been described by WUNDERLICH (2004: 1378). If the difficult to observe calamistrum really consists of two rows this specimen may actually be a member of the Amaurobiidae – the only known fossil specimen of this family (!).
(4) With the exception of *Eoprychia* the Eocene taxa are cribellate, possess a suture of the male tibia; and possess an unpaired tarsal claw which most probably is absent in *Eoprychia*; see fig. A.
(5) All known Eocene genera are extinct.

(6) Families which are more or less related to the Zoropsidae – e. g. Acanthoctenidae, Ctenidae, Lycosidae and Psechridae – are still unknown to me from the Eocene. At least Lycosidae is most probably a relatively "young" family.

Provisional **diagnosis** of the family Zoropsidae

See WUNDERLICH (2004: 1494 and 1492 f).

Probably the existence of a subbasal SUTURE OF THE MALE TIBIA (*) – which existed already in all taxa of the oldest (Eocene) fossils of this family about 45 million years ago (fig. 15) – may be an apomorphic character of the Zoropsidae, and may allow what I call a "palaeontologically/phylogenetically founded diagnosis" of this family, based mainly on ancient extinct taxa in contrast to a "descriptive diagnosis".

If the tibial suture may NOT be accepted as apomorphic zoropsid character the TENDENCY of the development of this character may be considered as apomorphy of this family; this opinion appears less likely to me than several losses in various taxa.

(*) This sexually dimorphic pattern is a peculiar and unique character of most Zoropsidae. It is combined in the fossils with the existence of a cribellum and of an unpaired tarsal claw (both regarded as plesiomorphies by me, see fig. A). In my opinion this suture has likely been lost several times (including the Ctenidae?) during spider evolution; therefore it is not usable as a "typical character" of all the extant taxa.

Note: A limitation of the family in the sense of POLOTOW et al. (2015) makes sense to me. A single sure and unique character of all fossil AND extant taxa of this QUITE DIVERSE family is unknown; so a usable diagnosis is still wanting, and a combination of plesiomorphic and apomorphic characters has to be used for practical purposes, see below and fig. A.

Characters of the family Zoropsidae and intrafamiliar variability:

- Basically cribellate (fig. 21) (1),
- basically existence of an unpaired tarsal claw (fig. 23) (2) like in the related Lycosidoidea, lost mainly in hunting spiders,
- basically absence of claw tufts (3), but evolved mainly in hunting spiders,
- leg scopulae or pseudoscopula absent (basically) or existing,
- only 3 ventral pairs of tibial I-II pairs – in *Pseudoeoprychia* up to 6 pairs in *Eoprychia* (fig. 29),
- basically with a prograde leg position but laterigrade legs exist if the Selenopidae are included in the Zoropsidae, and (at least I-II) in certain Australian taxa,
- basically (like in most Lycosidoidea) the posterior eye row is – even distinctly recurved (fig. 33) and three eye rows may exist, but two rows (fig. 22) exist frequently (4),
- a "Grate-shaped tapetum" of the secondary eyes (eyes besides the anterior median eyes) exist (5) like in the Lycosoidea, see below ("Subfamilies", "Relationships"),
- numerous extant (as well as the Eocene) members of the Zoropsidae are well recognizable by the existence of a TIBIAL SUTURE in the male sex (fig. 15) (6),

- a dorsal opisthosomal scutum is usually absent, it exists rarely,
- most often a single retrolateral tibial apophysis of the male pedipalpus exists (fig. 25) but several pedipalpal tibial apophyses may exist, e. g. in *Eomatachia*, fig. 19,
- the cymbium is usually short (fig. 19), rarely of medium length (figs. 25, 28), never distinctly elongated; modifications – mainly retrobasally – exist in several taxa,
- a dorsal patch of scopula hairs on the cymbium exists or is absent: e. g. in the Eocene fossils except *Eoprychia* (fig. 38),
- the median apophysis is usually large and leaf-shaped (figs. 18, 27, 30),
- few Zoropsidae build CAPTURE WEBS: Apparently most Eocene fossil spiders and members of the "Tengellidae" in which a capture web is retained (as well as leg scopulae (!)), but most extant spiders are free living hunters like the ecribellate members of the Griswoldiini and certain ecribellate Australian Zoropsidae, see RAVEN & STUMKAT (2005). – Note: In general free hunting is a rare character in cribellate spiders but cribellum, calamistrum and an unpaired tarsal claw are absent or strongly reduced in hunting spiders. The two-clawed members of *Zoropsis* are not mobile hunters and apparently build no true capture web.

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(1) Cribellum and calamistrum are strongly reduced or even absent at least in the male sex in several taxa; the shape of the calamistrum is quite variable within the family: a single row usually exists or a band (*Pseudoeoprychia*, fig. 24) or a field (e. g. in *Zoropsis*, fig. 39; see also the "Tengellidae" in which only *Tengella* is cribellate.

(2) An unpaired tarsal claw may exist but may be hidden by a claw tuft (fig. 34); it is absent e. g. in *Zoropsis*, most probably in the extinct genus *Eoprychia* as well as in most of the "Australian hunters", see fig. A. (According to the erroneous diagnostic characters of the Zoropsidae given by JOCQUE & DIPPENAAR-SCHOEMAN (2007: 272) an unpaired tarsal claw is absent in this family).

(3) In my opinion claw tufts are basically absent in the Zoropsidae: the ancient spiders of this family were cribellate and most probably built capture webs in which claw tufts are hindering. Well developed claw tufts exist e. g. in the genera *Zoropsis* and *Eoprychia* (fig. 34).

(4) Two eye rows probably evolved convergently in several taxa, see fig. A and the Psechridae. Tengellinae is diverse in this respect: the posterior eye row is more or less recurved. Three eye rows within the Eocene zoropsid genera exist only in *Eoprychia* (fig. 33).

(5) This structure has probably been lost in few taxa; see POLOTOV et al. (2015).

(6) See above: "Provisional diagnosis" and below: "Phylogenetics". A suture is absent in numerous taxa, as well as in all Tengellidae and Ctenidae. The area of the suture is usually breakable (autotomy, and a tibial crack exists), in the extinct taxa, too; the extant genera *Akamasia* and *Zoropsis* (and probably related taxa) – in which only a suture exists which is not breakable – is an exception. Fossil spiders: This structure exists in the Eocene genera: *Cymbioropsis* n. gen. (fig. 15), *Eomatachia* PETRUNKEVITCH 1942, *Eoprychia* PETRUNKEVITCH 1958, and *Succiniropsis* WUNDERLICH 2004, but is probably absent in *Pseudoeoprychia* n. gen.

Distribution: EXTANT: Worldwide (mainly tropical and subtropical); FOSSIL: Eocene European amber forests less than 50 million years ago.

Relationships: Zoropsidae s. l. – or Zoropsoidea? – are recently regarded as a senior synonym of the Tengellidae and Zorocratidae, and as the SISTER GROUP of the Lycosoidea; both are members of the "Grate-shaped tapetum clade", see POLOTOW et al. (2015). See also GRISWOLD (1993) as well as RAVEN & STUMKAT (2005). For several years Zoropsidae has been included in the superfamily Lycosoidea s. l. If the grate-shaped tapetum of the secondary eyes evolved as an apomorphy of the lycosoid taxa

the Lycosoidea s. l. (but see below) may include the Zoropsidae and related taxa as proposed by RAVEN & STUMKAT (2005: 354). The extant members of the superfamily Lycosoidea s. l. in the sense of these authors comprises 11 families (these authors included families like Lycosidae, Miturgidae, Psechridae, Zoridae and Zoropsidae in their enlarged Lycosoidea). POLOTOW et al. (2015) placed *Senoculus* (Senoculidae) within the same group as *Zoropsis* (Zoropsidae): “Despite our results, the synonymy of Senecolidae with Zoropsidae will be proposed, because this family is a classical Lycosoidea” <!> “and this relation should be further explained.” (p.143/144). Remark: In the same paper Zoropsidae is excluded from the Lycosoidea. – The families Amaurobiidae and Zoropsidae have several characters in common: A cribellum in various taxa, existence of claw tufts in certain taxa, the absence of an unpaired tarsal claw in certain taxa, a short cymbium which may be modified especially retrobasally. A suture of the male tibia exists in several Zoropsidae but is completely absent in the family Amaurobiidae. Several pedipalpal tibial apophyses exist in certain taxa of both families. I do not know a single clear difference between the famililies Amaurobiidae and Zoropsidae besides the grate-shaped tapetum of the secondary eyes in the Zoropsidae – which is not observable in the fossils with the help of a light microscope –, and the male tibial suture which exists in certain extant zoopsid taxa only but probably exists in all fossil Eocene taxa of this family. POLOTOW & BRESCOVIT (2010) grouped Amaurobiidae and Zorocratidae (Zoropsidae) closely together (!). See also directly below.
The families Ctenidae (three eye rows and ecribellate if Acanthoctenidae is excluded) and Ububidae (two eye rows, cribellate) may be MOST RELATED to the Zoropsidae; in contrast to the Zoropsidae, a grate-shaped tapetum and a suture of the male tibia are absent in all taxa of both families. Furthermore the cymbium is usually long in the Ctenidae and usually short or fairly short in the Zoropsidae.

Subfamilies, peculiar genera and some synonyms: Number and limit of the subfamilies are unsure. In the Udubidae a grate-shaped tapetum is absent; it may be the sister group of the Zoropsidae/Zoropsoidea + Lycosoidea , see POLOTOW et al. (2015). The cribellate genus *Acanthoctenus*, the type genus of the family (!) Acanthoctenidae F. O. PICKARD-CAMBRIDGE 1902, is – in my opinon correctly – regarded as a member of the superfamily Lycosoidea by POLOTOW et al. (2015) but is considered as sister group to the Zoropsidae by PIACENTINI et al. (2013), and within (!) the family Zoropsidae by BOSSELAERS (2002). *Griswoldia* is set in a quite basal position of the Zoropsidae by BOSSELAERS (2002: Fig. 2) but near *Zoropsis* by POLOTOW & BRESCOVITCH (2010). According to POLOTOW et al. (2015: 124) the important character ‘grate-shaped tapetum of the secondary eyes’ “... appears independently at least three times and has a complex evolutionary history, with seven reversions.” (!). “There is some evidence that the grate-shaped tapetum has little phylogenetic value ...” (p. 125). – Unclear to me are the relationships of the African and Australian hunting Zoropsidae. A tapetum is absent in the Australian genus *Austrotengella* RAVEN 2012 which was regarded as a member of the “Tengellidae” but the grate-shaped tapetum may be lost in this genus, and it may probably be included in the Zoropsidae.
TO SUM IT UP: Besides the Griswoldiinae and the Zoropsinae also the Uliodoninae, Selenoculinae and Tengellinae (= Zorocratinae) may probably have to be regarded as subfamilies of the Zoropsidae. The four branches of fig. A may be regarded as subfamilies of the Zoropsidae but – accordng to characters like the position of the eyes as well

as the existence/absence of a cribellum and an unpaired tarsal claw – two additional subfamilies may be included in the Zoropsidae s. l.: (a) the Psechridae (related to the Eocene fossils and the Griswoldiinae), and (b) the Acanthoctenidae (related to the Zoropsinae and the "Australian hunters" (?+ Selenopidae and Eoprychiini)).

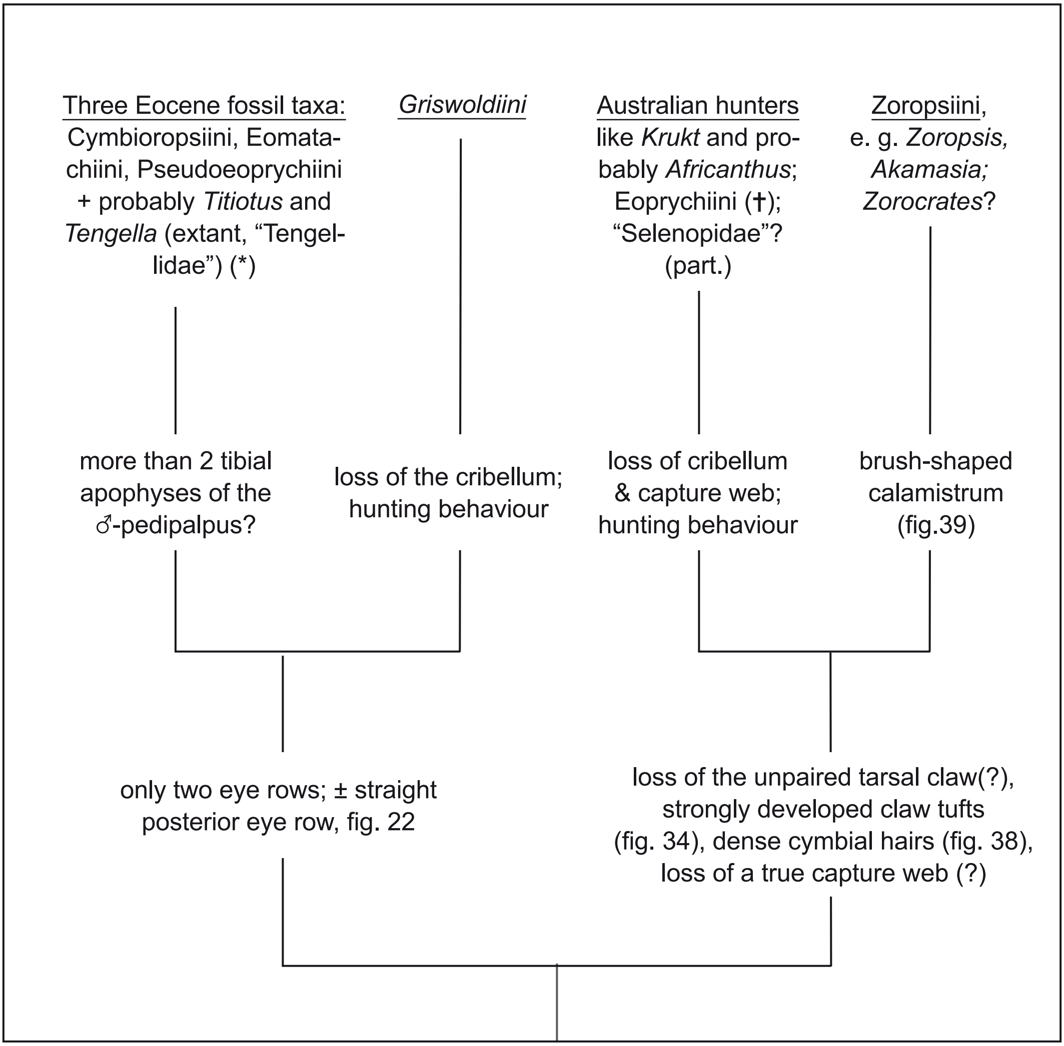
The SUBFAMILIAR RELATIONSHIPS OF THE EOCENE FOSSILS treated in this paper are not quite clear to me, further fossils and further studies are needed. Most genera may be related to the Griswoldiinae, the Matachiinae probably to the "Tengellidae" genus *Titiotus* (ecribellate, see below), but *Eoprychia* (ecribellate, too) may be related to *Zoropsis*, see fig. A.

Phylogenetics (see the diagnosis of the Zoropsidae, the paragraph on the subfamilies, fig. A, and the papers which are cited above):

According to the common grate-shaped tapetum of the secondary eyes the basically cribellate superfamily Zoropsoidea is apparently the sister group of the – mainly? – ecribellate superfamily Lycosoidea (cribellates exist if Acathoctenidae and Psechridae are included). As basically being cribellate spiders the Zoropsidae should basically be dwellers of capture webs. According to the strongly recurved posterior eye row in taxa of both superfamilies (mainly of the Lycosoidea) I regard this character as a basic character of the Zoropsidae, too, being a synapomorphy or symplesiomorphy. The evolution of claw tufts (correlated with a reduction of an unpaired tarsal claw) may be connected with hunting behaviour and the loss of a capture web.

What do the Eocene zoropsid taxa demonstrate? Can they provide information about apomorphic and plesiomorphic characters of this family? With the exception of *Eoprychia* all (!) Eocene taxa are cribellate, three-clawed (not quite sure in *Eoprychia*) and they possess a suture of the male tibia. So the tibial suture is a phylogenetically old/ancient character of these – in the geological sense – oldest known members of the Zoropsidae, in my opinion it is even an apomorphy of the family Zoropsidae (see above), and should have been lost few times during the zoropsid evolution. In the evolved extant genus *Zoropsis* a suture exists but a break/crack is absent: Therefore I regard this pattern as a reduced character of this genus. The basal character – strongly recurved posterior eye row similar to three rows of the eyes (fig. 33) – retained in the known Eocene genera only in *Eoprychia,* in contrast to the remaining five fossil genera (fig. 22), see fig. A. An unpaired tarsal claw was lost most probably only in one of the five fossil genera, in *Eoprychia* (but probably a reduced claw exists hidden within the strongly developed claw tuft, see fig. 34). *Eoprychia* probably represents hunting – but not capture web building – spiders. In the cladogram (fig. A) no regains (reversals) of structures – like the cribellum – have to be used (!), and only few losses of the cribellum and of the tibial suture.

Apparently all extant and extinct suprageneric taxa possess a mixture of plesiomorphic as well as of apomorhic characters. The basal number of ventral tibial I bristles may have been increased in the derived hunters compared with most of the Eocene fossils (except *Eoprychia*).



(*) in both genera a tibial suture is absent like in all „Tengellidae"; *Titiotus* is ecribellate, its male pedipalpal tibia bears > two apophyses like in the Eocene cribellate Eomatachiini (*Eomatachia* and *Succiniropsis*) – a rare character in the „Tengellidae" and the Zoropsidae.

Supposed apomorphy: Suture of the breakable male tibia (fig. 15).

Supposed plesiomorphies: Cribellate, existence of unpaired tarsal claws, absence of claw tufts, strongly recurved eye rows (similar to three rows, fig. 33), capture web.

Fig. A. Selected characters of selected genera of the family Zoropsidae shown in a **provisional and incomplete cladogram**. The groups at the end of the branches may represent subfamilies. Only few genera and losses are included.

The fossil and extant European zoropsid (see also above) and lycosoid faunas: Five of the families of the Lycosoidea s. l. in the sense of RAVEN & SLUMKAT – occur in Europe today: Lycosidae, Oxyopidae, Pisauridae, Zoridae (s. str.) and the enlarged Zoropsidae; Zoropsidae is the only cribellate family of thess groups in Europe. Only two of these families: Oxyopidae (extremely rare) and Zoropsidae (relatively frequent) are known from the Eocene of Europe: The Baltic, the Bitterfeld and the Ukrainean Rovno ambers. In contrast to the only two European extant genera of the Zoropsidae we now know five European Eocene genera of this family which are all extinct.

The extant and the European Eocene faunas of the Zoropsidae/Zoropsoidea and the Lycosoidea are quite different in several respects: Besides the rare Oxyopidae the remaining genera – *Cymbioropsis, Eomatachia, Eoprychia*, *Pseudoeoprychia* and *Succiniropsis* – are cribellate and are spiders of a single (!) family, the Zoropsidae, see WUNDERLICH (2004: 1496). In contrast to the Eocene European members of the superfamilies Lycosoidea and Zoropsoidea the European taxa of today are predominantly ecribellate (and build no true capture web); *Zoropsis* SIMON 1878 and *Akamasia* BOSSELAERS 2002 (Zoropsidae) are exceptions, and are absent from the Eocene fauna like the very diverse ecribellate extant lycosoid family Lycosidae, which is apparently – in the geological sense – a young family, and diversified only in the Neogene. Ctenidae is absent in the extant as well as in the Eocene European spider faunas.

Behaviour, ecology and frequency/rarity: Most – apparently almost all – extant cribellate spiders build capture webs. The existence of capture webs of Eocene spiders is unknown although spider (capture?) threads are preserved in the same pieces of amber with some specimens. Most extant European members of the superfamily Lycosoidea prefer open biotopes (not forests) and are ground living spiders (Oxyopidae and certain Pisauridae prefer higher strata of the vegetation). Concerning the sister group Zoropsidae: Certain extant spiders live in semiarid areas, but Australian and New Zealand ecribellate (!) hunting spiders are found in the leaf litter of rain forests (!), see RAVEN & SLUMKAT (2005). Shown by their frequency certain spiders – members of the genera *Eomatachia* and *Succiniropsis* –, preserved in Baltic amber, lived (in higher strata of the vegetation?) within the amber FOREST, but I do not want to exclude that spiders of certain Eocene taxa were hunters, e. g. members of *Cymbioropsis* n. gen. in which the calamistrum is strongly reduced or even absent at least in the male sex, and – likely in my opinion – members of the ecribellate genus *Eoprychia* in which strongly developed claw tufts exist. The extreme rarity of these taxa in Baltic amber may indicate that they were probably dwellers of open biotopes within the amber forest (*) like the extremely rare member the spider genus *Eohalinobius* WUNDERLICH 2008 (Lycosoidea?), adult Thomisidae, and the Solifugae in Baltic amber. From certain – ground-living, related? – spiders such families like Lycosidae and Ctenidae may have been evolved (both families are unknown from the Eocene). The evolution of the extant "hunting families" of the Lycosoidea may well have been forced by the development of huge grass land biotopes mainly during the Neogene.

(*) The rarity of *Eoprychia* and *Pseudoeoprychia* in Baltic and Bitterfeld amber may simply be caused by the large body size of adult spiders, see directly below (juveniles may not be identified).

Body size: Most extant members of the Zoropsidae and the Lycosidoidea are larger or even huge spiders; for example the body size of extant Lycosidae is 3 to 45 mm (Eocene members are unknown). The body size of the single male of the family Oxyopidae in Baltic amber is 2.85 mm, extant confamiliar males are 4 to ca. 20 mm long. The body size of extant Zoropsidae is 6 -28 mm; the body size of male Eocene Zoropsidae is 1.7 mm in *Succiniropsis* (apparently a dwarfism), 3.1 mm in *Cymbioropsis*, ca. 4.5 mm in *Eomatachia* and 5.8 up to 11 mm in *Eoprychia* (ca. 10 mm in *Pseudoeoprychia*). Probably an increase of the average body size of the Zoropsidae happened during the Neogene like in the Zygiellidae, see WUNDERLICH (2004: 927) and in the Theridiidae: The body length of Eocene Theridiidae is 1.2 to 3.5 mm, the body length of extant spiders is ca. 1 to almost 10 mm, see WUNDERLICH (2008: 146). But we must keep in mind that larger spiders were captured only rarely in the fossil resins.

List of the Eocene Zoropsidae in Baltic, Bitterfeld and Rovno (*Eomatachia*) ambers: Known to me at the beginning of 2016

Cymbioropsis n. gen., only *C. palpussutura* n. sp. (Cymbioropsiini),
Eomatachia PETRUNKEVITCH 1942, several species (Eomatachiini),
Eoprychia PETRUNKEVITCH 1958, few species (Eoprychiini),
Pseudoeoprychia n. gen., only *P. triplex* n. sp. (Pseudoeoprychiini),
Succiniropsis WUNDERLICH 2004, several species (Eomatachiini).

Key to the Eocene genera of the family Zoropsidae incl. questionable Amaurobiidae (♂):

1 Larger and more slender spiders (photos), body length 5.8-11 mm, claw tufts well developed, especially in *Eoprychia* (fig. 34), tibia of the pedipalpus with a single retroapical apophysis (figs. 25, 31). Cribellate or ecribellate 2

- Smaller and more stout spiders, body length 1.7-5.3 mm, claw tufts less developed, (fig. 23), pedipalpal tibia with several apophyses (fig. 19). Cribellate 3

2(1) Eyes in three rows (fig. 33), tibiae I-II bear 6 pairs of ventral bristles (figs. 29), ecribellate but with a large colulus (fig. 36), unpaired tarsal claw most probably absent (fig. 34), median apophysis not standing out widely (fig. 31, 38) . . . . *Eoprychia*

- Eyes in two rows (fig. 22), tibiae I-II bear 3 pairs of ventral bristles (and short apicals), cribellate, calamistrum: fig. 24, unpaired tarsal claws existing (fig. 23, usually hard to observe), median apophysis standing out widely (fig. 27). . . . . *Pseudoeoprychia*

3(1) Body length ca. 1.7 mm. Pedipalpus: See WUNDERLICH (figs. p. 1519-1521) . . . . *Succiniropsis*

- Body length 3-5.3 mm. Pedipalpus different, see below 4

4(3) Pedipalpal tibia without dorsal apophysis, with a tibial suture (fig. 17), cymbium with an apical outgrowth (fig. 17), bulbus without a retrobasal apophysis . . . . *Cymbioropsis*

- Pedipalpal tibia with several partly erect aphyses, without a suture (fig. 19), cymbium without an apical outgrowth, bulbus with a large retrobasal median apophysis (fig. 18). . . . . *Eomatachia*

Descriptions of the NEW TAXA and revisions

Cymbioropsiini n. trib.

Etymology: See below.

Type genus (by monotypy): *Cymbioropsis* n. gen.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 15-17): Tibia with a suture similar to the tibial suture of the legs, cymbium with a large and pseudoarticulated apical outgrowth. Both characters are unique in spiders to my knowledge.

Further characters: Most probably cribellate (calamistrum reduced or even absent at least in the male sex), 3 tarsal claws existing, claw tufts absent, thoracal region high, tibia I with 3 pairs of ventral bristles.

Note: Apical cymbial outgrowths in spiders are not frequent – they exist for example in *Cheiracanthium* C. L. KOCH 1839 (Clubionidae) and certain species of *Agyneta* HULL 1911 (Linyphiidae) but an articulated cymbium besides *Cymbioropsis* is unknown to me.

Relationships: According to the existence of a tibial suture *Cymbioropsiini* is a member of the Zoropsidae. According to the existence of an unpaired tarsal claw, and other characters – see the tab. p. 1498 in WUNDERLICH (2004) – the tribe is related to the extinct tribe Eomatachiini (see below), but in the Eomatachiini cribellum and calamistrum are well developed (in the male sex, too), a pedipalpal tibial suture and an outgrowth of the cymbium are absent. *Pseudoeoprychia* n. gen: See below and the key. In the Eocene tribe Eoprychiini – and in the Zoropsini an unpaired tarsal claw may be absent or is absent (*), claw tufts exist, the posterior eye row is usually strongly recurved (similar to a third eye row).

(*) See the remark above. In *Zorocrates* SIMON 1888 an unpaired tarsal claw is absent on IV.

Distribution: Eocene Baltic amber forest.

Cymbioropsis **n. gen.**

Etymology: The first part of the name refers to the peculiar elongated cymbium, the second part refers to "ropsis" of the confamiliar genus name *Zoropsis*.

The gender is feminine.

Type species (by monotypy): *Cymbioropsis palpussutura* n. sp.

Diagnosis, relationships and **distribution**: See above.

Cymbioropsis palpussutura **n. gen. n. sp**. (figs. 15-17) photo 8.

Etymology: The species name refers to the existence of a tibial suture of the male pedipalpus.

Material: Holotype ♂ in Eocene Baltic amber, F2872/BB/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved in a yellow and mainly clear piece of amber. The distal part of the spider's left tarsus I is cut off, the ventral anterior body part is hidden by fissures, the opistosoma is covered with a white emulsion, the lung covers (?) look like sclerotized. – Syninclusions: A thin thread runs backwards from the spinnerets. A Diptera, a Collembola, stellate hairs and particles of detritus are preserved in the same piece of amber.

Description (♂):
Measurements (in mm): Body length 3.1, prosoma: Length 1.6, width 1.35; opisthosoma: Length 1.6, width 1.35; leg I: Femur 1.5, patella 0.5, tibia 1.2, metatarsus ca. 1.2, tarsus ca. 0.8, tibia II ca. 1.0, tibia III 0.9, tibia IV 1.15.
Colour mainly dark brown but opisthosoma medium grey.

Prosoma (photo) 1.2 times longer than wide, not corniculate, fovea indistinct or even absent, hairs indistinct, 8 eyes which are fairly large and partly covered with a white emulsion, position in two rows, posterior row slightly procurved, both rows distinctly procurved in anterior aspect, anterior median eyes smallest, spaced by less than their diameter, posterior median eyes spaced by almost their diameter, wider apart from the lateral eyes, length of the clypeus less than 2 diameters of the anterior median eyes, chelicerae covered with a white emulsion, ventral prosomal parts hiden. – Legs (fig. 15, photo) of medium length, order I/IV/II/III, III relatively long, hairs not distinct, tibial sutures well developed, bristles numerous, their position close to the articles, femora dorsally 1/1 and 3 apically, patellae 1 dorsally apically and a lateral pair on III-IV, most tibiae with 3 ventral pairs as well as some laterals, prodorsals and apicals (the number may be variable), metatarsal preening combs absent but a girland of half a dozen long apical bristles exist, metatarsi with 3 pairs of long ventral bristles and some laterals, tarsi bristleless, unpaired tarsal claws well developed, paired claws with long teeth. Calamistrum: I am not sure if the row of fairly bent retrolateral hairs in the basal half of metatarsus IV really possess the function of a calamistrum. The tarsi bear some trichobothria in more than a single row. – Opisthosoma (photo) partly hidden by a white emulsion, hairs not distinct, apparently soft but anteriodorslly a small hardened area may exist. Most parts of the ventral side are hidden. The large two-segmented and stronly converging anterior lateral spinnerets are well observable. A hidden cribellum may exist (its area is deformed). – Pedipalpus (figs. 16-17) (not easy to observe and to interpret): Femur straight, patella stout, tibia long, with a structure in the basal half which I regard as a suture similar to the sutures of the leg tibias, cymbium (of both pedipalpi) in an anusual – unnatural (?) – position bent “inside” (proventrally) by 180°, parallel to the pedipalpal patella and tibia, and with a pseudoarticulated distal outgrowth. The structures of both bulbi are hidden by the position and a white emulsion, parts of two apophyses are recognizable on the right bulbus.

Relationships (see also the diagnosis): A distinctly – otherwise, usually basally – modified cymbium exists also in certain genera of cribellate North American Coelotinae (Agelenidae?), e. g. in *Cavernocymbium* UBICK, *Parazanomys* UBICK 2005 and *Zanomys* CHAMBERLIN 1948.

Distribution: Eocene Baltic amber forest.

Eomatachiini WUNDERLICH 2004: 1496 (figs. 18-21) Photos 9-11.

Genera: *Eomatachia* PETRUNKEVITCH 1942, *Succiniropsis* WUNDERLICH 2004 and probably the new genus *Pseudoeoprychia* (Pseudoeoprychiini). See the key.

Notes on new material in Baltic amber: *Eomatachia* sp. indet., F2880/BB/CJW (photos 9-11): 1♀ which the spinnerets and the epigyne are excellently preserved; F2881/BB/CJW: 1♂ in which the left pedipalpus is small and distinctly deformed; F2882BB/

CJW (and a large separated piece of amber): 1 ¾ males in which a pedipalpus is excellently preserved, and a tibial break exists; F2883/BB/CJW: 1♂ which is related to *E. bipartita* WUNDERLICH 2004.
In the partly well preserved spiders 3 pairs of ventral tibial bristles (incl. a shorter subapical pair) are recognizable.

Relationships (see also below and fig. A): In the genera *Eomatachia* and *Succiniropsis* several tibial apophyses of the male pedipalpus exist like in the extant ecribellate genus *Titiotus* SIMON 1897 (Tengellidae) from California, in which a tibial suture is absent, and which may be related; see PLATNICK & UBICK (2008). In the extant Tengellinae – if regarded as a member of the Zoropsidae s. l. – retains a true capture web as an exception within the Zoropsidae which probably also existed in the Eomatachiini, an unpaired tarsal claw and two eye rows exist like in the Eomatachiini. In *Titiotus* the shape of the median apophysis and of the embolus are quite different. Is *Titiotus* a relict taxon related to the Eocene Eomatachiini in which the cribellum and the tibial suture have been lost during the long time span of evolution? Their preference of cave dwelling and microhabitats like “the Californian members of the basal araneomorph spider genus *Hypochilus* Marx” (PLATNICK & UBICK (2008: 2)) may indicate this supposition.

Distribution: Eocene European amber forests.

Pseudoeoprychiini n. trib.

Etymology: See the genus.

Type genus (by monotypy): *Pseudoeoprychia* n. gen.

Diagnosis (♂; ♀ unknown): Cribellate (calamistrum fig. 24), unpaired tarsal claws and claw tufts existing (fig. 23), only three pairs of ventral bristles of tibia I-II, two eye rows (fig. 22), suture of the ♂-tibia probably absent; pedipalpus (figs. 25-28): Tibia with a single apophysis, no dense cymbial hairs, median apophysis large and standing out widely (fig. 27).
Further characters: See below, the nominate genus.

Relationships (see the key above and fig. A): According to the existence of a cribellum, two eye rows, and an unpaired tarsal claw the genus may be related to the Eomatachiini. In the genera *Eomatachia* (and *Succiniropsis)* claw tufts are absent, SEVERAL apophyses of the male pedipalpus exist, the suture of the male tibiae is usually distinct, and their body size is smaller. See also the similar members of the tribe *Eoprychiini* which are ecribellate, an unpaired tarsal claw is most probably absent, and 6 pairs of ventral tibial I-II bristles exist. – In the probably related Psechridae several similar characters exist – e. g. a similar eye position, the existence of a cribellum and three tarsal claws, a modified calamistrum as well as the absence of leg scopulae – but the calamistrum consists of 3-6 REGULAR ROWS of hairs (fig. 14); furthermore the male coxa I bears frequently spines and the male pedipalpal patella or femur frequently bears humps or apophyses. – Members of the Zoropsiini are cribellate and the calamistrum is brush-shaped (fig. 39).

Distribution: Eocene Baltic amber forest.

***Pseudoeoprychia* n. gen.**

Etymology: The genus name refers to the similarities of *Pseudoeoprychia* to the extinct zoropsid genus *Eoprychia* PETRUNKEVITCH 1958, from pseud- (gr.) not true.

The gender of the name is feminine.

Type species (by monotypy): *Pseudoeoprychia triplex* n. sp.

Diagnostic characters: (♂; ♀ unknown): Cribellate, unpaired tarsal claws existing (fig. 23), claw tufts fairly well developed, leg scopulae absent, tibial suture indistinct or absent, calamistrum (fig. 24) consisting of a band of irregular hairs (*), tarsal trichobothria existing irregularly in more than a single row, prosoma not depressed, thoracal part fairly raised, 3 pairs of ventral tibial I-II bristles (and apicals), 2 eye rows (fig. 22), opisthosoma (photo) long and slender, pedipalpus (figs. 25-28): Tibia with a single apophysis (it is divided apically), no dense cymbial hairs, median apophysis large and standing out widely (fig. 27) (I do not exclude with certainty that the median apophysis may be expanded in both bulbi), embolus only fairly long, guided by a translucent conductor.

(*) Not regular rows like in the family Psechridae (fig. 39).

Relationships: See above.

Distribution: Eocene Baltic amber forest.

Pseudoeoprychia triplex **n. gen. n. sp**. (figs. 22-28) photos 12-13.

Etymology: The species name refers to the existence of an unpaired tarsal claw which is well observable within a claw tuft in the holotype, from triplex (lat.) = triple.

Material: 2♂ in Eocene Baltic amber; holotype F2878/BB/CJW; paratype F1655/BB/CJW; the latter male was regarded as a possible member of *Eoprychia succini* PETRUNKEVITCH 1958 by WUNDERLICH (2012: 116).

Preservation and syninclusions: Holotype: The spider is incompletely and – except the pedipalpi – not well preserved at the corner of a 3 cm long piece of amber, a white emulsion is absent. The left legs I-III are almost completely preserved, articles of the remaining legs are partly cut off, the opisthosoma is completely cut off. – Syninclusions: 3 Isoptera, 2 Coleoptera (one is an incomplete Cerambycidae), numerous Diptera, 1 tiny Hymenoptera, 1 tiny Nematoda: Rhabditida which is less than 0.4 mm long and preserved ventrally in contact with the left metatarsus I, some questionable animal hairs and numerous plant hairs. – The paratype is preserved in a flat and muddy piece of amber, covered with a white emulsion on all sides (see the photo), dissected, the left legs II-IV (and I except metatarsus and tarsus) are completely preserved, both bulbi are cut off. – Syninclusions: 1 ½ Diptera, 1 Hymenoptera, few Acari and stellate hairs.

Diagnosis: See above.

Description (♂):
Measurements (in mm): Holotype: Prosomal length 4.0; tibia I less than 6.0; leg II: Femur 5.5, patella 1.5, tibia 5.7, metatarsus 4.5, tarsus 2.3. – Paratype: Body length 10.0, prosomal length 4.8, opisthosoma: Length 5.7, width 2.6; femur I 6.5, femur IV 5.5, tibia IV 5.0.
Colour of prosoma and legs medium brown, legs not annulated.
Prosoma (most parts are hidden) not flattened, thoracal part fairly raised, 8 eyes in two rows (fig. 22, photo 13), clypeus slightly longer than the diameter of an anterior median eye, basal cheliceral articles and fangs long. – Legs (figs. 23-24, photo) long, position prograde, order most probably I/II/IV/III, III distinctly the shortest, hairs long, bristles only fairly long, I: Femur dorsally 1/1 and 3 apically, patella 2 hair-shaped dorsally, tibia few laterally, dorsally none, ventrally 3 pairs and apicals, metatarsus about 10 and several apicals: tarsi none. Tibial suture indistinct or absent. Few tarsal trichobothria in more than a single row. Claw tufts fairly well developed, paired claws with long teeth, unpaired claw well developed. The irregular row of hairs of the calamistrum is well recognizable in the paratype, its length is ca. 70% of the length of the article. – Opisthosoma (paratype, photo) 2.2 times longer than wide, cribellum apparently large and divided, anterior spinnerets stout and closely together. – Pedipalpus (figs. 25-28): Femur and patella almost straight, tibia long, bearing partly bristle-shaped hairs (only a single one is drawn), retrolateral apophysis fairly short, divided, no dense cymbial hairs, median apophysis large and standing out widely, conductor well developed, embolus bent and fairly short, basally thick.

Relationships: See above.

Distribution: Eocene Baltic amber forest.

Eoprychiini WUNDERLICH 2004: 1509

Only a single genus: *Eoprychia* PETRUNKEVITCH 1958 (figs. 29-38)

Material of *Eoprychia ?succini* PETRUNKEVITCH 1958 and sp. indet.: F2324/BB/CJW (♂): Autotomy at the right tibia IV; F2325/ BB/CJW (♂), F2879/BB/CJW (♂): Autotomy in a typical basal position on the left tibia I; F2884/BB/CJW (♂): Body length 11 mm, claw tufts relatively weak, and F2326/BB/CJW (sp. indet., juv. ♀, fig. 29, bristles of tibia II).

Diagnostic characters (♂; adult female unknown): Ecribellate (*), most probably unpaired tarsal claw absent, claw tufts usually well developed (fig. 34), suture of the breakable male tibia existing (suture frequently non recognizable!), leg scopulae absent or weak, tarsal trichobothria existing in more than a single row, prosoma fairly depressed dorsoventrally, thoracal part raised, 6 pairs of ventral tibial I-II bristles (fig. 29), 3 eye rows (fig. 33), opisthosoma (fig. 32, photo 14) long and slender, ♂-pedipalpus (figs. 30-31, 37-38): Tibia with a single retrolateral apophysis (divided apically, not recognizable in certain positions), median apophysis large, not standing widely out, embolus only fairly long, guided by a translucent conductor.

(*) In my previous paper – 2004: 1509, 1522: fig. 44 – I regarded a structure in front of the spinnerets as a questionable and probably functionless cribellum, but now I think it more likely is a large colulus (fig. 36) similar to the extinct Eocene genus *Mizalia* KOCH & BERENDT 1854 in Baltic amber which also is a member of a basically cribellate family.

Relationships: According to the position of the eyes, the well developed claw tufts, the absence of an unpaired tarsal claw, the single tibial apophysis of the ♂-pedipalpus, the existence of dense cymbial hairs and the conformation of the structures of the bulbus the Eoprychiini may be most related to certain extant ecribellate members of zoropsid “Australian hunters”, see RAVEN & STUMKAT (2005) and fig. A.- Zoropsiini is cribellate and a brush-shaped calamistrum exists. – In the Eocene Pseudoeoprychiini (see above and fig. A) the shape of the body, the body size and the male pedipalpus are quite similar, and leg scopulae are absent, too, but Pseudoeoprychiini is cribellate, only two eye rows exist, the claw tufts are less developed, an unpaired tarsal claw is well developed (it may be hidden on some legs), tibiae I-II bear only 3 pairs of ventral bristles, dense hairs of the cymbium are absent and the median apophysis stands out widely.

Distribution: Eocene Baltic amber forest.

***Eoprychia clara* n. sp.** (figs. 35-38) photo 14.

Etymology: The species name refers to the clear body and legs of the holotype which is free of emulsion; from clarus (lat.) = clear.

Material: Holotype ♂ in Eocene Baltic amber, F2885/BB/CJW.

Preservation and syninclusions: The spider is very well preserved in a yellow piece of amber which is 5 cm long and was fairly heated. Both pedipalpi are bent below the prosoma, the body and most leg articles are preserved, parts of the right legs II and IV are cut off, the tips of the left tarsi II and III are lost. – Syninclusions: 1 Diptera, numerous particles of detritus but only few stellate hairs.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 37-38): Tibial apophysis stout and undivided, shape almost triangular, in an apical position. Smallest known species of *Eoprychia*.

Description (♂):
Measurements (in mm): Body length 5.8, prosoma: Length 2.6, hight 0.6; opisthosoma: Length 3.5, hight 1.2; leg I: Femur 4.5, patella 1.2, tibia 5.0, metatarsus 4.7, tarsus 1.5, tibia III 2.3, tibia IV 3.3.
Colour: Prosoma and legs medium grey brown, legs not annulated, opisthosoma medium grey.
Prosoma low, 8 eyes in a wide field of three rows, clypeus about as long as the diameter of an anterior median eye, basal cheliceral articles, fangs, gnathocoxae and labium long, sternum fairly prolongated between the coxae IV. – Legs (fig. 35, photo) long and slender, order I/II/IV/III, III distinctly the shortest, position prograde, hairs indistinct, bristles numerous, thin and long; leg I: Femur dorsally 1/1, prolaterally 2, retrolaterally 1, apically few, patella: apparently absent (like in the remaining patellae), tibia ventrally 6 pairs, some apicals and ca. half a dozen dorsals-laterals, metatarsus 3 ventral pairs and few laterals, tarsus none. Scopulae, tibial sutures (not recognizable?), metatarsal III-IV preening combs, calamistrum and feathery hairs absent, few tarsal trichobothria in an irregular position (more than a single row), claw tufts dense and quite short, claws not studied. – Opisthosoma (fig. 36, photo) slender, low, ca. three times longer than high, hairs of medium length, not numerous, anterior spinnerets biarticulate, stout and converging, behind a large (size 0.1 x 0.05 mm) undivided structure (fig. 36) which I regard as a colulus (*). – Pedipalpus (figs. 37 – 38): Tibia long, bearing a long retrodorsal bristle in the basal half, RTA see the diagnosis, cymbium with dense dorsal hairs in the distal third, median apophysis large, most parts of conductor and embolus hidden.

(*) See the diagnosis of the genus *Eoprychia* above.

Relationships: In the remaining congeneric species – see WUNDERLICH (2004) – the pedipalpal tibial apophysis is more slender, bent, usually more spaced from the cymbium and divided.

Distribution: Eocene Baltic amber forest.

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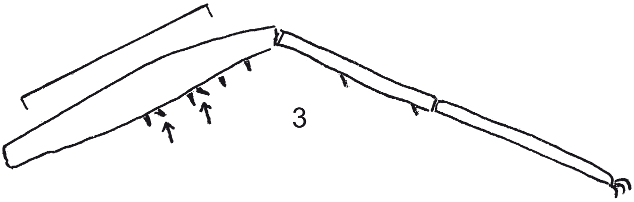
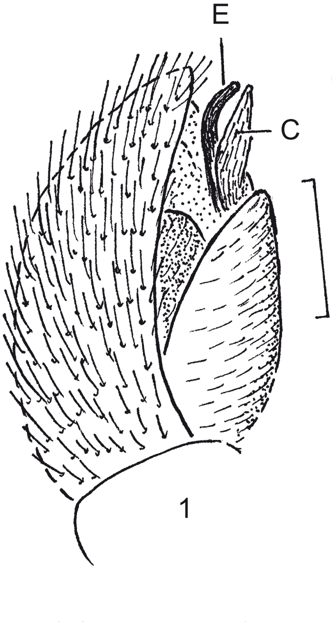
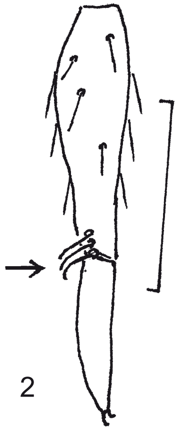






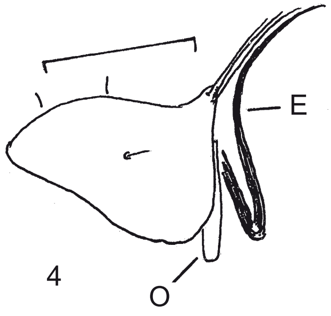
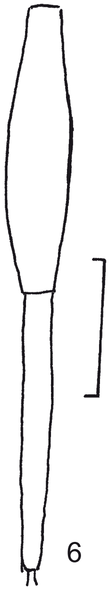
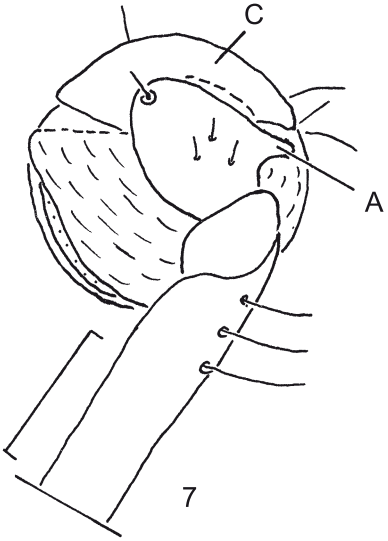


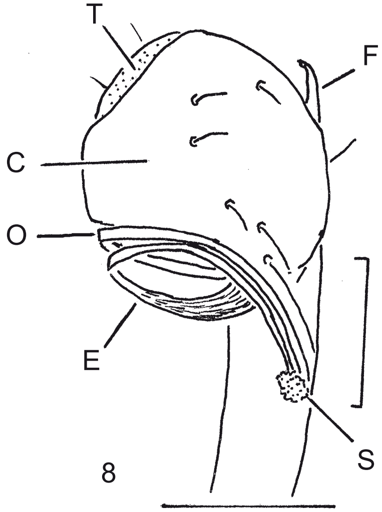
Fig. 1) *Spatiator bitterfeldensis* **n. sp.**, ♂, retrolateral aspect of the right pedipalpus. – C = conductor, E = embolus. Scale bar 0.2;

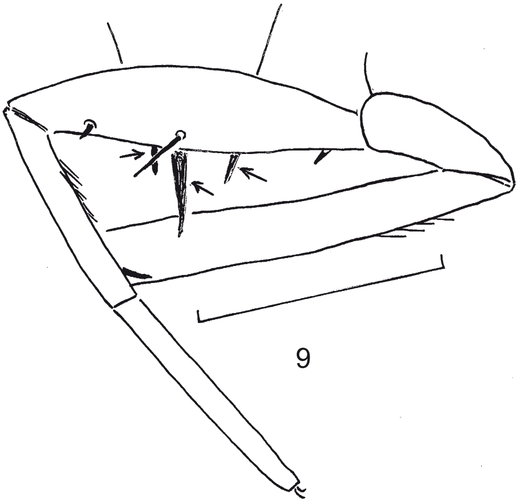
fig. 2) "*Balticonopsis " perkovskyi* WUNDERLICH 2004, holotype (♂), dorsal aspect of the right metatarsus and tarsus I. Note the three retroapical metatarsal hairs (arrow). Only few further hairs are drawn. – Scale bar 0.1 mm;

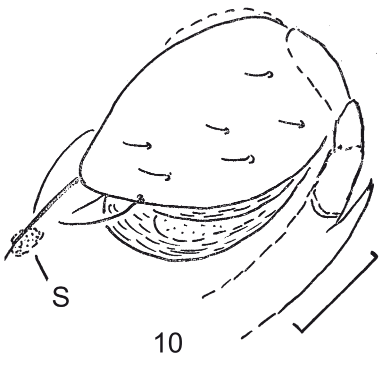
figs. 3-4: *Balticonopsis ludwigi* **n. sp.** ♂; 3) prolateral and slightly dorsal aspect of the left leg I. The arrows point to the retrolateral tibial spines. The tibia is shortened perspectively. Hairs are not drawn; 4) cymbium, conductor and embolus of the left pedipalpus, dorsal aspect. – E = embolus, O = conductor. Scales 0.5 and 0.1;





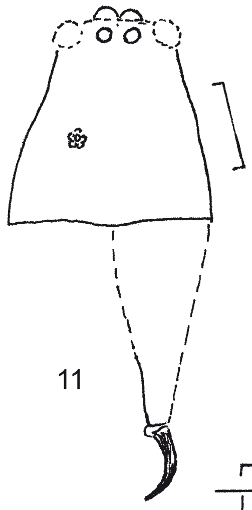


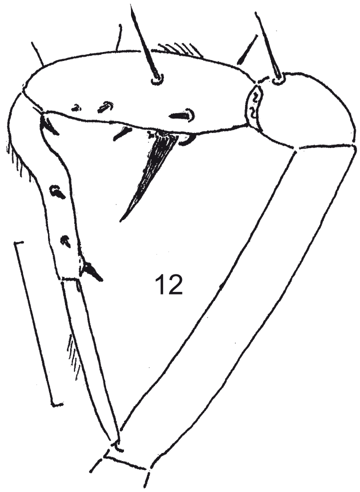


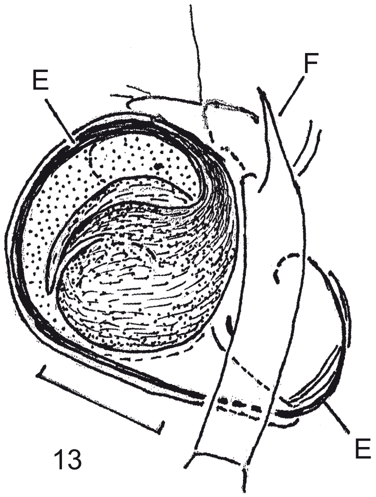


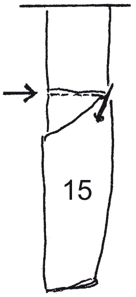
figs. 5-8: <u>*Balticonopsis metatarsalis*</u> **n. sp.**, ♂; 5) retrolateral aspect of the right tibia I. Apparently the dorsal-distal bristle is broken off; 6) dorsal aspect of the left metatasus and tarsus I. The long hairs are not drawn; 7) dorsal aspect of the right pedipalpus. Only few hairs and trichobothria are drawn; 8) apical aspect of the left pedipalpus. – A = retrolateral tibial apophysis, C = cymbium, E = embolus, F = femoral apophysis, O = conductor, S = questionable secretion on the tip of the embolus, T = Tegulum. Scale bars: 0.1 in figs. 7-8, 0.2 in figs. 5-6;

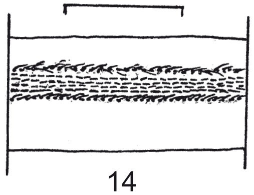
figs. 9-10: <u>*Balticonopsis distalis*</u> **n. sp.**, ♂; 9) prolateral aspect of the right leg I. The arrows point to the retroventral spines, the position of the remaining spines is prolaterally or proventrally. Only few hairs are drawn; 10) retrodorsal aspect of the left pedipalpus. – S = secretion on the embolus. Scales 0.5 and 0.1;

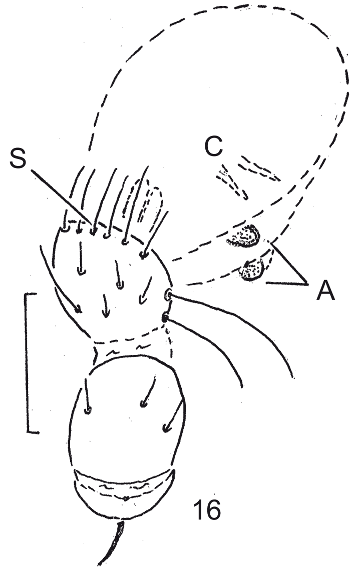


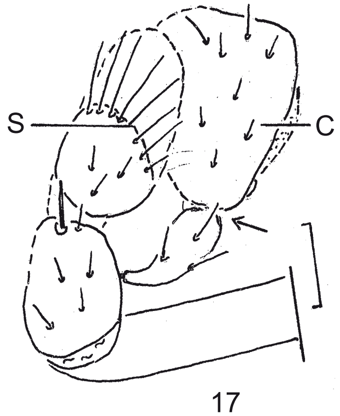








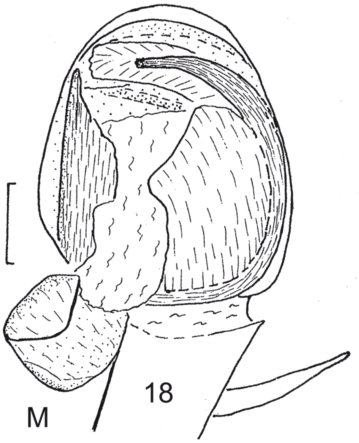


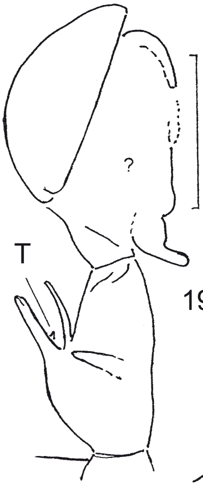


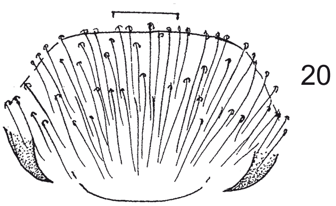
figs. 11-13: Balticonopsis dunlopi **n. sp.**, ♂; 11) anterior aspect of the prosoma with the left chelicera; 12) prolateral aspect of the right leg I. Only few hairs are drawn; 13) right pedipalpus, prodorsal aspect of the femur and ventral aspect of the bulbus. Note the long apical hairs of the cymbium which guide the embolus. – E = embolus, F = femoral apophysis. Scales 0.2, 0.5 and 0.1;

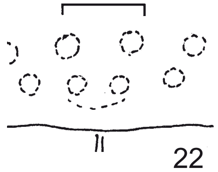
figs. 14) Psechrus luangprabang JAEGER 2007 (extant, Psechridae), ♀, retrolateral aspect of the middle part of metatarsus IV. Note the 6 regular rows of hairs of the calamistrum (not all hairs are drawn). Normal hairs are not drawn. – Scale = 0.5;

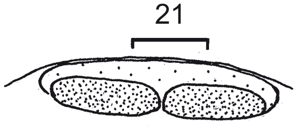
figs. 15-17: Cymbioropsis palpussutura **n. gen. n. sp.**, ♂; 15) dorsal aspect of the right patella I and the tibia I which bears a basal suture (arrow); 16) dorsal aspect of the right pedipalpus. The distal part and margin of the tibia are hidden. Note the two questionable tibial trichobothria. Only few hairs are drawn; 17) prodorsal aspect of most parts of the left pedipalpus but dorsal aspect of the cymbium. Note the long hairs near the tibial suture. The arrow points to the cymbial pseudoarticulation. Only few hairs are drawn. – A = apophyses of the bulbus, C = cymbium (with questionable apophyses in fig. 16), S = suture of the tibia. Scale bars 0.2;

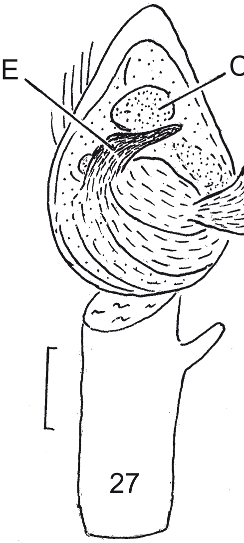


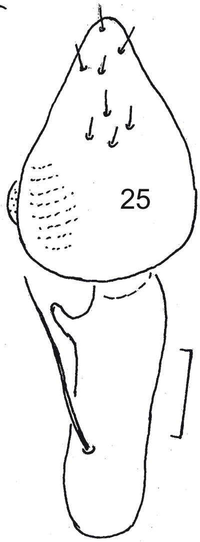


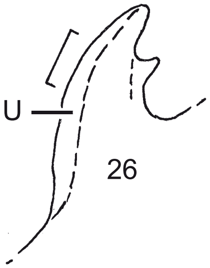


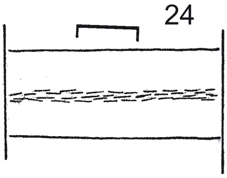










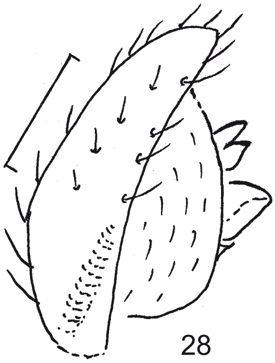


figs. 18-19) Eomatachia sp., ♂, ventral and retrolateral aspect of the right pedipalpus. Note the large median apopgysis (M) in the typical retrobasal position of this genus, and the long tibial apophyses (T). Taken from WUNDERLICH (2004). – Scales 0.1 and 0.2;

fig. 20) Eomatachia xanthippe WUNDERLICH 2004, ♀, epigyne. – Scale 0.2;

fig. 21) Eomatachia sp. indet., ♀ (F2880/BB/CJW), cribellum. – Scale 0.1;

figs. 22-28: Pseudoeoprychia triplex **n. gen. n. sp.**, ♂, holotype except fig. 24 (paratype); 22) anterior and slightly dorsal aspect of the eyes; 23) tip of the right tarsus I, retrolateral aspect. Parts are hidden. The arrow points to the strongly bent unpaired claw which is crossed by a hair. Only few hairs of the claw tuft are drawn; 24) Small part of the left metatarsus IV, retrodorsal aspect. Note the band of irregular hairs of the calamistrum. Normal hairs are not drawn; 25) dorsal aspect of the left pedipalpus. Only few haurs of the cymbium are drawn, a hair brush is absent; 26) prodorsal aspect of the tibial apophysis of the left pedipalpus; 27) ventral aspect of the left pedipalpus; 28) retrolateral aspect of the right pedipalpus with outline of the bulbus. – C = conductor, E = embolus, M = median apophysis, U = emulsion. – Scales 0.1 in figs. 23 and 26, 0.2 in fig. 24, 0.5 in figs. 22, 25, 27 and 28;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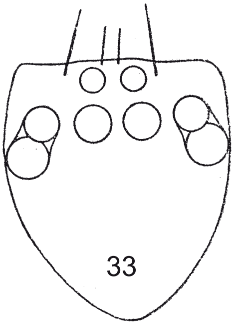
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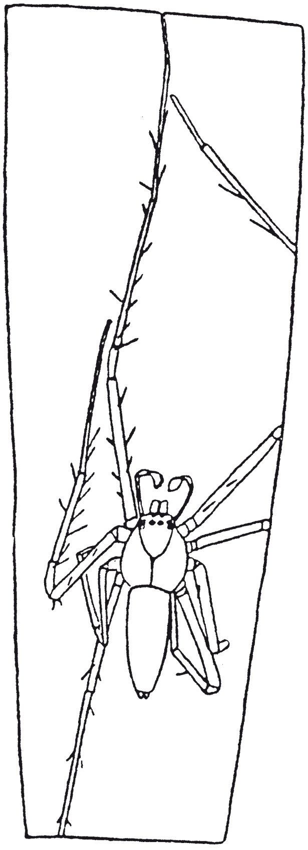
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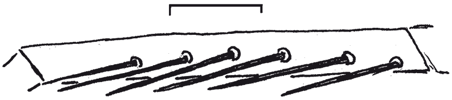
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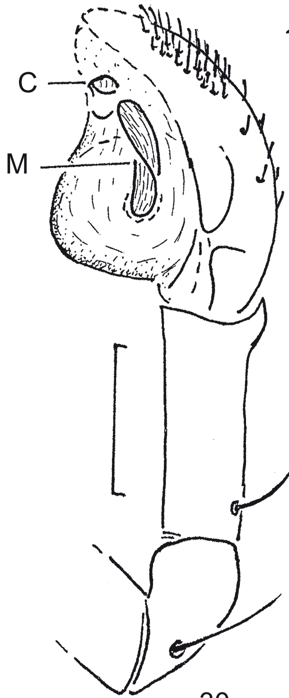

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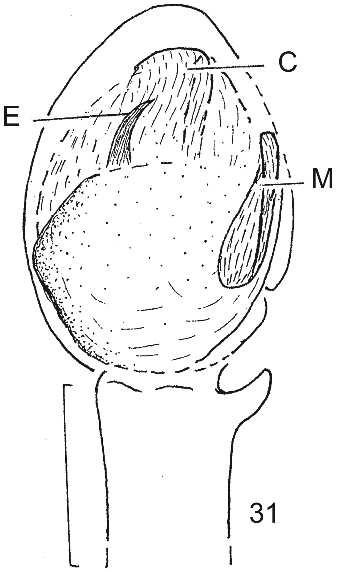

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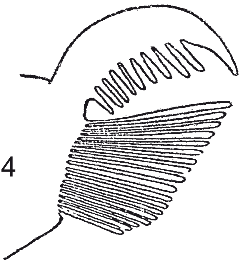
fig. 29) <u>Eoprychia</u> sp. indet., juv. ♀ (F2326/BB/CJW), proventral bristles of the right tibia II. – Scale bar 0.5;

figs. 30-31: Reconstruction of the left ♂-pedipalpus of the genus <u>Eoprychia</u>, retrolateral and ventral aspect. Note the cymbial hair brush in fig. 30. Taken from WUNDERLICH (2004) (the cymbial hair brush is added). – C = conductor, E = embolus, M = median apophysis. Scale 0.5;

figs. 32-34: <u>Eoprychia succini</u> PETRUNKEVITCH 1958, ♂ holotype; 32) dorsal aspect of the spider, body length 8.14 mm. Note the break throught the basal part of the right tibia III; 33) dorsal aspect of the eyes; 34) proclaw and claw tuft of the left tarsus II. Figs. taken from PETRUNKEVITCH 1958. – No scales;



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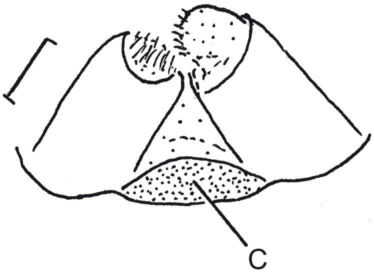

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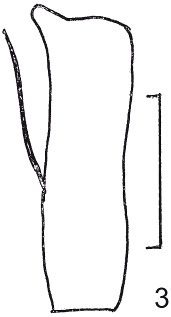

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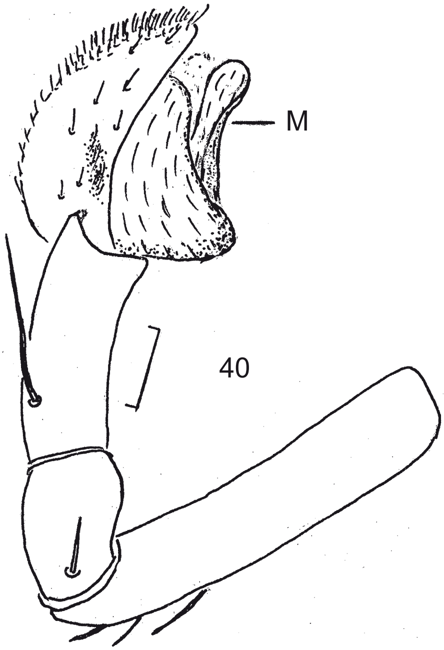

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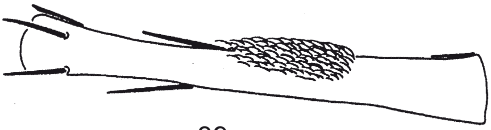

39

figs. 35-38: <u>*Eoprychia clara*</u> **n. sp.**, ♂; 35) prolateral aspect of the left tibia I. Not all of the thin bristles are drawn; 36) anterior spinnerets and questionable colulus (C); 37) prodorsal aspect of the left pedipalpal tibia. Hairs are not drawn; 38) oblique retrobasal aspect of the left pedipalpus. The median apophysis (M) appears enlarged in this position. – Scales 0.1 in figs. 35-36, 0.2 in figs. 37-38;

fig. 39) <u>*Zoropsis media*</u> (extant, Zoropsidae), ♀, metatarsus IV, showing the calamistrum. Taken from JOCQUE & DIPPENAAR-SCHOEMAN (2007).

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NEW EXTINCT TAXA OF THE ARACHNID ORDER RICINULEI, BASED ON NEW FOSSILS PRESERVED IN MID CRETACEOUS BURMESE AMBER

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Abstract: The Cretaceous families Hirsutisomidae **n. fam**. and Monooculricinuleidae **n. fam**. (Arachnida: Ricinulei: Suborder Primoricinulei WUNDERLICH 2015) in Burmese amber from Myanmar (Burma) are described including five new species of two genera: *Hirsutisoma* **n. gen**: *acutiformis* **n. sp**., *bruckschi* **n. sp**., *denticulata* **n. sp**., and *Monooculricinuleus* **n. gen**.: *incisus* **n. sp**. and *semiglobolus* **n. sp**. The first known fossil adult male of the order Ricinulei, a dwarf member of the genus *Hirsutisoma* is described. The relationships of ?*Poliochera cretacea* WUNDERLICH 2012 (suborder Posteriorricinulei) remain unsure. Findings of the fossil taxa provide new insight on the basic characters, the relationships, the evolution, the extinction, the life style, the behaviour and the biogeography of the order Ricinulei; a revised diagnosis of this order is given. The present fossils document examplarily the change of the life style during hundred million years in a whole arthropod order, the Ricinulei. Probably “modern” (post-mesozoic) spiders (Araneae) of the RTA-clade displaced/restricted the members of a whole arthropod order – the Ricinulei – to hidden species of a relict taxon of today. The taxonomy of the diverse Cretaceous Ricinulei remains not well-known but especially the Carboniferous ricinuleid taxa need a revision. Notes are given on the enigmatic Carboniferous genus *Idmonarachne* GARWOOD et al. 2016 – which is considered here to be probably a member of the order Trigonotarbida, not close to the order Araneae –, and on the Devonian genus *Palaeocharinus* HIRST 1923 (Trigonotarbida). It is not excluded that Ricinulei and Trigonotarbidae have to be united in a single order, the Trigonotarbida.

Key words: Amber, Arachnida, Araneae, behaviour, Burmite, Carboniferous, Cretaceous, fauna, France, Hirsutisomidae, *Idmonarachne*, Monooculricinuleidae, Myanmar, phylogeny, *Poliochera*, Posteriorricinulei, Primoricinulei, Primoricinuleidae, Ricinulei, taxonomy, Trigonotarbida.

Acknowledgements: For leaving fossil material I thank KLAUS-PETER BRUKSCH, CARSTEN GRÖHN, PATRICK MÜLLER, and RAINER OHLHOFF; for comments I thank JASON DUNLOP.

Techniques: See WUNDERLICH (2015a).

The expensive fossil material is partly still kept in the private collection of the present author, of CARSTEN GRÖHN and of PATRICK MÜLLER and will be given – that will be published later – to a scientific institution like the SMF. Parts of recently described material of the coll. JW (CJW) have been given to the Senckenberg Museum für Naturkunde Görlitz (AXEL CHRISTIAN), so most of the Ricinulei: *Poliochera cretacea* WUNDERLICH 2012, *Primoricinuleus pugio* WUNDERLICH 2015 as well *Opilioacarus aenigmus* DUNLOP et al. 2008 (Acari).

Introduction

Occasionally fossils provide surprising new conclusions on the evolution and on the relationships of high taxa. Examples are the early evolution and radiations of spiders – see WUNDERLICH (2015a and this volume) – and of birds; both are still discussed controversely.

The recent discovery of an extinct Cretaceous suborder of the Ricinulei ("Hooded Tickspiders"; Kapuzenspinnen in German) in Burmese amber (of Myanmar), the Primoricinulei – see WUNDERLICH (2015b) – as well as the peculiar new genera *Hirsutisoma* and *Monooculriculeus*, members of two new families of this suborder which are described below, are among the most important new discoveries of fossil arthropods of the Cretaceous (*). See also the palaeozoic Uraraneida (**). These fossils allow important conclusions on the phylogeny, on the relationships, the life style, the biogeography, the sexual and the prey-capturing behaviour of the fossils species as well as members of the whole order. The characters of the Cretaceous fossils of the suborder Primoricinulei require a distinctly modified new diagnosis of the order Ricinulei.

(*) The insect suborder Mantophasmatodea of the order Notoptera (= Grylloblattodea) was first identified in Baltic amber, later on discovered in Cretaceous Burmite, in stone from the Jurassic and even as extant relicts.

(**) The extinct arachnid taxon Uraraneida SELDEN et al. 1991 is usually regarded as an order but was – with hesitation – downgraded to the rank of a suborder of the order Araneae CLERCK 1757 and regarded as the sister suborder of the Araneida CLERCK 1757, see WUNDERLICH (2015a). This downgrading appars subjective, see the paper on the Mesothelae and on fossil spiders in Burmite in this volume.

Taxonomy, extinction and some general remarks (see also below)

Ricinulei (photos 15-35, figs. 1, 10-11, 19, 21) are strongly sclerotized, dorso-ventrally depressed, short legged and mainly tropical arachnids. A SINGLE FAMILY is distributed today worldwide, in the Americas and in Africa, but is absent in Eurasia and Australia. Fossil Palaeozoic proofs of two families exist of North America and Europe (in stone); recently they were discovered in South East Asia: in Burmese amber, see WUNDERLICH (2012, 2015a, b). The recent report of FOUR families solely in Cretaceous Burmite indicates a much wider distribution of this RELICT ORDER in former epochs, including Asia. Probably extant Ricinulei will be found somewhere in the tropical Asia in the future. – FOSSIL Ricinulei are already known from the Carboniferous (two families, preserved in stone), see SELDEN (1992), DUNLOP & PENNEY (2012). In amber are Ricinulei quite rarely reported and are only known in Mid Cretaceous Burmite from Myanmar (Burma), recently described by WUNDERLICH (2012: ?*Poliochera*, and 2015b: *Primoricinuleus*). Remarkably, members of both suborders – Primoricinulei and Posterricinulei – are preserved in the same kind of amber, Burmite, where members of both suborders are not too rare; I saw more than three dozen specimens. The males of *Hirsutisoma* n. gen. are the first known adult fossil males of this order and documents the existence of gonopods on the third leg (figs. 7-9, photos) of this extinct suborder – it is connected with the unique ricinuleid copulatory behaviour, see COOKE (1967) –, already 100 million years ago. With a body length of 2.8 mm of the male of *Hirsutisoma bruckschi* n. sp. (up to ca. 3.5 mm in the female) it represents the smallest known taxon of this order; the body length of extant and other adult (?) fossil members is 4 to 10 mm. In contrast to all other known extant and fossil Ricinulei existed triads of lateral eyes (figs. 2-3) in the new genus *Hirsutisoma* (as well as probably in other Cretaceous Primoricinulei like *Primoricinuleus pugio* WUNDERLICH 2015b); a striking single lateral (?) eye ("monad") (figs. 30-31) on each side of an prosomal elevation existed in *Monooculricinuleus*. Eyes other than diads of extant and fossil Ricinulei were not reported by MIETHER & DUNLOP (2016: 111). – EXTINCTION: Why were Ricinulei quite diverse in the Cretaceous in (at least SE-) Asia and are extinct in Asia today? Probably the absence of advanced entelegyne spiders of the RTA-clade like Clubionidae and Sparassida in the Cretaceous caused the diversity and frequency at that aera, and the radiation of members of the RTA-clade – ground-living spiders and dwellers of tree truncs – after the KT-events 65 million years ago caused the extinction of the Ricinulei in SE-Asia latest in the Palaeocene.

Emended diagnosis of the order Ricinulei (see below):

Ricinulei are well diagnosed by their autapomorphic characters (see also below):

(1) the unique existence of a "hood" (cucullus) (figs.2, 10-11, 24), a larger anterior plate-shaped structure of the prosoma which can be raised and lowered over the mouth parts and the chelicerae. It may remind one of the visor of knights of the Middle Ages which helped to protect parts of the face during a fight. Moving down the cucullus the members of the Ricinulei are able to protect their mouth parts against enemies);

(2) existence of reduced trachaeae (in contrast to book lungs in the Trigonotarbida);
(3) existence of a penis which is quite tiny and hidden situated on the pedicel (!), see LEGG (1977), TALARICO et al. (2008, fig. 1);
(4) the male leg III functioning as a copulatory organ (gonopodium) (figs. 7-8, 21, photos) (formed by the tarsi 1 and 2, see TALARICO et al. (2008: Fig.1b) for an indirect transfer of spermatozoa, specialized, complicated and partly thickened (analogous to the male pedipalpus of spiders in which contrarily a peculiar embolus exists and usually no spermatophores, except in the Telemidae);
(5) the lengthened (but not antenniform) leg II functiones as "feeler" (and captural leg in the Posteriorricinulei); the remaining legs are used for walking. (In most other arachnid orders, including most Acari, leg I is longest, but not in derived Opiliones),
(6) unpaired tarsal claw: absent (in the Primoricinulei, see WUNDERLICH (2015: 423, figs. 5-6) or blunt (in the Posteriorricinulei, fig. 18). (A pointed and well developed unpaired claw exists in the extinct related Trigonotarbida, see WUNDERLICH (2012: 244, fig. 8));
(7) loss of the median eyes which exist in the extinct sister group Trigonotarbida. But see the family Monooculricinuleidae.
(8) Cheliceral fangs (claws) working against each other (figs. 21, 24) similar to araneomorph spiders (in contrast to their parallel position in the Trigonotarbida which are similar to mygalomorph spiders).

Several other characters are not diagnostic for the Ricinulei if all fossil taxa are included, see the remarkable mixture of characters of the two suborders (tab. 1) which demonstrate their "mosaic-like evolution":

- a special LOCKING MECHANISM between prosoma and opisthosoma is shared by the Trigonotarbida, see DUNLOP et al. (2009: 311);
- convex eye lenses are absent in extant taxa (see fig. 19) but lateral eye diads (fig. 15), a single lateral eye (figs. 30-31) or even the basically existing triads (figs. 1-2, 10, photo 15) existed in extinct taxa;
- usually the opisthosoma is divided longitudinally dorsally and ventrally with rows of scuta which are typical in most extant (fig. 19 but see fig. 15), several Cretaceous (photo 25), and in the Carboniferous fossil taxa; but see the Primoricinulei;
- the sternum is usually tiny (in the Posterricinulei, fig. 21) but wide/large in the Primoricinulei (figs. 11, 24);
- the tarsal claws are distinctly retractable in most fossil and extant taxa (fig. 23) but less rectable in the Cretaceous Primoricinulei;
- the pedipalpi may bear pincers, are slender and positioned more ventrally in extant (figs. 22-23) and fossil taxa of the Posteriorricinulei, but in the Primoricinulei (figs. 2, 12, 26, photo 22) their raptorial articles are stout, a pincer is absent – only a single "CLAW" exists –, and their position and function are more anteriorly.

Further characters of the Ricinulei (also existing in certain other arachnid orders) are
- strongly armoured legs and body;
- dorso-ventrally depressed body;
- absence of leg trichobothria (*);
- tarsi with numerous segments, reduced/absent unpaired claw, paired claws with tiny teeth (figs. 6, 18) at least in certain taxa of both suborders;

- legs III and IV with double trochanters;
- metasoma (pygidium) (figs. 19, 21) short/small and rectable;
- the existence of spermatophores (**).

(*) Leg trichobothria are also absent in other arachnid orders: In the related extinct Trigonotarbida, in the Opiliones, in the Solifugae, certain Acari as well as in the Scorpiones in which the pedipalpi bear trichobothria. The numerous long leg hairs may contradict the existence of trichobothria in the Solifugae, the armoured leg articles may be responsible for their absence in the remaining orders in question.

(**) See COOKE (1967) who described the copulatory structures of the gonopodium, the copula and a globular spermatophore.

PRIMORICINULE	POSTERIORRICINULEI
pedipalpus ending in a single "claw" of a stout article, directed more anteriorly (figs. 11-12)	pedipalpus slender, ending in a pincer of a slender article, **directed below the prosoma** (figs. 21-22)
usually dorsal opisthosomal scuta **not distinctly divided longitudinally** (figs. 1, 10)	usually tergites divided into median and lateral plates, so in most extant taxa (fig. 19)
eyes larger, basically in triads (figs. 1-3)	**eyes in diads or strongly reduced** (figs. 15, 19)
sternum wide (figs. 11, 24)	**sternum strongly reduced, narrow** (fig. 21)
loss of the unpaired tarsal claw	**blunt unpaired tarsal claw** (fig. 18)

Tab.1. Selected characters of the ricinuleid suborders Primoricinulei and Posteriorricinulei which I regard as apomorphic (in bold print) rsp. plesiomorphic.

NOTE: Sexual dimorphic outgrowths of certain male legs – besides III – exist in several taxa of the Posteriorricinulei, at least in extant members, see e. g. fig. 21 in PLATNICK & PAZ S (1979). Such modifications are absent in the single known adult male of the Primoricinulei, see below and figs. 4-5.

Key to the families and genera of the suborder Primoricinulei in Burmite:

1 Opisthosoma dorsally in the anterior two thirds with striking long hairs and strongly concave, triads of the lateral eyes (figs.1-3, photo 18). *Hirsutisoma* n. gen. . . . . Hirsutisomidae **n. fam**.

- No such opisthosomal hairs and shape 2

2(1) Cephalic part strongly raised, this elevation bears a single pair of eyes (figs. 30-31, 34). *Monooculricinuleus* n. gen. . . . . Monooculricinuleidae **n. fam**.

- Cephalic part low, three (or only two?) lateral eyes (fig. 10). *Primoricinuleus* WUNDERLICH 2015 . . . . Primoricinuleidae WUNDERLICH 2015

Remarks on new fossil material of the Posteriorricinulei in Burmite besides the named taxa below:

(1) Specimens of the coll. CARSTEN GRÖHN:

9 juv. preserved in a single piece which is 3.8 cm long, body length of the specimens 1.8-2.7 mm, inv. no. 11094.

(2) Specimens of the coll. PATRICK MÜLLER:

A juvenile specimen inv. no. BUB 22. Photo 26.
It is well preserved in a yellow piece of amber, a loose pedipalpal pincer is preserved in front of the specimen. Body length 1.85 mm. The undivided tergites and two pairs of eyes are well observable.

1 ½ ?juveniles (or females) in the same piece of amber, inv. no. BUB 19.
The arachnids are well preserved in a yellow piece of amber, deformed and darkened by pressure by the preservtion; the pedipalpi are well observable. Body length of the complete specimen 4.3 mm. The eyes are hidden, an unpaired tarsal claw is absent.

(3) Specimens of the coll. JOERG WUNDERLICH (CJW):

1 ?ad. ♀, F2946/BU/CJW, body length 4 mm. – 1 ?juv., F3066/BU/CJW, body length 2.4 mm. – 5 ?ad. ♀, F3065/BU/CJW, body length ca. 4 mm, and a tiny juvenile.
Also existing are few Ricinulei indet. without an inv. no.

Remark on ?*Poliochera cretacea* WUNDERLICH 2012 and on the opisthosomal scuta:
With hesitation ?*poliochera cretacea* was originally regarded as a member of the genus *Poliochera* SCUDDER 1884 of the extinct family Poliocheridae. Based on the deformed opisthosoma of the holotype of this species I was (and I am) not sure about the relationships of this species, see WUNDERLICH (2012: 240). Longitudinal rows of dorsal opisthosomal scuta are absent in certain Carboniferous species of the genus *Curculioides* BUCKLAND 1837 of the family Curculioididae COCKERELL 1916.
Longitudinal rows of dorsal scuta of the opisthosoma (and furrows) are apparently absent in the holotype in question but distinctly developed in several fossils in Burmite (see fig. 15, photos) which may be members of undescribed taxa.

Notes on the family PRIMORICINULEIDAE WUNDERLICH 2015:

Type genus (by monotypy): *Primoricinuleus* WUNDERLICH 2015.

Diagnosis and relationships: See WUNDERLICH (2016: 417f) and the key to the families above. The number of the lateral eyes is still unsure, triads may exist or only diads.

DESCRIPTIONS OF THE NEW TAXA OF THE PRIMORICINULEI

HIRSUTISOMIDAE n. fam.

Etymology: The name refers to the hairy opisthosoma, based on hirsutus (lat.) = hairy and soma (gr.) = body.

Type genus (by monotypy): *Hirsutisoma* n. gen.

Diagnosis: Opisthosoma (fig. 1, photos 16, 23) dorsally with long hairs in the anterior two thirds and strongly concave (inclined), ventrally distinctly convex, scutate and entire (undivided) (*) male leg III (gonopod) as in figs. 7-9, bearing a long and whip-shaped structure. Smallest known Ricinulei, body length only 2.5 – ca. 3.5 (♀) mm.

(*) best observable in the female of the coll. PATRICK MÜLLER.

Further characters: Eyes in triads (figs. 1-3), legs I, II and IV without sexual dimorphic outgrowths.

Relationships: According to the wide sternum, the large eyes in triads, the absence of an unpaired tarsal claw, the structures of the pedipalpus, and the absence of a sexual dimorphism in the male legs *Hirsutisoma* is a member of the suborder Primoricinulei. In the Primoricinuleidae and in the Monooculricinuleidae the structures of the prosoma and/or opisthosoma and/or the number and the position of the eyes are different, see the kee above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Hirsutisoma **n. gen.** (figs. 1-9, photos 15-24)

Etymology: See the type genus.

The gender of the name is feminine.

Type species: *Hirsutisoma bruckschi* n. sp.

Diagnosis and relationships: See above.

Life style: See below.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Hirsutisoma bruckschi **n. gen. n. sp.** (figs. 1-9), photos 15-17

Derivatio nominis: It is a pleasure to me to dedicate this species to KLAUS-PETER BRUCKSCH who sent me the holotype of this peculiar species and discovered its unusual eye triads.

Material in Mid Cretaceous Burmese amber: Holotype ♂ and a separated piece of amber, F2830/BU/CJW. Most probably the holotype will be deposited in a Senckeberg institution like previous type material of my collection, see above.

Preservation and syninclusions: The male is well and almost completely preserved in a clear yellow piece of amber which is up to 10 mm long, a fissure runs through its opisthosoma, a weak emulsion and tiny bubbles hide ventral parts of the body, few loose (broken off) parts of the whip-shaped structure of the gonopod (fig. 9) are preserved in front of the arachnid, most legs are bent fairly downward (photo), the cucullus has an oblique position (photo 15), the opisthosoma looks incomplete, injured or partly dissected, dorsally apparently strongly depressed in the anterior part. – Syninclusions: Some loose opisthosomal hairs of the fossil and few small balls of questionable arthropods excrement are also preserved, one of these balls bears long opisthosomal hairs of the holotype on its surface. Furthermore some tiny plant hairs and a tiny part of an arthropod leg are preserved as well as – in the separated piece of amber – a tiny leg of an insect.

Diagnosis (♂; ♀ unknown): Pedipalpal tibiotarsus (fig. 2) dorsally with a dense field of longer hairs. Opisthosomal hairs up to ca. 1.2 mm long, (cheliceral claws hidden).

Description (♂):
Measurements (in mm): Body length 2.8; prosoma: Length without cucullus ca. 1.1, width ca. 1.0; cucullus: Length 0.4 width 0.45; opisthosoma: Length 2.0, width ca. 1.5; legs (see the drawings), tibia I 0.65, tibia II 0.75, tibia IV 0.85, femur IV 0.95; pedipalpus: Tibiotarsus 0.29, movable “finger” 0.23.
Colour mainly grey brown, opisthosomal hairs and the whip-shaped gonopod structure dark brown.
Prosoma (figs. 1-3, photo) 1.2 times longer than wide, convex, finelly corniculate (the surface is not clean), hairs short, two triads of larger eyes with convex lenses in the anterior half, cucullus large, wider than long, mouth parts hidden, sternum poorly observable, similar to fig. 24. – Pedipalpus (fig. 2) in a more anterior position, raptorial, with stout articles, movable finger (apothele) long and fairly bent, fixed finger absent, tibiotarsus with a dense field of longer dorsal hairs. – Legs (figs. 4-6) strongly sclerotized, fairly short, order II/IV/I/III, hairs short, bristles and trichobothria absent, articulation apparently as in *Primoricinuleus pugio* WUNDERLICH 2015, unpaired tarsal claw absent, paired claws long and slender, bearing tiny teeth, not or only slightly retractable. Long hairs of the claw tufts which are spatulate apically. Leg III: the copulatory organ (gonopodium) (figs. 7-8) with stout articles, several apophyses, a long and blunt tarsal 1 apophysis, a further slender apophysis as well as a long, slender, whip-shaped flexible, sclerotized apophysis which may be not (much) shorter than the body of the male, originating probably at the base of tarsus 1, and wrapped around the article. – Opisthosoma (fig. 1, photos) (it may be injured), incomplete, see above, and is ventrally partly covered with an emulsion) distinctly longer than wide, dorsally covered with long hairs which are up to ca. 1.2 mm long, adpressed and directed posteriorly, apparently scuta of the ventral side are observable, the ventral side is scutate or leathery, the metasoma is retracted, the connection between prosoma and opisthosoma is hidden.

Relationships: In the remaining known species a dense field of longer hairs of the pedipalpal tibiotarsis are absent, in *dentata* the opisthosomal hairs are longer.

Distribution: Mid Cretaceous Burmese amber forest.

***Hirsutisoma acutiformis* n. gen. n. sp.** (figs. 24-26) photos 18-28

Etymomolgy: The species name refers to the pointed and very slender (needle-shaped) cheliceral claw, from (lat.) acutus = pointed.

Material: Holotype ♀ in Mid Cretaceous Burmite, coll. CARSTEN GRÖHN no. 11100.

Preservation and syninclusion: The female is very well and almost completely preserved in a yellow piece of amber, two bubbles hide the right eyes, the left eyes are deformed. – Syninclusions: 1 small Coleoptera, 2 Collembola, few Acari, 1 small questionable insect larva, tiny eggs and excrement of insects, and small particles of earth; 2 small particles of siliceous pebbles are preserved dorsally-posteriorly on the opisthosoma.

Diagnosis (♀; ♂ unknown): Cheliceral fang long and thin (figs. 24-25), pedipalpal tibiotarsus as in fig. 26, opisthosomal hairs up to ca. 1.1 mm long.

Description (♀):
Measurements (in mm): Body length 3.1, prosoma: Length 0.9, width 0.85; femur IV 0.9, basitarsus IV 0.75; sternum: Length and width ca. 0.28.
Colour: Prosoma and legs grey brown, opisthosoma dark brown.
Prosoma (figs. 24-25, photo) slightly longer than wide, partly hidden by an emulsion, eyes apparently as in *H. bruckschi*, cucullus wide, cheliceral claws long and thin, pedipalpus (fig. 26) raptorial, gnathocoxae large, sternum large, widely spacing the coxae. – Legs (photo) except III similar to *bruckschi*. – Opisthosoma (photo) dorsally bearing long hairs in the anterior two thirds, inclined posteriorly, probably incomplete, ventral scuta well developed.

Relationships: In *H. bruckschi* the pedipalpal tibiotarsus bears a dense field of longer dorsal hairs, in *dentata* the cheliceral fang bears a pointed dorsal hump, and the opisthosomal hairs are longer.

Distribution: Mid Cretaceous Burmese amber forest.

***Hirsutisoma dentata* n. gen. n. sp.** (figs. 27-28) photos 21-22

Etymology: The species name refers to the dent-like pointed hump on the cheliceral fang, from dentatus (lat.) = toothed.

Material: Holotype ♀ in Mid Cretaceous Burmite, coll. PATRICK MÜLLER no. BUB-76.

Preservation and syninclusions: The female is well preserved in a yellow piece of amber under convex surfaces, parts of its body – especially the ventral side – are covered with a white emulsion, the dorsal-posterior part of the opisthosoma is distinctly inclined (concave), the chelicerae and the pedipalpi are fairly well observable, the eyes are badly recognizable, the cucullus is fairly deformed, parts of the left pedipalpus and parts of the left leg II are cut off. – Syninclusions: The larva of a Hymenoptera, 1 Thysanoptera, 1 Coccoidea, few Acari, numerous plant hairs and particles of detritus.

Diagnosis (♀; ♂ unknown): Cheliceral fang (fig. 27) relatively thick and bearing dorsally a pointed hump, pedipalpal tibiotarsus (fig. 28) with long ventral hairs mainly in the dital half, opisthosomal hairs up to ca. 1.5 mm long.

Description (♀):
Measurements (in mm): Body length ca. 3.5, prosomal length ca. 1.0, right femur III 1.1, opisthosomal hairs up to ca. 1.5.
Colour mainly medium brown.
Prosoma (most parts are covered with a white emulsion) (photo): Cucullus large and hairy, slightly deformed; chelicera and pedipalpus: See the diagnosis. – Legs (photo) slender, except III apparently quite similar to *H. bruckschei*. – Opithosoma (photo) partly covered with a white emulsion, with long dorsal hairs which are directed backward in the anterior two thirds, distinctly depressed in the posterior half, with a transverse fold in the posterior third.

Relationships: See *H. bruckschi*. In *H. acutiformis* a pointed hump of its distinctly more slender cheliceral fang is absent.

Distribution: Mid Cretaceous Burmese amber forest.

Hirsutisoma sp. indet.

Material:

(1) 1 ad. ♂, coll. PATRICK MÜLLER (still no. inv. no.). Photo 23.
The male is excellently preserved, including its copulatory organs, parts of the left legs are cut off, the sternum is fairly deformed and apparently more narrow than in other related species, the body length is 4.1 mm, the hairy opisthosoma is dorsally longitudinally and transversely divided.

(2) 1 ?juv. ♀ in Mid Cretaceous Burmese amber and a separated piece of amber, coll. PATRICK MÜLLER no. BUB 88.
The specimen is excellently preserved in a clear yellow piece of amber, only the left leg IV is missing beyond the coxa (?).
The body length is 2.5 mm, the prosoma length is 0.9 mm. The basic characters are as in the genus, the opistosoma is ventrally covered by a well observable large and apparently entire sctutum.

MONOOCULRICINULEIDAE n. fam.

Etymology: The name refers partly to the order Ricinulei and partly to the single lateral eye on the side of the cephalic elevation, from mon-/mono- (gr.) = single and oculus (lat.) = eye.

Type genus (by monotypy): *Monooculricinuleus* n. gen.

Diagnosis (♀; ♂ unknown): Prosoma with a large cephalic elevation which bears only a single pair of eyes on its side (figs. 30-31, 34), cucullus (deformed?) not wide (fig. 34), opisthosoma with an entire dorsal scutum at least in *semiglobosus* and at least 5-6 wide sternites which are not divided longitudinally (photo). Pedipalpus (figs. 32, 34) without distinctly thickened articles in a more parallel position, a stout tibiotarsus and a long movable "finger".
Notes: (1) Remarkably the – really lateral? – eyes possess a quite median position if compered with the lateral eyes of other Ricinulei. – (2) Unfortunately the position of the cheliceral "fangs" is unknown. – (3) Questionable sac-like ventral structures of the opisthosoma: See *M. incisus* n. sp.

Relationships: According to the entire dorsal opisthosomal scutum, the shape and the position of the large pedipalpus which bears a single claw-shaped movable "finger" and the absence of an unpaired tarsal claw Monooculricinuleidae is a member of the suborder Primoricinulei. In the remaining known fossil and extant taxa of the Ricinulei a cephalic elevation is absent and the number of the eyes (in the extant taxa – members of the suborder Posterricinule – exist only remains of lenses) is larger; see the key to the families. Certain characters like the structures of the prosoma – including the remarkable position of the eyes somewhat intermediate between median and lateral eyes –, the ventral plates of the opisthosoma as well the questionable sac-like opisthosomal structures (photo) reminds on characters of the Trigonotarbida.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Monooculricinuleus **n. gen.**

Etymology: See above.

The gender of the name is masculine.

Type species: *Monooculricinuleus semiglobosus* n. sp.

Further species: *Monooculricinuleus incisus* n. sp.

Diagnosis, relationships and distribution: See above.

***Monooculricinuleus semiglobosus* n. gen. n. sp.** (figs. 30-33) photos 27-28

Etymology of the species name: The name refers to semiglobose shape of the cephalic elevation, from semi- (lat.) = half, and glob- (lat.) = globe-shaped.

Material: Holotype ♀ (adult?) in Mid Cretaceous Burmite, F3012/BU/CJW.

Preservation and syninclusions (photos): The fossil is preserved in an almost disc-shaped and up to 1 ½ cm long yellowish piece of amber, strongly decomposed and partly dissected, most probably the cucullus is lost, most articles of the 8 legs are preserved, the distal articles or the right leg IV and the pygidium are cut off, the mouth parts and most parts of the sternum are partly hidden by an emulsion. – Larger particles of detritus exist directly on both sides as well as anteriorly-dorsally of the fossil, remains of plants like hairs are also preserved.

Diagnosis: An opisthosomal incision is absent (fig. 30, photo).

Description (♀):
Measurements (n mm): Body length 5.0, prosoma: Length ca. 1.2, width ca. 1.6; opisthosoma: Length 3.8, width 3.1, width of the sternum between the coxae II ca. 0.3, metatarsi: I 1.1, II 1.55, III 1.1, IV 1.9.
Colour: Prosoma and legs light brown, opisthosoma dorsally medium brown.
Prosoma (figs. 30-31) ca. 1.3 times longer than wide, deformed, bearing tiny granulations, cephalic part with a semiglobular dorsal outgrowth which bears a single large lateral eye on each side; cucullus apparently lost (hidden?), mouth parts hidden or partly lost; sternum only fairly wide (ca. 0.3 mm). – The deformed large pedipalpi (fig. 32) are partly covered with an emulsion, bear thickened articles, and a long/strong movable "finger". – Legs (fig. 33, photo) only fairly long, most articles dissected, II distinctly longer than I, IV longest, III shortest, tarsi with long ventral hairs. Paired claws long, bearing numerous small teeth, unpaired claw absent. – Opisthosoma (fig. 30, photo) 1.23 times longer than wide, flattened, dorsally finelly granulate, completely covered with an undivided scutum, hairless, ventrally with at least 5 wide plates (sternites) which are not divided longitudinally, sac-like structures near the geniral opining not recognizable; pygidium cut off.

Relationships: In *M. incisus* n. sp. exists an opisthosomal incision.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Monooculricinuleus incisus* n. gen. n. sp.** (fig. 34) photos 29-30

Etymology of the species name: The name refers to the anterior dorsal opisthosomal incisum, lat. = incision.
Material: Holotype juv. ♀ in Mid Cretaceous Burmite, F3037/BU/CJW.

Preservation and syninclusions: The holotype is almost completely preserved (the left tarsus IV is partly cut off) in a yellow muddy piece of amber, partly decomposed, deformd and covered with an emulsion, probably the left eye is recognizable. – Syninclusions are a larger "bubble" in contact with the right side of the body and numerous small to tiny particles of detritus.

Diagnosis (♀; ♂ unknown): Opisthosoma dorsally anteriorly with a distinct incision (fig. 34, photo).

Description (♀):
Measurements (in mm): Body length 2.5; prosoma: Length ca. 0.6, width ca 0.75; opisthosoma: Length 2.0, width 1.7; femur II ca. 0.85.
Colour mainly dark brown below the emulsion.
Prosoma (fig. 34, photo) deformed, wider than long, cephalic part with a semiglobular dorsal outgrowth which bears a single large lateral eye on each side (the left eye may be recognizable), cucullus apparently strongly deformed and directed foreward between the pedipalpi, mouth parts and most parts of the sternum hidden, sternum fairly narrow. – Pedipalpus: articles (photo) fairly thickened, partly hidden, movable finger long and slender, needle-shaped. – Legs (photo) only fairly long, II distinctly longer than I, IV longest, III shortest, paired claws long, unpaired claw absent.– Opisthosoma (fig. 34, photo) (most dorsal parts are hidden) 1.18 times longer than wide, flattened, dorsally apparently completely covered with a scutum and anteriorly distinctly incised in the middle, ventrally bearing at least 7 hairless wide plates , ventrally with at least 6 wide plates (sternites) which are not divided longitudinally, as well probably with a pair of questionable sac-like structures near the genital opening; pygidium retracted.

Relationships: In *M. semiglobosus* n. sp. an opisthosomal incision is absent.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

DISCUSSION

Phylogenetics, behaviour and ecology of the Primoricinulei: *Primoricinuleus*:
See WUNDERLICH (2015: 421-422). The discussion below focuses on phylogenetics and the primoricinuleid life style in which characters of and conclusions on the new genera are included.

PHYLOGENETICS See DUNLOP et al. and FERNANDEZ & GIRIBET (2015)

The existence of PEDIPALPAL PINCERS is an ancient character of the Arachnida. They exist in the Posteriorricinulei (figs. 16, 21-22) in contrast to the in this character more derived Primoricinulei which have only a single pedipalpal claw (figs. 11-12, 18, 32 photo 30).

EYE REDUCTION during the arachnid evolution: A reduction of the number of the eyes – Ricinulei (see above and fig. 15 of the Posteriorricinulei): well developed ricinuleid eyes – figs. 1-3 (the basically existing triads of the lateral eyes!), fig. 10 (probably diads but I do not exclude the existence of triads), figs. 30-31 (a single lateral eye, a “monad”) of the ancient suborder Primoricinulei (*) – exists also in the order Opiliones, in which the extant members have only a single pair of MEDIAN eyes in contrast to certain carboniferous fossils, see GARWOOD et al. (2014: 1017): “We establish the <carboniferous> suborder Tetrophthalmi suborder nov., which bore four eyes... Furthermore, embryonic gene expression in the extant species *Phalangium opilio* demonstrates vestiges of lateral eye tubercles.”. – A reduction of the number of the eyes (basically eight) – loss of the anterior median eyes like in the Ricinulei – during the evolution of not cave-dwelling arachnids exists also in the order Trigonotarbida as well as in numerous Araneae, e. g. within the families Palpimanidae, Pholcidae, Tetrablemmidae and Uloboridae.
A reduction of the number of the eyes happened quite early in the ricinuleid evolution: a reduction from a triad to a diad in one branch most probably already in the Palaeozoicum, a reduction to a “monad” latest in the Cretaceous (*Monooculricinuleus* in Burmite). Members of the extinct and – e. g. in the number (*Hirsutisoma*, figs. 1-3) and in the size of the eyes as well as the wide sternum – more “primitive” suborder Primoricinulei are known only in 100 million years old Burmite but they should have existed already in the Carboniferous 200 million years earlier, together with its sister group, the Posteriorricinulei, which is known already from the Carboniferous and survived up to now.
Open questions are still numerous, e. g.: Does an eco-behavioural reason exist for the evolution of narrow coxae of the Posteriorricinulei? Are the Primoricinulei really extinct or did members survive hidden in caves or in the soil e. g. somewhere in South East Asia or Africa?

(*) Eye TRIADS like in *Hirsutisoma* n. gen. may to be regarded as a plesiomorphic characters of the Ricinulei (similar to certain other arachnid orders), but not diads as supposed by me previously, see WUNDERLICH (2015: 420). I suppose that such eye triads most probably will be discovered in Carboniferous fossils in the future, in still unknown members of the suborder Primoricinulei of this period.

Ricinulei and Trigonotabida (see also above): If the extinct order Trigonotarbida KARSCH 1882 is regarded as the sister group of the Ricinulei THORELL 1892 – see above and WUNDERLICH (2015: 415-416) – the apomorphic and plesiomorphic characters of the ricinuleid suborders may be correctly listed in tab. 1, and both suborders possess apomorphic as well as plesiomorphic characters IN A MOSAIC-LIKE COMBINATION. In 1882 KARSCH suggested that ricinuleids were the last living descedents of the extinct order Trigonotarbida. This hypothesis was "recovered" by DUNLOP (1996). Shared by both taxa is a UNIQUE STRUCTURE, a coupling mechanism between pro- and opisthosoma, see DUNLOP et al. (2009: 311). According to DUNLOP & PENNEY (2012: 101) Trigonotarbida "... do not have any obvious unique characters." (!); but see below: the sac-like opisthosomal structures may be apomorphic. Number and position of the eyes are quite variable within the Ricininulei (see above) and in the Trigonotarbida as well. The same is true for the distal structures of the pedipalpus and the opisthosomal tergites: The three-rowed medial and lateral tergites of certain Ricinulei may be a synapomorphic character of Ricinulei and Trigonotarbida (see the note below), and strongly modified in certain Ricinulei, see the Primoricinulei and the Monooculricinulei. The variability of certain structures of Ricinulei and Trigonotarbida is comparable with the strong variability in the Acari, in the Araneae and in the Opiliones. In sum: Uniting Ricinulei and Trigonotarbida in a single order (Trigonotarbida would have priority) may be justified in my opinion. Following this opinion Ricinulei and "Trigonotarbina" may to be regarded as suborders of the Trigonotarbida, and Primoricinulei and Posteriorricinulei may to be regarded as infraorders of the Ricinulei. Ricinulei lost their book lungs and evolved a cucullus as well as a different position of the chelicerae; Trigonotarbida evolved ventral "sac-like" structures of the opisthosoma near the genital openings but see above: Monooculricinuleidae. Latest if a male Trigonotarbida would be found possessing copulatory structures on its third leg the opinion of KARSCH (see above) would be accepted and the two taxa in question would be united in the single order Trigonotarbida.

Notes on the enigmatic Carboniferous genus *Idmonarachne* GARWOOD et al. 2016 and *Palaeocharinus* HIRST 1923 (Trigonitarbida).

Idmonarachne has been regarded as sister group of the Araneae by GARWOOD et al.; its mouth parts appear similar to Araneae. According to the existence of the peculiar structure of the opisthosomal tergites (fig. 29), the existence of ventral opisthosomal plates, the absence of an anal tubercle and spinning organs as well as the relatively small pedipalpi – which are NOT leg-like (fig. 29) (*) as in "primitive" spiders – the genus *Idmonarachne* seems to me more likely to be an advanced member of the Trigonotarbida – which PROBABLY lost its pygidium or is not observable (**) – than an ancient ("primitive") taxon close to the Araneae (***). If so the peculiar tripartite tergites of the DEPRESSED and STRONGLY ARMOURED opisthosoma – divided into median and lateral plates – may have evolved ONLY ONCE: in the ancestor of Ricinulei + Trigonotarbida + *Idmonarachne* in contrast to the opinion of GARWOOD et al. (2016) who suggest a triple

(!) convergent evolution in the taxa in question. But such very special tripartite tergites are unique within the Arachnida and completely absent in all fossil and extant Araneae. The pedipalpus of the Devonian *Palaeocharinus* sp. sensu DUNLOP et al. (2009) (Trigonotarbida) ends in a small CHELA (although it is called "pedipalpal CLAW" in the title of that paper) quite similar to most Ricinulei. The apical pedipalpal structures of other Trigonotarbida are not surely known; a simple claw may exist in some taxa. In the fossil Ricinulei pedipalpal claws as well as chelae existed, see WUNDERLICH (2015), above and below. Therefore I do not want to exclude that in both orders – Ricinulei and Trigonotarbida – a pedipalpal claw as well as a pedipalpal chela exist(ed), and the pedipalpal claw of *Idmonarachne* should not be exceptional for the order Trigonotarbida.

(*) Remarkably the pedipalpus of *Idmonarachne* is characterized as "distinctly shorter than legs" in its diagnosis but as "pediform" in the description. Number and position of the eyes of *Idmonarachne* are unknown.

(**) A pygidium is also not observable in certain Trigonotarbida, see DUNLOP & PENNEY (2012: figs. 79-81).

(***) Unfortunately the important existence or absence of leg trichobothria of this genus – leg trichobothria are absent in Ricinulei and Trigonotarbida in contrast to the Araneae (!) – could not be observed in *Idmonarachne*.

The possible LIFE STYLE of the Cretaceous Ricinulei

The short-legged (photos, fig. 21), flat – see DUNLOP & PENNEY (2012: 98, fig. 75) and WUNDERLICH (2012: 242, fig. 1) –, slow-moving and probably mainly nocturnal extant members of the Posteriorricinulei live typically in leaf-litter and caves. The rather short legs of the fossil arachnids indicate a similar slow movement. Eye lenses of extant ricinuleids are absent (fig. 19) or strongly reduced and flat. Fossil/extinct Posteriorricinulei possessed two pairs of lateral eyes, see WUNDERLICH (fig. 15). In the Cretaceous Primoricinulei the (lateral) eye lenses were well developed and distinctly convex; they existed – in *Hirsutisoma*, figs. 1-3, photo 15, in triads, in *Monoculricinuleus* in single large lateral eyes only (figs. 30-31, 34). In the third genus – *Primoricinuleus*, fig. 10, – the eye lenses of the holotype and related specimens are not well observable – diads or (more likely in my opinion) also triads existed. The larger number and the larger size of eye lenses in the extinct Primoricinulei may contradict a nocturnal – and surely a cave – life style. As indicated by the reduced eyes of the extant ricinuleid taxa in contrast to the Cretaceous fossils the life style changed during the evolution of this order within the last hundred million years. Probably "modern" (post-mesozoic) spiders (Araneae) of the RTA-clade displaced/restricted the members of the whole order Ricinulei to the hidden life style of the relict family of today.

The existence of very long paired tarsal claws and of apical spatulate tarsal hairs – see WUNDERLICH (2015: 423, fig. 6) – may indicate the ability of the Primoricinulei to climb tree trunks. If members of *Hirsutisoma* were hiding – e. g. in crevices of the bark of trees – their long and backwards directed opisthosomal hairs may have prevented their transportation backwards by predatory enemies.

Body and legs of the fossil ricinuleids are strongly armoured; furthermore their mouth parts could be hidden by moving down their well developed hood (cucullus) like in extant relatives. This behaviour and their strong sclerotization enabled the animals to protect themselves against predators, e. g. certain Acari, Araneae like Lagonomegopidae and Mygalomorpha as well as insects like Coleoptera and Formicidae. The hairy opisthosoma of *Hirsutisoma* (fig. 1, photo 18) in both sexes may be a further protection against certain predatory enemies. Quite long body hairs which stands not out from the body exist also in other arachnids like certain mites, e. g. *Trombicula canestrinii* (BUFFA 1899) and in an Acari indet. (CJW) in Burmite. Are such body hairs – a quite different idea – a special kind of camouflage / mimesis in these animals?

PREY CAPTURING: Extant members of the Ricinulei – members of the Posteriorricinulei – are known to capture their prey (small arthropods like Collembola) with the help of their enlarged legs II and to transport it to the pedipalpi who forward it to the chelicerae/ mouth parts. The characters – structure, shape, size and position of the pedipalpi – of the two suborders differ more than within most other arachnid orders (*), and indicate two quite different kinds of prey transport or prey capturing as well as different life styles; see WUNDERLICH (2015: 421) and tab. 1. Members of the Posteriorricinulei transpor(ted) their prey with the help of pincers of their small pedipalpi which possess a more ventral position, see figs. 21-22, while members of the extinct Primoricinulei probably grapped their prey directly with the help of their strongly developed pointed raptorial pedipalpi (which possess a more anterior position, see the photos and the figs. 2, 11-12), and pulled it to their mouth parts similar to the Uropygi: Thelephonida. Because of their large pedipalpi (and their long claw) the prey of the raptorial Primoricinulei was probably larger than the prey of the Posteriorricinulei. The relatively huge pedipalpi of the advanced Primoricinulei may be an adaptation to their dwarfism.

COPULATORY BEHAVIOUR AND SPERM TRANSFER: Extant and fossil (Cretaceous) Ricinulei are known to possess an indirect sperm transfer with the help of gonopods: An almost unique transfer with the help of complicated structures/apophyses of the male leg III (figs. 7-8 – 21, photo 17) (**). In the primoricinuleid genus *Hirsutisoma* n. gen. an additional unique structure exists: A very long – probably about as long as the male's body – whip-shaped, thin, flexible, dark brown and sclerotized structure which originates apparently at the base of tarsus 1 (figs. 7-9). Such a structure is unknown in extant Ricinulei. What about its function? Did it play a role in the transfer of a spermatophore to the female genital opening? – In certain species of the spider family Thomisidae the male fixes the female before copulating with loose threads in a "symbolic" way. It may be too phantastic to assume a similar behaviour in the extinct fossils: The use of this whip-shaped "band" to fix the female before and during the copula.

(*) Even in the two suborders of the Uropygi – in the Schizomida and in the Thelephonida – the differences of the pedipalpi are less distinct. Raptorial pedipalpi existed in certain Opiliones like the Ischyropsalidae, in contrast to most remaining Opiliones.

(**) Certain Acari: Hydrachnidia within the class Arachnida are known to use their third pair of legs in a similar way, see TALARICO (2008: 396).

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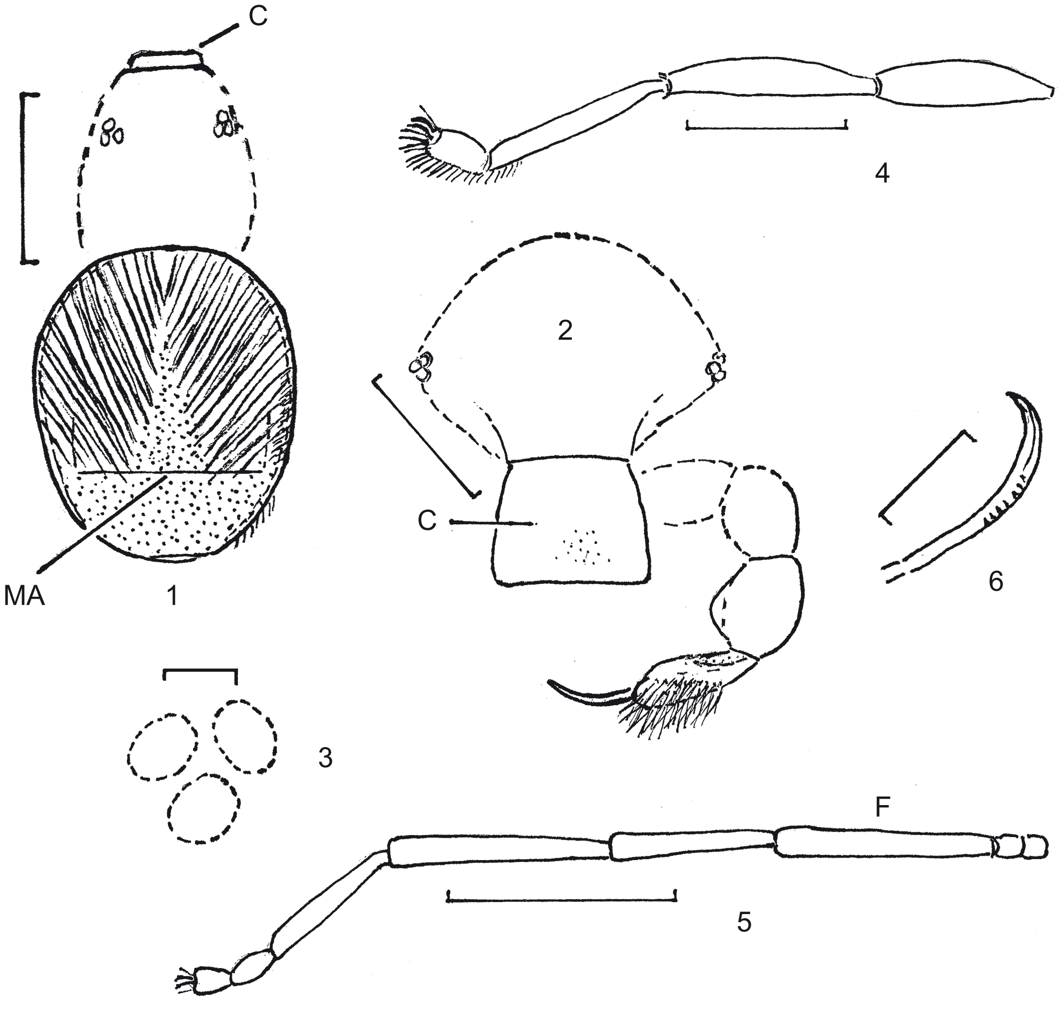
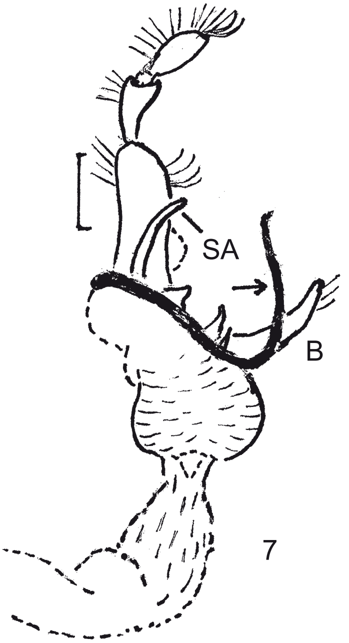


Figs. 1-9: *Hirsutisoma bruckschi* **n. gen. n. sp.** (Primoricinulei, extinct, Cretaceous Burmite), ♂; 1) dorsal aspect of the body. Note the eye triads, the long opisthosomal hairs which are absent (probably lost) on the injured posterior part in which the margin of two ventral scuta (MA) is observable; 2) anterior aspect of the body and the left pedipalpus which bears a single long movable "finger". Note the large cucullus (C). Only few hairs are drawn like in the other figs.; 3) outline of the lenses of the right eye triad; 4) prolateral aspect of the right leg I; 5) prodorsal aspect of the right leg II; 6) retroventral aspect of the retroclaw of the right tarsus IV. Note the



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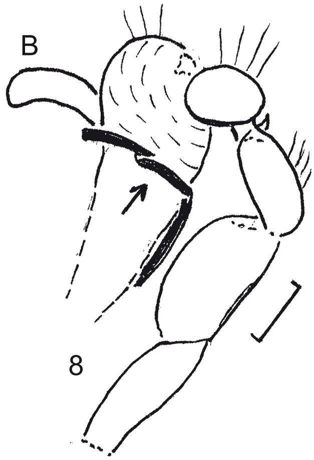

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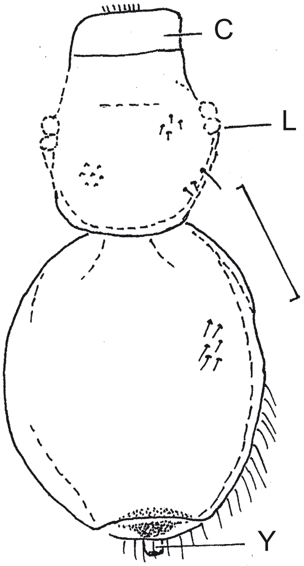

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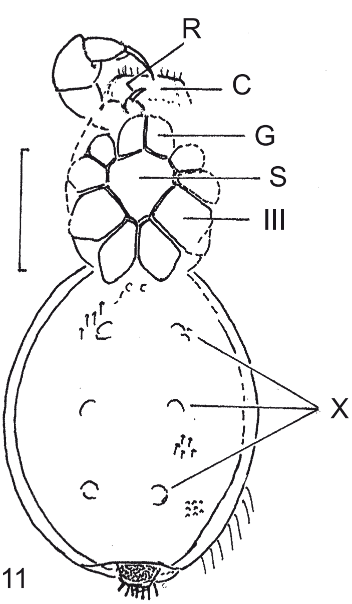

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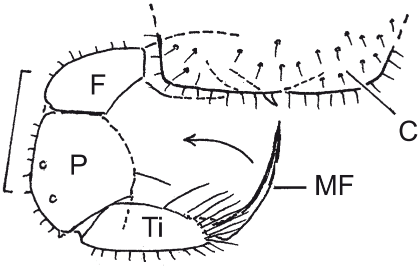

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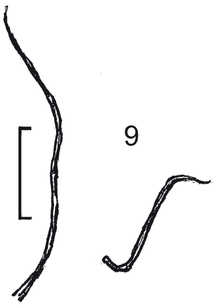

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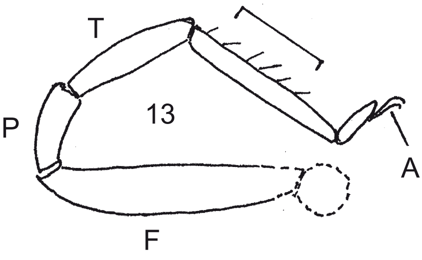
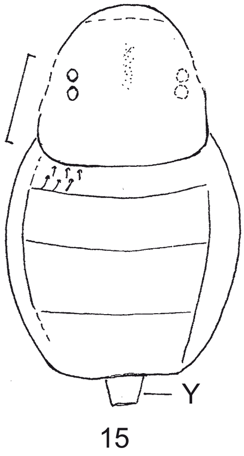
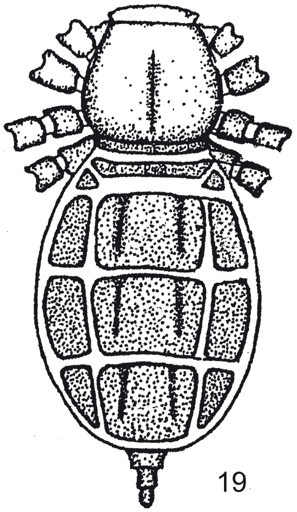
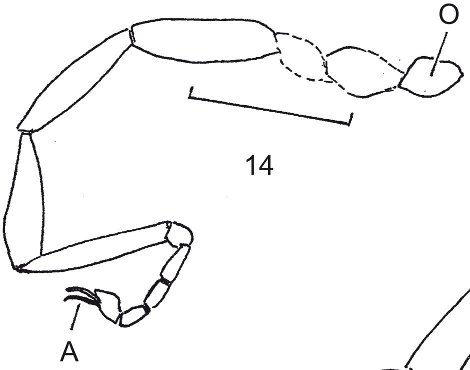
row of tiny teeth on the retrolateral margin of the claw; 7) prolateral and slightly ventral aspect of the right leg III which functions as a secondary copulatory organ (gonopodium). Note the partly thick and complicated structures which are partly deformed, as well as the long and whip-shaped structure/apophysis (black, arrow); 8) retrolateral aspect of the left leg III. Parts – e. g. of the tarsi – are hidden; 9) two loose (broken off) distal parts of the whip-shaped structures lying anteriorly above the male.

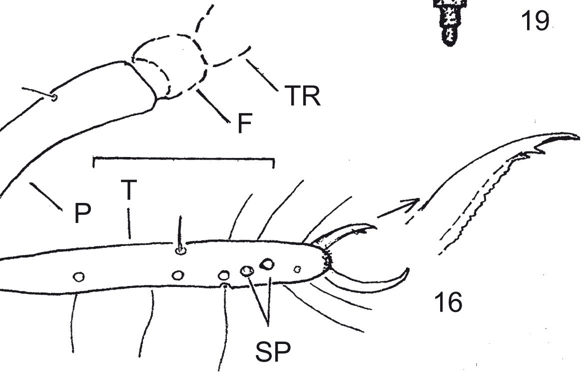
Figs. 10-14: Primoricinuleus pugio WUNDERLICH 2015 (Primoricinulei, extinct, Cretaceous Burmite), nymph; 10-11) dorsal and ventral aspects of the body (the transverse dorsal scuta are hidden in fig. 10); 12) dorsal and slightly anterior aspect of the right pedipalpus and the anterior part of the cucullus (C). The arrow points to the mobility of the long "clasp-knife" mobile "finger" (M); 13) prolateral leg of the left leg I; 14) prolateral aspect of the right leg IV.

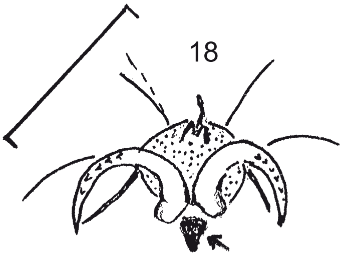


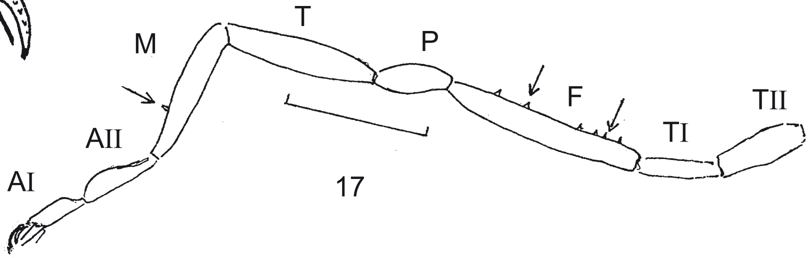






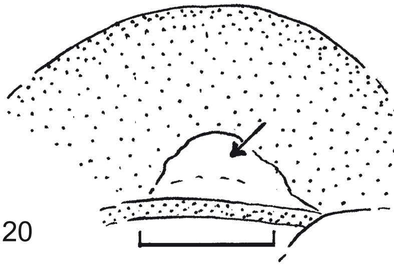






Figs. 15-18: ?Poliochera cretacea WUNDERLICH 2012 (Posteriorricinulei, extinct, Cretaceous Burmite), female nymph; 15) dorsal aspect of the body. Note the widely spaced diads of the lateral eyes. Only few hairs are drawn on the anterior tergite; 16) prolateral and slightly dorsal aspect of the right pedipalpus which is folded in this natural position. The fixed finger of the pincer (arrow) is enlarged to show its teeth; 17) oblique retrolateral and slightly ventral aspect of the left leg. IV. Some articles are deformed. The coxa is not drawn, few of the dorsal “thorns” (arrows) are drawn; 18) apical aspect of the right tarsus IV with its claws. The arrow points to the blunt unpaired claw. Only few of the long hairs are drawn.

Figs. 19-23: Extant Ricinulei (Posteriorricinulei); 19) *Pseudocellus* sp., dorsal aspect of the body. Taken from DUNLOP (1996); 20) Ricinulei indet., ad. female from Brazil (CJW), translucent structure (arrow) near the right prosomal margin which is similar to a lense but is flat and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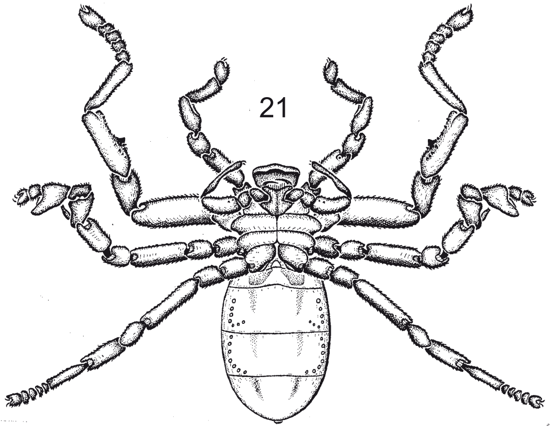
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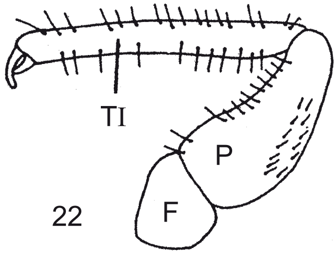
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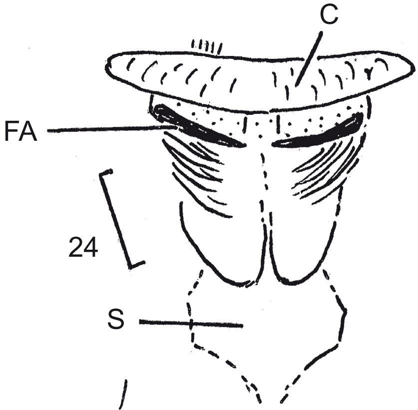
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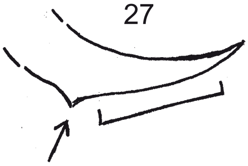
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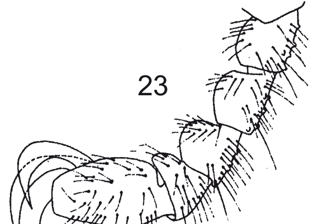
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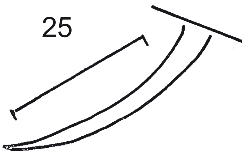
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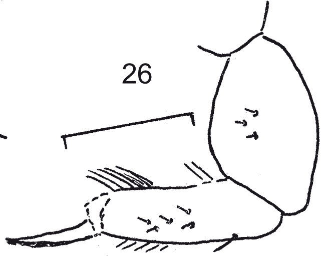
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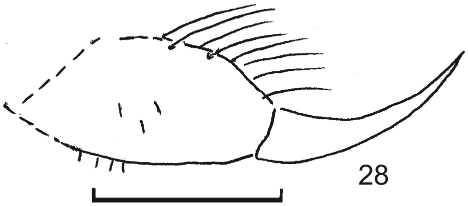
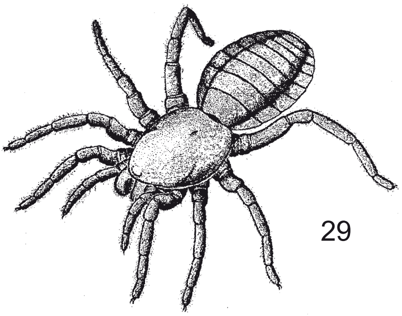

28

not sharply defined; 21) ventral aspect of *Cryptocellus narino* PLATNICK & PAZ 1979, male. Note the copulatory structures of the legs III. Taken from PLATNICK & PAZ (1979); 22-23) *Cryptocellus* prope *bolivari* GERTSCH 1971 from Mexico; 22) lateral aspect of the pedipalpus; 23) lateral aspect of tarsus IV. The arrow points to the deep apical inclination. Taken from BRIGNOLI (1973), WUNDERLICH (2015b: 423).

Figs. 24-26: *Hirsutisoma acutiformis* **n. gen. n. sp.**, (Primoricinulei, extinct, Cretaceous Burmite), ♀; 24) ventral aspect of the prosoma: mouth parts and sternum; 25) anterior aspect of the fang of the left chelicera; 26) anterior aspect of the the distal articles of the left pedipalpus. Only few hairs are drawn.

Figs. 27-28: *Hirsutisoma dentata* **n. gen. n. sp.**, (Primoricinulei, extinct, Cretaceous Burmite), ♀; 27) anterior aspect of the tight chelicareal fang. Note the dorsal tooth-like hump (arrow); 28) prolateral and slightly apical aspect of the distal parts of the right pedipalpus. Only few hairs are drawn.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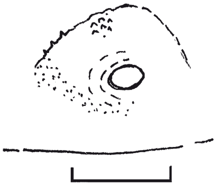
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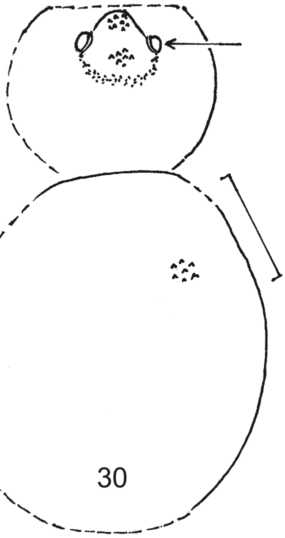
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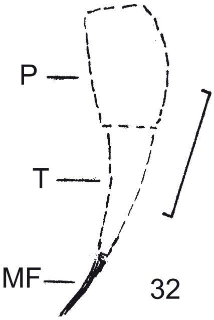

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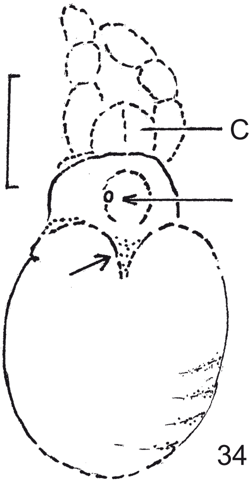

34


33

Fig. 29: *Idmonarachne brasieri* GARWOOD et al. 2016 (unknown arachnid order), holotype, probably adult female, body length ca. 10.4 mm, preserved in Carboniferous stone of France, suggested appearence, dorsal aspect of the fossil. – Taken from GARWOOD.

Figs. 30-33: *Monooculricinuleus semiglobosus* **n. gen. n. sp.** (Primoricinulei, extinct, Cretaceous Burmite), ♀; 30) dorsal aspect of the partly decomposed body. The arrow points to the single large right lateral eye on the cephalic elevation. The pygidium is cut off, the cucullus is most probably lost; 31) lateral aspect of the cephalic elevation with the single right lateral eye; drawn under water; 32) dorsal and slightly apical aspect of the distal articles of the left pedipalpus which in main parts is decomposed and covered with an emulsion; 33) prolateral aspect of the distal articles of the right leg III.

Fig. 34: *Monooculricinuleus incisus* **n. gen. n. sp.** (Primoricinulei, extinct, Cretaceous, Burmite), juv., dorsal aspect of the body and the pedipalpi. Parts are deformed or decomposed or hidden by emulsions. The short arrow points to the anterior incision of the opisthosoma, the long arrow points to the cephalic elevation.

A = paired tarsal claws, AI, AII = two tarsal articles, C = cucullus, B = blunt metatarsal apophysis, F = femur, FA = cheliceral fang, G = gnathocoxa, L = lateral eyes, M = metatarsus, MA = ventral opisthosomal margin, MF = movable "finger", O = coxa, P = patella, R = right fang, S = sternum, SA = slender apophysis, SP = sensory pits, T = tibia, Ti = tibiotarsus, TI, TII = trochantera I and II, TR = trochanter, X = three paired ventral opisthosomal structures of unknown function, Y = pygidium, III = third coxa. – Scale bars (in mm): 0.05 in fig. 6; 0.1 in figs. 3, 8, 18, 25, 27; 0.2 in figs. 7-9, 13, 24, 26, 28; 0.3 in fig. 20; 0.5 in figs. 2, 5, 10, 11, 14-17 and 31-33; 1.0 in figs. 1, 5, 30 and 34; figs. 21-23: no scale.

BEITR. ARANEOL., 10 (2017: 72–279)

NEW AND RARE FOSSIL SPIDERS (ARANEAE) IN MID CRETACEOUS AMBER FROM MYANMAR (BURMA), INCLUDING THE DESCRIPTION OF NEW EXTINCT FAMILIES OF THE SUBORDERS MESOTHELAE AND OPISTHOTHELAE, AS WELL AS NOTES ON THE TAXONOMY, THE EVOLUTION AND THE BIOGEOGRAPHY OF THE MESOTHELAE

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Abstract: New results on spider's evolution, extinctions, palaeofaunas, palaeogeography, palaeobehaviour, palaeoecology and phylogeny are dealt with. The composition of the Cretaceous spider fauna – at least 35 families are reported – indicates a global change of this fauna, and probably the most pronounced revolution of spider evolution and diversification, which could have happened during the Palaeocene. The KT events caused a distinct faunal cut in spiders: 16 of the families in Burmite are extinct. – Probably (a taxon near) the sister group of the diverse superfamily Araneoidea has been found within fossil spiders in Burmite: the new cribellate family Praearaneidae. I do not want to exclude that the branch which includes Burmadictynidae n. fam. + Salticoididae may be the sister to the superfamilies Araneoidea + Deinopoidea. – The results of phylogenomics are partly not in accord with findings concerning fossil spiders. – The following fossil spider (Araneae) TAXA in Mid Cretaceous Burmite are described/treated: (a) MESOTHELAE: BURMATHELIDAE **n. fam.**: *Burmathele biseriata* **n. gen. n. sp.**; CRETACEOTHELIDAE **n. fam.**: *Cretaceothele lata* WUNDERLICH

2015; PARVITHELIDAE **n. fam.**: *Parvithele muelleri* **n. gen. n. sp**., *Parvithele spinipes* **n. gen. n. sp**. and *Pulvillothele haupti* **n. gen. n. sp**. The extant families Liphistiidae and Heptathelidae are regarded as families of their own but not as subfamilies and are unknown from fossils. Mainly the oldest fossil Mesothelae need a revision. A provisional chronocladogram of the higher extinct and extant taxa as well as notes on the historical biogeography and the evolution of the Mesothelae are given. (b) OPISTHOTHELAE: Mygalomorpha: DIPLURIDAE: *Cethegoides patricki* **n. gen. n. sp.**; HEXATHELIDAE: *Alioatrax incertus* **n. gen. n. sp**. – Araneomorpha: SEGESTRIIDAE; PLUMORSOLIDAE: *Pseudorsolus* **n. gen**.; OONOPIDAE: Orchestiniinae: *Burmorchestina acuminata* **n. sp**., *B. biangulata* **n. sp**., *B. plana* **n. sp**., *B. pulcher* WUNDERLICH 2008, *B. pulcheroides* **n. sp**., *B. tuberosa* **n. sp**.; TETRABLEMMIDAE: *Brignoliblemma bizarre* **n. gen. n. sp**., *B. nala* **n. gen. n. sp**., *B. paranala* **n. gen. n. sp**., *Cymbioblemma corniger* **n. gen. n. sp**., *Electroblemma bifida* SELDEN et al. 2016, *Eogamasomorpha ?clara* WUNDERLICH 2015, *E. hamata* **n. sp**., ?*E. unicornis* **n. sp**., ?*E*. sp. with its capture web, *Furcembolus crassitibia* **n. sp**., *F. grossa* **n. sp**., *F. longior* **n. sp**., *Longissithorax myanmarensis* **n. gen. n. sp**., *Longithorax furca* **n. gen. n. sp**., *Palpalpaculla pulcher* **n. gen. n. sp**.; EOPSILODERCIDAE: *Eopsiloderces serenitas* WUNDERLICH 2015, Praepholcinae **n. subfam**., *Praepholcus huberi* **n. gen. n. sp**., Loxodercinae **n. subfam**., *Loxoderces longicymbium* **n. gen. n. sp**., *L. curvatus* **n. gen. n. sp**., *L. rectus* **n. gen. n. sp**.; PSILODERCIDAE: *Aculeatosoma pyritmutatio* **n. gen. n. sp**., *Priscaleclercera* **n. gen**., *P. paucispina* **n. gen. n. sp**., *P. brevispina* **n. gen. n. sp**., *P. spinata* (DEELEMAN-REINHOLD 1995 **n. comb.** (extant), *P. sexaculeata* (WUNDERLICH 2015) **n. comb**.; PHOLCOCHYROCEROIDEA **n. superfam**.: MONGOLARACHNIDAE: *Longissipalpus cochlea* **n. sp**., *L. magnus* WUNDERLICH 2015, *Pedipalparaneus seldeni* WUNDERLICH 2015; PHOLCOCHYROCERIDAE: *Pholcochyrocer altipecten* **n. sp**.; Leptonetidae: *Palaeoleptoneta crus* **n. sp**.; TELEMIDAE: ?*Telemophila crassifemoralis* **n. sp**.; PRAETERLEPTONETIDAE: *Autotomiana* WUNDERLICH 2015 is transferred from the Praeterleptonetidae to the Pholcochyroceridae (**n. relat.**) ARCHAEIDAE: *Burmesarchaea alissa* **n. sp**., *B. caudata* **n. sp**., *B. crassicaput* **n. sp**., *B. crassichaelae* **n. sp**., *B. gibber* **n. sp**., *B. gibberoides* **n. sp**., *B. grimaldii* (PENNEY 2003), *B. longicollum* **n. sp**., *B. propinqua* **n. sp**., *B. pseudogibber* **n. sp**., *B. pustulata* **n. sp**., *B. quadrata* **n. sp**., *B. speciosa* (WUNDERLICH 2008) (**n. comb.**), *Eomysmauchenius dubius* **n. sp**., ?*E. longissipes* (WUNDERLICH 2015), *E. septentrionalis* **n. sp**.; Planarchaeini **n. trib**., *Planarchaea kopp* WUNDERLICH 2015, *P. oblonga* **n. sp**., *P. ovata* **n. sp**.; *Filiauchenius* WUNDERLICH 2008 ?= *Planarchaea* WUNDERLICH 2008 (**questionable n. syn**.), *Lacunauchenius* WUNDERLICH 2008 = *Burmesarchaea* WUNDERLICH 2008 (**n. syn**.), *Lacunauchenius speciosus* WUNDERLICH 2008 (the type species) and *L. pilosus* WUNDERLICH 2015 are transferred to *Burmesarchaea* (**n. comb**.); LAGONOMEGOPIDAE: *Albiburmops annulipes* **n. gen. n. sp**., ?*Parviburmops bigibber* **n. sp**., ?*Paxillomegops cornutus* n. sp., *Planimegops parvus* **n. gen. n. sp**.; SPATIATORIDAE: Spatiatoridae indet.; VETIATORIDAE **n. stat**. (from Vetiatorinae of the Spatiatoridae): *Pekkachilus vesica* **n. gen. n. sp**. *Vetiator gracilipes* WUNDERLICH 2015; STENOCHILIDAE (extant); MICROPALPIMANIDAE: *Micropalpimanus poinari* WUNDERLICH 2008, PALPIMANIDAE: Chediminae indet.; OECOBIIDAE; ?DEINOPIDAE: *Deinopedes tranquillus* **n. gen. n. sp**.; BURMADICTYNIDAE **n. fam**.: *Burmadictyna postcopula* **n. sp**., *Eodeinopis longipes* **n. gen. n. sp**.; ULOBORIDAE: *Furculoborus patellaris* **n. gen. n. sp**., *Kachin fruticosus* **n. gen. n. sp**., *K. fruticosoides* **n. gen. n. sp**., *Propterkachin magnooculus* **n. gen. n. sp**.; PRAEARANEIDAE **n. fam**: *Praearaneus bruckschi* **n. gen. n. sp**.; THERIDIOSOMATIDAE; a quite questionable member indet. of the RTA-CLADE.

Selected key words: Ancestor, Araneae, Amber, Araneoidea, Archaeoidea, autotomy, behaviour, biogeography, Burma, Burmite, camouflage, capture web, Cretaceous, cribellate, decomposition, Deinopoidea, ecology, extinction, evolution, faunistic, Fossilcalcaridae, KT events, Lagonomegopidae, Leptonetoidea, Liphistiidae, Mesothelae, Mesozoic, Mimesis, "missing link", molecular genetics, Myanmar, Mygalomorpha, Orchestininae, palaeobiogeography, Palpimanidae, Parvithelidae, pectunculus, peer reviews, Pholcochyroceridae, phylogenetics, phylogenomics, Praearaneidae, Praeterleptonetidae, relicts, RTA-clade, spiders, Telemidae, Vetiatoridae.

Acknowledgements: For leaving me material I thank very much Klaus Brucksch, Scott Davies, Sieghard Ellenberger, Carsten Gröhn, Engin Ni, Rainer Ohlhoff, Peter Schwendinger, Beate Stolz, and mainly Patrick Müller who recognized numeous important specimens.

Deposition of present and previous Material:

The present material has been sold to the author by different dealers and collectors (*) mainly from Germany and Myanmar (Burma). It is actually kept in the collection of the author (CJW) in the Laboratory of Arachnology in 69493 Hirschberg, Germany, and will most probably be deposited in a Senckenberg institution (Frankfurt a. M. and Görlitz) and/or in the Zool. Staatssammlung Palaeontology Munic and/or in the Zoologische Staatssammlung München (Munic) in the future. A great part of spiders and other arachnids published by me were already given to Senckenberg (Frankfurt a. M. and Görlitz). Recently I transferred the following holotypes of fossil Araneae taxa in Burmite to the Senckenberg Museum für Naturkunde Görlitz (AXEL CHRISTIAN): *Eopsiloderces loxosceloides* WUNDERLICH 2008 (Eopsilodercidae), *Fossilcalcar praeteritus* WUNDERLICH 2015 (Fossilcalcaridae), *Lagonoburmops plumosus* WUNDERLICH 2012 (Lagonomegopidae), *Myanlagonops gracilipes* WUNDERLICH 2012 (Lagonomegopidae), *Pholcochyrocer guttulaeque* WUNDERLICH 2008 (Pholcochyroceridae), *Plumorsolus gondwanensis* WUNDERLICH 2008 (Plumorsolidae), *Praeterleptoneta spinipes* WUNDERLICH 2008 (Praeterleptonetidae), and furthermore a male of *Micropalpimanus poinari* WUNDERLICH 2008 (Micropalpimanidae).

(*) If not bought by certain authors rsp. private persons who spent huge sums of money – up to several thousand Dollars or Euros for peculiar special fossil arachnid specimens like Mesothelae or Ricinulei – various rare and peculiar material of unique taxa would probably be lost for a scientific study forever. It is not a reasonable demand that an owner should present such specimens to an institution for nothing. – The private collection of PATRICK MÜLLER, 66849 Käshofen, is in a very good care and loans are available.

Notes: (1) Several taxa of the families Leptonetidae. Praeterleptonetidae, Theridiosomatidae and Uloboridae in Burmite, which are kept in my private collection, are not included in this paper; they hopefully will be described later in a different paper. – (2) Most fossil spiders of my publications are documented by photos. Not all of my photos (slides) are published; the remaining slides are kept by me and will later be given to a scientific institution, probably the SMF. – (3) See the paper "Corrections and additional remarks concerning vol. 9 of the Beitr. Araneol. (2015)" in this volume.

Techniques: See WUNDERLICH (2015: 24).

Remark on the method: What is the reason why I usually write "POSSIBLE" cladogram but not simply "cladogram"? Two main fundamental problems exist in this matter: (1) some structures – e. g. the existence of cheliceral "peg teeth" in certain taxa of the superfamily Archaeoidea – is hard to recognize with certainty, and (2) the evaluation and the possible convergent developments of certain characters are hard to decide. Examples are losses, e. g. of the posterior spinnerets during the evolution of the archaeoid families. Therefore I use the term "possible cladogram".
See also WUNDERLICH (2008: 22-23 and 2011: 7-8).

Remarks on the traditional "PEER-review method" (see also the internet: WIKIPEDIA) and on the Mesozoic spider fauna.

I appreciate very much the discussion with experts/colleagues but unfortunately the number of interested and competent experts is quite limited. Furthermore their opinions e. g. on the methods of investigation are frequently quite peculiar; generally spoken only few scientists are interested in fossil spiders.
I strongly suspect that the reviews of papers are not rarely directed to pleasant colleagues – who may be "blind on one eye", and even do not question the results – but not to true experts, and thus much more "inbreeding" than "friendly fire" may occur. The resulting damages are innumerable errors, compare the long list of wrong determinations and wrong conclusions regarding PEER-reviewed papers, see e. g. WUNDERLICH (2008: 539-540), (2011:163-164) and (2015: 57-63). They will mislead researchers of fossil arthropods for a long time. Remarkably most of these mistakes have never been corrected by the authors; a quite rare exception refers to a Cretaceous taxon described as a member of the family Nephilidae (Araneoidea) and transferred to the ancient family Mongolarachnidae by SELDEN.
THE WORST CONCLUSIONS BY CERTAIN AUTHORS CONCERN THE COMPOSITION OF THE MESOZOIC SPIDER FAUNA, THE CHANGES OF THE FAUNAS, AND THE ALLEGED ABSENCE OF A FAUNAL "CUT" AT THE CRETACEOUS-TERTIARY BOUNDARY EVENTS (***). Such "conclusions" – published in PEER-reviewed journals and in books – are based on various erroneous determinations; they are highly incorrect and in absolute contrast to my findings. According to my investigations ...
(a) sure fossil proofs of members of the RTA-clade (e. g. the families Lycosidae, Pisauridae (*) and Salticidae) and of non orb-weaving Araneoidea (**) (e. g. the family Linyphiidae (*)) are absent before the Palaeogene according to sure present proofs, see WUNDERLICH (2015),
(b) several spider families became extinct at the end of the Cretaceous at the latest, a peculiar faunal cut exists, see WUNDERLICH (2015). Most conspicuous is the extinction

of the family Lagonomegopidae at the end of the Cretaceous which was very diverse during the whole Cretaceous in most parts of the Northern Hemisphere (***).

(*) Erroneous Cretaceous reports: See PENNEY & SELDEN (2011: 73), see WUNDERLICH (2015); repeated by GARRISON et al. (2016).

(**) Probably with the exception of the family Theridiidae, see WUNDERLICH (2015).

(***) The extinction of the family Lagonomegopidae (see below) happened apparently about at the same time as the extinction of the dinosaurs. To my knowledge the diversification of the RTA-clade happened only subsequently – in contrast to the opinion of GARRISON et al. (2016) –, almost at the same time as the distinct diversification of the Passeriformes, Plazentalia and the Gramineae.

CONTENTS

page

INTRODUCTION

The main aim of my study of fossil spiders in Burmite is to identify as many taxa as possible in order to recognize the composition of the Mid Cretaceous spider fauna and the still hidden roots of higher spider taxa. Future studies will complete details of numerous structures described in the present paper – or overlooked by me – with the help of newest techniques. See also WUNDERLICH (2015: 28).

Recently a large number of fossil spiders in Mid Cretaceous amber (Burmite) from Myanmar (Burma) has been described by the present author; about 30 spider families are known from this kind of amber, see WUNDERLICH (2015) and below. Up to now I have investigated more than 1000 spider specimens in Burmite; colleagues and friends saw several thousand spiders in this kind of amber. During the last year I had the opportunity to buy and study numerous spiders in Burmite, and among them are some rare and even until now unknown higher taxa which are listed or described in the present paper, e. g. the first Mesozoic spiders of the family Palpimanidae in amber, the first named Cretaceous Telemidae, some more members of the Mesothelae, including two new extinct families, and a quite questionable member of the RTA-clade. Certain extinct spider families are examples of peculiar and very remarkable high taxa in Burmite whose "precise systematic affinities are difficult to resolve", see the new and peculiar family Praearaneidae, and the paper on a different arachnid order – the Solifugae – by DUNLOP et al. (2015), as well as the recently described extinct suborder Primoricinulei of the Ricinulei (treated in this volume, too) which are all also preserved in Burmite.

The spider genus *Burmesarchaea* WUNDERLICH 2008 (14 species of the family Archaeidae), is a highly impressive example of intrageneric radiation of Cretaceous animals, see the figs. A – N p. 171–172.

The sequence of fossil taxa during long periods enables us in a fascinating way to leaf through the "book of evolution", the "book of life". Cretaceous fossils may help to find out whether a certain character is an ancestral (plesiomorphic) or a derived (apomorphic) stage. Fossils like some taxa of the Mesothelae fill the large gap of the fossil documentation between the Carboniferous and today; see also the quite unusual taxa of the arachnid order Ricinulei, in this volume.

The "sheltered world" of phylogenetics and sytematics of several higher extant taxa is shattered by the closer knowledge of Cretaceous fossils in Burmite. Examples are the spider families Archaeidae, Oecobiidae, Praearaneidae, Tetrablemmidae, Uloboridae, the questionable taxon of the RTA-clade, and taxa of the ancient Mesothelae (as well as taxa of the relict arachnid order Ricinulei – see a different paper in this volume).

Remarks on the preservation of spiders and other arthropod inclusions in Burmite:

Numerous fossil spiders are excellently preserved in a clear piece of amber (e. g. the photos 59, 62), others are badly preserved or embedded in muddy amber, see e. g. photo 74 and photo 14 in WUNDERLICH (2015: 483). Occasionally leg articles and even male pedipalpi have been amputated by the flowing resin, see the extreme effects by the preservation of ?*Eogmasomorpha unicornis* n. sp. (Tetrablemmidae). Most often the pieces of Burmese amber consist of numerous layers rsp. flows of the fossil resin (photo 91). Numerous arthropod inclusions – even if they are armoured – have been compressed if they were captured between two layers – especially in a lateral position – by the fossil resin, see *Burmesarchaea propinqua* n. sp. (photo 91). Especially the eye region is strongly deformed in *Electroblemma bifida* SELDEN et al. (2016) (Tetrablemmidae) (fig. 61). Other examples are certain members of the family Archaeidae in which the prosoma looks unusually narrow, see the photos; *Burmesarchaea crassicaput* n. sp. and *crassichelae* n. sp. (fig. 149, photos 85-86) are exceptions and examples of a more natural kind of preservation: Apparently, occasionally a large flow of the fossil resin embedded a whole spider within a short time. But most often a series of small flows formed the pieces of amber and compressed the animals.

"Frozen behaviour", see WUNDERLICH (2008: 535-536; 2015: 29-31): The discovery of particular fossils allows fascinating conclusions: The peculiar morphological characters of members of the extinct family Lagonomegopidae (see below and the photos) enables us to reconstruct the probable life style of spiders of this family, and to glance backward at a minute section of a vanished world. See also the pair of arachnids – a predatory mite and a spider as its prey, photo 3 – which is treated in this volume as an example of "frozen behaviour". – Especially larger spiders – e. g. the holotypes of *Parvithele muelleri* n. sp., *P. spinipes* n. sp. (cannibalism?) (Mesothelae) and *Cethegoides patricki* n. sp. (Mygalomorpha) – may have been the prey of arthropod animals before they were captured by the fossil resin probably after their death. Camouflage/mimesis: See *Brignoliblemma*, e. g. *bizarre* (Tetrablemmidae, photo 53), *Burmesarchaea* (Archaeidae) and the families Lagonomegopidae and Uloboridae (figs. 223, 227). – Prey capturing: See e. g. the families Lagonomegopidae and Deinopidae, *Propterkachin* n. gen. (Uloboridae) and the "wrapping behaviour in the Oecobiidae and in the Deinopoidea like Uloboridae and *Praearaneus* (fig. 238). – Threads and parts of capture webs: See e. g. ?*Eogamasomorpha* sp. indet. (Tetrablemmidae): Part of a capture web including sticky droplets (photo 60), *Pholcochyrocer* (Pholcochyroceridae), *Propterkachin* n. gen. (Uloboridae) (cribellate threads) and WUNDERLICH (2008: 535-536). – Mating behaviour and copulatory behaviour: A cheliceral "clasping spine" exists already in *Eopsiloderces* WUNDERLICH 2008 (Eopsilodercidae), a pedipalpal-cheliceral stridulatory organ was not rare already in Mid Cretaceous members e. g. of the families Archaeidae (figs. 153-154), Spatiatoridae and Vetiatoridae (fig. 199). "Mating spurs" of male legs I (II) and of a male pedipalpal article: See *Brignoliblemma* n. gen. (Tetrablemmidae) (figs. 49, 55) and WUNDERLICH (2015: 17, 23-24, 27) (the mygalomorph families Dipluridae and Fossilcalcaridae WUNDERLICH). "Mating plug" of the embolus: See the family Burmadictynidae, see WUNDERLICH (2015: 3, 315, figs. 351-352) (under Salticoididae: *Burmadictyna* WUNDERLICH 2015). – Jumping behaviour: The thickened femur IV in

Early and Mid Cretraceous spiders of the Oonopidae: Orchestininae (fig. 36, photo 47) indicate a jumping behaviour already up to 140 million years ago. – Remains of blood at a broken leg: See *Pekkachilus* sp. indet. (Vetiatoridae). – Leg autotomy: See e. g. the families Leptonetidae, Oonopidae, Tetrablemmidae and Oecobiidae. – Intrageneric radiation: See *Burmesarchaea* (Archaeidae). – The taxonomic value of "frozen behaviour": See e. g. the families Archaeidae (prey), Oecobiidae and Tetrablemmidae (capture webs), Oonopidae, as well as the genera *Palaeoleptoneta* (Leptonetidae), *Autotomiana* (Pholcochyoceridae) and *Retrooecobius* (Oecobiidae) (leg autotomy).

Biogeography, biology, faunistics, frequency, extinctions and phylogenetics

See WUNDERLICH (2015), Beitr. Araneol., 9: e. g. p. 83-89, 287.

Our knowledge of the Mesozoic spider faunas is mainly based on more than 30 families which are known in the well-studied Mid Cretaceous Burmese amber (Burmite).

Biogeography: Various spider taxa are related to extant SE-Asian taxa – see the previous papers by the present author –, examples are the families Psilodercidae and Tetrablemmidae. Exceptions are ancient members of the Mygalomorpha which may be related to Australian taxa: (1) The genus *Cethegoides* n. gen. (Dipluridae) probably possesses close relationships to the extant Australian genus *Cethegus* THORELL 1881 and (2) the genus *Alioatrax* n. gen. (Hexathelidae) may possess relationships to Australian taxa of the subfamily Atracinae. – See also below: The taxa of the Mesothelae, the widely distributed families Oonopidae and Lagonomegopidae and the order Ricinulei: This volume and Beitr. Araneol., 9 as well as previous volumes of the Beitr. Araneol. Relatives of the Archaeidae are taxa of the Eocene Baltic amber forest as well as extant ones of South America and the Australian Region.

Extinction events at the Mesozoic-Cenozoic boundary: Cretaceous spiders were strongly affected, a larger number of Cretaceous families (> 40 %) are extinct now, see WUNDERLICH (2015) – the diverse Cretaceous family Lagonomegopidae is an impressive example. 8 extinct Cretaceous genera of the family Segestriidae are known (6 only from the Burmese amber forest), see WUNDERLICH (2015: 67-68), but only 2 are worldwide today. 8 extinct genera (4 in Burmese amber and 4 in Baltic amber) of the family Archaeidae are known, but only 4 extant ones worldwide. – Numerous insect families became extinct at the end of the Cretaceous. According to PERKOVSKY & WEGIEREK (2016: 40) "Cretaceous aphids were affected more than other insects" by this extinction events. PENNEY et al. (2003: 2599) published "... the first evidence that spiders suffered no decline at the family level during these mass extinction events." This "opinion" strongly contradicts the results of my investigations in spiders as well as those of several authors of insect taxa: Strong evidence exists regarding a distinct faunal cut by the KT events.

Note on the extinct spider families: Remarkably only two extinct families were diverse during the Cretaceous: The Lagonomegopidae (widely distributed) and the Praeterleptonetidae (in Burmese amber). The remaining ca. 14 extinct families in Burmite are usually known from a single genus only (or even from a single species), rarely (the Pholcochyroceridae and the Salticoididae) from two or three genera. I suggest that these genera are quite old relicts which became extinct at the end of the Cretaceous at the latest. It is striking that 3 or even 4 families of the cribellate superfamily Deinopoidea are extinct; only the family Uloboridae – which has been quite diverse during the Cretaceous – survived. The percentage of cribellate entelegyne taxa became strongly reduced during the Palaeogene.

To my knowledge members of only very few spider genera SURVIVED from the Mid Cretaceous Burmite up to now; the determination of only a single(!) surviving genus – *Priscaleclercera* n. gen. – appears sure to me:

Ariadna AUDOUIN 1826 (Segestriidae), determination unsure,
Orchestina SIMON 1882 (Oonopidae); determination unsure; surely unknown in Burmite,
Priscaleclercera n. gen. (Psilodercidae), incl. *Leclercera* DEELEMAN-REINHOLD 1995,
  part.: *L. spinata*, extant, from Indonesia,
Telemofila WUNDERLICH 1995 (Telemidae); determination unsure,
Scytodes LATREILLE 1804 (Sctytodidae); determination unsure.

Notes: (1) The extinct genus *Spatiator* PETRUNKEVITCH 1942 (Spatiatoridae, reported in Burmite, see below) survived up to the Eocene Baltic amber forest. (2) The extinct genera *Brignoliblemma* n. gen. and *Electroblemma* SELDEN et al 2016 (Tetrablemmidae, Burmite) are quite closely related to *Sinamma* LIN & LI 2014 which survived as relicts in caves of China.

Remarkably all these genera are members of the ancient Haplogynae; genera of the Araneoidea and of the RTA-clade are absent from this list. Does a "faunal cut" exist around the KT events which pushed the evolution/diversification of members of the RTA-clade? See below and WUNDERLICH (2008: 547, tab. 3 and 4; see also below: (*)).

The fauna

See WUNDERLICH (2008: 544-556), (2015: 81-87, 92), above: "Biogeography" and below "Phylogenetics".

The importance of Cretaceous arthropod fossils regarding the fauna and the change of the fauna during millions of years is well demonstrated by spiders, e. g. by the Mesothelae as well as by a different arachnid order, the Ricinulei (this volume).

The existence of the taxa Archaeidae, (?) Deinopidae, Mesothelae, Tetrablemmidae, Theridiosomatidae and Uloboridae indicates that the Mid Cretaceous Burmese amber forest was a tropical rain forest. Although today's forests of Myanmar are also partly tropical rain forests – presenting a similar climate/environment during more than 100 million years (!) – the extant and the Mid Cretaceous spider faunas are quite different, see WUNDERLICH (2008: 547) and below. One of the most diverse Cretaceous families – the Lagonomegopidae – is extinct (the probable reason for its extinction see below); members of families like Araneidae, Linyphiidae, Tetragnathidae and probably Theridiidae (which are all frequent and diverse today in Burma) as well as of the diverse RTA-clade – thousands of genera exist today – have not been reported or were even completely absent in Burmite. In my opinion the composition of the strange Mid Cretaceous spider fauna preserved in Burmite indicates a GLOBAL CHANGE of the Cretaceous spider fauna compared to the Eocene Baltic amber fauna and to the extant tropical and not tropical spider fauna. The same is true for the order Ricinulei (this volume).

In the LIST of Cretaceous spider FAMILIES – see WUNDERLICH (2015: p. 92) – the family Liphistiidae has to be deleted, and the new extinct families Burmathelidae, Cretaceothelidae and Parvithelidae (Mesothelae), as well as the mygalomorph family Hexathelidae (extant) and the araneomorph families Palpimanidae (extant) and Praearaneidae (extinct) are new to the Burmite and have to be added to its fauna; a questionable member of the family Deinopidae is described, a quite questionable member of the RTA-clade is discussed. The family Mecysmaucheniidae has NOT to be included in this list because I regard questionable Cretaceous taxa as members of the Archaeidae.

THE SPIDER FAUNA IN BURMESE AMBER IS CHARACTERIZED BY ...
(details see below)

- a quite high percentage (probably more than 40%) of extinct families,
- a high diversity of (extinct) families of the ancient infraorder Mesothelae: three families compared to two extant families,
- a high percentage/diversity/frequency of Haplogynae compared to Entelegynae, see WUNDERLICH (2008: 547) (*),
- a high percentage of cribellate taxa,
- a high diversity (and frequency) of ORB WEAVERS of the cribellate Burmadictynidae, Deinopidae (?), Praearaneidae, Uloboridae as well as the ecribellare Theridiosomatidae and probably Praeterleptonetidae,
- the absence of a sure proof of members of the RTA-clade (but see below) and of non orb-weaving members of the superfamily Araneoidea like Linyphiidae (only a single questionable taxon of the Theridiidae has been reported).

(*) DUNLOP & PENNEY (2012: 123) stated erroneously "It is also important to stress that the majority of these Cretaceous finds are entelegyne spiders –". As pointed out earlier by me the diverse haplogyne superfamily Archaeoidea (incorrectly called Palpimanoidea) was mistaken as entelegyne by DUNLOP & PENNEY (2012: 123).

List of the MOST DIVERSE FAMILIES IN BURMITE:

(1) Haplogynae:
(a) Segestriidae (Dysderoidea): At least 4 genera,
(b) Tetrablemmidae (Pholcoidea): At least 9 genera,
(c) Archaeidae (Archaeoidea (= Palpimanoidea)): 6 genera,
(d) Lagonomegopidae (Archaeoidea (= Palpimanoidea)): 10 or 13 genera.

(2) Unsure relationships (Entelegynae):
Praeterleptonetidae: 9 genera; some (CJW) have still to be described.

(3) Entelegynae:
(a) Uloboridae: 10 genera; few (CJW) still have to be described,
(b) Theridiosomatidae: At least 3 genera; few (CJW) still have to be described.

Frequency/abundance/lifestyle of selected species and genera:
See WUNDERLICH (2004: 223-228) (Eocene Baltic amber spiders).

Resin functions as a kind of trap. About 5% of the arthopod specimens in Baltic amber are spiders; their percentage in Burmite is probably (as suggested by me) only about 3 % but I do not know a study based on unsorted material of Burmese amber.
Sex and the life style strongly influenced the abundance of spider species in fossil resins as follows:

- MALES are more frequent than females because they – even males of sessile species – (a) were occasionally searching for females in the amber forest, (b) were selected for my study by dealers more frequently than females and much more frequently than juvenile spiders;
- other ground-living species – which taxa? E. g. certain Mygalomorphae – are rare in Burmite, with the exception that they were captured in fallen droplets of the liquid resin. The only – questionable – member of the huge RTA-clade of the Burmese amber forest (see below) as well as the only member of the family Palpimanidae were probably ground- (and soil-)living species;
- mainly females of SESSILE SPIDERS living in capture webs and mainly in higher strata of the vegetation like Praeterleptonetidae, Theridiosomatidae – especially of the genus *Leviunguis* WUNDERLICH 2012 – and Uloboridae (the more mobile males of these families are not rare in Burmite!) should be underrepresented (less abundant) in Burmite compared with vagile spiders like members of *Burmorchestina* WUNDERLICH 2008 (Oonopidae) which are not rare in Burmite but probably often overlooked because of their small size, and therefore were actually more frequent than reported. To my present knowledge *Burmorchestina pulcher* WUNDERLICH is (one of) the most frequent species in Burmite, see directly below;
- remarkable is the DOMINANCE OF A SINGLE SPECIES within certain genera like *Burmorchestina* in Burmite: Four species are known by a single specimen only (rarely by two) but almost a dozen specimens of *B. pulcher* exist in my private collection. Was *pulcher* a species mainly living in higher strata of the vegetation in contrast to the remaining congenerics? *Burmesarchaea grimaldi* (Archaeidae) is the most frequent species of this diverse genus. – A similar case exists in Eocene Baltic amber: A single

up to a dozen specimens of six species of the genus *Balticoroma* WUNDERLICH 2008 (Comaromidae) were reported mainly by WUNDERLICH (2008: 1035-1043) but about 60 specimens of *B*. *serafinorum* WUNDERLICH 2008. – The dominant *Araneus diadematus* (CLERCK 1757) (Araneidae) is an example within extant genera;

- surely the (micro-)habitat influenced the frequency of spiders;
- spiders living mainly HIDDEN IN TUBES like Mesothelae (and which furthermore may be relatively LARGE WHEN ADULT like members of the Praearaneidae and questionable Deinopidae) are usually relatively rare (except dispersing juveniles or trying to dig new and larger tubes like Mesothelae). Mesothelae lived probably on the base of tree trunks in contrast to the tube-dwelling Segestriidae which are quite frequent in Burmite, and lived apparently in holes and fissures of the bark of the "amber trees".

Qestionable FAUNAL GAPS (so far as known today: still not found or still not existing in the Mid Cretaceous), evolution and ecology (see above and the list in the book by WUNDERLICH (2015: 86)):
Most WANTED by me – and expected in Burmite – is the find of a member of the superfamily Hypochiloidea s. l. in Burmite. This mainly tropical ancient high taxon has never been reported by a fossil up to now (!). Several mygalomorph families – e. g. Atypidae, Ctenizidae and Nemesiidae – have also still not been reported in Burmite. A male of the family Plumorsolidae (*Burmorsolus*) is wanting. Haplogyne spiders of the families Ochyroceratidae s. str., Pholcidae (see *Praepholcus* n. gen.), Sicariidae incl. Loxoscelinae as well as of all subfamilies of the Oonopidae besides the Orchestininae and of several families of dwarf entelegyne araneoid spiders: Anapidae, Comaromidae, Mysmenidae and Symphytognathidae (they are related to the family Theridiosomatidae which was frequent in the Burmese amber forest!) as well as sure Araneidae, Linyphiidae and Mimetidae are still not reported from Burmite and from the whole Cretaceous, although according to BENAVIDES et al. (2016) the diversification of the Mimetidae is estimated to be around 114 Ma. in the Early Cretaceous. Furthermore taxa near the roots of the Araneoidea (see the cribellate Praearaneidae n. fam. and a fam. indet (CJW)) as well as of the RTA-clade (but see below) wait for their discovery in Burmite.

Phylogenetics, chronocladograms. Based on the knowledge of more than 100 000 fossil spiders I called – in a hypothetic chronocladogram – the Mesozoic the "Era of Hyplogynae (*) and Mygalomorpha", and the Cenozoic the "Era of the Araneoidea and the RTA-clade"; see WUNDERLICH (211: 543, 2015: 47). These findings are in contrast to the chronocladogram given by GARRISON et al. (2015: 15) (under "chronogram"): The origin of the RTA-clade is set back far more than 150 million years by these authors, far more than 50 million years before the existence of the Burmese amber forest; but in Burmite not a single member of various families like Amaurobiidae, Corinnidae, Pisauridae (**) and Salticidae of this clade have been found among far more than 1000 Cretaceous spiders. Probably we will learn more about spider phylogeny from Mesozoic fossils in amber than from phylogenomics; see the families Burmadictynidae and Praearaneidae.
Note on the family Oonopidae: Only the subfamily Orchestininae is known from the Cretaceous; it was widely distributed and rather diverse already in the Cretaceous, and the remaining subfamilies may have been diversified or even originated only after the KT events.

“Trends”: Remarkable is the increasing thickness of the femur of the jumping leg IV during spider evolution in certain Orchestininae (figs. 41, 36), and the increase of the body length in certain spider families, see below: “Questionable dwarfism...”. See also above: “extinctions”.

The “CRETACEOUS TERRESTRIAL REVOLUTION” (KTR) 125-90 million years ago has probably forced the diversification (and even the origin?) of ground-dwelling members like Salticidae of the huge RTA-clade, “favoring diversification of spiders that feed on cursorial rather than flying prey.” See GARRISON et al. (2016) and below. But:
(a) still no sure proof of a Cretaceous member of this clade exists;
(b) during far more than a hundred million years before the KTR members of the Mesothelae and of the diverse Mygalomorpha fed on cursorial animals like Acari, certain Araneae, Coleoptera, Collembola, Diplopoda, Formicidae and Myriapoda;
(c) certain cursorial spiders – like the tiny members of *Burmorchestina* (Oonopidae) in Burmite were already frequent in the Cretaceous. Extant onopids are ground dwellers or dwellers of higher strata of the vegetation and feed e. g. on Collembola;
(d) the HUGE biomass of social living ants – preserved e. g. in the Eocene Baltic amber – did not yet exist in the Cretaceous; and
(e) large areas of open grass land probably developed also AFTER the KT events.
Such biotopes may have forced the evolution of members of the RTA-clade which were not dwellers of forests and therefore are absent in amber.
Therefore in my opinion the most pronounced revolution of spider evolution and diversification probably happened still during the Palaeocene.

The distinctive intrageneric RADIATION in *Burmesarchaea* WUNDERLICH 2008 (14 species) of the haplogyne family Archaeidae – see p.171–172, the figs. A – N of the prosoma – is most pronounced within all Cretaceous and Mesozoic spider genera known to me. In *Priscaleclercera* n. gen. (Psilodercidae) also a larger number of species evolved.

The COMPLEXITY of male copulatory structures, see e. g. the “mating plug” (in the family Burmadictynidae) and in the genus *Priscaleclercera* (fig. 116) of the family Psilodercidae, and the VARIABILITY of genital and non-genital structures of certain spiders of the Mid Cretaceous were frequently not less than in extant spiders. Examples are the families Lagonomegopidae, Leptonetidae, Tetrablemmidae, Theridiosomatidae and Uloboridae. On the other hand quite simple structures of the bulbus in extinct haplogyne families like in the Eopsilodercidae exist (fig. 95) compared with Eocene or extant related taxa. (See also the simple bulbus structures in certain Eocene spiders of the families Oecobiidae and Hersiliidae compared with extant spiders: WUNDERLICH (2004: 263-264 and figs.)).

QUESTIONABLE DWARFISM AND INCREASING BODY SIZE (GIGANTISM) during spider evolution: See e. g. the Mesothelae and Mygalomorpha as well as the families Tetrablemmidae, Theridiosomatidae and Uloboridae.

The RELATIONSHIPS OF CERTAIN FAMILIES are unsure: Huttoniidae (the family is most probably unknown from fossils; only juveniles have been reported), Mongolarachnidae, Pholcochyroceridae, Praearaneidae, Praeterleptonetidae and Salticoididae.

Taxa like the Burmadictynidae, the diverse Lagonomegopidae and the Mongolarachnidae – they became extinct at the latest at the end of the Mesozoic – may represent early "BLIND ENDS" of Mesozoic spider evolution. Hopefully near the base (the origin) of these families some "hidden missing links" to (extant mega-diverse) branches (like the RTA-clade) and the superfamily Araneoidea (see the subfamily Retrooecobiinae of the Oecobiidae and the Praearaneidae) will be found/recognized in the future among amber fossils.

REMARKS ON THE PAPER BY GARRISON ET AL. (2016): (1) Cretaceous fossils and faunal gaps reported by the present author as well as the corresponding publications – including numerous (!) erroneous identifications of Mesozoic spiders by certain authors (**) – are ignored or even concealed. Is the reason for that that the results of the phylogenomics and of the fossil reports are not congruent which each other? (2) Close relationships of the families (and their superfamilies!) Hypochilidae and Filistatidae appear quite unlikely to me – see WUNDERLICH (2015: 279f, fig. G, p. 287) –, e. g. the (prey capturing) behaviour and the (genital)morphology of both taxa are quite different (***). (3) The position of the family Theridiidae as sister group to all remaining families of the superfamily Araneoidea appears extremely unlikely to me: Theridiidae is a derived family of this superfamily (for example the orb web has been lost) and in contrast to several other families (for example the members of the family Theridiosomatidae which are frequent in Mid Cretaceous Burmese amber) only a single – questionable! – specimen of the family Theridiidae has been reported from the whole Mesozoic, see WUNDERLICH (2015: 341-344) and above and below (descriptions of thethe taxa).

(*) In 2011: 543 I noted the double number of haplogyne genera compared to entelegyne spider genera in the Cretaceous but according to recent finds the number may even be higher although the superfamiliar position of the family Praeterleptonetidae is still not sure.

(**) See WUNDERLICH (2008: 538): *Palaeohygropoda myanmarensis* PENNEY 2004 has turned out as a member of quite another – haplogynea – superfamily. See also below: The quite questionable member of the RTA-clade in Burmite. – A strong discrepance between the absence of fossil proofs of the Mesozoic and molecular genetical results – which point to very early (Mesozoic; Cretaceous or even Jurassic) origins of high taxa – exists not only in spiders but also in other animals like placental mammalia.

(***) Is present phylogenomics generating a kind of pseudoscientific religion – ignoring the real physical animals –, including their morphology, anatomy, behaviour, biology and biogeography, as well as fossils?

DESCRIPTIONS OF THE TAXA

(A) MESOTHELAE

The discovery of several striking new taxa of three extinct families in Burmite documents the RELICT CHARACTER of the infraorder Mesothelae; the extant mesothelid fauna includes only two families. The Cretaceous taxa in Burmite fill a large gap of the fossil documentation between the Carboniferous and today.

In the present paper I describe three new Cretaceous mesothelid families in Burmite: The Burmathelidae, based on juveniles and a probably adult female of the new genus *Burmathele*, the Cretaceothelidae, based on a single juvenile specimen, and the Parvithelidae, based on two adult males of the new genus *Parvithele* – the first known adult fossil males of the Mesothelae –, as well as a juvenile specimen, and a juvenile of the new genus *Pulvillothele*. A list of the extant and extinct suprageneric mesothelid taxa and a key to their Cretaceous and extant taxa are given.

Life style: Members of the tropical ancient "primitive" segmented spiders of the infraorder Mesothelae (fig. 4, photos) live underground in tubes; they use threads for building tube covers, for their egg sacs, for draglines, and some do so furthermore for building signal (fishing) lines: Members of the Liphistiidae, in contrast to the Heptathelidae. Mainly when growing and spreading, juveniles – as well as males searching for females – leave their burrow and thus may have been captured by the fossil resin.

Apparently both males of the genus *Parvithele* have been the prey of an arthropod (see below), of an insect (a beetle?), of a mygalomorph spider (a Dipluridae) or probably of a conspecific female (canibalism) although according to HAUPT (2003: 56) "Sexual partners had never been observed to show any aggressive behaviour against each other,..." (in extant Mesothelae).

Mesozoic fossils: Only two year ago the first Cretaceous member of the Mesothelae was described in 100 million year-old Mid Cretaceous Burmese amber (Burmite) of Myanmar (Burma). The first Cretaceous record was a very small – body length 1.5 mm – juvenile specimen of *Cretaceothele lata* WUNDERLICH 2015: 101, see figs. 4-7. Its typical mesothelid characters – four pairs of spinnerets in a ventral position, pseudosegmented lateral spinnerets, and a segmented opisthosoma – are well preserved. The relationships of this taxon – originally described as a plesion but now regarded as a family of its own – are unsure, it is not a member of the family Liphistiidae which possesses club-shaped leg trichobothria (the family has to be deleted from the list of Cre-

taceous and even of fossil spider families; see WUNDERLICH (2015: 92)); its posteriorly wide sternum and its smooth tarsal claws are unknown from other Mesothelae. An adult specimen of this taxon is wanted for a further study.
The Carboniferous taxa – preserved in stone, e. g. the Arthrolycosidae, partly described under Mygalomorpha – are only insufficiently known, their (sub-) familiar assignment is unknown, see SELDEN et. al. (2014) and below.
The Cretaceous fossils FILL THE LARGE GAP of mesothelid spider reports worldwide between the Carboniferous and today. I suppose that East Asian Palaeozoic fossils of the Mesothelae will be discovered in the future.

Two extant mesothelid families, Liphistiidae and Heptathelidae, have been described, see e. g. HAUPT (2003), XIN XU (2015a). Most often they were listed as subfamilies but I follow PETRUNKEVITCH (1939) and HAUPT (2003) who regarded both as families.

In order to explain the apomorphic and plesiomorphic CHARACTERS OF THE MESOTHELAE we have to keep in mind the MAIN APOMORPHIC DIAGNOSTIC characters of the Araneae (s.str.):
(1) Loss of a telson,
(2) existence of a male pedipalpal copulatory organ (it is probably absent in the Uraraneida,
(3) existence of opisthosomal spinnerets (basically four – partly strongly segmented – pairs which basically possess a ventral position in the ancient Mesothelae),
(4) a distinctly segmented scutate opisthosoma;
as well as probably furthermore the existence of poison glands (they were overlooked by HAUPT (2003)), a narrow eye field on a tubercle, tarsal organs, an egg cocoon, draglines as well as signal lines – they most probably were all absent in the ancient Uraraneida; see WUNDERLICH (2015: 38).

Supposed selected **characters** of the Meothelae:

Apomorphic characters:
- An almost mid-ventral position of the (four pairs of) spinnerets (fig. 6),
- existence of an inclination of coxa IV (?) (see below) (figs. 2,8; but see fig. 6!),
- probably loss of teeth of the cheliceral retromargin, see below,
- existence of poison glands? (Plesiomorphy? See below),
- various uses of their threads including signal lines (?).

Plesiomorphic characters:
- Existence of 10 tergites (6 are shown in fig. 4 of a juvenile specimen),
- existence of poison glands? See above,
- existence of 8 eyes with the anterior median one strongly reduced (figs. 1a, 5) placed on a tubercle (?) (see fig. 12a),
- posteriorly wide and not elongated sternum (fig. 8),
- both margins of the fang furrow toothed – the retromargin, too –, so in *Palaeothele*,
- leg-shaped pedipalpi,
- no inclination of coxa IV (?) (fig. 6),

- toothed unpaired tarsal claws (fig. 3),
- moulting as adults,
- longevity (up to more than 20 years),
- existence of a trap door,
- absence of signal lines (?).

List, age and distribution of the families and a plesion of extant and fossil Mesothelae:

(1) Palaeozoic: Carboniferous – Permian, extinct, preserved in stone; see PENNEY & SELDEN (2011: 51-55):
- Arthrolycosidae FRIC 1904. USA, Europe: UK, France.
  - Plesion: *Palaeothele* SELDEN 1996, Europe: France.
- Arthomygalidae PETRUNKEVITCH 1923, Europe.
- Pyritaraneidae PETRUNKEVITCH 1953, Europe.

(2) Mesozoic: Mid Cretaceous, extinct, preserved in Burmese amber (Burmite):
- Burmathelidae **n. fam**., Myanmar.
- Cretaceothelidae **n. fam**., Myanmar.
- Parvithelidae **n. fam**., Myanmar.

(3) Extant, South-east Asia; diagnoses see HAUPT (2003: 67, 69):
- Liphistiidae THORELL 1869, South East Asia.
- Heptathelidae KISHIDA 1923, South East Asia.

Provisional **key** to the extant and the extinct Cretaceous families and selected genera of the Mesothelae:

Notes: The adult male is known from the extant families Heptathelidae, Liphistiidae, and the genus *Parvithele* of the extinct family Parvithelidae. – The structures of the tarsus – especially its apical structures – are of special taxonomic value. – Usually 8 eyes exist with the anterior median eyes distinctly reduced (or even absent as in the extinct Burmathelidae and in some specimens of the extant *Liphistius batuensis*).

1 Tarsi, metatarsi and cymbium with club-shaped trichobothria (fig. 3a) besides long and thin trichobothria. Paired tarsal claws with few teeth (frequently 3) in a single row. Tibia of the male pedipalpus with a well developed raptorial retroapical apophysis (fig. 13). Signal lines existing. – Extant, SE-Asia. Only *Liphistius* . . . . . LIPHISTIIDAE

- Club-shaped trichobothria absent. Teeth of the paired tarsal claws quite variable, in two rows only in the Burmathelidae. Male pedipalpal tibial apophysis absent at least in the Parvithelidae and Heptathelidae (figs. 17-18), unknown in the remaining fossil taxa in which the adult male is unknown. Signal lines absent in the Heptathelidae, unknown in the fossil taxa. Extant or extinct 2

2(1) Paired tarsal claws with two rows of numerous teeth (figs. 10 – 10a) (they may be difficult to observe and absent on certain claws). Only 6 eyes in a narrow field (fig. 12a). Sternum posteriorly with a wide structure (fig. 8). – Juv., *Burmathele*. Cretaceous. . . . . BURMATHELIDAE

- Paired tarsal claws with a single row of teeth (fig. 7). Usually 8 eyes. 3

3(2) Paired tarsal claws with quite tiny teeth, 8 eyes in a wide field (fig. 5) with tiny anterior median eyes in an anterior position. Sternum posteriorly variable, e. g. as in fig. 6. Coxa IV without inclination (fig. 6) in contrast to (all?) other Mesothelae. – Juv., *Cretaceothele*. Cretaceous . . . . CRETACEOTHELIDAE

- Paired tarsal claws with large teeth. 8 eyes at least in the Heptathelidae (in all taxa?) in a narrow field (fig. 1a). Adult male known except in *Pulvillothele*. 4

4(3) Tarsi without an apical “pseudopulvillus” (fig. 11). Teeth of the unpaired tarsal claws absent (*), paired claws with about 3 teeth. Body length without chelicerae 8 mm up to more than 15 mm. Paracymbium with pointed spines as in fig. 13 or with strong hairs. Several genera. Extant, SE-Asia . . . . HEPTATHELIDAE

- Tarsi with an apical “pseudopulvillus” (figs. 16, 19, 21). Teeth of the unpaired tarsal claws existing (e. g. fig. 11) (in all taxa?), paired claws with 4 or – usually – more teeth (figs. 16, 19, 21). Body length without chelicerae in the male sex 3.6 – 8 mm. Paracymbium with apically NOTCHED spines at least in *Parvithele* (figs. 18, 20). *Parvithele* and *Pulvillothele*. Cretaceous Burmese amber. . . . . PARVITHELIDAE

(*) Teeth of the unpaired tarsal claws are absent at least in Japanese Heptathelidae according to ONO, person. commun. – Special sensory tibial bristles (spurs) exist in most Heptathelidae but are absent e. g. in *Heptathela australis* (ONO 2000) according to SCHWENDINGER & ONO (2011: 603).

Discussion: Taxonomy, biogeography, evolution and phylogenetics

See also the introduction.

The limits and the level of the extant high taxa of the Mesothelae are still debated. Following PETRUNKEVITCH (1939) and HAUPT (2003: 67-69) I regard the Heptathelidae – they possesses e. g. paired receptacula and a conductor – and the Liphistiidae – they possesses e. g. club-shaped trichobothria, see fig. 3a, and “fishing lines” – as families but not as subfamilies of the Liphistiidae s. l..

Note: In my opinion the level and terms especially of the highest spider taxa are subjective, so Araneomorpha and Mygalomorpha may be regarded as infraorders of the Opisthothelae or both as suborders of the Araneae besides the suborder Mesothelae. The Araneae and the insufficiently known extinct Uraraneidae may well be regarded as – strongly related – orders of their own.

The PSEUDOPULVILLUS (new term) is a special flattened apical structure of the tarsus of the Cretaceous family Parvithelidae (*Parvithele, Pulvillothele*), originating just above/between the paired claws. In the genus *Parvithele* (fig. 19, photo 40) it is blunt and translucent, in *Pulvillothele* (fig. 21) the structure is apically notched and not translucent. I call this structure “pseudopulvillus”; a true pulvillus – existing e. g. in certain members of the family Caponiidae – has a position BELOW the tarsal claws like in the Solifugae.

COMPARISON of fossil and extant Mesothelae:

(1) Questionable dwarfism/gigantism: The small size of the Cretaceous mesothelid spiders is remarkable: The male holotype of *Parvithele spinipes* n. sp. is only 3.6 mm long (it is the smallest known member of the Mesothelae), the holotype of *P. patricki* is only 7-8 mm long. These specimens are smaller than all extant mesothelid species which have a body length of 8-37 mm. Does “gigantism” of certain extant species or dwarfism exist in Cretaceous spiders? Also the Carboniferous members of this order are larger than their Cretaceous relatives. – Questionable dwarfism is also known from Cretaceous Ricinulei: The adult male of *Hirsutisoma bruckschi* WUNDERLICH 2017 (this volume) is only 2.8 mm long in contrast to extant Ricinulei whose body length is at least 4 mm.

(2) The leg spination of the fossil spiders (fig. 15, photos) is stronger than in most extant species.

(3) The legs of the fossil spiders are more slender (photos) than in most extant spiders.

(4) The body length of the fossil spiders – only 3.6 and 7-8 mm in the two known fossil adult males – is clearly less than in all(!) known extant spiders (8 – 37 mm). Does gigantism exist in the extant Mesothelae or dwarfism in the fossils in Burmite?

Biogeography: Extant and fossil taxa of the Mesothelae are absent from Africa and Australia. Palaeozoic taxa are known from North America and Europe. Mesozoic taxa are only known from South East Asia, in Cretaceous Burmite, see the list above.
According to XIN XU et al. (2015b) “The available fossil evidence supports the Euroamerican origin hypothesis for Mesothelae...”, and a spreading of Mesothelae from Europe to South East Asia during the Palaeogene. In my opinion the discovery of the South East Asian Mid Cretaceous genera *Cretaceothele*, *Burmathele*, *Pulvillothele* – and especially *Parvithele* – contradict the conclusions by XIN XU et al. (2015b) which are based on molecular genetic studies; see the paper on historical biogeography in this volume below, WUNDERLICH (2017).

DESCRIPTION OF THE CRETACEOUS MESOTHELID TAXA

CRETACEOTHELIDAE n. fam.

Type genus (by monotypy): *Cretaceothele* WUNDERLICH 2015: 101.

Correction regarding the holotype of the type species *C. lata* WUNDERLICH 2015: Syninclusions are two Diplopoda: Polyzoniidae but not Isopoda.

Diagnosis (juv.): 8 eyes in a wide field (figs. 4-5), inclination of the coxae IV absent (fig. 6), paired tarsal claws with quite tiny teeth.
Further character: The sternum bears a small posterior “tip” (fig. 6).

Relationships (see the key): In contrast to other Mesothelae known to me inclinations of the coxae IV are absent – an apomorphic/derived or a plesiomorphic character? –, and the eye field is wider.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

BURMATHELIDAE n. fam.

Etymology: The name refers to the amber of Myanmar (Burma) – Burmite in which the holotype of the family type is preserved, and “thele” (gr.) meaning “nipple”, see SELDEN (2000: 292).

Type genus (by monotypy): *Burmathele* n. gen.

Diagnosis (?ad. ♀, juv.): At least certain paired tarsal claws bear a double row of teeth, see below (figs. 10, 10a) (similar to the mygalomorph family Nemesiidae), only 6 eyes (figs. 12a), sternum posteriorly with a wide part (fig. 8).

Further characters: Fovea low, posterior spinnerets short, leg trichobothria thin (fig. 9) (not club-shaped), unpaired tarsal claws toothed (fig. 11), apical sensory tibial spurs absent, retrobasal inclination of coxa IV existing (fig. 8).

Relationships (see the key): In all other known mesothelid taxa the paired tarsal claws bear only a single row of teeth, and usually 8 eyes exist. Teeth of the unpaired tarsal claw exist e. g. also in the Liphistiidae (fig. 3) in which – as an apomorphy – club-shaped trichobothria exist (fig. 3a), and rarely only 6 eyes, as well as in the Parvithelidae which possesses only a single row of teeth of the paired tarsal claws. Teeth of the unpaired tarsal claws are absent in the Heptathelidae. The characters of the much older Carboniferous mesothelid taxa are only insufficiently known; in the plesion *Palaeothele* SELDEN 2000 – preserved in stone – the retromargin of the fang furrow bears teeth; the fang furrows of the present specimens of *Burmathele* are hidden. The posterior structure of the sternum is apparently unique in the Burmathelidae.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Burmathele **n. gen.**

The gender of the name is feminine.

Type species (by monotypy): *Burmathele biseriata* n. gen.

Etymology, diagnosis, relationships and distribution: See above,

Burmathele biseriata **n. gen. n. sp**. (figs. 8-12) photos 31-33

Etymology: The species name refers to the two rows of teeth of the paired tarsal claws, taken from bi (Lat.) = double and serere (lat.) = join together.

Material: 2 specimens in Mid Cretaceous Burmite, holotype ?ad. ♀ F2829/BU/CJW; 1 juv. F3010/BU/CJW.

Holotype (figs. 9-12, photo):

The spider is smaller than extant mesothelid adults but according to the strongly sclerotized tergites I do not want to exclude that it is adult. Furthermore it appears to be not injured and may have been died by old age.

Preservation and syninclusions: The arachnid is almost completely and fairly well preserved in a clear yellow piece of amber, partly dissected (bubbles of probably decomposition gas exist) and ventrally with an emulsion which covers the mouth parts and most parts of the sternum and spinnerets; the left leg II is cut off beyond the patella. Few short spider's threads are preserved at the left tarsus III. Parts of detritus and tiny plant hairs exist, too.

Diagnosis (?ad. ♀): See above.

Description (? ad. ♀):
Measurements (in mm): Body length 5.0, prosoma: Length ca. 2.3, width 2.0; opisthosoma: Length ca. 2.0, width 1.6; leg I: Metatarsus ca. 1.0, tarsus ca. 0.85, metatarsus III 1.1, metatarsus IV 1.4, tarsus IV 0.95, pedipalpal tarsus ca. 1.2.
Colour mainly grey brown, tergites dark brown.
Prosoma (photo) not much longer than wide, finely scaly, fovea low, 6 eyes, field narrow, anteriors large and close together, clypeus very short, basal cheliceral articles stout and spiny distally, fangs long, their tips close together, mouth parts and most parts of the sternum hidden, sternum wide. – Pedipalpus large, spiny, claw large, with large teeth in the basal half. – Legs (figs. 9-11, photo) stout and spiny, IV longest, trichobothria thin, tarsal claws long, unpaired claws toothed, paired claws with two rows of teeth which may be difficult to observe and are probably absent on certain claws, mainly on III-IV; apical sensory tibial bristles absent, a retrobasal coxal IV inclination not observable. – Opisthosoma (fig. 12, photos) with large and strongly sclerotized tergites, I observed at least 8 ones which are close together and bear 1-3 posterior pairs of long erect bristles. Spinnerets badly preserved, 6 or 8 pairs, anterior laterals larger and multisegmented, posterior laterals short, partly hidden, medians hidden.

Paratype (figs. 8, 10a, 12a, photo 33):

Preservation and syninclusions: The spider is very well preserved in a clear yellowish piece of amber, the distal parts of the right legs II and IV and the left legs III and IV are cut off. – Syninclusions: 1 tiny winged insect, 1 Collembola: Sympleona, plant hairs, insects excrement and detritus; 1 particle of detritus is preserved on the middle of the injured (laterally inclined) prosoma.

Description (juv.):
Measurements (in mm): Body length 2.4; prosoma: Length 1.4, width 1.15; opisthosoma: Length ca. 1.5, width 0.9; leg I: Tibia 0.85, metatarsus 0.63, tarsus 0.5; leg II: Femur ca. 1.3, patella 0.4, tibia 0.65, metatarsus 0.6, tarsus 0.5.
Colour light brown.
Prosoma (figs. 8, 12a, photo) 1.2 times longer than wide, finelly furrowed, 6 large eyes on a tubercle, fovea hidden, clypeus quite short, basal cheliceral articles large and fairly protruding, teeth of the fang furrow hidden, fangs long, their tips touch each other, sternum large, bearing long and stronger hairs, wide posteriorly and with a wide part. – The claw of the leg-shaped pedipalpus bears 4 large teeth. Legs (figs. 8, 10a, photo) robust, bristles and trichobothria numerous and thin, coxae IV widely spaced, bearing distinct retrolateral inclinations in the basal half; unpaired tarsal claws with 3 large teeth, paired claws with two rows of teeth, 3 longer and about 3 shorter basal ones. – Opisthosoma (photo) 1.7 times longer than wide, bearing few dorsal hairs and at least 7 tergites; spinnerets only fairly well preserved, the anteriors retracted, large and in a rather anterior position.

Relationships: See above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Burmathele sp. indet., photo 34

Material: 1 juv. in Mid Cretaceous Burmite, coll. Patrick Müller BUB-81.

Preservation: The spider is completely and excellently preserved in a yellow piece of amber.

Description:
Measurements (in mm): Body length 2.0; prosoma: Length 1.0, width 0.9; tibia I 0.5.
Colour light brown. 6 eyes which are well observable. Legs: Bristles long and thin, metatarsus I bears a long trichobothrium, position in 0.8. On some tarsi a double row of teeth of the paired tarsal claws is observable, e. g. on the retroclaws I-II, the long unpaired claw bears several teeth. Opisthosoma: Six tergites are observable, the anterior three ones bear 2 pairs of long bristles. Lateral spinnerets large, medians very small, anal tubercle large, surrounded by a small sclerotized ring.

PARVITHELIDAE n. fam.

Etymology: From parvus (lat.) = small, referring to the small body size of the confamiliar spiders and “thel” referring to a part of the name Mesothelae.

Type genus (by monotypy): *Parvithele* n. gen.

Diagnosis (♂; ♀ unknown): Tarsi with an apical „pseudopulvillus“ (see above) (figs. 16, 19, 21), paracymbial spines apically notched (figs. 18, 20).

Further characters: Leg trichobothria thin, paired tarsal claws with a single row of teeth (figs. 16, 19, 21), unpaired claws with few teeth (figs. 16, 19), distinct pedipalpal tibial apophysis absent. Smallest known member of the Mesothelae, body length 3.6 to almost 8 mm. Probably the position of the spinnerets is more anteriorly than in other Mesothelidae.

Relationships (see the key): Parvithelidae already possesses the large cymbium and spiny paracymbium as well as a small bulbus which are all characteristic for extant Mesothelae. – According to the absence of a distinct pedipalpal tibial apophysis Heptathelidae may be most related; in the larger Heptathelidae a pseudopulvillus and teeth of the unpaired tarsal claws are absent, the paired tarsal claws bear only about 3 teeth, the teeth of the paracymbium are not notched.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Key to the taxa of the Parvithelidae:

1 Pseudopulvillus well recognizable (not translucent) and apically notched (fig. 21). Paired tarsal claws with 8 teeth (fig. 21). Juv. . . . . *Pulvillothele haupti*

- Pseudopulvillus difficult to recognize, translucent and blunt (figs. 16, 19). Paired tarsal claws usually with 6 (rarely 4) teeth (figs. 16, 19). ♂. *Parvithele* 2

2(1) Pedipalpus (figs. 17-18): Paracymbium with numerous spines, tibia with several long and strong bristles, questionable cymbium with short apical spines. . . .*P. muelleri*

- Pedipalpus (fig. 20): Paracymbium with a lower number of spines, tibia with thinner bristles, questionable cymbium without observable apical spines. . . . . *P. spinipes*

Parvithele **n. gen**. (figs. 14-20) photos 35-37

Etymology: See above.

The gender of the name is feminine.

Type species (by monotypy): *Parvithele muelleri* n. sp.
Further species: *P. spinipes* n. sp.

Diagnosis (♂): Pseudopulvillus blunt and translucent, paired tarsal claws with 4–6 teeth (figs. 16, 19).

Relationships: In *Pulvillothele* (juv.) the pseudopulvillus is apically notched and not translucent, and the paired tarsal claws bear ca. 8 teeth (fig. 21).

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Parvithele muelleri* n. gen. n. sp.** (figs. 14-18) photos 35-36

Derivatio nominis: It is a pleasure to me to dedicate this species to PATRICK MÜLLER, the former owner of the holotype.

Material: Holotype ♂ in Mid Cretaceous Burmite of Myanmar (Burma), F2853/BU/ CJW.

Preservation and syninclusions: The spider is badly and incompletely preserved in a clear yellowish piece of amber which is 2 ½ cm long. The body and the pedipalpal articles are distinctly deformed/crumbled, the opisthosoma is empty, the right pedipalpus is broken off within the amber beyond the femur and loose, the posterior spinnerets are deformed, loose and transported posteriorly, the distal half of a tarsus is loosely preserved behind the spider, the eye field is strongly compressed laterally, the right leg IV is completely preserved, most of the remaining leg articles are lost, white emulsions and ventral bubbles hide parts of the spider. Probably the spider has been the prey of a member of the spider families Lagonomegopidae which is frequent in Burmite or Dipluridae (Mygalomorpha) which are not very rarely preserved in Burmite and which knead and crumble their prey; probably the remain of the spider has been blown by the wind from the ground to the trunk of the amber tree. According to HAUPT (2003: 56) cannibalism appears unlikely in this mesothelid spider: “Sexual partners had never been observed to show any aggressive behaviour against each other.” – Syninclusions: Few particles of detritus and small plant hairs exist in the same piece of amber as well as a small mite and a questionable larva of an insect far below the spider.

Diagnosis (♂; ♀ unknown; see above): Pedipalpus (figs. 17-18): Paracymbium with numerous spines, body length ca. 8 mm.

Description (♂):
Measurements (in mm): Length of the deformed body 7 mm (originally somewhat more, the opisthosoma is shortened artificially), prosomal length 4.4, opisthomal length at least 2.5, length of a posterior spinneret ca. 1mm, leg IV: Patella 1.4, tibia 3.5, tarsus 2.3.
Colour medium to dark grey, legs not annulated.
Prosoma (photos; it is distinctly compressed laterally, especially the eye field is strongly deformed) longer than wide, cuticula finelly scaly, few hairs, distinct lateral furrows, fovea deep, eye field raised on a tubercle, eye number not recognizable, chelicerae hidden or even lost, ventral parts hidden. – Opisthosoma (fig. 14) strongly deformed an incomplete, see above, with large tergites which bear few long bristles (several bristles are most probably lost), ventrally hidden; spinnerets (only the multisegmented posteriors are observable/preserved) in an artificial position. – Legs (figs. 15-16) quite incompletely preserved, I-II are lost, only fairly long, hairy, scopulae absent, bristles numerous, long and thin, tibia IV bears about a dozen, tarsus IV bears ventrally 15 bent hairs in an irregular position which stand out from the article, trichobothria thin and indistinct, not studied, paired claws with 6 partly long teeth in a single row, unpaired claw well developed and toothed. – Opisthosoma (fig. 14, photo) badly preserved (see above), tergites well developed, bearing few long bristles which probably are absent (rubbed off?) on the posterior plates, ventrally hidden, spinnerets (most are hidden or

lost), the posteriors multisegmented, strongly deformed. – Pedipalpus (figs. 17-18) with deformed articles, femur apparently not thickened, patella fairly short, tibia thick, distinct apophysis absent, bearing retroapically 3 quite long and strong bristles besides smaller bristles, few short and thin trichobothria, cymbium large, with a blunt retrobasal paracymbium which bears numeous short and thick spines which are apically notched, apical spines of unknown position exist, bulbus small, strongly deformed, most structures are hidden by an emulsion, complicated structures MAY BE absent (a micro-CT study is needed), the questionable subtegulum is recognizable.

Relationships: In *P. spinipes* n. sp. the number of paracymbial spines is lower and its body is smaller.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Parvithele spinipes* n. gen. n. sp.** (figs. 19-20) photo 37

Etymology: The species name refers to the long and numerous spines of the legs, from spina (lat.) = thorn, bristle and pes (lat.) = feet.

Material: Holotype ♂ in Mid Cretaceous Burmite, F 3024/BU/CJW.

Preservation and syninclusions: The spider is badly preserved, strongly deformed and probably also decomposed, the chelicerae and most parts of the spinnerets are lost, the body is strongly crumbled, the opisthosoma is shrunked to only 1.1 mm. I do not want to exclude that the male has been the prey of a beetle, a mygalomorph spider (Dipluridae?) or by a conspecific female (cannibalism); the right tibia II is cut off. – Syninclusions are a small beetle, remains of insects and insect's excrement.

Diagnosis (♂; ♀ unknown): Paracymbium (fig. 20) with few spines; body length only ca. 3.6 mm; smallest known mesothelid species.

Description (♂):
Measurements of the strongly deformed spider (in mm): Body length alive ca. 3.6 (see above); prosomal length 2.1; opisthosomal length 1.2 (alive probably ca. 1.5); leg I: Femur ca. 3.0, patella ca. 0.7, tibia ca. 3.2, metatarsus ca. 2.8, tarsus ca. 1.3, femur IV 3.0. Colour medium grey brown.
Prosoma (photo): Eye region raised, eyes unknown, chelicerae apparently lost. – Legs (fig. 19, photo) fairly long and slender, covered with numerous long bristles similar to *P. muelleri*, existing on femora, patellae, tibiae and metatarsi. Tarsal claws large, paired claws usually with 6 teeth (rarely 4), unpaired claws with probably 1-3 teeth; a larger flattened, translucent and blunt pseudopulvillus exists. – Opisthosoma strongly deformed and incomplete, bearing few very long bristles, dorsal scuta not observable, spinnerets partly lost. – Pedipalpus (fig. 20): Tibia similar to *P. muelleri* but apical bristles appar-

ently weaker, paracymbium well developed, bearing at least 4 short notched spines as well as at least 2 longer retrolateral spines, cymbium apically divided, bulbus small, strongly deformed.

Relationships: See *P. muelleri* n. sp.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Parvithele sp. indet.

Material: 1 juv. in Mid Cretaceous Burmite, F3038/BU/CJW.

The spider is only fairly well preserved, partly injured and decomposed, most left leg articles I-III are cut off, the posterior dorsal parts of prosoma and opisthosoma are lacking, the spinnerets are partly hidden.
The legs are fairly stout, the structures of the tarsal tips/claws are like in the genus *Parvithele*.
Measurements (in mm): Body length 2.6; prosoma: Length 1.3, width 1.1; opisthosoma: Length 1.3, width 1.0; femur III ca. 0.85.

***Pulvillothele* n. gen.** (figs. 21-22) photos 38-40

Etymology: The first part of the name refers to the structure of the tarsi which is similar to a pulvillus, the second part – thel- (gr.) – reminds on the name of the infraorder Mesothelae.

The gender of the name is feminine.

Type species (by monotypy): *Pulvillothele haupti* n. sp.

Diagnosis (juv.): Pseudopulvillus apically strongly notched and not translucent, paired tarsal claws with ca. 8 teeth (fig. 21).

Relationships: See the key and *Parvithele*.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Pulvillothele haupti* n. gen. n. sp.** (figs. 21-22) photos 38-40

Derivatio nominis: The species name is dedicated to Joachim Haupt, who published an important monography on the infraorder Mesothelae.

Material: 1 juv. in Mid Cretaceous Burmite, F3011/BU/CJW.

Preservation and syninclusions: The spider is almost completely and distinctly deformed preserved in a flat clear yellowish piece of amber, the tip of the right pedipalpal tarsus is cut off. – Syninclusions: A tiny winged insect, a tiny strongly deformed winged insect, plant hairs and particles of detritus.

Diagnosis, **distribution** and **relationships**: See above.

Description (juv.):
Measurements (in mm): Body length 3.2; prosoma: Length 1.8, width ca. 1.4; opisthosoma: Length 1.4, width 1.1; leg I: tibia ca. 0.65, metatarsus 0.55, tarsus 0.4, tibia II 0.72, tibia III 0.7, tibia IV 1.0.
Colour light to medium (tergites) brown.
Prosoma (photo; it is strongly deformed and partly hidden) 1.3 times longer than wide, finelly granulate, flat, 8 (or only 6?) small eyes, ventral parts deformed and hidden. – Pedipalpus spiny, tarsal claw well developed. – Legs (figs. 21-22, photo) stout, IV longest, bristles numerous, about a dozen exist on tibia IV, long and thin, trichobothria numerous and long, not thickened; tarsal claws: See the diagnosis, the unpaired claws bear ca. 3 teeth. – Opisthosoma (photo) dorsally with few longer bristles on at least half a dozen tergites which are well developed; spinnerets strongly deformed, the anterior laterals are partly broken off.

Mesothelae indet. Photo 41

Material: 1 juv. in Mid Cretaceous Burmite, coll. Patrick Müller BUB-80.

The spider is completely and well preserved, its body length is 1.3 mm.

(B) OPISTHOTHELAE

MYGALOMORPHA

Apparently the mygalomorph spider fauna in the Cretaceous Burmese amber forest was quite diverse; mainly members – most often juveniles – of the family Dipluridae were not rare, see below, WUNDERLICH (2012: 169-171) (Dipluridae indet.) and (2015: 103-111) (Dipluridae: *Phyxioschemoides* n. gen., Dipluridae indet.). Furthermore questionable Atypidae and the new family Fossilcalcaridae are known. Probably members of the family Hexathelidae (e. g. *Alioatrax* n. gen.) were not rare, too.
Three features of the adult holotype males of the families Dipluridae and Hexathelidae are remarkable:

- They are the smallest known members of their families,
- both species show putative taxonomic relationships to Australia,
- both specimens are decomposed; therefore I suppose that they were captured after their dead by fallen fluid droplets of the resin which enclosed these ground-living spiders on the ground.

Family DIPLURIDAE

Cethegoides n. gen.

Etymology: The characters of the new genus refer to the similar extant Australian genus *Cethegus* THORELL 1881 (-oides = similar).

The gender of the name is masculine.

Type species (by monotypy): *Cethegoides patricki* n. sp.

Diagnosis (♂; ♀ unknown): The tarsi bear dorsal cuspules (fig. 24), tibia I-II bears numerous strong bristles (fig. 23). Pedipalpus: See below.

<u>Further characters</u>: See below, the paragraph relationships. *C. patricki* is one of the smallest members of the family Dipluridae.

Relationships: The key to the genera of the Dipluridae by RAVEN (1985: 72-73) led the new taxon to the probably related extant endemic Australian genus *Cethegus* THORELL 1881 of the subfamily Ischnothelinae. Similar characters are the low prosoma, the well developed transverse fovea, the absence of leg scopulae, preening combs, mating spurs and apical cymbial bristles (various "negative characters"!), but tarsal cuspules and tibial I-II megaspines are absent in *Cethegus*. The eyes, the mouth parts and the spinnerets are hidden, incompletely preserved or injured in the holotype of *C. patricki*, and they may also be different in both genera.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Cethegoides patricki* n. gen. n. sp**. (figs. 23-27) photo 42

<u>Derivatio nominis</u>: I like very much to dedicate this species to PATRICK MÜLLER who recognized the peculiar taxon of the holotype and left it to me.

Material: Holotype ♂ in Mid Cretaceous Burmese amber, F2889/BU/CJW.

Preservation and syninclusions: The spider is preserved in a small yellow piece of amber; it is partly decomposed, the body is partly covered with emulsions, dorsal parts of the opisthosoma are lost and its inner part is eaten out, a ventral prosomal part of the prosoma is eaten out, too (probably these injuries happened after the death of the spider), several leg articles are lost, or cut off, the right leg IV is twisted outwards behind the patella (fig. 26), the left legs I and II as well as the right legs I-III are completely preserved, the right pedipalpus is well observable, the spinnerets are only partly preserved, injured and crumbled, the distal articles of the posterior spinnerets are broken off and lost. – <u>Syninclusions</u>: The slender leg of a trionychian spider behind the femur, length 4 ½ mm, is situated right above the holotype. Two remains of a winged insect are preserved, one at the surface of the amber behind the holotype (its wings are cut off), the second one behind the left tibia IV (it is strongly deformed). Numerous plant hairs, parts of detritus as well as small questionable gas bubbles are also preserved.

<u>Remark</u>: The twisted right leg IV may indicate the attack of an enemy to the spider. The hollow – apparently eaten out – opisthosoma may have been originated later on, after the death of the spider.

Diagnosis (♂; ♀ unknown; see also above): Pedipalpus (fig. 27) with rather slender articles, bulbus pear-shaped, embolus fairly long.

Description (♂):
Measurements (in mm): Body length 5.0, prosoma (deformed): Length ca. 3.0, width probably 2.0; leg I: Femur 1.85, patella 1.2, tibia 2.0, metatarsus 2.0, tarsus 1.6; leg II: Femur 2.3, patella 1.2, tibia 2.0, metatarsus 2.0, tarsus 1.6; leg III: Femur 2.2, patella 1.1, tibia ca. 1.9, metatarsus 2.2, tarsus 1.9; femur IV 2.6; length of the basal cheliceral articles 0.8.
Colour dark brown; according to the bluish shine the amber was darkened by natural pressure and heating.
Prosoma (photo) (most parts like the eyes are hidden or deformed) low, distinctly longer than wide, covered with shorter hairs, fovea deep and transverse, eyes on a fairly high hump, basal cheliceral articles protruding, ventral prosomal parts hidden. – Legs (figs. 23-24, photo) fairly long, order IV/I/II/III, III relatively long, hairs of medium lenght, both femora partly thickened and injured (apparently by the preservation), scopulae, mating spurs and preening combs absent, bristles fairly long and fairly numerous, absent on patellae and tarsi, femora dorsally 4-10 (on IV); leg I: Femur dorsally 4-5, tibia 2 ventral pairs, 1 retrobasally, 2 retrodistally and a central-apical pair, metatarsus 1 retroventrally in the basal half and a ventral apical one; II similar I, III and IV with numerous bristles, metatarsus IV bears at least 8 bristles; the tarsi bear few prodorsal cuspules in a single row. Paired tarsal claws with a single row of long teeth, unpaired claw long and smooth. Trichobothria thin and numerous, two or three rows on the tarsi. – Opisthosoma incompletely preserved and deformed, longer than wide, dorsal scutum absent. Spinnerets only partly preserved, injured and crumpled, probably 3 pairs, the distal articles of the posterior spinnerets are broken off and lost. – Pedipalpus (fig. 27) with rather slender articles, without bristles, cymbium elongated, apical bristles absent, bulbus pear-shaped, embolus thin and fairly long.

Relationships and distribution: See abovw.

Family HEXATHELIDAE

Hexathelidae is a pantropical and subtropical family which has not been reported in Burmite and from the Cretaceous. From the Triassic a questionable Hexathelidae has been described: *Rosamygale grauvogeli* SELDEN & GALL 1992 in stone from France, see WUNDERLICH (2015: 66). The present specimens possess probably two pairs of spinnerets (unknown in *Alioatrax*!), and quite short posterior spinnerets in contrast to the relatively frequent Dipluridae in Burmite whose posterior spinnerets are very long. I do not exclude the membership of the family Hexathelidae of two juveniles (see below), and I regard an adult male of a new genus as a rather sure member of this family.

The posterior lateral spinnerets of extant Hexathelidae are usually rather long but they are fairly short in certain Atracinae of Australia, see GRAY (2010) and below. Hexathelidae live in funnel webs e. g. under rocks, some live in tubes in the earth. Extant spiders are usually 14 – 28 mm (♀) long, the Australian Atracinae are smaller, their prosomal length is only 4.5-7.5 mm, see GRAY (2010: 292). The prosomal length of the new species of *Alioatrax incertus* n. gen. in Burmite is only 3.6 mm; this is the smallest known species of the family Hexathelidae and of the subfamily Atracinae.

Alioatrax **n. gen.**

Etymology: From alio (lat.) = different and the probably related genus *Atrax*.

The gender of the name is masculine.

Type species (by monotypy): *Alioatrax incertus* n. sp.

Diagnosis (♂; ♀ unknown): Basal cheliceral articles (fig. 27a) relatively weak and diverging, posterior lateral spinnerets (fig. 27b) relatively short, opisthosoma ca. 3.7 times longer than the posterior spinnerets, tibia I-II unmodified, paired tarsal claws (fig. 27c) with numerous long teeth, pedipalpus (figs. 27e-f): Tibia distinctly thickened, cymbium with a proapical outgrowth, bulbus small, embolus long and thin; eyes and mouth parts unknown (hidden).

The **relationships** are unsure. According to its characters – e. g. the existence of an unpaired tarsal claw, absence of a rastellum and the relative SHORT POSTERIOR SPINNERETS (fig. 27b) – the genus *Alioatrax* may be the member of the family Hexathelidae and furthermore of the AUSTRALIAN subfamily Atracinae – it may be a family of its own; see GRAY (2010) – which contains the smallest known extant Hexathelidae and which characters are rather variable, see GRAY (2010: 292-293). Unfortunately the eyes and the mouth parts are unknown in *Alioatrax*. The new genus – it existed 100 million years ago! – is surely not congeneric with one of the three extant atracine Australian genera in which the basal cheliceral articles are distinctly larger, and other generic characters are different, too. – In the widely (in SE-Asia, too) distributed and apparently not closely related extant hexathelid genus *Macrothele* AUSSERER 1871 the posterior spinnerets are much longer.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Alioatrax incertus* n. gen. n. sp**. (figs. 27a-f)

Etymology: The name refers to its unsure relationships, from incertur (lat.) = unsure.

Material: Holotypus ♂ in Mid Cretaceous Burmite, F3074/BU/CJW.

Preservation and syninclusions: The spider is incompletely and partly decomposed preserved in a flat piece of amber; the right leg II is lost beyond the coxa probably by autotomy, the pedipalpi, the prosoma, most parts of the opisthosoma (dorsally it is incomplete) including the spinnerets and most parts of the leg articles except the distal parts are lost/cut off, the right metatarsus and tarsus IV are preserved. – Syninclusions are few Acari (one above the eye field), 1 Thysanoptera as well as remains of arthropods and plants.

Diagnosis, relationships and distribution: See above.

Description (♂):
Measurements (in mm): Body length 7.0; prosoma: Length 3.6, width ca. 2.8; opisthosoma: Length 3.7, width ca. 2.2; leg I: Femur ca. 2.9, patella ca. 1.3, tibia ca. 2.3, leg IV: Tibia ca. 2.1, metatarsus ca. 3.5, tarsus 2.0; length of a posterior spinneret less than 1.0.
Colour of the darkened spider medium to dark (the opisthosoma) brown, legs not annulated.
Prosoma (fig. 27a) 1.28 times longer than wide, low, eye region weakly raised, eye lenses, fovea and mouth parts hidden, basal cheliceral articles small, porrect and diverging, hairy anteriorly, rastellum absent. – Legs (fig. 27c) only fairly long, order probably IV/I/II/III, I-II inmodified, metatarsi III-IV slender, scopulae absent, hairs not distinct, bristles numerous and fairly long, existing on femora, patellae, tibiae and metatarsi, femur III bears ca. a dozen bristles, tibia I bears ca. 15 bristles, trichobothria thin, unpaired tarsal claw existing, paired claws with numerous long teeth, the retroclaw IV bears 6-7 long and some short teeth. – Opisthosoma (figs. 27b-c) 1.7 times longer than wide, hairs only fairly long, dorsal scutum absent, posterior lateral spinnerets relatively short (remaining spinnerets hidden). – Pedipalpus (figs. 27e-f): See the diagnosis.

Questionable Hexathelidae indet. in Burmite of the coll. PATRICK MÜLLER:

(a) 1 juv. Measurements (in mm): Prosoma: Length 0.8, width ca. 0.7, length of the posterior spinnerets 0.2.

(b) 1 juv. (together with a Mygalomorphae indet., see below). Measurements (in mm): Prosoma: Length 1.2, width 1.0; the quite short posterior spinnerets are deformed, their length is less than 0.2.

Mygalomorpha indet., photo 43

Fam. indet.:

Material: (a) 1 juv. in Mid Cretaceous Burmese amber, coll. PATRICK MÜLLER no. BUB 370; (b) 1 juv. in Mid Cretaceous Burmite, coll. PATRICK MÜLLER (together with a questionable member of the family Hexathelidae of the coll. P. MÜLLER, see above).

Specimen (a):
The spider is partly deformed and decomposed.
Measurements (in mm): Body length 2.0, prosoma (deformd!): length 1.0, width ca. 0.6; tibia IV ca. 0.5. Colour dark brown. Prosoma (deformed) almost 1.7 times longer than wide, fovea small and u-shaped, 8 eyes on a narrow elevation, the mediums tiny, basal cheliceral articles only weakly protruding, rastellum absent, fangs apparently directed obliquely, mouth parts hidden, pedipalpus large, legs only fairly long, IV longest, numerous long and thin bristles, scopulae absent, unpaired tarsal claw well developed, paired claws toothed. Opisthosoma oval, scuta absent, spinnerets short, probably partly broken off.

Specimen (b):
The spider is partly deformed and decomposed.
Measurements (in mm): Prosoma: Length ca. 1.2, width ca. 0.85 (ratio 1.65), length of the deformed and incomplete opisthosoma: 0.9, length of the posterior spinnerets almost 0.25.
According to the slender prosoma both species may be congeneric.

?**Mygalomorpha indet**. (photo 44)

Material: Distal leg articles, probably of a female in Mid Cretaceous Burmite, F3009/BU/CJW.

The stout leg articles (photo 44) – tarsus (0.5 mm), metatarsus (0.9 mm) and basal part of the tibia – are ca. 2 mm long and dark brown. Two rows of widely spaced strong ventral bristles include a longitudinal furrow. In most of the thick bristles (photo) the tip is distinctly bent, dorsally exist several long and thin bristles or trichobothria, the unpaired tarsal claw is small and probably smooth, the large paired claws bear a single row of two long and two or three short teeth.
I suppose that the present part of a leg may be originated of a member of the Mygalomorpha (Ctenizidae?), probably of an anterior leg of a large (adult?) female.

ARANEOMORPHA

Superfamily DYSDEROIDEA

Family SEGESTRIIDAE

See WUNDERLICH (2015: 115-135).

Myansegestria caederens WUNDERLICH 2015

New material: 1♂ in Mid Cretaceous Burmese amber, F2921/BU/CJW.

The spider is excellently and almost completely preserved, its body length is 2.7 mm; its right leg IV has been amputated near the end of the metatarsus.

Family PLUMORSOLIDAE WUNDERLICH 2008

See WUNDERLICH (2015: 136-140).
The relationships of this family – its male is still unknown – are quite unsure: The third pair of legs is directed forward like in the Segestriidae but an unpaired tarsal claw is absent and – well developed and usually spatulate – claw tufts exist as in the Orsolobidae in which the paired tarsal claws are biserially dentate in contrast to the Plumorsolidae and the third pair of legs is directed backward (probably with a rare exception).

Two tribes have been described: (a) Plumorsolini WUNDERLICH 2008 (only *Plumorsolus* WUNDERLICH 2008) in Lebanese amber in which feathery hairs exist, and (b) Burmorsolini WUNDERLICH 2015 (only *Burmorsolus* WUNDERLICH 2015) in Burmese amber in which feathery hairs are absent.

Burmorsolus WUNDERLICH 2008

New material of *B. nonplumosus*:

A fairly well preserved female in which all legs are directed forward, body length ca. 3 mm, F2898/BU/CJW.

A well preserved female with the legs in an almost laterigrade position, body length 3 mm, F2930/BU/CJW.

Besides the type species – *B. nonplumosus* WUNDERLICH 2015 – only *B. crassus* WUNDERLICH 2015 has been described, both species in Burmese amber. Because of its different characters *B. crassus* is designed here as the member of a new genus:

***Pseudorsolus* n. gen.**

Etymology: The name refers to the similarities of the new genus to *Burmorsolus* and pseudo(gr.) = not true.

The gender of the name is masculine.

Type species (by monotypy): *Burmorsolus crassus* WUNDERLICH 2015: 139, figs. 74-77, photo 37.

Diagnosis (♀; ♂ unknown): Leg bristles thick, hairs of the claw tufts thin (not spatulate), legs relatively stout.

Relationships: In *Burmorsolus* WUNDERLICH 2015 feathery hairs are absent, too, but the leg bristles are thin, the hairs of the claw tufts are spatulate and the legs are more slender.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family OONOPIDAE: Subfamily ORCHESTININAE

In contrast to other oonopid subfamilies members of the Orchestininae were already frequent and widely distributed at least in the Northern Hemisphere during the Mesozoic, see WUNDERLICH (2008: 57) (2015: 141-142), SAUPE et al. (2012).
In Mid Cretaceous Burmese amber only a single genus and species has previously been described: *Burmesorchestina pulcher* WUNDERLICH 2008: 68-72, figs. 34-46, photos 66-70. Here I describe five further species of this genus and present a key to the species as well as a emended diagnosis of the genus.

Remarkable is the dominance of a single species *Burmorchestina* in Burmite: Five species are known by a single specimen only (rarely by two) but almost a dozen specimens of *B. pulcher* exist in my private collection. To my present knowledge *B. pulcher* is the most frequent spider species reported in Burmite.

Burmorchestina WUNDERLICH 2008

Type species: *Burmorchestina pulcher* WUNDERLICH 2008; see the key.

New material: A probably conspecific ♀, prosomal length 0.5 mm, F2945/BU/CJW.

Emended diagnosis, variability and relationships (see WUNDERLICH (2008: 68-69)): Shape of the thoracal part of the prosoma quite variable (figs. 28, 30, 32, 35, 40, 43): plain (*B. plana* n. sp.) to strongly raised (it is very rarely raised in *Orchestina* SIMON 1882), femur IV strongly thickened (fig. 36) or rather slender (fig. 41) (in *Orchestina* and other Orchestininae it is always strongly thickened), articles of the ♂-pedipalpus almost slender (in *Orchestina* at least a single article is distinctly thickened, usually the tibia), bulbus (e. g. figs. 29, 31, 33, 38, 45) usually with a long embolus which bears an abruptly narrowed needle-shaped and usually bent distal part in contrast to *Orchestina*. The bulbus is small in *B. pulcher* (fig. 37) but rather large in the remaining species (e. g. figs. 29, 31, 42). The position of the metatarsal trichobothrium is in ca. 0.9-0.95 like in all other Orchestininae; this apical position may even be a character of the family Oonopidae (and the Orsolobidae as well).

Ecology, enemies and prey (see WUNDERLICH(2008: 69)): Extant Orchestininae are dwellers on the ground as well as of higher strata of the vegetation. The high frequency in Burmite indicates the presence of *Burmorchestina* in higher strata of the vegetation in the Burmese amber forest. – Enemies: See the paper on frozen behaviour in this volume: Attack of a mite (Bdellidae) on a female of *Burmorchestina* sp. indet., F2877/BU/CJW, photo 3.

Distribution: Only the Mid Cretaceous amber forest of Myanmar.

Key to the species of *Burmorchestina*:

Note: Because of its flexibility the shape of the thin distal part of the embolus may be different even within the same specimen.

1 Femur IV long and rather slender (fig. 41), ca. 4.7- ca. 7.0 times longer than high. 2

- Femur IV stout and thick (fig. 36), ca: 3.5- 4.6 times longer than high. 4

2(1) Thoracal part raised and laterally enlarged (fig. 43). . . . . *tuberosa* n. sp.

- Prosoma dorsally strongly raised but laterally not enlarged (figs. 30, 40), similar to *pulcher*. 3

3(2) Embolus bent only once (fig. 42) . . . . *pulcheroides* n. sp.

- Embolus bent twice (fig. 31) . . . .*biangulata* n. sp.

4(1) Prosoma with a pointed dorsal-posterior outgrowth (fig. 28) . . . *acuminata* n. sp.

- No such outgrowth. 5

5(4) Prosoma plane (fig. 32). Pedipalpus: Figs. 33-34 . . . .*plana* n. sp.

- Prosoma strongly domed (fig. 35), similar to *pulcheroides*. Pedipalpus (figs. 37-39): Bulbus more slender and thin part of the embolus shorter than in the remaining species. Most frequent species of the genus. . . . . *pulcher* WUNDERLICH 2008

***Bormorchestina acuminata* n. sp.** (figs. 28-29) photo 45

Etymology: The species name refers to the pointed posterior outgrowth of the prosoma, from acuminatus (lat.) = pointed.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3014/BU/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved in a clear yellow piece of amber; both legs I are lost beyond the coxa by autotomy, the prosoma is fairly darkened by the preservation, bubbles cover dorsal-lateral parts of the prosoma. – Syninclusions: two Acari (one has been separated as F3015/BU/CJW), the longer leg of an Opiliones, particles of excrement of an insect and few stellate plant hairs.

Diagnosis (♂; ♀ unknown): Prosoma (fig. 28, photo) not raised but bearing dorsally-posteriorly a pointed outgrowth between furrows, embolus (fig. 29) long.

Description (♂):
Measurements (in mm): Body length 1.1; prosoma: Length 0.57, width ca. 0.57; opisthosoma: Length 0.6, width 0.57; leg II: Femur 0.55, patella 0.2, tibia 0.6, metatarsus ca. 0.62, tarsus 0.25, tibia III ca. 0.45, tibia IV at least 0.5; femur (deformed) IV 0.6, ca. 4.5 times longer than wide.
Colour: Prosoma dark brown, legs medium brown, opisthosoma light grey brown.
Prosoma (fig. 28, photo) as wide as long, bearing few short hairs, cuticula smooth, two thoracic furrows include a pointed posterior outgrowth, 6 large eyes, clypeus with 6 pairs of long hairs, labium slightly longer than wide, sternum spacing widely the coxae IV. – Legs (photo) fairly long, bristleless, tarsi bearing a longer dorsal-distal hair as in related species, III relatively long, femur IV ca. 4.5 times longer than wide, position of the matatarsal trichobothrium in ca. 0.9, tarsal claws long and slender. – Opisthosoma about as long as wide, hairs short, spinnerets long. – Pedipalpus (fig. 29) with a long embolus.

Relationships (see the key): *Acuminata* is the only species of *Burmorchestina* in which the prosoma bears a posterior (thoracal) outgrowth.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Burmorchestina biangulata **n. sp**. (figs. 30-31) photo 46

Etymology: The species name refers to the shape of the embolus which is bent rectangularly two times , from bi- (lat.) = two, and angulatus (lat.) = angular.

Material: Holotype in Mid Cretaceous Burmite, F3039/BU/CJW.

Preservation and syninclusions: The spider is excellently and almost completely preserved in a flat clear yellow piece of amber, only the left leg III is lost near its base, a bubble is preserved on the left side of the prosoma, the left femur IV is – in my opinion artificially by the preservation – thickened, and only 4.1 times longer than wide. – Syninclusions are half of a bubble – remains of a boring by a boring shell – on the surface of the piece of amber.

Diagnosis (♂; ♀ unknown): Prosoma as in fig. 30 and the photo, femur IV (photo) slender, 7 times longer than wide (see above, the preservation), pedipalpus (fig. 31): Embolus bent two times in right angles.

Description (♂):
Measurements (in mm): Body length 1.4; prosoma: Length 0.65, height of the peltidium ca. 0.28; opisthosoma: Length 0.75, height 0.33; leg I: Femur 0.6, patella 0.18, tibia

0.62, metatarsus 0.62, tarsus 0.18, tibia III 0.5, tibia IV 0.6; right femur IV: Length 0.7, height 0.1 (see above).
Colour yellowish brown, legs not annulated.
Prosoma (fig. 30, photo): Thoracal part distinctly raised, dorsally bearing long hairs, 6 eyes which partly are covered with an emulsion, basal cheliceral articles fairly large, anteriorly distinctly concave. – Legs (photo) fairly long and slender, bristleless, hairs short, right femur IV 7 times longer than wide (the deformed left femur IV is only 4.1 times longer than wide), position of the metatarsal I and IV trichobothria in ca. 0.85. – Opisthosoma (photo) 2.3 times longer than heigh, densily covered with hairs of medium length. – Pedipalpus (fig. 31) with slender articles, bulbus globular and strongly elongated, embolus thin and bent two times in right angles. – Note: The practicability of an insertion of the – flexible? – embolus during copulation would be interesting!

Realtionships: See the key; the shape of the embolus is unique, the shape of the prooma is similar to *B. pulcheroides* n. sp.

Distribution: Mid Cretaceous amber forest of Myanmer (Burma).

***Burmorchestina plana* n. sp. (figs. 32-34) photo 47-49**

Etymology: The name refers to the plane prosoma, from planus (lat.) = plane.

Material (in Mid Cretaceous Burmite): Holotype ♂ F2920/BU/CJW. Paratype ♂ F3004/BU/CJW. – Two probably conspecific females, F2688/BU/CJW (it is badly preserved) and F2704/BU/CJW (it is fairly deformed): See WUNDERLICH (2015: 141-142).

Preservation and syninclusions: Holotype: The spider is well preserved in a small bloc of yellow amber, a bubble is preserved below the mouth parts, the left legs I and IV and the right I and III are lost probably by autotomy. – Paratype: The spider is well preserved in a clear yellow piece of amber. The right legs I and IV and the left leg IV are lost. – 5 Acari, a questionable insect larva and remains of plants are also preserved.

Diagnosis (♂; ♀ probably unknown, see above): Prosoma (fig. 32) flat, femur IV thick as in *B. pulcher*, ca. 4.2 times longer than high, pedipalpus as in figs. 33-34.

Description (holotype):
Measurements (in mm): Body length 1.0, prosoma: Length 0.55, width 0.43, height above coxae 0.2; leg II: Femur 0.7, patella 0.16, tibia 0.5, metatarsus 0.52, tarsus 0.24, metatarsus IV 0.62.
Colour: Prosoma and legs dark to medium brown, opisthosoma light brown.
Prosoma (fig. 32) 1.3 times longer than wide, bearing long dorsal hairs, fovea indistinct, 6 large eyes similar to *B. tuberosa*, clypeus short, bearing 5 long hairs, basal cheliceral articles slender, most mouth parts hidden, labium free, sternum wide, the coxae IV

spacing by more than their diameter. Legs similar to *B. tuberosa*. – Opisthosoma oval, bearing long dorsal hairs. – Pedipalpus (fig. 33-34): Articles slender, bulbus with a long outgrowth and a long, thin and strongly bent embolus (most probably the embolus is strongly flexible).

Paratype: Measurements (in mm): Body length 1.2, prosomal length 0.6; leg I: Femur 0.7, patella 0.16, tibia 0.65, metatarsus 0.7, tarsus 0.2. Colour, body legs and pedipalpus quite similar to the holotype.

Relationships: See the key.

Distribution: Mid Cretaceous Burmese (Myanmar) amber forest.

Burmorchestina pulcher WUNDERLICH 2008: 68-72. Figs. 35-39; see the key above. – A probably conspecific deformed and decomposed ♂, F2019/BU/CJW , bears hyphae on its opisthosoma, photo 50.

***Burmorchestina pulcheroides* n. sp**. (figs. 40-42) photo 51

Etymology: The name refers to the similar domed shape of *Burmorchestina pulcher* WUNDERLICH 2008; -id, -oides (gr.) = similar.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3005/BU/CJW.

Preservation and syninclusions: The spider is very well and completely preserved in a clear piece of amber. – Syninclusions: A winged insect, remains of a mite, 1 Acari: Erythraeidae, two small pieces of bark including a small piece of amber, insect's excrement and hairs of plants.

Diagnosis (♂; ♀ unknown): Femur IV 5.4 times longer than high (fig. 41), thoracal part strongly domed (fig. 40), bulbus fairly large, embolus long (fig. 42).

Description:
Measurements (in mm): Body length 1.1, prosoma: Length 0.6, width 0.5, height 0.23; basal cheliceral article: Length 0.24, width 0.8; leg I: Femur 0.65, patella 0.2, tibia ca. 0.55, metatarsus 0.6, tarsus 0.26, femur IV: Length ca. 0.7, height ca. 0.13.
Colour medium brown, legs not annulated.
Prosoma (fig. 40, photo 51) 1.2 times longer than wide, bearing several dorsal hairs, strongly domed behind the middle, 6 large eyes, the medians close together, clypeus with three pairs of anterior hairs, basal cheliceral articles long and slender, fangs only fairly long, mouth parts hidden, coxae IV widely spaced by the stenum. – Legs (fig. 41) rathe long, femur IV only fairly thickened, 5.4 times longer than wide, bristles absent,

hairs short, position of the metatarsal II trichobothrium in 0.95. – Opisthosoma oval, hairs only fairly long. – Pedipalpus (fig. 42): See above; patella and tibia only slightly/fairly thickened.

Relationships: See the key and *B. biangulata* n. sp.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Burmorchestina tuberosa n. sp. (figs. 43-44) photo 52

Etymology: The species name refers to the raised thoracal part of the prosoma, for tuberosus (lat.) = humpy.

Material: Holotype ♂ in Mid Cretaceous Burmese amber and a separated piece of amber, F2919/BU/CJW.

Preservation and syninclusions: The spider is excellently and almost completely preserved in a small clear piece of amber, only the tip of the right tarsus IV is cut off. The left femur IV bears a dorsal emulsion and is seemingly (!) thickened.– A bubble – of digestive fluid? – is preserved below the mouth parts. A brush of plant hairs, few single plant hairs and an unidentified plant object are preserved in the same piece of amber.

Diagnosis (♂; ♀ unknown): Thoracal part of the prosoma enlarged laterally (fig. 43), femur IV fairly slender, ca. 4.7 times longer than high, embolus (fig. 44): Thin part quite long.

Description (♂):
Measurements (in mm): Body length 1.2, prosoma: Length 0.6, width ca. 0.5; leg I: Femur 0.65, patella 0.17, tibia 0.58, tibia II 0.58, tibia IV ca. 0.5, height of femur IV: Length 0.7, height 0.15.
Colour : Prosoma and legs dark brown, opisthosoma light brown.
Prosoma (fig. 43, photo) 1.2 times longer than wide, almost smooth, thoracal part strongly raised and widened laterally, 6 large eyes which are partly covered with an emulsion, anterior largest, clypeus short and not protruding, bearing 5 pairs of hairs similar to *B. pulcher* and *plana*, basal cheliceral articles long and slender, distinctly diverging distally, fangs long, mouth parts hidden. – Legs fairly long and slender, bristles absent, hairs fairly short, metatarsal trichobothria in a distal position. – Opisthosoma egg-shaped, hairs short. – Pedipalpus (fig. 44) with slender articles, bulbus fairly large, outgrowth slender, needle-shaped part of the embolus quite long.

Relationships: See the key.

Distribution: Mid Cretaceous Burmese (Myanmar) amber forest.

Burmorchestina sp. indet. (fig. 45)

Material: 1♂ in Mid Cretaceous Burmite, F3030/BU/CJW.

Preservation and syninclusions: The spider is fairly well preserved in a larger piece of amber, its left leg III is lose and preserved left in front of the spider, the prosoma is dorsally partly hidden by a bubble. – Syninclusions are 1 juv. spider indet., 1 spider's indet. exuvia, several Acari, 1 Psocoptera, 1 Diptera, Collembola, Coccina, insects excrement, remains of plants and detritus.

Description (♂):
Measurements (in mm): Body length 1.1; prosoma: Length 0.6, width 0.52; leg I: Femur 0.72, patella 0.17, tibia 0.63, metatarsus 0.63, tarsus 0.26, tibia IV ca. 0.53.
Colour medium grey brown. The prosoma is high, partly hidden by a bubble, femur IV is only fairly thickened, ca. 5.4 times longer than high. Pedipalpus (fig. 45) with a relatively small bulbus and a long embolus.

Relationships: According to the relatively slender femur IV the male is related to *B. tuberosa* n. sp. and *B. pulcheroides* n. sp.; its prosoma is partly hidden, and I do not want to exclude that it is the member of an unnamed species.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Superfamily PHOLCOIDEA (= SCYTODOIDEA)

= "branch of egg-carrying females" sensu WUNDERLICH (2004: 644-645), excl. Leptonetidae and Telemidae.

Pholcoidea is the most diverse superfamily in Burmite besides the Archaeoidea. The nominate family – Pholcidae – is still unknown from the Cretaceous and the whole Mesozoic (in contrast to the related Tetrablemmidae and the Scytodidae). See the new genus *Praepholcus* (family Eopsilodercidae: Praepholcinae).

Family TETRABLEMMIDAE

See WUNDERLICH (2008: 575-578; under Oonopidae: Gamasomorphinae), (2011: 545-547; under Oonopidae: Gamasomorphinae), (2012: 172-176), (2015: 157-170, and the list of the tetrablemmid genera in Burmite p. 70). See also the genus *Furcembolus* which is transferred here from the Eopsilodercidae.
Tetrablemmidae is the Cretaceous spider family which contains the highest number of fossil/extinct genera which have closely related extant genera, see below: e. g. *Brignoliblemma* n. gen. A member of the extinct genus *Brignoliblemma* has probably been (near to) the ancestor of the extant Chinese genus *Sinamma* LIN & LI 2014 which survived in caves of China. There is no need to upgrade the two subfamilies.
Here I describe few new tetrablemmid species and the new genera *Brignoliblemma, Cymbioblemma, Longissithorax* and *Longithorax*.

Family characters and life style: These tropical spiders are strongly armoured (including rows of LATERAL scuta (figs. 74, 82 photos) (they are indistinct in *Furcembolus*, fig. 80) and a rugose to pitted cuticula, the legs are bristleless and the fossil spiders are usually small to tiny, body length 0.9 to 4.5 mm, see directly below. The number of their eyes varies between 6 and none in extant taxa. All known species in Burmite possess 6 eyes, most often in a "segestriid" position (fig. 63, 68, 85), less often in a compact group near or on a projection. Occasionally the prosoma bears sexual-dimorphic dorsal humps or even projections (figs. 46, 52-53); this character is almost unique within the superfamily Pholcoidea and is similar to certain members of the entelegyne Linyphiidae: Erigoninae. In males exists not rarely a pair of anterior outgrowths of the clypeus (figs. 63-64, 73) and/or of the basal cheliceral articles (fig. 58) similar to certain Pholcidae, and rarely furthermore mating spurs of the male leg I (figs. 49, 54-55, 59), in contrast to the Pholcidae. In *Furcembolus* the opisthosoma bears dorsal humps (fig. 80). – The spiders build irregular capture webs which probably bear sticky droplets (!), see a female of ?*Eogamasomorpha* sp. indet., fig. 72, photo 60, like members of the family Pholcidae which may be closely related to the Tetrablemmidae. The females – at least of most taxa – bear their egg sac with the help of the chelicerae like the Pholcidae and other members of the the "branch of egg-carrying families", see WUNDERLICH (2004: 645), and of not related species. The protruding genital area of a female Tetrablemmidae indet., F2938/BU/CJW (fig. 92) is similar to several Pholcidae. Certain members of the Tetrablemmidae are known to be dwellers on the bark of trees. Particles of bark are preserved with the holotype of *Longissithorax myanmarensis* n. sp.

The body size of the known fossil Pacullinae (3- 4.5 mm) is distinctly lower than of the species of today (4.5-13.1 mm); see LEHTINEN (1981: 10) and SCHWENDINGER (1989). The body size of the smaller fossil and extant Tetrablemminae is almost identical.

Similar small/tiny armoured spiders: In the Archaeidae (also preserved in Burmite) are leg bristles absent, too, but 8 eyes exist in a different position. In the Oonopidae: Gamasomorphinae (they are not known from Burmite) an unpaired tarsal claw is absent and leg bristles may exist. In the Archaeidae and the Gamasomorphinae the typical

LATERAL opisthosomal scuta of the Tetrablemmidae are absent. In the members of the families Burmascutidae and Micropalpimanidae – extinct families in Burmite – exist 8 eyes and lateral opisthosomal scuta are absent.

Diversity in Burmite, frequency and synonyms: The family Tetrablemmidae was quite diverse already in the Mid Cretaceous Burmese amber forest (10 genera), and its members were not rare. Six tetrablemmid genera (and two gen. indet.) of the two known subfamilies in Burmite were previously described; in this paper I add three new genera, see the tab. and the key below; *Electroblemma* SELDEN et al. 2016 has recently described in Burmite, too. Only *Furcembolus* WUNDERLICH 2008 (= *Praeterpaculla* WUNDERLICH 2015) (**n. syn**.) is a member of the Pacullidae; *Brignoliblemma* **n. gen**., *Cymbioblemma* **n. gen**., *Electroblemma* SELDEN et al. 2016, *Eogamasomorpha* WUNDERLICH 2008 (= *Eoscaphiella* WUNDERLICH 2011) (**n. syn**.), ?*Eogamasomorpha unicornis* **n. sp**., *Longithorax* **n. gen**., *Saetosoma* WUNDERLICH 2012 and *Uniscutosoma* WUNDERLICH 2015 are members of the Tetrablemminae; *Bicornoculus* WUNDERLICH 2015, *Palpalpaculla* **n. gen**. and Tetrablemmidae gen. & sp. indet. may be members of an unnamed subfamily.

Extinction: All genera in Burmite are extinct, but see *Brignoliblemma* and *Longithorax*.

Selected differences of the fossil Paculline and Terablemmine spiders IN BURMITE with remarks on taxa which relationships are unclear (***):

Character	**PACULLINAE**	**TETRABLEMMINAE**
Body length (mm)	3.0-4.5 (*)	0.9-2.3
Position of the metatarsal trichobothria (**)	ca. 0.4-0.5	ca. 0.33-0.5
Tarsi	distinctly shorter than metatarsi	frequently longer than metatarsi
Embolus	thick, frequently bearing (***) an apophysis (figs. 78-79)	usually thin figs. 50, 56, 60, 66, 69) (***)

(*) The body lengt of an EXTANT male of *Perania robusta* SCHWENDINGER 1989 from Thailand is 13.1 mm.

(**) According to LEHTINEN (1981: 10) the position of the metatarsal I trichobothrium is 0.5-0.75 in extant Pacullinae and 0.33-0.46 in extant Tetrablemminae.

(***) In *Brignoliblemma paranala* (fig. 60) the embolus is thick except the distal part. In the small spiders of certain taxa – *Bicornoculus* levis, *Longithorax furca*, *Palpalpaculla pulcher* (figs. 90-91) and Tetrablemmidae gen. & sp. indet. –, which subfamiliar relationships are unsure (probably Tetrablemminae), the embolus is thick and complicated (additional sclerites of the bulbus may exist), quite different from both named subfamilies, see WUNDERLICH (2015: 165, 170, figs. 120, 123).

Key to the genera of the family Tetrablemmidae in Burmite:

1 Body length 3.0 – 4.5 mm. Metatarsi ca. 2 – 3 times longer than tarsi. (= *Praeterpaculla*), the opisthosoma bears small humps (fig. 80), ♂-pedipalpus as in figs. 78, 81. Pacullinae . . . . *Furcembolus*

- Body length 0.9-2.3 mm. Tarsi not distinctly shorter than metatarsi, frequently longer, opisthosomal humps absent. Tetrablemminae 2

2(1) Posterior half of the prosoma and anterior part of the opisthosoma dorsally covered with long hairs, body length 0.9 mm, ♂-pedipalpus with a thin and bent embolus, see WUNDERLICH (2012: 221, figs. 2-3). *S. filiembolus* WUNDERLICH 2012 . . . *Saetosoma*

- No long hairs in this position, body length and ♂-pedipalpus variable 3

3(2) Eye field compact and placed on a strong projection (figs. 46, 52-53). Paired tibial I clasping (mating) spine(s) existing (figs. 49, 55). 4

- No such strong cephalic projection, prosoma flat (fig. 62) eyes in a wider “segestriid position” (fig. 85). Tibial I clasping (mating) spines absent 5

4(3) Chelicerae with a pair of strong and BIFID (deformed) horns (fig. 61). *E. bifida* SELDEN et al. 2016. . . . . *Electroblemma*

- Two (rarely one?) pairs of undivided cheliceral horns (figs. 46-47, 53). . . . . *Brignoliblemma*

5(3) Clypeus with 4 horns in a transverse row (figs. 63-64) 6

- Less number of clypeal horns or horns absent but; see *Longithorax* (fig. 85) (no. 8) and ?*Eogamasomorpha unicornis* (fig. 73). In *Bicornoculus* (no. 9) the large anterior lateral eyes are placed on or behind projections, see WUNDERLICH (2015: 374, fig. 117) 7

6(5) Opisthosoma dorsally with small plates, see WUNDERLICH (2015: 375, fig. 133), legs long and slender, structures of the bulbus unknown. *U. aberrans* WUNDERLICH 2015. . . . . *Uniscutosoma*

- Opisthosoma dorsall without small plates (photo 55), legs stout (photo), ♂-pedipalpus: Figs. 65-67. *C. corniger* n. sp. . . . . *Cymbioblemma*

7(5) Embolus thin and without apophysis (figs. 69, 71). (= *Eoscaphiella*), unknown in ?*E. unicornis* n. sp. . . . . *Eogamasomorpha*

- Embolus thick, frequently bearing an apophysis. 8

8(7) Prosoma (fig. 85, photo 64-65) ca. 1.5 times longer than wide ca. 1.5 times longer than wide, pedipalpus: Figs. 87-88, cymbium divided. *L. furca* n. sp. . . . *Longithorax*

- Prosoma (photo) ca. 1.8 times longer than wide, pedipalpus: Figs. 83-84, cymbium not divided. *L. myanmarensis* n. sp. . . . . *Longissithorax*

- Prosoma 1.3 – 1.4 times longer than wide, pedipalpus different. 9

9(8) Thoracic part abruptly raised (fig. 89), anterior lateral eyes not placed on projections (fig, 89, photo), opisthosoma dorsally finely granulate (photo 66), ♂-pedipalpus (figs. 90-91): Embolus thick and tube-shaped. *P. pulcher* n. sp. . . . . *Palpalpaculla*

- Thoracic part only slightly raised to the cephalic part, anterior lateral eyes placed on projections, see WUNDERLICH (2015: 374, fig. 117), opisthosoma dorsally distinctly granulate, ♂-pedipalpus with a thick and complicated embolus, see WUNDERLICH (2015: 374, fig. 120). *B. levis* WUNDERLICH 2015. . . . .*Bicornoculus*

- Body length 1.5 mm, embolus thick and short, see WUNDERLICH (2015: 374, fig. 123) . . . . .Gen sp. indet.

- Body length 0.9 mm, embolus thick and long, deformed, see WUNDERLICH (2012: 175-176, 221: Figs. 4-5) (*) . . . . Gen. sp. indet.

(*) The single male, F2351/BU/CJW, is strongly deformed. The deformed thick embolus is similar to the embolus of *Palpalpaculla pulcher* n. sp. which is much larger.

DESCRIPTIONS OF THE TAXA

Brignoliblemma **n. gen.**

Derivatio nominis / etymology: The genus name refers to the well-known arachnologist PAOLO BRIGNOLI, who worked e. g. on taxa of the family Tetrablemmidae; the name of the new genus is combined with the family name.

Type species: *Brignoliblemma nala* n. sp.
Further species: *B. paranala* n. sp. and *B. bizarre* n. sp.

The gender of the name is neuter.

Diagnosis (♂; ♀ unknown): 6 eyes existing on a high and almost globular prosomal outgrowth (figs. 46, 52-53, photos 53-54), basal cheliceral articles with long anterior "horns" wich bear a small additional probasal outgrowth (figs. 47, 50, photo) (unknown in *B. bizarre*), tibia I with paired ventral-distal mating spurs (figs. 49, 55). Pedipalpus (figs. 50-51, 56): Bulbus with a fairly slender/thick embolus, additional sclerites absent.

Further characters: Position of the metatarsal trichobothrium in 0.35-0.4, opisthosoma dorsally completely covered with a scutum, ventral opisthosomal scuta: See the photo, body length 1.4 – 1.5 mm. Probably the prosomal outgrowth (figs., photo 53) had a mimetic function.

Relationships (see the key): According to the more basal position of the metatarsal trichobothria, the relatively slender embolus and the small body size the genus is a member of the Tetrablemminae sensu LEHTINEN (1981); according to the long cheliceral "horns" it may be a member of the Tetrablemmini. These long horns are similar in *Tetrablemma* O. PICKARD-CAMBRIDGE 1873 in which only 4 eyes exist. In the Brignoliellini the male leg I is not modified, see LEHTINEN (1981: 28), in the Ablemmini the embolus is modified. In *Shearella* LEHTINEN 1981 the "horns" of the male chelicerae are shorter, a ventral-basal structure and a probasal outgrowth of this "horn" as well tibial I mating spurs are absent. A tibial mating spur is very rare in the Tetrablemmidae; it exists e. g. in *Lamania gracilis* SCHWENDINGER 1989 which is – a not related – member of the Pacullinae, as well as in *Electroblemma* SELDEN et al. 2016 which is most related. In *Electroblemma* the cheliceral "horns" are divided (fig. 61) and the embolus is curved blade. *Sinamma* LIN & LI 2014 (extant, China) is also strongly related but its male leg I is strongly modified and its postepigastral scutum is narrowed. In the male of *Sinamma* exists a single "horn" of the cephalic projection but in the female exists a pair of "horns"; the female of *Brignoliblemma* and *Electroblemma* is unknown. – *Brignoliblemma, Electroblemma* and *Sinamma* are so strongly related (see the tab. below) that they may have to be regarded as subgenera or species-groups of the genus *Sinamma*.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Male characters of the extant genus *Sinamma* and two related genera in Burmite:

Character	***Sinamma***	***Brignoliblemma***	***Electroblemma***
"horns" on the cephalic projection-	a single pair	two pairs (figs. 47, 58)	at least a single pair (fig. 61)
position of the eyes	at the base	± on top (figs. 46, 53)	probably on top
large cheliceral "horns"	not divided	not divided (fig. 58)	divided (fig. 61)
additional small cheliceral "horns"	absent	existing (fig. 58)	probably absent
thickened femur I	strongly, femur only ca. 2.5 times longer than high	slightly: *bizarre,* fig. 48, fairly: *paranala,* fig. 59 or distinctly: *nala*, fig.54	slightly (fig. 61)

***Brignoliblemma bizarre* n. gen. n. sp.** (figs. 46-51), photo 53

Etymology: The species name refers to the bizarre cephalic projection and “horns”, from bizarre (franz.) = unusual, bizarre.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3028/BU/CJW.

Preservation and syninclusions: The spider is well preserved in a yellow piece of amber, partly hidden, the pedipalpi are strongly deformed, parts of the left pedipalpus and of the left legs I-II are cut off. – Syninclusions are the larva of a Dermaptera, a plant hair and particles of detritus.

Diagnosis (♂; ♀ unknown): Cephalic projection quite high, bearing two pairs of “horns” (figs. 46-47), position of the eyes almost on top of the projection, femur I (fig. 48) not thickened, embolus (figs. 50-51) long and slender, bent only near its base.

Description (♂):
Measurements (in mm): Body length 1.5; prosoma: Length 0.5, width ca. 0.5, height ca. 0.4; opisthosoma: length 0.9, width 0.65; leg I: Femur 0.5, tibia 0.4, leg IV: Tibia 0.55, metatarsus 0.4, tarsus 0.35.
Colour medium brown, legs not annulated.
Prosoma (figs. 46-47, photo) about as long as wide, with a high erect dorsal cephalic projection, bearing a pair of larger anterior erect “horns” and a pair of smaller posterior “horns”, finelly rugose, hairs short and indistinct, most mouth parts and most parts of the cheliceral articles hidden, basal cheliceral articles each with long, slender and blunt “horns” which are directed anteriorly, further “horns” unknown (hidden?), sternum finelly rugose, spacing widely the coxae IV. – Legs (figs. 48-49, photo) only fairly long, slender, bristleless, hairs of medium length, femur I slender, tibia I bearing a prodistal “mating spur”, position of the metatarsal II trichobothrium II in ca. 0.3. – Opisthosoma (photo) oval, strongly scutate, dorsally completely covered with a scutum, finelly granulate, hairs quite short. – Pedipalpus (figs. 50-51; both are strongly deformed): Articles apparently not thickened, cymbium short, embolus thin, very long, almost straight, bent only near its base.

Relationships: In *B. nala* and *B. paranala* the cephalic projection is shorter, the position of the eyes is different, and the embolus is different, too.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Brignoliblemma nala* n. gen. n. sp.** (figs. 52-57) photo 53a

Derivatio nominis: I like very much to name this species – an excellently preserved specimen – after Nala, the daughter of PATRICK MÜLLER, who discovered the present male within the huge collection of a dealer.

Material: Holotype ♂ in Mid Cretaceous Burmite, coll. PATRICK MÜLLER no. BUB-84. The fossil will later be given to a scientific institution, probably the SMF.

Preservation and syninclusions: The spider is excellently and completely preserved in a flat yellow and clear piece of amber, few bubbles cover the body, legs and pedipalpi. – Syninclusions: 1 Acari and 2 Diptera: Nematocera.

Diagnosis (♂; ♀ unknown): Femur I (fig. 54) thickened and with a retrolateral outgrowth, prosoma as in figs. 52-53, photo; the large cheliceral horns are not distinctly widened basally (fig. 52), pedipalpus (figs. 56-57): Femur distally distinctly thickened, embolus fairly slender and fairly bent.

Description (♂):
Measurements (in mm): Body length 1.4, prosoma: Length 0.65, width 0.5; leg I: Femur 0.5, metatarsus 0.35, tarsus 0.32, femur III 0.45, leg IV: Femur ca. 0.55, patella 0.17, tibia 0.55, metatarsus 0.37, tarsus 0.33.
Colour dark brown (darkened probably by the preservation), legs not annulated.
Prosoma (figs. 52-53, photo) 1.3 times longer than wide, cuticula finely granulate, clypeus very long protruding, 6 eyes on a high and almost globular elevation which bears some small almost tooth-shaped pointed humps more dorsally; the basal cheliceral articles bear anteriorly a pair of large and a pair of small horns, fangs short, medial cheliceral lamella hidden, labium and sternum wide, gnathocoxae deformed, large. – Legs (figs. 54-55) only fairly long, order IV/I/II/III, coxae IV widely spaced, hairs well developed, bristles and metatarsal preening combs absent, position of the metatarsal I trichobothrium in 0.4. Leg I: Femur thickened, bearing a pointed retrolateral outgrowth (on both femora), metatarsus unmodified, tibia with a paired ventral mating spur in the distal quarter.- Opisthosoma (photo) oval, fairly flattened, dorsally with short hairs and completely covered with a large scutum, laterally with three bands of scuta, ventrally scutate (partly hidden), bearing a large sclerotized ring around the small spinnerets. – Pedipalpus (figs. 56-57, photo): Femur distinctly thickened in the distal half, patella almost globular, tibia thickened, cymbium short, bulbus almost globular, embolus long, fairly slender and fairly bent.

Relationships: See *B. paranala* n. sp.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Brignoliblemma paranala* n. gen. n. sp.** (figs. 58-60) photo 54

Etymology: See *B. nala* n. sp. which is related; para- (gr.) = besides, related.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2951/BU/CJW.

Preservation and syninclusions: The spider is well but darkened preserved in a flat piece of amber, the left leg I is incomplete. – Syninclusions: A beetle (Pselaphidae?), remains of a winged insect, several Acari as well as numerous particles of detritus like remains of plants are also preserved.

Diagnosis (♂; ♀ unknown): Large cheliceral outgrowths/horns distinctly widened basally (fig. 58), embolus distinctly narrowed near its end (fig. 60).

Description (♂):
Measurements (in mm): Body length 1.4, prosoma: Length 0.65, width 0.5, femur I 0.5, patella II 0.1, tibia II 0.4, femur III 0.4.
Colour dark brown, legs not annulated.
Prosoma (fig. 58, photo) 1.3 times longer than wide, the cephalic projection is similar to *B. nala* n. sp. although it is darkened and not well recognizable. The basal cheliceral articles bear a smaller pair of anterior outgrowths more dorsally and medially than a large pair of outgrowths which is distinctly widened basally. – Legs (fig. 59, photo) similar to *B. nala* but femur I slender and without outgrowth; position of the metatarsal I trichobothrium in 0.35. The mating spur of tibia I is not well observable. – Opisthosoma (photo) quite similar to *B. nala*. – Pedipalpus (fig. 60): Femur not thickened, cymbium short, bulbus almost globular, embolus long and fairly thick, abruptly narrowed near its end.

Relationships: In *B. nala* n. sp. femur I is thickened and bearing an outgrowth, the large cheliceral horns are not thickened basally, the pedipalpal femur is distinctly thickened in the distal half, and the embolus is not distinctly narrowed near its end. In *B. bizarre* the cephalic projection is larger.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Cymbioblemma **n. gen.**

Etymology: The name refers (a) to the modified cymbium and (b) to the second part of the confamiliar genus name Tetrablemma.

Type species (by monotypy): *Cymbioblemma corniger* n. sp.

The gender of the name is feminine.

Diagnosis (♂; ♀ unknown): Clypeus with four “horns” in a transverse row (figs. 62- 64), anterior and lateral outgrowths of the chelicerae absent but a proapical tooth exists (fig. 64), pedipalpus (figs. 65-67): Cymbium modified (divided), bulbus simple, conductor absent.

Further characters: Prosoma (fig. 62) low, finelly but distinctly granulate/scaly, six eyes, cheliceral lamina very long, legs stout (photo), position of the metatarsal trichobothrium in ca. 0.4, large opisthosomal plate absent (photo), embolus thin (figs. 66-67).

Relationships: According to the low body length, the position of the metatarsal trichobothrium and the thin embolus *Cymbioblemma* is a member of the Tetrablemminae sensu LEHTINEN 1981; in contrast to most Tetrablemminae – e. g. the Brignoliellini – anterior cheliceral outgrowths are absent in *Cymbioblemma*. In the Tetrablemmini the number or the position of the eyes is different. According to LEHTINEN (1981: 52) certain members of the Tetrablemmini live under the bark of trees. – Four clypeal "horns" exist also in *Uniscutosoma* WUNDERLICH 2015 in Burmite (structures of the bulbus are unknown) but the opisthosoma bears small dorsal plates, see WUNDERLICH (2015: 375, fig. 133), the legs are longer and more slender, and the cheliceral teeth are quite different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Cymbioblemma corniger n. gen. n. sp. (figs. 62-67) photo 55

Etymology: The species name refers to the "horns" of the clypeus from (lat.) cornu; corniger = horned.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2936/BU/CJW.

Preservation: The spider is completely and very well preserved in a small yellow and clear piece of amber, emulsions cover the eye lenses, the clypeal "horns" are deformed.

Diagnosis, relationships and distribution: see above.

Description (♂):
Measurements (in mm): Body length 2.2, prosoma: Length 0.9, width 0.65; leg I: Femur 0.85, patella 0.25, tibia 0.65, metatarsus ca. 0.55, tarsus ca. 0.35; tibia II 0.5, tibia III 0.35, tibia IV 0.55.
Colour: Prosoma and legs light brown, opisthosoma light grey.
Prosoma (figs. 62-64, photo) 1.4 times longer than wide, low, distinctly narrowed anteriorly, distinctly granulate, fovea absent, six eyes in a "segestriid position" in a relatively wide field, clypeus with four "horns" (deformed) in a transverse row, basal cheliceral articles robust, outgrowths absent, bearing a proapical tooth, fangs and mouth parts hidden, sternum longer than wide, granulate, not elongated between the coxae IV. – Legs (photo) fairly short, order IV/I/II/III, hairs only fairly distinct, bristles absent, position of the metatarsal IV trichobothrium in ca. 0.4. – Opisthosoma (photo) distinctly longer than wide, dorsally covered with a large scutum (no small plates) and few longer hairs, distinctly punctuated, lateral scuta existing, ventrally exist at least two large scuta, spinnerets hidden, surrounded by a sclerotized ring. – Pedipalpus (figs. 65-67): Tibia distinctly thickened, Cymbium divided distally (and probably deformed), bulbus fairly large, embolus thin, ca. half as long as the bulbus, additional sclerites absent.

Electroblemma SELDEN et al. 2016 (fig. 61)

Type species (by monotypy): *Electroblemma bifida* SELDEN et al. 2016.

Diagnosis (♂; ♀ unknown): Cephalic part with a very long and erect dorsal projection with a bifid tip which most probably bears the eyes, chelicerae with bifid horns, leg I with paired tibial and a metatarsal clasping spine(s) (fig. 61), body length almost 1.6 mm. Note: The prosoma of the type material is STRONGLY deformed by the preservation; its original shape remains unknown. The position of their metatarsal trichobothrium is unknown.

Relationships: See the key to the genera, *Brignoliblemma* n. gen. above which possesses a high eye tubercle and tibial I mating spurs, too, as well as *Shearella* LEHTINEN 1981 and related extant genera, see SELDEN et al. (2016: 134). SELDEN et al. (2016) referred *Electroblemma* to the tribe Tetrablemmini.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Eogamasomorpha WUNDERLICH 2008 (= ***Eoscaphiella*** WUNDERLICH 2011 (**n. syn**.))

New material lead me to the conclusion that *Eoscaphiella* WUNDERLICH 2011 is synonymous with *Eogamasomorpha* WUNDERLICH 2008 (**n. syn**.). The length of femur I is variable in this genus and the metatarsal ?sensory hair near the end of the article of *Eogamasomorpha* – see WUNDERLICH (2012: 173) – is most probably not a trichobothrium. The members of this genus are tiny spiders, the males (e. g. photo 58) may be only 1 mm long. In contrast to *Eogamasomorpha* in the tribe Brignioliellini LEHTINEN 1981 the males bear outgrowths of the basal cheliceral articles.

Eogamasomorpha hamata **n. sp**. (figs. 68-70) photo 56

Etymology: The species name refers to the apical hooks of the embolus, from hamatus (lat.) = hook.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3027/BU/CJW.

Preservation and syninclusions: The spider is completely and very well preserved (slightly deformed) in a clear yellow piece of amber, some bubbles are preserved on several leg articles and near the right embolus. – Syninclusions are 1 Diptera: Nematocera, insect's leg articles, remains of plants and detritus.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 69-70): Tibia distinctly thickened, embolus relative thick, in the distal half, too, describing almost half a circle and bearing apically two tiny pointed "hooks".

Description (♂):
Measurements (in mm): Body length 1.0; prosoma: Length 0.45, width ca. 0.32; opisthosoma: Length 0.67, width 0.43; leg I: Femur 0.43, patella ca. 0.1, tibia ca. 0.35, metatarsus 0.25, tarsus 0.25, tibia II 0.27, tibia III 0.24, tibia IV 0.39.
Colour medium brown, legs not annulated.
Prosoma (fig. 68, photo) 1.4 times longer than wide, slightly raised, unmodified but bulging behind the median eyes, rugose, hairs short, fovea absent, 6 large eyes in a wide field of a "segestriid position", clypeus quite long and protruding, chelicerae diverging, partly hidden like the mouth parts, sternum distinctly rugose. – Legs (photo) fairly long and lender, order IV/I/II/III, bristles absent, hairs indistinct, position of the metatarsal IV trichobothrium in 0.35. – Opisthosoma (photo) flat, 1.6 times longer than wide, rugose, hairs short, dorsally completely covered with a large scutum, ventrally scutate, too (partly hidden), with a large sclerotized ring around the short spinnerets. – Pedipalpus: See the diagnosis.

Relationships: In *E. ohlhoffi* WUNDERLICH 2011 and *E. clara* WUNDERLICH 2015 the tibia of the pedipalpus is more slender, the embolus is more slender in the distal half, and apical hooks of the embolus are absent.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Eogamasomorpha ?*clara* WUNDERLICH 2015: 167-168, figs. 124-130, photo 45 (fig. 71)

Material: 1♂ in Mid Cretaceous Burmite, F3003/BU/CJW.

Preservation: The spider is completely and very well preserved in a flat yellow piece of amber, darkened by the preservation.

Description: Body length 1 mm, prosoma length 0.38 mm, femur I 0.5 mm long. Embolus thin and distinctly bent, both in different ways probably caused by the preservation.

Relationships: The shape of the embolus is similar to the holotype of *E. clara*. The differences are probably caused by the preservation (and partly by the aspects); therefore I do not exclude a conspecifity.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

?Eogamasomorpha sp. indet**.** (photo 59), **and a capture web and prey** (fig. 72) photo 60

Material: 1♀ in Mid Cretaceous Burmite, F3002/BU/CJW.

Preservation and syninclusions: The spider (photo 59) is excellently and completely preserved in a clear yellowish piece of amber which is 1.8 mm long. – Syninclusions, web and prey: A part of a larger irregular three-dimensional capture web including some sticky droplets (fig. 72, photo 60) is placed near the spider in different layers. The web may well be produced by the present female. Sticky droplets in capture webs are frequent in most members of the entelegyne superfamily Araneoidea but are quite rare in haplogyne spiders; they exist in haplogyne members of the family Pholcidae but are – to my knowledge – unknown in the family Tetrablemmidae, see BURGER et al. (2006). An Acari, 0.4 mm long, is preserved in contact with a dropless part of the web and may have been a prey of the spider. Another mite, a member of the family Bdellidae, well preserved and almost 0.5 mm long, is preserved near the margin of the piece of amber, away from the threads.

Note: In the part of a capture web near another tetrablemmid female indet., F2695/ BU/ CJW sticky droplets are absent, see WUNDERLICH (2015: 170).

Description:
Measurements (in mm): Body length 1.2, prosomal length 0.55; leg I: Femur ca. 0.35, patella 0.13, tibia almost 0.3, metatarsus 0.22, tarsus 0.25.The brown prosoma (including the sternum) is strongly wrinkled, the opisthosoma bears a large dorsal scutum, the pedipalpi are short and quite slender.

Relationships: The present female may be the member of the genus *Eogamasomorpha* WUNDERLICH 2008, see the key to the genera the male indet. above and ?*Eogamasomorpha* indet. F3069/BU/CJW below.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

?***Eogamasomorpha unicornis* n. sp**. (figs. 73-77) photo 57

Etymology: The species name refers to the single clypeal horn, from unus (lat.) = single and cornu (lat.) = horn.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3069/BU/CJW.

Preservation and syninclusions: The spider is fairly well preserved and injured, see the figs and the photos: “Amputated” are both pedipalpi and two right legs: The left pedipalpus is "amputated" through the femur, the right one at the end of the femur and lost; the ?left pedipalpus has been drifted between the left tibiae III and IV. The right leg I is "amputated" through the patella, the remaining articles were drifted within the fossil resin close to the front of the left (!) leg II; the right leg III is "amputated" beyond the patella and lost. Questionable remains of blood are preserved on all stumps besides the left pedipalpus. I suppose that the spider has been captured alife by the fossil resin, and pressure crushed and injured the spider. – Syninclusions: Crushed remains of possible plants are preserved near the spider.

Diagnosis (♂; ♀ unknown): Clypeus with a single ventral pointed horn (fig. 73, photo); pedipalpus (figs. 75-77): Questionable tibia quite tick, structures of the bulbus unknown. Further characters: Prosoma not raised, rugose, outgrowths of the basal cheliceral articles absent, body length 1.1 mm.

Description (♂):
Measurements (in mm): Body length 1.1; prosoma: Length ca. 0.5, width 0.4; opisthosoma: Length 0.75, width 0.65; leg I: Femur 0.45, patella 0.12, tibia 0.33, metatarsus ca. 0.2, tarsus ca. 0.17.
Colour: Body dark brown, legs medium brown.
Prosoma (fig. 73, photo) ca. 1.25 times longer than wide, finelly but distinctly rugose, low, hairless, 6 eyes in a wide field of a "segestriid position", clypeus quite long, bearing ventrally a pointed horn, basal cheliceral articles stout and diverging, mouth parts hidden by an emulsion, sternum distinctly rugose, coxae IV widely spaced. – Legs (photo) fairly short, hairs fairly well developed, bristles absent, position of the metatarsal trichobothria unknown. – Opisthosoma (fig. 74, photo) dorsally completely covered with a scutum, rugose, lateral scuta well developed, spinnerets surrounded by a large scutum. – Pedipalpus (figs. 75-77) incomplete (see above): Femur fairly thick, the questionable tibia quite thick, structures of the bulbus unknown.

Relationships: Most characters of the spider correspondent with the characters of the genus *Eogamasomorpha* WUNDERLICH 2008 but the pedipalpal tibia is not thickened in *Eogamasomorpha* in contrast to the present male. I do not want to exclude close relationships to the female of ?*E*. sp. indet., see above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Furcembolus WUNDERLICH 2008 (**n. relat**., from the family Eopsilodercidae)
(= *Praeterpaculla* WUNDERLICH 2015 (**n.syn**.))

Furcembolus is one of the most diverse spider genera in Burmite; 9 species are known when the present 3 new species are included.

Synonymy: In the single specimen of the generotype of *Furcembolus*, the holotype of *F. andersoni*, the chelicerae and the opisthosoma are missing. After the study of complete new species – mainly the comparison of the male copulatory organ of all known species – the genus *Praeterpaculla* WUNDERLICH 2015 turned out to be a junior synonym of *Furcembolus* (**n. syn**.), the monotypic Furcembolusini WUNDERLICH 2008 of the Eopsilodercidae WUNDERLICH 2008 turned out to be a taxon of the Tetrablemmidae: Pacullinae and a junior synonym of the Peranini LEHTINEN 1981 (**n. syn. & n. relat**.).

Based on the structure of their male pedipalpi – as well as the opisthosomal structure of the species studied recently – the following species described by WUNDERLICH (2015) under *Praeterpaculla* are transferred here to *Furcembolus* WUNDERLICH 2008: *armatura, biacuta, dissolata, equester* and *tuberosa* (**n. comb**.).

The gender of the name is feminine.

Type species: *Furcembolus andersoni* WUNDERLICH 2008 (under Eopsilodercidae).

Diagnosis (♂; ♀ unknown): *Furcembolus* is diagnosed by the combined existence of dorsal opisthosomal humps (fig. 80, photo 62), a short cymbium, a long and bent embolus and a shorter embolic apophysis which is absent in *grossa* (figs. 78-79).
Further character: The metatarsi are ca. 2 – 3 times as long as the tarsi.
Note: I did not recognize distinct plates of lateral opisthosomal scuta in the present members of the genus.

Relationships: In *Mirania* LEHTINEN 1981 (extant, Sumatra) exists dorsal opisthosomal humps, too, but the thoracal region bears a pair of long and spine-shaped outgrowths, the cymbium is long and an embolic apophysis is absent.

Determination: The species are well diagnosed by the structures of the male pedipalpus, mainly by the embolus.

***Furcembolus crassitibia* n. sp**. (fig. 78)

Etymology: The species name refers to the thick pedipalpal tibia, from crassus (lat.) = thick.

Material: Holotype (♂) in Mid Cretaceous Burmite, F3000/BU/CJW.

Preservation and syninclusions: The spider is fairly well preserved, darkened by the preservation, several leg articles are cut off, the right leg II is completely preserved, a droplet of questionable excrement is preserved on the anus. – Syninclusions: A wingless plant succing insect is preserved right below the spider, some plant hairs are also existing.

Diagnosis (♂; ♀ unknown): Pedipalpus (fig. 78): Tibia quite thick, embolus long and bent two times in a right angle, embolic apophysis well developed.

Description:
Measurements (in mm): Body length 3.2, prosomal length 1.6, opisthosoma: Length 1.8, width 1.4; femur I ca. 2.0, metatarsus II 1.45, tarsus II 0.7.
Colour dark brown (almost black), legs not annulated.
Prosoma quite similar to *F. longior* (fig. 80), strongly wrinkled, cephalic part fairly elevated, without modifications, thoracal fissure almost as long as the thoracal part, apparently six eyes in a "segestriid" position, clypeus long, basal cheliceral articles long, lateral files probably existing. – Legs long and bristleless, hairs long, metatarsus II more than twice than tarsus II, position of the metatarsus II trichobothrium in 0.48, three tarsal claws, the paired clwas strongly toothed. – Opisthosoma similar to *F. longior*, lateral plates indistinct, dorsal humps distinct, lung covers large, diameter ca. 0.3 mm. – Pedipalpus: See the diagnosis. The femur is fairly stout, the ventral-apical tibial outgrowth is well developed.

Relationships: The structures of the pedipalpus – especially of the embolus – are unique in *crassitibia*. See *F. grossa* n. sp.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Furcembolus grossa* n. sp.** (fig. 79) photo 61

Etymology: The species name refers to the thick pedipalpal tibia, from grossus (lat.) = thick.

Material: Holotype (♂) in Mid Cretaceous Burmite, F3042/BU/CJW.

Preservation and syninclusions: The spider is almost completely and well preserved in a clear yellow piece of amber, the tip of the left tarsus I as well as the right metatarsus and tarsus I are cut off, the left leg II is lost beyond the coxa by autotomy, the opisthosoma is bent ventrally in a right angle and partly hidden. – Syninclusions are a decomposed Myriapoda, remains of insects and particles of detritus.

Diagnosis (♂; ♀ unknown): Pedipalpus (fig. 79): Tibia quite thick, embolus long and bent, without apophysis.

Description (♂):
Measurement (in mm): Body length ca. 4.1; prosomal length 1.9; leg I: Femur 2.9, patella 0.55, tibia ca. 2.5, femur II 1.9, femur III 1.3, femur IV ca. 1.6.
Colour: Prosoma and legs dark brown (almost black), legs not annulated, opisthosoma dark grey.
Prosoma and legs quite similar to *F. longior*, position of the metatarsal trichobothrium unknown, opisthosoma (it is partly hidden) oval, dorsal humps difficult to observe, a single large one is recognizable, lateral plates are not observable (absent?), pedipalpus: See the diagnosis.

Relationships: In *F. crassitibia* n. sp. the pedipalpal tibia is quite thick, too, but the embolus possesses an apophysis.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Furcembolus longior **n. sp**. (figs. 80-81) photo 62

Etymology: the name refers to the quite slender pedipalpal femur and to the rather slender pedipalpal tibia, from longior (lat.) = longish.

Material: Holotypus ♂ in Mid Cretaceous Burmite, F3001/BU/CJW.

Preservation and syninclusions: The spider is excellently and almost completely preserved in a yellowish and mainly clear oval piece of amber which is 1.7 cm long. The left leg II is cut off through the end of the tibia, the left tarssus III claws are cut off, the right leg I is broken through the base of the tibia and drifted laterally, a droplet of blood is preserved on the stump. – Syninclusions: A tiny winged insect, insects excrement, remains of plants like hairs and a large part of a leaf are also preserved.

Diagnosis (♂; ♀ unknown): Pedipalpus (fig. 81): Femur quite slender, embolus bent in a right angle in the middle, with a triangular outgrowth near its tip, embolic apophysis well developed.

Description:
Measurements (in mm): Body length 3.0, prosoma: Length ca. 1.6, height 0.8; opisthosoma: Length 1.8, height 0.6; leg I: Femur 2.55, patella 0.5, tibia 2.8, metatarsus ca. 2.3, tarsus 0.75, femur I ca. 1.7, femur III 1.3, femur IV 1.7, tibia IV 1.4.
Colour medium brown, legs not annulated.
Prosoma (fig. 80, photo): Cephalic part fairly elevated, thoracic fissure almost as long as the thoracal part, cuticula strongly wrinkled, eyes difficult to recognize. – Legs (photo) long and slender but tarsi short, order I/IV?/II/III, bristles absent, hairs partly longer, position of metatarsal trichobothria: I in 0.58, IV in 0.6. – Opisthosoma (fig. 80, photo) ventrally fairly concave (did the specimen starve before it was captured by the resin?), dorsally with a large scutum which bears distinct humps, ventral and lateral scuta (except posteriorly) difficult to observe, spinnerets short. – Pedipalpus: See the diagnosis; the ventral-apical tibial outgrowth is well developed.

Relationships: The shape of the pedipalpus – especially of the embolus – is unique in *F. longior*.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Longissithorax **n. gen.**

Etymology: The name refers to the very long prosoma, especially of its thoracal part, from longus (lat.) = long, longissimus = very long.

The gender of the name is masculine.

Type species (by monotypy): *Longissithorax myanmarenis* n. sp.

Diagnosis (♂; ♀ unknown): Prosoma (especially the thoracal part) (photo) very long/slender, 1.8 times longer than wide, without “horns”, chelicerae without modifications, pedipalpus (deformed) (figs. 83-84): Articles slender, cymbium short and undivided, bulbus fairly small, bearing deformed apophyses, embolus long and bent. Note: The embolus of the left pedipalpus (not drawn) is distinctly stronger bent in the distal half.

Relationships: The prosoma is more slender than in all members of the Tetrablemminae known to me. In *Longithorax* n. gen. the prosoma is 1.5 times longer than wide, the long cymbium is distinctly divided, structures of the bulbus are quite different, the embolus is short, the sclerites of the bulbus are distinctly different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Longissithorax myanmarensis **n. gen. n. sp**. (figs. 82-84) photos 63-64

Etymology: The species name refers to the country Maynmar (= Burma), the origin of the Burmite.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3031/BU/CJW.

Preservation and syninclusions: The spider is very well and completely preserved in a yellow piece of amber, the right leg IV is lose beyond the deformed femur, the pedipalpi are deformd. – Syninclusions are plant hairs, detritus and particles of bark. A larger and 3 small bubbles are preserved between the left femora I and II.

Diagnosis, **relationships and distribution**: See above.

Description (♂):
Measurements (in mm): Body length 1.1; prosoma: Length 0.55,width 0.3; opisthososma: Length 0.65, width 0.38; leg I: Femur 0.35, patella 0.08, tibia 0.27, metatarsus 0.19, tarsus 0.19, length of the clypeus 0.03, length of a basal cheliceral article 0.04.
Colour: Body dark brown, legs medium brown, not annulated.
Prosoma (photo) 1.83 times longer than wide, slender, low, finelly rugose, hairs only

fairly long, 6 eyes in a "segestriid position", clypeus relatively short and not protruding, basal cheliceral articles of medium length, free, fairly diverging, lamellae difficult to recognize, gnathocoxae strongly converging, coxae IV spaced by about their diameter by the sternum. – Legs (photo) slender, of medium length, leg I longest and unmodified, bristles absent, hairs indistinct, position of the metatarsal I trichobothrium in 0.34. – Opisthosoma (fig. 82, photo) 1.7 times longer than wide, low, distinctly punctuated, dorsally completely covered with a scutum, ventrally and laterally also scutate, hairs indistinct. – Pedipalpus: See the diagnosis of the new genus.

***Longithorax* n. gen.**

Etymology: The name refers to the long thoracal part, from longus (lat.) = long.

The gender of the name is masculine.

Type species (by monotypy): *Longithorax furca* n. sp.

Diagnosis (♂; ♀ unknown): Prosoma (especially the thoracal part) (figs. 85-86, photo) quite long/slender, 1.5 times longer than wide, without "horns", chelicerae without modifications, pedipalpus (figs. 87-88): Articles slender, cymbium large and strongly divided, bulbus voluminous, embolus fairly short, additional tegular sclerites existing.

Relationships (see the key above and *Longissithorax* n. gen.): According to the small body and the more basal position of the metatarsal trichobothrium *Longithorax* is a member of the subfamily Tetrablemminae in which the prosoma is stouter, most often 1.3 – 1.4 times longer than wide. The Tetrablemmidae ?gen. indet. sensu WUNDERLICH (2015: 170, 374: Fig. 123) (♂ in Burmite) may be congeneric.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Longithorax furca* n. gen. n. sp.** (figs. 85-88) photo 65

Etymology: The species name refers to the furcate cymbium, from furca (lat.) = fork.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3029/BU/CJW.

Preservation and syninclusions: The spider is completely and well preserved in a clear yellow piece of amber, a bubble exists between the left pedipalpus and the clypeus. – Syninclusions are detritus and few plant hairs.

Diagnosis, **relationships and distribution**: See above.

Description (♂):
Measurements (in mm): Body length 1.6; prosoma: Length 0.75, width 0.5, height 0.33; opisthosoma: Length 1.0, width 0.53, height 0.5; leg I: Femur 0.65, patella 0.22, tibia 0.52, metatarsus 0.3, tarsus 0.18.
Colour dark brown, legs not annulated.
Prosoma (figs. 85-86, photo) 1.5 times longer than wide, anteriorly distinctly narrowed, fairly low, a pair of cylpeal "horns" are artefacts, cuticula scaly, fovea absent, hairs indistinct, 6 eyes in a "segestriid position", most parts of the chelicerae hidden, coxae IV spaced by their diameter by the sternum. – Legs (photo) fairly long, bristles absent, hairs distinct, position of the metatarsal II trichobothrium in 0.37, 3 large tarsal claws, paired claws with very long teeth. – Opisthosoma (photo) almost twice as long as wide, dorsally bearing a large scutum and hairs of medium length, ventrally also scutate. – Pedipalpus: See above.

Palpalpaculla **n. gen.**

Etymology: The name refers (a) to the unusual shape of the pedipalpus and (b) to the name of the confamiliar genus Paculla.

The gender of the name is feminine.

Type species (by monotypy): *Palpalpaculla pulcher* n. sp.

Diagnosis (♂; ♀ unknown): Prosoma abruptly raised (fig. 89), cuticula almost smooth, cheliceral and clypeal outgrowths absent, opisthosoma with a large dorsal scutum (small plates absent), pedipalpus (figs. 90-91): Bulbus elongated and bent, embolus long, tube-shaped.

Further characters: six eyes, legs fairly stout (photo), position of the metatarsal trichobothrium in ca. 0.4.

The subfamiliar **relationships** are unsure (see the key to the genera and the tab. above): The thick embolus is similar to the Pacullinae the low body length and the more basal position of the metatarsal trichobothrium are as in the Tetrablemminae. The cymbium of *Palpalpaculla* is undivided as in the Peranini, see LEHTINEN (1981: 14). The shape of the embolus is similar to *Perania robusta* SCHWENDINGER 1989 which was regarded as not completely corresponding with the diagnosis of *Perania* THORELL 1890; its body length (♂) is 12.1-13.1 mm. In *Perania* exists cuspules on metatarsus I as in *P. robusta* but such cuspules are absent in *pulcher* and the ventral opisthosomal scuta are different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Palpalpaculla pulcher* n. gen. n. sp.** (figs. 89-91) photos 66-67

Etymology: The species name refers to the beautiful preserved holotype, from pulcher (lat.) = beautiful.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2937/BU/CJW.

Preservation and syninclusions: The spider is completely and excellently preserved in a fairly clear yellowish piece of amber. – Gas bubbles are preserved on the mouth parts and between the right legs. Particles of detritus are also preserved.

Diagnosis and distribution: See above. Cuspules on leg I absent, cymbium (fig. 80) undivided.

Description (♂):
Measurements (in mm): Body length 2.2, prosoma: Length 1.0, width ca. 0.7; leg I: Femur 0.9, patella 0.25, tibia ca. 0.65, metatarsus 0.5, tarsus 0.35; tibia II ca. 0.6, tibia III ca. 0.45, tibia IV 0.6.
Colour mainly dark brown, opisthosoma partly light grey.
Prosoma (fig. 89, photo) 1.43 times longer than wide, posteriorly abruptly raised, dorsally-medially with some long hairs, cuticula finelly granulate, fovea absent, six eyes in a wide field in a “segetriid position”, median eyes close together, basal cheliceral articles (they are anteriorly inclined apparently by the preservation), without outgrowths, mouth parts hidden, sternum spacing the coxae IV by half of their diameter, posteriorior sternal “knob” apparently absent (the area is deformed). – Legs (photo) only fairly long, I about as long as IV, bristleless, hairs fairly long, position of the metatarsal IV trichobothrium in ca. 0.4. – Opisthosoma (photo) oval, dorsally completely covered with an undivided scutum which bears longer hairs, several lateral and 7 posterior plates, a large sclerotized ring exists around the short spinnerets, in front of this ring ventrally a larger and a slender ring behind the large epigastric scutum. – Pedipalpus (figs. 90-91): Femur slender, patella short, tibia thickened (not drawn), cymbium elongated and apparently not divided, bulbus elongated and bent, embolus long, thick, tuber-shaped and pointed.

Relationships (see above): The deformed structures of a male Tetrablemmidae indet. in Burmite, body length only 0.9 mm – see WUNDERLICH (2012: 221, figs. 4-5) – reminds of the structures of *P. pulcher*.

?Tetrablemminae indet. (fig. 92) photo 68

Material: 1♀ in Mid Cretaceous Burmite, F2938/BU/CJW.

Preservation: The spider is completely preserved, a larger fissure and bubbles hide parts of the body. The prosoma and parts of the opisthosoma are distinctly deformed.

Description (♀):
Measurements (in mm): Body length 2.2, prosomal length 1.0, femur I 0.9.
The strongly deformed prosoma is distinctly longer than wide, bearing a widely pair of clypeal “horns”. Position of the metatarsal IV trichobothrium in 0.5. The opisthosoma bears a large dorsal scutum (small plates are absent) and some longer hairs, lateral plates indistinct, a large plate (scutum) exists behind the genital area (fig. 92). The epigaster with the genital area is strongly sclerotized and ventrally-anteriorly strongly protruding (fig. 92). A sclerotized ring exists around the retracted spinnerets.

The **generic relationships** are quite unsure. A strongly protruding and sclerotized genital area in the Tetrablemmidae is unknown to me but it exists in several members of the family Pholcidae.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family EOPSILODERCIDAE WUNDERLICH 2008

With remarks on the Ochyroceratidae and the Psilodercidae (see also below).

The taxonomomic problems of the high taxa of the Ochyroceratidae and related families (as well as their subfamilies) are quite tricky. Unfortunately the respiratory system is not surely known in most fossils. Furthermore the taxonomic value of certain structures like the length of the clypeus may be unsure, and the question remains: which genera have to unite in the same subfamily? Probably the level of the high taxa (subfamilies) may be a (subjective) matter of opinion. If Ochyroceratidae is treated in a wide sense this family would have to add to the fauna of the Burmite, and Eopsilodercidae as well Psilodercidae would have to delete of the family list of this fauna.
Ochyroceratidae in the wide sense of DEELEMAN-REINHOLD (1995) includes the subfamilies Ochyroceratinae, Psilodercinae and Theotiminae. In the Ochyroceratinae and in the Theotiminae the book lungs are replaced by tracheae. In 2008: 577 I described the related family Eopsilodercidae including the Furcembolusini which I (2015: 69, 143) regarded as not closely related and a plesion of the superfamily Pholcoidea, and which I now transfer to the family Tetrablemmidae (**n. relat**.), see above.
Only the nominate genus *Eopsiloderces* WUNDERLICH 2008 of the Eopsilodercidae has been known up to now. The type species of *Eopsiloderces* is *E. loxosceloides* WUNDERLICH 2008. Further known species are *E. filiformis* WUNDERLICH 2012 (= ?*Psiloderces f.*, see WUNDERLICH (2015: 147)) and *E. serenitas* WUNDERLICH 2015. In the new genus *Loxoderces* cheliceral clasping spines are absent, the shape of the chelicerae and the male pedipalpus are clearly different. The cheliceral clasping spines cannot longer be regarded as a family character of the Eopsilodercidae. – Because of the recently discovered cheliceral stridulatory files in a male of *E. ?filiformis* (see below) this character has to add to the genus *Eopsiloderces* and to the family diagnosis of the Eopsilodercidae. In the holotype of *E. serenitas* also – questionable – stridulatory files

exist (fig. 97). – In the family Sicariidae exist cheliceral stridulatory files – as in certain Eopsilodercidae and in most related families –, but an unpaired tarsal claw is absent and its cheliceral fangs are stout. Sicariidae: Loxoscelinae is similar to the Eopsilodercidae in some respect, mainly besides the absence of an unpaired tarsal claw. – In the Praepholcinae n. subfam. the lateral eyes are placed on stalks, the anterior median eyes are quite close to the anterior clypeal margin, the eye field is wider, the basal cheliceral articles are quite short, “clasping spines” are absent, and the legs bear no long hairs, bristle-shaped hairs or bristles.
In this paper I treat three subfamilies of the Eopsilodercidae (see the key below) besides the strongly related family Psilodercidae.

Key to the fossil taxa of the Eopsilodercidae and Psilodercidae:

1 Clypeus short and not protruding (figs. 99, 104), position of the metatarsal trichobothrium near the end of the article, basal cheliceral articles bearing probably a long medial lamina but not distally/apically (fig. 104). EOPSILODERCIDAE 2

- Clypeus very long and distinctly protruding (figs. 113, 119), position of the metatarsal trichobothrium more basaly (in 0.45 – 0.7 in *Priscaleclercera* sp. indet., see below), cheliceral lamina short and restricted to a distal area, see WUNDERLICH (2015: 370, fig. 93). PSILODERCIDAE. 4

2(1) Bristles on the very long legs completely absent (photo), apical tarsal outgrowth absent (fig. 101), eye field very wide and lateral eyes placed on distinct elevated diads (figs. 98-100). Basal cheliceral articles weak, “clasping spines” absent. *P. huberi* n. gen. n. sp. . . . . .PRAEPHOLCINAE

- Legs with numenous bristles, apical tarsal outgrowth existing (fig. 107), eye field more narrow, lateral eyes not on distinct humps (fig. 93) 3

3(2) Basal cheliceral articles fused basally, cheliceral “clasping spines” existing, see WUNDERLICH (2015: 369, fig. 84), pedipalpus (fig. 94; WUNDERLICH (2015: 369, fig. 84)): Tibia thickened, cymbium quite short, bulbus attached apically at the cymbium, embolus directed anteriorly. *Eopsiloderces* WUNDERLICH 2008. . . . . .EOPSILODERCINAE

- Basal cheliceral articles free and very long (fig. 104), cheliceral “clasping spines” absent, pedipalpus (fig. 104): All articles slender, cymbium very long, bulbus attached basally at the cymbium, embolus directed backwards to the femur. *Loxoderces* n. gen. . . . . .LOXODERCINAE

4(1) Pedipalpus with spiny articles, bulbus bearing complicated structures (figs. 114 f). *Priscaleclercera* n. gen. (6 species in Burmite, and the extant *P. spinata* (DEELEMAN-REINHOLD 1995) (under *Leclercera* s.) from Indonesia. . . . . <u>*Priscaleclercera*</u>

- Pedipalpal articles spineless, bulbus simple (fig. 110). 5

5(4) Prosoma dorsally with very long hairs, cymbium with a pair of outgrowths, bulbus apically attached at the cymbium, see WUNDERLICH (2015: 371, figs. 99-100). *P. longiseta* WUNDERLICH 2015. . . . . *Propterpsiloderces*

- Opisthosoma with very long hairs (photo 110), bulbus basally attachend at the cymbium (fig. 111). *A. pyritmutatio* n. gen. n. sp. . . . . *Aculeatosoma*

DESCRIPTIONS OF THE TAXA

EOPSILODERCINAE WUNDERLICH 2008

See above and the key.

Eopsiloderces ?filiformis (WUNDERLICH 2012) (figs. 93-96) photo 69

2012 *?Psiloderces filiformis* WUNDERLICH, Beitr. Araneol., 7: 180-181, fig.15, photos 5-8).
2015 *Eopsiloderces filiformis*: WUNDERLICH, Beitr. Araneol., 9: 147, fig.89 (as n. comb.).

New material: 1♂ in Mid Cretaceous Burmite, F2891/BU/CJW, which may be conspecific.

Preservation and syninclusions: The spider is well and almost completely preserved together with three Acari; one of these is a parasitic larva of the family Erythraeidae.

Description:
Measurements (in mm): Body length 1.6, prosoma: Length 0.75, width 0.7; leg I: Femur 1.3, patella ca. 0.3, tibia 1.25, metatarsus 1.3, tarsus 0.5.
The position of the eyes is quite similar to the female of ?*E*. sp. indet., see WUNDERLICH (2015: 149, fig. 90) which has a body length of 2.7 mm.

Eye position: Fig. 93, cheliceral stridulatory files exist which are widely spaced (similar to fig. 97), on the left pedipalpal femur few tiny stridulatory bristles are recognizable in a prolateral position, fangs long and slender, cheliceral clasping spines are probably absent (or hidden or rubbed off?), the leg position is probably laterigrade, all legs are directed forward (photo), pedipalpus: Figs. 94-96.

PRAEPHOLCINAE n. subfam. of the Eopsilodercidae WUNDERLICH 2008

Etymology: See below.

Diagnosis (♂; ♀ unknown): Prosoma (figs. 98-100, photos 70-71) distinctly depressed, only 1.15 times longer than wide, oval, eye field very wide, lateral eye diads on distinct elevations, basal cheliceral articles short/weak (fig. 99), pedipalpus (figs. 102-103): Tibia thickened, bulbus small and simple, attached apically to the short cymbium; no sclerites besides the long embolus.

Further characters: Ecribellate, unpaired tarsal claw existing (fig. 101) (*), teeth of the paired claws short, legs (photo) extremely long and slender, prograde, bristles, bristle-shaped hairs and outgrowth below the claws absent, comb of serrated ventral hairs of tarsus IV absent, coxa-trochanter autotomy, position of the metatarsal trichobothrium near the end of the article, clypeus quite short: anterior median eyes large and close to the clypeal margin, basal cheliceral articles probably fused in the basal half and probably bearing a long medial lamella, without outgrowths, opisthosoma (photo) slender, 2.7 times longer than wide, respiratory system unknown, spinnerets short, colulus probably tiny or even absent, pedipalpal articles fairly stout.

(*) Only a single complete but not well preserved tarsal tip of the single known specimen is preserved; it is placed on the sternum).

Note: The sternum is seemingly quite slender, about twice as long as wide, and the position of the coxae is more medially than in other spiders known to me; but this pattern may be an artefact caused by the decomposition and strong deformation of the sternum.

The **relationships** are unsure; I refer the new subfamily only with hesitation to the family Eopsilodercidae: The quite short clypeus, the quite long legs, the almost apical position of the metatarsal trichobothrium (*) and the simple structures of the male pedipalpus all are similar. In contrast to the Eopsilodercinae and the Loxodercinae the shape of the prosoma is different in the Praepholcinae, the lateral eye diads are placed on distinct elevations, leg bristles and an outgrowth below the tarsal claws are absent, the teeth of the paired tarsal claws are short. – The prosoma is relatively wider, the eye field is wider, the elevations of the eye diads are larger and the basal cheliceral articles are weaker than in other related taxa in Burmite, see the key above. – In the – also six-eyed – Drymusidae, Ochyroceratidae, Psilodercidae, Scytodidae and Sicariidae the lateral eyes are not placed on stalks and the eye field is usually smaller (not in all Ochyroceratidae and Psilodercidae), the clypeus is longer, the basal cheliceral articles are distinctly longer, the onychium is well developed. (In the members of these families the bulbus is simple or complicated – bearing one or several sclerites – and may be attached at the end of the cymbium or more basally, the legs may be extremely long and may bear bristles or bristle-shaped hairs). DIMITROV et al. (2013) did not exclude that Drymusidae is (most) related to the Pholcidae but see above, the Tetrablemmidae. Lateral eyes placed on elevations, a quite wide eye field, quite weak basal cheliceral articles as well as bristleless and very long and slender legs are characters which may be synapomorphies of Pholcidae + Praepholcinae and are unknown from any other spider family in this combination. In the family Pholcidae exist – contrarily to *Praepholcus* – eye TRIADS instead of diads, the clypeus is long, the basal cheliceral articles usually bear outgrowths, the tarsi IV bear a comb of serrated ventral hairs, and the structures of the male pedipalpus are quite complicated: a large paracymbium (procursus) exists, the bulbus bears several apophyses.

(*) An almost apical position of the metatarsal trichobothrium is apparently not quite rare – but still not well studied – in haplogyne spiders and exists also e. g. in the families Oonopidae and Orsolobidae. Contrarily I found in *Priscaleclercera* n. gen. of the related family Psilodercidae the position of the metatarsal trichobothrium in 0.45 – 0.7, see below.

Number, position, kind and origin of the median eyes and possible relationships of certain haplogyne taxa:

In the following I list some findings/characters regarding the eyes of "primitive" spiders:
(1) According to MIETHER & DUNLOP (2016: 103) in "... spiders and their closest relatives, there is a clear trend towards the lateral eyes consolidating into triads of three lenses. A number of early-branching spider families (e. g. Hypochilidae, Atypidae, but interestingly *not* Liphistiidae) retain clear evidence of triads.".
(2) The Synspermiata (Dysderoidea s. l. + Pholcoidea) – see WUNDERLICH (2015: 287, fig. G) – are characterized by the tendency for the reduction or even loss of the anterior median eyes as well as – if the anterior median eyes have been lost – by moving the posterior median eyes anteriorly.
(3) Several haplogyne families possess basically 8 eyes (the anterior median eyes retained): Caponiidae, Filistatidae, Pholcidae, Plectreuridae (atavistic additional anterior median eyes exist also in certain specimens of *Orchestina* (Oonopidae)) – all these families are not extinct. Extinct eight-eyed haplogyne families are Mongolarachnidae and Pholcochyroceridae; see WUNDERLICH (2012:226, fig. 27), (2015: 384, fig. 191) and this volume.
(4) Remarkably among thousands of Cretaceous or older fossil spiders not a single member of the Pholcidae – or another family possessing triads – has been found.

An important open question: IS THE TRIAD OF THE LATERAL EYES REALLY AN ANCIENT (PLESIOMORPHIC) CHARACTER OF THE ARANEAE? A triad is absent in the most ancient Araneae – the Mesothelae –: the eyes are placed closely together on a tubercle similar to numerous Mygalomorpha and most Filistatidae. Is this eye tubercle an apomorphic character of the Araneae, modified several times in the Mygalomorpha and other taxa, and evolved a triad secondarily in the Pholcidae (*) as well as separately similar e. g. in the Archoleptonetinae of the Leptonetidae and certain Atypoidea, see MIETHER & DUNLOP (2016: 113)? – "... discussing the question as to whether the presence of such triads in various subtaxa of the Araneae could be a persisting plesiomorphic character expression.". "Almost perfect triads occur in Pholcidae (Fig. 41),..."; see KRAUS & KRAUS (1993: 580 and 582)

Further open questions are:

- What is the origin of the median eyes in the anterior position of *Praepholcus*? Did its ancestor lose its anterior median eyes and did the posterior median eyes move to an anterior position? Because of the quite anterior position of the anterior median eyes near the clypeal margin this option appears not likely to me but the eyes in the anterior position may actually be the anterior median eyes of this taxon like in the Pholcidae. NOTE: In most species of the Pholcidae the actual anterior median eyes retained, and they are distinctly SMALLER than the median eyes of *Praepholcus*.
- Are the eyes in the anterior median position of ALL the families Drymusidae, Eopsilodercidae, Ochyroceratidae, Psilodercidae, Scytodidae and Sicariidae really the translocated posterior median eyes?
- Did the predecessor of *Praepholcus* lose one of the eyes of a triad which existed previously? (*).
- Is the Pholcidae a relatively young (post-cretaceous) family – fossils are known latest from the Eocene, see WUNDERLICH (2004, 2008: 553) –, a "crown taxon" of a larger ancient branch which evolved sticky droplets in its capture web, prey warapping and rapid web-shaking behaviour as important "innovations"? According to the molecular study by DIMITROV et al. (2013) pholcids "start diversifying" already in the Mid Jurassic, about 200 million years ago (!), but a mesozoic proof stands out.

Conclusions: The opinion of KRAUS & KRAUS (1993) regarding the eye triad of the Pholcidae as a „persisting plesiomorphic character" appears quite less likely to me than its apomorphic/convergent evolution in few taxa like in *Pholcomma* THORELL 1869 of the Theridiidae. If the PECULIAR widely spaced lateral eyes originated actually only once within the Pholcoidea the following scenario appears speculative but not unlikely to me: *Praepholcus* is a genus closely related to the ancestor of the derived family Pholcidae; it still possessed a simple male pedipalpus (figs. 102-103), did not yet evolve a quite long clypeus nor (probably) cheliceral outgrowths nor a ventral comb of serrated hairs. The posterior median eyes of the predecessor of the Pholcidae + *Praepholcus* probably moved and were added to the lateral eye diad to build a triad on an elevation in most Pholcidae (such elevation is absent in the Ninetinae), and in *Praepholcus* these eyes became lost (*). If so, (1) extinct – Cretaceous or even Jurassic – taxa („missing links") will probably be discovered in the future (e. g. in Burmite), in which 8 eyes including lateral eye triads exist, and in which the structures of the bulbus are fairly simple. – (2) The origin of the Pholcidae probably happened within the Cretaceous but this family probably diversified only in the Palaeogene (their first proof is within Eocene Baltic amber fossils). – (3) The eyes in the anterior median position of *Praepholcus* are actually the anterior median eyes but are not reduced (or enlarged?) and distinctly larger than the small anterior median eyes of the Pholcidae (which have been completely lost in some taxa of this family). The elevated eye diad of *Praepholcus* may somewhat like a „model" or a „first evolutionary step" to the eye triad of the Pholcidae.

Note: More confamiliar fossil taxa are needed to study details of the chelicerae, the spinnerets and the respiratory system, to clear the relationships of *Praepholcus*. A question is: How different from extant and Eocene Pholcidae were the "pholcids" – if already existing – 100 or 200 million years ago? Would we recognize such taxa as "pholcids"?

(*) The arachnid order Ricinulei is an example for the loss of one eye or even two eyes of a triad during the evolution; a triad exists basically in certain extinct Primoricinulei in contrast to the (fossil and extant) Posteriorricinulei in which a diad of the lateral eyes (if any eye lenses) exists; see the paper on the Ricinulei in this volume.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Praepholcus* n. gen.**

Etymology: The name refers to the genus *Pholcus* as well as certain ancient (plesiomorphic) characters of the new genus, from prae- (lat.) = previously, before.

The gender of the name is masculine.

Type species (by monotypy): *Praepholcus huberi* n. sp.

Diagnosis, relationships and distribution: See above.

***Praepholcus huberi* n. gen. n. sp. (figs. 98-103) photos 70-71**

Derivatio nominis: The species is dedicated to BERNHARD HUBER, who described and revised numerous taxa of the diverse and fascinating family Pholcidae.

Holotypus ♂ in Mid Cretaceous Burmite, F2992/BU/CJW (the only known specimen of this taxon).

Preservation and syninclusions: The spider is well preserved in a yellow clear piece of amber and is partly decomposed, the right leg II is lost beyond the coxa apparently by autotomy, the opisthosoma is inclined ventrally, the ventral part of the prosoma is deformed and partly covered with an emulsion, most tips of the tarsi are cut off but the fairly well preserved left tarsus III is preserved on the sternum. – Syninclusions: A drop of questionable digestive fluid is preserved in front of the prosoma (photo), a row of 5 ½ possible scales of the scin of a reptile (photo), insect's excrements, plant hairs and some tiny pebbles of siliceous are preserved in the same piece of amber.

Diagnosis (♂; ♀ unknown): See above.

Description (♂):
Measurements (in mm): Body length 2.5, prosoma: Length 1.15, width ca. 0.95, height ca. 0.25; opisthosoma: Length 1.6, width ca. 0.6; leg II: Femur 4.0, patella 0.3, tibia 3.9, leg III: Femur 2.15, patella 0.25, tibia 2.1, metatarsus 2.4, tarsus ca. 0.6, femur IV 3.8.
Colour: Prosoma and legs light grey, prosoma laterally (and the region of the anterior median eyes) darkened, legs not annulated, opisthosoma medium grey.
Prosoma (figs. 98 – 100, photos) 1.2 time longer than wide, oval, only anteriorly narrowed, flattened, fovea and thoracal fissure absent, bearing few longer hairs, 6 eyes in a very wide field of three diads, lateral diads placed on distinct stalks and close together, anterior median eyes large, close together and quite near the clypeal margin; chelicerae partly hidden, basal articles quite short, probably not fused in the basal half, medial lamella unknown, outgrowths or teeth not surely recognizable (probably existing), lateral files unknown, fangs apparently small, mouth parts strongly deformed, gnathocoxae short and strongly converging, serrula existing, sternum slender, coxae IV spaced by about their diameter. – Legs (fig. 101, photos) extremely long and slender (but see above!), femur II 3.6 times longer than the prosoma, most hairs short, bristles and bristle-shaped hairs absent, metatarsal trichobothria short, their position near the end of the article, 3 tarsal claws (see above), paired claws well developed, bearing short teeth, unpaired claw large, onychium quite short (the fairly well preserved left tarsus III is preserved on the sternum). – Opisthosoma (photos) slender, 2.7 times longer than wide, deformed and inclined ventrally, soft, bearing few hairs of medium length, respiratory system unknown, spinnerets short, strongly deformed, colulus probably tiny (absent?). – Pedipalpus (figs. 102 – 103) deformed, articles hairy but not spiny, only fairly long, only the tibia is fairly thickened, cymbium short, bulbus simple, strongly deformed, attached apically to the cymbium, embolus long and bent, additional sclerites absent.

Relationships: See above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

LOXODERCINAE n. subfam. of the Eopsilodercidae WUNDERLICH 2008

Etymology: See below.

Type genus (by monotypy): *Loxoderces* n. gen.

Diagnosis (♂; ♀ unknown): Basal cheliceral articles very long and slender, free (even basally not fused), a distinct medial-distal outgrowth may exist, anterior margin of the fang furrow bearing up to 3 teeth (figs. 104-105); pedipalpus (fig. 104) with long and slender articles, cymbium extremely long, bulbus attached basally at the cymbium, embolus long and directed backwards to the femur.

Further characters: 3 pairs of eyes, clypeus very short (fig. 104), a long cheliceral lamina probably existing (indistinct), legs quite long, probably laterigrade (photos), bearing numerous thin bristles on femora (fig. 106), tibiae and metatarsi (even ventrally on the metatarsi), their number is variable even within the same specimen and on the same legs of both sides, paired tarsal claws with long teeth, a stronger sclerotized outgrowth (an onychium?) exists below the teeth (fig. 107) like in the Eopsilodercinae in contrast to the Praepholcinae; additional sclerites of the bulbus are absent (fig. 104). The existence of lungs is not quite sure.

Relationships: In the Ochyroceratinae s. str. and in the Theotiminae – both regarded as subfamilies of the Ochyroceratidae s. l. by DEELEMAN-REINHOLD (1995) – the promargin of the fang furrow bears 6-7 teeth/denticles and book lungs are absent. In the Psilodercidae – treated as Psilodercinae of the Ochyroceratidae s. l. by DEELEMAN-REINHOLD (1995) – the clypeus is very long and distinctly protruding (fig. 113), the cheliceral lamina is short and restricted to its most distal part. According to the short clypeus, the (thin) leg macrosetae, the long cheliceral lamina and the simple bulbus I regard the Loxodercinae (*Loxoderces*) as a member of the Eopsilodercidae although important differences exist between the Eopsilodercinae and the Loxodercinae: see the key above and the Praepholcinae.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Loxoderces **n. gen.**

Etymology: The name refers to the similarities to the subfamily Loxoscelinae of the Sicariidae as well to the familiy Psilodercidae.

The gender of the name is masculine.

Type species: *Loxoderces longicymbium* n. sp. – Further species: *L.curvatus* n. sp. and *L. rectus* n. sp.

Diagnosis (♂; ♀ unknown) and **relationships**: See above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Loxoderces longicymbium* n. gen. n. sp**. (figs. 104-107) photos 72-73

Etymology: the species name refers to the extremely long cymbium, from longus (lat.) = long.

Material: 2♂ in Mid Cretaceous Burmite; holotype F2918/BU/ CJW, paratype 3033/ BU/ CJW.

Preservation and syninclusions: (a) Holotype:The spider is fairly well preserved, the left legs I-II are lost near their base probably by autotomy, prosoma fairly, opisthosoma distinctly deformed, fissures hide some parts of the body. – Syninclusions: 1 Thysanoptera, some plant hairs and bubbles. The holotype of *Palaeoleptoneta crus* n. sp. (F2925/BU/CJW, family Leptonetidae) has been separated from the present piece of amber. – (b) Paratype: The spider is very well and almost completely preserved in a clear yellow piece of amber, a part of the right tibia IV is cut off, the opisthosoma is dorsally depressed, a fissure in the amber runs across through the body of the spider. – Syninclusions are few questionable spider's threads behind/below the spider.

Diagnosis (♂; ♀ unknown): Basal cheliceral articles (fig. 104) medially-distally more distinctly bulging than in the remaining congeneric species, embolus fairly thickened in the basal half (fig. 104).

Description (♂):
Measurements (in mm): Holotype: Body length 1.3, prosoma: Length 0.65, width 0.55; leg I: Femur 1.3, patella ca. 0.35, tibia 1.4, metatarsus ca. 1.35, tarsus 0.5, tibia II 1.1, tibia III 0.5, tibia IV ca. 0.7, basal cheliceral articles 0.5, cymbium 0.4. – Paratype: Body length ca 1.6; prosomal lentgh ca. 0.75; leg I: Femur 1.5, patella 0.35, tibia 1.5, metatarsus 1.35, tarsus ca. 0.45, femur IV 0.9.
Colour mainly light brown, chelicerae dark brown, legs not annulated.
Prosoma (fig. 104-105, photos 72-73; deformed, parts are hidden) 1.2 times longer than wide, distinctly narrowed anteriorly, hairs indistinct, six (deformed) eyes, clypeus short, basal cheliceral articles very long and slender, not fused, bearing medially-distally a distinct hook, few teeth exist near this hump whch are recognizable on the right chelicera of the paratype, median lamina low, very long, fangs only fairly long, teeth of the fang furrow difficult to observe, gnathocoxae and labium very long, labium apically not inclined. – Legs (fig. 106, photos): Order I/II/IV/III, long and slender, I longest, III distinctly the shortest, tarsi short, hairs short, strong bristles absent but (e. g.) prolaterally on the right tibia I exist 3 long and thin macrosetae in the holotype, position of the metatarsal I/ II trichobothrium of the paratype in 0.96/0.93, a sclerotized outgrowth exists below the claws, paired claws with long teeth, unpaired tarsal claw fairly small. – Opisthosoma (photos) deformed, hairs short, covers of book lungs may exist. – Pedipalpus (fig. 104) with long and slender articles, bulbus without apophyses, attached basally on the cymbium, embolus about as long as the bulbus, fairly bent distally.

Relationships: In *L. curvatus* and. *L. rectus* the embolus is different, see the figs., and the basal cheliceral articles are less bulging medially-distally.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Loxoderces curvatus* n. gen. n. sp.** (fig. 108)

Etymology: The name refers to the distinctly bent embolus, from curvus/curvatus (lat.) = bent.

Material: Holotype ♂ in Mid Cretaceous Burmite and a separated piece of amber, F2935/BU/CJW.

Preservation and syninclusions: The spider is well and completely preserved in a clear yellow piece of amber. – Two bubbles which include gas bubbles are preserved in front of the prosoma and right of the chelicerae; few plant hairs are also preserved.

Diagnosis (♂; ♀ unknown): Embolus (fig. 108) quite long, slender and distinctly bent in the distal half.

Description (♂):
Measurements (in mm): Body length 1.4, prosomal length 0.9; leg I: Femur 1.2, patella 0.3, tibia 1.45, metatarsus ca. 1.2, tarsus 0.45, tibia II 1.15, tibia III 0.5, tibia IV 0.7; basal cheliceral article 0.4, cymbium 0.35.
Colour light grey brown, legs not annulated.
Prosoma (photo) fairly flat, hairs indistinct, 6 eyes in a similar position to *L. longicymbium*, clypeus short, basal cheliceral articles not fused, similar to *L. longicymbium*,, stridulatory files absent – Legs (photo) quite long, order I/II/III/IV, hairs short, leg macrosetae thin, tibia IV bears at least 4 ones. – Opisthosoma (photo) oval, hairs short, spinnerets fairly stout, apparently 3 pairs. – Pedipalpus (fig. 108): Articles long and more slend than in *L. longicymbium*, embolus long, slender and distinctly bent.

Relationships: See *L. longicymbium* n. sp. and *L. rectus* n. sp. whose embolus is different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Loxoderces rectus* n. sp.** (fig. 109)

Etymology: The species name refers to the straight embolus, from rectus (lat.) = straight.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3032/BU/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved in a fairly muddy piece of amber, the left legs I and II are lost beyond the coxa by autotomy, the opisthosoma is ventrally depressed. – A plant hair is preserved left of the left pedipalpus.

Diagnosis (♂; ♀ unknown): Embolus (fig. 109) straight and relatively short.

Description (♂):
Measurements (in mm): Body length 1.8; prosoma: Length 1.0, width 0.8; opisthosoma: Length 115, width 0.8; leg I: Femur 1.7, patella 0.45, tibia 1.65, metatarsus 1.5, tarsus ca. 0.4, tibia II 1.35, tibia III 0.75, tibia IV 1.0.
Colour: Prosoma medium brown, legs (not annulated and opisthosoma light grey brown.
Prosoma 1.25 times longer than wide, hairs short, fovea indistinct or absent, 6 eyes in 3 diads, the medians close together, basal cheliceral articles quite large/long, diverging distally and here not or only slightly bulging medially, the anterior margin of the fang furrow bears at least a single tooth, fangs fairly stout, mouth parts hidden. – Legs quite similar to *L. longicymbium* n. sp., but probably fewer thin bristles except on the femora. – Opisthosoma 1.4 times longer than wide, covered with short hairs. – Pedipalpus (fig. 109) with slender articles, cymbium long and slender as in the related species, bulbus oval, embolus straight and relatively short.

Relationships: In contrast to the remaining known species the embolus is straight and shorter; in *L. longicymbium* the basal cheliceral articles are stronger bulging medially-distally.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Loxoderces sp. indet.

Material: 1♂ in Mid Cretaceous Burmite, coll. PATRICK MÜLLER BUB 566.

Preservation and syninclusions: The spider is incompletely preserved in a muddy piece of amber, the left leg III is shortened by a malformation, the cuticula is apparently oxidated, several articles are cut off, the left legs III-IV and the right leg IV are complete, the opisthosoma is dorsally strongly inclined, body and legs are “punctuated, the left pedipalpus seems partly decomposed, bulbi and emboli are partly hidden. – A longer spider thread – of the spider´s capture-web? – runs from the prosoma to the right; two spider legs and a Diptera are preserved in different layers of the amber, plant hairs and remains of leafs are also preserved.

Description (♂):
Measurements (in mm): Body length 1.4, prosomal length 1.0, opisthosoma: length ca. 0.9, height ca. 0.8; leg IV: Femur ca. 0.9, patella ca. 0.25, tibia ca 0.9, metatarsus ca. 0.85, tarsus 0.3; basal cheliceral articles 0.5.
Colour dark grey.
Body, legs, opisthosoma and pedipalpi (they are partly hidden) apparently quite similar to *L. longicymbium*.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family PSILODERCIDAE DEELEMAN-REINHOLD 1995 as subfamily of the Ochyroceratidae FAGE 1912, see WUNDERLICH (2015: 149f).

See the key above.

Diversity: Three genera of this family are known:

- the extinct new monotypic genus *Aculeatosoma*,
- the extinct monotypic genus *Propterpsiloderces* WUNDERLICH 2015 and,
- the new and fairly diverse genus *Priscaleclercera* which includes the extant species *Priscaleclercera spinata* (DEELEMEN-REINHOLD 1995) (**n. comb**.) from SE-Asia: Indonesia as well as six species (two are new) in Burmite.

Note: ?*Psiloderces filiformis* WUNDERLICH 2012 = *Eopsiloderces f.*, family Eopsilodercidae, see above.

Aculeatosoma **n. gen**

Etymology: The name refers to the long bristles of the opisthosoma (fig. 110), based on aculeatus (lat.) = prickly.

The gender of the name is feminine.

Type species (by monotypy): *Aculeatosoma pyritmutatio* n. sp.

Diagnosis (♂; ♀ unknown): Opisthosoma bearing – besides short hairs – long bristles (fig. 110), leg bristles absent; pedipalpus (figs. 111-112): Bulbus simple, attached basally at the cymbium.

Relationships: According to the long and protruding clypeus, the bristleless legs and the structures of the pedipalpus I regard *Aculeatosoma* as a member of the family Psilodercidae. In *Propterpsiloderces* WUNDERLICH 2015 (preserved in Burmite, too) the simple bulbus is similar to *Aculeatosoma* but it is attached at the end of the cymbium which bears a pair of apical outgrowths and the prosoma bears long dorsal hairs; bristles of the opisthosoma are absent. In *Priscaleclercera* n. gen. exist spiny pedipalpal articles and complicated structures of the bulbus.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Aculeatosoma pyritmutatio **n. gen. n. sp**. (figs. 110-112) photo 74

Etymology: The species name refers to the sternum which is modified by pyritization, from mutatio (lat.) = modification.

Material: Holotype ♂ in Mid Cretaceous Burmese amber, F2899/BU/CJW.

Preservation and syninclusions: The spider is not well and incompletely preserved, deformed and darkened by the natural preservation, the sternum is modified by pyritization, the opisthosoma is ventrally covered with a white emulsion, several leg articles are absent/cut off, not a single leg is complete. – Syninclusions: Few spider's threads, remains of a Diptera, plant hairs and particles of detritus.

Diagnosis: See above. Legs very long, femur I 3.8 times of the body lenght.

Description (♂):
Measurements (in mm): Body length ca. 1.3, prosomal length ca. 0.7, opisthosoma: Length 0.8, width 0.4; femur I ca. 5.0, femur IV ca. 2.5.
Colour (darkened by the preservation) dark brown.
Prosoma (most parts are hidden): Clypeus long and protruding, fangs long and slender. – Legs (photo) slender and very long (especially I), femur I 3.8 times of the body length, most hairs are rubbed off, bristles absent. – Opisthosoma (fig. 110) twice as long as wide, bearing – besides short hairs – long bristles, anterior spinnerets long, colulus well developed, bearing at least two hairs. – Pedipalpus (figs. 111 – 112): Femur quite long and slender, tibia and cymbium with some long bristles, tibia only fairly thick, bearing two long trichobothria, bulbus almost globular, attached basally at the long cymbium, embolus fairly thick, almost straight. The position of the bulbus and the embolus is different in both pedipalpi: It is directed backward in the left pedipalpus but standing out ventrally in the right pedipalpus.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Priscaleclercera **n. gen.** (figs. 113-121), photos 75-76

Etymology: The name refers to the longevity of this genus which is reported from 100 million years old Burmite as well as extant from Indonesia; from priscus (lat.) = old, combined with the name of the related genus *Leclercera* DEELEMAN-REINHOLD 1995.

The gender of the name is feminine.

Type species: *Leclercera ellenbergeri* WUNDERLICH 2012 in Burmite.
Further species: *Leclercera longissipes* WUNDERLICH 2012, *L. spicula* WUNDERLICH

2012 and *L. sexoculata* WUNDERLICH 2015 in Burmite as well as the extant *L. spinata* DEELEMAN-REINHOLD 1991 from Indonesia which all are transferred to *Priscaleclercera* (**n. comb**.). Here I describe additionally *Priscaleclercera brevispinae* **n**. **sp**. and *P. paucispinae* **n. sp**.

Diagnosis: ♂-pedipalpus (figs. 114-116, 118, 121): Femur with ventral spines, cymbium with a retrolateral apophysis or strong bristle (it may function like a paracymbium), bulbus with complicated sclerites.

Further character: Legs very long and slender.

Relationships: The extant genus *Leclercera* DEELEMAN-REINHOLD 1995 is not monophyletic but related to *Priscaleclercera* (extant and extinct). In the type species of *Leclercera khaoyai* DEELEMAN-REINHOLD 1995, a short retrolateral cymbial spine exists, too, but pedipalpal femoral spines are absent, the structures of the bulbus are different, and in *khaoyai* exists an epigynal scape – see DEELEMAN-REINHOLD (1995: fig. 119) – in contrast to *Priscaleclercera spinata* (fig. 114) (**n. comb**.) in which pedipalpal femoral spines exist like in other species of *Priscaleclercera*.

Remark: A spiny ♂-pedipalpus and a retrolateral cymbial spine exist also in most members of the family Leptonetidae in which (e. g.) the position of the eyes and the structures of the bulbus are quite different.

Distribution: Mid Cretaceous amber of Myanmar (Burma) and extant: SE-Asia: Indonesia (*spicula*). *Priscaleclercera* is one of the rare genera in Burmite which survived up to now.

***Priscaleclercera brevispinae* n. gen. n. sp**. (figs. 117-118)

Etymology: The species name refers to the quite short spines of the pedipalpal femur, from brevis (lat.) = short and spinae (lat.) = spines.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3007/BU/CJW.

Preservation and syninclusions: The spider is not well preserved in a clear yellowish piece of amber, deformed (especially the prosoma) and darkened, the opisthosoma is bent right below the prosoma, several leg articles are cut off, e. g. the left leg I through the femur, the right leg I is lost beyond the coxa by autotomy, both legs III and the right leg IV are complete. – Syninclusions: A long and thin spider's thread is preserved mainly below the spider; 1 adult Acari which is only 0.2 mm long, 1 Procoptera, several plant hairs and numerous particles of insects excrement are also preserved.

Diagnosis (♂; ♀ unknown): Legs quite long, femur II ca. 1.6 times longer than the prosoma; pedipalpus (figs. 117-118): Femur with 4 or 5 short ventral spines, embolus bifurcate.

Description (♂):
Measurements (in mm): Body length ca. 1.4; prosomal length ca. 0.5; opisthosoma: Length 0.85, width 0.42; femur II ca. 2.3, leg IV: Femur 1.75, patella 0.2, tibia 1.9, metatarsus 1.6, tarsus 0.7.
Colour median to dark brown.
Prosoma (it is strongly deformed) probably similar to *P. paucispinae* n. sp. – Legs very long, hairs short, bristles absent, femur II ca. 1.6 times the prosomal length, position of the metatarsal trichobothria on III in 0.45, on IV in 0.6. – Opisthosoma twice as long as wide, dorsally bearing longer hairs, anterior spinnerets long. – Pedipalpus: See the diagnosis.

Relationships: In *P. sexaculeata* (WUNDERLICH 2015) the shape of the embolus is similar but the pedipalpal femur bears 6 longer spines, the position of the metatarsal IV trichobothrium is in 0.7 and the shape of the apical part of the embolus is different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Priscaleclercera paucispinae* n. gen. n. sp.** (figs. 119-121) photo 75

Etymology: The species name refers to the low number of pedipalpal femoral spines, from paucus (lat.) = low and spinae (lat.) = spines.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3006/BU/CJW.

Preservation and syninclusions: The spider is partly very well preserved, both anterior legs are lost beyond their coxa by autotomy, several leg articles are cut off, both legs III and the right leg IV are complete, ventral parts of the spider are covered with a white emulsion. – Syninclusions are tiny particles of pebble and plant hairs.

Diagnosis (♂; ♀ unknown): Legs very long, femur II 2 ½ times the prosomal length; pedipalpus (figs. 120-121): Femur with only two ventral spines in the distal quarter, embolus with complicated apophyses.

Description (♂):
Measurements (in mm): Body length 1.6; prosoma: Length without clypeus 0.65, clypeus 0.25, width 0.7; Opisthosoma: Length 1.1, width 0.4; leg II: Femur 2.5, patella 0.2, tibia 2.6, remains of the incomplete metatarsus 2.0, tibia III 1.3, tibia IV 2.15.
Colour light brown, legs not annulated.
Prosoma (fig. 119, photo) wider than long, low, clypeus quite long and protruding, almost smooth, fovea not well developed, 6 larger eyes, field only fairly wide, anterior

median eyes not reduced, in an anterior position, diads of the lateral eyes on fairly low elevations, clypeus very large and strongly protruding, basal cheliceral articles fairly slender, diverging, posterior (?) margin of the fang furrow with 3 teeth, fangs long and slender, mouth parts hidden, sternum spacing the cocae IV by more than their diameter. – Legs (photo) extremely long, order ?I/II/IV/III, patellae quite short, femur II 2 ½ as long as the prosoma, bristles absent, hairs short and indistinct, the position of the long metatarsal trichobothria III-IV is in 0.56 and 0.66, three tarsal claws. – Opisthosoma 2.75 times as long as wide, bearing few longer hairs, most ventral parts are hidden, 3 pairs of spinnerets, the anteriors quite long. – Pedipalpus: See the diagnosis. The cymbium is apically spiny.

Relationships: To my knowledge *paucispinae* is the only congeneric species in which only two femoral pedipalpal spines exist. The bulbus apophyses and the long legs are similar to *P. longissipes* (WUNDERLICH 2012) in which no pedipalpal femoral spines are observable and the bulbus apophyses are different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Priscaleclercera sp. indet. (photo 76)

Material: 1♀ in Mid Cretaceous Burmite, F3008/BU/CJW.

Preservation and syninclusions: The spider is almost completely and quite well preserved (slightly deformed) in a claer yellow piece of amber, the right leg III is lost within the amber at the base of the femur; this may be an older and healed injurance. – Syninclusions are 1 Thysanoptera and remains of insects.

Description (♀):
Measurements (in mm): Body length incl. the clypeus 1.7; prosomal lenght excl. clypeus 0.5; opisthosoma: Length 1.0, height 0.45; leg I: Femur 2.0, patella 0.2, tibia 1.9, metatarsus 1.7, tarsus 0.6, tibia II ca. 1.65, tibia IV 1.55; pedipalpus: Femur ca. 0.35, patella 0.08, tibia 0.2, tarsus 0.28.
Colour light brown, legs not annulated.
Prosoma (photo) wide, 6 eyes, clypeus long and protruding. – Pedipalpus (photo) long and slender, bearing some long bristles. – Legs (photo) long and slender, bristles absent, hairs indistinct, position of the metatarsal I trichobothrium in 0.7. – Opisthosoma 2.2 times longer than wide, bearing few long dorsal hairs, 3 pairs of spinnerets, the anteriors quite long, genital area slightly protruding, not sclerotized.

Relationships: According to the slender opisthosoma *P. paucispinosa* n. sp. may be most related.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Superfamily PHOLCOCHYROCEROIDEA WUNDERLICH 2008

Nominate family: Pholcochyroceridae WUNDERLICH 2008.
Further family: Mongolarachnidae SELDEN et al. 2013.

Diagnosistic characters: Cribellate (cribellum undivided), three-clawed, probably haplogyne (as regarded by me), eigth eyes in a wide field with the lateral eyes widely spaced from each other (figs. 124, 128), chelicerae not fused (fig. 129), leg bristles numerous (absent on the tarsi), frequently thin, male pedipalpal articles (e. g. figs. 122) slender and frequently spiny, bulbus small, bearing complicated sclerites (figs. 123, 125-127, 129; unfortunately the bulbus structures of the nominate subfamily Mongolarachninae are unknown.
Further characters and variability: Clypeus not protruding, basal cheliceral articles long or fairly long, leg II longer than leg IV (*), the legs and especially the articles of the male pedipalpus (fig. 122) may be extremely long, the cymbium may be large and enclosing parts of the bulbus, most distinct in *Pedipalparaneus seldeni* WUNDERLICH 2015 (fig. 123). See also WUNDERLICH (2015: 202-210, figs. 185-197).

(*) In most members of the family Uloboridae leg IV is longer than leg II.

Relationships (see WUNDERLICH (2015: 202): All taxa of the Mongolarachnidae (*Longissipalpus*, *Mongolarachne* and *Pedipalparaneus*) as well as of the Pholcochyroceridae (*Pholcochyrocer, Spinicreber* and *Spinipalpus*) are cribellate in contrast to the Praeterleptonetidae, see WUNDERLICH (2015: 173, 198, 203) and below. Members of these three families possess slender articles of the male pedipalpus in contrast to the Dysderoidea and Pholcoidea. The structures of the bulbus of the Mongolarachnidae (see the figs. 125-127 of *Longissipalpus*, a genus preserved in Burmese amber) are complicated and quite different from the Dysderoidea, the Pholcoidea, the Leptonetidae, and the Praeterleptonetidae (see below) as well.
According to recently discovered fossils in Burmite (see below) the true members of the family Leptonetidae possess only 6 eyes, and are not strongly related to the eight-eyed members of the Praeterleptonetidae (ecribellate), Mongolarachnidae (cribellate) and Pholcochyroceratidae (cribellate). Within the Leptonetoidea (see below) only the genus *Archoleptoneta* GERTSCH 1974 (Leptonetidae: Archoleptonetinae) (part.) and the Palaeoleptonetinae are ecribellate. In my opinion Mongolarachnidae and Pholcochyroceridae may be closely related, and therefore I create the new superfamily Pholcochyroceroidea (**n. rank**) which includes the two families in question.

Family MONGOLARACHNIDAE SELDEN et al. 2013

See WUNDERLICH (2015: 201 ff.)

Mongolarachnidae SELDEN et al. 2013, its type genus is *Mongolarachne* SELDEN et al. 2013, the type species of *Mongolarachne* is *Nephila jurassica* SELDEN et al. 2011.
With some hesitation I previously included Mongolarachnidae in the superfamily Praeterleptonetoidea near the Pholcochyroceridae WUNDERLICH 2008, see WUNDERLICH 2015: 173.
The family is easily recognizable by the extremely long and slender articles of the male pedipalpus (fig. 122). Other diagnistic characters and relationships: See above, the superfamily Pholcochyroceroidea.

Subfamilies and their distribution: Jurassic (Mongolia: Mongolarachninae), Mid Cretaceous (Burmese amber of Myanmar: Longissipalpinae and Pedipalparaneinae: Figs. 122-123).

Subfamily LONGISSIPALPINAE WUNDERLICH 2015

Key to this subfamily: See WUNDERLICH (2015: 2003).

Notes on the Longissipalpinae: (1) The bulbus is not attached at the end of the cymbium as erroneously noted by WUNDERLICH (2015: 203 and 204); (2) the posterior eye row is distinctly recurved (fig. 124) similar to the Pedipalparaneinae.

Longissipalpus WUNDERLICH 2015

Males of this extinct genus in Burmite are recognizable by two long and needle-shaped apophyses of their bulbus (figs. 125-127, photo). The base of the shorter conductor is screw-shaped at least in *L. cochlea*. The true nature of the embolus – it may be enclosed by one of the conductors (C1) – is unsure. The female of these cribellate spiders is still unknown.

***Longissipalpus cochlea* n. sp.** (figs. 124-126) photo 77

Etymology: The species name refers to the distinctly screw-shaped base of the possible embous/conductor 1, from cochlea (lat.) = screw.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2931/BU/CJW.

Preservation and syninclusions: The spider is excellently and almost completely preserved in a yellow piece of amber; cut off are the left patella and the basal part of the left tibia II, parts of the left leg I except the basal part of the femur, the tarsus and the distal part of the metatarsus, the dorsal part of the right patella II and the right leg I except the basal part of the femur. – Syninclusions: 1 tiny Hymenoptera, 1 larger Hemiptera which is ventrally partly cut off, 6 larger bands of insect`s excrement and few plant hairs.

Diagnosis (♂; ♀ unknown): Pedipalpus as in figs. 125-126 and the photos, diameter of femur I ca. 0.32 mm.

Description (♂):
Measurements (in mm): Body length 2.5, prosoma: Length 1.15, width 0.95; opisthosoma: Length 1.5, width 0.85; leg I: Metatarsus at leasr 2.0, tarsus 1.0, femur III ca. 0.8, femur IV ca. 1.1; pedipalpus: Femur 1.8, patella 0.8, tibia 0.8.
Colour: Prosoma and legs light brown, legs not annulated, opisthosoma light grey brown.
Prosoma (fig. 124, photo) 1.2 times longer than wide, hairs short, fovea indistinct, 8 eyes, anterior medians largest, posterior row distinctly recurved, posterior median eyes widely spaced, basal cheliceral articles only fairly large, not protruding or diverging, lateral files absent, fangs and gnathocoxae only fairly large, labium triangular, with a seam to the wide sternum which separates the coxae IV by about their diameter. – Legs (photo) long, order I/II/IV/III, I distinctly the longest, III distinctly the shortest, tarsi distinctly shorter than metatarsi, hairs of medium length, bristles numerous and long, existing on femora to metatarsi; femora: I-II dorsally at least 1 in the basal half, III-IV dorsally 1/1, at least III-IV additionally with a retrodistal one, patellae dorsally 1 thin bristle basally and a stronger distal one (no laterally), tibiae dorsally 1/1, additionally 1 retrodistally as well as 1/1 prolaterally on IV (no ventrally), metatarsi with numerous bristles, 8 and a garland of 4 apically on I. Metatarsus IV straight, length of the calamistrum ca. 2/3 of the length of the article. Trichobothria: Absent on tarsi, position on the metatarsi unknown; tarsi with three large claws, paired claws toothed. – Opisthosoma (photo) 1.35 times longer than wide, hairs short, the large left lung cover is well observable, spinnerets and anal tubercle small, cribellum (like the spinnerets) not well recognizable. – Pedipalpus (figs. 125-126, photo) with long and slender articles, patella as long as the tibia, cymbium fairly large, structures of the bulbus complicated, two apophyses (“conductors”), the shorter one (C1) may enclose the questionable embolus, base of C1 screw-shaped.

Relationships: The diameter of the anterior femur at the end of the basal third is ca. 0.32 in *L. cochlea*, ca. 0.2 in *L. minor* WUNDERLICH 2015, ca. 0.3 in *L. maior* WUNDERLICH 2015 (in *maior* are the structures of the bulbus quite different to *cochlea*) and ca. 0.45 in *L. magnus* WUNDERLICH 2015, the largest known species of the genus; bulbus as in fig. 127. The proportions of the pedipalpal articles of *L. cochlea* are similar in *L. minor* but in *minor* the patella is longer than the tibia.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family PHOLCOCHYROCERIDAE WUNDERLICH 2008 (n. relat.)

Under Pholochyrocerini in WUNDERLICH (2008: 593), Pholcochyroceridae of the Leptonetoidea: The Praeterleptonetoid branch in WUNDERLICH (2012: 190-192) and Pholcochyroceridae of the Praeterleptonetoidea in WUNDERLICH (2015: 72, 197-201)

Pholcochyroceridae was described for the first time under Pholcochyrocerini WUNDERLICH 2008: 593 of the family Praeterleptonetidae WUNDERLICH 2008, and included in the superfamily Dysderoidea s. l. (p. 569). Designed as type genus (by monotypy) was *Pholcochyrocer* WUNDERLICH 2008. In 2012: 192 I elevated the tribe to family rank (Pholcochyroceridae) of the Praeterleptonetoidea, but now I include it in the superfamily Pholcochyroceridea (**n. relat**.). In contrast to the Praeterleptonetidae (see below) the Pholcochyroceridae is cribellate, the eye position is different, a paracymbium is absent and the structures of the bulbus are quite different. – Two newly discovered females (CJW) possess each a patella-tibia autotomy and further characters of *Autonomiana* WUNDERLICH 2015. In contrast to the specimen described in 2015 – in which cribellum and calamistrum are not recognizable – the present females are clearly cribellate. Therefore I transfer *Autonomiana* from the ecribellate family Praeterleptonetidae to the cribellate family Pholcochyroceridae (**n. relat.**).

Remarkably all specimens of this family are preserved in muddy ambers which include tiny brown droplets, so even the holotype of *Spinipalpus vetus* WUNDERLICH 2015 in contrast to the report in the original description.

Pholcochyrocer WUNDERLICH 2008

Three species in Burmite have been described: ?*P. baculum* WUNDERLICH 2012, *P*. *guttulaeque* and *P. pecten* WUNDERLICH 2012; here I describe a fourth species.

Cribellate threads are preserved with the holotype of *Pholcochyrocer pecten* WUNDERLICH 2012 and were now separated from a piece of amber which encluded a male of *P*. sp. indet., in front of the spider, F3034/BU/CJW.

Regarding the diagnosis of the genus – see WUNDERLICH (2012: 193; see also p. 195) I add here:
- a pair of lung covers exists,
- pedipalpal patella longer than the pedipalpal tibia. (In contrast to the probably related genera *Spinicreber* WUNDERLICH 2015 and *Spinipalpus* WUNDERLICH 2015). A rare character in spiders! See *Longissipalpus minor* WUNDERLICH 2015.
- distal femoral spines of the ♂-pedipalpus in Burmese amber spiders evolved – in a different kind/shape – also in the six-eyed genus *Priscaleclercera* n. gen. (Burmite) and *Leclercera* DEELEMAN-REINHOLD 1995 (extant, SE-Asia), see the figs.

***Pholcochyrocer altipecten* n. sp**. (figs. 128 – 132) photo 78

Etymology: The spider's name refers to the elevated/raised femoral outgrowth of the ♂-pedipalpus of the new species which looks similar to a comb in the dorsal aspect, from altus (lat.) = high and pecten (lat.) = comb (and the name of the related species *P. pecten*).

Material: Holotype ♂ and a separated piece of amber in Mid Cretaceous Burmite, F3035/BU/CJW.

Preservation and syninclusions: The spider is fairly well and almost completely preserved in a fairly muddy piece of amber, a thin emulsion covers parts of body, legs and pedipalpi, the dorsal part of the left tibia I is cut off, the mouth parts are hidden. – Syninclusions are tiny dark brown droplets, some are lengthened.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 129 – 132): Femur dorsally-distally with an outgrowth which bears about a dozen spines (a comb-shaped row in the dorsal aspect), tibia with dorsal-apical apophyses; embolus with two long and pointed apophyses.

Description (♂):
Measurements (in mm): Body length 2.8; prosoma: Length 1.3, width 0.95; opisthosoma: Length 1.5, width 1.0; leg I: Femur 1.5, patella 0.55, tibia 1.3, metatarsus 1.3, tarsus 0.7; tibia II 1.0, tibia III 0.5, tibia IV ca. 0.75.
Colour light grey brownish (the light colour is caused by an emulsion), legs annulated.
Prosoma (fig. 128, photo) 1.3 times longer than wide, fovea large/deep, hairs not distinct, 8 eyes of medium size in a wide field, lateral eyes widely spaced from each other, posterior row distinctly recurved, clypeus high, not protruding, basal cheliceral articles long and slender, free and not diverging, mouth parts hidden. – Legs (photo) fairly short, order I/II/IV/III, hairs distinct, bristles numerous and fairly long, existing on femora, tibiae

and metatarsi of all legs, tibia I bears ventrally a pair in the basal half, 1 retroventrally in the distal half, 2 prolaterally, 2 retrolaterally and 1 dorsally subapically, metatarsal trichobothria unknown (hidden or quite short?), metatarsus IV straight and not depressed, calamistrum not recognizable/indistinct. – Opisthosoma (photo) 1.5 times longer than wide, hairs not long, respiratory organd and spinnerets (they are apparently short) hidden by an emulsion. – Pedipalpus (figs. 129 – 132): Articles fairly slender, femur with a dorsal-distal outgrowth which bears about a dozen spines, patella longer than the tibia which bears a long and strong dorsal-distal bristle and apical apophyses, cymbium large/wide, hairy, bristles absent, bulbus (most parts are hidden) fairly protruding, bearing long and complicated sclerites, e. g. a long and strong one which describes a half circle below the patella, embolus (?) with two long and pointed apophyses.

Relationships: In the remaining known congeneric species the femoral spines of the ♂-pedipalpus are not placed on a distinct raised outgrowth, and the embolus with its apophyses is different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Superfamily LEPTONETOIDEA

Extant spiders of this superfamily possess 6 eyes; the Mid Cretaceous subfamily Palaeoleptonetinae ist probably ecribellate, the wide “cribellum” may be a functionless structure and may be called a “very wide colulus”.
The relationships of the family Praeterleptonetidae are quite unsure, see below.

Family LEPTONETIDAE

A single male specimen of the family Leptonetidae in Burmite has been described up to now: the holotype of *Palaeoleptoneta calcar* WUNDERLICH 2012; see WUNDERLICH (2015: 174, figs. 134a-c). It has been regarded as the type of the subfamily Palaeoleptonetinae WUNDERLICH 2012. Here I describe two further congeneric specimens of this subfamily in Burmite, a male of a new species as well as a female. In contrast to the holotype of *P. calcar* demostrate these two spiders a typical family character of the

Leptonetidae, the patella-tibia autotomy (fig. 133) (*). This peculiar character indicate that *Palaeoleptoneta* is really a member of the family Leptonetidae.

(*) In taxa of the Burmese amber fauna I know this kind of autotomy furthermore only in the genus *Autotomiana* WUNDERLICH 2015, a member of the extinct family Pholcochyroceride, earlier Praeterleptonetidae, see below. (Most frequent in spiders is a coxa-trochanter autotomy, e. g. in the Oonopidae).

Palaeoleptoneta crus **n. sp.** (figs. 133–134) photos 79-80

Etymology: The species name refers to the incomplete right leg I which is broken off by autotomy and lost; from crus (lat.) = broken leg.

Material: Holotype ♂ in Mid Cretaceous Burmese amber, F2925/BU/CJW.

Preservation and syninclusions: The spider is strongly deformed, the body is crumbled and injured, it may have been the prey of an arthropod. Several leg articles and a retrolateral part of the left pedipalpus are cut off, the right leg I is broken off between patella and tibia by autotomy and lost. – A small Diptera is preserved near the spider in a different layer, spider's threads are absent. The holotype male of *Loxoderces longicymbium* n. gen. n. sp. (F2918/BU/CJW, family Eopsilodercidae) has been separated from the present piece of amber.

Diagnosis (♂; ♀ unknown): Pedipalpus as in fig. 134, embolus fairly long.

Description (♂):
Measurements (in mm): Body length ca. 1.5, prosomal length ca. 0.75; leg IV: Femur ca. 0.9, tibia ca. 0.9, metatarsus 0.75, tarsus 0.55.
Colour light brown.
Prosoma (photo) with some longer dorsal hairs; 6 strongly deformed eyes in a field similar to *P*. sp. indet. but the field may be longer. Clypeus very long and protruding, mouth parts hidden. – Legs (photo) only fairly long, IV longest, patella-tibia autotomy existing (fig. 133), bristles numerous, apparently quite similar to *P. calcar* WUNDERLICH 2015, position of the trichobothrium on metatarsus II in 0.85, calamistrum absent.– Opisthosoma strongly deformed, a cribellum/colulus are not recognizable. – Pedipalpus (fig. 134) (most parts of the right pedipalpus are hidden, the left one is deformed and partly cut off) with slender articles, a longer cymbial spur and an embolus which is only fairly long and bears a droplet at its tip.

Relationships: In *Palaeoleptoneta calcar* WUNDERLICH 2015 the position of the eyes is probably different, the position of the metatarsal trichobothrium is in 0.95 and the embolus is much longer.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Palaeoleptoneta sp. indet. (fig. 135), photo 81

Material: 1♀ and a separated piece of amber in Mid Cretaceous Burmite, F2926/BU/CJW.

Preservation and syninclusions: The spider is strongly decomposed and incompletely preserved, the peltidium is lost beyond the eye field, several leg articles are also lost, the eyes and the spinnerets are fairly well preserved. – Numerous particles of detritus including arthropod legs are preserved in the separated piece of amber.

Description (♀):
Measurements (in mm): Body length ca. 1.6, prosoma: Length 0.65, width 0.55; tibiae: I 0.7, II 0.68, III 0.6, IV 0.77.
Colour light grey, 6 eyes in a field about as long as wide (fig. 135), legs only fairly long, bristles numerous, position of the trichobothrium on metatarsus III in 0.85, the right leg III is broken off between patella and tibia by autotomy and lost, calamistrum absent, the area of the questionable colulus is destroyed. Pedipalpus with long and slender articles, spiny, tarsal claw existing.

Relationships: The eye field of *P. crus* is probably a bit longer.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family TELEMIDAE

This ancient, mainly tropical and widely distributed family is **diagnosed** by the absence of lungs, a huge colulus between widely spaced anterior spinnerets (fig. 138) and the anterior – partly dorsal – sclerotization of the male opisthosoma (not observable or even absent in the single present fossil). – Further family characters are the only six eyes in a wide field of a "segestriid" position (fig. 135) (similar e. g. in the genus *Orchestina* of the Oonopidae), numerous small cheliceral teeth or denticles mainly on the anterior margin of the fang furrow (fig. 136), very long and slender fangs (fig. 136), few and thin leg bristles with only a single dorsal tibial bristle near the middle (fig. 137), a very long and slender cymbium which may bear a paracymbium (figs. 139-140), a large and simple bulbus. The body length of these tiny spiders is less than 2 mm, only 0.85 mm in the male described below. Unique in spiders is the existence of spermatophores (a questionable spermatophore: see fig. 141).

Ecology: At least spiders of some taxa are dwellers of capture webs in litter or in caves (first report of a telemid capture web by DEELEMAN-REINHOLD (2001)); in cave spiders the eyes may be reduced or even absent. Apparently the spiders need a high humidity.

Relationships: In the strongly related Leptonetidae lungs exist, opisthosomal sclerotizations are absent, the position of the eyes is different (its field is much narrower, a pair of eyes exists in front or behind the remaining four eyes), the colulus is distinctly smaller and not widely spacing the anterior spinnerets, frequently the articles of the male pedipalpus are more or less spiny, additional sclerites of the bulbus exist.

Distribution: Extant: North America, SW-Europe (in caves), Africa and SE-Asia. – Fossil: Paleogene: Eocene, in Baltic amber: ?*Telema moritzi* WUNDERLICH 2004, and Mesozoic (first report of a named species): Mid Cretaceous Burmite, see below.

?***Telemofila crassifemoralis* n. sp**. (figs. 135a-141)

Etymology: The species is named after its thickened anterior femora, from crassus (lat.) = thick.

Material: Holotype ♂ in Mid Cretaceous amber from N-Myanmar, F2804/BU/CJW.

Preservation and syninclusions: The spider is well and completely preserved fairly deep in a clear yellow-orange piece of amber, the opisthosoma is slightly shrunked. At the end of the embolus remains of a questionable spermatophore (or an artefact?) are preserved (fig. 141). – The syninclusions are numerous and quite remarkable: A member of the Schizomida (the arachnid order Uropygi) has been separated from the original piece of amber, F2803/BU/CJW; a male of the Araneae, family Tetrablemmidae, ?*Eoscaphiella* indet., has also been separated from this piece of amber, F2824/BU/CJW. Furthermore numerous Acari of various families are preserved, several Coleoptera and Collembola, some larvae of insects including two Auchenorrhyncha; Diptera and other arthropoda as well as plant hairs. One of the Coleoptera is in contact with one of two spider's threads which bear no sticky droplets.

Diagnosis (♂; ♀ unknown): Femur I thickened (fig. 137).
Further characters: Eyes well developed (figs. 135a-136), opisthosomal sclerotizations probably absent, legs (fig. 137) slender and only fairly long, bearing only few bristles, basal cheliceral articles distinctlly diverging (fig. 136); pedipalpus (figs. 139-141): Tibia apparently only as long as the patella, cymbium: bristles absent, prolateral paracymbium existing and well developed, embolus fairly stout, no additional apophyses of the bulbus.

Description (♂):
Measurements (in mm): Body length 0.85; prosoma: Length ca. 0.4, width ca. 0.4; leg I: Femur 0.5, patella 0.1, tibia 0.48, metatarsus 0.37, tarsus 0.29.
Colour light brown.

Prosoma (figs. 135-136) as wide as long, apparently not strongly convex, 6 eyes in a "segestriid" position, fairly large, clypeus long, basal cheliceral articles long and distinctly diverging, anterior margin of the fang furrow bearing several denticles, fangs long and slender (almost needle-shaped), bent only basally, labium and gnathocoxae not well observable, sternum wide, coxae IV widely spaced. – Legs (fig. 137) only fairly long, slender, I longest, III shortest, few thin bristles, femur I 1 retrodistally, patellae 1 dorsally-distally, tibiae 1 dorsally near the middle, hairs short and indistinct, position of the metatarsal trichobothria unknown. – Opisthosoma (fig. 138) oval, fairly deformed, anterior sclerotizations not observable or absent, hairs short and indistinct, colulus huge, anterior spinnerets widely spaced. – Pedipalpus (fig. 139-141): Articles slender and not spiny, tibia apparently not longer than the patella, cymbium very long and slender, position of the prolateral paracymbium in the basal half, well developed, slender, bulbus oval, embolus (spermatophor) fairly stout, additional sclerites absent.

Relationships: The huge colulus, the position of the eyes, the chaetotaxy and the structures of the bulbus are as in other taxa of the family Telemidae, see WANG et al. (2012). In the type species of *Telema* – *tenella* SIMON 1882 – the basal cheliceral articles are not distinctly diverging and a paracymbium is absent. The species of *Telema* need a revision and the genus has to split up. Numerous species have been described from SE-Asia under *Telema*. A prolateral paracymbium exists in some of these species, the basal cheliceral articles are not to strongly divided. In the extant monotypic genus *Telemofila* WUNDERLICH 1995 of Indonesia a paracymbium exists like in *crassifemoralis* which may well be congeneric (it may be the best diagnostic character of *Telemofila*) but the basal cheliceral articles are not strongly diverging, and the bulbus bears a hook near the embolus in *Telemofila samosirensis*.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family PRAETERLEPTONETIDAE WUNDERLICH 2008

The relationships of this family are still unsure, and probably it is not monophyletic; see WUNDERLICH (2015: 175-176). JASON DUNLOP and his team (Naturkundemuseum Berlin) as well as KARIN SCHÜTT (Berlin) failed to find out the existence (or absence) of a spinneret triplett in some of the small or tiny members of the family Praeterleptonetidae (CJW) by using micro-CT.

The spiny pedipalpal articles and the large tegulum – but not the eight eyes – may indicate relationships to the family Leptonetidae but – mainly because of the complicated structures of its bulbus and the large cymbium (as well as paracymbium-like outgrowths) in certain taxa – in my opinion Praeterleptonetidae may be a member of the superfamily Araneoidea, and probably related to the family Theridiosomatidae which, e. g., possesses usually longer leg bristles. Sternal pits of the sternal glands – they are a diagnostic character of the Theridiosomatidae – are surely absent in Praeterleptonetidae studied by me, a dorsal-distal tibial bristle exists usually in contrast to the family Theridiosomatidae.

In the Praeterleptonetidae the clypeus may be short or long, the leg bristles may be long or of medium length. In the probably not monophyletic Zarqareneini (Jordanian and Burmese amber) metatarsal bristles are absent in contrast to the Praeterleptonetini (Burmese amber).

Several taxa of this family in Burmite (CJW) are still waitung for descriptions (in prep.). The genus *Autotomiana* WUNDERLICH 2015 and the tribe Autotomianini are transferred here from the Praeterleptonetidae to the Pholcochyroceride, see above.

Superfamily ARCHAEOIDEA (= PALPIMANOIDEA)

Remarks on the ca. 10 families of the superfamily Archaeoidea (= Palpimanoidea):
(Pararchaeidae is probably a member of the superfamily Araneoidea)

The old haplogyne Archaeoidea is the only spider superfamily in which the number of the 4 – already known! – extinct families is almost as high as the number of the ca. 5 extant families. Archaeoidea was the most diverse spider superfamily in the mesozoic "Era of the Haplogynae" besides the Pholcoidea, see WUNDERLICH (2015: 47, fig. C). Certain families survived as relicts by few taxa, in contrast to the Archaeidae and the Palpimanidae which are diverse and widely distributed today.

During the Cretaceous it was probably the only superfamily of spiders whose – even most? – species were specialized on spiders as prey, probably all species as sit-and-wait-predators. The spezialized cheliceral shape and "peg teeth" e. g. of the Archaeidae indicate an araneophagy which is known from extant and Eocene spiders – see WUNDERLICH (2015: 15-20) –; direct Cretaceous proofs of this kind of prey are still missing; but see ?*Eomysmauchenius longissipes* WUNDERLICH 2015: Two juv. spiders are preserved near the holotype of this species. Eocene Spatiatoridae is known to feed on spiders, see below.

Strictly extinct archaeoid families are Lagonomegopidae ESKOV & WUNDERLICH 1995, Micropalpimanidae WUNDERLICH 2008, Spatiatoridae PETRUNKEVITCH 1942 and Vetiatoridae WUNDERLICH 2015 (**n. stat.**; as questionable subfamily of the Spatiatoridae). These families are known from Mid Cretaceous Burmite; only the Spatiatoridae is additionally reported from the Cenozoic (Eocene Baltic amber). According to our recent knowledge most of these families are monotypical, but the Lagonomegopidae was quite diverse all over the Northern Hemisphere during the Mesozoic, it was one of the most diverse spider families in this period. – The dubious Jurassic genus *Seppo* SELDEN & DUNLOP (2014) („it most likely <!> belongs to the Palpimanoidea,...“) may be the member of another superfamily, I do not exclude the Araneoidea, see WUNDERLICH (2015: 61, 211). „Peg teeth“ exist in the Araneoidea in the Mimetidae (as a family character), in few members of the Theridiidae and in the Pararchaeidae (as a family character) – if this family is really a member of the superfamily Araneoidea.

Extant families are Archaeidae and the closely related (or even to be included, see below) Mecysmaucheniidae (today both are restricted to the Southern Hemisphere. Numerous fossil taxa are also known, all from the Northern Hemisphere (!), but no sure proof of the Mecysmaucheniidae (see below: *Burmesarchaea*), Huttoniidae (few genera; the family is most probably not known from fossils, see below), Palpimanidae: diverse, also known in Micocene Dominican amber as well as in Cretaceous stone of Brasil (Crato) of the Southern Hemisphere (!), see SELDEN et al. (2016), as well as in Burmite (a single specimen, see below), and Stenochilidae (the genera *Colopea* and *Stenochilus*). Pararchaeidae are probably Araneoidea (see below).

The extant families – except the Palpimanidae and certain Stenochilidae from South Asia – are restricted today to the Southern Hemisphere. Today all extinct families are known from the Northern Hemisphere whose fossils are much better studied than the fossils of the Southern Hemisphere.

The most diverse families of this superfamily are: Archaeidae (Jurassic to extant), Lagonomegopidae (Cretaceous) and Palpimanidae (extant, Miocene Dominican amber and Cretaceous: Brasil and Myanmar (Burma).

Apomorphic basic characters of the superfamily Archaeoidea (besides the existence of a diastema and a foramen):

- Existence of cheliceral “peg teeth” (fig. 174) (lost in most Stenochiidae). Archaeoidea is the only superfamily of the Haplogynae in which peg teeth exist,
- strong basal cheliceral articles,
- existence of retrolateral cheliceral stridulatory files as well as stridulatory teeth of the pedipalpal femur (fig. 174) (several losts),
- existence of – or tendency to – a granulate or even strongly corniculate prosomal cuticula (figs. 142, 156),
- a strongly raised cephalic part (fig. 142) (reversed/low in Huttoniidae, Stenochilidae, Vetiatoridae and certain Archaeidae like *Planarchaea* (fig. 173),
- dense prolateral hairs in the distal articles of the legs I-II (reduced mainly in certain Stenochilidae and certain Archaeidae like *Eoarchaea* and the *Planarchaea*),
- probably cymbium covering large parts of the bulbus and bearing strong and long retrolateral hairs (fig. 151), on the female tarsus, too (several reversals),
- loss of the cribellum,
- loss of the capture web,

- loss of leg bristles (but see below: Huttoniidae, Lagonomegopidae and Micropalpimanidae: few bristles existing mainly on legs III-IV (reversals),
- tendencies (a) to the loss of median and/or posterior spinnerets at least in one sex e. g. in the Archaeidae s. l.: Mecysmaucheniinae, Stenochilidae and certain Palpimanidae (not in the Lagogomegopidae), (b) to the existence of large anterior median eyes (fig. 173), and (c) probably to the existence of metatarsal III-IV preening comb-like bristles (fig. 148),
- feeding on spiders (reversal e. g. in some Mecysmaucheniidae),
- nocturnal life style as sit-and-wait predators: E. g. in the Palpimanidae and certain long-legged members of the families Archaeidae like *Planarchaea* and probably of the Lagonomegopidae.

<u>Selected special family characters</u>:

- Archaeidae: Frequently very long and strongly diverging basal cheliceral articles and tendency to the evolution of a +/- long "neck" (figs. 146, 158) (reversal in the *Planarchaea*, fig. 180), dwarfism in certain species (body length 1.4 mm),
- Huttoniidae (*): existence of few bristles on leg III and/or IV (a "reversal" like in the Micropalpimanidae), loss of the fovea (like in several other archaeoid families), low (not raised) prosoma (a low prosoma exists also in the Vetiatoridae and Archaeidae: Planarchaeinae),
- Lagonomegopidae: existence of several tarsal and metatarsal trichobothria as well as probably few femoral bristles in certain taxa ("reversals"); huge (anterior median!) eyes in a lateral (!) position, see below,
- Mecysmaucheniidae: Usually only three pairs of eyes,
- Micropalpimanidae: existence of few bristles on the leg III and/or IV (a "reversal") (see Huttoniidae), dwarfism in certain species (body length 1.5 mm),
- Palpimanidae: loss of spatulate hairs on leg II; loss of the posterior (and median?) spinnerets as well as stout anterior spinnerets, enlarged to powerfull leg I; in certain taxa: loss of the unpaired tarsal claw (**) and of a pair of median eyes,
- Stenochilidae: loss of all cheliceral teeth including peg teeth as well as of posterior and median spinnerets at least in the female sex (like in other archaeiod families); most often (!) existence of two foveae: one behind the other (**),
- Vetiatoridae: low prosoma (see Huttoniidae), complete loss of "peg teeth" in certain taxa and of spatulate hairs on legs I-II; no opisthosomal scuta. According to my suggestion vagile hunters and not spider eaters.

(*) Regarding the spinnerets of the Huttoniidae JOCQUE & DIPPENAAR-SCHOEMAN (2007: 142) noted erroneously "median and posterior pairs reduced to groups of spigots" but their fig. 48d shows the posterior spinnerets well developed in a female.

(**) The loss of the unpaired tarsal claw was – erroneously – reported also for the Stenochilidae by JOCQUE & DIPPENAAR-SCHOEMAN (2007: 234).

Family ARCHAEIDAE

Members of this ancient tropical family were quite frequent and diverse in the Burmese amber forest; six genera of two subfamilies have been previously described (but see below!), see WUNDERLICH (2008) and the list: WUNDERLICH (2015: 73).
In this paper I describe two new species of *Planarchaea* WUNDERLICH 2015 of the Planarchaeini **n. trib**. as well as twelve new species of the most diverse genus *Burmesarchaea* WUNDERLICH 2008 (= *Lacunarchaea*). *Lacunauchenius pilosus* WUNDERLICH 2015 is transferred to *Planarchaea* (**n. comb**.). *Lacunauchenius speciosus* WUNDERLICH 2008 is transferred to *Burmesarchaea* WUNDERLICH 2008 (**n. comb**.). Few questionable new combinations are proposed (see *Eomysmauchenius* and *Planarchaea*).

Synonymy: According to the characters of huge well preserved material of new fossil species in Burmite (see below) I regard the subfamily Lacunaucheniinae WUNDERLICH 2008 – type genus: *Lacunauchenius* WUNDERLICH 2008 in Burmite, type species by monotypy in Burmite: *Lacunauchenius speciosus* WUNDERLICH 2008 – as junior synonym of the subfamily Archaeinae KOCH & BERENDT 1854 (**n. syn**.) – the only subfamily of the Archaeidae besides the doubtful Jurarchaeinae and if Mecysmaucheniidae is excluded (*). Its extinct type genus by monotypy in Eocene Baltic amber is *Archaea* KOCH & BERENDT 1854 (type species by monotypy: *Archaea paradoxa* KOCH & BERENDT 1854). – *Filiauchenius* WUNDERLICH 2008 is probably a synonym of *Planarchaea* WUNDERLICH 2008, *Lacunauchenius longissipes* WUNDERLICH 2015 is probably a member of *Eomysmauchenius* WUNDERLICH 2008 (**quest. n. syn**.).

(*) See WUNDERLICH (2015: e. g. p. 219).

Main **basic diagnostic characters** (and **variability**) of the Archaeinae and most remaining Archaeidae: the existence of a sclerotized ring around the spinnerets (fig. 156; it may be retracted or indistinct or even absent in fossils) (reversal in *Planarchaea* and *Eomysmauchenius*), a granulate or pustulate prosomal cuticula (figs. 146, 152) (reversals in few genera like *Planarchaea*), a scutate and furrowed opisthosoma (fig. 152, photos) (reversed e. g. in *Planarchaea*, photo, and frequently dorsal femoral humps in the basal half (it may be hidden in fossil specimens or even absent like in *Planarchaea* and *Eomysmauchenius*. An anterior-basal bristle of the basal cheliceral articles may exist (in extant and Eocene taxa) or may be absent (in the Cretaceous taxa; in *Eomysmauchenius septentionalis* it probably evolved convergently).

Selected further characters: 8 eyes, the anterior medians largest, cephalic part usually raised but low and elongated anteriorly in *Planarchaea* (figs. 177, 180).

Notes on the phylogeny, the diversity and the biogeography of the family Archaeidae s. l.:

According to its peculiar characters (see below: "Main diagnostic characters and variability") Planarchaeini may be the member of a subfamily of its own. This extinct taxon – in my opinion a "crown taxa" of that area – is only known in Mid Cretaceous Burmite of the Northern Hemisphere. We should keep in our mind that rich Cretaceous amber deposits of the Southern Hemisphere are unknown. Mecysmaucheniidae is strongly related to the Archaeidae, probably a relict taxon, only known from extant taxa, and only from the Southern Hemisphere. In contrast to the related archaeid subfamilies a sure proof of a fossil species of the Mecysmaucheniidae is unknown to me; see the genus *Archaemecys* below. This fact may indicate that Mecysmaucheniidae is a "crown taxon" of the Archaeidae which is characterized mainly by reductions like the number of the eyes and of the spinnerets besides few apomorphic characters like an exposed tarsal organ which bears a larger bristle. The most diverse and most remarkable subfamily Archaeinae is reported from the Jurassic (if correctly determined) up to now: Fossil Archaeinae are known from the Northern Hemisphere – see WUNDERLICH (2015: 73, 222-226) and the present paper –, but extant taxa only from the Southern Hemisphere. The 4 extinct genera in Burmese amber are quite different from the 4 extinct genera in Baltic amber – see WUNDERLICH (2004: 768-791) – and from the 4 extant genera.

The peculiar shape of the large cephalic modifications in BOTH sexes (without a distinct sexual dimorphism) of fossils: *Burmesarcheaa*, see the figs. A-N, a striking intrageneric radiation – as well as of extant Archaeidae – shows a remarkable diversity within different genera of Eocene and Cretaceous Archaeinae, see FORSTER & PLATNICK (1984), WUNDERLICH (2004, 2015) and figs. A-N, as well as within extant Archaeinae (a) of Australia (*Austrarchaea*), (b) of South Africa and Madagascar (e. g. *Eriauchenius*) and within extant Mecysmaucheniidae, see FORSTER & PLATNICK (1984) as well as fossil and extant Tetrablemmidae IN THE MALE SEX, see e. g. the figs. 46, 63). Which factors caused the peculiar diversity of this fascinating "game of evolvolution"? Surely the basicly fairly raised cephalic part of the Archaeoidea (e. g. of the Palpimanidae) was a disposition of such outgrowths. A reversed low/flat prosoma exists e. g. in the Huttoniidae and Archaeidae: *Planarchaea* (photos). In contrast to the family Archaeidae evolved SEXUAL-DIMORPHIC cephalic outgrowths convergently – only in the male sex – within numerous extant taxa of the Linyphiidae: Erigoninae as well as several taxa of the Theridiidae. It is obvious that all such "luxurian" members of these families are small to tiny spiders.

Revised **key** to the extant and fossil subfamilies of the families Archaeidae and Mecysmaucheniidae and the peculiar genera *Eomysmauchenius* and *Planarchaea*

The genera *Eomysmauchenius* and *Planarchaea* (no. 1) are regarded by me as members of the Archaeidae: Archaeinae.
See the outdated key published by WUNDERLICH (2015: 220).
Reversals of certain characters occur, and some characters are difficult to recognize in fossil specimens.

1 Prosoma slender, low and plane (cephalic part narrow and protruding anteriorly but not raising) (figs. 177, 180, photos 95-96), not granulate or pustulate, 8 eyes, opisthosoma soft, legs (photo) and ♀-pedipalpus (fig. 180) extremely long, femoral humps and pedipalpal-cheliceral stridulatory organ absent. Extinct: Burmese amber. Planarchaeini n. trib.: *Planarchaea* WUNDERLICH 2015. . . . . ARCHAEIDAE (part.)

- Similar but prosoma (strongly) raised (figs. 171 – 173). Extinct: Burmese amber. *Eomysmauchenius* WUNDERLICH 2008 . . . . ARCHAEIDAE (part.)

- Cephalic part most often strongly raised (fig. 142, photos), granulate, pustulate or smooth, 6 or 8 eyes, opisthosoma soft or armoured (Archaeinae), length of legs and ♀-pedipalpus variable, femoral humps existing or absent, pedipalpal-cheliceral stridulatory organ usually existing (fig. 154). Extinct or extant. 2

2(1) 8 eyes (fig. 143), opisthosoma usually strongly sclerotized and frequently with a dorsal scutum (photos) and with a sclerotized ring around the spinnerets (*), the median spinnerets may be small but they are well developed, prosoma with – frequently distinct and rowed – pustules (fig. 156) or not (*), femora usually with a dorsal hump, ♀-pedipalpus short (fig. 146) or long (fig. 158). Fossil (Northern Hemisphere, e. g. in Burmese and Baltic ambers) and extant (only in the Southern Hemisphere). (= Lacunaucheniinae WUNDERLICH 2015). . . . . ARCHAEIDAE (most parts) (**)

- Usually 6 eyes (8 eyes only in *Aotaora* of the Mecysmaucheniinae and in *Zearchaea* of the Zearchaeinae), opisthosoma not sclerotized, sclerotized ring around spinnerets absent, median and posterior spinnerets strongly reduced or even absent, prosoma most often smooth, femoral humps absent, ♀-pedipalpus long (Zearchaeinae) or very long, tarsal organ exposed, bearing a distinct bristle. Extant: South America and New Zealand. MECYSMAUCHENIIDAE 3

3(2) Only 2-3 "peg teeth" in a single row on the cheliceral promargin, ♀-pedipalpus less slender. . . . . ZEARCHAEINAE

- Two rows of several to numerous "peg teeth" on the cheliceral promargin, ♀-pedipalpus very long and slender. . . . . MECYSMAUCHENIINAE

(*) In the genus *Eoarchaea* FORSTER & PLATNICK 1984 (♂ unknown) of the Eocene Baltic amber forest prosomal pustules are absent and the opisthosoma is not distinctly sclerotized, but a weakly sclerotized ring exists around the spinnerets.

(**) Regarding the shape of the prosoma the family Pararchaeidae of the Australian Region (extant) is similar, but a pronounced median cheliceral keel exists in the distal half; distinct prosomal "pustules", retrolateral cheliceral stridulatory files and femoral humps are absent; the opisthosoma is less sclerotized, a sclerotized ring around the spinnerets is absent; see RIX (2006). According to SCHÜTT (2000) the family – e. g. based on the existence of a paracymbium – should be placed in the superfamily Araneoidea but in the Araneoidea a median cheliceral keel is absent, leg bristles exist usulally and cheliceral "peg teeth" are extremely rare, existing mainly in the family Mimetidae (in which an "araneoid triplett" of the spinnerets is absent) and rarely in the family Theridiidae.

Burmesarchaea WUNDERLICH 2008

The intensive study of fossil spiders like *Burmesarchaea* provides a fascinating – even though superficial – insight into the creative and almost artistic operation of evolution; see the figs. A-N.

Burmesarchaea is one of the most diverse spider genera in Burmite which shows a strong radiation as well as striking modifications of the prosoma, see the figs. A – N. *Burmesarchaea* evolved more than a dozen species of three groups. – The prosoma is raised in quite different ways. The function of these modifications is unknown; they may indicate the existence of mimesis in this genus, probably the similarity to parts of plants, especially in *caudata,* in which an additional opisthosomal modification exists, fig. 146. A similar diversity of prosomal elevations (see the figs.) evolved convergently in extant spiders of the Archaeinae in *Eriauchenius* O. PICKARD-CAMBRIDGE on Madagascar, and in *Austrarchaea* FORSTER & PLATNICK in Australia. Such elevations/modifications are quite rare in haplogyne spiders but exist in several entelegyne spiders, e. g. in numerous members of the Linyphiidae: Erigoninae (superfamily Araneoidea) – they are also small to tiny –, but they exist only in the male sex in this subfamily.

Type species: *Afrarchaea grimaldii* PENNEY 2003 in Burmite.
Further species in Burmite See the list below.

Revised diagnosis: Prosoma quite slender/narrow (fig. 149, photos), ♂-pedipalpus (figs. 145,): Bulbus usually complicated (figs. 145, 155, 162-164, 166, but see fig. 151), bearing several translucent apophyses including leaf-shaped ones. The embolus may be one of the strongly sclerotized and almost straight bulbus apophyses.
Note: The structures of the bulbus of these species are quite different from the structures of the generotype *grimaldii* which were published by PENNEY (2003), see WUNDERLICH (2015: Fig. 200). I assume that the bulbus structures of the holotype of the generotype (*grimaldii*) are modified by the preservation and/or drawn in an unusual aspect.

Further characters and variability: Shape of the prosoma extremely variable (figs. A-N) prosomal pustules (even in rows) more or less distinct, hairs dense or sparce (figs., photos), cheliceral “peg teeth” exist in two rows, anterior cheliceral bristle absent, pedipalpal-cheliceral stridulatory organ usually existing (figs. 153-154), legs and female pedipalpus fairly short or long (photos). Flattened hairs of the legs I-II are apparently absent like in *Planarchaea* and *Eomysmauchenius*. Apparently exist two rows of cheliceral “peg teeth” in all species. Body length 1.4-3 mm.

Synonymy: See above (Archaeidae: Synonymy) and below (*Eomysmauchenius*: The unusual *speciosus*).

Relationships (see WUNDERLICH (2015: 224) and the key above): In contrast to *Afrarchaea* and other extant genera of the Archaeidae an anterior cheliceral bristle is absent in *Burmesarchaea* like most often in the usually larger species of *Planarchaea* WUNDERLICH 2008, see below. – The genus *Archaemecys* SAUPE & SELDEN 2009, type species by monotypy: *A. arcantiensis* SAUPE & SELDEN 2009, preserved in Lower Cretaceous amber from France, has been transferred from the Mecysmaucheniidae to the Archaeidae: Archaeinae by WUNDERLICH (2015: 223-224). The dorsal part of the prosoma of the holotype is only partly preserved and I do not want to exclude that this genus may be related or even a younger synonym of *Burmarchaea*.

Distribution: Mid Cretaceous Burmite and probably Lower Cretaceous of France (*Archaemecys*, see above).

Determination:

Most species are known from the male sex but the male is unknown in *caudata, crassicaput, gibbosa, longicollum* and sp. indet. (F2627).
Profile of the prosoma: See the figs. A-N; opisthosoma: See the photos.

1 Opisthosoma tail-shaped elongated beyond the spinnerets: *caudata* n. sp., figs. 146, K

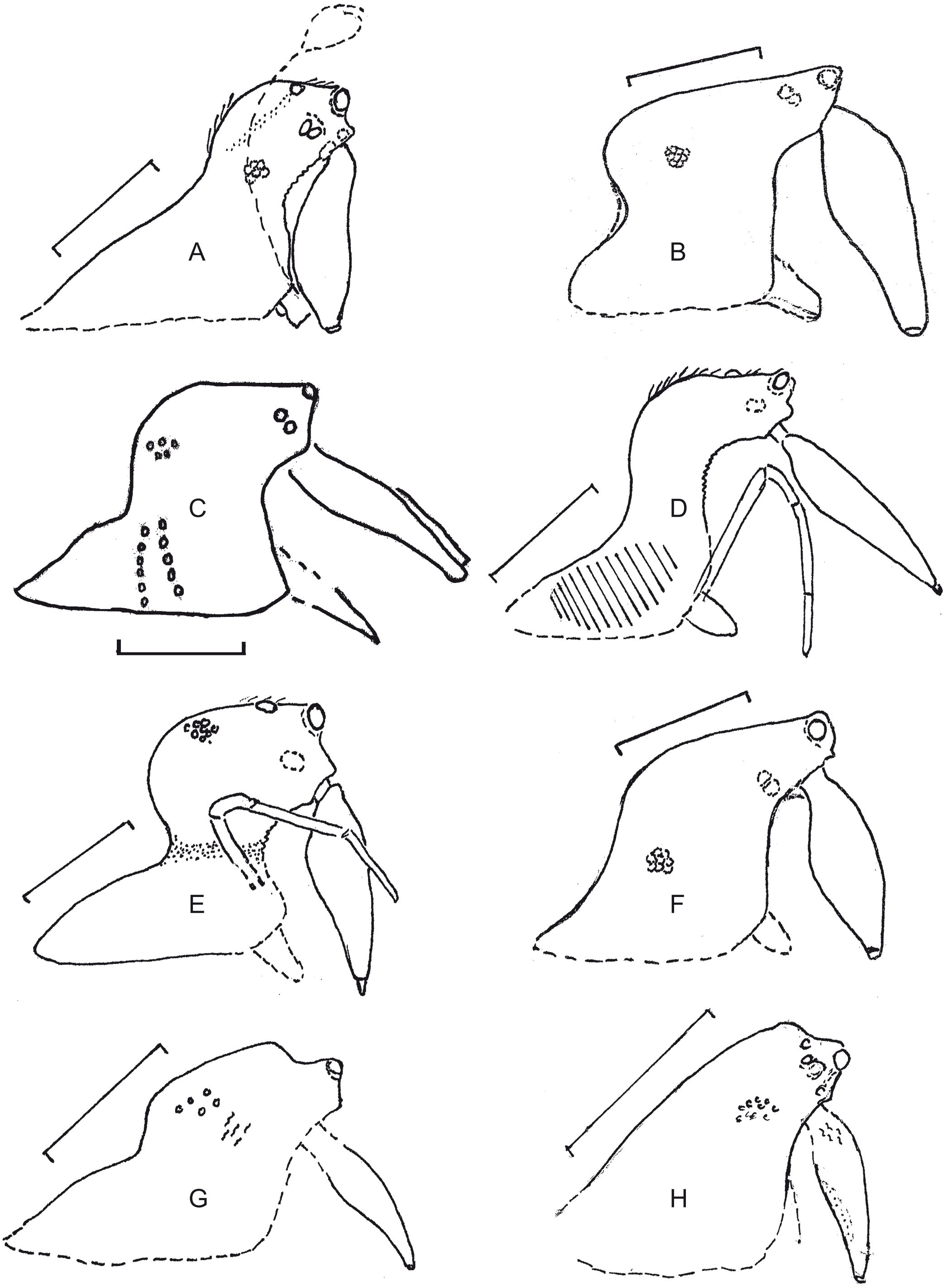
- Opisthosoma not or not strongly elongated beyond the spinnerets, figs. 149, 156 . . 2

2(1) Pedipalpal articles long and slender, figs. 142, 147, 151, 158
alissa n. sp., figs. 142-145, A
crassichelae n. sp., figs. 149-151, M
crassicaput n. sp., figs. 147-148, E
longicollum n. sp., figs. 158, D
quadrata n. sp., figs. 168-169, N
speciosa (WUNDERLICH 2008), figs. 170, B

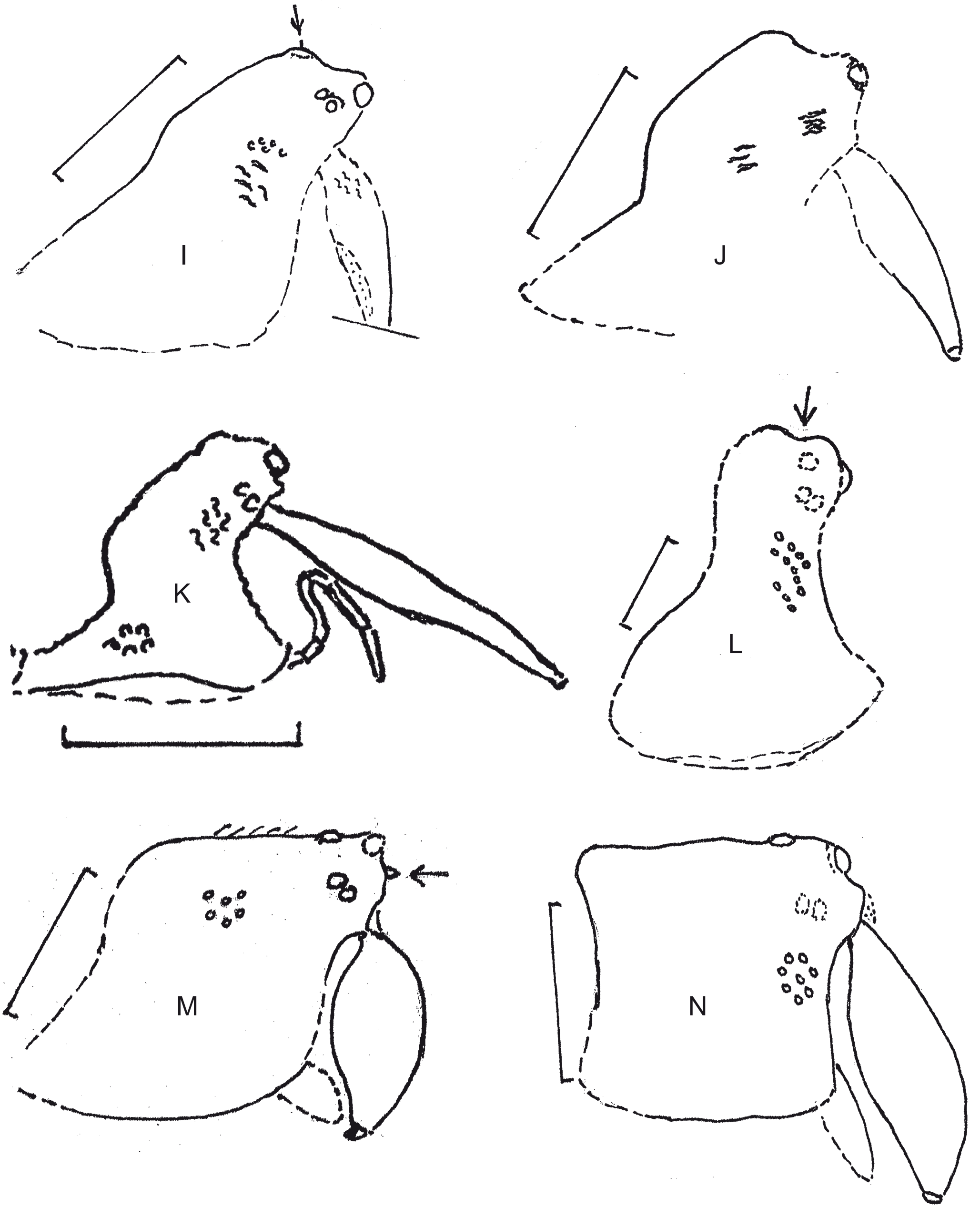
- Pedipalpal articles short or even stout, figs. 146, 155, 162, 166. 3

3(2) Shape of the opisthosoma oval, distinctly longer than heigh:
grimaldii (PENNEY 2003) (under *Afrarchaea*), prosomal pustules quite distinct, figs. 156-157, C
propinqua n. sp., figs. 159-160, F

- Opisthosoma about as long as high:
gibber n. sp., figs. 152, G
gibberoides n. sp., figs. 153-155, I
gibbosa n. sp., fig. H
pseudogibber n. sp., figs. 161-164, J
pustulata n. sp., pustules quite distinct, figs. 165-167 L



Figs. A – N: **Radiation** in species of the genus *Burmesarchaea*, profiles of the prosoma. – A: *alissa* n. sp., ♂; B: *speciosa* (WUNDERLICH 2008), ♂; C: *grimaldii* (PENNEY 2003), ♂; D: *longicollum* n. sp., ♀; E: *crassicaput* n. sp., ♀; F: *propinqua* n. sp., ♂; G: *gibber* n. sp., ♂; H: *gibbosa* n. sp., ♀;



I: *gibberoides* n. sp., ♂; J: *pseudogibber* n. sp., ♂; K: *caudata* n. sp., ♀; L: *pustulata* n. sp., ♂; M: *crassichelae* n. sp., ♂; N: *quadrata* n. sp., ♂. – Scale bars (in mm): 0.2 in fig. L, 1.0 in fig. K, 0.5 in the remaining figs.

DESCRIPTIONS of the species (in alphabetic order):

Burmesarchaea alissa **n. sp.** (figs. A, 142-145) photo 82

Derivatio nominis: It is a pleasure for me to name this species after the wife of PATRICK MÜLLER; PM who discovered the holotype of this species within the huge collection af a dealer.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2947/BU/CJW.

Preservation and syninclusions: The spider is excellently and almost completely preserved in a mainly clear yellowish piece of amber; only the right leg I is cut off through the tibia and the chelicerae are fairly deformed in an unusual posterior position. – Syninclusions: Bubbles are preserved on the left side of the spider; further tiny bubbles, two tiny Diptera: Nematocera and particles of detritus are also preserved.

Diagnosis (♂; ♀ unknown): Cephalic part strongly raised (figs. 142, A), not overhanging posteriorly; pedipalpus (figs. 144-145) with long articles, cymbium only fairly long, questionable embolus in an apical position of the bulbus.

Description (♂):
Measurements (in mm): Body length 2.2; prosoma: Length 1.3, height 1.0 width ca. 0.8; opisthosoma: Length 0.8, height 0.6; leg I: Femur 1.85, patella 0.2, tibia ca. 1.7, metatarsus 1.2, tarsus ca. 0.5; tibia III 0.7.
Colour: Prosoma and legs dark brown, opisthosoma light grey.
Prosoma (figs. 142-143, photo 82): Cephalic part strongly raised, not overhanging posteriorly, covered with “pustules”, fovea absent, 8 eyes, anterior medians largest, basal cheliceral articles quite large, stridulatory files apparently absent, “peg teeth” long, fangs fairly long. – Legs (photo 82) long and slender, order I/II/IV/III, I longest, III distinctly the shortest, femoral humps and bristles absent, hairs indistinct. – Opisthosoma (photo 82) oval, 1.33 times longer than wide, soft, hairs and spinnerets short. – Pedipalpus (figs. 144-145): Articles long and slender, cymbium and bulbus only fairly long, bulbus retrolaterally with a pointed apophysis, prolaterally with a blunt apophysis, questionable embolus in a distal position, directed anteriorly.

Relationships: In *B. longicollis* n. sp. the cephalic part is more slender; in *crassicaput* the thoracic part is larger and overhanging posteriorly.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea caudata* n. sp.** (figs. 146, K) photo 83

2015 *Burmearchaea grimaldii*: WUNDERLICH (2015: 226, 499: Photo 118, and photo in the middle left of the cover of the book).

Etymology: The species name refers to the tail-shaped elongated opisthosoma, from cauda (lat.) = tail.

Material: Holotype ♀ in Mid Cretaceous Burmite, F2709/BU/CJW.

Preservation and syninclusions: The spider is completely and very well preserved in a clear piece of amber, a bubble is preserved on the region of the eyes; a fissure of the amber exists in contact to the right side of the spider. – Syninclusion: The part of a deformed male spider, *Priscaleclercera* sp. indet. (Psilodercidae) in front of the holotype, 1 tiny Acari, 2 Collembola, remains of insects, insect's excrement and some stellate plant hairs.

Diagnosis (♀; ♂ unknown): Prosoma (figs. 146, K, photo 83) as high as long, opisthosoma (fig. 146) 1.9 times as long as wide, tail-shaped elongated beyond the spinnerets, legs fairly long and slender.

Description (♀):
Measurements (in mm): Body length 2.8; prosoma: Length 1.0, height 1.0; opisthosoma: Length 1.9, hight 1.0, width ca. 0.6; leg I: Femur 1.55, patella 0.4, tibia 1.6, metatarsus ca. 0.5, tarsus ca. 0.4, tibia III 1.3.
Colour medium to dark brown, legs not annulated.
Prosoma (fig. 146 K, photo) as high as long, "pustules" partly in rows, hairy (the hairs are partly rubbed off), basal cheliceral arrticles long and slender, "peg teeth" numerous and quite long. – Pedipalpus (fig. 146) slender and only fairly long. – Legs (photo) slender and fairly long, I distinctly the longest, III distinctly the shortest; bristleless, femur IV distinctly bulging near its base. – Opisthosoma (fig. 146, photo) 1.9 times longer than wide, furrowed, hairy, distinctly elongated beyond the short spinnerets; the right lung cover is well observable.

Relationships: The opisthosoma of *B. caudata* is more elongated beyond the spinnerets than in all other described congeneric species. The shape of the prosoma is similar but not identical with the prosoma of *B. pseudogibber* n. sp. (fig. J).

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea crassicaput* n. sp.** (figs. E, 147-148) photo 84

Etymology:The species name refers to its thick cephalic part (“head”), from crassus (lat.) = thick and caput (lat.) = head.

Material: Holotype ♀ in Mid Cretaceous Burmite, F2949/BU/CJW.

Preservation and syninclusions: The spider is completely and excellently preserved in a fairly muddy piece of amber; the opisthosoma is distorted almost 90° to the left, most legs have been moved below the spider, see the photo. The body is not depressed laterally, in contrast to most other Archaeidae; the reason may be that the spider has been captured by a single flow of the resin only, see above. – Syninclusions: A fissure within the amber is preserved left to the spider. Some small and numerous tiny particles of detritus are also preserved.

Diagnosis (♀; ♂ unknown): Cephalic part larger than the thoracic part (fig. E, photo), not depressed laterally.

Description (♀):
Measurements (in mm): Body length 2.1; prosoma: Length 1.0, width 0.6, height 1.1; opisthosoma: Length 1.1, width and height ca. 1.0; leg I: Femur ca. 1.7, patella 0.2, tibia 1.8, metatarsus 1.3, tarsus 0.55; tibia II 1.4, tibia III 0.7, tibia IV 0.8; basal cheliceral article 0.8, pedipalpal tarsus 0.5.
Colour mainly grey brown, legs light grey, not annulated.
Prosoma (fig. 147, photo) higher than long, relatively wide, cephalic part larger than the thoracic part, overhanging posteriorly, covered with numerous distinct “pustules”, fovea absent, 8 eyes, anterior medians distinctly largest, basal cheliceral articles large, anterior “peg teeth” long, most probably exists a posterior row of shorter teeth. – Pedipalpus (fig. 147) long and slender. – Legs (fig. 148, photo) long and slender, order I/II/IV/III, tibia IV relatively short, tarsi short, bristles absent, hairs short, metatarsus III (fig. 148) apically with almost comb-shaped bristle-shaped hairs. – Opisthosoma (photo) globular (probably egg-bearing), soft, hairs short, genital area distinctly protruding, apparently bearing a transverse slit; 3 pairs of short spinnerets, the medians quite short.

Relationships: The shape of the prosoma is similar to *B. speciosa* in which the cephalic part is longer and less overhanging posteriorly. The shape of the opisthosoma is fairly similar to *B. alissa* but in *alissa* the cephalic part is more narrow and shorter, not overhanging posteriorly.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea crassichelae* n. sp**. (figs. M, 149-151) photo 85

Etymology: The species name refers to the thick basal articles of the chelicerae, from crassus (lat.) = thick.

Material: Holotype ♂ in Mid Cretaceous amber from Myanmar (Burma), F3068/BU/CJW.

Preservation and syninclusions: The spider is excellently and completely preserved in a yellowish piece of amber. Remarkably the spider is enclosed in a single large flow of the fossil resin (photo) (left of the spider exists a larger number of flows which build most parts of the piece of amber). Therefore the spider is well preserved, and only the posterior part of the prosoma is fairly deformed. – Syninclusions are half of a small – apparently haplogyne – spider which possesses leg bristles, a tiny mite, remains of insects and plants as well as numerous tiny ?gas bubbles.

Diagnosis (♂; ♀ unknown): Prosoma (figs. 149-150) high, clypeus bearing a pair of small humps, basal cheliceral articles huge, opisthosoma (fig. 149, photo) apparently not scutate but leathery, pedipalpus: fig 151 (certain sclerites may be hidden).

Description (♂):
Measurements (in mm): Body length 2.0; prosoma: Length 1.0, width 0.5; opisthosoma: Length 1.1, width 0.75, height 0.65; leg I: Femur 0.7, patella 0.18, tibia 0.45, metatarsus 0.5, tarsus 0.4, tibia II 0.45, tibia III 0.27, tibia IV 0.4.
Colour: Prosoma and legs dark brown, legs not annulated, opisthosoma light grey brown.
Prosoma (figs. 149-150, M, photo) twice as long as wide, not overhanging posteriorly, high, cuticula strongly rugose, 8 eyes, clypeus bearing a pair of small humps, basal cheliceral articles huge, lateral stridulatory files existing, labium wider than long, free, gnathocoxae distinctly longer than wide, sternum strongly rugose, protruding. – Legs (photo) fairly short, bristleless, hairs indistinct, position of the metatarsal trichobothrium in the basal half. – Opisthosoma (fig. 149, photo) oval, covered with short hairs, apparently not scutate but leathery. – Pedipalpus (fig. 151): Articles including the cymbium long and slender, tibia bearing at least two dorsal trichobothria in the basal half, bulbus protruding, tegular apophyses not observable, embolus fairly long and fairly bent.

Relationships: Similar huge basal cheliceral articles exist also in *B. alissa* n. sp. and in *B. quadrata* n. sp.; in both species the shape of the prosoma is different, in *alissa* the embolus is straight. In *B. speciosa* (WUNDERLICH 2008) (= *Lacunauchenius s.*) exists also a pair of small clypel humps, but the prosoma is overhanging posteriorly and the basal cheliceral articles are more slender.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea gibber* n. sp.** (figs. 152, G) photo 86

Etymology: The species name refers to the dorsal cephalic “hump”, from gibber (lat.) = hump.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2980/BU/CJW.

Preservation and syninclusions: The spider is completely and fairly well preserved in a yellowish piece of amber, emulsions, tiny particles of detritus and tiny bubbles cover parts of body and legs. – Syninclusions are parts of two larger insect’s legs preserved directly left and below the spider. Two threads of a larger web of a spider, two questionable insect’s eggs, plant hairs and particles of detritus are also preserved.

Diagnosis (♂; ♀ unknown): Prosoma as in figs 152, G and the photo. (The pedipalpus is badly preserved).

Description (♂):
Measurements (in mm): Body length 1.9; prosoma: Length 0.8, height 0.7; leg I: Femur 1.15 (diameter up to 0.15), patella 0.35, tibia 1.1, metatarus 0.5, tarsus 0.35; tibia IV 0.65.
Colour medium grey brown, legs not annulated.
Prosoma (figs. 152, G, photo) slightly longer than high, bearing a dorsal “hump”, granulate and distinctly hairy, most eyes hidden, basal cheliceral articles long and slender. – Legs fairly long and slender, similar to *gibboides* but metatarsi short. – Opisthosoma similar to *gibboides*. – Pedipalpus not well preserved, deformed and partly hidden.

Relationships: See *B. gibberosus*, *gibbosa* and *pseudogibber* in which the prosomal shape is different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea gibberoides* n. sp.** (figs. I, 153-155) photos 87-88

Etymology: The name refers to the cephalic hump, from gibber (lat.) = hump and –oides (gr.) = similar; see the related *B. gibber* n. sp.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2979/BU/CJW.

Preservation and syninclusions: The spider is excellently and completely preserved in a clear yellow piece of amber. – Syninclusions: Few spider’s threads are preserved in front and above the spider; 1 Diptera, 1 Psocoptera and air bubbles are also preserved.

Diagnosis (♂; ♀ unknown): Prosoma as in figs. I, 153. the cephalic hump bears a pair of short bristles.

Description (♂):
Measurements (in mm): Body length 1.9; prosoma: Length 0.9, width probably only ca. 0.2 (it is laterally depressed by the preservation), height 0.8; opisthosoma: Length 1.05, height 0.85; leg I: Femur 1.2 (diameter up to 0.1), patella 0.35, tibia 1.05, metatarsus 0.45, tarsus 0.3, tibia II 0.8, tibia III 0.45, tibia IV 0.6.
Colour: Prosoma and legs medium grey, legs not annulated, opisthosoma light grey.
Prosoma (figs. 153, I): The cephalic hump bears a pair of short bristles and is covered with dense hairs; 8 eyes, anterior medians largest, basal cheliceral articles long and slender, fangs long, "peg teeth" long, their position irregular in the basal part. – Legs (photo) fairly long, slender, order I/II/IV/III, femur I ca. 12 times longer than high, bristleless, hairs short and indistinct, dorsal femoral humps existing but indistinct, position of the right metatarsal I trichobothrium in ca. 0.9, three small tarsal claws. – Opisthosoma almost as high as long, narrow (probably compressed laterally by the preservation), distinctly furrowed, hairy and pustulate, posteriorly vertically sloping, bearing a large sclerotized ring surrounding the short spinnerets. – Pedipalpus (figs. 154-155): Femur slender and distinctly bent, probasally bearing probably a stridulatory tooth, patella short, tibia long, bearing a retrolateral spine, cymbium long, bulbus almost globular, bearing two slender sclerites (the almost straight one may be the embolus), and probably three large and leaf-shaped apophyses.

Relationships: See *B. gibber, B. pseudogibber* and *B. gibbosa*; according to the shape of the prosoma *gibbosa* is most related but it is distinctly smaller and a "step" on the prosoma is absent.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea gibbosa* n. sp** (fig. H), photo 89

Etymology: The species name refers to the dorsal hump of the cephalic part, from gibbus/gibbosus (lat.) = humped.

Material: Holotype ♀ in Mid Cretaceous Burmite, F2989/BU/CJW.

Preservation and syninclusions: The spider is completely and well preserved, a fissure exists dorsally on the body. – Syninclusions: Tiny Acari, 1 Diptera: Nematocera, insects excrement and plant hairs.

Diagnosis (♀; ♂ unknown): Prosoma (fig. H): Profile oblique, only slightly convex, without a dorsal "step". Body length only 1.4 mm.

Description (♀):
Measurements (in mm): Body length 1.4; prosoma: Length 0.6, height 0.45; opisthosoma: Length 0.6, height 0.6, width (apparently depressed) 0.2; leg I: Femur ca. 0.7, tibia ca. 0.45, tibia IV 0.35; pedipalpus: Femur 0.12, remaining articles 0.2.
Colour: Prosoma and legs medium to light brown, legs not annulated, opisthosoma light yellow grey.
Prosoma (fig. H) higher than long, profile oblique and only slightly convex, without a "step", distinctly granulate, dorsal cephalic spines absent or hidden; bearing few hairs and 8 eyes which are partly hidden. Basal cheliceral articles large, lateral files probably existing, "peg teeth" quite long. – Pedipalpus small, see above. – Legs fairly long and slender, similar to *gibberoides*, I longest, III shortest. – Opisthosoma furrowed, similar to *gibberoides* but as high as long.

Relationships: According to the shape of the prosoma *gibberoides* may be most related.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Burmesarchaea grimaldii (PENNEY 2003) (figs. C, 156-157)

Material: During the last two years I got much more and better preserved spiders of *Burmesarchaea* than previously. In 2015 I regarded several spiders as conspecific or probably conspecific with *B. grimaldii* but probably none of this material is really conspecific.

- The female 2709/BU/CJW is now regarded as a new species, *B. caudata*.
- The male F2519/BU/CJW has the opisthosoma stronger elevated than *grimaldii*.
- The female of *Lacunauchenius* sp. indet., F2627/BU/CJW sensu WUNDERLICH (2015: 231) possesses a very long (deformed) prosoma and may be an undescribed member of *Burmesarchaea*.

Revised diagnosis (see WUNDERLICH (2015: 224)): Shape of the prosoma as in figs. C, 156.157 cephalic part raised distinctly convex, pustules well developed and partly arranged in rows, opisthosoma distinctly longer than wide, spinnerets surrounded by a large sclerotized ring, their position at the end of the opisthosoma; I am quite unsure about the shape and the position of the embolus in the sense of PENNEY (2003).

Relationships: In *B. caudata* (figs. K, 146) the opisthosoma is still longer, the position of the spinnerets is more anteriorly and the shape of the prosoma is different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea longicollum* n. sp.** (figs. D, 158) photo 90

Etymology: The species name refers to the long prosomal “neck”, from collum (lat.) = neck.

Material: Holotype ♀ in Mid Cretaceous Burmite, F2950/BU/CJW.

Preservation and syninclusions: The spider is fairly well preserved, depressed between ca. 3 narrow layers of the fossil resin which probably has been rolled and contains ca. 50 layers within 11 mm. The right half of the prosoma is lost (cut off within the amber), most leg articles are preserved, the right femur IV is lost. – Syninclusions: The large and spiny leg of a spider, 1 Coleoptera, 1 Diptera, 1 Psocoptera and plant hairs.

Diagnosis (♀; ♂; unknown): Cephalic part (figs. D, 158 photo) very long, slender and bent in a half circle; basal cheliceral articles slender.

Description (♂):
Measurements (in mm): Body length 2.2, prosoma: Length 1.0, width unknown (depressed), height ca. 1.0; leg I: Femur 1.6, patella 0.2, tibia 1.4, metatarsus 1.15, tarsus 0.5; tibia II ca. 1.0, tibia III ca. 0.6, tibia IV ca. 0.7; basal cheliceral article 0.75; pedipalpal tarsus 0.5.
Colour: Prosoma and legs medium to dark brown, legs not annulated, opisthosoma grey.
Prosoma (fig. D, photo): Cephalic part see the diagnosis, pustules not distinct, hairs of medium length, 8 eyes, the anterior medians largest, basal cheliceral articles long and slender, spread anteriorly in an unnatural way probably caused by the preservation, lateral files probably absent, “peg teeth” fairly long, fangs long. – Pedipalpus (figs. D, 158, photo) long and slender. – Legs (photo) bristleless and long, comb-like bristles of metatarsus III absent. – Opisthosoma (it is incompletely preserved) soft, hairs of medium length, 3 pairs of spinnerets, the medians well developed, small.

Relationships: The cephalic part is longer and more slender than in other known congeneric species, see figs. A-N.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea propinqua* n. sp.** (figs. F, 159-160) photo 91

Etymology: The species name refers to the similarity of several species according to the shape of the prosoma (see figs. F – H), from propinquus (lat.) = near, related.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2948/BU/CJW.

Preservation and syninclusions: The spider is completely and well preserved in a small clear and yellow piece of amber, prosoma with chelicerae are fairly deformed/ depressed. – Syninclusions are a spider's thread and some plant hairs.

Diagnosis (♂; ♀ unknown): Legs quite short, femur I only 0.9 mm long, shorter than the prosoma, prosoma as in fig. F and 159, pedipalpus as in fig. 160, with the questionable embolus directed ventrally.

Description (♂):
Measurements (in mm): Body length 1.8; prosoma: Length 0.95, width ca. 0.4, height 0.9; leg I: Femur 0.9, patella 0.17, tibia 0.5, tibia II 0.45, tibia IV ca. 0.45.
Colour: Prosoma and legs dark brown, legs slightly annulated, opisthosoma light grey brown.
Prosoma (figs. F and 159, photo) almost as high as long, narrow, fovea absent, cephalic part raised and not overhanging posteriorly, granulate, 8 eyes, anterior medians largest, basal cheliceral articles long, bearing long "peg teeth", lateral files absent, fangs long. – Legs (photo) relatively short, order I/II/IV/III, femur I shorter than the prosoma, bristles and dorsal femoral humps absent, hairs indistinct. – Opisthosoma (photo) oval, soft, spinnerets short. – Pedipalpus (fig. 160): Articles long and slender, cymbium only fairly long, the questionable embolus stands strongly out ventrally.

Relationships: The legs of *propinquus* are shorter than in the related species; prosoma: Compare figs. F–H.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea pseudogibber* n. sp.** (figs. J, 161-164)

Burmesarchaea grimaldii, -- WUNDERLICH (2015: 225).

Etymology: The name refers to the shape of the prosoma which is similar to *B. gibber* n. sp., from pseud- (gr.) = not true, similar.

Material: 2♂ in Mid Cretaceous Burmite, holotype F2529/BU/CJW, paratype coll. PATRICK MÜLLER.

Preservation and syninclusions: The holotype is very well and completely preserved in a larger clear yellow-orange piece of amber, a bubble is preserved on the ventral side of the spider. – Syninclusions: Several Diptera, a tiny beetle, insect's excrement, parts of a leaf, plant hairs and detritus. – The paratype is fairly well and completely preserved, its opisthosoma is depressed laterally, fissures and bubbles hide parts of the spider. – Particles of detritus are also preserved.

Diagnosis (♂; ♀ unknown): Cephalic part (figs. J and 161) strongly raised, with a dorsal depression, opithosoma (photo) not much longer than high, spinnerets in a more anterior position, pedipalpus as in figs 162-164.

Description (♂):
Measurements (holotype in mm): Body length 2.0, prosoma: Length ca. 0.9, height ca. 0.8; opisthosoma: Length 1.2, height 1.0; leg I: Femur ca. 0.9, patella 0.3, tibia ca. 0.9, tibia IV ca. 0.6. – Body length of the paratype only 1.1.
Colour medium grey, legs indistinctly annulated.
Prosoma (figs. J and 161) almost as high as long, cephalic part strongly raised, with a dorsal depression, pustules indistinct or hidden by quite dense hairs, sternum slender, coxae IV close together. – Legs slender and only fairly long, I longest, III shortest, the right femur IV bears a dorsal-basal hump. – Opisthosoma not much longer than high, laterally depressed, distinctly furrowed and quite hairy, a large scutum covers the epigaster (holotype), a large sclerotized ring surrounds the short spinnerets. – Pedipalpus (figs. 162-164) Tibia (holotype) with a short retrodistal spine, cymbium long, bulbus almost globular, leaf-shaped apophysis large.

Relationships: The shape of the prosoma is rather similar but different in *B. gibber* n. sp. and *B. gibberiodes* n. sp. In both species the shape of the opisthosoma is different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea pustulata* n. sp.** (figs. L, 165-167) photo 92

Etymology: The species name refers to the numerous “pustules” of the prosoma, from lat. pustula.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2943/BU/CJW.

Preservation and syninclusions: The spider is well and almost completely preserved in a clear yellow piece of amber; the left patellae I, II and IV are cut off, some fissures restrict the view on parts of the spider, e. g. on the eye field. – The antenna of an insect is preserved in the same piece of amber.

Diagnosis (♂; ♀ unknown): Prosoma (figs. L, 165) high, possessing a “neck” and a depression behind/above the eye field (fig. L, photo), opisthosoma with adpressed bristle-shaped hairs, pedipalpus (figs. 166-167) small, cymbium short, not covering the relatively small bulbus, bearing a strong retrolateral bristle, bulbus prodistally with the pointed and bent questionable embolus, a longer and sclerotized apophysis as well as a flattened scinny apophysis.

Description (♂):
Measurements (in mm): Body length 1.5, prosoma: Length 0.6, width 0.5, height 0.7; opisthosoma: Length 1.1, width 0.6, heigth 0.9; leg I: Femur 0.9, patella 0.27, tibia 0.85, tibia II 0.7, tibia III 0.4, tibia IV 0.55, basal cheliceral article ca. 0.6 long.
Colour medium grey.

Prosoma (figs. L, 165 , photo) 1.2 times higher than long, protruding anteriorly; bearing a transverse dorsal inclination behind/above the field of the eyes, with numerous "pustules" which partly build rows, 8 eyes, anterior medians largest, laterals close together, basal cheliceral articles long, anterior basal bristles absent, "peg teeth" long, lateral stridulatory files unknown (not recognized by me), gnathocoxae fairly long, sternum slender and bearing "pustules". – Legs (photo) only fairly long, slender, I longest, III distinctly shortest, tarsi distinctly shorter than metatarsi, dorsal femoral humps indistinct, bristles absent, metatarsal trichobothria not studied. – Opisthosoma (photo) narrow and high, posterior shape vertically, strongly armoured and furrowed, bearing bristle-shaped hairs which are adpressed to the cuticula, ring around the spinnerets existing, spinnerets hidden. – Pedipalpus (figs. 166-167) (see above) with relatively small articles.

Relationships (see the paragraph "Determination"): *Burmesarchaea grimaldii* (PENNEY 2003) is larger, the body length of the male is 1.8-2.0 mm.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Burmesarchaea quadrata* n. sp**. (figs. N, 168-169) photo 93

Etymology: The species name refers to the square profile of the prosoma, from quadratum (lat.) = square.

Material: Holotype ♂ in Mir Cretaceous Burmite, F2013/BU/CJW.

Preservation and syninclusions: The spider is well and completely preserved, a large bubble exists on the opisthosoma, a larger bubble at the ventral opisthosomal margin, bubbles and emulsions cover most parts of the left bulbus. – Syninclusions: A tiny movable gas bubble is preserved in the middle of a larger bubble within the opisthosoma; few tiny stellate plant hairs are also preserved.

Diagnosis (♂; ♀ unknown): Prosoma (figs. M and 168) very high, prosomal profile almost quadratic, shape of the posterior margin vertically. Pedipalpus (fig. 169) (most parts are hidden) with a hook-shaped retrolateral apophysis of the bulbus.

Description (♂):
Measurements (in mm): Body length 1.7; prosoma: Length 0.8, width ca. 0.55, height 0.8; opisthosoma: Length ca. 0.8, height 0.6; leg I: Femur 0.6, metatarsus 0.35, tarsus 0.37, tibia II 0.45, tibia IV ca. 0.43, femur IV 0.55.
Colour: Prosoma dark brown, legs medium brown, not annulated, opisthosoma light grey.
Prosoma (figs. N and 168 photo) as high as long, hairs short, cuticula slightly granulate, 8 eyes in the usual position of the genus, anterior medians largest, basal cheliceral articles powerful, most "peg teeth" hidden, lateral files absent, fangs fairly stout. – Legs (photo) only fairly long, hairs short, bristles and dorsal femoral humps absent, position

of the metatarsal III trichobothrium in 0.5, 3 small tarsal claws. – Opisthosoma (photo) oval, not scutate, hairs short, spinnerets not retracted, well developed. – Pedipalpus (fig. 169, photo): Articles including the cymbium long, bulbus (most parts are hidden) with a hook-shaped retrolateral apophysis.

Relationships: In *B. propinqua* n. sp. (fig. F) the shape of the cephalic part is posteriorly oblique but not vertical.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Burmesarchaea speciosa (WUNDERLICH 2008) (**n. comb**.) (figs B, 170)
(= *Lacunauchenius speciosus* WUNDERLICH 2008: 607-608, figs. 49-56, photos 86-87).

After the study of a larger number of species and according to the quite similar structures of the body and the male pedipalpus I regard now *Lacunauchenius speciosus* WUNDERLICH 2008 as a member of *Burmesarchaea* (**n. comb**.) and the Lacunaucheniinae as a junior synonym of the Archaeinae (**n. syn**.).

The shape of the prosoma (figs. B, 170) is similar to *B. crassicaput* (figs. E, 147), see above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Eomysmauchenius WUNDERLICH 2008

Type species (by monotypy): *Eomysmauchenius septentrionalis* WUNDERLICH 2008 (♀) (fig. 171).

Further species: *Eomysmauchenius dubius* n. sp. (♂) and probably *Lacunauchenius longissipes* WUNDERLICH 2015 (♂) (**quest. n. comb**.) (fig. 172).

The **relationships** of this dubious genus are unsure. The **diagnostic characters** (the male is not surely known; see *E. dubius* n. sp.) are a mix of characters of the genera *Burmesarchaea* (the raised prosoma only) and of *Planarchaea* (extremely long legs and pedipalpi, a soft body, absence of a sclerotized ring around the spinnerets and a pedipalpal-cheliceral stridulatory organ at least in the type species). Pedipalpus of the probably congeneric male *longissipes*: See WUNDERLICH (2015: Fig. 215). The prosoma/sternum is granulate in this pecies.

Note: In *Burmesarchaea speciosa* (**n. comb**.) – the type species of *Lacunauchenius* WUNDERLICH 2008 – a sclerotized ring around the spinnerets is tiny or probably even absent but cheliceral stridulatory files exist apparently.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Eomysmauchenius dubius* n. sp**. (figs. 173-176) photo 94

Etymology: The species name refers to the unsure relationship of the new species, from dubius (lat.) = doubtful.

Material: Holotypus in Mid Cretaceous Burmite, F2993/BU/CJW.

Preservation and syninclusions: The spider is well preserved in a yellow piece of amber, the body is slightly deformed by the preservation, several leg articles are loose or cut off, the right legs II and IV as well as the left legs III and IV are completely preserved. – Syninclusions: 1 Diptera, few plant hairs and few spiders's threads are also preserved; two larger and two tiny bubbles exist directly on the left side of the spider.

Diagnosis (♂; ♀ unknown): Prosoma (figs. 173-174) slender, fairly elevated, basal cheliceral articles very long, slender and diverging distally, pedipalpus (figs. 175-176) with a very long, slender and pointed tegular apophysis, the strongly bent questionable embolus has a distal position.

Description (♂):
Measurements (in mm): Body length 2.2, prosoma: Length 1.1, width ca. 0.6, height 0.5; opisthosoma: Length 1.2, width ca. 0.6, height 0.55; basal cheliceral articles 0.65 long; leg I: Femur > 4.0, leg II: Femur 3.0, patella 0.3, tibia 2.7, metatarsus 1.9, tarsus 1.0, femur III 1.9, femur IV 2.9.
Colour: Prosoma and legs dark brown, opisthosoma medium brown.
Prosoma (figs. 173-174, photo) ca. 1.8 times longer than wide, cuticula finelly granulate, rows absent, 8 eyes, the anterior medians quite large, the laterals contiguous, basal cheliceral articles very long and divergings distally, bearing long "peg teeth" probably in a single row, lateral stridulatory files existing, mouth parts not studied. – Legs (photo) very long and slender, I distinctly longest, III distinctly shortest, femur I probably 4 times longer than the prosoma, bristleless, hairs short, metatarsal trichobothria unknown, 3 tiny tarsal claws, metatarsal III-IV preening comb absent. – Opisthosoma (photo) twice as long as wide, soft, hairs short, furrows and sclerotized ring around the 3 pairs of spinnerets absent. – Pedipalpus (figs. 175-176) with long and slender articles, the femora bear some hair-bearing prolateral hooks, cymbium slender and hairy, the deformed bulbus bears a very long, slender and pointed tegular apophysis which originates retrolaterally, the questionable embolus has a distal position and is bent retrolaterally.

Relationships: According to the extremely long legs and pedipalpal articles, the shape of the prosoma and the absence of a sclerotized ring around the spinnerets I regard *dubius* as a member of *Eomysmauchenius*; the structures of the bulbus are unique.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

PLANARCHAEINI n. trib.

Etymology: The name refers to the name of the type genus *Planarchaea* WUNDERLICH 2015 as well as to the name of the family Archaeidae.

Type genus (by monotypy): *Planarchaea* WUNDERLICH 2015.

Diagnosis: Prosoma low and plane, cephalic part narrow and protruding anteriorly but not raising) (figs. 177, 180, photos 95-96), not granulate or pustulate, opisthosoma soft, not or weakly furrowed (photo), sclerotized ring around the spinnerets absent, legs (photo) and ♀-pedipalpus (figs. 177, 180) very long (pedipalpus ca. 1.3 times the prosomal length), femoral humps and pedipalpal-cheliceral stridulatory organ absent. ♂–pedipalpus (*P. pilosa*): See WUNDERLICH (2015: Fig. 212).

Further characters: 8 eyes, two rows of cheliceral “peg teeth” (fig. 181), anterior cheliceral bristle, metatarsal preening combs and leg bristles absent but long and bristle-shaped leg hairs exist in the type species *P. kopp* (fig. 179), fangs long and slender, body length 1.65 (the type speies *kopp* up to 3.4 mm.

Questionable synonym: *Filiauchenius* WUNDERLICH 2008, see below: *paucidentata*.

Relationships: See *Eomysmauchenius* WUNDERLICH 2008 above. In *Burmesarchaea* WUNDERLICH 2008 and most other Archaeidae the prosoma is quite different, the cephalic part is – usually strongly – raised, the cuticula is granulate or even pustulate, lateral cheliceral stridulatory files exist frequently, the opisthosoma is usually furrowed and bears usually a sclerotized ring around the spinnerets, legs and female pedipalpus are usually distinctly shorter. – In the extant New Zealand family Huttoniidae exists a low prosomal part like in the *Planarchaea* but leg bristles and spatulate hairs of the tarsi and metatarsi I-II exist, the fangs are stout and only a single row of “peg teeth” exists.

Ecology and behaviour: The extremely long legs of these spiders which built no capture web may indicate their sit-and-wait life style similar to other Archaeidae.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Planarchaea WUNDERLICH 2015

Type species (by monotypy): *Planarchaea kopp* WUNDERLICH 2015. The gender of the name is feminine.

Synonymy: A **questionable synonym** is *Filiauchenius* WUNDERLICH 2008; see below, ?*Planarchaea paucidentata*.

Diagnosis, Relationships and distribution: See above.

Planarchaea kopp WUNDERLICH 2015: 232-233, figs. 218-219, photos 129-130 (figs. 177-179)

The only known specimen, the female holotype, is probably adult. The body length of the holotype is 1.65 mm; it is the smallest member of the genus. Prosoma and pedipalpus: See figs.177-178. The legs bear several long and bristle-shaped hairs (fig. 179).

***Planarchaea oblonga* n. sp**. photos 95-96

Etymology: The species name refers to the quite long opisthosoma, from lat. oblongus.

Material: Holotype ♀ in Mid Cretaceous Burmite, F2939/BU/CJW.

Preservation and syninclusions The spider is completely and excellently preserved in the center of a yellow-orange piece of amber which consists of numerous layers and which I did not cut. The piece looks like Baltic amber but the smell during dry grinding it not “sweet” like Baltic amber and the few plant hairs are not of the Baltic type of stellate hairs. – Four Diptera (two are close to the right femur I, and were apparently not a prey of the spider) and few insect`s larvae are also preserved in the piece of amber.

Diagnosis (♀; ♂ unknown): Body length 3.4 mm, body and legs very long and slender (photo), prosoma ca. three times longer than wide.

Description (♀):
Measurements (in mm): Body length 3.4, prosoma: Length 1.8, width posteriorly ca. 0.6, anteriorly probably 0.4, height ca. 0.35; opisthosoma: Length 1.7, width 0.6; leg I:

Femur 3.7, patella 0.6, tibia 3.6, metatarsus ca. 4.0, tarsus ca. 2.0, tibia II at least 2.2, tibia III 1.05, tibia IV 1.55, pedipalpus at least 1.5.
Colour grey brown, legs not annulated.
Prosoma (photo) three times longer than wide, low, distinctly smaller in the anterior half, finely granulations are most probably caused by the preservation, slightly depressed behind the eye field, hairs indistinct, fovea absent, 8 eyes similar to *P. kopp* (figs. 177-178), mouth parts hidden, pedipalpus very long and slender, similar to *P. kopp*. – Legs (photo) very long and slender, similar to *P. kopp*, humps of the femora absent, bristle-shaped hairs similar to *P. kopp* (fig. 179), metatarsal trichobothria absent. – Opisthosoma (photo) 2.8 times longer than wide or high, fairly elongated behind the short spinnerets, soft, hairs absent, genital area distinctly protruding.

Relationships: Largest known species of the genus.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Planarchaea ovata* n. sp.** (figs. 180-181)

Etymology: The species name refers to the oval opisthosoma, from lat. ovatus.

Material: Holotype ♀ in Mid Cretaceous Burmite, F2940/BU/CJW.

Preservation and syninclusions: The spider is fairly well preserved, the legs I and II are cut off at the end of their femora, the opisthosoma is slightly deformed on the left side, a bubble exists of its anterior-ventral part. – Some insect's leg articles are preserved rigth above the spider's prosoma, an insect (beetle?) larva exists, a tiny winged insect is preserved on the left metatarsus I.

Diagnosis (♀; ♂ unknown): Body length 2.3 mm, shape of the opisthosoma oval (photo), cheliceral "peg teeth" very long (fig. 181).

Description (♀):
Measurements (in mm): Body length 2.3, prosoma: Length 1.1, width 0.6 in the posterior half, 0.4 in the anterior half; leg I: Femur 2.45, patella 0.3, tibia 2.25, metatarsus ca. 2.8, tarsus 1.3, tibia IV ca. 1.0. pedipalpus 1.45, diameter of an anterior median eye 0.06, diameter of a posterior median eye ca. 0.03..
Colour medium grey, legs not annulated.
Prosoma (fig. 180) low, anterior distinctly narrowed (see above), hairs short, cuticula not granulate, fovea absent, eye field wide and similar to *P. kopp* (figs. 177-178), anterior median eyes largest, basal cheliceral articles long, bearing a row of long and thin "peg teeth" and additionally a posterior row of short "peg teeth", lateral stridulatory files absent, fangs long and slender, labial spur well developed, labium with a distinct seam to the sternum. – Pedipalpus very long and slender, tarsus hairy, claw absent. – Legs very long and slender, I distinctly longest, III distinctly shortest, dorsal femoral humps

absent, hairs short, bristles absent but apical bristle-shaped hairs existing similar to *P. kopp* (fig. 179) on several articles, position of the metatarsal trichobothria unknown, three small tarsal claws. – Opisthosoma almost 1.3 times longer than wide, hairs short, genital area hidden by a bubble, spinnerets not retracted, three pairs, anteriors and posteriors large, medians small.

Relationships: The species is larger than *P. kopp* and distinctly stouter and smaller than *P. oblonga*; see above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

?***Planarchaea paucidentata*** (WUNDERLICH 2008) (**quest. n. comb**.)
(= *Filiauchenius paucidentatus*)

It is the type species of *Filiauchenius* WUNDERLICH 2008.

The female holotype is strongly deformed, the body length is 2.4 mm, apparently the number of cheliceral “peg teeth” is lower than in the other congeneric species. According to the plane prosoma, the absence of a sclerotized ring around the spinnerets, and the very long legs and pedipalpi I regard *paucidentata* as a questionable member of *Planarchaea* (**quest. n. comb**.) and thus *Filiauchenius* WUNDERLICH 2008 as **questionable synonym** with *Planarchaea* WUNDERLICH 2015.

Planarchaea pilosa (WUNDERLICH 2015: 228) (**n. comb**.)
(= *Lacunauchenius pilosus*)

Body and legs – including the region of the spinnerets – of the male holotype in Burmite are strongly deformed, the prosoma has not been drawn (a photo exists), the legs are extremely long, the pedipalpal articles are also extremely long (like in the genus *Longissipalpus* WUNDERLICH 2015 of the family Mongolarachnidae), the prosoma is low, the body length is 3.0 mm (not 3.5 mm as published originally). According to the long and low prosoma as well as the very long legs and articles of the pedipalpus I regard *Lacunauchenius pilosus* as a member of *Planarchaea* (**n. comb**.).

Planarchaea sp. indet.: 1 probably juv. ♀, F3062/BU/CJW, which is completely and well preserved, prosoma 0.9 mm long, tibia I 1.55 mm long.

Family LAGONOMEGOPIDAE

Proposed family name in English: Big-eyed spiders.

Members of this diverse and strictly Cretaceous family were recently treated by WUNDERLICH (2015: 238-271), including an emended family diagnosis, a list of the taxa (15 species), a key to the 14 to 16 genera (11 to 13 genera are known in Burmite when the new genera *Albiburmops* and *Planimegops* as well as an indet. genus are included), selected structures, the distribution, the behaviour and the ecology. Certain members of this family represent the largest spiders known in Burmite. The most striking character of the family are the huge anterior median eyes in a lateral (!) position, see WUNDERLICH (2015: 240), and the photos 101-102. Also remarkable is the existence of a retrolateral pedipalpal tibial apophysis (RTA) in some genera like *Archaelagonops* WUNDERLICH 2012 and *Albiburmops* n. gen. (fig. 182) which is similar to most taxa of the RTA-clade. The tendency to the development of such an apophysis may be added to the family characters of the Lagonomegopidae. I suggest that the family Lagonomegopidae is the most advanced haplogyne spider family of the Cretaceous and probably of the whole Mesozoic. The reasons for extinction around the KT-events 65 million years ago is enigmatic. Was the prey capturing of the probably night-active members (see below) of this family strongly effected by darkenings around the KT-events which caused their extinction after an existence of more than 80 million years? Or caused night-active advanced entelegyne spiders of the RTA-clade like members of the family Sparassidae – they were absent in the Mid Cretaceous – the extinction of the Lagonomegopidae after the KT-events?

The peculiar morphological characters of members of the extinct family Lagonomegopidae make it possible to reconstruct the hypothetical life style of spiders of this family, and to look back to a minute section of a vanished world, see below.

The distinct variability in the body size and shape, the proportions of the stout or slender legs as well as the short- or long-haired legs indicate the adaptation of the lagonomegopid species to quite different niches.

According to new observations the relationships of the family – see WUNDERLICH (2015: 241) – have to be corrected: Micropalpimanidae (see below) is not strongly related. In the key (p. 245: no. 6) the new genus *Albiburmops* has to be added. It is similar to *Lineaburmops* but its pedipalpal tibia bears a retrolateral apophysis. The short patella I of *Albiburmops* – like in *Lineaburmops* – is distinctly shorter than half the length of tibia I in contrast to *Picturmegops* (key no. 8) which is also known in Burmite and whose patella I is ca. half as long as tibia I.

In the following I will discuss in short the value of – and the possible conclusion on – selected structures of the Lagonomegopidae:

(1) The peculiar pattern and the function/value of the eyes (figs. 98-99, 102):

Probably all members of the family Lagonomegopidae possessed 8 eyes in a unique position. Size and position of these eyes are similar in all taxa, occupying a wide and long field by a pair of huge eyes – the translocated anterior median (!) eyes (see fig. 143 of the Archaeidae!) – in a lateral position, and three pairs of strongly reduced tiny eyes, with the lateral eyes close together, see figs. A-C. Why did the anterior median eyes of the lagonomegopid ancestor change their position in a unique way from the middle to the side? The pair of the largest lagonomegopid eyes is not directed forwards like in the Salticidae (or the posterior median eyes of the Deinopidae) – to detect a prey in front of the spider – they are directed not only sidewards, but also dorsally as well as anteriorly (!). So these huge eyes give the spiders an almost spherical view similar to Chamaeleons which are slow-moving and usually sit-and-wait predators, or like night-active geckos. Several night-active animals possess eyes which are directed more laterally.

These huge eyes are the "main eyes" of spiders like the anteriorly directed anterior median eyes of the Salticidae. In the Salticidae these eyes are placed in a "normal" – anterior median – position in contrast to the Lagonomegopidae (figs. A-C). Salticidae are dayactive hunting spiders which use their large anterior median eyes to detect their prey by a three-dimensional view. The function of these eyes in the Salticidae is quite special: internal parts with their retina can be moved laterally so that the visual field can be widened, see FOELIX (2014: 117-118). The internal parts of the largest eyes probably functioned in a similar way in the family Lagonomegopidae whose optical sensory apparatus was probably the highest developed one of all Cretaceous and other pre-Cenozoic spiders. In the night-active members of the family Deinopidae (*) the huge POSTERIOR median eyes are even 3000 times more sensitive to light than the huge anterior median eyes of the day-active Salticidae, see FOELIX (2014: 117). Were the huge eyes of the Lagonomegopidae also quite unusually sensitive? A study with the help of the micro-CT method may solve this question in the future.

(*) The intensity of the light of the moon and the stars is enough for prey-capturing of members of the nocturnal Deinopidae.

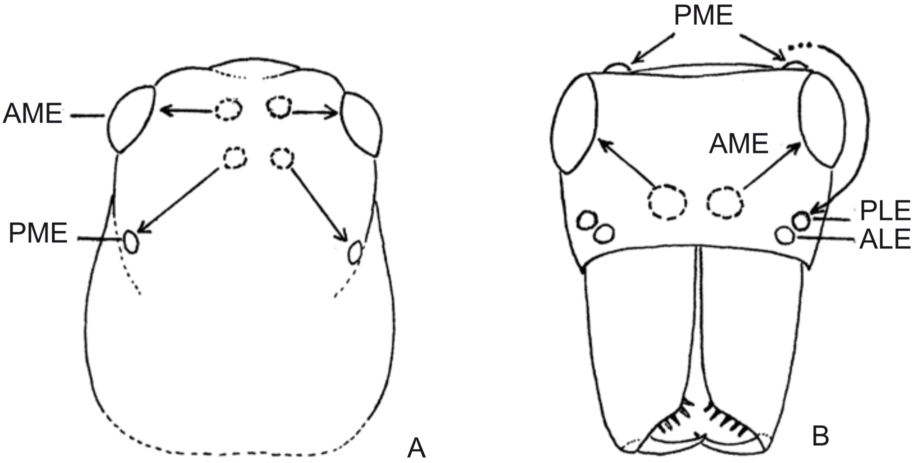
(2) The function/value of the coloration of the body:

In certain members of the Lagonomegopidae striking structural hair markings of the body existed, see WUNDERLICH (2015), fig. C and the photos 97-99. As far as I know a sexual dimorphism of the body colour is absent in the Lagonomegopidae – thus a courtship behaviour of the body colour appears quite unlikely. The body markings probably attracted prey – e. g. flying insects – even AT NIGHT as known from extant Sparassidae, see WUNDERLICH (2015: 242) in which peculiar light hairs especially on the clypeus. I saw a male Lagonomegopidae, ?*Archaelagonops* sp., body length 3 mm, coll. PATRICK MÜLLER which possesses dense white hairs on the cymbium like certain members of the – diurnal! – family Salticidae, in which the cymbium bears dense white hairs too, which may have attracted prey, similar to certain nocturnal sit-and-wait predators of the family Thomisidae. Such striking dense white hairs of the clypeus exist in both sexes of several lagonomegopid species, e. g. of *Albiburmops annulipes* n. gen. n. sp., see the photos 97-98 (!). Flying insects – Diptera – as most possible prey are preserved with a member of the lagonomegopid genus *Archaelagonops* WUNDERLICH, see WUNDERLICH (2015: 248).

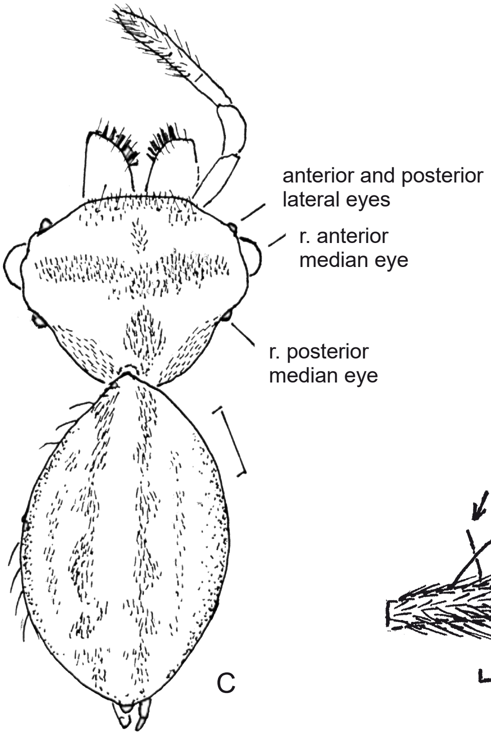
(3) The function/value of the unusually long hairs of leg I:

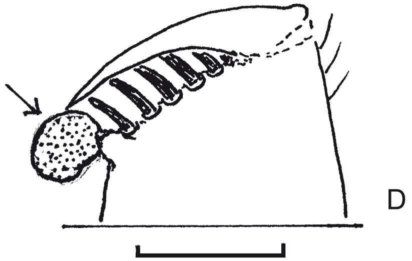
Certain members of the Lagonomegopidae possessed unusually strongly developed hairs of the anterior legs, see fig. C and WUNDERLICH (2015: 242, photo 107 of *Lineaburmops hirsutipes* WUNDERLICH 2015). These hairs were probably used for prey capturing by these spiders, to my suggestion probably even for “fishing” flying insects from the air with the help of the lengthened anterior legs as may be speculated. – Quite another function of such densely hairy legs is also possible: a gliding through the air, as recently reported by YANOVIAK et al. (2015) from extant canopy spiders of the family Selenopidae of Panama and Peru (*). The leg position of the Selenopidae is laterigrade, and such a position may be needed for gliding. The leg position of most Lagonomegopidae – as far as I can conclude from the fossils – was not laterigrade but the position of certain spiders like *Lineaburmops hirsutipes* may have been mediograde or even laterigrade, see WUNDERLICH (2015: photo 106), and therefore I do not want to exclude a gliding ability in certain lagonomegopid species.

(*) A similar gliding ability is known – besides some vertebrates – from certain insects, see YANOVIAK et al. (2015), but has never before been reported from spiders.



Figs. A-B: Likely translocation of the eyes of the hypothetical pre-precursor of a lagonomegopid spider (dotted) towards a Cretaceous member of the family Lagonomegopidae; dorsal (A) and anterior (B) aspects. AME = anterior median eyes, PME = posterior median eyes, ALE = anterior lateral eyes, PLE = posterior leteral eyes.





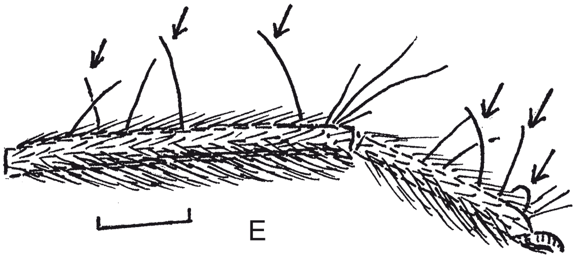


Fig. C: Dorsal aspect of the body and the right pedipalpus of a female of *Picturmegops signatus* WUNDERLICH 2015.

Fig. D. Distal part of the left chelicera of a lagonomegopid spider, posterior aspect, with long “peg teeth”. The arrow points to a secretion of the large cheliceral gland mound.

Fig. E. Prolateral aspect of the left metatarsus and tarsus I of *Picturmegops signatus* with long trichobothria (arrows) and dense hairs.

To estimate and sum up the present conclusions: I have tried to focus on single lagonomegopid characters in question – these are mainly the huge eyes in a lateral position (figs. A-C), the long cheliceral “peg teeth” (fig. D), the striking body colouration and camouflage (fig. C, photos) as well as the densely hairy anterior legs (fig. E) – not in an isolated way but put these characters TOGETHER IN THE LIGHT OF A SYNOPSIS. Furthermore I considered also certain corresponding characters of related extant spider taxa as well as the behaviour and the kind of prey capturing of not related animals like chamelaons or geckos. I conclude that the circumstances discussed above indicate a nocturnal life style of most members of the family Lagonomegopidae as sit-and-wait predators in higher strata of the vegetation similar to extant members of the related family Archaeidae, see WUNDERLICH (2015: 242). The PREY of non-lagonomegopid spiders like Archaeidae (Cretaceous, Eocene and extant) and Spatiatoridae (Cretaceous and Eocene) were and still are spiders, see WUNDERLICH (2015) but at least some members of the diverse family Lagonomegopidae probably fed on insects (*). The peculiar size, lateral position and probably specialized structures of their anterior median eyes may have been the main innovation of the evolutionary success of the Lagonomegopidae, the base for their huge diversity, their wide distribution all over the Northern Hemisphere and their longevity for almost 80 million years or even more. Probably the lagonomegopid spiders – caused by unknown reasons – were displaced by entelegyne spiders like Sparassidae (**) around the Cretaceous-Tertiary events.

The existence of metatarsal "preening combs" of the Lagonomegopidae exclude their capture web dwelling.

The peculiar colouration of the body – see above – may well have had three different functions: (1) a camouflage/mimesis with respect to enemies, (2) a camouflage with respect to prey, and (3) an function for attracting prey.

A possible gliding ability corresponding to unusual long hairs of the anterior legs: See above.

(*) The probably prey attracting body colour and capturing behaviour do not correspond to spiders as prey of all members of the Lagonomegopidae. Flying insects – Diptera – as most possible prey are preserved with a member of the lagonomegopid genus *Archaelagonops* WUNDERLICH, see WUNDERLICH (2015: 248). The existence of – frequently numerous – metatarsal and tarsal trichobothria (fig. E) which are unique within the superfamily Archaeoidea, may have been useful to detect flying prey. – The existence of cheliceral "peg teeth" (fig. D) may indicate araneophagy of the Lagonomegopidae like in most other members of the superfamily Archaeoidea (= Palpimanoidea) but a spider as the prey of a Lagonomegopidae has not been reported up to now. Probably members of another arachnid order, the Ricinulei, may have been the prey of certain Lagonomegopidae. The sure proof of prey of this family is needed for a more close conclusion.

(**) but not by members of the family Salticidae – see WUNDERLICH (2015: 242) – which are mainly day-active, not spider-feeding, and possess a quite different position of the eyes.

New material of *Archaelagonops* WUNDERLICH 2008:

Archaelagonops sp. indet.: 1♂ in Mid Cretaceous Burmese amber, F2932/BU/CJW.
The spider is strongly deformed and was probably dried out.
Its body length is 4.3 mm. A ventral pedipalpal tibial apophysis is absent.

In the following I describe 2 new genera and 7 new species of the family Lagonomegopidae in Burmese amber.

***Albiburmops* n. gen.**

Etymology: The name refers (a) to the numerous white hairs of the body, from albus (lat.) = white, and (b) a part of the name of the related genus *Lagonoburmops* WUNDERLICH 2012.

The gender of the name is masculine.

Type species (by monotypy): *Albiburmops annulipes* n. sp.

Diagnosis (♂; ♀ unknown): Legs (photo) short, patella I distinctly less than half as long as tibia I, basal cheliceral articles stout, body widely covered with numerous white hairs (photos 97-98), pedipalpus (figs. 182-183): Tibia with a short retrolateral apophysis which may be partly fused with the tibia, cymbium short, questionable embolus slender.

Relationships: According to the short legs, patellae and basal cheliceral articles the genus is most related to *Lineaburmops* WUNDERLICH 2015 (see below) in which the legs are not annulated, a pedipalpal tibial apophysis is absent and the cymbium is longer. A retrolateral pedipalpal tibial apophysis exists – in my opinion convergently evolved – also in *Archaelagonops* WUNDERLICH 2012 (see below) in which position and shape of the pedipalpal tibial apophysis are different, prosoma, basal cheliceral articles and legs are longer and the colouration is different, the legs are not annulated.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Albiburmops annulipes* n. gen. n. sp.** (figs. 182-183) photos 97-98

Etymology: The species name refers to the annulated legs, from annulipes (lat.) = annulated legs.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2928/BU/CJW.

Preservation and syninclusions: The spider is almost completely and in a rather rare kind excellently (not deformed) preserved in a larger clear yellow piece of amber, the left tarsus IV is amputated near its end. – Syninclusions: Several Acari of different families, 2 Hymenoptera, 1 Thysanoptera, 1 Psocoptera, 1 Coleoptera, 1 Blattaria larva, insects excrement, plant hairs and detritus.

Diagnosis, relationships and distribution: See above.

Description (♂):
Measurements (in mm): Body length ca. 3.5, prosoma: Length 1.6, width ca. 1.6; opisthosoma: Length 1.8, width and height 0.9; leg I: Femur 1.5, patella 0.55, tibia 1.4, metatarsus 1.1, tarsus 0.6; diameter of a large anterior median eye 0.3.
Colour (photos 97-98): The dark brown body and legs are widely covered with white hairs: The prosoma anteriorly and medially a small band, laterally white except a small dark band at the margin, clypeus completely white below the lateral eyes, basal cheliceral articles anteriorly and laterally completely covered with white hairs (therefor stridulatory files cannot exist), opisthosoma with a pair of wide longitudital bands, pedipalpus: Patella bearing white hairs distally and tibia basally, legs distinctly annulated by white and dark hairs.
Prosoma (photos) as wide as long, fovea fairly low and long, no inclination between the lateral and the large anterior median eyes, small but distinct humps between the anterior lateral and the anterior median eyes, 4 pair of eyes, posterior median eyes separated from the anterior median eyes by ca. one diameter of the anterior median eyes, lateral eyes ca. ½ diameters apart. Basal cheliceral articles relatively stout, peg teeth long, mouth parts hidden. – Legs (photos) only fairly long, order I/IV/II/III, III distinctly the shortest, patellae relatively short, bristles absent, hairs short, dense on the metatarsi, metatarsal III-IV preening combs well developed, tarsi and metatarsi bear several trichobothria. – Opisthosoma (photo) twice as long as wide, dorsally with short and some longer hairs, anterior and posterior spinnerets fairly long. – Pedipalpus (figs. 182-183) with fairly stout articles, tibia bent, bearing a short, blunt and toothed retrolateral apophysis which is apparently basally fused with the tibia, cymbium wide, fairly short and quite hairy, bulbus with several apophyses, the questionable embolus is slender and fairly long.

Lineaburmops WUNDERLICH 2015

The genus is characterized by longitudinal bands of white hairs on prosoma and opisthosoma, their body length is 2.7-5 mm, the legs and the basal cheliceral articles are relatively stout (photo), the patella I is short.

Species: *L. beigeli* WUNDERLICH 2015 (generotype) and *L. hirsutipes* WUNDERLICH 2015 (see below). Here I describe a further new species.

Note on *Lineaburmops hirsutipes* (photo 99): According to the strongly hirsute and long leg I (tibia I is 3.6 mm long) – and the probably long basal cheliceral articles – I exclude this species from the genus *Lineaburmops*; it may be a member of the genera *Picturmegops* or *Lagonoburmops* in which also long hairs on leg I exist.

***Lineaburmops maculatus* n. sp.** (fig. 184)

Etymology: The species name refers to the large spots of white hairs on the prosomal sides, from macula (lat.) = spot.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2929/BU/CJW.

Preservation and syninclusions: The spider is completely and well preserved in a small clear yellow piece of amber, questionable gas bubbles cover parts of body and legs, a large bubble exists anteriorly on the opisthosoma. – A small Collembola is preserved above the spider's opisthosoma.

Diagnosis (♂; ♀ unknown): Colour: See below, pedipalpus as in fig. 184, bearing a long and slender embolus.

Description (♂):
Measurements (in mm): Body length 2.7, prosoma: Length 1.15, width 0.9; opisthosoma: Length 1.1, width 0.8; leg I: Femur 1.3, patella 0.4, tibia 1.1, metatarsus 0.95, tarsus 0.65; leg IV: Femur 1.3, tibia 1.1; length of the cymbium 0.6.
Colour: Prosoma widely dark in the middle, posteriorly and anteriorly-laterally, with large white patches laterally in the middle, clypeus with white hairs except laterally, basal cheliceral articles bearing white hairs, legs not annulated, opisthosoma dorsally with a wide medial field of dark hairs (0.5 mm wide in the middle) and a narrow (0.12 mm wide) band of white hairs along the median field.
Prosoma similar to *L. beigeli* WUNDERLICH 2015 but stouter, 1.3 times longer than wide, thoracal fissure indistinct, 4 pairs of eyes, humps of the clypeus quite small, cheliceral peg teeth long, lateral cheliceral files absent. – Legs only fairly long, IV longest, bristles absent, metatarsi with only a single trichobothrium (if additionals are not rubbed off or hidden), its position on I-II in 0.63, tarsi with only 2 trichobothria near the middle of the article. Opisthosoma 1.4 times longer than wide, hairs and spinnerets short. – Pedipalpus (fig. 184) with stout patella and tibia, tibial apophysis absent, cymbium long, embolus long and slender.

Relationships: In *L. beigeli* the lateral prosomal bands of white hairs are smaller, the embolus is distinctly shorter and the distal leg articles bear a larger number of trichobothria.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Parviburmops WUNDERLICH 2015

Only the type species – *Parviburmops brevipalpus* WUNDERLICH 2015 (photo 100) – has been described. Here I describe a species which may be congeneric, and which bears a ventral pedipalpal tibial apophyses in contrast to the generotype.

?***Parviburmops bigibber* n. sp.** (figs. 185-188) photo 101

Etymology: The species name refers to the pair of clypeal humps which are well developed, from bi- (lat.) = two, and gibbus (lat.) = arched.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2933/BU/CJW.

Preservation and syninclusions: The spider is excellently and completely preserved in a larger yellow to orange piece of amber, the opisthosoma is deformed and the spinnerets are hidden; the bulbus of the right pedipalpus is expended. – Syninclusions: Remains of a small spider near the corner of the piece of amber, 1 Hymenoptera, several Diptera, plant hairs and particles of detritus; several holes produced by a boring shell exist on the surface of the piece of amber.

Diagnosis (♂; ♀ unknown): Prosoma stout, clypeal humps large (fig. 185), pedipalpus (figs. 186-188): Tibia with a ventral apophysis, bulbus with a large tegular apophysis, embolus rather long, slender and bent.

Description (♂):
Measurements (in mm): Body length 3.8, prosoma: Length 1.8, width 1.5, diameter of the large anterior median eyes 0.3; leg I: Femur 1.6, patella 0.7, tibia 1.8, metatarsus 1.05, tarsus 0.55; tibia II 1.8, tibia III 1.1, tibia IV 1.4; pedipalpal femur 0.65.
Colour: Prosoma dark brown, covered with white hairs widely medially, partly laterally of the median eyes and at the prosomal margin, on the clypeus, on the basal cheliceral articles and distinctly on the cymbium; legs medium to dark brown, annulated by white hairs, opisthosoma light yellow brown.
Prosoma (fig. 185, photo 101) stout, 1.2 times longer than wide, fovea rounded and deep; bulging behind the large anterior median eyes and strongly anteriorly between the anterior median eyes; 8 eyes, position of the posterior lateral eyes ca. 1 diameter behind/of the anterior median eyes. Basal cheliceral articles fairly large, anteriorly tuberculate, fangs and gnathocoxae long. – Legs (photo 101) fairly long, order I/II/IV/III, patellae short, bristles absent, hairs short, metatarsal preening combs well developed, metatarsi and tarsi with several trichobothria, tarsus IV bears at least 4 trichobothria. – Opisthosoma deformed, spinnerets hidden, hairs short. – Pedipalpus (figs. 186-188) (see above; the right bulbus is expanded) with stout articles.

Relationships: In *P. brevipalpus* WUNDERLICH 2015 the clypeal humps are smaller, a ventral apophysis of the pedipalpal tibia is absent (so far recognizable in the muddy piece of amber), and the structures of the bulbus are distinctly different. The structures of the ♂-pedipalpus of both species are so different that close relationships are doubtful.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

?***Paxillomegops cornutus* n. sp**. (figs. .189-191) photo 102

Etymology: The species name refers to the horn-shaped clypeal humps, from cornu (lat.) = horn.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3056/BU/CJW.

Preservation and syninclusions: The spider is completely and well preserved in a clear yellow piece of amber; some leg articles, the opisthosoma and the pedipalpi are fairly deformed, the opisthosoma is separated a bit from the prosoma due to the preservation, some questionable remains of organs are preserved inside the translucent opisthosoma, the spinnerets are expanded, slightly right of the middle of the thoracal part exists a small circular hole-shaped depression (an injury?). – Syninclusions are remains of an insect and few tiny particles of detritus.

Diagnosis (♂; ♀ unknown): Clypeus (fig. 189, photo) with a pair of strong horn-shaped humps, order of the legs II/IV/I/III, pedipalpus (deformed) (figs. 190-191): Bulbus with long tegular apophyses which stand widely out.

Description (♂):
Measurements (in mm): Body length, 4.0; prosomal length ca. 1.7; opisthosoma: Length 2.0, width 0.9; leg I: Femur 1.4, patella 0.55, tibia 1.5, metatarsus 1.1, tarsus 0.5, tibia II (r./l.) 1.6/1.8, tibia III 1.15, tibia IV 1.5, femur II 1.65, femur IV 1.6.
Colour brown, laterally widely darkened, legs medium to dark brown, annulated, opisthosoma light grey brown; bands of white hairs are absent.
Prosoma (fig. 189, photo) ca. 1 1/3 times longer than wide, hairs thin and short, cephalic part distinctly raised, clypeus (fig. 189, photo) with a pair of strong horn-shaped humps, 8 eyes, the small posterior eyes spaced from the large lateral eyes by ca. the radius of the lateral lateral eyes, the small (true) lateral eyes are widely spaced from the clypeal margin, the deformed basal articles of the chelicerae are long and slender and bear numerous long "peg teeth" in two rows, mouth parts strongly deformed, the sternum separates the coxae IV by less than half of their diameter. – Legs (photo) long and quite slender, order II/IV/I/III, hairs short and quite indistinct, scopulae absent, tibiae, metatarsi and tarsi with several long trichobothria, unpaired tarsal claws short, paired claws with long teeth. – Opisthosoma 2.2 times longer than wide, hairs of medium length, the large anterior and the slender posterior expanded and fairly deformed spinnerets are well preserved. – Pedipalpus (figs. 190-191) deformed, tibia long, with numerous spine-

shaped teeth and long ventral hairs, apophyses absent, cymbium hairy and fairly short, bulbus with long tegular apophyses which stand widely out.

The **relationships** are quite unsure; the key to the genera leads to *Paxillomegops*, see WUNDERLICH (2015: 245) but the strong clypeal “horns” and the – apparently expanded – structures of the bulbus are quite unusual in this genus.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Planimegops **n. gen.**

Etymology: The name refers to the plain prosoma, from planus (lat.) = plain and megops to the family name Lagonomegopidae.

The gender of the name is masculine.

Tape species (by monotypy): *Planimegops parvus* n. sp.

Diagnosis (♂; ♀ unknown): Prosoma (photo 103) flat/low, anterior-dorsal prosomal depressions absent, clypeus with short and scale-shaped hairs, distinct humps absent, order of the legs II/IV/I/III, pedipalpus (figs. 192-194): Tibial apophysis absent, cymbium long, the questionable embolus stands widely out, body length only 2.8 mm.

Relationships: The key to the genera – see WUNDERLICH (2016: 244) – leads to *Parviburmops* WUNDERLICH 2015 in which clypeal humps are well developed and the structures of the pedipalpus are different. See also *Albiburmops* n. gen. in which numerous white prosomal hairs and a tibial apophysis of the pedipalpus exist.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Planimegops parvus **n. gen. n. sp**. (figs. 192-194) photo 103

Etymology: The species name refers to its low body length, from parvus (lat.) = small.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3055/BU/CJW.

Preservation and syninclusions: The spider is very well preserved in a clear yellow piece of amber, the dorsal part of the right patella III and the right leg IV beyond the end of the femur are cut off, a bubble is preserved on the posterior part of the prosoma, two fissures in the amber – they disappeared partly after the use of Benzylium benzoicum – hided parts of the prosoma. – Synincluded are some plant hairs.

Diagnosis: See above.

Description (♂):
Measurements (in mm): Body length, 2.8; prosoma: Length 1.55, width 1.05; opisthosoma: Length 1.1, width 0.75; leg I: Femur 1.25, patella 0.3, tibia 1.2, metatarsus 1.0, tarsus 0.65, tibia IV 1.4, femur II 1.55, femur III 1.3, femur IV 1.6.
Colour: Prosoma and legs dark brown, legs not annulated, opisthosoma light grey brown, white hairs absent.
Prosoma (photo) (see the diagnosis): 1.5 times longer than wide, cephalic part not elevated, 8 eyes, posterior eyes spaced from the large laterals by more than one diameter of the large eyes, position of the small lateral eyes far away from the clypeal margin, basal cheliceral articles large, laterally with a lare field of stridulatory files, "peg teeth" well developed, fangs of medium length, labium wide, with a seam to the sternum, coxae IV spaced by the sternum by more than half of their diameter. – Legs (photo) fairly long and slender, order II/IV/I/III, almost bristleless, but metatarsus IV with a garland of short bristles, hairs short and indistinct, scopulae absent, tibiae, metatarsi and tarsi with numerous trichobothria. – Opisthosoma (photo) 1.5 times longer than wide, covered with numerous short hairs, spinnerets short (retracted). – Pedipalpus (figs. 192-194) with slender articles, femur prolaterally with half a dozen stridulatory teeth, tibial apophysis or teeth absent, cymbium long and slender, structures of the bulbus difficult to observe, questionable embolus in a distal position and standing widely out ventrally.

Relationships and distribution: See above.

Gen. & sp. indet. (fig. 195)

Material: Remains of a female, apparently of an exuvia, in Mid Cretaceous Burmite, F3073/BU/CJW.

Preservation: The exuvia is distorted/twisted and incompletely preserved between few layers of the piece of amber, most parts of body and legs are lost/cut off, the chelicerae, the right leg I and most parts of the lenses of the large right eye are preserved.

Diagnosis (exuvia): Metatarsus and tarsus I bear some ventral cusps (fig. 195), basal cheliceral articles stout, quite large spiders, adults probably more than 1 cm long.

Description (exuvia):
Measurements (in mm): The body length of the spider was probably 7-8 mm; prosoma: Length ca. 3.5, width ca. 3.2; leg I: Femur: Length 2.9, height 1.0, patella 1.5, tibia 2.6, metatarsus ca. 2.3, the distal part of the tarsus is hidden; diameter of the lense of a large eye in lateral position 0.6.

Colour of prosoma and legs light brown.
Prosoma not much longer than wide, basal cheliceral articles stout, legs fairly stout, most hairs are short, the pseudoscopulae, too, metatarsus and tarsi I – II (probably also metatarsi and tarsi of other legs) bear some ventral cups (fig. 195).

Relationships: Stout basal cheliceral articles exist in several genera of the Lagonomegopidae. The unnamed present spider represents the only lagonomegopid species known to me which possesses ventral cusps of leg I; it well may be the member of an undescribed genus.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family SPATIATORIDAE

The extinct taxon Vetiatorinae is excluded here from the family Spatiatoridae sensu WUNDERLICH (2015: 269f), and elevated to family rank, see the tab. below.

Members of the Spatiatoridae are not very rare in Eocene Baltic amber but only a single specimen has been found in Burmite up to now, a male of *Spatiator putescens* WUNDERLICH 2015. Here I describe – but not name – shortly a female of this family which is preserved in Burmite, too.

Spatiatoridae indet. (fig. 196) photo 104

Material: 1♀ or juv. ♂ in Mid Cretaceous Burmite, coll. PATRICK MÜLLER, inv. no. BUB-93.

Preservation: The female is fairly well and incompletely preserved, the left tarsus II is shortened probably by a malformation.

Description:
Measurements (in mm): Body length 2.8, prosomal length 2.0, length of tibia IV 1.45.
The prosoma (incl. the sternum) (fig. 196) is distinctly wrinkled, a well developed furrow separates the cephalic and the thoracic part, most eyes are hidden, the basal cheliceral articles are distinctly protruding, stridulatory files and peg teeth exist, the pedipalpal tarsus is quite hairy and distinctly thickened, leg bristles are absent, the spatulate prolat-

eral hairs on metatarsus and tarsus I-II are well developed and dense, the opisthosoma may be leathery but a distinct scutum is absent even on the epigaster, the posterior spinnerets are well developed.

Relationships: The shape of the prosoma and most other characters are as in *Spatiator* PETRUNKEVITCH 1942, see the tab. below. In *Spatiator putescens* WUNDERLICH 2015, preserved in Burmite, too, the basal cheliceral articles are not protruding. A conspecific male is needed for a closer determination of the present female.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family VETIATORIDAE WUNDERLICH 2015 (from Vetiatorinae) (**n. stat**.) (and Huttoniidae)

Revised diagnosis (♂; ♀ unknown) (see WUNDERLICH (2015: 272; new material lead to some corrections): Cheliceral "peg teeth" existing (probably not in all taxa), spatulate leg hairs completely absent (only thin hairs exist), prosoma low and abruptly narrowed anteriorly (photo), opisthosoma soft: Scuta completely absent, on the epigaster, too; it is even not leathery, anterior spinnerets large, posterior (and probably median) spinnerets existing (fig. 197-198, 203-204).

Further characters (see also the characters of the superfamily Archaeoidea): Ecribellare, unpaired tarsal claw existing, anterior median eyes largest and on humps (fig. 200), prosomal/sternal cuticula finely rugose or furrowed (figs. 200), fovea apparently absent, patellae fairly lengthened, tarsi not shortened, about as long as metatarsi, metatarsal "preening" comb existing (fig. 201), pedipalpal-cheliceral stridulatory organ existing (fig. 199), structures of the bulbus: See WUNDERLICH (2015: 395, figs. 286-287), at least a single bulbus apophysis exists.

Type genus: *Vetiator* WUNDERLICH 2015. Further genus: *Pekkachilus* n. gen.

The female of the family is unknown.

Relationships: The extinct and previously monotypic Vetiatorinae WUNDERLICH 2015 in Burmite was – with hesitation – treated by me as a subfamily of the Spatiatoridae, but in the Spatiatoridae the prosoma is quite different, it is strongly wrinkled, much longer, the cephalic part is strongly raised and distinctly separated from the thoracic part, spatulate hairs on legs I-II are well developed, tarsi I-II are distinctly shorter than metatarsi I-II, and an epigastric scutum exists, see the tab. below. Therefore (and based on new material) I elevate the taxon to the family level, Vetiatoridae (**n. rank**). – In the STENOCHILIDAE (extant, see below) exists also a low cephalic part but cheliceral teeth are absent, dense spatulate leg hairs as well as a scutate opisthosoma exist, and posterior spinnerets are absent. – Most probably HUTTONIIDAE is a member of the Palpimanid subbranch like the Vetiatoridae – its prosoma is low, too –, but spatulate leg hairs exist, its legs bear some bristles, see WUNDERLICH (2015: 213). – See also below, the pair of the families Micropalpimanidae (extinct) and Palpimanidae (fossil and extant) which may be related.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Vetiator WUNDERLICH 2015: 272-273

Type species (by monotypy): *Vetiator gracilipes* WUNDERLICH 2015.

Note added to the diagnosis of the genus: The dark colour of the prosoma (photo) of two of the known congeneric specimens may originate from a strong sclerotization (apparently it is stronger than in the related genus *Pekkachilus* n. gen.).

New material: 2♂ (figs. 197-198, photo 105), which may be conspecific with the generotype, F2954/BU/CJW and coll. PATRICK MÜLLER.

Preservations: The male 2954 (photo) is well and completely preserved, the opisthosoma is dorsally partly injured. The male of the coll. PATRICK MÜLLER is well and almost completely preserved, both tarsi IV are cut off, an emulsion covers ventrally the injured opisthosoma.

Descriptions:
F2954: Measurements (in mm): Body length 2.1, prosoma: Length 1.05, width 0.7; leg I: Femur 1.0, patella 0.4, tibia ca. 0.85, metatarsus 0.55, tarsus 0.5, tibia IV 0.9.
Colour (photo 105): Prosoma and legs dark brown like in the holotype of *gracilipes*, most other characters also as in the holotype, prosoma (photo) strongly narrowed anteriorly, cuticula finely but distinctly rugose, position of the metatarsal trichobothria unknown, anterior spinnerets large, posterior spinnerets difficult to observe, small (fig. 198), they are fairly observable in the holotype (fig. 197), pedipalpus: Femur with three prolateral stridulatory teeth in its basal half (fig. 199), structures of the bulbus difficult to observe because of their position bent under the prosoma, apparently like in the holotype.
Male coll. PM: Body length ca. 1.8 mm, prosoma silvery, finely but distinctly rugose. Body, legs and pedipalpi quite similar to F2954; the structures of the left bulbus are well preserved/observable.

Relationships: See *Pekkachilus* n. gen.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Pekkachilus* n. gen.** (figs. 200-204) photos 106-107

Derivatio nominis: The genus is named in honour to PEKKA T. LEHTINEN who revised the related palpimanoid family Stenochilidae of the Oriental-Australian region.

The gender of the name is masculine.

Type species (by monotypy): *Pekkachilus vesica* n. sp.

Diagnosis (♂; ♀ unknown): Prosoma (fig. 200, photo 106) weakly sclerotized, cuticula almost smooth (finely furrowed). Cheliceral “peg teeth” may exist, see below.

Further characters: See the characters of the family and of the type species.

Relationships: Several characters of *Pekkachilus* – like the eyes, the spinnerets, the absence of spatulate leg hairs – are as in *Vetiator* in which the prosoma is strongly sclerotized and the prosomal cuticula is finely but distinctly rugose.

Life style: According to the strongly developed metatarsal III “preening” comb (fig. 201) the spiders were no capture web dwellers; due to their large anterior median eyes, their robust legs and their rarity in amber the spiders may well have been fast runners on the ground and probably on the bark of trees, too.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Pekkachilus vesica* n. gen. n. sp.** (figs. 200-202) photo 106

Etymology: The species name refers to the simple bubble-shaped bulbus, from vesica (lat.) = bubble.

Material: Holotype ♂ in Mid Cretaceous Burmese amber and a separated piece of amber, F2923/BU/CJW.

Preservation and syninclusions: The spider is fairly well and almost completely preserved, the left patella, parts of the tibia, metatarsus and tarsus IV are cut off, the petiolus is anteriorly broken, the opisthosoma is dorsally injured (depressed), the spinnerets are not well preserved. – Syninclusions: Parts of a winged insect are preserved near the spider in a different layer of the amber, a small Diptera and a Thysanoptera are preserved in the separated piece of amber.

Diagnosis (♂; ♀ unknown): See above.

Description (♂):
Measurements (in mm): Body length 2.2, prosoma: Length 1.0, width 0.7; femur I 1.0, leg IV: Femur 1.0, patella ca. 0.27, tibia 0.95, metatarsus ca. 0.5, tarsus ca. 0.5.
Colour light grey brown.
Prosoma (fig. 200, photo) (it is slightly deformed) not raised, cuticula smooth (finelly furrowed), fovea a small, low and round depression, 8 eyes, the anterior medians distinctly the largest and apparently placed on humps. Basal cheliceral articles large/stout, lateral stridulatory files existing (difficult to recognize), cheliceral lamella not recognizable, “peg teeth” of the fang furrow absent, fangs stout, gnathocoxae long and strongly converging, probably apically bearing a small outgrowth, labium triangular, long and probably with a seam to the sternum, sternum wide, bearing low lateral humps near the coxae, coxae not surrounder by sclerotized rings, coxae IV not widely separated. – Legs (fig. 201, photo) only fairly long and slender, I not enlarged, III relatively long, patellae distinctly shorter than tibiae, tarsi distinctly shorter than metatarsi, hairs not long, bristles completely absent, spatulate hairs on tarsi and metatarsi I-II absent (only thin hairs existing), metatarsal III preening comb long and well developed, tarsal trichobothria absent, position of the metatarsal III trichobothrium in ca. 0.65, three small tarsal claws, paired claws toothed, not reduced on legs I-II. – Opisthosoma (photo) oval, hairs short, scuta completely absent, spinnerets difficult to observe, apparently the posteriors quite small. – Pedipalpus (fig. 202; see above) with slender and short articles, cymbium only fairly large, covered with long hairs more dense retrolaterally, bulbus quite simple (the ventral aspect is hidden), protruding, embolus probably short, hidden, probably in a distal/apical position.

Relationships: See above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Pekkachilus sp. indet. (fig. 203)

Material: 1♂ in Mid Cretaceous Burmite, F2953/BU/CJW.

Preservation and syninclusions: The spider is almost completely and fairly well preserved; the distal articles of the left leg I and II are cut off, the prosoma – especially the area of the eyes – is deformed. – Syninclusions: A female spider of the family Tetrablemmidae indet., body length 1 mm, and the chela of a Pseudoscorpion nearby are preserved near the male. A large mite, plant hairs and particles of detritus are preserved in the same piece of amber.

Description (♂):
Measurements (in mm): Body length 2.2, prosoma: Length 1.1, width 0.65; opisthosoma: Length 1.1, width 0.65; leg I: Femur 0.9, patella ca. 0.5, tibia ca. 0.9, metatarsus ca. 0.5, tarsus ca. 0.5, tibia IV 0.8.

Colour: In my opinion the deformed prosoma has been darkened by pressure and heating of the preservation. Most remaining characters as in the holotype of *versica*. Cuticula almost smooth, eyes hidden, cheliceral teeth absent, widely spaced lateral cheliceral files are observable on the right chelicera, the position of the metatarsal trichobothria is in 0.82 on I and 0.73 on IV (its position in the holotype of *P. resica* is apparently in 0.77). The left posterior spinneret is observable (fig. 203). The pedipalpal tarsi are bent under the pedipalpal femora, and therefore the bulbi are only badly recognizable.

Relationships: I do not want to exclude that the present male is conspecific with the holotype of *P. vesica* n. sp.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

?*Pekkachilus* sp. indet. (fig. 204), photo 107

Material: 1♀ in Mid Cretaceous Burmite, F3053/BU/CJW.

Preservation and syninclusions: The spider is well and completely preserved in a yellow piece of amber, the prosoma is slightly deformed (its right margin is "undulating"), the left leg IV has been broken within the fossil resin at its end, and a drop (remains) of blood is preserved (photo), a second smaller drop of blood is preserved at the end of the injured right femur IV. – Syninclusions: A small Coleoptera, a tiny Diptera and remains of plants including hairs.

Description (♀):
Measurements (in mm): Body length 2.8; prosoma: Length 1.4, width ca. 0.8; opisthosoma: Length 1.6, width ca. 0.85; leg I: Femur 1.2, patella ca. 0.5, tibia 0.9, metatarsus 0.6, tarsus 0.6, tibia IV 1.1.
Colour: Prosoma and legs medium red brown, legs not annulated, opisthosoma light grey.
Prosoma (photo) ca 1.75 times longer than wide, anteriorly distinctly narrowed, cuticula finely scaly, fovea hidden or absent, 8 eyes, anterior medians largest, cheliceral "peg teeth" well observable (!), fangs stout, gnathocoxae long and strongly converging. – Pedipalpal tarsus with numerous strong hairs. – Legs (photo) fairly long, bristleless, spatulate hairs absent, metatarsus III with strong ventral hairs like in *P. vesica*, position of the metatarsal IV trichobothrium in 0.72. – Opisthosoma (photo) oval, soft, dorsal hairs quite short, anterior spinnerets (fig. 204) large, posterior spinnerets small, median spinnerets unknown.

Close **relationships** are unknown. The characters of body and legs are quite similar to *Pekkachilus* n. gen.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Vetiatoridae indet.

Material: 1♂ in Mid Cretaceous Burmite, coll. PATRICK MÜLLER.

Preservation: The spider is completely preserved in a clear piece of amber. Most parts of the eyes, the mouth parts, the spinnerets and the bulbus are hidden.

Description: Body length 2.1 mm, length of tibia I 0.75 mm. Body and legs slender, leg bristles, spatulate hairs and metatarsal preening combs absent, prosoma not raised but fairly convex, cuticula finelly but distinctly granulate, hairs of the cymbium not dense, bulbus only weakly convex.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Remarks on the family STENOCHILIDAE (extant) (figs. 204-205)

Only the genera *Colopea* SIMON 1893 and *Stenochilus* O. PICKARD-CAMBRIDGE 1870 are known from this australasian family.
No fossils of this family were reported up to now although the family is extant known from Myanmar..

Diagnostic characters of the Stenochilidae (*):
(see also above, the characters of the superfamily Archaeoidea)
– Median and posterior spinnerets absent (spigots remain),
– teeth of the cheliceral fang furrow – including “peg teeth” – absent in the two extant genera *Colopea* and *Stenochilus*,
– cephalic part low,
– chelicerae with a toothlike basal “lamella”, see LEHTINEN (1982. 117), PLATNICK & SHADAB (1974: 4).

Further characters and variability:
The coxae are usually surrounded by sclerotized rings which cuticula is usually strongly corniculate. The scopula of the legs I-II is usually quite dense but it may be weakly developed or almost absent: so in some species of *Colopea*, see LEHTINEN (1982). The size of the median eyes is also quite variable: In *Stenochilus* the posterior median eyes are largest, in *Colopea* the anterior or the posterior median eyes are largest, see LEHTINEN (1982). The opisthosoma may be leathery or more or less scutate; USUALLY

AT LEAST THE EPIGASTER IS DISTINCTLY SCLEROTIZED. Male pedipalpus: In *Stenochilus* the cymbium is large, encloses more parts of the bulbus which possesses well observable apophyses in contrast to *Colopea*.

(*) A loss of the unpaired tarsal claw was erroneously reported for the family Stenochilidae by JOCQUE & DIPPENAAR-SCHOEMAN (2007: 234).

Relationships: The extinct monotypic families Spatiatoridae and Vetiatoridae may be most related, see the tab. below.

Distribution: Australasian region (fossil unknown).

Character	Stenochilidae	† Spatiatoridae	† Vetiatoridae
peg teeth	absent	existing	absent/present?
posterior spinnerets	absent	existing	existing (fig.197)
dense/spatulate hairs of legs I-II	existing	existing	absent
raised cephalic part	absent	existing	absent
opisthosomal/epigastric scutum	existing	existing	absent
prosomal cuticula	tuberculate (figs. 205-206)	strongly tuberculate (fig. 196)	more or less "rugose"
distribution	Australia, India, Myanmar (extant)	Eocene Baltic and Cretaceous Burmese amber forests	Mid Cretaceous Burmese amber forest
genera	*Colopea*, *Stenochilus*	*Spatiator*	*Pekkachilus*, *Vetiator*

Tab. Characters of the Australasian family Stenochilidae and two extinct families which may be closely related

Family MICROPALPIMANIDAE WUNDERLICH 2008
(and some related families)

Members of this monotypic family are more frequent in Burmite than suggested previously by me.

New material of this monotypic extinct family: 1♂ of *Micropalpimanus ?poinari* WUNDERLICH 2008 in Mid Cretaceous Burmite, coll. PATRICK MÜLLER; 1♂ 1♀ coll. of J. WUNDERLICH (CJW), see below.

The male of the coll. MÜLLER is fairly well and almost completely preserved. Like in most other members of the genus *Micropalpimanus* exist few leg bristles, a prodistal bristle on tibia III, in the present male exists also a retrolateral bristle in the middle of the patella II, the spatulate hairs on tarsi and metatarsi I-II are dense and well developed, the epigaster is strongly sclerotized. Pedipalpus (figs. 207-209): The deformed femur bears a row of prolateral stridulatory pricks and bristles.

The male F2927/BU/CJW is well and completely preserved in a muddy piece of amber, its body length is 1.9 mm, its prosomal length is 0.95 mm, the tibiae III bear a prodistal bristle.

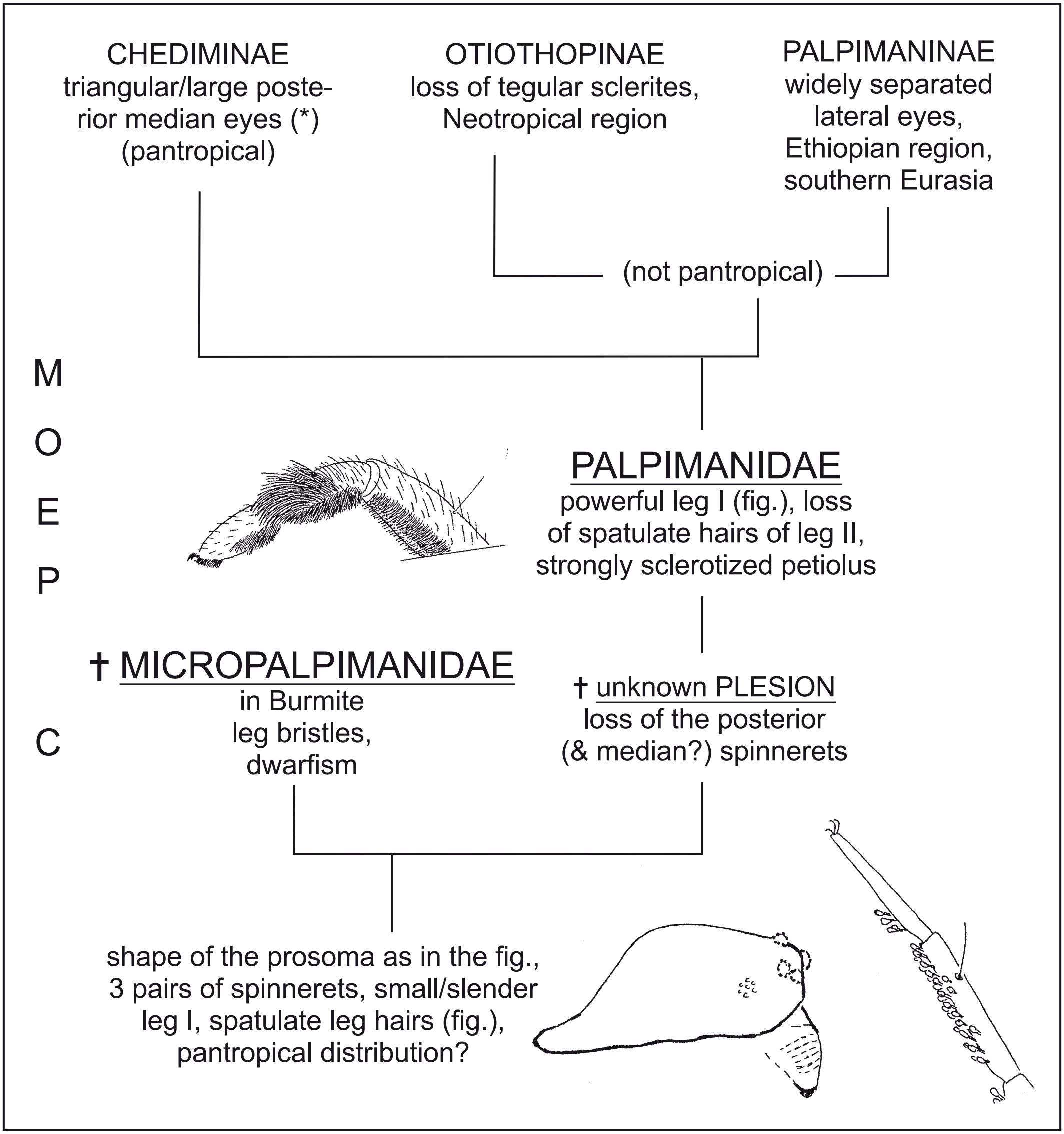
The female F2871/BU/CJW (fig. 209, photo 108) possesses a rather large opisthosoma and may be egg-bearing; it is very well and almost completely preserved in a clear piece of amber but most ventral parts of its opisthosoma are lost. Its body length is almost 3 mm, its prosoma length is 1.2 mm (it is the largest known specimen of the genus *Micropalpimanus*), a median CHELICERAL LAMELLA is absent, the patellae III bear a well developed dorsal-distal bistle, the tibiae III bear a well developed prodistal bristle. Thin hair-shaped „bristles“ exist also on the femora dorsally-distally (a single one) and dorsally on the tibiae (1-1). Metatarsi and tarsi I-II bear dense spatulate prolateral hairs. Metatarsus and tarsus of the long pedipalpus bear long prolateral bristles, the tarsus bears additionally dense retrolateral hairs, a tarsal claw is not observable.

Revised diagnosis of the Micropalpimanidae after the study of new material:
Usually SEVERAL leg bristles exist, at least a single one prodistally on tibia III (apomorphy), dwarfism (body length usually 1.5 – 2.5 mm) (apomorphy).
Remark: True tarsal trichobothria are ABSENT (see below) and spatulate hairs on tarsi and metatarsi I-II EXIST in contrast to the statements by WUNDERLICH (2015: 266).
Further – plesiomorphic – characters (see also the remark directly above): Prosoma strongly raised, not wrinkled, petiolus short, leg I slender and only about as large as II, tarsal I-II claws not reduced, patellae I-II not lengthened, tarsi I-II not shortened, EPIGASTER STRONGLY SCLEROTIZED, no further opisthosomal sclerites, posterior spinnerets well developed.

Relationships: Recently I recognized that – in contrast to the Lagonomegopidae – TARSAL TRICHOBOTHRIA ARE ABSENT in the tiny members of the Micropalpimanidae – see WUNDERLICH (2015: fig. 267 p. 393) -; long sensory hairs of another kind exist on the tarsi of this family. Furthermore SPATULATE hairs of the legs I and II exist in contrast to the THIN hairs of the Lagonomegopidae, and the eyes of both families are quite different, too. Therefor I revise my previous opinion, see WUNDERLICH (2015: 213, fig. D): the family Micropalpimanidae is transferred herewith from the Lagonopid branch to the Archaeid branch, as member of the Palpimanid subbranch, and as strongly related or even the sister family of the Palpimanidae, see fig. A. In contrast to the Palpimanidae and the Stenochilidae of the Palpimanid subbranch the posterior spinnerets are not reduced, and few leg bristles exist. The shape of the prosoma of the Micropalpimanidae is like in the Palpimanidae; in contrast to the Micropalpimanidae the posterior spinnerets, leg bristles, and spatulate hairs on leg II are absent, and a powerfull leg I, lengthened patellae I-II, shortened tarsi I-II (and frequently reduced tarsal I-II claws) exist in the Palpimanidae. – In the Pararchaeidae leg bristles and spatulate leg hairs are absent but a median cheliceral lamella exists. – Leg bristles within the Palpimanid subbranch exist – according to R. R. FORSTER (in litt. 1983 to the present author) – also in the family Huttoniidae: “There are a few spines on the tibiae and metatarsi of the third and fourth pair of legs which are usually represented by a ventral pair on the tibiae and a single prolateral spine on the metatarsus.” In the Huttoniidae exists a quite distinct – low – prosoma, and the position of the leg bristles is also quite different compared with the Micropalpimanidae.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Remarks on the cladogram of the families of the Archaeoidea sensu WUNDERLICH (2015: 213, fig. D) (see also above): The passage “strongly reduced median and posterior spinnerets” of the Palpimanid subbranch has to delete (these spinnerets exist in the Spatiatoridae, the posterior spinnerets retained also in the Huttoniidae). In this subbranch these spinnerets have been lost two times independently (in Palpimanidae and Stenochilidae) (a further loss within the Archaeoidea exists in the Mecysmaucheniidae). See also above.



(*) Compare the circular posterior median eyes in the fossil indet. below.
Irregular posterior median eyes exist also in some Otiothopinae.

Fig. A. **Provisorical chronocladogram** of the extinct Micropalpimanidae and the subfamilies of the family Palpimanidae.

The exact eras of the branchings are still unknown. The sister group of Micropalpimanidae + Palpimanidae is unknown, see WUNDERLICH (2015: 213). There is a huge gap in the fossil documentation of 80 million years between the Cretaceous Micropalpimanidae and the Miocene Palpimanidae. Because of the high number of derived characters – they surely did not originate in a single branch – of the family Palpimanidae I predict more unknown branchings than the single listed plesion. C = Cretaceous; PEOM = Palaeocene, Eocene, Oligocene and Miocene.

Family PALPIMANIDAE

This family is mainly characterized by the loss of the posterior (and median?) spinnerets as well as stout anterior spinnerets (fig. 211), an enlarged to powerful leg I (photo), and the loss of spatulate hairs of leg II, see fig. A above (such hairs on leg I may be reduced in the Chediminae). Furthermore the cephalic part is distinctly raised, usually their patellae are rather long and their tarsi are rather short.
The family Micropalpimanidae may be most related and has a similar shape of the prosoma (see above). Palpimanidae has a cosmopolitan distribution, is much more frequent in the tropics and occurs today in Myanmar (Burma), too, see below.
Palpimanid fossils (Otiothopinae) have been described in Miocene Dominican amber, see WUNDERLICH (1988: 92-93). SELDEN et al. (2016) regard a species from the Cretaceous of Brasil (Crato, in stone) as a member of the subfamily Palpimaninae. Here I describe – but not name – a Cretaceous palpimanid spider, the first one in Burmite, which I regard as a member of the subfamily Chediminae.

Palpimanidae indet. (figs. 210-211) photo 109

Material: 1 ?ad. ♂ in Mid Cretaceous Burmite, F2958/BU/CJW.

Preservation: The spider is completely preserved in a muddy orange piece of amber, the opisthosoma is dorsally deformed, most ventral parts (not the spinnerets) are hidden.

Description (♀):
Measurements (in mm): Body length 2.6, prosoma: Length 1.3, width 1.0; leg I: Femur 0.9 (height 0.27), patella 0.47, tibia ca. 0.7, metatarsus ca. 0.5, tarsus 0.37, tibia II 0.65, tibia III 0.5, tibia IV ca. 0.8.
Colour mainly redbrown, opisthosoma lighter.
Prosoma (fig. 210, photo) 1.3 times longer than wide, finely granulate, cephalic part distinctly raised, fovea absent, 8 eyes in two wide rows, posterior row distinctly procurved, lateral eyes contiguous, anterior median eyes largest, posterior median eyes circular and widely spaced. Basal cheliceral articles stout, teeth and fangs hidden, lateral stridulatory files absent, mouth parts hidden, petiolus hidden. – Legs (photo) stout and bristleless, order IV/I/II/III, femora I-II basally distinctly thickened, patellae rather long, scopulae on leg I apparently weakly developed (difficult to observe), metatarsal III-IV preening comb most probably absent, paired tarsal claws I-II not reduced. – Opisthosoma (fig. 211, photo) soft, a weak sclerotized ring around the spinnerets may exist, anterior spinnerets stout (no further spinnerets are observable). – Pedipalpus very small/minute.

Relationships: According to the shape of body and legs, the rather long patellae, the small pedipalpi, the stout chelicerae and anterior spinnerets (apparently no further spinnerets), the thickened femora I-II and the redbrown colour of prosoma and legs I regard the spider as a member of the family Palpimanidae, although cheliceral "peg teeth" are not known. The number and the position of the eyes is similar to the "most plesiomorphic" subfamily Chediminae although the posterior median eyes are circular but not oval like in extant Chediminae. – Three genera of this subfamily occur in SE-Asia, see ZONSTEIN & MARUSIK (2013: 36): *Boagrius* SIMON 1893, *Sarascelis* SIMON 1887 and *Steriphopus* O. PICKARD-CAMBRIDGE 1873. The present female may be the member of an undescribed extinct genus near *Steriphopus* – see the unknown plesion in fig. A -; a male is needed for further conclusions.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Superfamily OECOBIOIDEA

Members of this superfamily are rather diverse and not very rare in Burmite, see WUNDERLICH (e. g. 2008, 2015). Some undescribed taxa are kept in the CJW.
Today exist the families Oecobiidae and Hersiliidae; both are also known as fossils in Burmite. Certain extinct taxa in Burmite are quite different from extant taxa, and are of special interest, mainly members of the extinct subfamily Retrooecobiinae.
Oecobioidea include cribellate and ecribellate taxa, even within the same subfamily; the posterior spinnerets may be long or short (in the Retrooecobiinae), the anal tubercle may be modified or not (in the Retrooecobiinae). The diagnosis of the superfamily Oecobioidea is strongly modified by the characters of the Retrooecobiinae: the prosoma including the eyes, the spinnerets and the anal tubercle. This superfamily may be defined only by a combination of characters (see below) but not by a single autapomorphy; probably the wrapping prey behaviour – unknown in the fossil taxa – is an autapomorphy. The existence of a wide prosoma (about as wide as long), ventral tarsal bristles, the BASICALLY flat and simple bulbus and the unsclerotized epigyne are typical characters of the superfamily. These characters exist also in other superfamilies but not in this combination.

Family OECOBIIDAE

Subfamily RETROOECOBIINAE WUNDERLICH 2015

Type genus (by monotypy): *Retrooecobius* WUNDERLICH 2015
See also below: "*Retrooecobius" convexus*.

Diagnosis: Posterior spinnerets short and anal tubercle small (photo); ♂-pedipalpus: Bulbus flat, median apophysis large and divided, embolus in 2-3 wide loops near the cymbial margin, leg autotomy between coxa and trochanter.

Further (plesiomorphic) characters: Most probably ecribellate, entelegyne, unpaired tarsal claw existing, prosoma wide, fovea well developed, 8 eyes, retrolateral cheliceral files, feathery hairs as well as tarsal and femoral trichobothria absent, finely granulate prosomal cuticula, ventral tarsal bristles existing, legs stout, 3 pairs of fairly short spinnerets, unmodified anal tubercle, pedipalpal articles stout but not thickened, cymbial bristles absent.

Distribution: Mid Cretaceous Burmese (Myanmar) amber forest.

"*Retrooecobius" convexus* WUNDERLICH 2015

Relationships: According to the long basal cheliceral articles (0.5 mm) and the not protruding but long clypeus I regard *convexus* as not congeneric with the type species of *Retrooecobius* – *R. chomskyi* WUNDERLICH 2015) – but as the member of an unnamed genus of which the male is still unknown.

Distribution: Mid Cretaceous amber forest of Myanmer (Burma).

Superfamily DEINOPOIDEA

In this superfamily I include the cribellate families Burmadictynidae (extinct), questionable Deinopidae (Burmite), Praearaneidae (extinct, Burmite), Salticoididae (extinct, Jordanian amber) and Uloboridae (extant and fossil). Three families are extinct, only probably the Deinopidae and the Uloboridae survived.

Here I describe in Burmite: a questionable member of the Deinopidae the new extinct families Burmadictynidae (excluded from the Salticoididae) and the peculiar Praearaneidae, which I suppose to be probably related with the Araneoidea.

Note on the femoral trichobothria within the Deinopoidea: These special sensory hairs exist only in certain taxa of the Uloboridae: in all extant members but only in certain fossil/extinct taxa, see below.

Remarks on the prey capturing and the spinning behaviour of extinct and extant members mainly of the Deinopoidea, and on structures of Cretaceous fossils in Burmite: (1) Cribellate threads are used for prey capturing by the capture web, see WUNDERLICH (2008: 671, fig. 120). Such threads are drawn out from the spinnerets with the help of a dorsal comb (calamistrum) of the metatarsus IV, see figs. 216, 245. – (2) Ecribellate threads are used for enveloping the prey. Such threads are drawn out with the help of a row of specialized thick (bristle-shaped) ventral hairs (better called bristles in my opinion) of metatarsus and tarsus IV, see the figs. 213 and 228. They were called “Kolbenhaare” by BERTKAU (1882), “macrosetae” by OPELL (1979), and a structure named “PECTUNCULUS” of the family Uloboridae by PETERS (1982), see WUNDERLICH (2008: 671, fig. 120). This term has been overlooked rsp. not used by most authors. To my observations such bristles may exist on other tarsi than IV, too, and occur also in several further families which are more or less related to the Uloboridae (besides certain cribellate members of the RTA-clade): Burmadictynidae – see WUNDERLICH (2008: 674, fig. 138) –, Deinopidae, Praearaneidae and Salticoididae of the Deinopoidea as well as Hersiliidae and Oecobiidae of the Oecobioidea. Members of all these families are entelegyne and build capture webs, usually or even only orb webs. In other – more “basal” and haplogyne – cribellate spider families I did not find such “pectunculus”: In the Filistatidae. The example of an extinct spider with its prey is reported below: A Diptera in Burmite is preserved near the male holotype of *Propterkachin magnoculus* n. gen. n. sp. (Uloboridae), see below; the partly dissected insect is densily enveloped by ecribellate threads.

Key to the Cretaceous families of the superfamily Deinopoidea:

Notes: (1) Cribellum and calamistrum may be reduced or even absent in the male sex. – (2) Feathery hairs exist in members of the Deinopidae and Salticoididae as well as in most members of the Uloboridae. These hairs can easily be overlooked.

1 Body length 5.5 – 7 mm 2

- Body length 0.9 – 3.2 mm 3

2(1) Legs I-II powerfull, BOTH strongly longer than legs III-IV (photo 110), lateral eyes widely spaced from each other, similar to fig. 222. ♂ -Pedipalpus: Figs.214-215. Only *Deinopedes tranquillus* n. gen. n. sp. . . . . ?DEINOPIDAE

- Legs I-II not strongly longer than legs III-IV (*) (photos 123-124). Lateral eyes close together (fig. 235). ♂- Pedipalpus: Figs. 241 – 244. *Praearaneus* n. gen. . . . . .PRAEARANEIDAE

3(1) Lateral eyes always widely spaced from each other (figs. 222, 231), metatarsus IV frequently concave dorsally (similar to fig. 245), femoral trichobothria and feathery hairs frequently existing (they may be difficult to recognize). Numerous genera . . . . ULOBORIDAE

- Lateral eyes usually close together, fairly spaced (by their diameter) only in *Eodeinopis*, metatarsus IV most often straight or slightly concave, femoral trichobothria absent. 4

4(3) Feathery hairs absent, anterior median eyes not enlarged. Burmite and Lebanese amber. 3 genera . . . . BURMADICTYNIDAE

- Feathery hairs existing, anterior median eyes enlarged. Jordanian amber. Only *Salticoididus*. . . . . SALTICOIDIDAE

(*) Leg I but not II is strongly lengthened in *Eodeinopis* n. gen. and in *Palaeomicromenneus* PENNEY 2003 (both Burmadictynidae), as well as in some Uloboridae.

?Family DEINOPIDAE

Palaeomicromenneus PENNEY 2003: See Burmadictynidae and the key above.

Deinopidae has been reported from Eocene Baltic amber, see WUNDERLICH (2004: 887-897) but never surely from the Cretaceous of the Mesozoic up to now. Here I describe a questionable member of this peculiar cribellate family in Burmite.

Deinopedes **n. gen.**

Etymology: The name refers to the similar long legs I-II of the deinopid genus *Deinopis*, from pedes (lat.) = legs.

The gender of the name is masculine.

Type species (by monotypy): *Deinopedes tranquillus* n. sp.

Diagnosis (♂; ♀ unknown): Prosoma and opisthosoma long and slender (photo 110), legs I AND II quite large, powerful, III and IV distinctly shorter (photo); pedipalpus (figs. 214-215): Cymbium wide, bearing a larger and bent retrolateral bristle, median apophysis large and divided, embolus hidden, probably describing one or two wide loops. I regard the behaviour – see below – also as a diagnostic family character.

Further characters: Metatarsus IV straight, not depressed laterally, calamistrum probably absent; eyes: See below. Larger spiders, body length 6.5 mm.

Behaviour: The position of the legs – with the quite long legs I and II which are widely spread laterally in the single fossil (photo 110) – may indicate a capturing leg position similar to extant members of the family Deinopidae: The capture web is spread between the legs I and II, see WUNDERLICH (2004: 897, figs. 11-12) and JOCQUE & DIPPENAAR-SCHOEMAN (2007: 109, fig. 31 h). In contrast to these extant spiders the legs III and IV are distinctly shorter than I and II in *Deinopedes*, but in the Eocene ?*Menneus pietrzeniukae* WUNDERLICH 2004 in Eocene Baltic amber the legs III and IV are also distinctly shorter than I and II, like in *Deinopedes*.

The **relationships** (see the key to the families and the paragraph “Behaviour “ above): Like in the family Deinopidae the legs I AND II are quite long/powerful but the posterior median eyes are smaller – a character of ancient Deinopidae? In *Praearaneus* n. gen. (family Praearaneidae) the prosoma is almost as wide as long, the legs are less powerful, the opisthosoma is oval (almost egg-shaped), the structures of the ♂-pedipalpus (e. g. of the tibia and the bulbus) are quite different, a retrolateral cymbial bristle is absent. – In *Eodeinopis* n. gen. and the small *Palaeomicromenneus* PENNEY 2003 in Lebanese amber – both are regarded here as members of the family Burmadictynidae – leg II is distinctly shorter than leg I.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Deinopedes tranquillus* n. gen. n. sp.** (figs. 212-215) photo 110

Etymology: The species name refers to the leg position of certain members of the family Araneidae, from tranquillus (lat.) = at rest.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2990/BU/CJW.

Preservation and syninclusions: The spider is preserved in a muddy piece of amber which is 3.7 cm long; it is partly decomposed and covered with an emulsion, the prosoma is injured (inclined) dorsally, structures like the eyes, mouth parts, chelicerae, spinnerets and bulbus are partly hidden, both legs I are cut off through their tibia, the right tarsus I is lost by amputation. – Syninclusions: Several arthropod larvae, a Thysanoptera, a Hymenoptera, an Acari and several Diptera (a large one at the right side of the spider has probably been the prey of the spider), plant hairs as well as a band-shaped structure including probably spider's threads as well as sticky droplets are preserved in the same piece of amber.

Diagnosis: See above.

Description (♂):
Measurements (in mm): Body length ca. 6.5, prosoma: Length ca. 2.5, width ca. 1.6, basal cheliceral articles 0.9; opisthosoma: Length ca. 4.0, width ca. 2.5; leg I: Femur ca. 7.0, patella 2.0, leg II: Femur ca. 4.5, patella 1.6, tibia ca. 3.5, metatarsus 3.4, tarsus 1.5, tibia III 2.0, metatarsus IV ca. 3.5.
Colour mainly medium brown.
Prosoma (photo) low, ca. 1.6 times longer than wide, decomposed and strongly deformed, 8 eyes which are partly hidden or even destroyed, posterior medians probably largest but not powerful, lateral eyes widely spaced, basal cheliceral articles relatively large, fangs long. – Legs (fig. 212-213, photo): I-II quite long, powerful, III-IV distinctly shorter and more slender, scopulae, metatarsal preening combs and claw tufts absent, metatarsus IV straight and not depressed laterally, calamistrum probably absent, hairs short, bristles numerous, existing on femora to tarsi (ventrally), partly long, standing out from their articles, not paired on tibiae and metatarsi; femoral and tarsal trichobothria as well as feathery hairs absent, large tarsal claws, the paired are toothed. – Opisthosoma (photo) decomposed and strongly deformed, ca. 1.6 times longer than wide, soft, hairs short, posterior spinnerets longest, anterior spinnerets probably widely spaced, cribellum unknown, anal tubercle of medium size, unmodified. – Pedipalpus (figs. 214-215) strongly deformed, with slender articles, spiny, the left tibia has a "suture" apparently as an artefact and bears a strong dorsal-apical bristle, cymbium quite wide, without paracymbium and apical spines, with a long retrolateral bristle as well as two small bristles, bulbus protruding, partly hidden, bearing a larger and divided median apophysis, embolus hidden, probably describing one or two wide loops.

Relationships and distribution: See above.

Family BURMADICTYNIDAE n. fam.

The genus *Burmadictyna* is excluded here from the family Salticoididae (see below) and designed as the type genus of the related new family Burmadictynidae. The genus *Salticoididus* WUNDERLICH 2008 remains in the family Salticoididae, see WUNDERLICH (2008: 310 f) but *Palaeomicromenneus* PENNEY 2003 (*) is transferred here to the family Burmadictynidae. Here I describe a further member of *Burmadictyna* and the new genus *Eodeinopis*. – The family Salticoididae has to be removed from the fauna of the Burmese amber forest and may – probably together with the Burmadictynidae – be the sister group of the remaining Deinopoidea (or of the Deinopoidea + Araneoidea?).

(*) Only the type species *P. lebanensis* PENNEY 2003 in Lebanese amber, see the tab. and the key below and WUNDERLICH (2015: 313-314, figs. 338-339).

Type genus: *Burmadictyna* WUNDERLICH 2008.
Further genera: *Eodeinopis* n. gen. and *Palaeomicromenneus* PENNEY 2003.

Diagnostic characters: Cribellum and calamistrum well developed in both sexes (figs. 112, 114), legs spiny, order I/II/IV/III, three tarsal claws, femoral and tarsal trichobothria absent, leg bristles usually existing on femora to metatarsi (see below), ventral tarsal III-IV bristles frequently existing, metatarsus IV not depressed laterally, straight or slightly to fairly bent (fig. 216) (see below), eyes in two wide rows, posterior row +/- recurved, lateral eyes usually close together (fairly spaced in *Eodeinopis*), anterior median eyes not enlarged – see WUNDERLICH (2015: 401: Figs. 342-343) –, fovea apparently absent, opisthosoma usually soft but scutate in *B. postcopula*, anal tubercle quite large, pedipalpus (figs. 217-218, 219-220; WUNDERLICH (2015: 402: Figs. 350-352)): Tibia dorsally-apically modified in the type genus, embolus building a spiral which is quite long and cylindrical in the type genus.

Intrageneric and intraspecific variability (see also the diagnostic characters): (1) Most often the metatarsus IV is straight, in some specimens it is slightly bent, in the single known male of *Burmadictyna postcopula* n. sp. it is fairly bent (fig. 216). (2) The calamistrum occupies more than 2/3 of the metatarsus but in some specimens it occupies almost the whole metatarsal length (fig. 216) although it is fairly indistinct at its end. (3) The number of ventral tarsal III-IV bristles is variable e. g. within *Burmadictyna*, also within the same pair of legs, from 0 to 3. (4) The position of the metatarsal trichobothrium is in 0.25 in *Eodeinopis*, ca. 0.7-0.9 in *Burmadictyna* (unknown in *Palaeomicromenneus* and *Salticoidus*). (5) The legs are not annulated in *Burmadictyna postcopula* but slightly or even strongly annulated in other confamiliar species. The strength of the annulation may partly depend on the kind of preservation. (6) Femoral bristles exist except in *Eodeinopis*. (7) The legs are frequently distinctly/densely hairy but not in *Burmadictyna postcopula* n. sp. and in *Eodeinopis longipes* n. sp. (8) The embolus builds a relatively short spiral in *Eodeinopis* (fig. 219-220) and *Palaeomicromenneus* or a long cylindrical spiral (fig. 218). (9) A “mating plug” of the embolus may exist – see WUNDERLICH (315, 402: Figs. 350-352) – but it may be absent – in *Eodeinopis* and *Palaeomicromenneus* – or absent after/by a copulation, e. g. in *B. postcopula* (fig. 218).

(10) Body length usually 2.5-2.86 mm but only 1.7 mm in *Eodeinopis*. (11) Leg autotomy usually absent, only in the female holotype of *Burmadictyna pecten* WUNDERLICH 2008 a – questionable! – patella-tibia autotomy has been observed.

Relationships (see the tab. below and the key to the families): In the Deinopidae the position of the eyes is quite different from the Burmadictynidae and the legs I AND II are distinctly elongated. In the Uloboridae the lateral eyes are widely spaced, the posterior row is strongly recurved, USUALLY (in the extant taxa) metatarsus IV is depressed laterally as well as strongly bent, and femoral trichobothria exist USUALLY (so in the extant taxa). In the most related Salticoididae – the genus *Salticoididus* WUNDERLICH 2008 – preserved in Jordanian amber – feathery hairs exist, the anterior median eyes are enlarged, the existence of a "mating plug" is unknown and probably absent. – According to the unmodified position of the eyes with the usually almost contiguous lateral eyes, the not depressed metatarsus IV, and the absence of femoral trichobothria the Burmadictynidae may be the most "primitive" member of the superfamily Deinopoidea besides the Salticoididae.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Selected characters of the genera of the families Salticoididae (*Salticoididus*) and Burmadictynidae (the remaining genera):

Character	*Burmadictyna*	*Eodeinopis*	*Palaeomicromenneus*	*Salticoididus*
feathery hairs (*)	–	–	+??	+
quite large anterior median eyes	–	–	–	+
lateral eyes	close together	spaced by their diameter	widely spaced?	close together
very long leg I (**)	– (photos)	+ (photo 110)	+	–
femoral bristles	+	–	+	+
position of the metatarsal trichobothrium	ca. 0.7-0.9	ca. 0.25	?	?
distinct median apophysis	– (fig. 218)	– (fig. 219)	+	+
body length (♂)	2.2-2.8	1.7	2.86	ca. 2.6
embolus	numerous loops, cylindrical shape (fig. 218)	ca. 3 loops (fig. 219)	ca. 3 loops	ca. 3 loops (?)
mating plug	+/–	–	–	–
distribution	Burmese amber	Burmese amber	Lebanese amber	Jordanian amber

(*) in the sense of WUNDERLICH (2008: 670, fig. 113).
(**) Femur I about twice as long as the prosoma.

Burmadictyna postcopula n. sp. (figs. 216-218) photos 113-115

Etymology: The species name refers to the embolus of the holotype whose “mating plug” is broken off and lost, probably during the copulation (see below); from post (lat.) = after, and copula (lat.) meaning copulation.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3026/BU/CJW.

Preservation and syninclusions: The spider is completely and excellently preserved in a clear yellow piece of amber, several gas bubbles hide parts of body, legs and pedipalpi, a large bubble is preserved on the opisthosoma, the opisthosoma contains a movable gas bubble, the “mating plug” is lost. – Syninclusions are 3 ½ Diptera: Brachycera, plant hairs and detritus.

Diagnosis (♂; ♀ unknown): Opisthosoma (photo) leathery or even scutate; pedipalpus (figs. 217-218): Patella dorsally-distally bulging, tibia with a (retro)dorsal apophysis close to the dorsal-basal outgrowth of the cymbium. (The “mating plug” is lost).

Description (♂):
Measurements (in mm): Body length 2.7; prosomal length 1.35; opisthosomal length 1.5; leg I: Femur 1.2, patella 0.45, tibia 1.4; leg IV: tibia 0.95, metatarsus 0.95, tarsus 0.55.
Colour: Prosoma and legs medium brown, legs not annulated, opisthosoma light grey brown.
Prosoma (photo) distinctly longer than wide, anteriorly distinctly narrowed, hairs short, fovea indistinct or absent, 8 eyes in 2 wide rows, posterior row slightly recurved, posterior median eyes spaced by more than 2 diameters, lateral eyes close together, anterior median eyes not enlarged, spaced by ca. 1 ½ diameters, basal cheliceral articles, mouth parts and most parts of the sternum hidden. – Legs (fig. 216, photo) only fairly long, order I/II/IV/III, I distinctly the longest, hairs fairly short, spiny; bristles: Leg I: Femur ca. 10, patella none (few on other patellae), tibia 3 prolaterally and 2 retrolaterally, metatarsus at least 3 in the basal half, all tarsi bristleless, all metatarsi bear a fringe of apical bristles, position of the metatarsal trichobothria in ca 0.9, 3 large tarsal claws, paired claws with large teeth. – Opisthosoma (photo) oval, hairs quite short, dorsally apparently with a large scutum (or hardened/leathery?) except the posterior part, ventrally also scutate, lung covers large, anal tubercle quite large, cribellum wide and undivided, 3 pairs of well developed spinnerets. – Pedipalpus (figs. 217-218, photo 115): Patella bulging dorsally-distally, tibia with a large trichobothrium near its middle, quite long retrolateral hairs and an apical outgrowth close to a probasal cymbial outgrowth, cymbium wide and high, bearing a basal depression, embolus expanded, building a cylindrical spiral of ca. 10 loops, seam indistinct, tip with a tiny droplet. The “mating plug” of the right embolus is lost (the tip of the left pedipalpus is hidden). The absence of the “mating plug” indicates its loss during a copulation; see WUNDERLICH (2015: 3, 316, 402: Figs. 450-452).

Relationships: In the remaining congeneric species the legs are more or less annulated, the opisthosoma is soft, and the ♂-pedipalpus is different, in *B. clavata* WUNDERLICH 2015 the pedipalpal patella possesses a large dorsal outgrowth.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Burmadictyna excavata WUNDERLICH 2015, new material:

1♂ in Mid Cretaceous amber, coll. Patrick Müller, inv. no. BUB-92.

The spider is well and completely preserved.
Stridulatory picks of the pedipalpal femur are absent, cheliceral stridulatory files are apparently absent, too; metatarsus IV straight, calamistrum occupying more than 2/3 of the metatarsal length; 3 pairs of spinnerets and the cribellum are well observable.

Burmadictyna sp. indet. (photos 111-112)

Material: 1♂ in Mid Cretaceous Burmite, F2959/BU/CJW.

Preservation and short description: The spider is fairly well preserved, the spinnerets and the undivided cribellum (photo) are excellently preserved, few parts of the left legs I-II and dorsal parts of the opisthosoma (within the amber) are cut off. A piece of amber is preserved in front of the spider. The spider is 2.8 mm long, its prosoma is 1.3 mm long. The spider's posterior eye row is slightly procurved, the clypeus bears two pairs of long bristle-shaped hairs, the legs are distinctly annulated, ventral tarsal I-II bristles are absent, metatarsus IV is straight, the position of the right metatarsal II trichobothrium is in 0.82, the opisthosoma is soft (a scutum is absent), the pedipalpi are deformed, the bulbi are not expanded, the blunt and unmodified tip of the right spiral emboli is fairly well observable, its "mating plug" is lost.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Burmadictyna sp. indet.

Material: 1♀, F3061/BU/CJW.
The spider is not well preserved, its body length is 3.2 mm.

***Eodeinopis* n. gen.**

Etymology: From eo- (gr.) = early and the genus name *Deinopis*.

The gender of the name is feminine.

Type species (by monotypy): *Eodeinopis longipes* n. sp.

Diagnosis (♂; ♀ unknown) (see the tab above): Leg I (photo 116) quite long, lateral eyes spaced by their diameter from each other, femoral bristles absent, position of the metatarsal trichobothria in ca. 0.25, feathery hairs absent, embolus (figs. 219-220) describing ca. 3 loops. Smallest member of the family Burmadictynidae, body length 1.7 mm.

The **relationships** are not sure (see the tab. above): In *Burmadictyna* the lateral eyes are close together, the position of the metatarsal trichobothrium is quite more distally and the embolus describes numerous loops. In *Palaeomicromenneus* PENNEY 2003 leg I is quite long, too, but femoral bristles, and PROBABLY feathery hairs exist. Members of *Burmadictyna* and *Palaeomicromenneus* are larger and a distinct median apophysis (conductor?) exists.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Eodeinopis longipes* n. gen. n. sp.** (figs. 219-220) photo 116

Etymology: The species name refers to the very long leg I, from longus (lat.) = long and pes (lat.) = leg.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3036/BU/CJW.

Preservation and syninclusions: The spider is almost completely and very well preserved in a clear yellow piece of amber which is 16 mm long; the right patella IV and the spinnerets are cut off, the prosoma is dorsally inclined. – Syninclusions: A tiny Thysanoptera, right above near the spider, 1 Coleoptera (body length 2 mm) in the same layer of the amber as the holotype, a juv. Araneae: Uloboridae indet., body length 1.4 mm as well as tiny droplets, remains of plants and tiny scales. Furthermore questionable cribellate threads and few ECRIBELLATE THREADS of an unknown spider are preserved which has not been captured by this piece of amber and which bear swollen sticky droplets. A muddy “band” of threads which may include cribellate threads as well as sticky droplets runs from the spider’s body 10 mm to the beetle. One of the double threads (fig. 221) bears half a dozen droplets and runs to a clue of threads. The threads are unbranched and may originate from an orb-shaped capture web, probably of a member of the Theridiosomatidae or of the Praearaneidae.

Diagnosis: See above.

Description (♂):
Measurements (in mm): Body length 1.7; prosoma: Length 0.8, width ca. 0.9; opisthosoma: Length 1.0, width 0.6; leg I: Femur 1.6, patella 0.4, tibia 1.65, metatarsus 1.95, tarsus 0.8, tibia II 0.8, tibia III 0.4, tibia IV 0.6.
Colour: Prosoma and legs dark brown, legs probably not annulated, opisthosoma light grey brown.
Prosoma (photo) (deformed) slightly wider than long, bearing few short hairs, fovea apparently absent, 8 eyes of medium size in two rows of a fairly wide field, anterior median eyes not enlarged, posterior row recurved, lateral eyes spaced by about their diameter from each other, clypeus short, basal cheliceral articles fairly long, mouth parts hidden, coxae IV spaced by about their diameter by the sternum. – Legs (photo) slender, order I/II/IV/III, I very long (twice as long as the prosoma), hairs not distinct, spiny, femora none, patellae and tibiae dorsally 1/1, metatarsi several including apical bristles, at least 5 dorsally and laterally on I, femoral trichobothria absent, metatarsus IV straight and not depressed laterally, length of the calamistrum ca. 2/3 the length of the article, position of the metatarsal II trichobothrium in ca. 0.25, 3 tarsal claws. – Opisthosoma (photo) oval, hairs indistinct, spinnerets cut off. – Pedipalpus (figs. 219-220) (see above) with slender articles, patella and tibia short, tibia dorsally-apically modified, cymbium large/wide, tegulum protruding, median apophysis/conductor not recognizable, embolus bearing a seam.

Relationships: See above.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Family SALTICOIDIDAE WUNDERLICH 2008

The genus *Burmadictyna* is excluded here from the family Salticoididae and designed as the type genus of the related new family Burmadictynidae, see above. The genus *Salticoididus* WUNDERLICH 2008 (Cretaceous Jordanian amber) remains in the family Salticoididae, see WUNDERLICH (2010: 310 f) but *Palaeomicromenneus* PENNEY 2003 (Burmite) is transferred to the family Burmadictynidae, see above. The family Salticoididae has to be removed from the fauna of the Burmese amber forest and may be – probably together with the strongly related Burmadictynidae and Praearaneidae (see below and the key above) – the sister group of the remaining Deinopoidea (or of the Deinopoidea + Araneoidea?).

Family ULOBORIDAE

Camouflage/mimesis, similarity to plants: See WUNDERLICH (2008: 535).

The discovery of peculiar Cretaceous uloborid taxa causes a strongly modified new diagnosis of this family, see WUNDERLICH (2015: 319). Some of the most important characters of the extant Uloboridae are ABSENT in certain taxa in Burmite, e. g. femoral trichobothria. In my opinion this absence is not a symplesiomorphic but an apomorphic character of certain taxa like the Uloborinae (*). In the extinct new genus *Kachin* of this subfamily the metatarsus IV is only slightly bent and not depressed laterally in contrast to the extant members of this subfamily (and extant members of the family), an intermediate stage. – The situation – the combination of characters – is somewhat similar in the family Tetragnathidae (superfamily Araneoidea) in which certain ancient/basal taxa lack femoral trichobothria, too (and quite large modified male chelicerae are absent as well) in contrast to advanced members like the taxa of the subfamily Tetragnathinae. Members of this – in the geological sense – young subfamily are absent in Burmite and also in the Eocene European ambers like the Baltic amber, see WUNDERLICH (2004).

(*) They exist in most of the remaining Uloboridae.

Evolution, ”missing links” (See also above): Members of the four-eyed Miagrammopini (rsp. Miagrammopinae) have not been found in Cretaceous ambers and are apparently absent in the Mesozoic. The eight-eyed genus *Paramiagrammopes* WUNDERLICH 2008 in Burmite may be related to the precursor of the extant genus *Miagrammopes* O. PICKARD-CAMBRIDGE 1869 and the six-eyed genus *Eomiagrammopes* WUNDERLICH 2004 in Eocene Baltic amber. *Eomiagrammopes* may be a model of the “missing link” between the remaining two genera, see WUNDERLICH (2008: 558, figs. A-C).

Note on the fossils in Burmite: I did not find a Cretaceous uloborid taxon which possesses close relationships to an extant taxon of Myanmar or other aeras of SE-Asia. Here I describe two new genera and three new species in Burmite. Some more taxa (genera and species, CJW) are still waiting for their descriptions).

Kachin n. gen

Etymology: The genus name refers to Kachin. Kachin are inhabitants of the Kachin State in N-Myanmar in which the Burmese amber including the holotypes of the two species of the new genus *Kachin* have been collected. Few years ago I visited the Kachin State and had the opportunity to discuss with several friendly residents. People of the Kachin State are fighting for independence from the Central Regime of Myanmar. The Myanmar Armed Forces is called to use chemical weapons. More informations: See Wikipedia (Internet).

The gender of the name is masculine.

Type species: *Kachin fruticosus* n. sp.
Further species: *Kachin fruticosoides* n. sp.

Diagnosis (♂; ♀ unknown): Opisthosoma with few pairs of hair brushes (figs. 223, 227), femoral trichobothria existing, feathery hairs and calamistrum (of the male sex) absent, metatarsus IV not depressed laterally and only slightly concave dorsally. Pedipalpus (figs. 224-226, 228-230): Patella longer than the tibia, bulbus bearing long tegular apophyses, the longest one is directed backward (to the prosoma), embolus unknown.

Relationships: Concerning the unusual structures of the bulbus *Propterkachin* n. gen. (see below) may be related. According the absence of feathery hairs and the existence of opisthosomal hair brushes in my opinion *Kachin* is most likely a member of the subfamily Uloborinae.
Note: A further spider taxon in Burmite known to bear hairy opisthosomal humps/brushes is *Pedipalparaneus seldeni* WUNDERLICH 2015 of the extinct family Mongolarachnidae. See also the genus *Furcembulus* WUNDERLICH (Tetrablemmidae).

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Kachin fruticosus* n. gen. n. sp.** (figs. 222-226) photos 119-121

Etymology: The species name refers to the small opisthosomal brushes of hairs, from fruticus (lat.) = bushy.

Material: Holotype ♂ in Mid Cretaceous Burmite and a separated piece of amber, F3058/BU/CJW.

Preservation and syninclusions: The spider is excellently and almost completely preserved in a clear yellowish piece of amber, only the tip of the left tarsus I is cut off; a small bubble (a secretion from the mouth) is preserved on the sternum. – Syninclusions are several plant hairs and a small beetle in the separated piece of amber, some questionable spider's threads and several small particles of pyrite.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 224-226): Retrodorsal hairs of the patella existing along the whole length of the article, longest tegular apophysis straight at its tip (fig. 224).

Description (♂):
Measurements (in mm): Body length 2.5; prosoma: Length 1.3, width 0.9; opisthosoma: Length 1.5, width 0.9; leg I: Femur 2.0, patella 0.6, tibia 1.5, metatarsus 1.7, tarsus 0.15, tibia II 0.8, tibia III 0.45, tibia IV 0.7.
Colour light grey brown, legs annulated.
Prosoma (fig. 222, photo) 1.44 times longer than wide, densily covered with thickened hairs, fovea well developed, 8 eyes of medium size in a wide field, posterior row strongly recurved, lateral eyes widely separated from each other, thoracal part with a distinct pair of raised "shoulders", clypeus and basal cheliceral articles fairly long, mouth parts hidden by an emulsion, coxae IV close together. – Legs (photo) fairly long, order I/II/IV/III, I distinctly the longest, feathery hairs absent, few femoral trichobothria which are difficult to recognize, normal hairs short, bristles numerous and rather long, leg I: Femur prolaterally 2, dorsally 1 basally and 1 distally and a pair of laterals distally, patellae dorsally 1/1 and a pair of laterals, tibia 7, metatarsus 6 and apicals, tarsus none; leg IV: Tibia ca. 5, metatarsus 2 retrodorsally, 1 prolaterally, 1 ventrally in the distal half and 4 apicals, tarsus 2 ventrally in the distal half. Metatarsus IV slightly concave dorsally, not depressed laterally, calamistrum absent; position of the metatarsal trichobothria unknown. – Opisthosoma (fig. 223, photo) 1.7 times longer than wide, slightly overhanging the spinnerets, covered with numerous hairs of medium length and two or three small pairs of hair brushes, spinnerets fairly short, cribellum partly hidden by a bubble. – Pedipalpus (figs. 224-226, photo 121) with spiny and slender articles, patella longer than the tibia and with dense dorsal hairs along its whole length, cymbium large, apparently not modified, bristles absent, bulbus with long tegular apophyses, the longest one straight at its end, embolus unknown.

Relationships: In *K. fruticosoides* n. sp. the dorsal hairs of the pedipalpal patella are restricted to a distal brush, the largest tegular apophysis is bent at its end and the number of leg bristles (e. g. of femur I) is higher.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Kachin fruticosoides* n. gen. n. sp. (figs. 227-230) photos 117-118**

Etymology: The species name refers to the similar shape of body and pedipalpus of *K. fruticosus* n. sp., from -id(es) (gr.) = similar.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3059/BU/CJW.

Preservation and syninclusions: The spider is excellently and completely preserved in a larger flat yellowish piece of amber, the opithosoma is depressed dorsoventrally and bears ventral emulsions; the position of the legs (photo) indicates a "resting position" of the spider. – Also preserved is a questionable spider's thread above the spider.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 228-230), retrodorsal hairs of the patella (fig. 228) restricted to a distal brush, longest tegular apophysis bent at its end (fig. 229).

Description (♂):
Measurements (in mm): Body length 2.8; prosoma: Length 1.2, width 0.95; opisthosoma: Length 1.6, width 0.95; leg I: Femur 2.2, patella 0.6, tibia 1.5, metatarsus 1.55, tarsus 0.75, tibia II 0.9, tibia III 0.5, tibia IV 0.7.
Colour light grey brown, legs annulated, prosoma and opisthosoma have probably been darkened in the living spider.
Prosoma, legs and opisthosoma (fig. 227, photo) quite similar to *K. fruticosus* n. sp., the number of leg bristles is lower in *fruticosus* (if not incomplete and partly rubbed off), femur I bears about a dozen bristles in *fruticosoides*), the number of opisthosomal hair brushes may be a bit lower in *fruticosus* (if not incomplete). Femoral trichobothria difficult to recognize, few observable e. g. on the left femur II; position of the metatarsus I trichobothrium in 0.38. – Pedipalpus (figs. 228-230) with slender and spiny articles, the retrodorsal bristles of the long patella (fig. 228) are restricted to a distal brush, the longest tegular apophysis is bent at its end (fig. 229).

Relationships: See *K. fruticosus* n. sp.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Propterkachin **n. gen.**

Etymology: The name refers to the similar/related genus *Kachin*, see above.

The gender of the name is masculine.

Type species (by monotypy): *Propterkachin magnoculus* n. sp.

Diagnosis (♂; ♀ unknown): Anterior median eyes (fig. 231) strongly enlarged, femoral trichobothria not found; pedipalpus (fig. 232): Tegulum with long apophyses.

Further characters: Feathery hairs absent, metatarsus IV distinctly concave but not depresssed laterally, calamistrum long.

Relationships: According to the absence of feathery hairs probably a member of the subfamily Uloborinae. In *Kachin* n. gen. the anterior median eyes are not enlarged, the opisthosoma bears brushes of hairs, the pedipalpal patella is longer than the tibia, the tegulum bears also long apophyses which are similar but different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

***Propterkachin magnoculus* n. gen. n. sp**. (figs. 231-232)

Etymology: The species name refers to its large anterior median eyes, from magnus (lat.) = large and oculus (lat.) = eye.

Material: The male holotype is kept in the coll. of PATRICK MÜLLER in 66894 Käshofen, inv. no. BUB 1132. PATRICK MÜLLER recognized this interesting spider; it is preserved together with several rare/unusual arthropods which are waiting for descriptions, see below.

Preservation and syninclusions: The spider is completely preserved in a fairly muddy piece of amber which is about 2 ½ cm long; the opisthosoma is dorsally fairly inclined in the middle. – Syninclusions: Remains of a larger capture web is preserved in several parts of the piece of amber, a beetle and a partly dissected Diptera (body length almost 2 mm) are preserved 3 mm left of the spider in contact to spider threads (fig. 232a). At least the Diptera should well have been a prey of the spider: It is partly densily enveloped by – apparently ecribellate – threads. The enveloping capturing behaviour of extant Uloboridae has been described by PETERS (1982), see above (Deinopoidea), and is in the present paper reported from Cretaceous (and fossil) spiders for the first time. – Further preserved are 3 Hymenoptera (a quite long one is rather special), 2 Diptera, a second Coleoptera, 3 unusual small insects indet. as well as remains of insects and plants.

Diagnosis, relationships and distribution: See above.

Description (♂):
Measurements (in mm): Body length 2.0; prosoma: Length 1.0, width 0.7; opisthosoma: Length 1.25, width 0.9; tibia I ca. 0.9.
Colour dark brown, legs not annulated.
Prosoma (fig. 231) 1.4 times longer than wide, anteriorly distinctly narrowed, weakly rugose, hairs short, fovea deep and transverse, thoracal part not raised, 8 eyes in a wide and long field, anterior median eyes distinctly largest and protruding, posterior row distinctly recurved, mouth parts hidden, sternum hairy and wide, spacing the coxae IV by more than half of their diameter. – Legs only fairly long, hairs short, bristles numerous and well developed, femur I bears 1 dorsally near the middle and 1/1 in the distal half, patella IV 1/1 dorsally, tibia I ca. 10, metatarsus I probably only 2 and apicals, metatarsus and tarsus IV bear ventral bristles, femoral trichobothria not found, metatarsus IV dorsally distinctly concave, laterally not depressed, calamistrum long. – Opisthosoma 1.33 times longer than wide, hairs short, 3 pairs of questionable sigillae existing, spinnerets partly hidden, short. – Pedipalpus (fig. 232): Femur slender, patella bearing 3 bristles, shorter than the tibia, cymbium partly hidden, bulbus with two long tegular apophyses, questionable embolus in an apical position.

Furculoborus **n. gen.**

Etymology: The name refers to the furcate apophysis of the pedipalpal patella, from furc- (lat.) = fork, and the uloborid genus name Uloborus.

The gender of the name is masculine.

Type species (by monotypy): *Furculoborus patellaris* n. sp.

Diagnosis (♂; ♀ unknown): Existence of femoral trichobothria unknown, feathery hairs existing, prosoma (fig. 233, photo 122) egg-shaped, metatarus IV straight and not depressed laterally, calamistrum apparently long; pedipalpus (figs. 233-234): Articles stout, patella with a forked dorsal apophysis, cymbium dorsally raised, bulbus almost globular, distinct tegular apophyses absent, embolus unknown.

Relationships: I do not know any other uloborid taxon in which a forked dorsal pedipalpal patellar apophysis exists. According to the existence of feathery hairs *Furculoborus* is not a member of the subfamily Uloborinae. The outline of the prosoma is similar to *Philoponella divisa* OPELL1976: Fig. 217, in which the structures of the male pedipalpus are quite different.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Furculoborus patellaris **n. gen. n. sp**. (figs. 233-234) photo 122

Etymology: The species name refers to the peculiar forked apophysis of the pedipalpal patella.

Material: Holotype ♂ in Mid Cretaceous Burmite, F3060/BU/CJW.

Preservation: The spider is fairly well and incompletely preserved in a fairly muddy piece of amber, a bubble hides the mouth parts, most legs are bent under the body, several leg articles are cut off, the left legs II-IV and the right leg II are complete.

Diagnosis, relationships and distribution: See above.

Description (♂):
Measurements (in mm): Body length 2.0; prosoma: Length 1.0, width 0.8; opisthosoma: Length 1.2, width 0.8; leg I: Femur ca. 1.3, femur II ca. 0.65, femur III ca. 0.48; leg IV: Femur ca. 0.8, patella 0.25, tibia 0.5, metatarsus 0.6, tarsus 0.35.
Colour: Prosoma and legs dark brown, legs not annulated, opisthosoma medium grey.
Prosoma (fig. 233, photo) 1.25 times longer than wide, thoracic “shoulders” absent,

not hairy, feathery hairs existing, fovea well developed, short, 8 small eyes in a wide field, anterior medians largest, both rows strongly recurved, basal cheliceral articles small, mouth parts and sternum hidden. – Legs (photo) incomplete, fairly stout, hairs fairly short, femoral and metatarsal trichobothria unknown, bristles few and short, difficult to observe, few ventral metatarsal and tarsal bristles exist, metatarsus IV straight, not depressed laterally, calamistrum apparently long. – Opisthosoma (photo) 1.5 times longer than wide, hairs not dense and fairly short, spinnerets short, cribellum difficult to observe. – Pedipalpus: See above.

Family PRAEARANEIDAE n. fam., photos 123-126

Etymology: See *Praearaneus* n. gen.

Type genus: *Praearaneus* n. gen.

Diagnostic characters (♂; the possible ♀ of *Praearaneus* indet. is only insufficiently known): Cribellum existing, undivided, calamistrum of the probably congeneric adult female long, metatarsus IV not depressed laterally, distinctly concave dorsally (fig. 245) (straight in the adult male and in the juvenile female F3064), feathery hairs absent, 8 eyes in two rows of a wide field with the lateral eyes close together and the posterior row straight (fig. 235), clypeus short and not protruding (fig. 236), ventral tarsal bristles existing (fig. 238), ♂-pedipalpus (figs. 240-244): Patella and tibia short, tibia with a retrolateral outgrowth, cymbium wide and short, paracymbium absent, median apophysis large and divided, further apophyses unknown, embolus coiled in 2-3 wide loops near the cymbial margin (similar convergently evolved e. g. in *Zamilia* WUNDERLICH 2008 of the Oecobiidae: Oecobiinae).

Further characters: Unpaired tarsal claw existing, prosoma low, basal cheliceral articles relatively large (fig. 236), metatarsal preening combs, leg scopulae, claw tufts as well as femoral and tarsal trichobothria absent, position of the metatarsal trichobothrium in the juvenile ?*Praearaneus* sp. indet. in ca. 0.8, 3 pairs of spinnerets (fig. 239), anal tubercle only fairly large and unmodified; larger spiders, body length (male holotype) 5.5 – 7 mm (only certain spiders of the family Lagonomegopidae in Burmite are larger). No distinct sexual size dimorphism. – Note: Because of their relatively large body size adult members of this family – they were probably not rare in the Burmes amber forest – were only rarely captured by the fossil resin.

Relationships: The habitus of the spiders is similar to extant members of the ecribellate family Araneidae. In the superfamily Deinopoidea a cribellum and ventral tarsal bristles (see above) exist like in the Praearaneidae (in the Deinopidae a coiled embolus, too), but feathery hairs (usually) and a quite different position of the eyes exist: The posterior row is strongly recurved and the lateral eyes are widely spaced. In the Araneidae and other members of the superfamily Araneoidea a cribellum and ventral tarsal bristles – in all taxa? – are absent, a paracymbium exists (and the position of the bulbus is different in the Araneidae). Ventral tarsal bristles like in the Praearaneidae exist – besides in the Deinopoidea – also in the cribellate superfamily Oecobiidea in which the shape of the prosoma and of the modified anal tubercle are different from the Praearaneidae. In the Salticoididae (Jordanian amber) exist feathery hairs, the anterior median eyes are quite large and the body length is only ca. 2.6 mm. Like in the Praearaneidae feathery hairs are absent in the extinct family Burmadictynidae in Burmite in which metatarsus IV is not concave dorsally, the embolus build a longer cylindrical spiral and their body length is only 1.4 – 2.8 mm. The extinct cribellate genus *Palaeomicromenneus* PENNEY 2003 (Cretaceous Lebanese amber), originally described as a member of the family Deinopidae, referred by me in 2015 to the family Salticoididae and now regarded as a member of the Burmadictynidae, possesses – according to PENNEY – allegedly feathery hairs (which type? A figure is lacking in the original description) in contrast to the Praearaneidae, the posterior eye row is drawn distinctly procurved in fig. 3 although its position is called "distinctly recurved" p. 571, leg II is distinctly shorter than the long leg I and metatarsus IV is not concave dorsally. – See also below: The quite questionable member of the RTA-clade. – In the ancient Praearaneidae exists an interesting combination of characters: The existence of a cribellum and ventral tarsal bristles, the shape of the metatarsus IV, and the absence of a paracymbium are as in the Uloboridae, the absence of feathery hairs is as in the Araneoidea (and the Uloborinae as well), and the position of the eyes is also similar to most Araneidae.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Praearaneus **n. gen.,** photos 123-126

Etymology: The name refers to the genus *Araneus* and certain ancient (plesiomorphic) deinopoid characters of the new genus, from prae- (lat.) = previously, before.

The gender of the name is masculine.

Type species (by monotypy): *Praearaneus bruckschi* n. sp. – Probably congeneric spiders: See below.

Diagnosis: See above.

Relationships and distribution: See above.

***Praearaneus bruckschi* n. gen. n. sp.** (figs. 233-244) photos 123-124

Derivatio nominis: It is a great pleasure to me to dedicate this interesting species to KLAUS BRUCKSCH, the former owner of the present holotype.

Material: Holotype ♂ in Mid Cretaceous Burmite, F2956/BU/CJW; paratype subad. ♂, in Mid Cretaceous Burmite, F3040/BU/CJW.

Preservation and syninclusions: Holotype: The spider is well preserved in a clear yellowish piece of amber, the opisthosoma is twisted by 90° so that the left side is directed dorsally, the right cymbium and bulbus are artificially directed a bit retrolaterally. Cut off are the left patella IV and the apical parts of the left tibiae I-III. – Several thin spider threads are preserved partly in a parallel position right in front and below the spider; two threads bear some tiny (apparently sticky) droplets. Remains of ten larger grey bubbles produced by boring shells (photo) are preserved partly in contact with the holotype, one apparently goes inside the spider. Few plant hairs are also preserved in this piece of amber. – The paratype is partly well preserved in a clear yellowish piece of amber which is 17 mm long, the distal third of the opisthosoma and several leg articles are cut off, the right leg III and the left legs I-III are complete. The remaining parts of the opisthosoma are filled with grey “stiny” particles. – Syninclusions are several tiny Arari below the opisthosoma, a small Diptera: Nematocera in contact to the left metatarsus III, few short and thin spider threads behind the right tarsus and metatarsus IV, a plant hair and several bubbles.

Diagnosis (♂; ♀ unknown): See above.

Description (♂):
Measurements (in mm): Holotype: Body length ca. 5.5; prosoma: Length 2.5, width 2.4, height 1.0; opisthosoma: Length 3.4, width ca. 1.7, height 1.75; leg I: Femur 2.7, patella 1.0, tibia 2.4, metatarsus ca. 2.5, tarsus ca. 1.4, tibia II ca. 2.2, tibia III ca. 1.25, tibia IV 2.0; length of the basal cheliceral articles 0.3. – Paratype: Body length originally ca. 6.5; prosoma: Length ca. 3.0, width ca. 2.9; opisthosoma (incomplete): Length originally ca. 4.0, width 4.2; leg I: Femur 3.2, patella 1.1, tibia ca. 3.1, metatarsus ca. 2.5, tarsus ca. 1.7, tibia II 2.8, leg III: Femur 2.0, patella 0.6, tibia 2.3, metatarsus 1.8, tarsus 1.15.
Colour: Prosoma and legs medium grey brown, tibiae and metatarsi distinctly annulated by light hairs (fig. 237), opisthosoma dark grey.
Prosoma (figs. 235-236, photos) almost as wide as long, not domed, anteriorly distinctly smaller, cuticula finely granulate (and covered with numerous tiny bubbles), hairs short and numerous, feathery hairs absent, fovea well developed, 8 eyes in two wide rows, anterior median eyes largest, posterior row slightly procurved, lateral eyes contiguous, clypeus short, basal cheliceral articles relatively large, condylus and lateral stridulatory files absent, teeth of the fang furrow unknown (the area is hidden), fangs fairly long, mouth parts and most parts of the sternum hidden in the holotype; paratype: Gnathocoxae longer than wide, labium free, about as long as wide, apically rebordered. – Legs (figs. 237-238, photos, see also fig. 245) stout, gnathocoxae (paratype) close together, bristles numerous and partly stout, existing on femora to tarsi; leg I: Femur ca 8 dorsally and laterally, patella 1 prolaterally, tibia at least a dozen (ventrally 2 pairs and apicals),

metatarsus ca. half a dozen, tarsus unknown (hidden because of its position), tarsus IV 3 ventrally in the distal half, hairs only fairly long, femoral and tarsal trichobothria as well as metatarsal preening combs absent but with strong bristles around its end, position of the – apparently quite short – metatarsal trichobothria unknown, calamistrum indistinct or absent, three tarsal claws and a questionable sustentaculum existing, claw tufts absent, paired claws toothed, unpaired claws long. – Opisthosoma (fig. 239, photos) twice as long as wide, soft, hairs short and numerous, 3 pairs of well developed short/ stout spinnerets, bases of the anterior spinnerets fairly spaced, situated close behind a bubble. A wide, flat and probably undivided structure in the position of a cribellum (it is partly hidden by bubbles) may be a cribellum. – Pedipalpus: Holotype, figs. 241-244) with stout but not thickened articles, spines absent, few bristles existing, patella short and inclined apically, tibia short and wide and with a retrolateral outgrowth, cymbium wide and hairy, bulbus flat, shape circular, median apophysis large and divided, terminal apophysis and conductor unknown, embolus very long and thin, describing two or three loops, the distal part is free observable. Paratype (subad. male, fig. 240): Tibia with at least 3 short and 3 long dorsal trichobothria, cymbium spiny, apical claw well developed, bearing at least half a dozen teeth.

Ecology/biology (see also above): The existence of pear-shaped bubbles in and on the surface of the present piece of amber near the holotype – produced by boring shells (photo) – indicates that the species was a dweller (on a bush or a tree?) near an area of salty water. Such bubbles are preserved with numerous other spider species in Burmite.

Relationships and distribution: See above.

?*Praearaneus* sp. indet. (fig. 245)

Material: 1♂1♀ (probably both adult) in a larger piece of Mid Cretaceous Burmite, F3063/ BU/CJW.

Preservation and syninclusions: The spiders are closely face-to-face and rather badly preserved, strongly hidden by darkening, incomplete and partly decomposed, in a partly clear and partly muddy piece of amber, which longest diameter is ca. 1.5 cm. – Syninclusions are 1 Hymenoptera, insect's excrement and particles of detritus.

Description:
Measurements (in mm): Male: Body length ca. 6.0, prosomal length 2.8, femora I-III 3.0/2.5/1.5; female: Body length ca 7.0, prosomal length ca. 3.0.
The metatarsus IV (fig. 245) is not depressed laterally and dorsally distinctly concave; the calamistrum is well developed, half as long as the metatarsus. The claw of the ♀-pedipalpus is well developed.and toothed.

Relationships: Legs and the general habitus are quite similar as in the holotype.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Unsure/indet. material (see also below, the RTA-clade):

?Praearaneus sp. indet. photos 125-126

Material: 1 juv. ♀ in Mid Cretaceous Burmite, F2064/BU/CJW.

Preservation and syninclusions: The spider is completely and only fairly well preserved in a clear yellow piece of amber, the opisthosoma is strongly dissected, a large fissure runs through the piece. – Syninclusions are the tiny larva of a Hemiptera, the part of a leaf, plant hairs and particles of detritus.

Description (juv. ♀):
Measurements (in mm): Body length 3.8; prosoma: Length 1.5, width 1.4; leg I: Femur 1.9, patella 0.6, tibia 1.6, metatarsus 1.3, tarsus 1.15; femur II 1.8, femur III 1.3, femur IV 1.55.
Colour Prosoma and legs medium brown, prosoma laterally darkened, legs annulated, opisthosoma light grey brown.
Prosoma (photo) almost as wide as long, fovea large, hairs indistinct, feathery hairs absent, 8 eyes in two rows, anterior median eyes largest, posterior median eyes spaced by ca. 1 1/2 of their diameter, posterior row straight, lateral eyes close together, basal cheliceral articles large, fangs long. – Pedipalpus long, tarsus spiny, its claw large and toothed. – Legs (photo) of medium length, spiny, ventral bristles existing on all tarsi, position of the metatarsal III trichobotrium in ca. 0.8, metatarsus IV straight, not depressed laterally, calamistrum well developed along 2/3 the length of the article. – Opisthosoma strongly dissected, hairs short and indistinct.

Close **relationships** are unsure, most characters are as in *Praearaneus* but leg II is relatively long compared with the type material, the posterior median eyes are wider spaced and the calamistrum is longer.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

Superfamily ARANEOIDEA including some doubtful and erroneous family proofs

I am still searching for ADVANCED families of this superfamily in Burmite (like Araneidae and Linyphiidae) besides the Theridiosomatidae; see also the Praeterleptonetidae above (Leptonetoidea?). A questionable Cretaceous taxon of the family Theridiidae –

Cretatheridiidae in Burmite –: See WUNDERLICH (2015: 340-344). See also above, the genus *Seppo*, under Archaeoidea: “Extinct taxa”.

Note on the families Zygiellidae and Linyphiidae: See WUNDERLICH (2015: 337-338, 345). I now do not want to exclude that at least some of the taxa in question may be related to the families Praeterleptonetidae or Theridiosomatidae which both are frequent in Burmite.

Note on the family Nephilidae: *Geratonephila burmanica* POINAR & BUCKLEY 2012 (Nephilidae), allegedly preserved in Burmite, is considered to be a junior synonym of *Nephila tenuis* WUNDERLICH 1988 in Dominican amber, see WUNDERLICH (2015: 58). *Nephila jurassica* SELDEN et al. 2011) – preserved in Jurassic stone of Mongolia – has turned out to be a member of the cribellate genus *Mongolarachne* SELDEN et al. 2013 of the family Mongolarachnidae; see above: the new superfamily Pholcochyrecoidea. Therefore the genus *Nephila* as well as the family Nephilidae are unknown in Burmese amber, and the whole Cretaceous as well.

The diagnostic characters of the superfamily Araneoidea:

- basicly the existence of an orb web including a sticky spiral (loss of the capture web e. g. in the family Mimetidae),
- absence (loss) of the cribellum; see below,
- existence of a paracymbium (lost few times in several taxa),
- existence of a triad of the spinnerets (lost in the Mimetidae),
- absence (loss) of feathery hairs,
- absence of femoral and tarsal trichobothria,
- absence (loss) of ventral tarsal bristles.

Family THERIDIOSOMATIDAE

The small or even tiny members of this family are quite frequent in Burmite, mainly members of the genus *Leviunguis* WUNDERLICH 2012. Several genera and species in Burmite (coll. JW and coll. PATRICK MÜLLER) are still waiting for descriptions. The tiniest male of the coll. P. M. has a body length of only 0.7 mm.

The dubious genera *Hypotheridiosoma* WUNDERLICH 2012 (and *Zarqaraneus* WUNDERLICH 2008?) may be members of the Theridiosomatidae.
See also the Praeterleptonetidae, p. 162.

?RTA-CLADE: A quite doubtful taxon (figs. 246-248) photo 127

Sure proofs of spiders of the RTA-clade (the retrolateral tibial apophysis clade) older than Cenozoic are unknown to me, see above. The present araneomorph cribellate and three-clawed subadult (!) male is similar to the RTA-clade in some respect. An adult male of this taxon is needed for further conclusions on its relationships.
See WUNDERLICH (2008: 652) and (2015: 81).

Material: 1 subad. ♂ in Mid Cretaceous Burmite, F3021/BU/CJW.

Preservation and syninclusions: The spider is well and completely preserved in a yellow piece of amber, some fissures hide parts of the opisthosoma which is cut off ventrally within the amber and partly filled with a larger bubble. – 1 Psocoptera is preserved, to the left, close to the spider.

Description (subad. ♂):
Measurements (in mm): Body length 3.6; prosoma (it is fairly deformed): Length ca. 1.6, width probably only 1.2; opisthosoma: Length 2.3, width 1.4; leg I: Femur ca. 1.9, patella 0.65, tibia 1.65, metatarsus 1.4, tarsus ca. 0.7, tibia II 1.45, tibia III ca. 1.0. The adult conspecific male may have been 4-5 mm long.
Colour: Prosoma and legs medium brown, opisthosoma yellow brown.
Prosoma (fig. 246, photo) fairly deformed, area of the fovea hidden, cuticula smooth, few hairs including feathery hairs (fig. 248), two rows of eyes in a wide field, posterior row straight, lateral eyes closely together, clypeus short, basal cheliceral articles distinctly bulging in their basal half, spiny anteriorly, teeth of the fang furrow hidden, fangs long and slender, position araneomorph, labium free, ca. as wide as long, coxae IV close together. – Legs (figs. 247-248, photo) relatively stout, prograde, order I/II/IV/III, hairs short, scopulae absent, bristles numerous, existing on femora, patellae, tibiae and metatarsi (absent on tarsi), tibia I with laterals, 2 dorsally (2 close to the article, 1 erect, ventrally an erect pair in the distal half, 1 proventrally in the basal half, metatarsus I: 1 dorsally, 1 pair and a single one ventrally (!) as well as an apical garland, bristles completely absent on all tarsi; tibial sutures, trochanteral notches, scopulae and claw tufts absent, feathery hairs existing. Trichobothria apparently quite short and indistinct,

not closely studied, apparently absent on femora and tarsi; three well developed tarsal claws, paired claws bearing long teeth, metatarsus IV laterally distinctly compressed, not bent, calamistrum occupying more than 2/3 of the metatarsal length. – Opisthosoma (photo) incomplete, oval,1.64 times longer than wide, bearing few short hairs, cribellum (deformed), apparently not divided. Three pairs of spinnerets, the anteriors quite large, anal tubercle large, blunt, undivided and hairy apically. – Pedipalpus: Tarsus long oval, bearing a short apical claw.

Relationships and life style: According to its characters the present spider is different from most cribellate members of families like Deinopidae, Filistatidae, Oecobiidae, Salticoididae and Uloboridae; I will not exclude relationships to the Praearaneidae of the Deinopoidea, but I did not find tarsal bristles or feathery hairs. In the small members of the Salticoididae metatarsus IV is laterally not depressed, leg I is elongated, and short ventral tarsal bristles exist. In contrast to most Uloboridae the legs are more stout, femoral trichobothria and ventral tarsal bristles are absent and the position of the eyes is quite different: the position of the lateral eyes is close together, the position of the posterior eye row is slightly procurved. Like in numerous members of the RTA-clade the ventral bristles of metatarsus I are close to the article (not standing out), but apparently the cribellum is not divided in the present specimen. The leg trichobothria are few and short in certain short-legged Dictynidae and Lycosoidea which may be related. Most cribellate spiders build capture webs; Zoropsidae is an exception. The relatively robust legs may contradict the use of a capture web in the present taxon, but see the family Praearaneidae.

Distribution: Mid Cretaceous amber forest of Myanmar (Burma).

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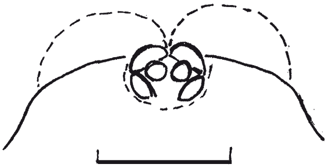
INDEX to the newly described and some other taxa



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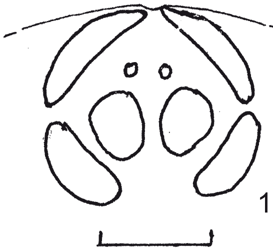

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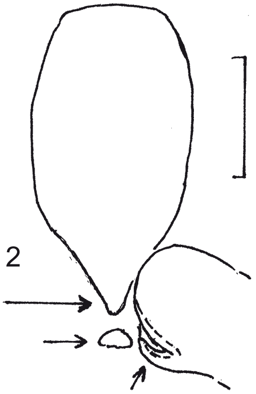

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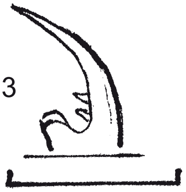

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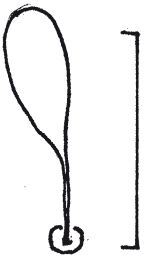

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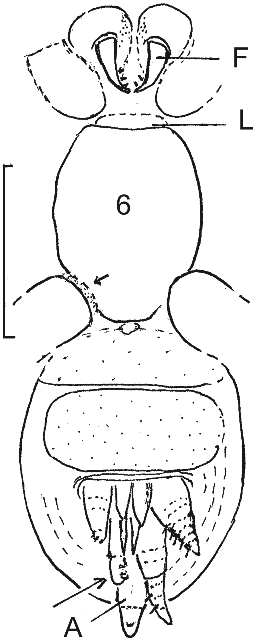

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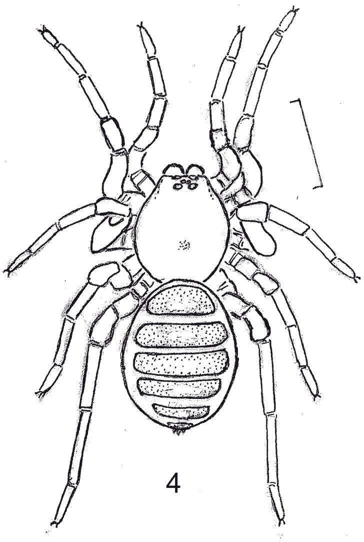

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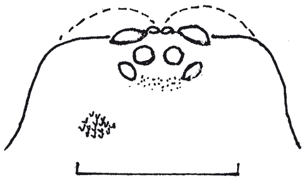

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Figs. 1-3a: Liphistius sp. indet., Liphistiidae, extant, Myanmar (Burma), juv., P. SCHWENDINGER leg., CJW, body length 10 mm in figs. 3 and 3a, 3.8 mm in figs. 1 and 2, 8.5 mm in fig. 1a); 1) dorsal aspect of the anterior part of the prosoma; the anterior median eyes are absent or difficult to recognize in this specimen; 1a) dorsal aspect of the eyes. Note the tiny anterior median eyes; 2) ventral aspect of the sternum with its posterior elongation (longest arrow), the ventral outgrowth of the pedicel (arrow of medium length), and the retrobasal outgrowth/furrow of the left coxa IV (short arrow); 3) retrolateral aspect of the unpaired claw of the left tarsus IV. Note the existence of two denticles; 3a) club-shaped trichobothrium of tarsus I. Scale bars (in mm) 0.05 in fig.3, 0.1 in fig.3a), 0.2 in fig.1, 0.4 in fig. 1a), 0.5 in fig. 2.

figs. 4-7: Cretaceothele lata WUNDERLICH 2015, Cretaceothelidae, in Burmite, holotype, 2. or 3. instar; 4) reconstruction of the specimen, dorsal aspect. Hairs and bristles are not drawn; 5) dorsal aspect of the anterior part of the prosoma. Note the strongly reduced anterior median eyes and the finely rugose cuticula; 6) ventral aspect of the body. The right posterior spinneret (long arrow) is deformed, partly retracted or injured. Note the four pairs of spinnerets, the small median pairs, the ventral position of the large anal tubercle, and the two large sternites which cover the two pairs of book lungs. The short arrow points to the sloping sternum; 7) distal part of the retroclaw of the right leg II, prolateral aspect. Scale bars 0.05 mm in fig. 7, 0.5 mm in the remaining figs.

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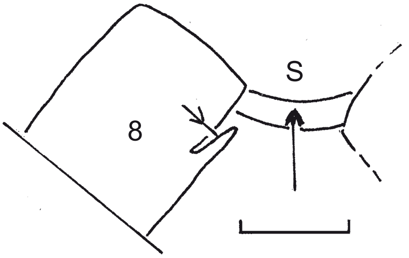

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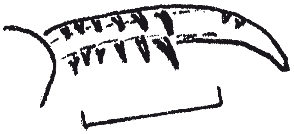

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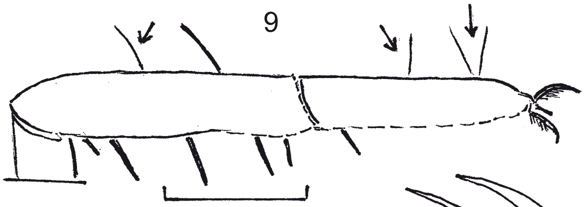

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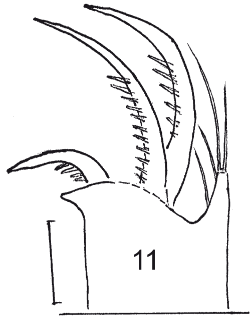

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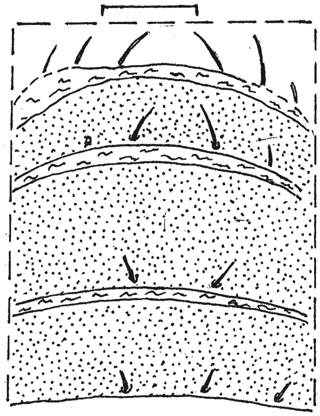

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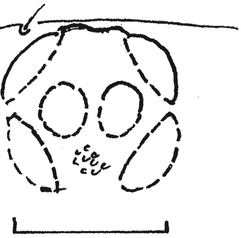

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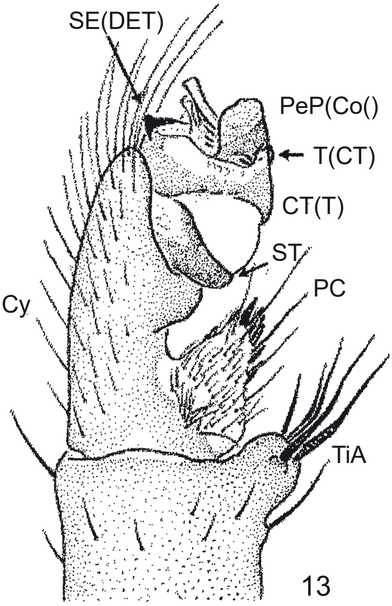

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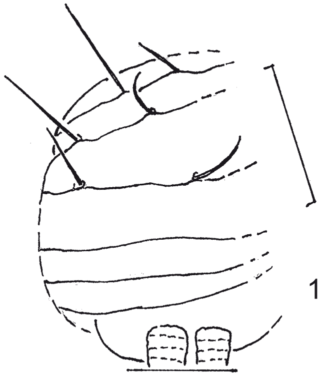
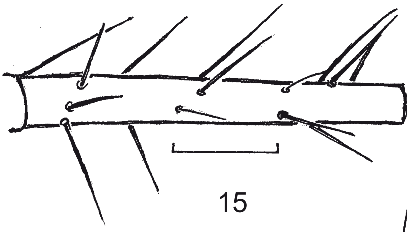
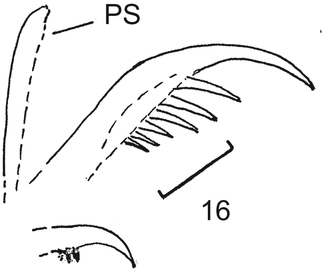
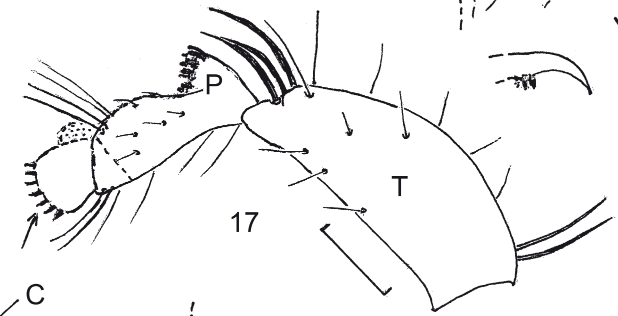
figs. 8-12a: Burmathele biseriata **n. gen. n. sp.**, Burmathelidae **n. fam.**, in Burmite, paratype, juv.: Figs. 8, 10a) and 12a); holotype: remaining figs, ?ad. ♀; 8) outline of the basal part of the coxae IV which are partly hidden; 9) prodorsal aspect of the right tarsus and metatarsus I. Some trichobothria (arrows) are drawn but no normal hairs; 10) dorsal aspect of the retroclaw of the left leg II. The two rows of the teeth are only fairly well observable; only few teeth are drawn; 10a) retroventral and slightly apical aspect of the paired proclaw of the left tarsus I; 11) retrolateral aspect of the tip of the left tarsus III. Only a single row of teeth of the paired claws is observable in this position, only few hairs are drawn; 12) dorsal aspect of three large tergites. Note the bristles and the small skinny spaces between the tergites. Hairs and short bristles are not drawn; 12a) dorsal aspect of the eyes. Anterior median eyes are absent. – A = anal tubercle, F = fang, L = labium, S = sternum. Scale bars (in mm): 0.5 in figs. 2, 4, 6, 9 and 12, 0.1 in figs. 3a), 10 and 11, 0.2 in figs. 1, 5, 8 and 12a), 0.05 in figs. 3, 7 and 10a).

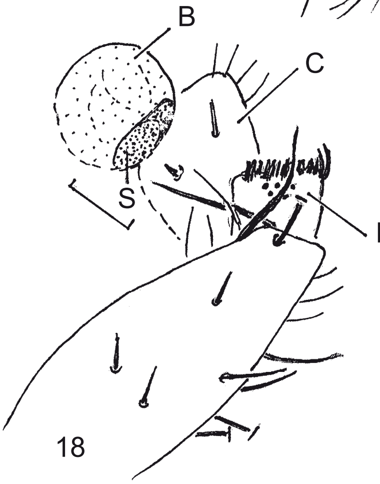
Fig. 13) Liphistius ornatus ONO & SCHWENDINGER 2009, extant, Liphistiidae, ♂, ventral aspect of the distal articles of the left pedipalpus. Taken from SCHWENDINGER & ONO (2011). TiA = tibial apophysis.

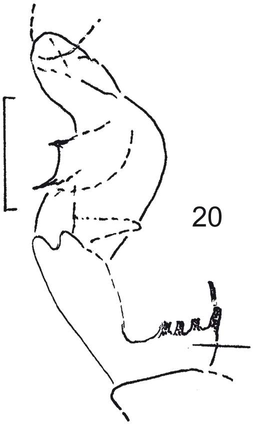


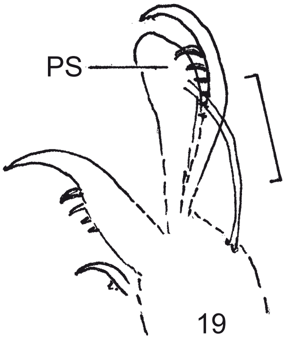






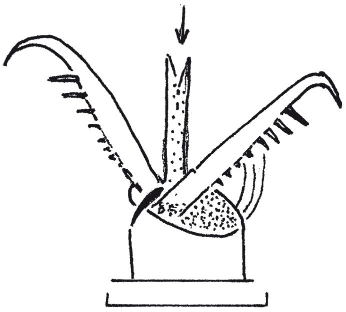






Figs. 14-18: *Parvithele muelleri* **n. gen. n. sp.**, Parvithelidae **n. fam.** in Burmite, holotype ♂; 14) dorsal aspect of the left part of the deformed and empty opisthosoma. Most bristles apparently are broken off or are preserved in an unnatural position. Hairs and small bristles are not drawn. Six tergites are observable in this position. Only the bases of the segmented deformed and lose posterior spinnerets are drawn; 15) prodorsal aspect of the right tibia IV. Hairs are not drawn; 16) retroventral aspect of the large paired retroclaw and the unpaired claw of the right leg IV. The basal parts are hidden; 17) prolateral aspect of the right pedipalpal tibia and the cymbium. Only few hairs are drawn;18) retrodorsal aspect of the left pedipalpus. – B = bulbus which is covered with a white emulsion, C = cymbium, P = paracymbium, PS = pseudopulvillus, S ?= subtegulum, T = tibia which is distinctly flattened. Scale bars (in mm): 1.0 in figs. 14-15, 0.5 in fig. 17, 0.2 in fig. 18 and 0.1 in fig. 16.

Figs. 19-20: *Parvithele spinipes* **n. gen. n. sp.**, Parvithelidae **n. fam.** in Burmite, ♂; 19) retrodorsal aspect of the tip of the deformed right tarsus IV; 20) dorsal aspect of cymbium and bulbus of the strongly deformed right pedipalpus. The distal part is hidden, hairs are not drawn. – P = paracymbium, PS = pseudopulvillus. Scale bars 0.1 and 0.5.



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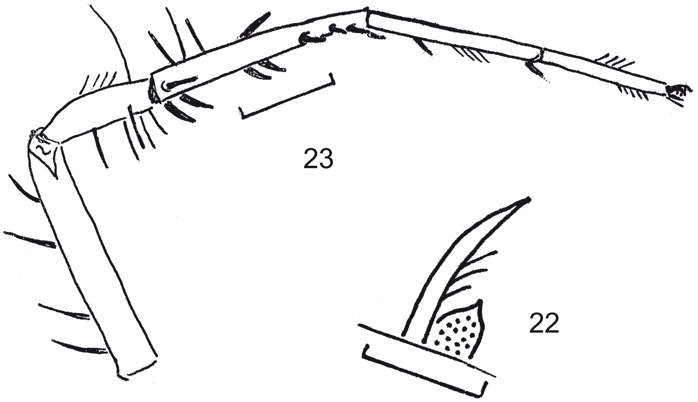

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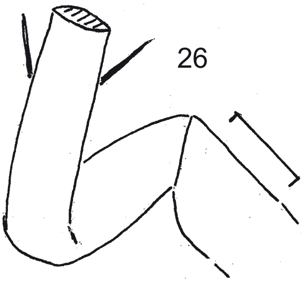

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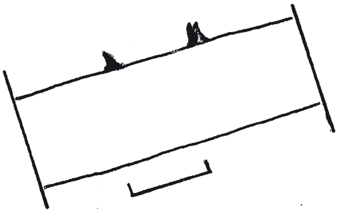

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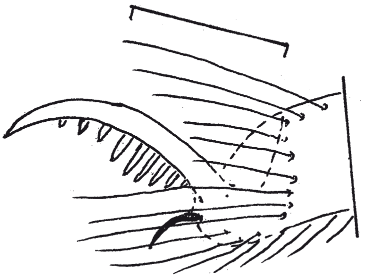

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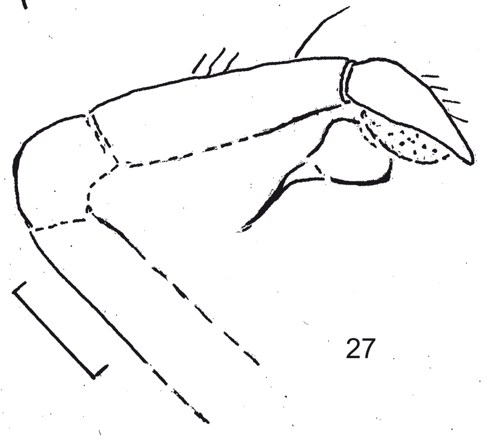

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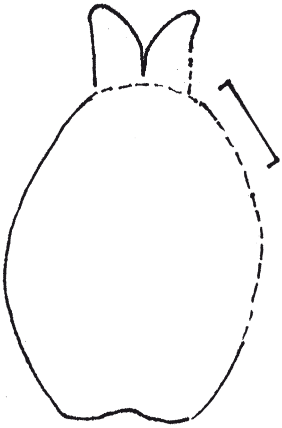
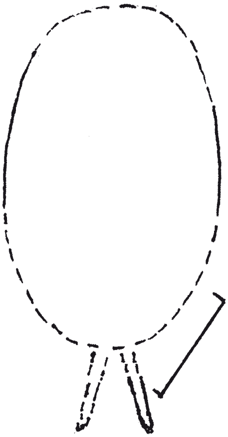
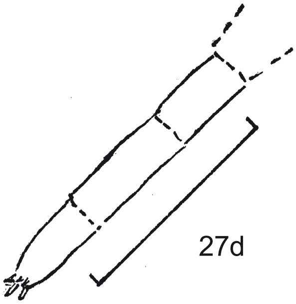
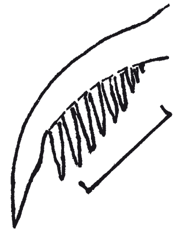
Figs. 21-22: *Pulvillothele haupti* **n. gen. n. sp.**, Parvithelidae **n. fam.** in Burmite, juv.; 21) ventral aspect of the right tarsal claws IV. The arrow points to the bifurced pseudopulvillus. The unpaired claw is drawn in black; 22) prolateral aspect of the unpaired right tarsal claw I and the pointed ventral outgrowth. – Scale bars 0.1 and 0.05 mm.

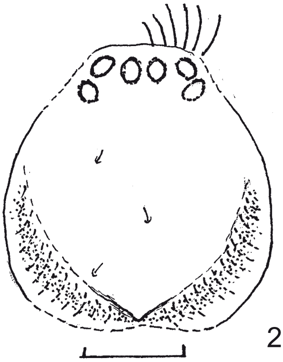
Figs. 23-27: *Cethegoides patricki* **n. gen. n. sp.**, Dipluridae, ♂; 23) retrolateral aspect of the right leg I. Only few hairs are drawn; 24) retrolateral-distal aspect of a distal part of the left tarsus IV. Note the dorsal cusps (black). Hairs are not drawn; 25) prolateral aspect of the tip of the left tarsus III: The unpaired claw (black) and the prolateral paired claw. Only few hairs are drawn. The length of the long teeth of the paired claw is shortened by the perspective in this position; their real length is 0.7 – 0.8 mm; 26) prolateral aspect of the distal part of the right femur IV, the injured and twisted patella and the basal part of the tibia which is cut off. Hairs are not drawn; 27) retrolateral aspect of the right pedipalpus. Only few hairs are drawn. – Scale bars 0.1 in fig. 24, 0.2 in fig. 25, 1.0 in fig. 23, 0.5 in the figs. 26 and 27.

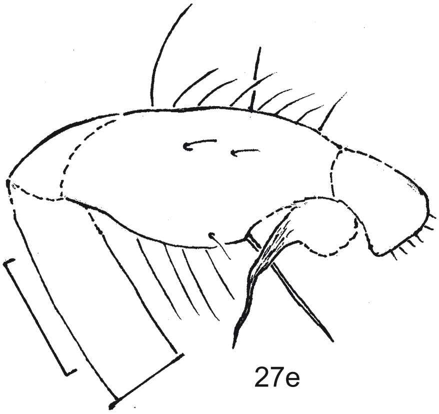


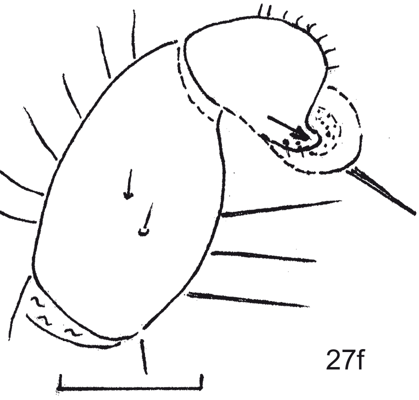






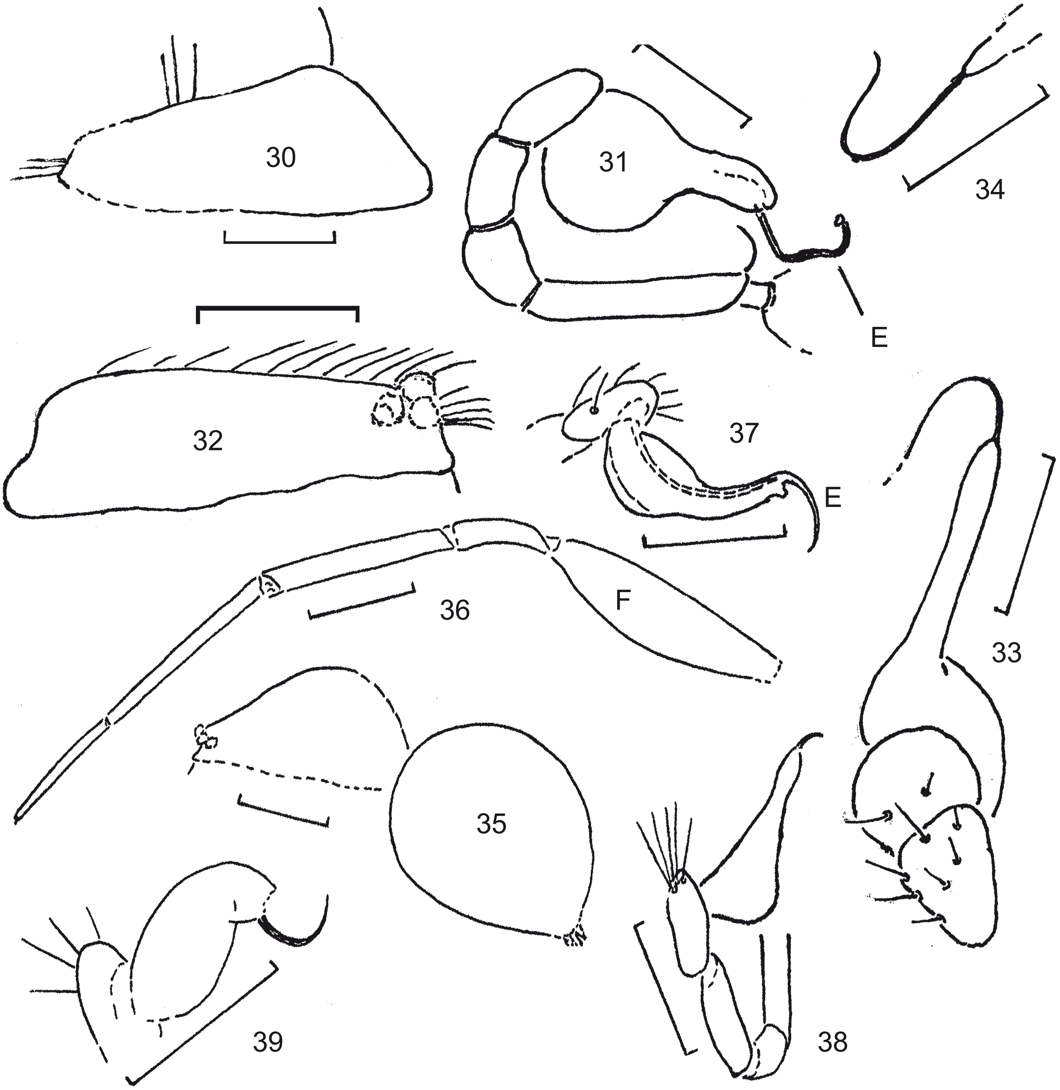






Figs. 27a-f: <u>*Alioatrax incertus*</u> **n. gen. n. sp.**, Hexathelidae, ♂; a) dorsal aspect of the prosoma, outline. Fovea and eyes are hidden; b) dorsal aspect (reconstruction of the outline) of the badly preserved opisthosoma; c) prodorsal aspect of the tarsus II retroclaw; d) prodorsal aspect of the right posterior lateral spinneret which is not well preserved; the articles are not clearly observable; e) retrodorsal aspect of the right pedipalpus; f) proapical aspect of the left pedipalpus. The arrow points to the proapical cymbial outgrowth. Only few hairs are drawn. – Scale bars 1.0 in figs. a-b, 0.1 in fig. c, 0.5 in the remaining figs.

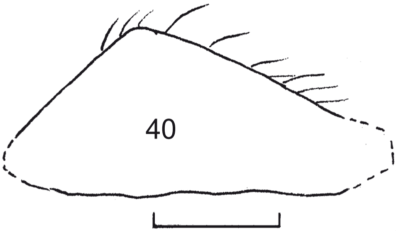
Figs. 28-29: <u>*Burmorchestina acuminata*</u> **n. sp.**, Oonopidae, ♂; 28) dorsal aspect of the prosoma. Only few hairs are drawn; 29) dorsal aspect of the left bulbus and embolus which is distally hidden. – Scale bars 0.2 and 0.1.



Figs. 30-31: Burmorchestina biangulata **n. sp.**, Oonopidae, ♂; 30) lateral (left) aspect of the prosoma. The eyes are hidden, only few hairs are drawn; 31) retrolateral aspect of the right pedipalpus. The tip of the embolus (E) bears a tiny droplet. Scale bars 0.2 and 0.1.

Figs. 32-34: Burmorchestina plana **n. sp.**, Oonopidae, ♂; 32) holotype, lateral aspect of the prosoma. The eyes are covered with an emulsion, only few hairs are drawn; 33) holotype, dorsal aspect of the left pedipalpus: Patella, tibia and bulbus with the strongly bent embolus which distal part is hidden. The flexible right embolus has a different shape; 34) paratype, ventral aspect of the distal part of the right embolus (the bulbus of this pedipalpus is deformed). – Scale bars 0.2 in fig. 32, 0.1 in figs. 33-34.

Figs. 35-39: Burmorchestina pulcher WUNDERLICH 2008, Oonopidae, ♂; 35) lateral aspect of the body; 36) prolateral aspect of the right leg IV; 37) retrolateral aspect of cymbium and bulbus of the right pedipalpus; 38) prodorsal aspect of the left pedipalpus with deformed bulbus; 39) prodistal aspect of the left cymbium and bulbus. – Scale bars 0.2 in figs. 35-36, 0.1 in the remaining figs.



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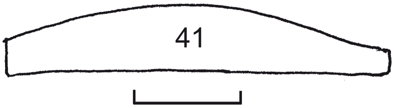

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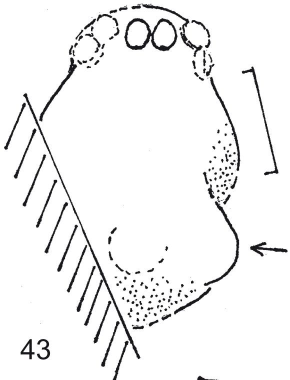
42



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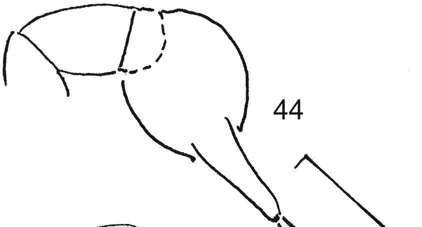

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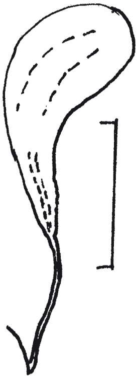

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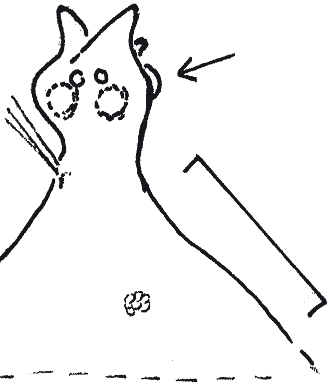

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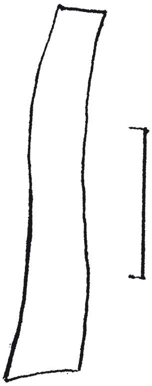

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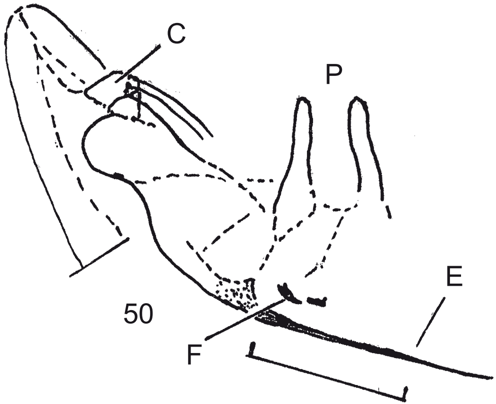
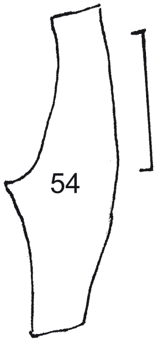
Figs. 40-42: <u>*Burmorchestina pulcheroides*</u> **n. sp.**, Oonopidae, ♂; 40) lateral (right) aspect of the prosoma. The anterior part is hidden, only few hairs are drawn; 41) retrolateral aspect of the left femur IV; 42) dorsal aspect of the left pedipalpus. Note: The basal part of the right embolus is distinctly more slender. – Scale bars 0.2, 0.2 and 0.1.

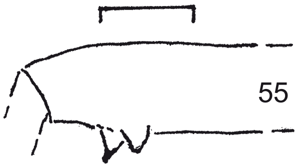
Figs 43-44. <u>*Burmorchestina tuberosa*</u> **n. sp.**, Oonopidae, ♂; 43) dorsal (slightly left) aspect of the prosoma which is partly hidden by a leg. The arrow points to the right thoracic hump. The eyes are partly covered with an emulsion; 44) retrolateral aspect of the right pedipalpus. Most probably the flexible embolus of the left pedipalpus is strongly bent. – Scale bars 0.2 and 0.1.

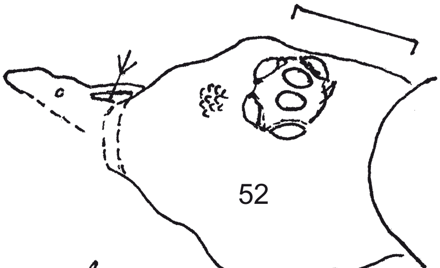
Fig. 45) <u>*Burmorchestina* sp. indet</u>. F3030/BU/CJW, Oonopidae, ♂, dorsal aspect of the right bulbus and embolus. – Scale bar 0.1.

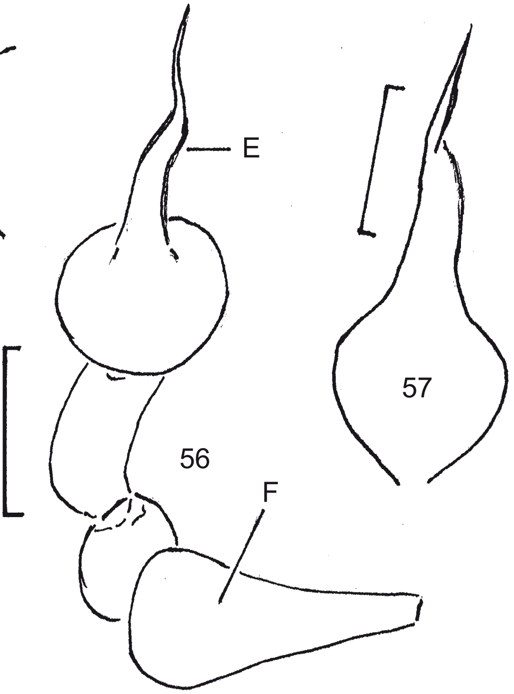
Figs. 46-51: <u>*Brignoliblemma bizarre*</u> **n. gen. n. sp.**, Tetrablemmidae, ♂; 46) anterior-left aspect of the prosoma which is partly hidden. The arrow points to the questionable left posterior eye. The position of the remaining eyes is also unsure; 47) anterior-dorsal aspect of the "horns" of

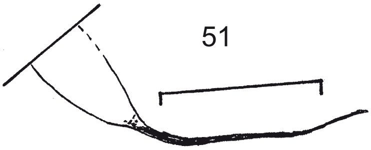






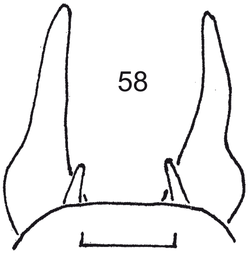


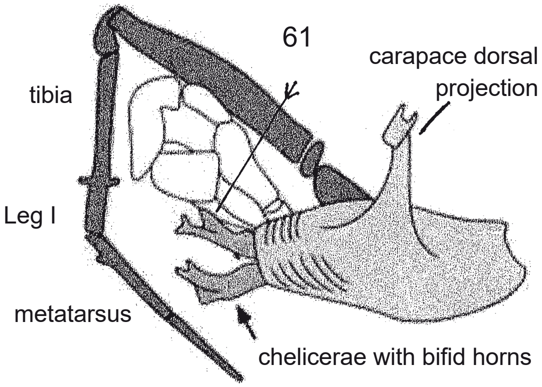


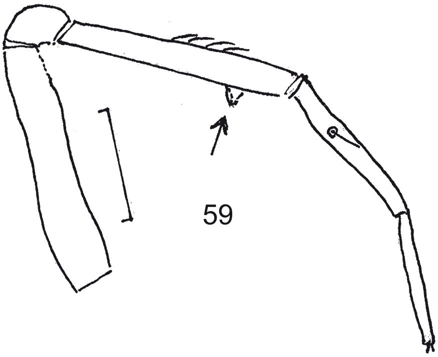


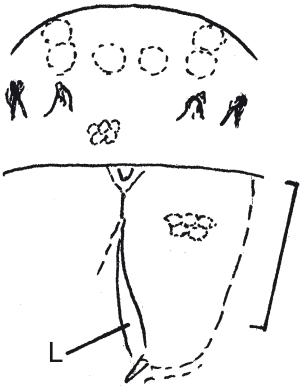
the cephalic projection; 48) ventral aspect of the left femur I; 49) prolaeral (slightly dorsal) aspect of the right tibia I with the "mating spur" (arrow); 50) retrolateral aspect of the strongly deformed right pedipalpus and ventral aspect of the cheliceral projections; 51) retrodorsal aspect of the deformed distal part of the left bulbus and embolus. – C = hairy cymbium, E = embolus, F = right fang, P = projections (horns) of the chelicerae. Scale bars 0.1 in fig. 47, 0.2 in the remaining figs.

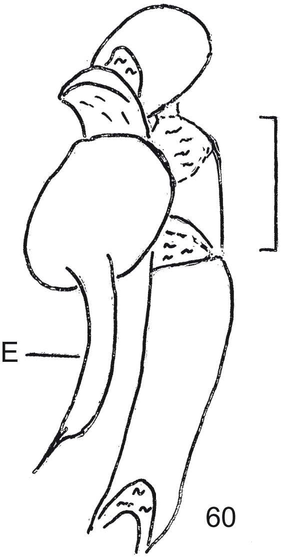
Figs. 52-57: *Brignoliblemma nala* **n. gen. n. sp.**, Tetrablemmidae, ♂; 52) dorsal-lateral aspect of the prosoma and the short right cheliceral horn (arrow). Note the area of the eyes which are placed on a high elevation. The prosoma is fairly deformed, especially its margin; 53) lateral aspect of the prosoma. Thin emulsions cover the eye lenses; 54) dorsal aspect of the left femur I. Note the pointed retrolateral outgrowth; 55) proapical aspect of the right tibia I. Note the paired ventral "mating spurs"; 56) ventral aspect of the left pedipalpus, bubus in a more apical aspect; 57) retrolateral aspect of the left bulbus and embolus. – E = embolus, F = femur. Scale bars 0.1 in fig. 55, 0.2 in the remaining figures.

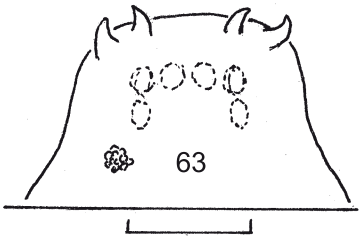


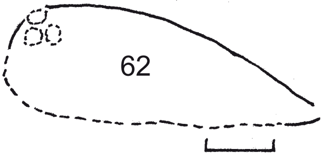








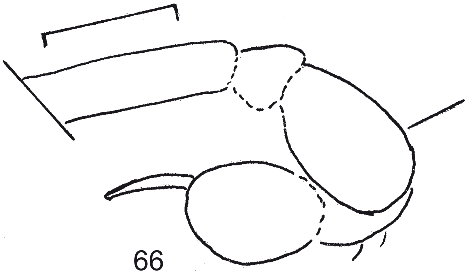




Figs. 58-60: *Brignoliblemma paranala* **n. gen. n. sp.**, Tetrablemmidae, ♂; 58) dorsal aspect of the large and small cheliceral horns; 59) retrodorsal (femur more retroventral) aspect of the right leg I. The arrow points to the tibial “mating spur”. Only few hairs are drawn; 60) ventral (bulbus dorsal) aspect of the strongly bent left pedipalpus. – E = embolus. Scale bars 0.2 in fig. 59, 0.1 in the figs. 58 and 60.

Figs. 61) *Electroblemma bifida* SELDEN et al. 2016, Tetrablemmidae, ♂, holotype, left dorsolateral aspect of the strongly deformed prosoma, the right pedipalpus with the embolus (arrow) and the right leg I. The prosomal (“carapace”) projection may bear the eyes. The body length of the spider is ca. 1.6 mm. – Taken from SELDEN et al. (2016).

Figs. 62-67: *Cymbioblemma corniger* **n. gen. n. sp.**, Tetrablemmidae, ♂; 62) outline of the prosoma, lateral aspect. The clypeal horns are not drawn; 63) dorsal aspect of the anterior part of the prosoma. The four horns of the clypeus and the six eyes are deformed. The finelly granulate structure of the cuticula is shown in a small field; 64) anterior aspect of the prosoma. Note the four deformed horns; 65) dorsal aspect of the deformed cymbium. Hairs are not drawn;



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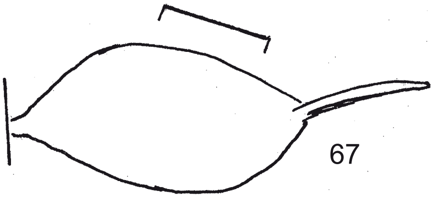

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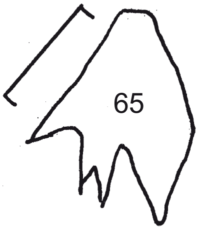

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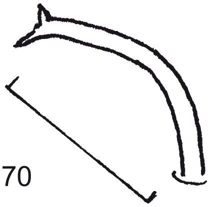

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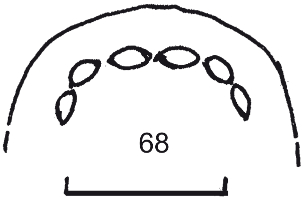

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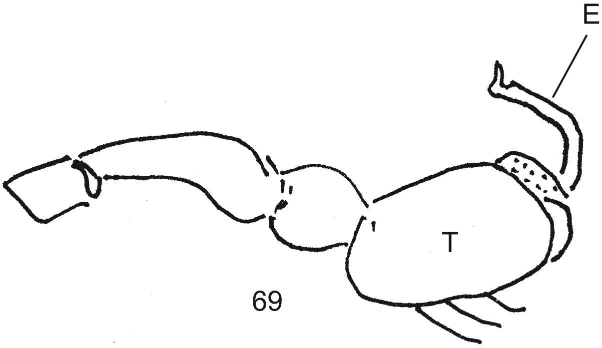

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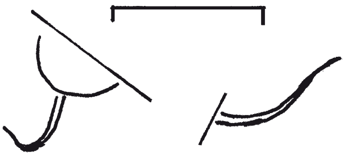

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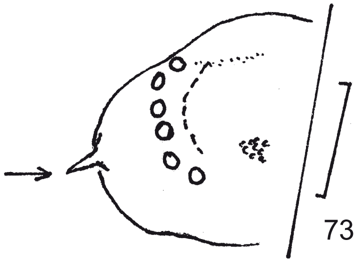
66) mainly dorsal aspect of the left pedipalpus (ventral aspect of the bulbus; 67) retrolateral aspect of the right bulbus and embolus. – L = cheliceral lamina, T = tibia. Scale bars 0.1 in figs. 65 and 67, 0.2 in the remaining figures.

Figs. 68-70: *Eogamasomorpha hamata* **n. sp.**, Tetrablemmidae, ♂; 68) dorsal aspect of the anterior part of the prosoma; 69) dorsal aspect of the left pedipalpus. Only 3 hairs are drawn; 70) dorsal aspect of the right embolus. – E = embolus. Scale bars 0.05 in fig. 70, 0.1 in the remaining figs.

Figs. 71) *Eogamasomorpha* ?*clara* WUNDERLICH 2015, Tetrablemmidae, ♂ F3003/BU/CJW; dorsal aspect of the emboli in different position (ventral aspect of the spider).– Scale bar 0.1.

Fig. 72) Part of an irregular capture web with two sticky droplets 6 mm away from a female of ?*Eogamasomorpha* sp. indet., F3002/BU/CJW, Tetrablemmidae. (Most of the remaining parts of the web are free of droplets). Remains of a questionable secretion are preserved between the droplets. – Scale bar 0.2.



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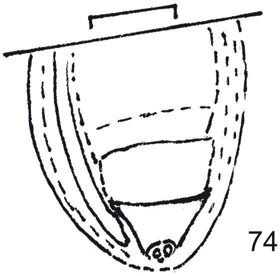

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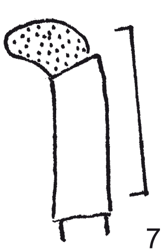

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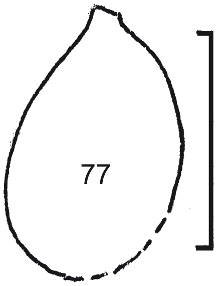

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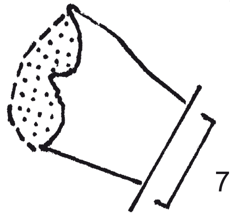

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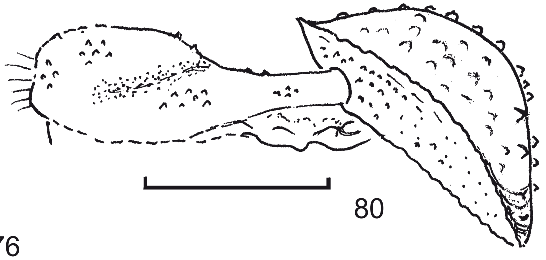

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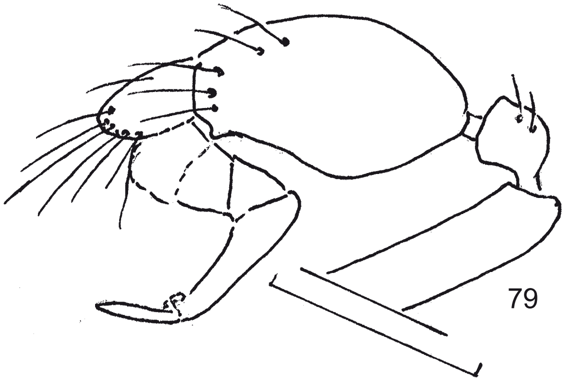

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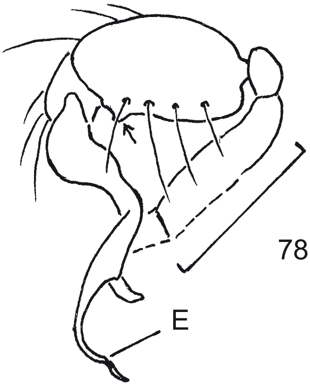

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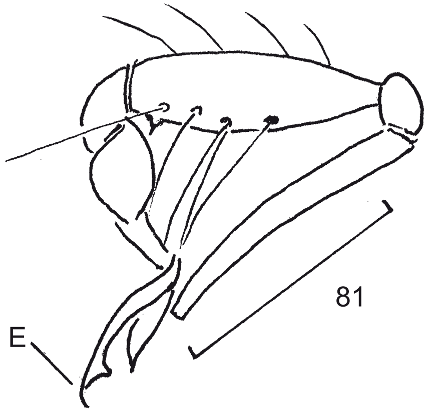
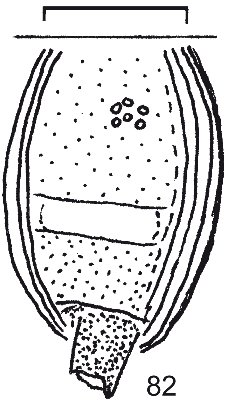
Figs. 73-77: ?Eogamasomorpha unicornis **n. sp**., Tetrablemmidae, injured ♂; 73) dorsal-left aspect of the anterior part of the prosoma. The arrow points to the pointed clypeal horn; 74) ventral aspect (slightly from the right side) of the opisthosoma. The anterior part and parts of the lateral scuta are hidden; 75) anterior aspect of the right pedipalpal femur which is amputated at its end. Questionable remains of blood are preserved on the stump (dotted); 76) retroapical aspect of the basal part of the left pedipalpal femur which has been teared near its middle; 77) dorsal aspect of the questionable left pedipalpal tibia. – Scale bars 0. 1 in figs. 75 and 77, 0.5 in fig. 76 and 0.2 in the remaining figs.

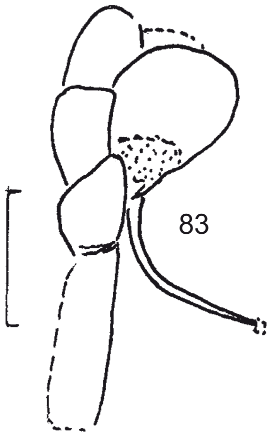
Figs. 78) Furcembolus crassitibia **n. sp**., Tetrablemmidae, ♂, retrolateral aspect of the left pedipalpus. The arrow points to the ventral-apical hook of the tibia. – E = embolus. Scale 0.5.

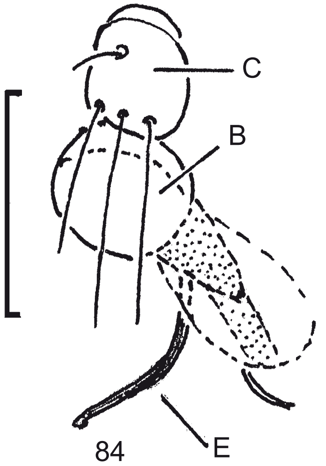
Figs. 79) Furcembolus grossa **n. sp**., Tetrablemmidae, ♂, prolateral aspect of the right pedipalpus. Only few hairs are drawn. Scale bar 0.5.

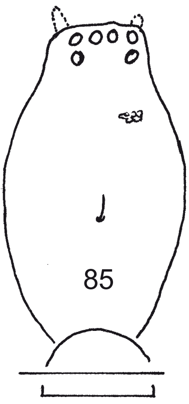
Figs. 80-81: Furcembolus longior **n. sp**., Tetrablemmidae, ♂; 80) lateral aspect of the body. Only few of the wrinkles are drawn, the eyes are not drawn, the lung cover is hidden by an emulsion; 81) retrolateral aspect of the left pedipalpus. Only few hairs are drawn. – E = embolus. Scale bars 1.0 and 0.5.

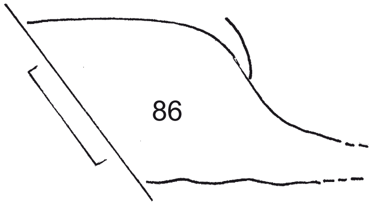


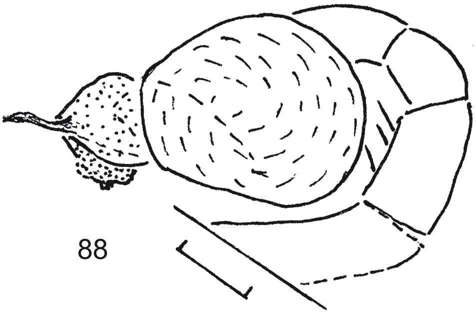






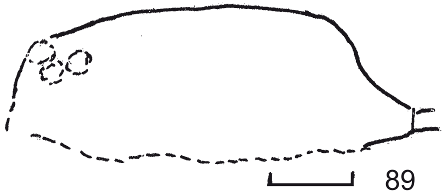






Figs. 82-84: *Longissithorax myanmarensis* **n. gen. n. sp.**, Tetrablemmidae, ♂; 82) ventral aspect of the opisthosoma which is anteriorly hidden. Only a small part of the punctuation is drawn; 83) dorsal aspect of the right pedipalpus (but ventral aspect of bulbus and embolus) (dorsal aspect of the spider); 84) dorsal aspect of the right pedipalpus (ventral aspect of the spider). Only few hairs are drawn, the deformed parts are not well observable. – B = bulbus, C = cymbium, E = embolus. Scale bars 0.2, 0.05 and 0.1.

Figs. 85-88: *Longithorax furca* **n. gen. n. sp.**, Tetrablemmidae, ♂; 85) dorsal aspect of the prosoma. The clypeal “horns” are of different size and may be artefacts; 86) left aspect of the prosoma which partly is hidden; 87-88) dorsal and retrolateral aspects of the left pedipalpus. Only few hairs are drawn. – C = cymbium, E = embolus. Scale bars 0.2 in figs. 85-86, 0.1 in figs. 87-88.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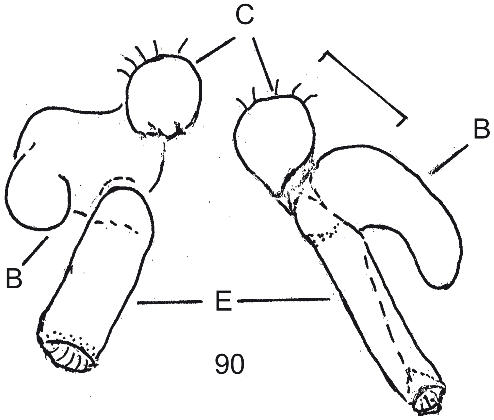

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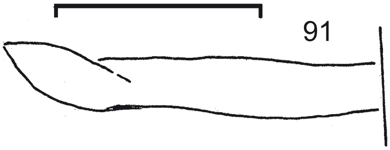
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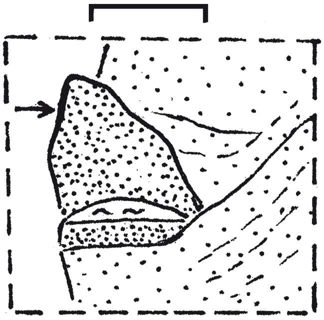
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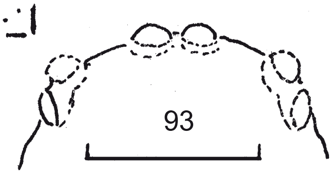
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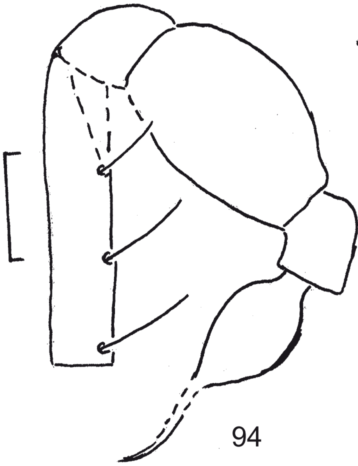
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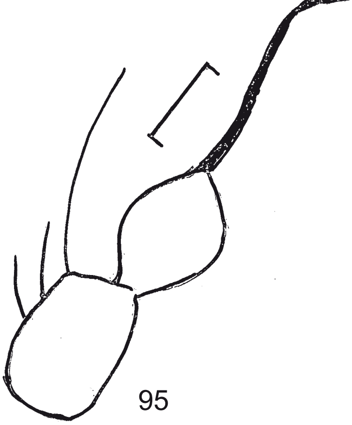
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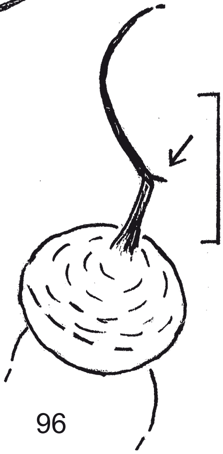
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Figs. 89-91: Palpalpaculla pulcher **n. gen. n. sp.**, Tetrablemmidae, ♂; 89) outline of the prosoma, lateral aspect; 90) outline of both pedipalpi viewed from the ventral side of the spider in fairly different positions so that the structures of the right pedipalpus appear shortened; 91) retrolateral aspect of the left embolus. – B = bulbus, C = cymbium, E = embolus. Scales 0.2.

Fig. 92) Tetrablemmidae indet., ♀ F2938/BU/CJW, sclerotized and distinctly protruding genital area (arrow), lateral-ventral aspect. – Scale bar 0.3.

Figs. 93-96: *Eopsiloderces ?filiformis* (WUNDERLICH 2012), Eopsilodercidae, ♂ F2891/BU/CJW; 93) dorsal aspect of the eyes. The long clypeal hairs are not drawn; 94) retrolateral aspect of the right pedipalpus; 95) dorsal aspect of the distal part of the right pedipalpus; 96) apical and slightly retrolateral aspect of the left bulbus and embolus. The arrow points to a possible artefact on the embolus. – Scale bars 0.2 in fig. 93, 0.1 in the remaining figures.

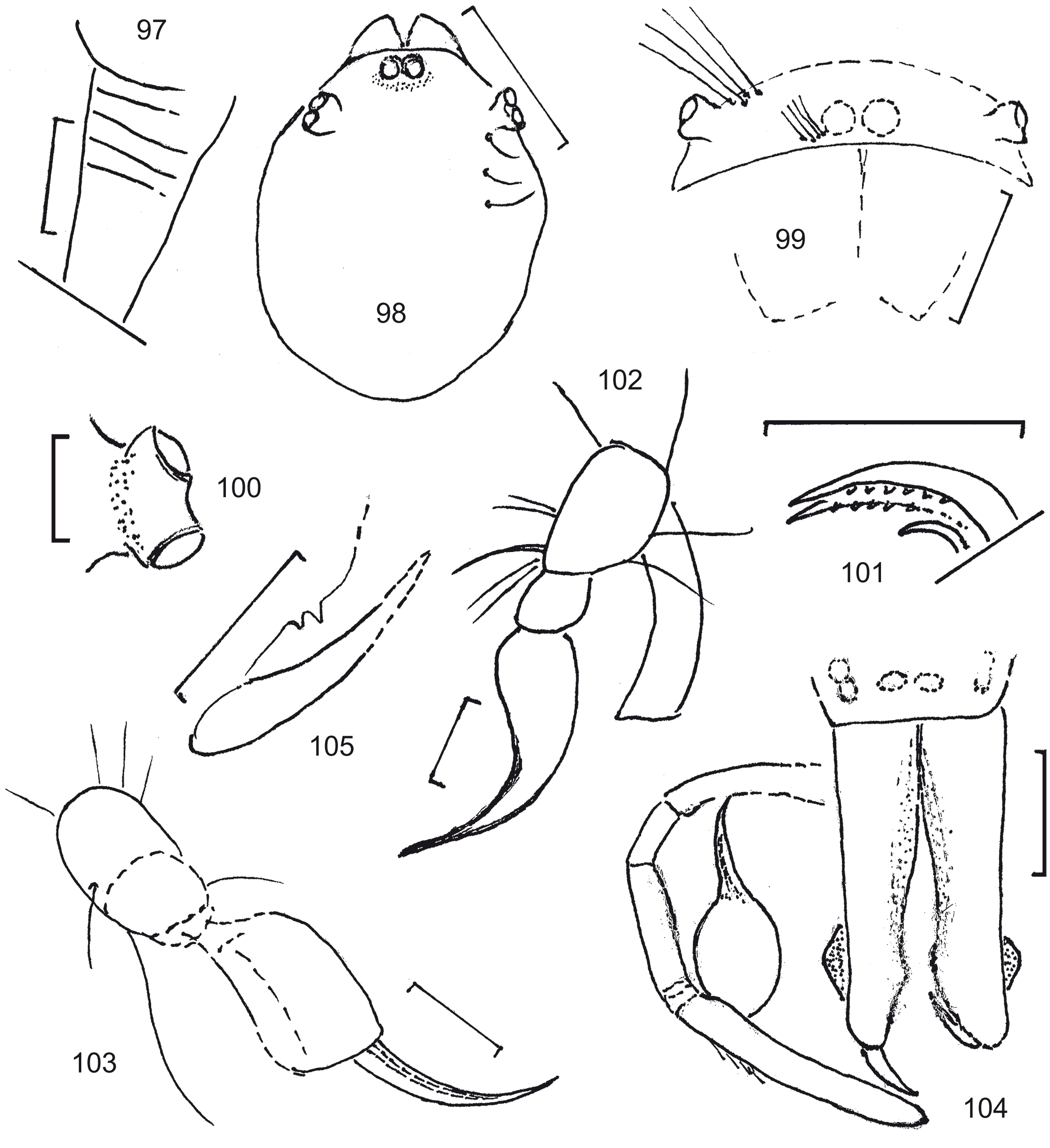
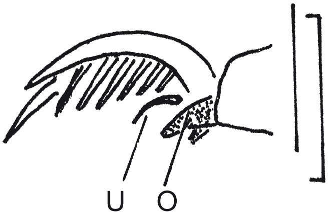
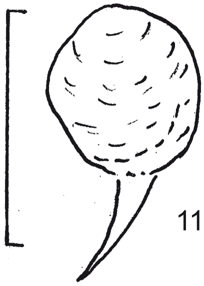


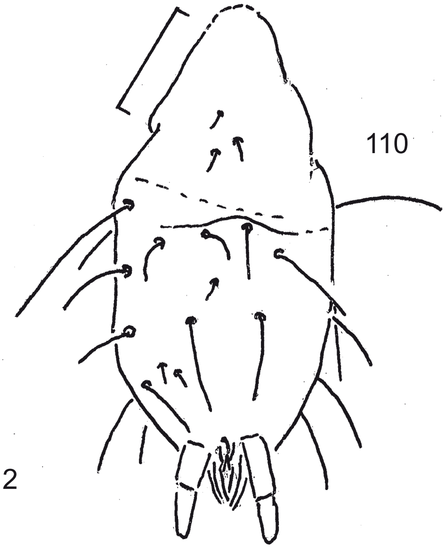
Fig. 97) *Eopsiloderces serenitas* WUNDERLICH 2015, Eopsilodercidae, ♂, retrolateral aspect of the right chelicera. Note the four questionable stridulatory files. – Scale bar 0.1.

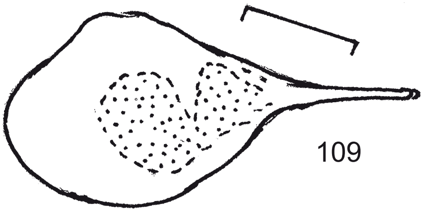
Figs. 98-103: *Praepholcus huberi* **n. gen. n. sp.**, Eopsilodercidae, ♂; 98) dorsal aspect of the slightly deformed prosoma. Only few hairs are drawn; 99) anterior aspect of the prosoma. Parts – mainly of the chelicerae – are hidden; 100) dorsal aspect of the right diad of the lateral eyes on a stalk; 101) retrolateral aspect of the left tarsal III claws. Most probably the teeth of the claws are shortened by the perspective; 102) dorsal aspect of the fairly deformed left pedipalpus which is bent below the body; 103) dorsal aspect of the deformed right pedipalpus. – Scale bars 0.5 in fig. 98, 0.2 in fig. 99, 0.05 in fig. 101, 0.1 in the remaining figs.

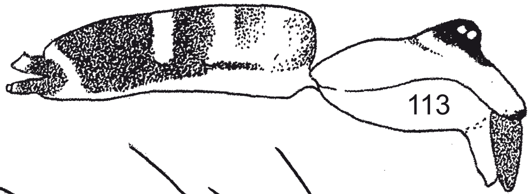
Figs. 104-107: *Loxoderces longicymbium* **n. gen. n. sp.**, Eopsilodercidae, ♂, holotype (fig. 104) and paratype (the remaining figs.; 104) dorsal-anterior aspect of the anterior part of the pro-

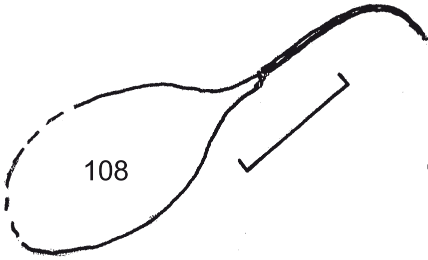


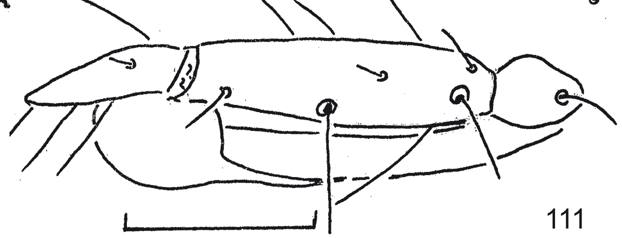










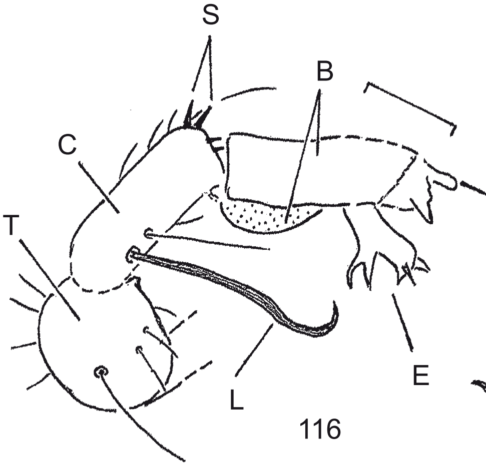


soma with the chelicerae and prolateral aspect of the right pedipalpus. The eyes are strongly deformed, only few of the six eyes are fairly well preserved. The prodistal part of the chelicerae is partly hidden, the existence of teeth is unknown; 105) anterior aspect of the distal part of the right chelicera with its fang; 106) prolateral aspect of the right femur II; 107) retroventral aspect of the tip of the left tarsus III. Not all of the long teeth of the paired claws are drawn. – O = outgrowth, U = unpaired claw. Scale bars 0.2 in fig. 104, 0.1 in fig. 105, 0.5 in fig. 106, 0.05 in fig. 107.

Fig. 108) *Loxoderces curvatus* **n. gen. n. sp.**, Eopsilodercidae, ♂, retroventral aspect of the left bulbus and embolus. – Scale bar 0.1.

Fig. 109) *Loxoderces rectus* **n. gen. n. sp.**, Eopsilodercidae, ♂, prolateral aspect of the right bulbus and embolus. – Scale bar 0.1.

Figs. 110-112: *Aculeatosoma pyritmutatio* **n. gen. n. sp.**, Psilodercidae, ♂; 110) ventral aspect of the deformed opithosoma. Only few of the long bristles are drawn; 111) retrodorsal aspect of the left pedipalpus. Note the long tibial trichobothria and the slender femur. Only few hairs are drawn; 112) retrodorsal aspect of the right bulbus and embolus. – Scale bars 0.2 in figs. 110-111, 0.1 in fig. 112.



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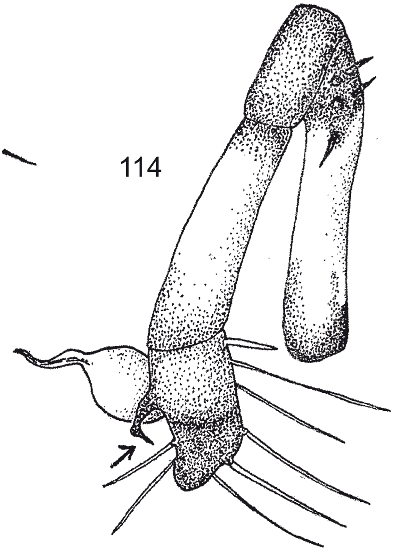

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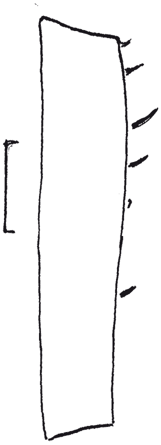

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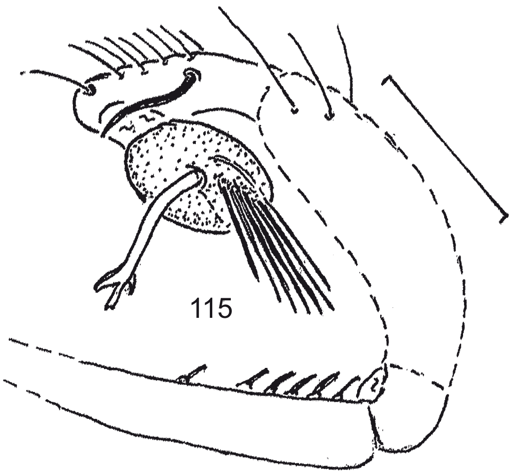

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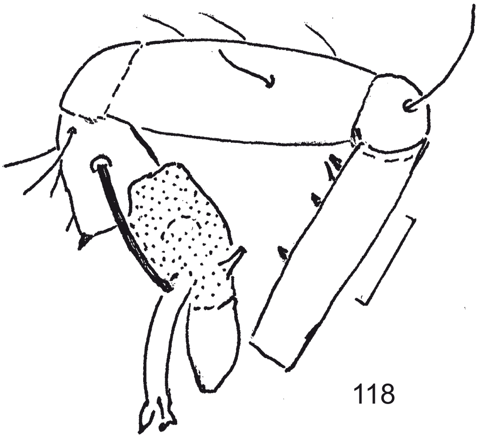

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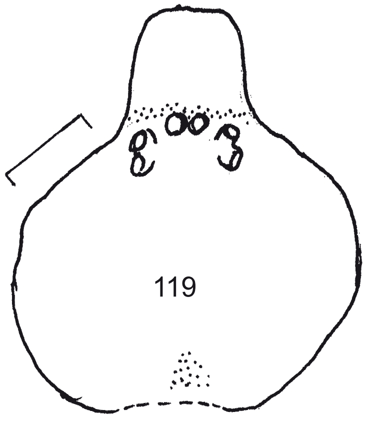
Figs.113-114: *Priscaleclercera spinata* (DEELEMAN-REINHOLD 1995) (under *Leclercera*, Ochyroceratidae), Psilodercidae, ♂, extant, Indonesia; 113) lateral aspect of the body which is ca. 2 mm long; 114) dorsal aspect of the right pedipalpus but ventral aspect of the femur. The arrow points to the paracymbium-like apophysis of the cymbium. – Taken from DEELEMAN-REINHOLD (1995).

Fig. 115) *Priscaleclercera sexaculeata* (WUNDERLICH 2015) (under *Leclercera*), Psilodercidae, ♂, retrolateral aspect of the left pedipalpus. – Scale bar 0.2.

Fig. 116) *Priscaleclercera* sp. indet., Psilodercidae, ♂, retrodorsal aspect of the deformed right pedipalpus. – B = structures of the bulbus, C = cymbium, E = embolus, L = long cymbial bristle, S = apical cymbial spines, T = tibia. Taken from WUNDERLICH (2015: 371, fig. 98, under *Leclercera*). Scale bar 0.1.

Figs. 117-118: *Priscaleclercera brevispina* **n. gen. n. sp.**, Psilodercidae, ♂; 117) femur of the left pedipalpus, prolateral and slightly apical aspect; 118) retrolateral aspect of the left pedipalpus. – Scale bars 0.1.



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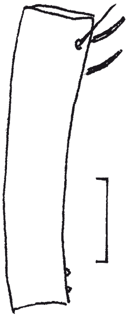

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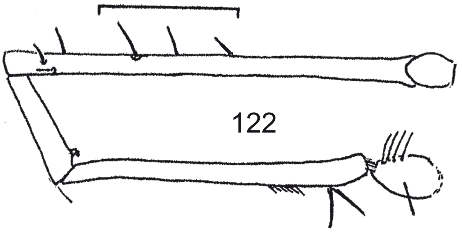

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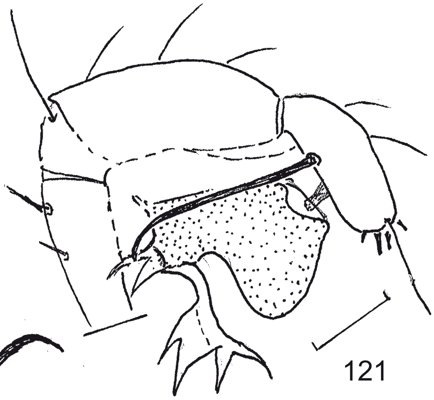

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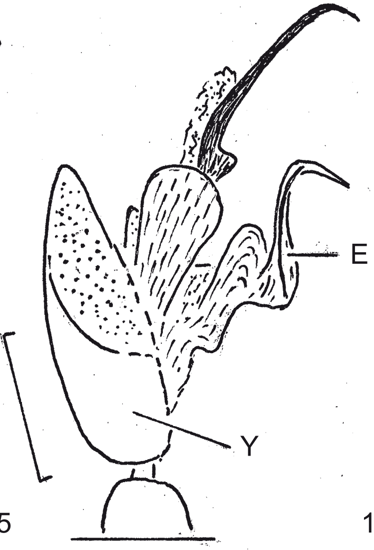

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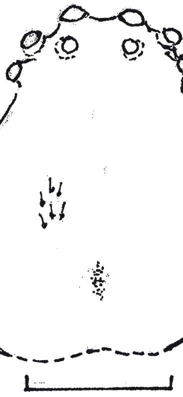

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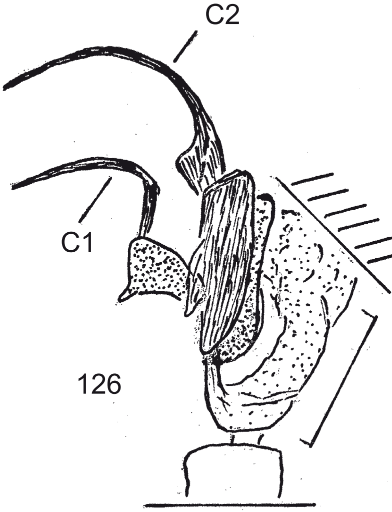
Fifs. 119-121: *Priscaleclercera paucispina* **n. gen. n. sp.**, Psilodercidae, ♂; 119) dorsal aspect of the slightly deformed prosoma. Note the diads of the lateral eyes on humps as well as the very long and protruding clypeus; 120) prolateral aspect of the left pedipalpal femur; 121) retrolateral aspect of the right pedipalpus. Only few hairs are drawn. The ventral femoral bristles are hidden. – Scale bars 0.2 in fig. 119, 0.1 in figs. 120-121.

Figs. 122-123: *Pedipalparaneus seldeni* WUNDERLICH 2015, Mongolarachnidae, ♂ holotype; 122) prolateral aspect of the right pedipalpus; 123) Retrolateral aspect of the distal parts of the right pedipalpus; redrawn and corrected from WUNDERLICH (2015: 384, fig. 197), with the cymbium basally enclosing the bulbus. – C = cymbium, E = embolus, R = retrobasal part of the cymbium. Scale bar 0.5.

Figs. 124-126: *Longissipalpus cochlea* **n. sp.**, Mongolarachnidae, ♂; 124) dorsal aspect of the prosoma; 125) retroventral aspect of the expanded left pedipalpus. Hairs are not drawn, parts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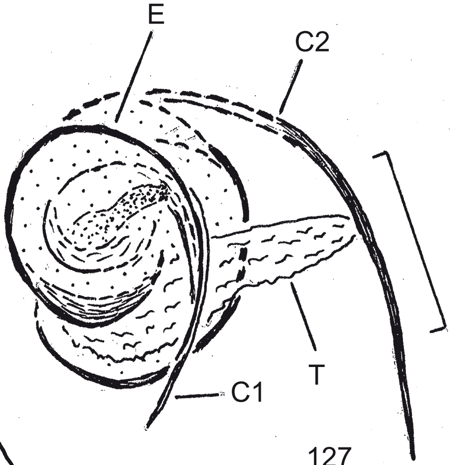
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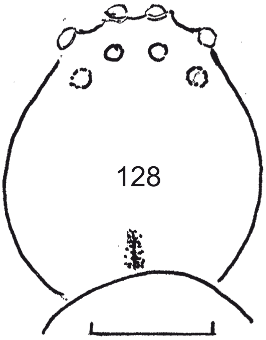
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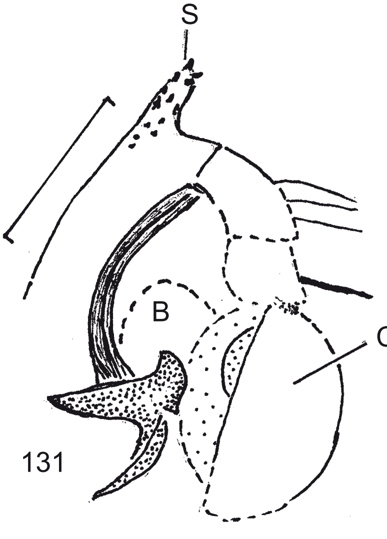
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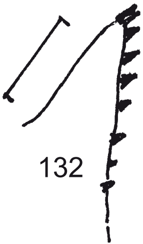
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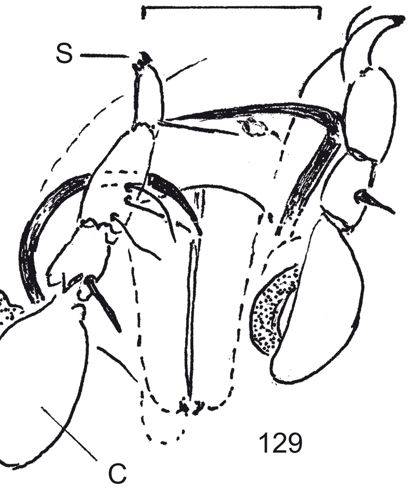
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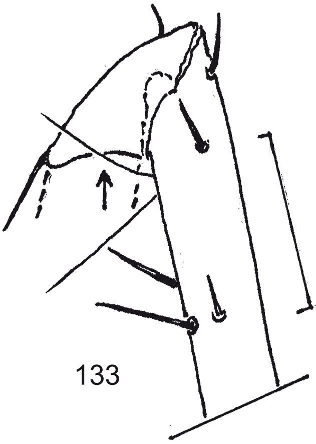
are hidden; 126) dorsal aspect of the expanded left pedipalpus. Parts like the embolus and tegular apophysis are hidden. – C = conductors, E = embolus with conductor, Y = cymbium. Scale bars 0.5 in fig. 124, 0.2 in the figs. 125-126.

Fig. 127) <u>*Longissipalpus magnus*</u> WUNDERLICH 2015, Mongolarachnidae, ♂ holotype, prodistal aspect of the structures of the left pedipalpus. – C = conductors, E = embolus, T = tegular apophysis. Scale bar 0.2.

Figs. 128-132: <u>*Pholcochyrocer altipecten*</u> **n. sp.**, Pholcochyroceridae, ♂; 128) dorsal aspect of the prosoma; 129) anterior aspect of the prosoma and the pedipalpi. The eyes and parts of the chelicerae are hidden. Hairs are not drawn; 130) dorsal and slightly probasal aspect of the "comb-shaped" spines on the outgrowth of the right pedipalpal femur; 131) retrolateral aspect of the right pedipalpus; 132) retrodorsal aspect of embolus and conductors of the right pedipalpus. – B = bubble, C = cymbium, S = spines of the femoral outgrowth. Scale bars 0.5 in figs. 128, 129 and 131, 0.1 in fig. 132.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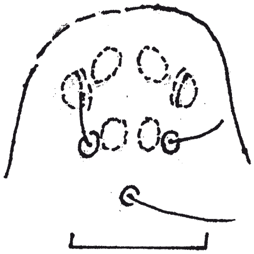
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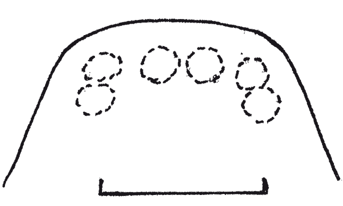
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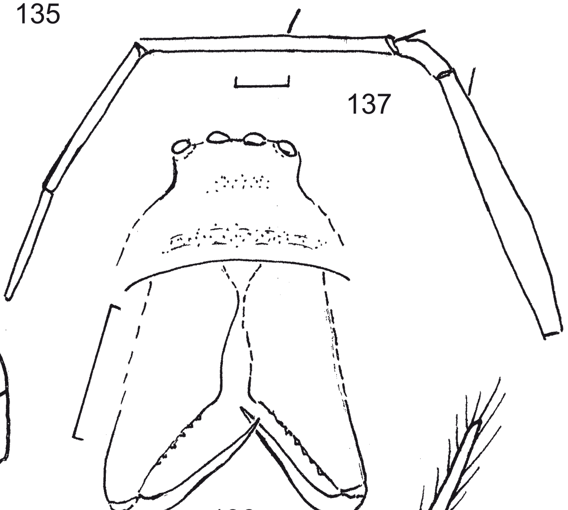
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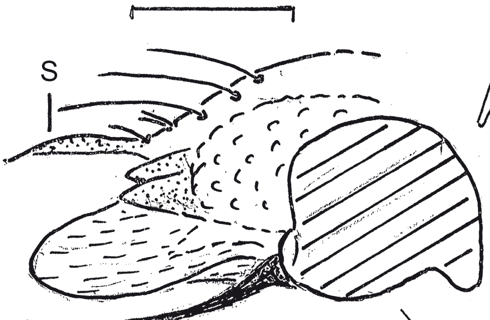

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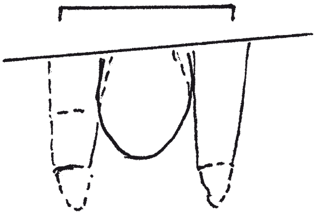
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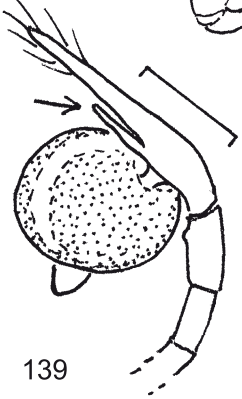
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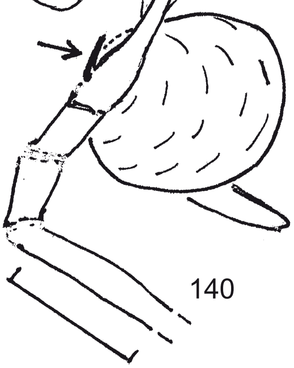
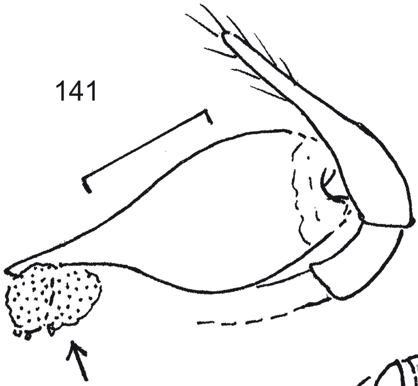

140

Figs. 133-134: *Palaeoleptoneta crus* **n. sp.**, Leptonetidae, ♂; 133) distal part of the femur and patella of the right leg I. The arrow points to the apical part of the patella where the leg has been broken by autotomy; 134) retrolateral aspect of the deformed left pedipalpus which partly is cut off. – E = embolus, S = cymbial spur. Scale bars 0.2.

Fig. 135) *Palaeoleptoneta* sp. indet. (F2926/BU/CJW), ♀, dorsal aspect of the anterior part of the prosoma. The eyes are partly deformed and covered with an emulsion. Scale bar 0.2

Figs. 135a-141: ?*Telemofila crassifemoralis* **n. sp.**, Telemidae, ♂; 135a) dorsal aspect of the anterior part of the prosoma. Note: The exact position of the eyes is hard to observe; 136) anterior aspect of the prosoma. Parts are hidden or may be deformed. Hairs are not drawn; 137) prolateral and slightly dorsal aspect of the right leg I; 138) ventral aspect of the large colulus between the widely spaced anterior spinnerets. Both are basally partly hidden by the right metatarsus IV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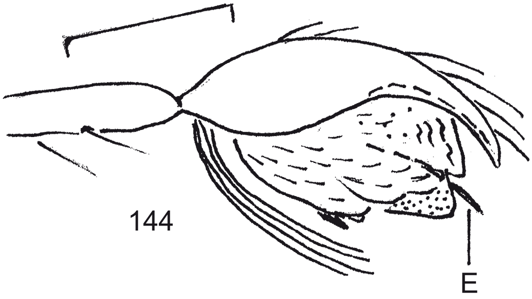
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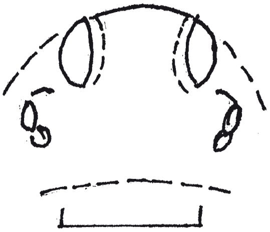
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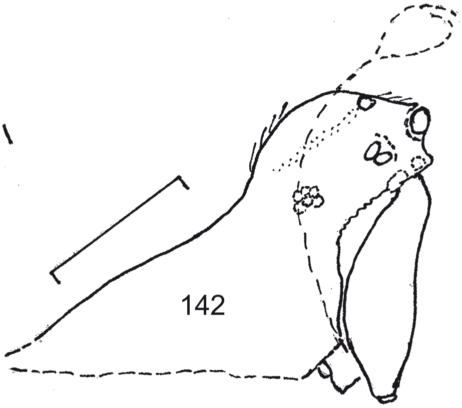
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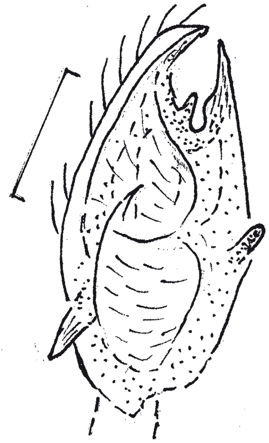
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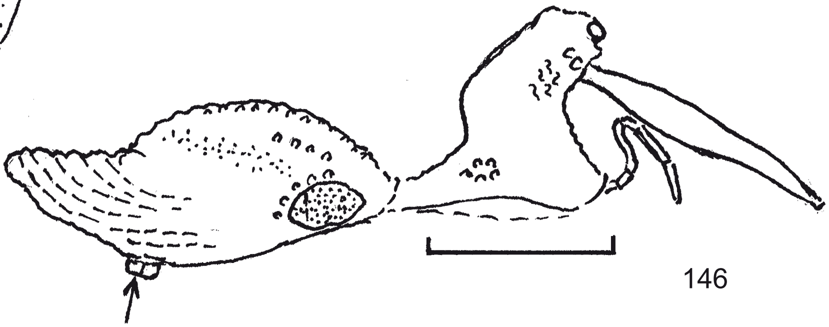
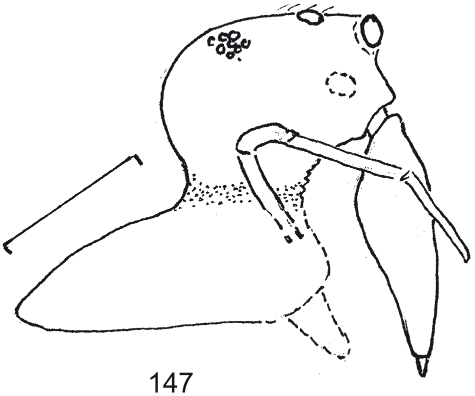

146

and difficult to observe; 139) prolateral aspect of the right pedipalpus. The arrow points to the tip of the paracymbium; 140) right pedipalpus seen from in front of the spider. Only few hairs are drawn. The arrow points to the paracymbium; 141) retrolateral aspect of the left pedipalpus with remains of a questionable spermatophore (arrow). Probably the bulbus has been deformed by the preservation. – Scale bars 0.1 mm.

Figs. 142-145: Burmesarchaea alissa **n. sp.**, Archaeidae, ♂; 142) lateral aspect of the prosoma. Chelicerae apparently in an unnatural position. The position of the right pedipalpus is shown in a dotted line; 143) anterior aspect of the eyes. Note the large anterior median eyes. (They are translocated to a lateral position in the related family Lagonomegopidae, see the figs.); 144-145) retroventral and retroventral-apical aspects of the right pedipalpus. Only few hairs are drawn. – E = questionable embolus. Scale bars 0.5 in fig. 142, 0.2 in the remaining figs.

Fig. 146) Burmesarchaea caudata **n. sp.**, Archaeidae, ♀, lateral aspect of the body, the right chelicera (apparently in an unnatural position) and the right pedipalpus. The arrow points to the position of the spinnerets. Only few hairs and pustules are drawn The eyes are covered with an emulsion. Note the large right lung cover. – Scale bar 1.0.



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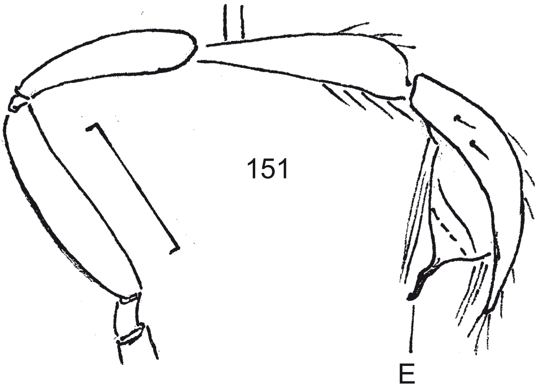

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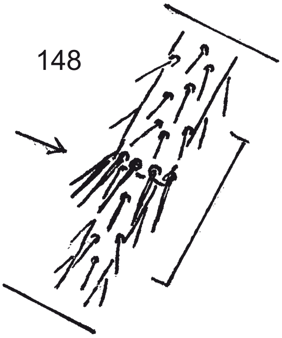

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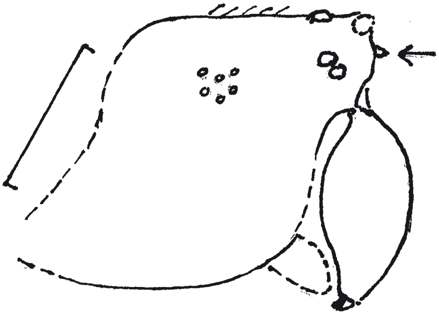

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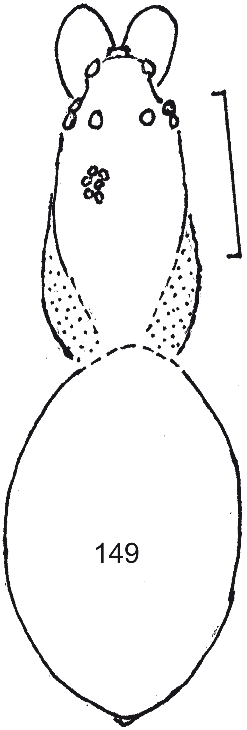

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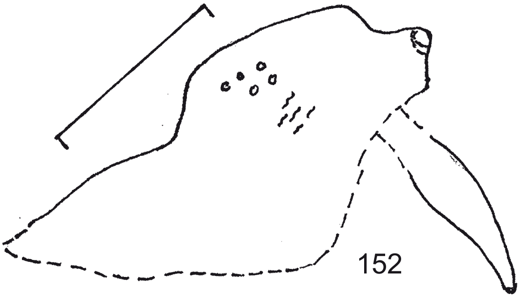
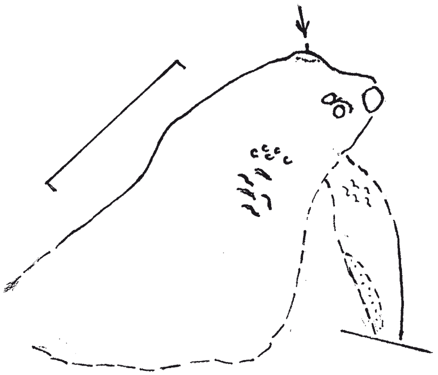


152

Figs. 147-148: Burmesarchaea crassicaput **n. sp**., Archaeidae, ♀; 147) lateral aspect of the prosoma and the right pedipalpus. Only few hairs are drawn; 148) ventral aspect of the left leg III: Distal part of the metatarsus and basal part of the tarsus. The arrow points to the apical metatarsal comb-like bristle-shaped hairs which exist in other congeneric species, too. – Scale bars 0.5 and 0.1.

Figs. 149-151: Burmesarchaea crassichelae **n. sp**., Archaeidae, ♂; 149) dorsal aspect of the body; 150) Lateral aspect of the prosoma. The arrow points to the clypeal humps; 151) retrolateral aspect of the right pedipalpus. Only few hairs are drawn. – E = embolus. – Scale bars: 0.5 in figs. 149-150, 0.2 in fig. 151.

Figs 152) Burmesarchaea gibber **n. sp**., Archaeidae, ♂, lateral aspect of the prosoma. Parts are hidden, e. g. most eyes. – Scale bar 0.5.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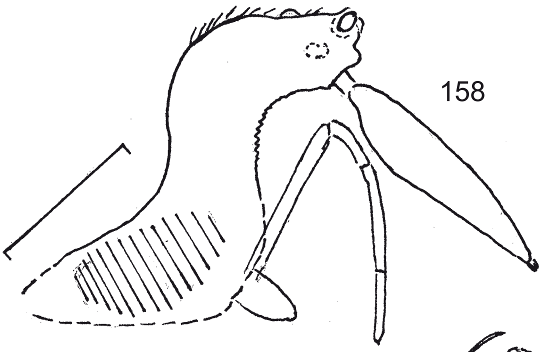
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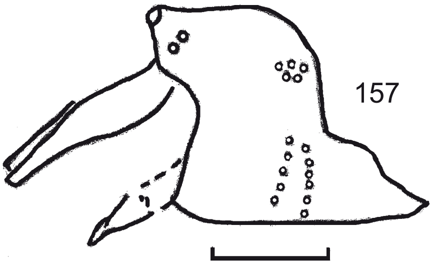
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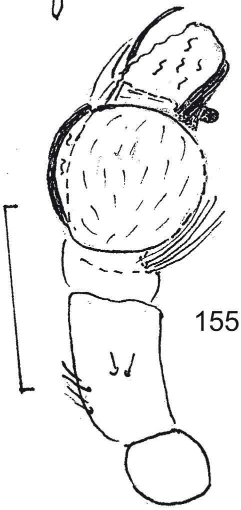
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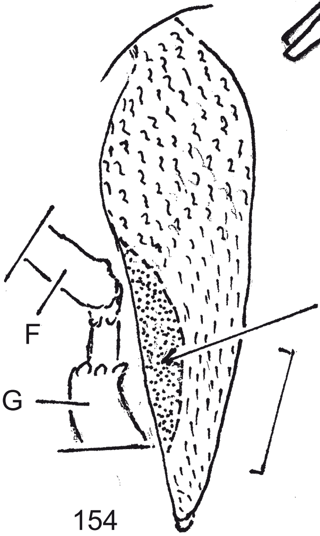

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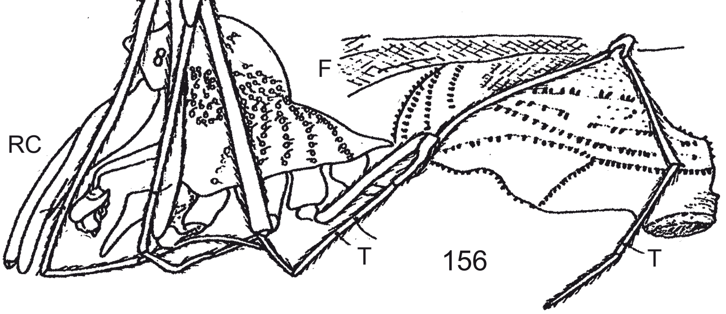
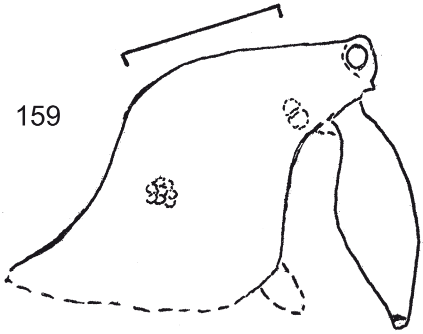


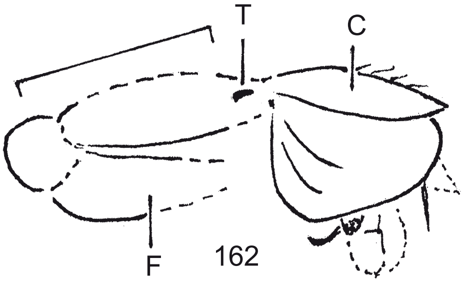
156

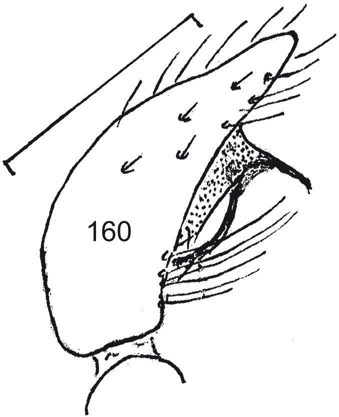
Figs. 153-155: Burmesarchaea gibberoides **n. sp.**, Archaeidae, ♂; 153) lateral aspect of the prosoma. A single spine (arrow) is observable on top of the cephalic part. Only few pustules and of the dense hairs are drawn; 154) retrolateral aspect of the right chelicera and the basal part of the right pedipalpus. The arrow points to the hairless and concave retrolateral area which apparently bears indistinct fine stridulatory files or granules; 155) ventral aspect of the right pedipalpus. – F = femur, G = gnathocoxa. Scale 0.5 in fig. 153, 0.2 in the remaining figs.

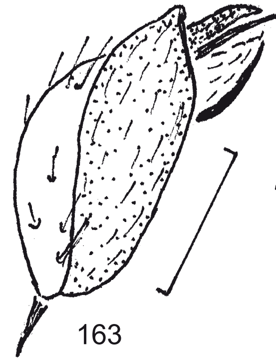
Figs. 156-157: *Burmesarchaea grimaldii* (PENNEY 2003), Archaeidae, ♂; lateral aspect of the body and of the modified prosoma. 156) is taken from PENNEY (2003). – Scale bar 0.5.

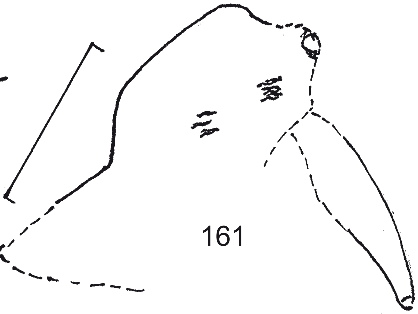
Fig. 158) *Burmesarchaea longicollum* **n. sp.**, Archaeidae, ♀, lateral aspect of the prosoma and the right pedipalpus, with the chelicerae not in their natural position but spread anteriorly. A thoracal part is hidden or cut off within the amber. – Scale bar 0.5.

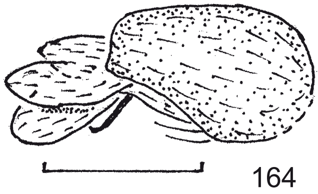


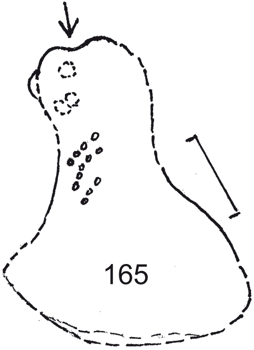


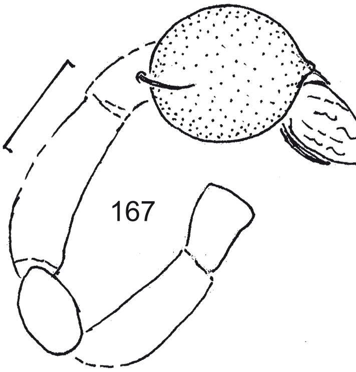


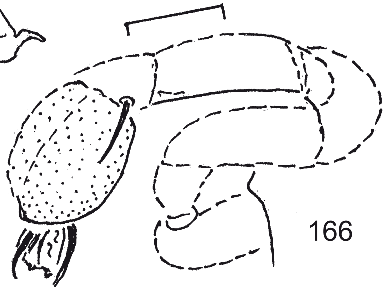








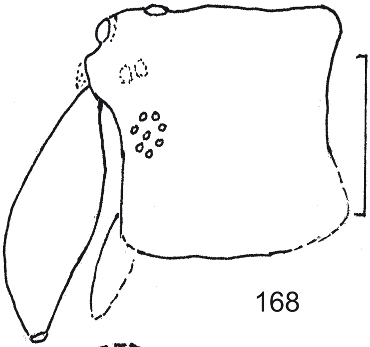




Figs. 159-160: *Burmesarchaea propinqua* **n. sp.**, Archaeidae, ♂; 159) lateral aspect of the prosoma; 160) retrodorsal aspect of the right pedipalpus. – Scale bars 0.5 and 0.2.

Figs. 161-164: *Burmesarchaea pseudogibber* **n. sp.**, Archaeidae, ♂; 161 and 163 holotype, 162 and 164 paratype; 161) lateral aspect of the prosoma. Parts are hidden. Only few hairs are drawn; 162) retrodorsal aspect of the right pedipalpus. The conductors are not well observable; 163) retrolateral aspect of the right pedipalpus; 164) ventral aspect of the left pedipalpus. – C = cymbium, F = femur, T = retrodistal tibial spine. Scale bars 0.5 in fig. 161, 0.2 in fig. 162, 0.1 in figs. 163-164.

Figs. 165-167: *Burmesarchaea pustulata* **n. sp.**, Archaeidae, ♂; 165) lateral aspect of the prosoma, outline. The arrow points to the dorsal depression. Only few pustules are drawn, see the photo; 166) retrolateral aspect of the left pedipalpus. Parts are decomposed or covered with an emulsion; 167) retrolateral aspect of the lose right pedipalpus. – Scale bars 0.2 in fig. 165, 0.1 in the figs. 166-167.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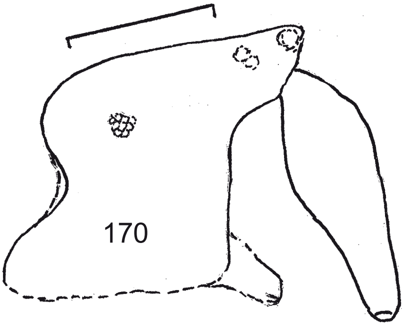
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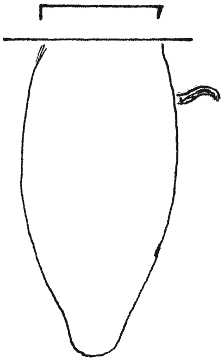
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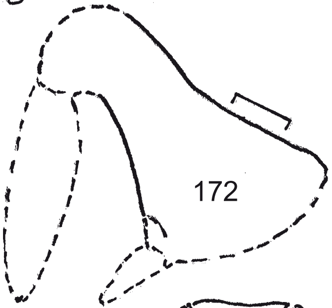
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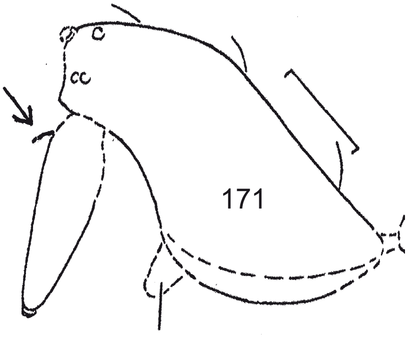
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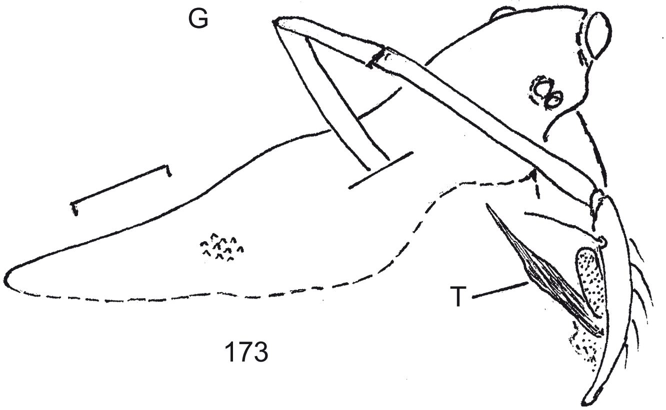
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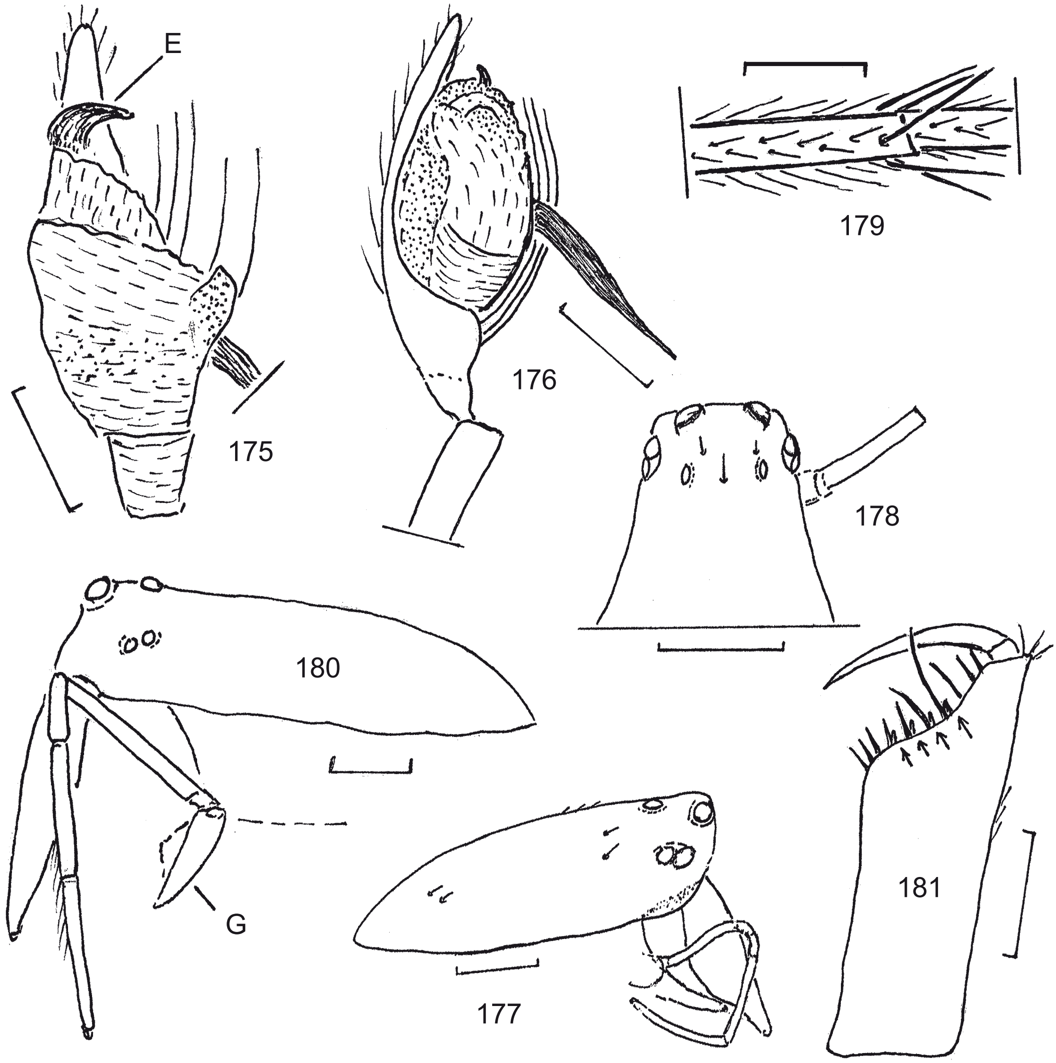
Figs. 168-169: Burmesarchaea quadrata **n. sp.,** Archaeidae, ♂; 168) lateral aspect of the prosoma. Only few pustules are drawn. Posterior-ventral parts are hidden. – Scale bars 0.5 and 0.1.

Fig. 170) Burmesarchaea speciosa (WUNDERLICH 2008), Archaeidae, ♂ holotype, lateral aspect of the prosoma. – Scale bar 0.5.

Figs. 171) Eomysmauchenius septentrionalis WUNDERLICH 2008, Archaeidae, juv. ♀, holotype, lateral aspect of the prosoma. The arrow points to the anterior cheliceral bristle which was overlooked in the original description. – Scale bar 0.2.

Fig. 172) ?Eomysmauchenius longissipes (WUNDERLICH 2015) (under *Lacunauchenius*), Archaeidae, ♂ holotype, lateral aspect of the prosoma. Eyes are not drawn. – Scale bar 0.2.

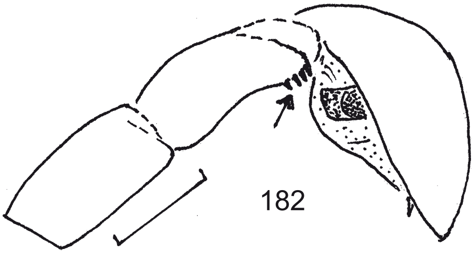
Figs. 173-176: Eomysmauchenius dubius **n sp**., Archaeidae, ♂; 173) lateral aspect of the prosoma and the right pedipalpus. Only the basal part of the right chelicera is drawn; 174) anterior aspect of the prosoma. “Peg teeth” are only drawn on the right chelicera; 175) ventral and slightly



basal aspect of the left pedipalpus; 176) prolateral aspect of the left pedipalpus. The structures of the bulbus are partly deformed. – E = questionable embolus, T = large tegular apophysis. Scale bars 0.2 in figs. 173-174, 0.1 in figs. 175-176.

Figs. 177-179: *Planarchaea kopp* WUNDERLICH 2015, Archaeidae, ♀ holotype; 177) lateral aspect of the prosoma and the right pedipalpus; 178) dorsal aspect of the anterior part of the prosoma and of the right pedipalpal femur. Only few bristles/hairs are drawn; 179) distal part of the left metatarsus IV, prodorsal aspect. Note the thin apical bristle-shaped hairs which are up to 0.13 mm long and slightly stronger than the normal hairs. Similar strong apical hairs exist on the femora and tibiae and in other Lacunaucheniini, see WUNDERLICH (2015: 386, fig. 216). – Scale bars 0.2 in figs. 177-178, 0.1 in fig. 179.

Figs. 180-181: *Planarchaea ovata* **n. sp.**, Archaeidae, ♀; 180) lateral aspect of the prosoma and the left pedipalpus; 181) dorsal aspect of the right chelicera. Note the (at least four) short “peg teeth” of a posterior row (arrows) which are partly hidden by the large teeth of the anterior row. – G = gnathocoxa. Scale bars 0.2.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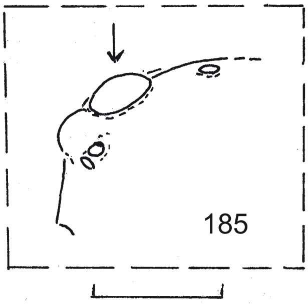
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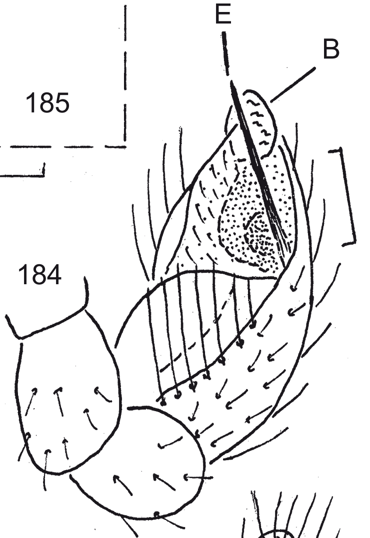

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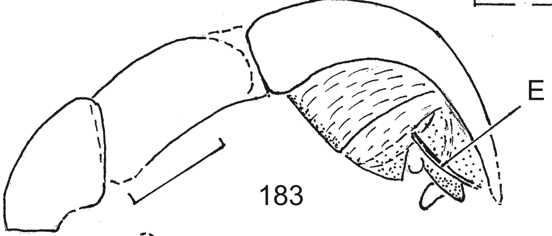

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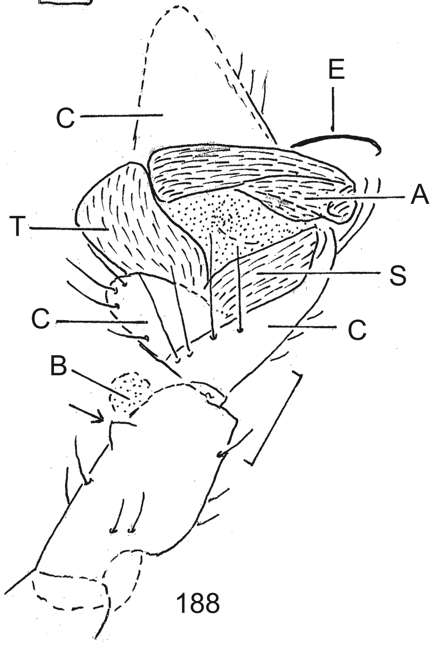

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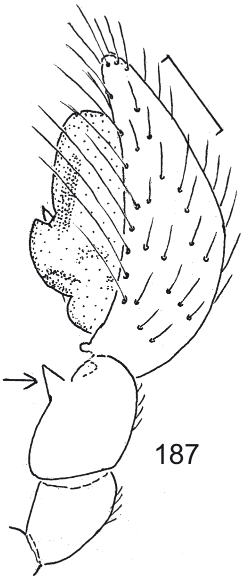
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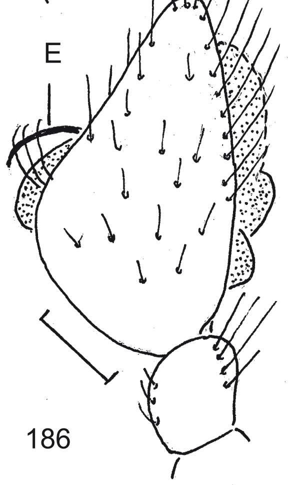

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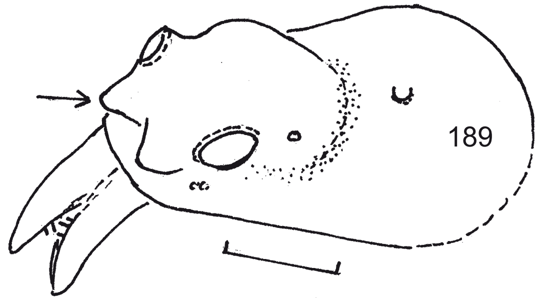
Figs. 182-184: *Albiburmops annulipes* **n. gen. n. sp.**, Lagonomegopidae, ♂; 182) retrolateral aspect of the right pedipalpus. The arrow points to the dents of the tibial apophysis; 183) prolateral aspect of the left pedipalpus; 184) retrobasal aspect of the left pedipalpus. The perspection in the drawing of the cymbium is shortened. Only few hairs are drawn. – B = bubble, E = embolus. Scale bars 0.2.

Figs. 185-188: ?*Parviburmops bigibber* **n. sp.**, Lagonomegopidae, ♂; 185) Lateral aspect of the anterior part of the prosoma. The arrow points to the anterior median eye (in a lateral position!); 186) dorsal aspect of the right pedipalpus; 187) retrolateral aspect of the left pedipalpus. The cymbium is covered with long white hairs; only few hairs are drawn; 188) ventral aspect of the right pedipalpus with expanded bulbus. The arrow points to the ventral tibial apophysis. Only few hairs are drawn. – A = tegular apophysis, B = bubble, C = cymbium, E = embolus, S = subtegulum, T = basal tegular apophysis. Scale bars 0.5 in fig. 185, 0.2 in the figs. 186-188.



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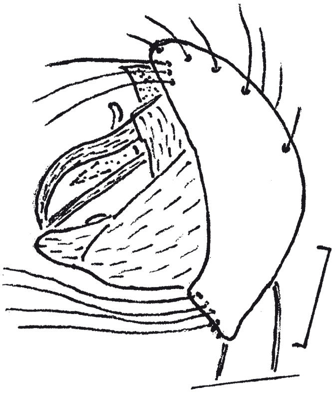

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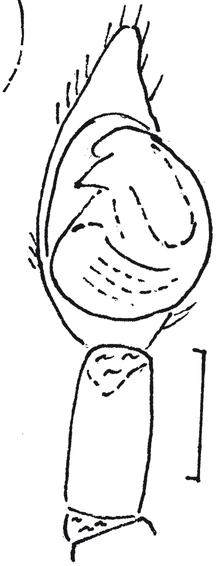

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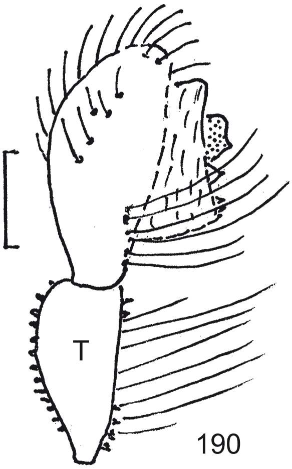

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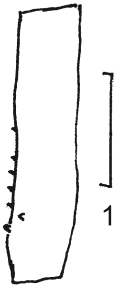

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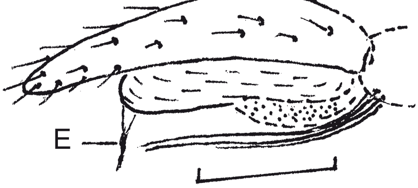

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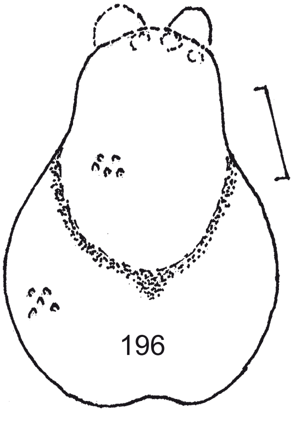

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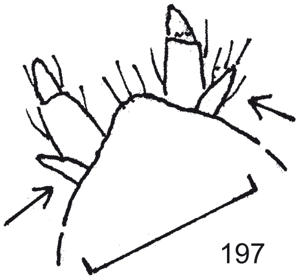
Figs. 189-191: ?*Paxillomegops cornutus* **n. sp.**, Lagonomegopidae, ♂; 189) dorsal anterior-left aspect of the prosoma. The arrow points to the right clypeal "horn". Only few "peg teeth" are drawn; 190) dorsal aspect of the left pedipalpus which is fairly deformed; 191) prolateral aspect of the deformed right pedipalpus with its probably expanded bulbus. – T = tibia. Scale bars 0.5 in fig. 189, 0.2 in the figs. 190-191.

Figs. 192-194: *Planimegops parvus* **n. gen. n. sp.**, Lagonomegopidae, ♂; 192) ventral aspect of the left pedipalpal femur. Note the prolateral stridulatory teeth; 193) prodorsal aspect of the right pedipalpus. Note the long proapical cymbial hairs. Only few further hairs are drawn. – E = questionable embolus. Scale bars 0.2.

Fig. 195) Unnamed female of the family Lagonomegopidae (gen. & sp. indet.), prolateral aspect of the right metatarsus and tarsus I (part). Note the ventral cusps. Hairs are not drawn. A bristle-shaped structure on the tibia (arrow) may be an artefact. – Scale bar 1.0.

Figs. 196) Spatiatoridae indet., ♀ or subad. ♂, coll. PATRICK MÜLLER inv. no. BUB-93, dorsal aspect of the prosoma. Only few tubercles are drawn. Note the protruding basal cheliceral articles and the distinct furrow beween the cephalic and the thoracal part. Most parts of the eye lenses are hidden. – Scale bar 0.5.



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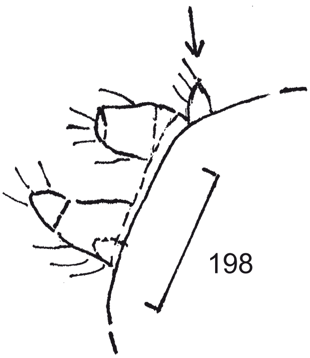

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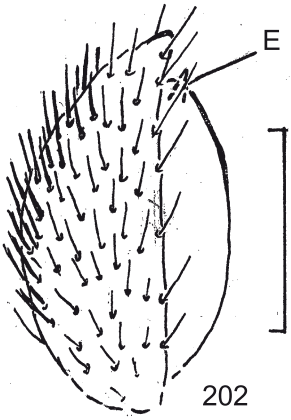

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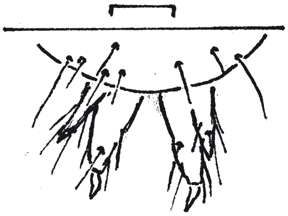

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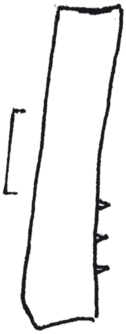

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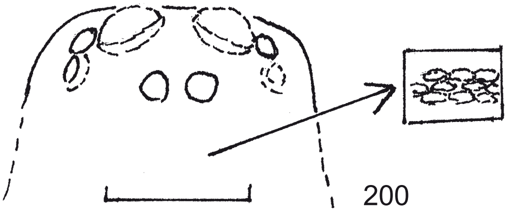

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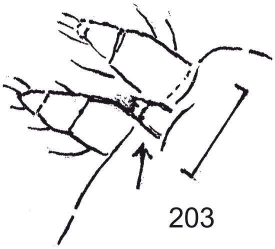

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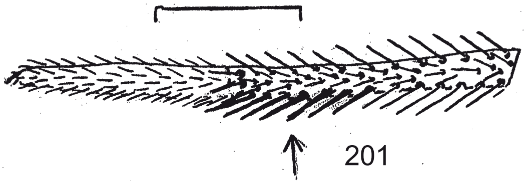

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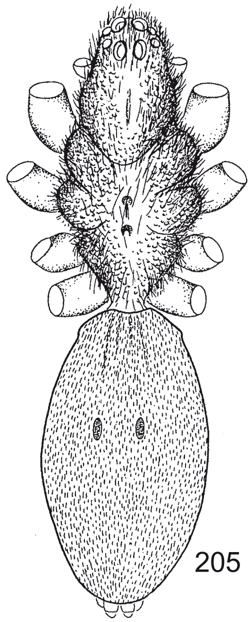
Figs. 197) Vetiator gracilipes WUNDERLICH 2015, Vetiatoridae, ♂, holotype, dorsal aspect of the distal part of the opisthosoma. The arrows point to the reduced posterior spinnerets. Only few hairs are drawn. – Scale bar 0.1.

Figs. 198-199: Vetiator ?gracilipes WUNDERLICH 2015, Vetiatoridae, ♂ F2954/BU/CJW; 198) dorsal aspect of the spinnerets. The arrow points to the questionable left posterior spinneret. Note the large/stout anterior spinnerets. Only few hairs are drawn; 199) dorsal aspect of the left pedipalpal femur. Note the three prolateral stridulatory teeth. – Scale bars 0.1.

Figs. 200-202: Pekkachilus vesica **n. gen. n. sp.**, Vetiatoridae, ♂ holotype; 200) dorsal aspect of the eyes. Most probably an emulsion covers the anterior median eyes. A part of the cuticula is strongly enlarged (arrow); 201) prodorsal aspect of the right tarsus and metatarsus III. The arrow points to the long and strong ventral hairs of the metatarsal “comb”. Not all hairs are drawn; 202) prodorsal aspect of the left pedipalpus. Not all hairs are drawn. – E = questionable embolus. Scale bars 0.2.

Fig. 203) Pekkachilus sp. indet., Vetiatoridae, ♂, dorsal-left aspect of the spinnerets. The arrow points to the questionable small left posterior spinneret. The anal tubercle is not observable. Only few hairs are drawn. – Scale bar 0.1.

Fig. 204) ?Pekkachilus sp. indet., Vetiatoridae, ♀, dorsal aspect of the deformed spinnerets. The anal tubercle is hidden. Only few hairs are drawn.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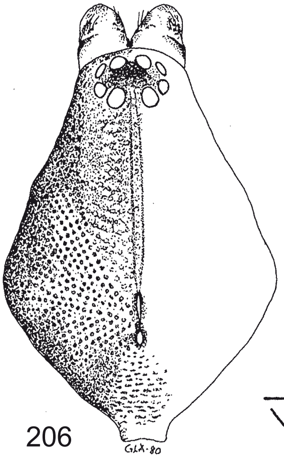
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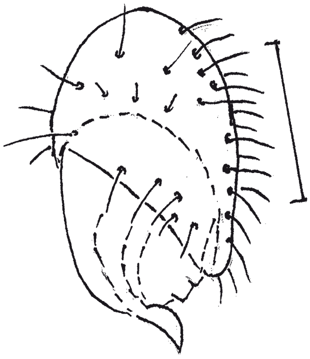
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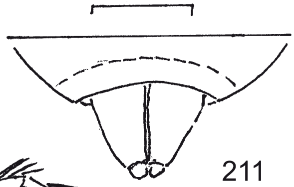
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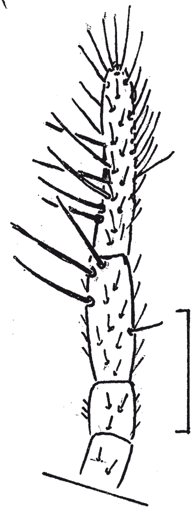
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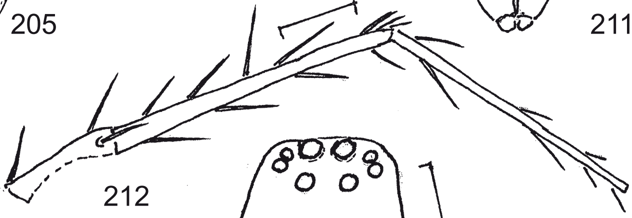
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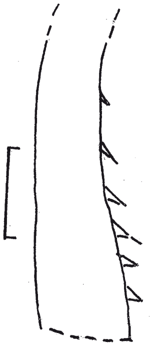
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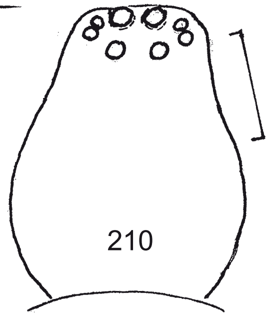
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213

Fig. 205) Stenochilus crocatus SIMON 1884, Stenochilidae, extant, ♀, body length 7.5 mm, dorsal aspect of the body. Taken from LEHTINEN (1982).

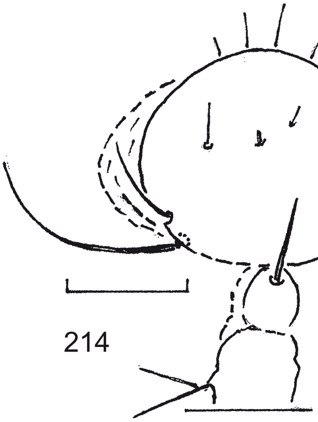
Fig. 206) Colopea xerophila LEHTINEN 1982, Stenochilidae, extant (Papua New Guinea), ♂, dorsal aspect of the prosoma. Taken from LEHTINEN (1982).

Figs. 207-208: Micropalpimanus ?poinari WUNDERLICH 2008, Micropalpimanidae, ♂, coll. PATRICK MÜLLER; 207) dorsal aspect of the left pedipalpal femur. Note the prolateral stridulatory bristles; 208) dorsal-apical aspect of the left pedipalpus. Not all hairs are drawn. – Scale bars 0.1.

Fig. 209) Micropalpimanus poinari WUNDERLICH 2008, Micropalpimanidae, ♀ F2871/BU/CJW, dorsal aspect of the right pedipalpus.

Figs. 210-211: Palpimanidae indet., ?ad. ♀ F2958/BU/CJW; 210) dorsal aspect of the prosoma; 211) ventral aspect of the spinnerets. – Scale bars 0.5 and 0.2.

Figs. 212-215: Deinopedes tranquillus **n. gen. n. sp.**, ?Deinopidae, ♂; 212) retrolateral aspect of the left patella, tibia and metatarsus II; 213) retrodorsal aspect of the left tarsus IV. Only few hairs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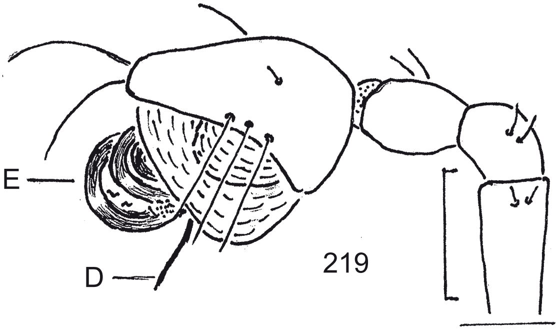

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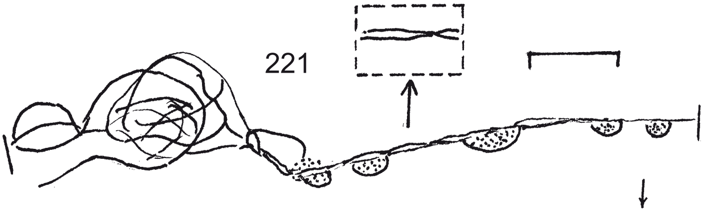
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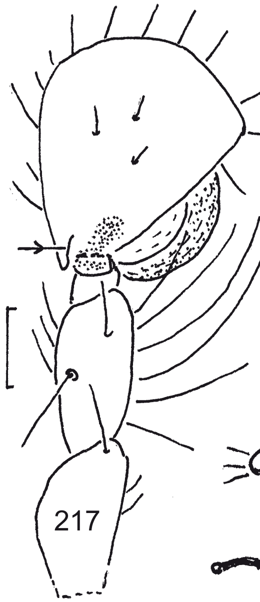
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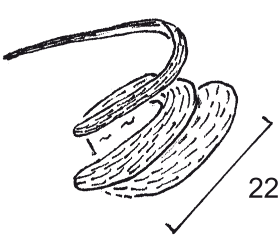
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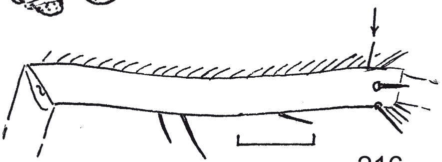
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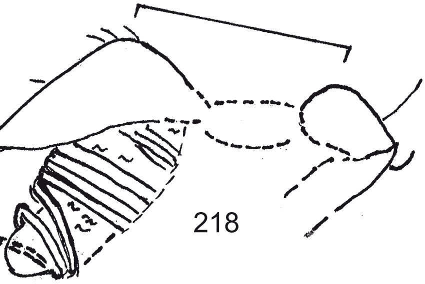
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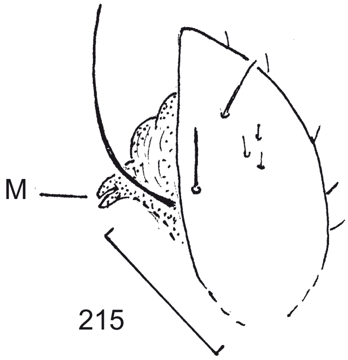

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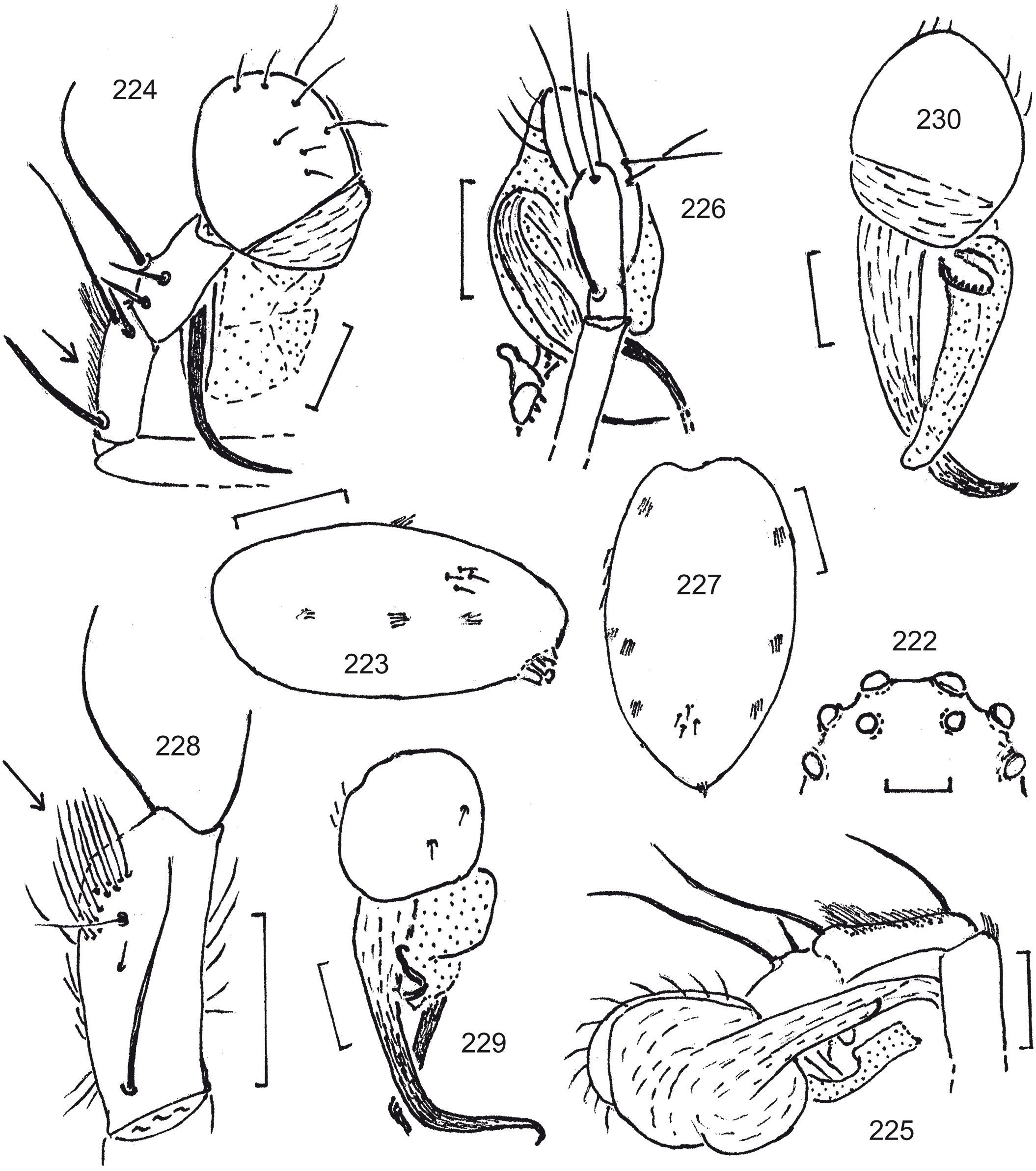
are drawn; 214) dorsal aspect of the distal articles of the deformed left pedipalpus; 215) basal-retrolateral aspect of the left cymbium and bulbus. Parts are hidden. – M = median apophysis. Scale bars 0.5.

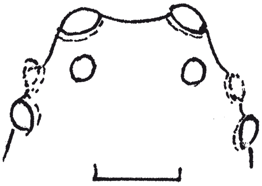
216-218: <u>*Burmadictyna postcopula*</u> **n. sp.**, Burmadictynidae, ♂; 216) prolateral aspect of the left metatarsus IV. Note the quite long calamistrum. The arrow points to the trichobothrium; 217) dorsal aspect of the right pedipalpus. The arrow points to the probasal cymbial outgrowth; 218) retrolateral aspect of the expanded left pedipalpus. The "mating plug" of the embolus is lost. Only few hairs are drawn. – Scale bars 0.2 in figs. 216-217, 0.5 in fig. 218.

Figs. 219-221: <u>*Eodeinopis longipes*</u> **n. gen. n. sp.**, Burmadictynidae, ♂; 219) prolateral aspect of the right pedipalpus. Only few hairs are drawn; 220) retrodorsal aspect of the distal part of the right embolus; 221) Small section of a thread of a capture web near *Eodeinopis longipes* with an enlarged part. Not all threads are drawn. – D = distal part of the embolus E. Scale bars 0.2 in figs. 219-220, 0.5 in fig. 221.



Figs. 222-226: *Kachin fruticosus* **n. gen. n. sp.**, Uloboridae, ♂; 222) dorsal aspect of the eyes; 223) lateral and slightly dorsal aspect of the opisthosoma. Only few hairs besides the small brushes are drawn; 224) prodorsal aspect of the partly deformed left padipalpus; 225) retrolateral aspect of the left pedipalpus; 226) dorsal-basal aspect of the left pedipalpus. Only few hairs are drawn. – Scale bars 0.5 in fig. 223, 0.2 in the remaining figs.

Figs. 227-230: *Kachin fruticosoides* **n. gen. n. sp.**, Uloboridae, ♂; 227) dorsal aspect of the slightly deformed opisthosoma. Note the three pairs of hair brushes. Only few further hairs are drawn; 228) dorsal aspect of the left pedipalpal patella. The arrow points to the retrodistal brush of longer hairs. Most of the short hairs are not drawn; 229) dorsal aspect of the left pedipalpus; 230) dorsal aspect of the slightly deformed right pedipalpus. – Scale bars 0.5 in fig. 227, 0.2 in the remaining figs.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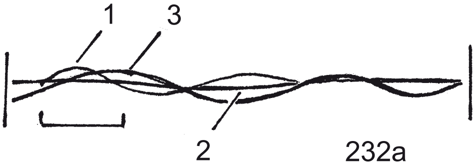

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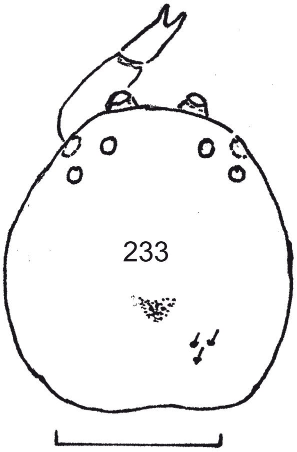
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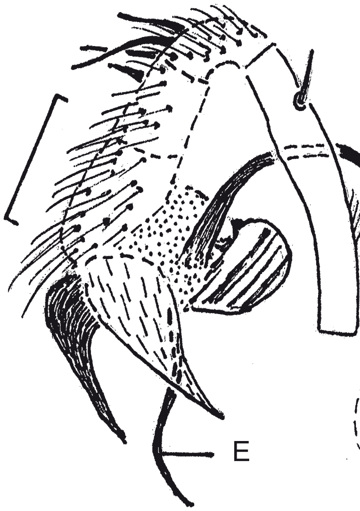

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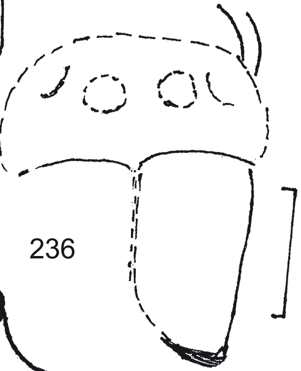
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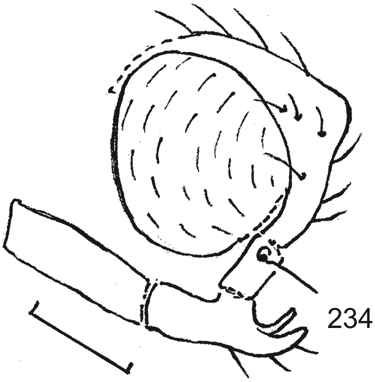
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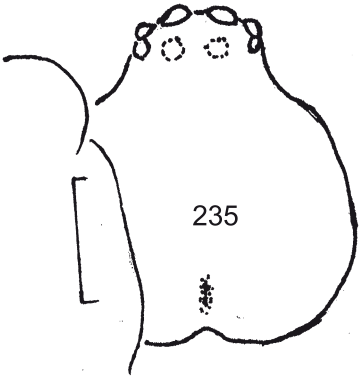
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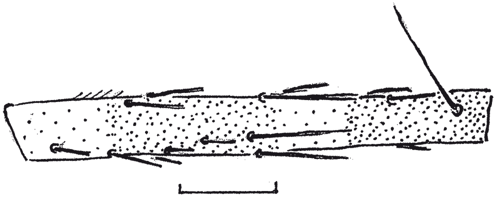
Figs. 231-232: <u>*Propterkachin magnooculus*</u> **n. gen. n. sp.**, Uloboridae, ♂; 231) dorsal aspect of the eyes; 232) retrodorsal (partly lateral) aspect of the left pedipalpus; 232 a) part of a web near the holotype of *Propterkachin magnooculus*. 1, 2, 3 = thin, medium and thick threads. – E = questionable embolus. Scale bars 0.2 in fig. 231, 0.1 in the figs. 232 and 232a.

Figs. 233-234: <u>*Furculoborus patellaris*</u> **n. gen. n. sp.**, Uloboridae, ♂; 233) dorsal aspect of the prosoma as well as of femur and patella of the left pedipalpus with its furked apophysis; 234) retrodistal aspect of the left pedipalpus. Only few hairs are drawn. – Scale bars 0.5 and 0.2.

Figs. 235-244: <u>*Praearaneus bruckschi*</u> **n. gen. n. sp.**, Praearaneidae **n. fam.**; ♂ holotype, only fig. 240 paratype, subad. ♂; 235) dorsal aspect of the prosoma which is partly hidden on the left side. The eyes are partly covered with an emulsion; 236) anterior aspect of the prosoma which



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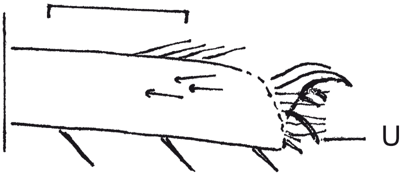

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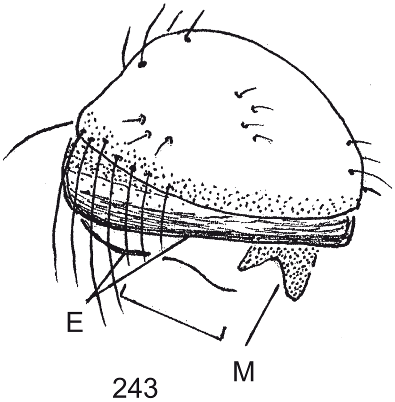

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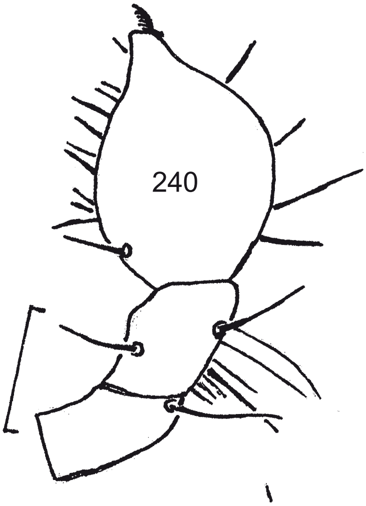

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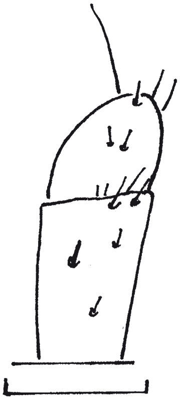

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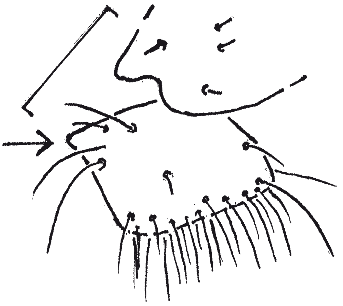

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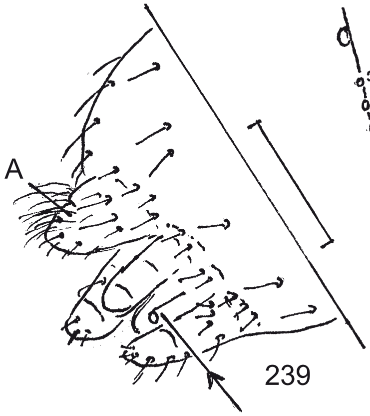

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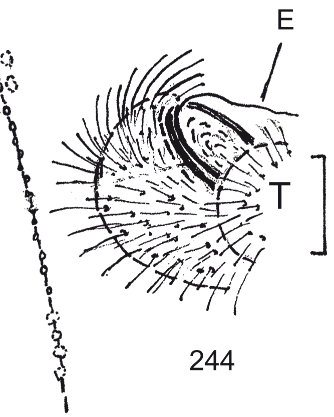

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is partly hidden or covered with an emulsion (the eyes); 237) prodorsal aspect of the right tibia I. Note the annulation and the long distal-dorsal bristle. Only few hairs are drawn; 238) retrolateral aspect of the distal part of the right tarsus IV. Only few hairs are drawn; 239) lateral aspect of the spinnerets. The arrow points to the right median spinneret; 240) prodorsal aspect of the right pedipalpus of the subad. ♂. 6 trichobothria of the tibia are drawn (the basal three are rather short); 241) dorsal aspect of the right pedipalpal patella and femur which basally is hidden. Only few hairs are drawn; 242) dorsal aspect of the tibia and distal part of the patella of the right pedipalpus. The arrow points to the retrolateral outgrowth of the patella; 243) dorsal aspect of the left pedipalpus; 244) prodorsal aspect of the left pedipalpus. Not all hairs are drawn. The distal part of the embolus possesses a free position. Note the questionable spiders thread on the left. – A = anal tubercle, E = embolus, M = median apophysis. Scale bars 1.0 in fig. 235, 0.5 in the figs. 236-237 and 239-241, 0.2 in the remaining figs.

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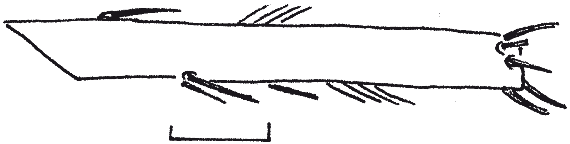

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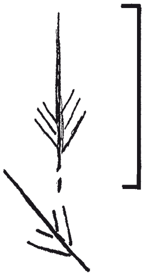

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Fig. 245) ?*Praearaneus* sp. indet., Praearaneidae, ad. ♀, prolateral aspect of the right metatarsus IV. Note the calamistrum which is well developed in the basal half of the article. – Scale bar 0.5.

Figs. 246-248: Questionable indet. member of the RTA-clade in Burmite, subad. ♂ F3015/ BU/ CJW; 246) dorsal aspect of the eyes. The lenses of some eyes are quite indistinct, the lateral eyes are not well observable; 247) retrolateral aspect of the right metatarsus I. Trichobothria are not drawn, only few hairs and bristles are drawn; 248) two feathery hairs from the left tibia I. – Scale bars 0.2 in the figs. 246-247, 0.1 in fig. 248.

BEITR. ARANEOL., 10 (2017: 280–284)

DESCRIPTION OF A DERIVED SPIDER TAXON IN ETHIOPIAN AMBER (ARANEAE: SALTICIDAE)

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Abstract: ?*Gorgopsina scharffi* n. sp. (Araneae: Salticidae) is described in Ethiopian amber, an African fossil resin which originated probably during the Miocene.

Key words: Africa, amber, Araneae, Cenozoic, Cretaceous, Eocene, Ethiopia, fossil, *Gorgopsina*, Linyphiidae, Mesozoic, Miocene, Salticidae, *Tomocyrba*, *Tomomingi.*

When I read about an alleged Cretaceous Ethipian spider of the family Linyphiidae (superfamily Araneoidea – see SCHMIDT et al. (2010) – and then I got an alleged Cretaceous member of the family Salticidae of the diverse RTA-branch of spiders; described in the present paper – I doubted at the very beginning my conclusions on a late (Tertiary?) origin of the Linyphiidae as well as of the Salticidae and the RTA-clade. In contrast to the previous opinion of certain authors the Ethiopian amber recently turned out not to be Cretaceous but much younger: Miocene, see PERRICHOT et al. (2016).

Fossil Cenozoic Salticidae are not rare and rather diverse; the oldest known fossils of this family were described in Eocene Baltic amber, see WUNDERLICH (2004). A sure proof of Jumping Spiders older than Eocene is unknown to me although Salticidae is the most diverse spider family today. Here I describe the first salticid taxon preserved in African amber from Ethiopia which is now considered to be Miocene.

?***Gorgopsina scharffi* n. sp**. (fig. 1), photos 128-129

Etymology: The spider is dedicated to NICOLAI SCHARFF, Zool. Mus. Copenhagen, Denmark, who revised the living members of *Tomocyrba* and related genera which are closely related to *Gorgopsina*.

Material: Holotype, juv., in Ethiopian amber, and a small separated piece of amber for a study in the future, F2890/E/CJW. – I bought the piece of amber from Scott Davies in Bangkok who claimed that this amber is "almost certainly Cretaceous", well documented by photos by KIEFERT (2015): "The amber deposits are located approximately 150 km north-northwest of Addis Ababa, near the town of Alem Keterna ... it occurs within Mesozoic sedimentary rocks just under the contact within the oldest Cenozoic volcanic rocks, ...". But the exact locality and the age of the present piece of amber is not sure, not known to me. According to PENNEY (2016: 14) Ethiopian amber is "now considered to be Miocene). Working with the piece of amber I found it being very hard during grinding.

Preservation and syninclusions: The spider is completely and excellently preserved in a light green piece of amber which I divided into four pieces. The opisthosoma is injured, it is dorsally longitudinally inclined to a low furrow, tiny bubbles exist mainly on the opisthosoma as well as on the prosomal hairs, a muddy bubble is preserved directly below the mouth parts. Tiny questionable pollen grains, insect's excrement and detritus exist in the same piece of amber. In the two separated and numbered pieces are preserved: The distal part of a questionable stamen and a tiny insect in F2890a/E/CJW, a tiny Hymenoptera in F2890b/E/CJW.

Diagnosis (juv.): Colour markings of the body absent; they may exist in conspecific adult spiders.

Description (juv.):
Measurements (in mm): Body length 2.0, prosoma: Length 1.0, width 0.7, height above legs 0.4, diameter of an anterior median eye 0.22, diameter of a posterior lateral eye 0.1, length of the clypeus ca. 0.02, length of a basal cheliceral article ca 0.25; opisthosoma: Length 1.0, width 0.65; tibia I 0.33; leg IV: Femur 0.55, patella 0.22, tibia 0.38, metatarsus 0.35, tarsus 0.35.
Colour: Prosoma medium brown, legs grey brown, not annulated, opisthosoma uniformly medium grey
Prosoma (photos) 1.4 times longer than wide, as in fig. 1 (the extant African genus *Tomomingi*), very high and with a distinct constriction behind the posterior median eyes, highest at the large posterior lateral eyes, posterior median eyes tiny, thoracal fissure quite long, clypeus very short, basal cheliceral articles fairly short, fangs and teeth of the cheliceral furrow hidden, sternum widely separating the coxae IV. – Legs (photos) only fairly long, order IV/I/II/III, III about as long as II, bristles long and thin, indistinct, frequent on III-IV, 2 dorsally on the femora, a single ventral pair in the basal half on metatarsus I, trichobothria difficult to recognize, teeth of the paired tarsal claws minute or absent. – Pedipalpus fairly slender, tarsal claw very thin or absent. – Opisthosoma (photos) 1.5 times longer than wide, hairs short, anterior and posterior spinnerets large.

Relationships: According to the specific constriction behind the posterior median eyes (fig. 1, photos) the present spider belongs to the tribe Hisponini SIMON 1901 in which metatarsus I bears usually a single pair of bristles, see SZÜTS & SCHARFF (2009) (under Hisponinae) (= Tomocyrbini). According to the high prosoma and the short clypeus *scharffi* n. sp. may well be a member of the extant genus *Tomomingi* SZÜTS & SCHARFF 2009. Members of this genus occur in Africa. Several authors suggested that the extinct Eocene genus *Gorgopsina* PETRUNKEVITCH 1942 in Baltic amber is probably a juniour synonym of *Tomocyrba* SIMON 1900, see WUNDERLICH (2004), but the short clypeus of *Gorgopsina* is similar to *Tomomingi* and *scharffi* as well. To my knowledge a paracymbium – existing in the extant Hisponini – is absent in *Gorgopsina*; thus most probably it is not synonymous with *Tomomingi*. ?*G. scharffi* may be a member of *Gorgopsina* or of *Tomomingi* or of an undescribed genus. The discovery of an adult male in Ethiopian amber may help to solve this question.

Ecology: Extant Hisponini are dwellers of rain forests; members of *Gorgopsina* were not rare dwellers of the mainly subtropical Eocene Baltic forest.

Distribution: Fossil amber forest of Ethiopia.

Discussion: The age – or the ages of different deposits? – of the Ethiopian amber(s) is still discussed, see SCHMIDT et al. and KIEFERT (2015): Little more than 65 million years – KIEFERT, see above – to/or more than 90 million years? But according to PENNEY (2016: 14) the origin of this amber is Miocene, according to COTY et al. (2016) it is cenocoic.
The existence of a kind of amber quite near the KT-event would be of special interest but...

- its age is doubted by palaeontologists like D. GRIMALDI and P. SELDEN (person communic. in 2015-2016),
- the present taxon is a derived one of the Salticidae (see below), not an ancient one (similar e. g. to ants according to GRIMALDI),
- no proof of a Cretaceus member of the family Salticidae exists, see below. (*)

Therefore it appears likely to me that the present fossil (and the present amber) originates not from the Cretaceous but from the Cenozoic.

(*) SCHMIDT et al. (2010) reported an unnamed member of the family Linyphiidae in Ethiopien amber. If correct this would be the only Cretaceous and Mesozoic specimen of the family Linyphiidae.

The discovery of the present fossil is highly remarkable for two aspects and various conclusions:
(A) The characters of the eyes and the eye field of *scharffi* are typical for derived extant and Eocene Salticidae (fig. 1, photos). The existence of advanced taxa like *scharffi* during the (Mid) Cretaceous appears quite unlikely to me.

(B) (1) It is conspicuous that in the Mid Cretaceous Burmese amber forest (it existed 100 million years ago and its spider fauna is rather well studied) not a single member of the diverse family Salticidae – or other derived families like Agelenidae or Zoropsidae – has been found but salticid taxa are well-known from the Eocene Baltic amber forest. Salticidae are excellent ballooners and – if this family had existed in an Ethiopian amber forest already 90-95 million years ago – it appears likely to me that members should have spread and should have existed in the Burmese amber forest. The absence of Jumping Spiders in the Burmese amber forest may date the salticid origin – at least its diversification – distinctly less than 90 or 100 million years ago, in the Late Cretaceous or early Paleogene. – (2) In the Eocene Baltic amber forest Salticidae was already rather diverse – see WUNDERLICH (2004) – in contrast to the lowermost Eocene amber forest of the Paris Basin which was not far away from the Baltic amber forest and which is only about 10 to 15 million years older (ca. 15 million years younger than the Cretaceous-Tertiary border), see PENNEY (2007: 74). PENNEY studied more than 230 spiders of the Paris Basin but did not find a single specimen of the distinctive family Salticidae. (Probably Salticidae will be found in amber from the Paris Basin in the future).

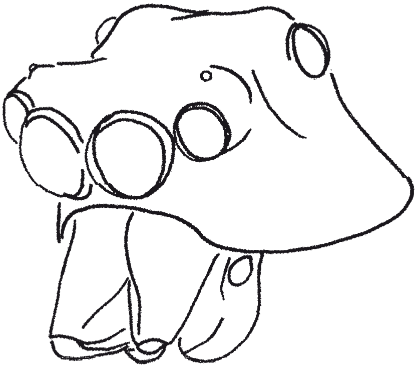

Fig. 1) Anterior-lateral aspect of an extant African member of the genus *Tomomingi* SZÜTS & SCHARFF (2009), taken from SZÜTS & SCHARFF (2009).

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BEITR. ARANEOL., 10 (2017: 285–288)

PALAEOBIOGEOGRAPHY AND PHYLOGENOMICS – FOSSIL PROOFS CONTRA RESULTS FROM MOLECULAR GENETIC: THE CASE OF MESOZOIC SEGMENTED SPIDERS (ARANEAE: MESOTHELAE)

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Abstract: The finds of Mid Cretaceous South East Asian fossils of the spider suborder Mesothelae (Araneae) are compared with results of molecular genetical (e. g. mtDNA) investigations of extant spiders. The proof of these fossils contradict conclusions by molecular genetical studies and even may falsify these conclusions: The Mesothelae did not invade South East Asia in the Palaeogene for the first time but their members lived already in this region for million of years. Fossils possess a great importance regarding the historical biogeography, evolution and phylogeny: Based on the asiatic fossils an Euroamerican origin of the suborder Mesothelae appears quite doubtful.

Key words: Araneae, Burmite, Carboniferous, Cretaceous, dispersal, Liphistiidae, Mesothelae, Mesozoic, molecular genetics, Palaeogene, palaeobiogeography, Palaeozoic, phylogenomics, phylogeny, spiders.

Fossil and extant lower and higher taxa of the suborder Mesothelae – mainly in Mid Cretaceous South East Asian Burmese amber from Myanmar (Burma) – are treated in this volume – see WUNDERLICH (2017) –; in this paper the new families Burmathelidae and Parvilhetidae of the Mesothelae are described, and the genus *Cretaceothele* (Cretaceotelidae) is redescribed.

In the geological sense the peculiarly segmented Mesothelae (fig. 1) is the oldest group of spiders (Araneae), known already from the Palaeozoic, more than 300 million years ago, PREVIOUS TO THE BREAK OF PANGAEA into the northern Laurasia and the southern Gondwana. It is a relict taxon which is restricted to South East Asia today but reported from North America and Europe from the Carboniferous. Therefore the first proof of Mesothelae in the Cretaceous – see WUNDERLICH (2015) – is not a surprise, and the report of fossils from the Southern Hemisphere should be only a matter of time.

Liphistiidae is regarded here in a strict sense, strongly related to the Heptathelidae, following PETRUNKEVITCH (1939) and HAUPT (2003); XU et al. regarded both taxa as subfamilies of the Liphistiidae s. l.. IF the family Liphistiidae is regarded in a wide sense – including Liphistiinae and Heptathelinae – the families Burmathelidae WUNDERLICH 2017 and Parvithelidae WUNDERLICH 2017 (as subfamilies) should also be included as subfamilies. Because of distinct differences I accept at least four families, two extant families and three extinct Cretaceous families, see WUNDERLICH (2017), this volume.

According to XU et al. (2015) “The available fossil evidence supports the “Euroamerican origin hypothesis” for Mesothelae...”. “Since their origin in the Palaeogene Asia is relatively recent, we argue that liphistiids are modern spiders, ..., their diversification is much more recent than expected.” These authors suppose “a relatively recent origin of Liphistiinae at approximately 124 Ma,...”, or even earlier: “... the Palaeogene origin of the family Liphistiinae estimated at 48 Ma (39-58 Ma) is relatively recent. Heptathelinae origin is estimated at 32.9 Ma (28-39 Ma). The origins of all < the extant > liphistiid genera (*) fall into the late Palaeogene and Neogene (4-36 Ma).”. Liphistiinae and Heptathelinae are regarded as sister taxa of the Liphistiidae s. l. by these authors whose studies are based on moleculargenetical (mtDNA) investigations. The authors used mygalomorph taxa of the families Atypidae and Ctenizidae as outgroups (!) in their study. Is Mygalomorpha really a suitable outgroup? Contrarily the Mesothelae can be designated as an outgroup of the Mygalomorpha. Probably Amblypygi can be used as a suitable outgroup of the Mesothelae in this connection.

Apparently XU et al. postulate or conclude:

(a) an “Euramerican origin of Mesothelae” and that...
(b) no Asian fossils of the Mesothelae exist,
(c) a precursor of the extant Liphistiidae s. l. existed in Europe, and
(d) “... a long eastward over-land dispersal towards the Asian origin of Liphistiidae during the Palaeogene...” exists.

The discovery of the Mid Cretaceous (100 Ma old) South East Asian genera *Cretaceothele*, *Burmathele* and *Parvithele* contradict the conclusions by XU et al.:

- Arthropod fossils of the Northern Hemisphere (especially of North America and Europe) are generally better studied than fossils of Asia and of the Southern Hemisphere. I expect the discovery of fossil Mesothelae in the Southern Hemisphere in the future, see above. Therefore I regard a Euroamerican origin of the Mesothelae as quite doubtful.
- Studies on East Asian fossil Mesothelae have just started, the three known genera represent apparently three different mesothelid families (!) (taxa of the extant Liphistiidae or Heptathelidae are not reported from fossils in Burmite). We do not know how many fossil mesothelid taxa are still hidden in the ground of this region. Based on the

recent fossil records – see WUNDERLICH (2015, 2017) – I suppose the mesothelid diversity during the Mid Cretaceous in South East Asia to be at least as high as today.
- No indication exists for a long eastward over-land dispersal from Europe to East Asia, except one assumes that the mesothelid fossil taxa in Burmite became extinct, and gave no raise to the extant taxa (**). The extinction of the Carboniferous Mesothelae in Europe was probably caused by a climatic change (cooling) but the climate was stable (tropical) for a very long time in South East Asia, and no reason is known for an extinction. In my opinion it is even more likely that a Mid Cretaceous East Asian species was the precursor of the extant taxa of this region.

The new fossil records show that Mesothelae existed already at least 100 million years ago in South East Asia but members of the two extant families have not been reported from the Cretaceous. The conclusions by XU et al. refer only to the extant Heptathelidae and Liphistiidae; the recently described Cretaceous taxon *Cretaceothele* of South East Asia has still been unknown to these authors, and apparently has even not been expected. In my opinion more caution rather than hasty conclusions should be used in this matter: Fossil reports of pre-Palaeogene spiders are rare, but the absence of records of a taxon in a given area does not indicate the absence of fossils (***), see above.

There are open questions: Most characters and branchings of the high mesothelid taxa – their exact eras as well as their sequence – are still unsure; for example the origin of the inclination of coxa IV as well as of the sensory distal tibial bristles may be earlier than shown in tab. 2, see WUNDERLICH (2017). The real apomorphic or plesiomorphic kind of several characters have to be discussed further on in the future probably by the investigation of new fossils.

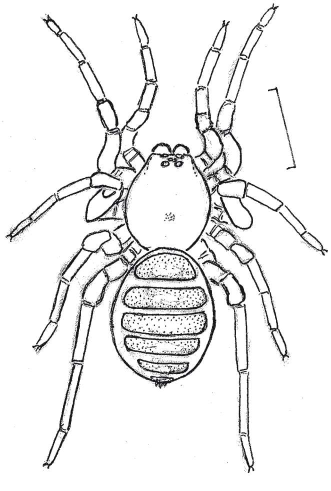

Fig. 1. Dorsal aspect of an extinct spider of the Mesothelae

(*) of the Heptathelinae and Liphistiinae = Heptathelidae and Liphistiidae in the sense of the present paper.

(**) The Mid Cretaceous genus *Parvithele* WUNDERLICH 2017 (Parvithelidae) in Burmite may be strongly related to the extant families Heptathelidae and Liphistiidae, and the stem species of the extant families can well be strongly related with *Parvithele*.

(***) A dozen authors are involved in the paper by XU et al. which includes excellent genetical investigations – but what insufficient conclusions on the palaeobiogeography! – Further dubious phylogenetic conclusions by molecular genetic studies of spider families (e. g. Pholcidae and Sparassidae): See WUNDERLICH (2015, e. g. p. 63). – See also the paper on the order Ricinule by FERNANDEZ & GIRIBET (2015).

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PICTURED KEY TO THE IDENTIFICATION OF MESOZOIC TO EXTANT ORDERS OF THE ARACHNIDA

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Abstract: A pictured key is provided for the identification of Mesozoic to extant orders of the class Arachnida.

Key words: Acari, Amblypygi, Arachnida, Araneae, Cretaceous, pictured identification key, Mesozoic, orders, Opiliones, Palpigradi, Pseudoscorpiones, Ricinulei, Schizomida, Scorpiones, Solifugae, Thelyphonida, Uropygi.

Acknowledgements: For discussions I thank PATRICK MÜLLER, for leaving some drawings from the book „Fossil insects“ I am grateful to JASON DUNLOP.

More and more fossils in amber were reported during the last decades, e. g. in the most important Baltic, Burmese and Dominican ambers. Members of the ten orders of the Mesozoic Arachnida – Palpigradi has recently reported in Burmese amber, see ENGEL et al. (2016) and tab. A – represent the most frequent inclusions after the insects; all these ten orders are reported from Burmite. I estimate the existence of ten thousands of fossil arachnid species in amber, most frequent are mites and spiders, few hundred species have already been described. – Entomologists and non-specialists are fascinated by the frequently excellently preserved animals – their aesthetic, their diversity, their phylogenetic and biogeographic importance and the various kinds of „frozen behaviour“ –, which waited in amber up to 140 million years (for 100 million years in Burmite) for their discovery!

A detailed key to the extant arachnid orders including various drawings has been published by WUNDERLICH (2004: 276-282). A recent survey of the fossil arachnids has been published by DUNLOP & PENNEY (2012) including a short key p. 16-17.
Here a pictured key to the identification of these orders and some subgroups is presented which may be helpful for the study by beginners, too, and may allow to determine also untypical and rare groups. Mainly such typical and simple characters are used which may be well observable in the fossils.

Abbreviations:

B = Burmese amber (Mid Cretaceous),
D = Dominican amber (usually Miocene),
E = Eocene European ambers: Germany (Baltic, Bitterfeld), Ukraine (Rovno amber).

The prosoma is the anterior part of the body, the opisthoma (= „abdomen“) is the posterior part.
The legs are designated in their sequence from anteriorly to posteriorly: I, II, III and IV.

In this key I use three distinctlively main characters which may be well observable in fossils, too:

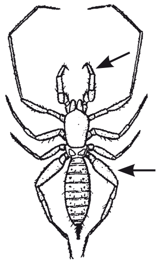
- the presence (tab. A) or absence (tab. B and C) of a posterior appendix („tail“, telson, flagellum) of the opisthosoma,
- a distinctly bipartite body (tab. B, C),
- the shape and the structures of the pedipalpus.

The popular English and German names are added.

Two orders are splitted up here for practical reasons: (a) The Uropygi in tab. A to the suborders Schizomids and the Whip Scorpions (previously both were regarded a separate orders), and (b) the Harvestmen in tab. B in the ancient suborder Cyphophthalmi and the remaining advanced suborders. See also note (4) on the suborders of the Ricinulei.
All orders which are treated here are already known from the Palaeozoicum. The Haptopoda, Phalangiotarbida, Trigonotarbida and Uraraneida are restricted to the Palaeozoicum. The body of the Trigonotarbida is similar to certain Ricinulei – see figs. 4 – but a cucullus and probably a male copulatory organ on leg IV are absent in the Trigonotarbida.

---------------------- UROPYGI: B, D ----------------------

(Uropygids, Geißelskorpione im weiten Sinn)

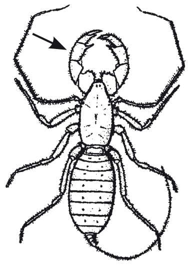


SCHIZOMIDA: B, D
(Short-tailed Whip-scorpions, Zwerggeißelskorpione)

pedipalpi only fairly thick, with an apical claw, „tail" relatively short, thickened in the male, femur IV usually thickened

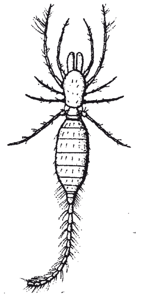
THELYPHONIDA: B
(Whip Scorpions, Geißelskorpione im engen Sinn)

pedipalpi powerful developed, bearing an apical pincer, „tail" longer than the diameter of the opisthosoma, femur IV not thickened



PALPIGRADI: B
(Microwhipscorpions, Palpenläufer)

„tail" long & hairy, pedipalpi slender, bearing an apical claw, femur IV slender

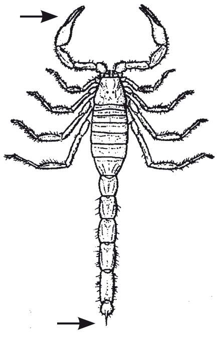


„tail" short and pedipalpi fairly slender (Schizomida) or „tail" long and pedipalpi quite thick (Thelyphonida), pedipalpi bearing a claw or a pincer, femur IV slender or thickened (most Schizomida)

„tail" slender, without a sting, pedipalpi variable, with or without pincers

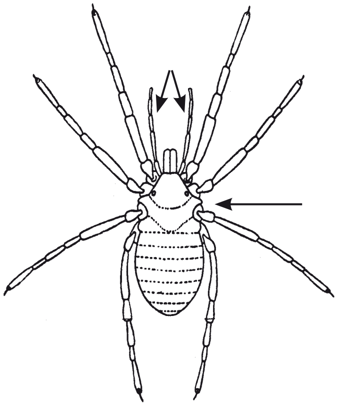
SCORPIONES: B, D, E
(Scorpions; Skorpione)

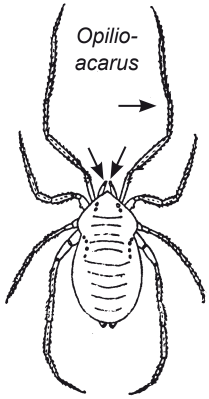
„tail" very large, ending in a poisenous sting, pedipalpi powerful and with large pincers.



Tab A. Opisthosoma bearing a well developed „tail" (telson, flagellum); it is distinct but short in the Schizomida in which the femur IV usually is thickened (fig.). A minute remain of a telson (the pygidium) exists in the Amblypygi and Ricinulei, see tab. C.

---------------------- OPILIONES: B, D, E ----------------------
(Harvestmen, Weberknechte)



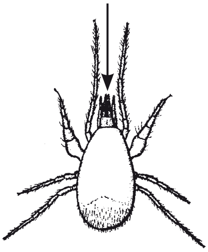


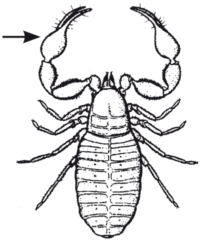
REMAINING OPILIONES:
B, D, E
(übrige Weberknechte)

leg I usually distinctly shorter than II which is frequently very long (1), defense glands small

CYPHOPHTHALMI: B, E
(Pimitive Harvestmen,
ursprüngliche Weberknechte)

leg I usually slightly longer than II, defense glands lange, on humps in a lateral position: long arrow





leg I usually distinctly shorter than II (1); usually larger animals, defense glands, pedipalpi long and free observable (short arrows) (a pair of large median eyes may exist on a hump)

ACARI: B, D, E
(Mites, Milben)

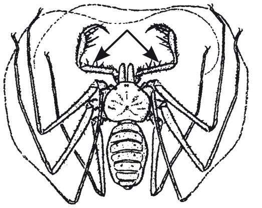
leg I most often (usually distinctly) longer than II, small to tiny animals, body shape very diverse, defense glands absent, no large and free observable pedipalpi (arrows) (2)

PSEUDOSCORPIONES: B, D, E
(Pseudoscorpions, Pseudoskorpione)

pedipalpi powerful developed, with large pincers similar to scorpions

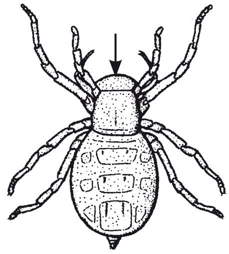
pedipalpi quite different, without such a peculiar pincer but see fig. 1a

Tab. B. Body undivided



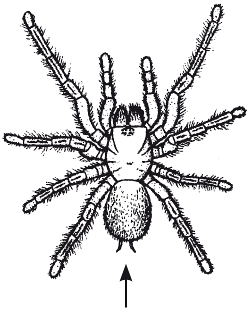
AMBLYPYGI: B, D
(Whip Spiders, Geißelspinnen)

legs long and slender, leg I extremely long and thin, antenniform, pedipalpi (arrows) powerful and spiny, forming a raptorial „capturing basket“



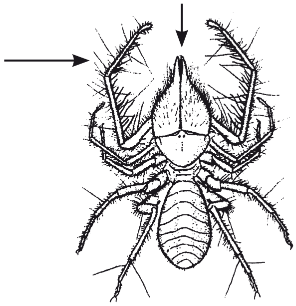
RICINULEI: B
(Hooded Tickspiders, Kapuzenspinnen)
legs stout, prosoma anteriorly with a movable „hood“ (arrow), leg III distinctly longer than I.
See figs. 4-7. (4)

chelicerae small



ARANEAE: B, D, E
(Spiders, Spinnen)

opisthosoma below the end (in the Mesothelae more in front) bearing paired spinnerets (arrow), opisthosoma rarely with transverse plates (fig. 3). The male pedipalpus is a copulatory organ. (3)



SOLIFUGAE: B, D, E
(Camel Spiders, Walzenspinnen)

chelicerae powerful (short arrow) sometimes larger than the prosoma, pedipalpi leglike, longer than the hairy legs (long arrow)

spinnerets absent

Tab C. Body bipartite, with a constriction between prosoma and opisthosoma

Notes on the tab. A-C:

(1) In the most frequent LONG-legged Opiliones leg II is distinctly longer than I in contrast to the Acari but leg II is relatively short in some shorter-legged Opiliones. – The shape of the pedipalpus is quite variable in this order, it may be „simple“ or strongly modified: bearing a pincer or a claw and numerous strong spines (figs. 1 a-b, 2). It is large/long in the Opiliones in contrast to most (!) Acari. – A cover of the genital opening (operculum genitale) exists in most Opiliones but is absent in the Cyphophthalmi.

(2) Regarding the body shape the mites (Acari) are the most diverse (most variably shaped) order of the Arachnida besides the Opiliones; some mites possess only two pairs of legs, juveniles of numerous taxa (they are quite frequent in amber) possess only three pairs of legs, others are worm-shaped. The body of most mites are less than 2 mm long but ticks may be 20 mm long. Characteristic – but not easy to recognize in certain fossil species – is the existence of a peculiar anterior body part which may be distinctly elongated and pointed (arrow in tab. B). It is separated from the remaining body by a suture, called gnathosoma, and unites the mouth and the feeding parts, the chelicerae and the base of the pedipalpi.

(3) All Araneae possess 7 leg articles like the ancient extinct Uraraneida; the basal two leg articles are usually quite short and not observable from above. The present drawing shows a female member of the Mygalomorpha which possess protruding basal cheliceral articles. A distinctly segmented opisthosoma including dorsal plates exists in members of the suborder Mesothelae (fig. 3) in contrast to the remaining spiders.

(4) The structure of the opisthosoma is quite variable in the fossil members of the Ricinulei: the dorsal plates may be divided longitudinally (fig. 4a), so in the extant taxa) or not. The distinctive articulation of the legs (especially of the distal articles and of the long second leg) is characteristic for Ricinulei. The male ricinuleid leg III (!) bears a peculiar copulatory organ. In the suborder Posteriorricinulei the slender pedipalpus ends in pincers (fig. 5) and the sternum is strongly reduced (fig. 4b) but in the suborder Primoricinulei the stout pedipalpus bears a single claw (figs. 6-7) and the sternum is wide (fig. 7). Juveniles (nymphs) – they are much more frequent in amber than adults – possess four or less pairs of legs. The number of the eyes is quite variable in this order; usually exist 2 or 3 pairs (fig. 6); only a single pair of eyes exists in the recently discovered extinct family Monooculricinuleidae in Burmese amber, see WUNDERLICH (2017).

Remarks on an important arachnid appendage, the pedipalpus – especially its apical structures: pincers and claws – within the arachnid orders:

An important taxonomic character is the chelate end of the pedipalpus, which is powerful developed e. g. in the Scorpiones and in the Pseudoscorpiones (see also below): A PINCER at the end of the pedipalpus which is an ancient character of the Arachnida. Such a pincer is difficult to observe in some groups like mites and hooded tickspiders, and is absent, modified (in the Solifugae) or – frequently – replaced by a claw in various groups: Araneae, most Opiliones (existing e. g. in the Ischyropsalidae, fig. 1, Palpigradi, Ricinulei: Primoricinulei (fig. 6), Uropygi: Schizomida and in several Acari.

Both – a pincer as well as a claw at the end of the pedipalpus – have evolved several times WITHIN THE SAME ORDER: in the Uropygi: a claw in the Schizomida and a pincer in the Thelyphonida, in some Opiliones (fig. 2) and in the Ricinulei: a claw in the Primoricinulei (fig. 6), and a pincer in the Posteriorricinulei (fig. 5).

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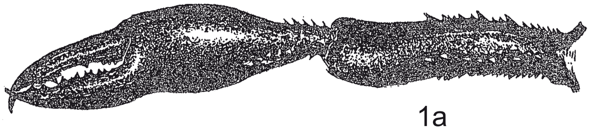

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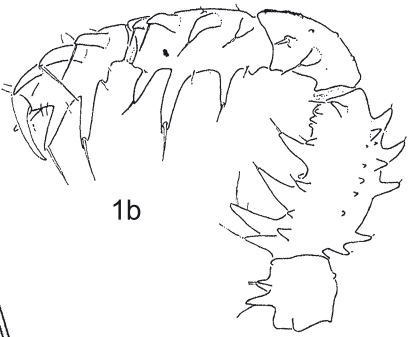
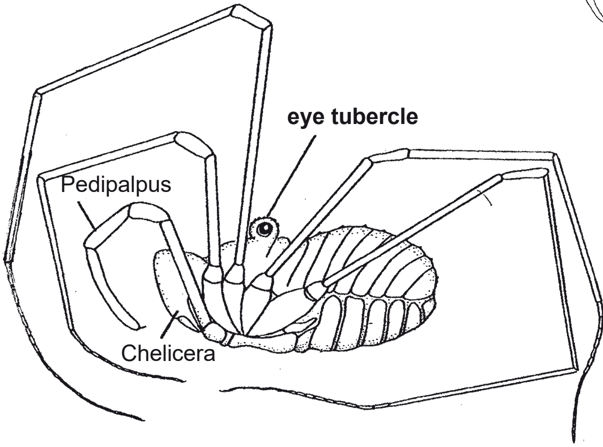


1b



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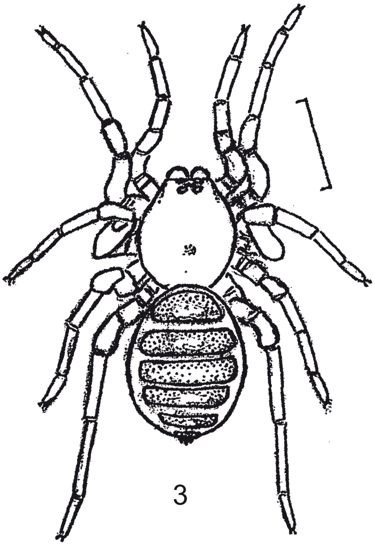

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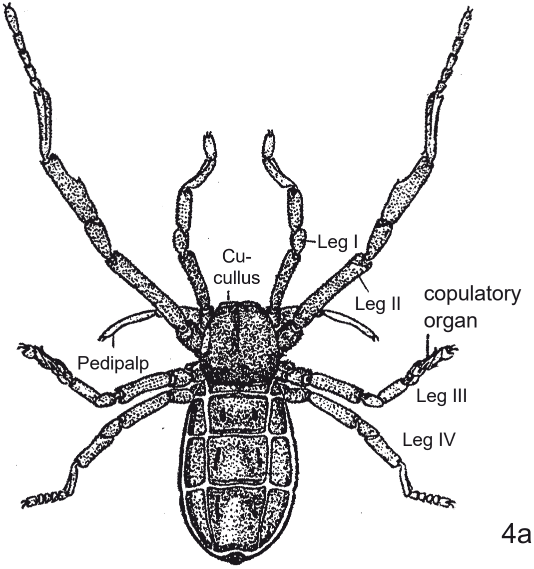


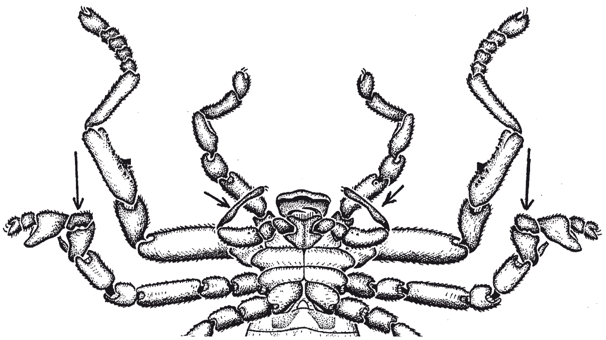
4a

Figs. 1a-b) Extant Opiliones: Two quite different pedipalpi of two families (Ischyropsalidae and Erebomatridae), lateral aspects.

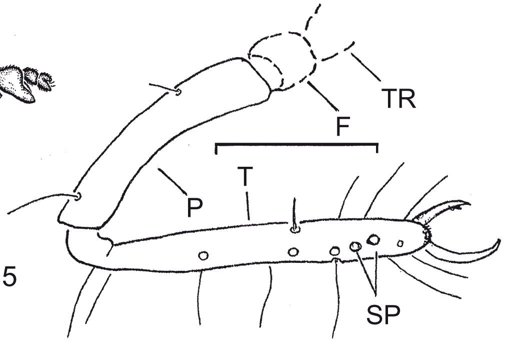
2) Lateral aspect of a derived member of the Opiliones. Note the median left eye which is placed on a large tubercle.

Fig. 3) Juvenile Araneae: Mesothelae in Burmese amber, dorsal aspect.

Figs. 4a-b: Extant male of the Ricinulei: Posteriorricinulei; a) dorsal aspect; b) ventral aspect of the anterior part. Taken from PLATNICK & PAZ (1979). Note the strongly reduced sternum, the small pedipalpi (the two short arrows) and the copulatory organs on leg III (the long arrows).



4b



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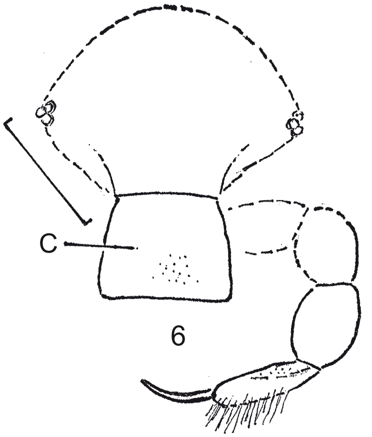

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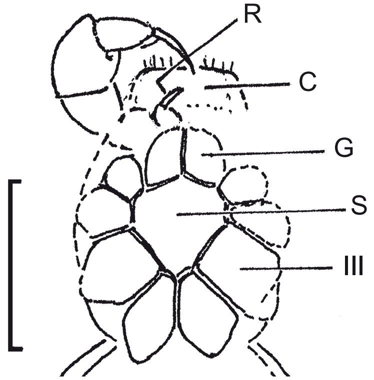

Fig. 5) Right pedipalpus of ?*Poliochera cretacea* WUNDERLICH 2015 (Ricinulei: Posteriorricinulei), nymph in Burmese amber, prolateral aspect. The pedipalpal articles are folded in their natural position. Note its chelate end.

Figs. 6-7: *Hirsutisoma bruckschi* WUNDERLICH 2017 (this volume) (Ricinulei: Primoricinulei), holotype ♂ in Burmese amber; 6) anterior aspect of the body and the raptorial left pedipalpus. Note the three pairs of eyes and the single strong pedipalpal claw; 7) ventral aspect of the prosoma (note the large sternum!) and the right pedipalpus. – C = cucullus, F = femur, G = left gnathocoxa, P = patella, R = right cheliceral fang, S = sternum, SP = sensory pits, III = left coxa III.

BEITR. ARANEOL., 10 (2017: 298 –326)

DESCRIPTIONS, NOTES AND SYNONYMS OF SOME MAINLY MEDITERRANEAN AND MACARONESIAN SPIDERS (ARANEAE) OF VARIOUS FAMILIES

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Abstract: *Adonea algarvensis* **n. sp**. (Eresidae) is described from S-Portugal; *Adonea* is new to the European fauna. *Oecobius sinescapus* **n. sp**. (Oecobiidae) is described from the Canarian Island Tenerife, some synonyms and questionable synonyms are proposed, the synonymy of *Titanoeca psammophila* WUNDERLICH 1993 (Araneae: Titanoecidae) with *Amaurobius spominima* TACZANOWSKI 1866 is considered as not well founded and is not accepted. Therefore the name *psammophila* is restored (**nom. rest**.), and *spominima* is regarded as a nomen dubium. *Arboricaria* BOSMANS 2000 is regarded as a junior synonym of *Micaria* WESTRING 1851 (Gnaphosidae) (**n. syn**.). *Poecilochroa taborensis* LEVY 2009 (Gnaphosidae) from Israel is transferred to *Macarophaeus* WUNDERLICH 2011; *Macarophaeus sabulum* WUNDERLICH 2011 is regarded as a junior synonym of it (**n. syn**.). The European species of the genus *Hyptiotes* WALCKENAER 1837 (Uloboridae) are revised; *Hyptiotes gerhardti* WIEHLE 1929 is restored, being not a junior synonym of *H. flavidus* (BLACKWALL 1862) (**nom. restor**.). Both sexes of the mainly Mediterranean spider species *Hyptiotes flavidus* have been collected and recognized 2015 for the first time in Germany and Central Europe north of the Alps. The spreading northwards of this species may be in connection of global climatic change. Colour forms of *Latrodectus tredecimguttatus* (ROSSI 1790) (Theridiidae) are discussed. *Zodarion robertbosmans* **n**. **sp**. (Zodariidae) is described from Turkey. Gnaphosidae: The unknown female of *Gnaphosa artaensis* WUNDERLICH 2011 is described for the first time; *Scotophaeus torretrencada* **n. sp**. is described from Spain (Menorca). *Ozyptila blitea* SIMON 1875 (**rev. comb**.) (Thomisidae) is transferred from

Xysticus to *Ozyptila*. Salticidae: *Evarcha eriki* WUNDERLICH 1987 is synonymized with *E. jucunda* (LUCAS 1846) (**n. syn**.), *Heliophanus agricoloides* WUNDERLICH 1987 is regarded as a questionable synonym of *H. agricola* WESOLOWSKA 1968 (**quest. syn**.); *Yllenus algarvensis* LOGUNOV & MARUSIK 2003 is regarded as a questionable synonym of *Y. squamata* (SIMON 1881) (**quest. syn**.). References are given regarding the deposition of type material of extant spiders of the collection J. WUNDERLICH.

Acknowledgements: I thank numerous colleagues for helpful discussions and the loan of material; see also below.

The material of the present paper is kept in the Lab. of Arachnology of the author in 69493 Hirschberg. The holotypes of *Zodarion robertbosmans* and *Scotophaeus torretrencada* will probably be given to the Senckenberg Museum Frankfurt a. M. (SMF) similar to a number of type material from my collection (CJW). Unfortunately certain spiders – possessing malformations, remains of healing effects or being intersexes, and which I kept in special boxes – were not separated but are to be find actually under the species name of various families in the SMF. Several types of extant spiders (CJW) I gave recently to the Zoologische Staatssammlung München (Munic), section Arthropoda Viaria (JÖRG SPELDA).

The mediterranean and Canarian spider faunas are fairly well known but in certain genera like *Ariadna* (Segestriidae) (in prep.), *Oecobius* (Oecobiidae) and *Gnaphosa* (Gnaphosidae) species still have to add, and numerous genera still have to be revised.

The taxa are treated in the following order:

Eresidae: *Adonea*, *Eresus* and *Stegodyphus*,
Oecobiidae: *Oecobius*,
Uloboridae: *Hyptiotes*,
Theridiidae: *Latrodectus*,
Zodariidae: *Zodarion*,
Titanoecidae: *Titanoeca*,
Liocranidae: *Liocranum*,
Gnaphosidae: *Gnaphosa, Arboricaria, Micaria, Macarophaeus* and *Scotophaeus*,
Thomisidae: *Ozyptila* and *Xysticus*,
Salticidae: *Evarcha, Heliophanus* and *Yllenus*.

Family ERESIDAE

In the peculiar ancient cribellate family Eresidae the cribellum is well developed in both sexes and divided, the calamistrum (it may be indistinct in the male sex) occupies almost the whole length of metatarsus IV. The compact spiders (see the photos) are eaysily recognizable by the almost rectangular shape of the prosoma (fig. 35, photos) and the long and wide eye field of the mainly tiny eyes (figs. 35-37), only the posterior median eyes are fairly large, and the eyes may be hidden under hairs. The leg bristles are usually short/stout and restricted to the ventral side of metatarsi and/or tarsi. Members of the Eresidae build capture webs in low vegetation near the ground; members of *Eresus* dig tubes in the earth.
In Europe three genera of the family exist (see also the note on *Storkaniella* below): *Eresus* WALCKENAER 1805, *Stegodyphus* SIMON 1873 and *Adonea* SIMON 1873. *Adonea* has a mainly south-mediterranean distribution and is newly recorded for Europe here.

The genus *Eresus* possesses several special features:

- The sexual size dimorphism is stronger developed than in *Adonea* and *Stegodyphus*,
- the males possess striking fields of red hairs on the opisthosoma (photo 131),
- the spiders hide in tubes in the earth,
- it is distributed in most parts of Europe in contrast to *Adonea* and *Stegodyphus*, which are restricted to Southern Europe,
- there are several species of *Eresus*, probably half a dozen, but only a single one of the remaining genera exists.

Remarks on the **synonymy** of the genus *Storkaniella*:

LEHTINEN (1967: 208, 265) synonymized *Storkaniella* KRATOCHVIL & MILLER 1940 without foundation with *Adonea* SIMON 1873. The position of the median eye quadrangle of *Storkaniella* – see fig. 2 given by KRATOCHVIL & MILLER (1940) – is similar to *Adonea* and *Eresus* as well; the cephalic part is similar to *Eresus* but less raised than in *Adonea*. Therefore I do not exclude the synonymy of *Storkaniella* with *Eresus*. The male of *Storkaniella* is still unknown but it probably will be found in the future in the area typica of Greece, Epirus and Corfu, and may help to clear the relationships and probable synonymy of this genus.

Key to the eresid genera of Europe:

Storkaniella is not included, see above.

1 Posterior median eyes not distinctly larger than anterior median eyes and less spaced from each other (fig. 33). Eyes of the posterior row closer together and in a more anterior position (figs. 33-34). Opisthosoma dorsally with black and white hairs, without red hairs, usually with longitudinal bands. – *S. lineatus*, S-Europe . . . . Stegodyphus

- Posterior median eyes distinctly larger than anterior median eyes and more widely spaced from each other (fig. 37). Eyes of the posterior row more widely spaced from each other and in a more posterior position (figs. 32, 35). ♂-opisthosoma dorsally with or without red hairs, ♀-opisthosoma dorsally black or with white patches. 2

2(1) Opisthosoma: ♂ usually WITH RED HAIRS (photo 131) (they may be bleached/pale in alcohol, very rarely black), surrounding two large dark pairs of round patches around the sigillae; ♀: (Almost) black, Without (distinct) white patches. Prosoma: ♂ posteriorly not or only slightly overhanging (fig. 36); ♀ less raised (e. g. as in fig. 42). The spiders live in tubes in the earth and build capture webs in low vegetation near the ground. – Several species, Europe. . . . . Eresus

- Opisthosoma: ♂ variable (photo 130), without red dorsal hairs; ♀ (the female of the single European species is unknown) usually dorsally with distinct white patches. Prosoma: Strongly raised, posteriorly overhanging in the male (fig. 41). The spiders build capture webs in low vegetation near the ground. – *A. algarvensis* n. sp., S-Portugal (Algarve). . . . . .Adonea

***Adonea algarvensis* n. sp.** (figs. 35-40), photo 130

Etymology: The name refers to the area typica, the Algarve in S-Portugal.

Material: S-Portugal, Algarve, near Fuzeta, Ilha de Fuzeta, E Olhao, in dune vegetation near the beach, 2♂ JW leg. 20. V. 2016; holotype R175/AR/CJW, paratype R176/AR/CJW.

Diagnosis (♂; ♀ unknown): Cephalic part (fig. 36) strongly raised but posteriorly not distinctly overhanging, opisthosomal pattern (photo) quite variable, pedipalpus as in figs. 38-40.

Description (♂):
Measurements (holotype in mm): Body length 6.5 (paratype 7.0); prosoma: Length 3.8, width 2.8; opisthosoma: Length 3.5, width 2.4; leg I: Femur 2.0, patella 1.1, tibia 1.35, metatarsus 1.35, tarsus 1.2, tibia II 1.05, tibia III 0.8, tibia IV 1.5.

Colour in alcohol (photo) (quite similar in living spiders): Prosoma mainly black, posteriorly a medium brown area, few small groups of white hairs are partly rubbed off, no transverse anterior band of white hairs; legs medium to dark brown/black, dense white hairs between the coxae, all femora, patellae, tibiae and metatarsi apically with white hairs like on femora, patellae and tibiae of the pedipalpi; opisthosoma ventrally mainly black, spinnerets, too, some indistinct patches of white hairs, laterally black, dorsally quite variable, covered densely with white hairs and medially largely with black hairs surrounding mainly the sigillae.

Prosoma (figs. 35-37) 1.7 times longer than wide, rugose, cephalic part strongly raised, posteriorly steep but only slightly overhanging the thoracal area, fovea absent, 8 eyes, the posterior medians largest, spaced by about their diameter, anterior median eyes much smaller and much less spaced, lateral eyes widely spaced, basal cheliceral articles stout, fangs fairly stout, labium free, 1.7 times longer than wide, pointed, gnathocoxae ca. 40 % longer than the labium, sternum rugose, 1.6 times longer than wide, posteriorly pointed and not elongated between the coxae IV. – Legs (photo) stout, order IV/I/II/III, hairs short, dense ventral pseudoscopulae on tibia, metatarsus and tarsus I, femoral, patellar and tibial bristles absent (like in the Arachaeoidea (= Palpimanoidea)), few short ventral bristles existing on all metatarsi and tarsi, more frequent on III-IV, paired on tarsi IV, apical metatarsal bristles existing also laterally, metatarsi I-III bear an apical trichobothrium, tarsal trichobothria absent, metatarsus IV straight, calamistrum existing along almost the whole length of the article, hairs quite short. – Opisthosoma (photo) 1 ½ times longer than wide, three pairs of sigillae exist (the posterior pair may be small), laterally and partly ventrally with numerous short spine-shaped bristles, cribellum wide, with a small pair of widely spaced spinning fields. – Pedipalpus (figs. 38-40) with stout articles, cymbium bearing few long bristles, the embolus describes more than half a circle, conductor apically divided and tooth-shaped.

Relationships: Mainly according to the absence of red hairs on the opisthosoma, the widely spaced posterior lateral eyes and the strongly raised cephalic part (fig. 36) I regard *algarvensis* as a member of *Adonea* SIMON 1873 although the cephalic part is only quite slightly overhanging posteriorly, compare fig. 41. The quadrangle of the median eyes (fig. 37) is as in other members of *Adonea* and as in *Eresus*, too. The shape of the male cephalic part of *Adonea* and *Eresus* is overlapping, see figs. 36 and 41. The cephalic part of *Eresus lucasi* SIMON 1873 (=? *E. albopictus* SIMON 1873, see EL-HENNAWY (1916), see fig. 41) is quite similar to *Adonea algarvensis* n. sp. but – according to the original description – in *E. lucasi* distinct red hairs exist on the ♂-opisthosoma. SIMON (1910) synonymized *lucasi* (♂) with *albopictus* (♀), see EL-HENNAWY (2016: 107), but I am not sure that this synonymy is correct, in which both sexes are put together. The body length of the male of *lucasi* (12 mm) is much larger than the body length of *algarvensis* (6.5-7 mm). – The type species of *Adonea* is *A. fimbriata* SIMON 1873, and *Eresus algiricus* EL-HENNAWY 2004 is probably a junior synonym, see MILLER et al. (2012: 31). With a body length of the male of 12 mm *fimbriata* is distinctly larger than *algarvensis*. – See also the note on *Storkaniella* above.

Distribution: Iberian Peninsula, S-Portugal, Algarve, E Olhao; first report of the genus *Adonea* in Europe.

Family OECOBIIDAE

The West-Palaearctic members of the family Oecobiidae – the very diverse genus *Oecobius* LUCAS 1846 – were revised by WUNDERLICH (1987, 1992, 1994). A further species from the Canarian Islands is described below.

Oecobius sinescapus **n. sp.** (figs. 1-2)

Etymology of the species name: Taken from sine (lat.) (term. app.) = without and scapus referring to the absence of an epigynal scapus.

Material: Holotype ♀ (opisthosoma loose and demanched, leg III lost beyond the patella by autotomy, epigyne separated), S-Tenerife, Playa de las Americas, N28°05' 00.24'' W16°43'10.39'', 151 m, MARIO FREUDENSCHUSS leg. 7. VI. 2014, under threads below a stone; SMF.

Diagnosis (♀; ♂ unknown): Epigyne/vulva (figs. 1-2) distinctly longer than wide, without a scape, with a stronger sclerotized and triangular median area which hides the small receptacula seminis, copulatory openings small and close together, their position close to the epigastral furrow, ducts narrow, widely in a parallel position, anteriorly apparently partly spirally.

Description (♀):
Measurements (in mm): Body length 3.0, prosoma: Length 1.2, width 1.2; leg I: Femur 1.4, patella 0.5, tibia 1.15, metatarsus 1.1, tarsus 0.9, tibia II 1.25, tibia III 1.1, tibia IV 1.2.
Colour: Prosoma mainly yellowish, marginally and medially dark grey, with three pairs of large dark grey patches, sternum light, margin small darkened, legs distinctly annulated, opisthosoma dorsally dark grey, bearing dark patches mainly in the posterior half, and with tiny white „spots“, ventrally light, posterior spinnerets dark grey.

Prosoma as wide as long, fovea low, clypeus long and „nose-shaped“, 8 eyes, the medians distinctly the largest, the anterior laterals distinctly the smallest, lenses of the medians indistinct, sternum wider than long. – Legs fairly stout. Bristles (most are lost): Patellae with 2 dorsals, the left tibia IV bears a pair of long dorsal bristles near the base of the article, the right tibia II bears a thin dorsal bristle at the base, the right femur I bears a prolateral and a dorsal bristle in the basal half. Position of the metatarsal IV trichobothrium in 0.94. The calamistrum covers 2/3 of the length of metatarsus IV. – The opisthosoma bears fairly long hairs. – Epigyne/vula (figs. 1-2): See the diagnosis. An epigynal depression is absent, transverse furrows are distinct.

Relationships: The absence of an epigynal scape is an unusual character of *sinescapus*. A conspecific male is needed to find out close relationships of the species.

Distribution: Spain, Canarian Island Tenerife.

Family ULOBORIDAE

The genus ***Hyptiotes*** WALCKENAER 1837 in Europe

The four European species of the genus *Hyptiotes* WALCKENAER 1837 (Araneae: Uloboridae) are revised. *Hyptiotes gerhardti* WIEHLE 1929 is restored, being not a junior synonym of *H. flavidus* (BLACKWALL 1862) (**nom. restor**.). Both sexes of the mainly Mediterranean spider species *Hyptiotes flavidus* have been collected in 2015 and 2016 for the first time in Germany and Central Europe north of the Alps. The function of the opisthosomal humps in females of *flavidus* – whose intraspecific size is very variable – is discussed.

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Material; further material of European species: SMF, see WUNDERLICH (2008: 676):

(1) *H. flavidus* (see also below under *H. gerhardti*): SW-Germany, Hirschberg-Leutershausen ca. 10 km N Heidelberg, Häuselbergweg 24, at the Eastern rim of the River Rhine Valley, slope at the margin of a large forest (Odenwald); (a) near the wall of our house exposed to the south, shadowish, partly under a fig tree, 1♂1♀ JW leg. 10. IX. 2015 and 1♂ leg. 15. IX. 2016 in ivy and tendrils of wild wine, ca. 1 ½ m above ground in the spiders capture webs, coll. JW; (b) same locality but on a bush of lilac 10 m away from the house, ca. 1 ½ m above ground, 1♀ JW leg. 24. IX. 2015, coll. JW; (c) same locality but on a bush of a boxtree 10 m away from the house, 1 ½ – 2 m above ground, 1♀ JW leg. 24. IX 2015, 1♂ JW leg. 15. IX. 2016, coll. JW. The pair of spiders has been preserved in alcohol abs. for a genetical study in the future. – ♂♀ without locality, coll. WIEHLE, SMF 19389.

(2) H. gerhardti: (a) A deposition of the type material (syntypes, 2 ad. ♀ from Pentelikon (Greece), loc. typ., collected on *Pinus*) is unknown to me; the spiders are not kept in the SMF (P. JÄGER) nor in the Museum für Naturkunde in Berlin (J. DUNLOP). (b) "Naxos" (Greece), 1♀ L. PERASCHI leg. in I 1982, no further information, CJW.
(c) Material from Sochi (Russia) leg. by H. WIEHLE in 1963 and kept in Senckenberg (SMF): WIEHLE (1964: 83) listed under the SMF no. 13096 2♂ and 4♀. The spiders of this number were separated later to three tubes: Only a single ♂ is actually listed and kept in the tube of this number; it has been revised by me (2008) and transferred from *gerhardti* (at that time erroneously listed under „Syntypus" of *gerhardti*) to *flavidus*. In the tube SMF no. 13097 are actually 4♀ of *gerhardti* preserved, in 13098 1♂, in 91942 2♂, and in 21943 8♀. – Probably WIEHLE matched material of *H. flavidus* and *gerhardti*.

(3) H. paradoxus: T. BLICK, D. NÄHRIG and A. STAUDT checked their adult spiders from Germany and identified only *paradoxus* but not *flavidus*.

Members of the cribellate genus Hyptiotes WALCKENAER 1837 (fig. 3, photos 132-134) are easily recognizable by their shape, their stout and hairy body and legs, the quite large and widely spaced prosomal humps which bear the posterior lateral eyes (arrows in fig. 1); males possess unusually voluminous pedipalpi (the cymbium about as long as the prosoma). Size, shape and colour of the female's opisthosoma is quite variable (see below and the photos), it may be oval or high and voluminous (when bearing eggs) (in contrast to the slender male opisthosoma), occasionally bearing a pair of dorsal humps near the middle of quite variable size of females (*), e. g. *H. flavidus*, see the photos) as well as some further pairs of small/tiny humps. The colour of the body is also very variable. The spiders construct unique vertical capture webs which build only a sector of an orb web; they hang upside-down on a single thread near a twig of their „one-way capture web".

(*) C. L. KOCH (1845: Figs. 1024, 1025) published drawings of female *paradoxus* under *Mithras paradoxus* and *M. undulatus* (body length ca. 5 mm) in which a distinct pair of dorsal opisthosomal humps exists. Such humps are not reported by certain authors like WIEHLE. BLACKWALL (1862: 375) reported paired dorsal „protuberances" of the opisthosoma in both (!) sexes of *flavidus*.

European species: In Europe four species of *Hyptiotes* occur:

dentatus WUNDERLICH 2008, ad. ♀ unknown, S-France (Provence),
flavidus (BLACKWALL 1862), Madeira (loc. typ.), circummediterranean, Russia, recently introduced to Germany, photos 132-134,
gerhardti WIEHLE 1929, Greece to Russia,
paradoxus (C. L. KOCH 1834), Palaearctic.

Remarks on *Hyptiotes gerhardti* WIEHLE 1929 (see also above under material):

WUNDERLICH (2008: 678) synonymized *H. gerhardti* with the older *H. flavidus*. The synonymy was mainly based on a male kept in the SMF which was designated as syntype of *gerhardti*. This male turned out to be (a) not a syntype of *gerhardti* (syntypes of this species are actually females, see above: material), and (b) an erroneously as *gerhardti* identified specimen of *H. flavidus*. Probably WIEHLE matched both species. In the meantime I studied the vulvae of the species of *Hyptiotes*: the vulva of *H. gerhardti* (fig. 14) is clearly different from the other European species (figs. 6, 18), and therefore I now regard it as a species of its own (**nom. restor**.).

Key to the west-palaearctic species of *Hyptiotes*:

Males:

1 Prosomal length as well as length of the cymbium ca. 1.4-1.6 mm. Bulbus (retrolateral aspect) apically with a large/high and pointed median apophysis (figs. 7, 9). . . . 2

- Prosomal length as well as length of the cymbium 0.9-1.25 mm. Bulbus apically different (figs.15, 19) 3

2(1) Pedipalpus (figs. 9-10): The embolus possesses two angles/points (arrows) and originates almost in the middle of the bulbus (O). Prosomal length as well as length of the cymbium ca. 1.4 mm. France (Provence), humid habitat . . . . *dentatus*

- Pedipalpus (figs. 7-8): Embolus (E) without angles/points, originating at the base of the bulbus. Prosomal length as well as length of the cymbium ca. 1.6 mm. Palaearctic, not humid habitat. . . . . *paradoxus*

3(1) Bulbus apically with complicated structures including a sclerite bent in a right angle (arrow in fig. 15). Eastern mediterranean to Russia. . . . . *gerhardti*

- Bulbus without an apical sclerite which is bent in a right angle (fig. 19). Circummediterranean, Russia, Germany (recently introduced) . . . . *flavidus*

Females (distribution: See above):

Notes: (1) The adult female of *dentatus* is unknown.
(2) The size of the dorsal opisthosomal humps in the female sex (see also above and below) shows a strong intraspecific variability, they may be absent or tiny, existing in certain females of *paradoxus*, too, and are most strongly developed in certain females of *flavidus* (photo) and almost so in *gerhardti*.
(3) *H. flavidus* is the smallest species, *H. paradoxus* is the largest one, body length of females up to 6 mm, see below. The differences are stronger in egg-bearing females. The prosomal length of the unknown adult female of *H. dentatus* may be more than 1.6 mm.
(4) The epigynal grove and the more anterior aspect of the posterior margin of the epigyne may be helpful for the determination but a sure determination of the females should be based on the structures of the vulva: size and space of the receptacula seminis and the length/loops of the introductorial ducts: the receptacula are smallest and widest spaced in *flavidus* (fig. 18), the ducts are shortest in *paradoxus* (fig. 6).

1 Prosomal length 1.1-1.5 mm. Epigynal grove usually with a medial ridge (fig. 17)(*). Posterior margin of the epigyne protruding/convex medially (fig. 16). Vulva (fig. 18): Receptacula seminis (R) small, their diameter ca. 0.065 mm, spaced by about 3 to almost 4 times of their diameter, introductory ducts long and coiled. . . . . *flavidus*

- Prosomal lenght 1.4-1.7 mm. Epigynal grove without a medial ridge (figs. 12-13). Posterior margin of the epigyne straight (fig. 14). Vulva (fig. 9): Receptacula seminis (R) large, their diameter ca. 0.15 mm, spaced by ca. their diameter; introductory ducts long and coiled. . . . . *gerhardti*

- Prosomal length ca. 1.8 mm. Epigynal grove wider anteriorly than in the other species, almost circular (fig. 4). Posterior margin of the epigyne concave medially (fig. 5). Vulva (fig. 6): Receptacula seminis (R) large, their diameter ca. 0.15 mm, spaced by ca. their diameter; the well recognizable ducts SHORT, describing about a single loop only. . . . . *paradoxus*

(*) SIMON (1914: 29, fig. 53) figured the epigyne of *flavidus* in an untypical – more POSTERIOR – position.

Discrimination of the German species of *Hyptiotes* (see also the key above):

body length of *paradoxus* ♂ 3.0-4.5.0, ♀ 4.5-6.0 mm (*),
body length of *flavidus* ♂ 2.2-3.0, ♀ 2.7-4.3 mm,
prosomal length paradoxus ♂ ca. 1.6, ♀ ca. 1.8,
prosomal length *flavidus* ♂ 1.0-1.25, ♀ 1.1-1.5,
length of the cymbium of *paradoxus* ca. 1.6 mm,
length of the cymbium of *flavidus* 0.9-1.25 mm,

(*) Body length of the female only 3.5 – 4.5 mm according to SIMON (1914: 29) who most probably matched females of *flavidus* and *paradoxus*.

Characteristics of the present specimens of *flavidus* from Germany (see the photos 132-134): The body length of the small spiders is ♂ 2.2-2.3 and ♀ 3.2-3.7 mm, the length of the cymbium is 0.9 mm. All females – egg-bearing! – possess a pair of unusually large dorsal opisthosomal humps or outgrowths (photos).

The habitat of the *Hyptiotes* species: Because of – in my opinion – doubtful determinations to be found in collections and in literature I am not sure about the habitat which is preferred by *flavidus* and *paradoxus*. Revisions and collections of surely determined material are needed. Frequently *paradoxus* is published to be restricted to *spruce* or Pine forests but also oak trees are reported (correctly determined *paradoxus*?). *Flavidus* is reported from bushes but also from Pine forests (really *flavidus*?). In Germany I found *paradoxus* only in spruce. I collected the present 4 specimens of *flavidus* in Germany on bushes, see above. I do not want to exclude a weak intrageneric separation of both species.
H. *gerhardti* has been collected on needle trees, on young trees of *Pinus* in Greece and mainly on *Cupressus sempervirens* in Russia (Sochi).
H. dentatus has been collected in a humid habitat on trees ABOVE A BROOK.

Phenology: To my knowledge adults of *Hyptiotes* were usually collected in July to September, rarely in October: *H. gerhardti*, see WIEHLE (1964: 81). A single female of *gerhardti* was collected in January on Naxos (Greece), see above (material). Females of *H. flavidus* from Germany still live in captivity during October.

Note on Southern European spider species introduced to Germany (see KOBELT & NENTWIG (2008) and NEDVED et al. (2011)): The list of introduced species is not short, and several Southern European species are established outside of houses – some species are not rare or even frequent in Germany today –, which is caused by human transport (plants, cargo), ballooning, and the warming of Central Europe during the last decades; see WUNDERLICH (1995), FRITZEN et al. (2015): Araneidae introduced to Finland. An example: only few years ago I reported the S-European Jumping species (Salticidae) *Macaroeris nidicolens* (WALCKENAER 1802) from the same area as *H. flavidus* in SW-Germany; *nidicolens* is quite frequent in our garden around the house now, see WUNDERLICH (2008: 736-737). *M. nidicolens* was first reported from Central Europe more than ten years ago and is widely distributed in this region. Also not rare in our garden is *Zodarion italicum* (CANESTRINI 1868) (Zodariidae), introduced a longer time ago from Southern Europe, which I have found since we lived here (12 years), as well as *Mermessus trilobatus* (EMERTON 1882) (Linyphiidae) which probably was introduced by the US army from the USA after the Second World War. The species in question live outside houses. (*).
H. flavidus is mainly known circummediterranean, including Madeira and the Canary Islands, and furthermore from Hungary and Russia (see the material above); it is new to Germany and even to Central Europe north of the Alps. The find of SIX specimens in 2015 AND 2016 is remarkable: apparently a population of this species has newly been established here. I did not find this species in our garden previously during the years 2004-2014. Observations in the future are needed regarding a stable establishing of the species in Germany. The last winter was quite warm in southern Germany. Will speci-

mens survive also cold winter seasons within plants close to the wall of our house or nearby in the garden? Because of my frequent journeys to various parts of SW Europe I do not want to exclude with certainty that *H. flavidus* travelled with me as a „blind passenger" but I did not observe or collect *flavidus* during the last years in S-Europe, and therefore this possibility appears quite unlikely to me. The River Rhine Valley including a motor way and railway not far from our house (few kms away) offer a good pathway to the north for the immigration of animals and plants, see WUNDERLICH (2008: 737). The slope to the Odenwald forest may be suitable for catching aeronautic spiders.

(*) Apparently „peculiar arachnologists attract peculiar spiders" – this „rule" is designated here as MURPHY's law no. 111, rsp. „WUNDERLICH's law of spider' spreading". (One meaning of the German name WUNDERLICH is „peculiar").

The opisthosomal humps of females of *flavidus* and their supposed function: The sexual dimorphic existence of dorsal humps (or outgrowths, protuberances) – existing in the female sex only – are not rare within the family Uloboridae, see OPELL (1979); the genus *Hyptiotes* is not an exception (it is known from other families, too). The size of these humps shows a special wide range in females of *flavidus*. All the present three females possess a pair of very large dorsal opisthosomal humps (photos 132-134) in contrast to certain females from Southern Europe and the male as well (photos). The two females living in my private laboratory did not build a cocoon, and so I was not able to observe changes of the size of their opisthosomal humps.

The function of the striking intraspecific variability – between the sexes and between females – of the opisthosomal humps is unknown to me. It may be a kind of camouflage but may possess a second function, too. I do not want to exclude that the size of the opisthosomal humps is connected with the growth of eggs, the building of the egg sac and/or with the season: A SLENDER opisthosoma bearing only tiny humps exists in the female of *H. gerhardti* from Greece (Naxos) which was collected in January, was probably hungry, and was surely not bearing large eggs.

Small dorsal opisthosomal humps which are quite variable in size exist in females of certain species of the genus *Paidiscura* ARCHER (Theridiidae), e. g. in *P. dromedaria* (SIMON 1888).

Dorsal opisthosomal humps – well developed in BOTH sexes! – are regarded as a kind of camouflage in certain members of various spider families like Archaeidae, Araneidae (e. g. in *Cyclosa* MENGE 1866) or Mimetidae (e. g. in *Ero* C. L. KOCH 1837).

Family THERIDIIDAE

Notes mainly on the coloration of the female's opisthosoma of questionable *Latrodectus tredecimguttatus* (ROSSI 1790) from the Balearic and the Macaronesian Islands

For several reasons Widow spiders (genus *Latrodectus* WALCKENAER 1805) are of special interest: They are very poisonous, for humans, too, females show a (sexual-dimorphic) gigantism, frequently possess a peculiar – e. g. red – warning colour of parts of the opisthosoma and feed cannibalistically on conspecific males which possess a genital mutilation including a „breaking point" (fig. 21) of the long and coiled embolus, see UHL et al. (2010: 86). (An embolus broken off in the female introductory duct may secure the paternity. A „breaking point" exists e. g. in males of various entelegyne taxa like *Argiope* AUDOUIN 1826 of the family Araneidae which possesses a quite long and coiled embolus).

Differences between L. *tredecimguttatus* and *lilianae* (besides the copulatory organs): The male opisthosoma of *lilianae* possesses more white portions in contrast to *tredecimguttatus*, the female opisthosoma of *tredecimguttatus* possesses tiny bifid bristles (fig. 20B) (*) besides „normal" bristles which are absent in *lilianae* (fig. 20A) and the opisthosomal colour of the female opisthosoma is very variable in *tredecimguttatus* in contrast to *lilianae*; see LEVY & AMITAI (1983: Fig. 17), MELIC (2000: Fig. 4) and LOTZ (1994: 9, fig. H).

(*) These tiny bristles (frequently 0.02 mm long) exist besides normal (frequently 0.2-0.35 mm long) bristles and are best observable on light parts of the opisthosoma.

Distribution: *Latrodectus tredecimguttatus* (ROSSI 1870): Mainly circummediterranean, including the Iberian Peninsula, the Baleares: Menorca (first report), and the Macaronesian Islands (see below); the species is actually spreading to the north. On the Iberian Peninsula a second European species exists, the endemic *L. lilianae* MELIC 2000; the Iberian Peninsula is the only region in which both species exist together.

The very variable coloration of the female's opisthosoma of *L. tredecimguttatus* has been reported by various authors, e. g. by LOTZ (1994) and MELIC (2000). In the following I would like to draw attention to the coloration of questionable *L. tredecimguttatus* from two regions. Remarkably the colour of the opisthosoma is CONSTANT within populations of both regions:
(a) From Madeira (material: SMF and Mus. Nat. Hist. Funchal) and the Canary Islands (material from all islands: SMF and University La Laguna, Tenerife): I saw about two dozen females which all possess a constantly black opisthosoma as well as a short and wide yellow band just behind the epigastral furrow. Bifid opisthosomal hairs exist. The colour of the males is like in *L. tredecimguttatus*. – See the notes on spiders from the Canary Islands by WUNDERLICH (1992: 57 and 413).

(b) From the Balearic island Menorca, NW part of the island, few hundred m SE Punta Nati, 2♀ and 2 cocoons, JW leg in VIII 2015, CJW (I failed to find a male): The colour of the opisthosoma of both females is mainly black but VENTRALLY a large red patch in front of the spinnerets exists. Such patch has also been reported from *L. tredecimguttatus*.

THORELL (1875: 65-66) treated „*L. 13-guttatus* (Rossi) Var. *lugubris* (Duf.)“ in which the ♀-opisthosoma is almost black (a yellow band just behind the epigastral furrow exists additionally). Such spiders have been reported from several countries; apparently the area typical of this „form“ is located in Spain.

According to MELIC (2000) *L. schuchi* C. L. KOCH 1836 – described from Greece and in which the ♀-opisthosoma is mainly black dorsally – is a junior synonym of *L. tredecimguttatus*.

LEVI (1983) discussed the value of the colour of the ♀-opisthosoma in *Latrodectus*.

According to Y. MARUSIK (person. commun.) the females of „*tredecimguttatus*“ have a black opisthosoma.

Further investigations – including molecular genetic studies and cross mating experiments – of the populations in question are needed.

Colour forms are known from numerous spider families; within the family Theridiidae they are known e. g. from *Steatoda* and the *Enoplognatha ovata*-group.

Family ZODARIIDAE

According to BOSMANS et al. (2014: 99) „The spider genus *Zodarion* Walckenaer, 1826 includes 138 species, which are distributed throughout the Mediterranean basin (Platnick 2013) but have limited distribition areas.“. About a dozen species – predominantly of the *germanicum* group – are known from Turkey. The new species is strongly related to a species which has recently described from Turkey: *Z. bigaense* BOSMANS et al. (2014).

***Zodarion robertbosmans* n. sp.** (figs. 22-23)

Derivatio nominis: The new species is dedicated to Robert Bosmans who described numerous species (e. g.) of the genus *Zodarion*.

Material: Turkey, Kurucam Tepe, 428 m, ca. 30 km NE Edremit, N39°43’29,2” E27°11’1,1”; Meybohm & Brachat leg. 14. IV. 2010; male holotype R168/AR/CJW, in the collection of the author, later probably given to the Senckenberg Museum.

Diagnosis (♂; ♀ unknown): pedipalpus (figs. 22-23): tibial apophysis long, divided apically and with a longitudinal rim, bulbus with a large tegular apophysis which stands widely out, tegulum retrobasally with a blunt hump which is well developed, median apophysis situated on a slender stick, folded tripartite.

Description (♂):
Measurements (in mm): body length 2.5, prosoma: length 1.3, width 0.95, leg I: femur 0.9, patella 0.4, tibia 0.8, metatarsus 1.0, tarsus 0.75, tibia II 0.75, tibia III 0.7, tibia IV 1.15.
Colour: Prosoma dark brown, cephalic part stronger darkened, margin black, sternum light brown, margin small dark brown, legs mainly yellow, femora fairly darkened like the articles of the pedipalpus, opisthosoma mainly black brown, ventrally and laterally in the middle yellowish, spinnerets yellow, a yellow spot exists above the spinnerets. – Prosoma 1.37 times longer than wide, cephalic part wide, thoracic fissure well developed, eyes only fairly large, anterior median eyes largest, posterior median eyes smallest. Basal cheliceral articles stout, anteriorly with bristle-shaped hairs, fangs quite thick in the basal half, very thin in the short distal half, labium wide and free, gnathocoxae strongly converging. – Legs fairly long, order IV/I/II/III, bristles slender and numerous (especially on III and IV), some are rubbed off, femur I (pro)dorsally at least 4, metatarsus IV several ventrally in the distal half, metatarsi II-IV bear an apical garland of short bristles, unpaired tarsal claws small. – Opisthosoma oval, dorsally in the basal half slightly scutate (leathery), tracheal fold very wide, a transverse row of ten bristles exists in front of the spinnerets. – Pedipalpus (figs. 22-23) with stout articles, tibia with 3 dorsal trichobothria and a long straight apophysis which has a longitudinal rim and is divided apically. Cymbium apically with a large and a small tooth. Bulbus: See the diagnosis.

Relationships: The male pedipalpus is quite similar to *Z. bigaense* BOSMANS et al. 2014 (also Turkey) of the *Zodarion germanicum* group; I find no difference in the tibial apophysis of the male pedipalpus but *Z. bigaense* is distinctly larger, the length of the ♂-prosoma is 1.7-2.42 mm, the tegular apophsis is shorter and less protruding, its position more distally, the shape of the median apophysis is different.

Distribution: Turkey, see above.

Family TITANOECIDAE

Basically I welcome the clearing of the identity of old names of spider species as shown exemplarily by BREITLING et al. (2015, 216) in several cases. If well founded the older names may replace the younger names which will be regarded as younger synonyms. I consider the present case to be an exception.

BREITLING et al. (2015) regarded *Titanoeca psammophila* WUNDERLICH 1993 (Titanoecidae) as a younger synonym of *Amaurobius spominima* TACZANOWSKI 1866. These authors founded the new synonymy by ...

- „a number of distinguishing characters that allow a confident identification“,
- different characters of congeneric species, and
- the peculiar habitat (dunes).

The original description of *spominimus* is very short, less than three lines, the characters are a redbrown colour of the prosoma, a short, black and hairy opisthosoma, reddish dark hairy legs, and a body length of the female of 4 mm. Figures are absent, the copulatory organs are unknown, type material appears to be lost. The type material was collected in dunes near Warsaw. *T. psammophila* has not been reported from this area. Based on the sparse description no „distinguishing characters“ of the species in question are recognizable but only few general characters which refer to numerous species. If *spominimus* – it has been described under *Amaurobius* – really was a member of *Titanoeca* another congeneric species cannot be excluded from the synonymy with *spominimus*: *T. tristis* L. KOCH 1872, in which also white spots of the opisthosoma are absent.

Furthermore – in contrast to *psammophila* – *spominimus* is an almost forgotten name, is only found as listed in catalogues, is based on an unsifficient description without type specimens and without any topotypic material. During the last two decades *psammophila* has been reported from 8 countries, see BREITLING et al (2015). Therefore – and for the sake of stability – the name *psammophila* is restored here (**nom. rest**.) and *spominimus* is regarded as a nomen dubium.

Note: BREITLING et al. (2015, 2016) „synonymized“ several ERRONEOUS DETERMINATED taxa with valid species – e. g. *Alopecosa accentuata* auct. with *A. farinosa* (HERMAN 1879) in 2016 – but these cases are simply corrections of wrongly identified material, not new synonyms („n. syn.“).

Family LIOCRANIDAE

Liocranum L. KOCH 1866

The relationships and the synonymy of *Liocranum apertum* DENIS 1954, *L. majus* SIMON 1878, *L. pallidum* SIMON 1878, *L. segmentatus* SIMON 1878 and *L. variabilis* WUNDERLICH 2008 are quite unsure and I do not want to exclude that these nominal species (or most of them) may represent a single variable species only; see LEDOUX (2008).

Family GNAPHOSIDAE

Gnaphosa artaensis WUNDERLICH 2011 (figs. 24-27)

Gnaphosa monteserra WUNDERLICH 2015 (: 447, figs. 1-3) (♂) = *G. artaensis* WUNDERLICH 2011 (53-54, figs. 146-147) (♂) (**n. syn**.).

Material (JW leg.): *Gnaphosa artaensis*: Holotype ♂, Spain, Mallorca, near Arta, R19/AR/CJW; *Gnaphosa monteserra*: Holotype ♂, S-Portugal, near Fuzeta, R167/AR/ CJW; further material (sub *artaensis*): S-Portugal, near Fuzeta, 1♀ R169/AR/CJW; Spain, N and Central Menorca, 2♀, CJW.

Synonymy: The structures of the ♂-pedipalpus of both holotypes are identical and therefore I regard *monteserra* as junior synonym of *artaensis* (**n. syn**.). Some differences exist in the males of *artaensis / monteserra*: Prosomal length 2.4/4.0 mm, metatarsus I with a pair of ventral bristles/a single proventral bristle only (its position in 0.37) (figs. 24-25), opisthosomal scutum almost absent/weakly developed, posterior eye row slightly less recurved in *monteserra*.

Description of the female: Measurements (in mm): Body length 6.5-10.0 (large ♀ from Menorca), prosoma: Length 2.6 (♀ from Fuzeta, similar to the holotype of *artaensis*) to 4.0, width 1.95 (♀ from Fuzeta); tibia I 1.25, tibia IV 1.45 (♀ from Fuzeta).
Colour light as in the holotype of *artaensis* (the holotype of *monteserra* is distinctly darker): Prosoma and legs light brown, opisthosoma medium brown.
Both metatarsi I bear a single proventral bristle in the basal half like the male holotype of *monteserra* from the same area, fig. 25, metatarsus II bears a pair of ventral bristles in the basal half similar to fig. 24 in the ♀ from Fuzeta, a single bristles or a pair of bristles in the females from Menorca. Epigyne/vulva: Figs. 26-27 (♀ from Fuzeta). In the females from Menorca exist A PAIR of sclerotized longitudinal bands of the epigyne.

Relationships: *G. saurica* OVTSHARENKO et al. 1992 from Kazakhstan may be most related; its embolus is less bent.

Distribution: Western Mediterranean.

Arboricaria BOSMANS 2000 and ***Micaria*** WESTRING 1851

Both nominal genera were differentiated by MIKHAILOV (2016) mainly according to the shape of the sternum and of the bulbus (the differences of both characters are not distinctive in my opinion), the absence of a median apophysis in *Arboricaria* (it may be absent in *Micaria*, too!), the posterior margin of the epigyne, and a usually (!) bifid tibial apophysis of the male pedipalpus in *Arboricaria*.
In my opinion the ethological and ecological characters – their diurnal life style, their ant-mimicing behaviour and their myrmecomorphy –, as well as the existence of their squamose and iridescent hairs, which are all shared by *Arboricaria* and *Micaria,* should not be neglected when the level of these taxa is estimated.
Therefore I regard *Arboricaria* as species-group of *Micaria* or as a subgenus. *M. dives* (LUCAS 1846) may be the member of another species-group, or of the named subgenus *Micariolepis* SIMON 1879.

Macarophaeus taborensis (LEVY 2009) (**n. comb**.) (under *Poecilochroa*) from Israel

= *Macarophaeus sabulum* WUNDERLICH 2011: 49 (**n. syn**.) from S-Portugal.

Fig. 28.

Material: S-Portugal, Algarve, islands near Fuzeta and Tavira, in dunes. Holotype ♀ Ilha de Fuzeta; 1♂ 2♀ Ilha de Fuzeta, JW leg. 20. V. 2016, CJW); 1♂ Ilha de Armona, JW leg., R155/AR/CJW.

Synonymy and relationships: According to the descriptions and the figs. of males of these nominal species – which show no differences (*) – I regard ?*Macarophaeus sabulum* WUNDERLICH 2011 as a junior synonym of *Poecilochroa taborensis* LEVY 2009 (**n. syn**.). LEVY (2009: 20) regarded this species as a member of *Poecilochroa* WESTRING 1874, but in *Poecilochroa* the opisthosoma is dark and bears white patches, the femora are distinctly darker than the remaining leg articles, the posterior eye row is straight or slightly recurved, and the epigyne bears anteriorly a helm-shaped structure. Because of these differences I regard *taborensis* as a member of *Macarophaeus* WUNDERLICH 2011 (**n. comb**.).

(*) (1) The drawing of the embolus of *sabulum* – see WUNDERLICH (2012: 191, fig. 11) – is incomplete, the distal part is lacking, see the redrawing, fig. 28 below. – (2) According to J. LISSNER (in litt., XII. 2016) the drawing of the epigyne of *taborensis* by LEVY (2009: Fig. 46) is incorrect, and there are no differences regarding the ♂ ♀ copulatory structures of *sabulum* from S-Portugal and the type material of *taborensis* from Israel.

Distribution: Israel and S-Portugal (new to Europe).

Scotophaeus torretrencada n. sp. (figs. 29-30)

Origin of the species name: The name refers to the locus typicus of the species on Menorca, the ancient settlement Torretrencada.

Material: Spain, Balearic island Menorca, western-central area E Cuitadella, within the ancient settlement Torretrencada, under a stone, holotype ♂ JW leg. 25. VIII. 2016, R174/AR/CJW, later probably SMF.

Notes: The left leg I is lost, both pedipalpi are loose.

Diagnosis (♂; ♀ unknown): Pedipalpus (figs. 29-30): Tibia with an apical „notch“, cymbium and bulbus relatively long and slender, embolus long and crossing the long and slender median apophysis, embolus with a large translucent basal „shield“.

Description (♂):
Measurements (in mm): Body length 7.6; prosoma: Length 4.0, width 3.0; opisthosoma: Length 3.5, width 2.3; leg I: Femur 2.1, patella 1.5, tibia 1.8, metatarsus 1.4, tarsus 0.65; tibia II 1.65, tibia III 1.3, tibia IV 1.95.
Colour: Prosoma and legs medium brown, opisthosoma mainly black brown, dorsal scutum dark grey brown, epigaster yellowish.
Prosoma 1.33 times longer than wide, anteriorly distinctly smaller, bearing few short hairs, feathery hairs existing, thoracal fissure well developed, most eyes small but anterior median eyes quite large, posterior row slightly procurved, posterior median eyes spaced by 1 ½ of their diameters, clypeus quite short, basal cheliceral articles long and slender, anterior margin of the fang furrow with 3 teeth, posterior margin with a single tiny tooth (on the left side) but smooth on the right side, fangs long and slender, gnathocoxae long and bearing a distinct depression, labium long, a free sclerite, sternum not elongated between the coxae IV which are close together. – Legs fairly stout, order IV/I/II/III, hairs short, bristles only fairly long; I: Femur 1/1 dorsally in the basal half and 1/1 prolaterally in the distal half, patella smooth, tibia a short one proventrally in the distal half and a short apical-ventral pair, metatarsus and tarsus bristleless; III and IV with numerous bristles but patella IV smooth and patella III with a single retrolateral one, metatarsi III and IV with a garland of strong apical bristles, metatarsal and tarsal scopulae and claw tufts well developed. – Opisthosoma 2.3 times longer than wide, hairs dense and fairly long, dorsal scutum well developed, spinnerets stout, colulus absent. – Pedipalpus (figs. 29-30): See the diagnosis. The scinny conductor is long. Like in related species the sperm duct is abruptly narrowed before entering the embolus.

Relationship: According to the shape and the structures of the male pedipalpus *S. nanus* WUNDERLICH 1995 from Austria is most related; in *nanus* a „notch“ of the pedipalpal tibia is absent and the median apophysis is more stout. In *S. scutulatus* (C. L. KOCH 1866) – see GRIMM (1985: Figs. 210a-b) – the pedipalpal tibial apophysis is apically also slightly „notched“ but the structures of the bulbus are distinctly different, the embolus is much longer and not crossing the median apophysis. – A revision of the the *S. albomaculatus* subgroup will probably document the existence of several undescribed species.

Distribution: Spain: Baleares: Menorca.

Family THOMISIDAE

Ozyptila blitea SIMON 1875 (**rev. comb**.)

This mediterranean species has been regarded as a member of the genus *Xysticus* C. L. KOCH 1835 s. l. by several authors, e. g. by LEVY (1985). According to several characters I regard *blitea* – following SIMON – as a member of *Ozyptila* SIMON 1864: the only 2 pairs of ventral bristle on tibia I-II (apical bristles may exist) in *blitea* like in other members of *Ozyptila* – at least 3 pairs exist in *Xysticus* (apical bristles may exist) – the absence of lateral bristles on tibia I-II – they exist usually in males of *Xysticus* – the thickened dorsal opisthosomal bristles – the shape of these bristles is variable in *Xysticus*: thickened or thin and pointed – and the small size: the prosomal length of male *blitea* is about 1.3 mm – the prosomal length in *Xysticus* is usually 1.8-3.8 mm in *Xysticus*, rarely 1.5 mm or less like in *pullata* (I found a prosomal length of 1.2-1.8 mm in male *Ozyptila*). To my knowledge the position of the eyes is intragenerical variabel in *Ozyptila* and in *Xysticus* as well.

Family SALTICIDAE

Evarcha eriki WUNDERLICH 1987 = *E. jucunda* (LUCAS 1846) (**n. syn**.) (fig. 31)

Material (CJW): (1) Spain, Mallorca, near Arta, 2♂ 1♀ JW leg. in IV; (2) Spain, Menorca, Cala Pilar, 1 subad. ♂ JW leg. in VIII 2013, ad. 3. X. 2013; (3) S-Portugal, Caldas da Rainha, 1♂ 1♀ 1juv. ♀ JW leg. in VIII 2012; (4) S-Portugal, Island of Fuzeta, 1♂ JW leg. in VI 2012. Further specimens: S-Portugal, JW leg.

Synonymy: Body size, colouration as well the structures of the ♂♀-copulatory organs – e. g. the shape of the tibial apophysis, the bulbus and the embolus as well as of the epigyne/vulva frequently are striking variable intraspecificly, even within the same population, e. g. in *Heliophanus* and *Salticus*. – The distinct variability of the shape of the male pedipalpal tibial apophysis of *Evarcha jucunda* (fig. 31) has been figured by HANSEN (2000); the distal part of the embolus may be straight or bent in this species, the more basal part of the embolus may be slender or distinctly thickened – e. g. in the holotype of *E. eriki* from Gran Canaria – and intermediates exist, see the internet: www.salticidae.org/salticid/diagnost/evarcha/jucunda.htm. According to my investigation these variable structures are not correlated with each other nor with different geographical regions. In my opinion the differences between *eriki* and *jucunda* figured by LOGUNOV (2015) are the result of only few specimens studied by this author. Therefore I regard *E. eriki* WUNDERLICH 1987 as a junior synonym of *E. jucunda* (LUCAS 1846) (**n. syn**.). In my opinion this species has been introduced to Gran Canaria by men.

Two questionable synonymies:

(1) I do not want to exclude that *Heliophanus agricoloides* WUNDERLICH 1987 from Gran Canaria may be a junior synonym of *H. agricola* WESOLOWSKA 1968 from the Iberian Peninsula and probably Algeria (**quest. n. syn**.). See the discussion on the intraspecific variability above.

(2) In my opinion *Yllenus algarvensis* LOGUNOV & MARUSIK 2003 is most probably a junior synonym of *Y. squamifer* (SIMON 1881) (**quest. n. syn**.). I collected both sexes in the Algarve near Fuzeta, CJW. See the discussion on the intraspecific variability above.

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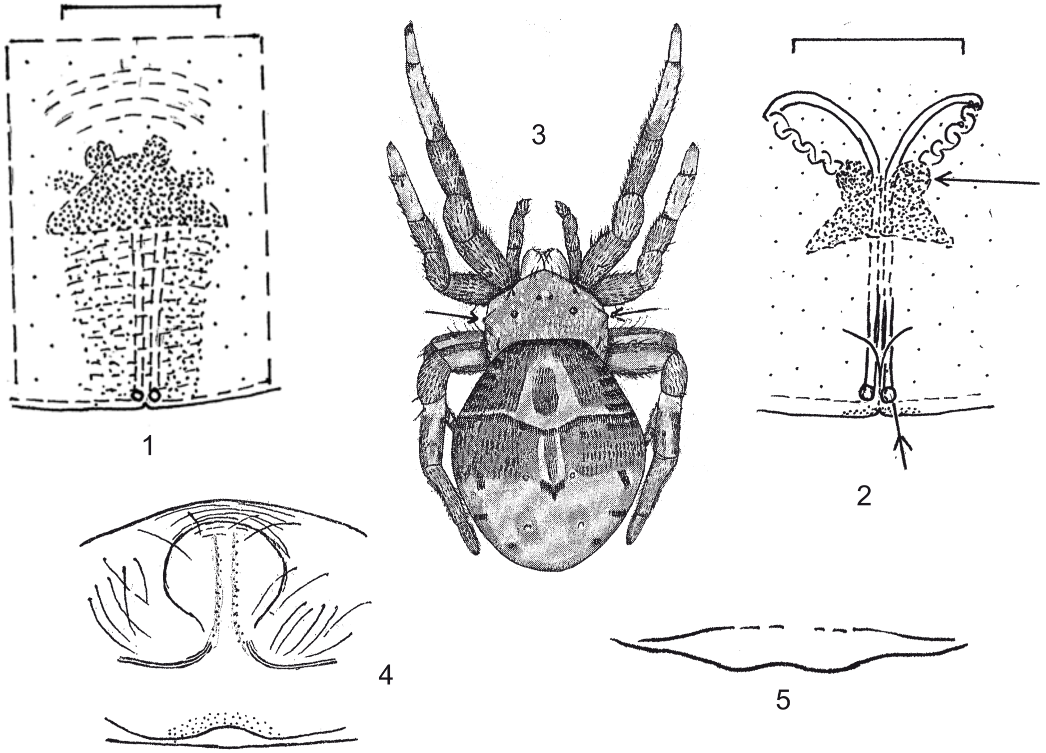
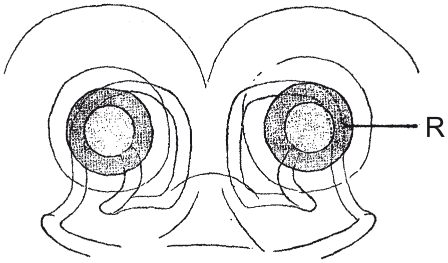


Figs. 1-2: *Oecobius sinescapus* **n. sp.**, ♀; 1) epigyne; 2) dorsal aspect of the vulva. The short arrow points to the left copulatory opening, the long arrow points to the left receptaculum seminis. – Scale bars = 0.2 mm;

figs. 3-8: *Hyptiotes paradoxus* (C. L. KOCH 1834); 3) dorsal aspect of the female. The arrows point to the large humps which bear the posterior lateral eyes. In this female distinct opisthosomal humps are absent (or not drawn) in contrast to certain other females; 4) ♀, epigyne, 5) ♀, ventral



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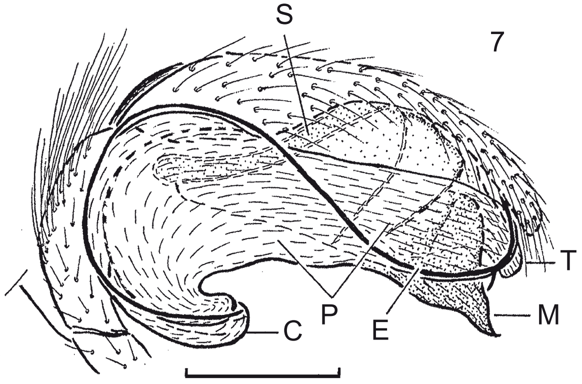

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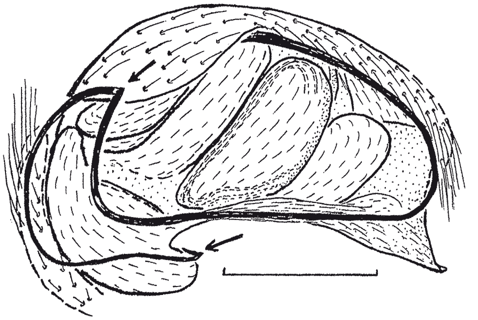

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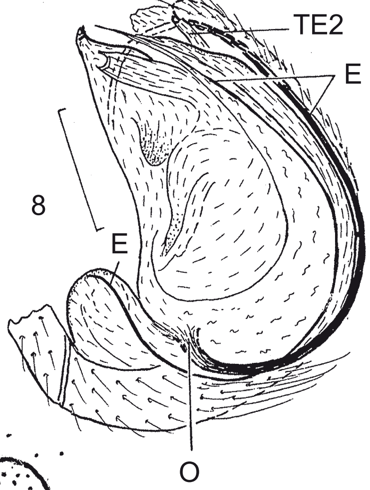

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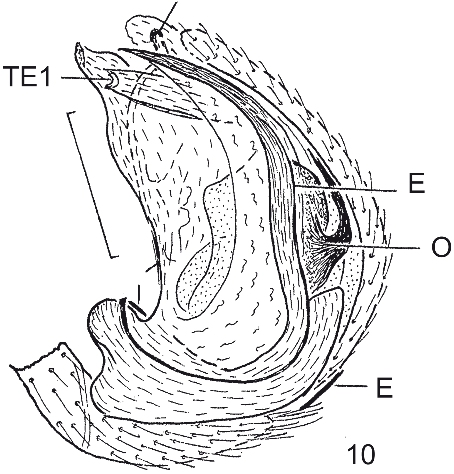

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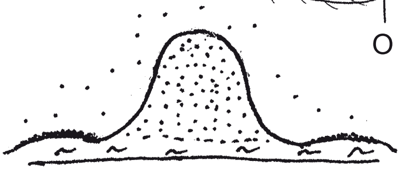

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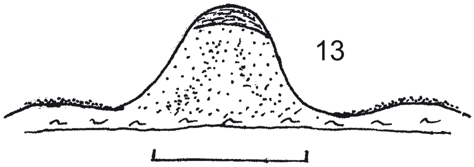

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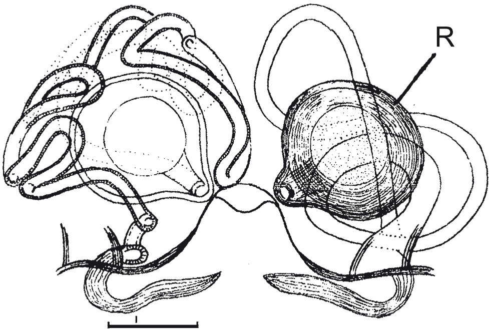
and slightly anterior aspect of the posterior margin of the epigyne; 6) ventral aspect of the vulva R = receptaculum); 7-8) retrolateral and proventral aspect of the right ♂-pedipalpus;

figs. 9-10: <u>*Hyptiotes dentatus*</u> WUNDERLICH 2008: retrolateral and proventral aspect of the right ♂-pedipalpus;

figs. 11-15: <u>*Hyptiotes gerhardti*</u> WIEHLE 1929; 11) ♀, ventral-anterior aspect of the posterior margin of the epigyne; 12-13) epigyne, variability of the shape of the grove; note the „helm-shaped“ structure of the anterior margin in fig. 13); 14) ventral aspect of the vulva; only few ducts are shown (R = receptaculum); 15) retroletarel aspect of the right ♂-pedipalpus;



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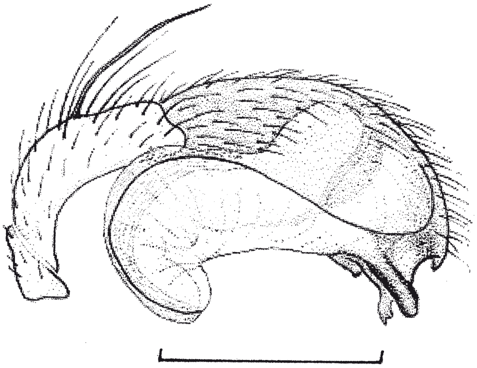

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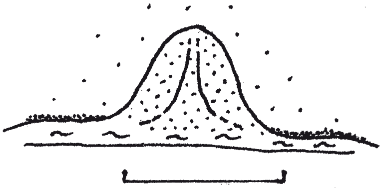

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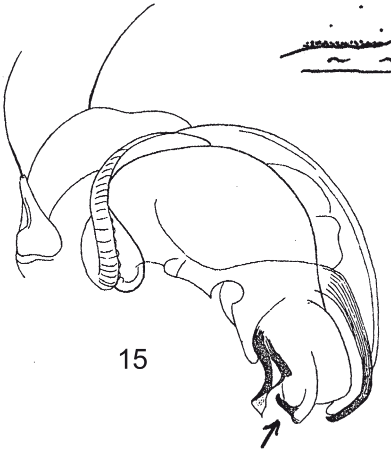

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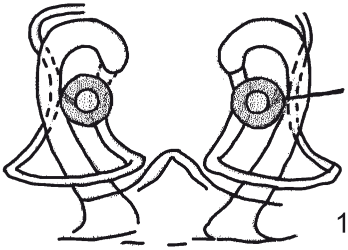

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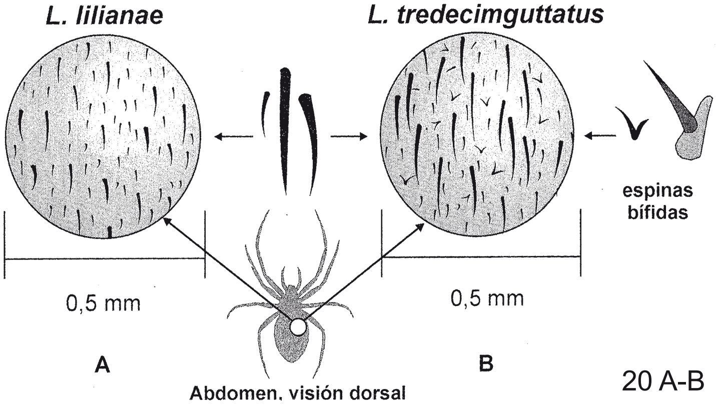
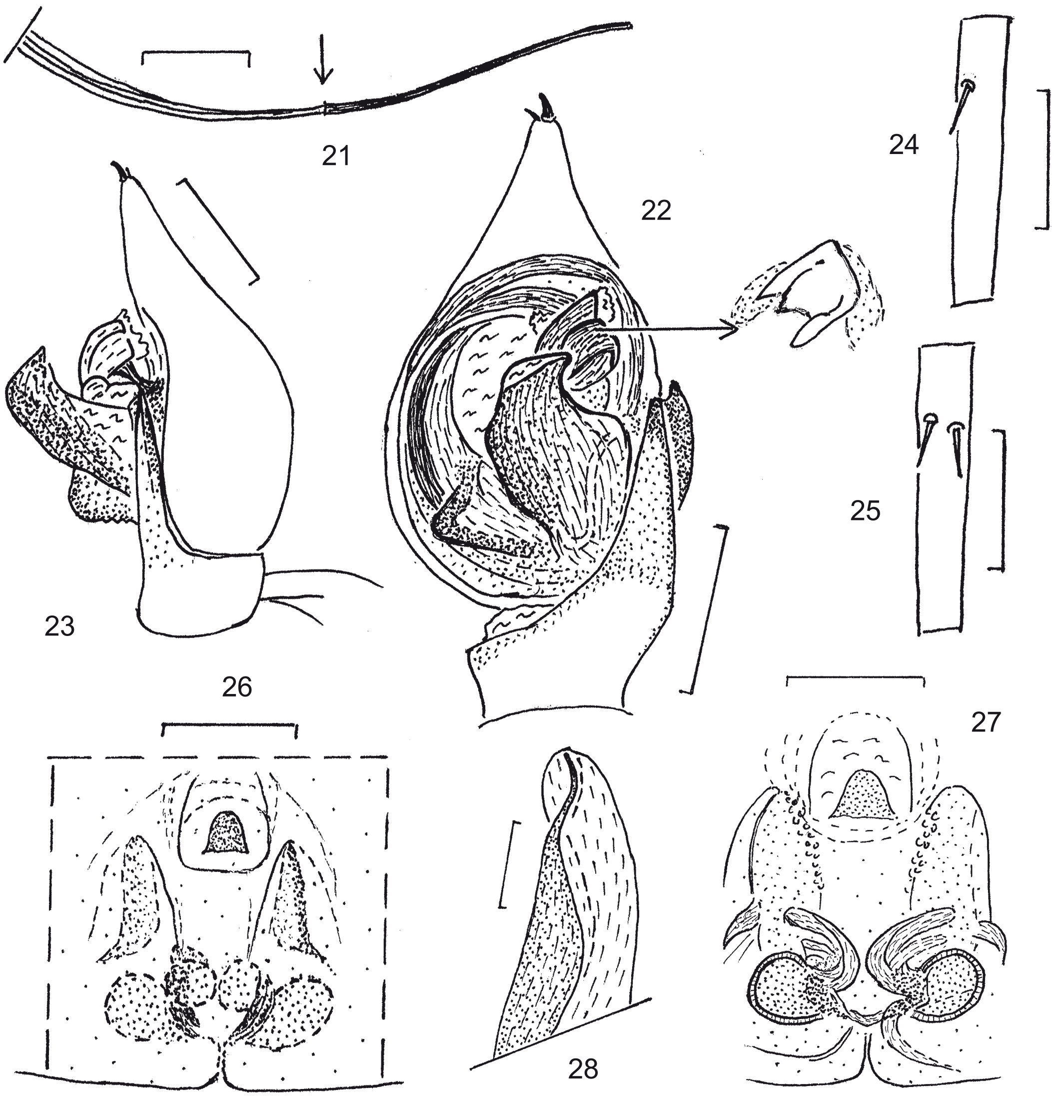


20 A-B

figs. 16-19: Hyptiotes flavidus (BLACKWALL 1862); 16) ♀ ventral-anterior aspect of the posterior margin of the epigyne; 17) epigyne; note the fairly distinct prominent medial ridge; 18) ventral aspect of the vulva; only very few ducts are shown (!) (R = receptaculum); 19) retrolateral aspect of the right ♂-pedipalpus. – Scale bars 0.2 mm in figs. 12- 13, 0.1 mm in the remaining figs. Figs. 3-4, 6-8, 14-15, 18 are taken from WIEHLE, fig. 19 is taken from BARRIENTOS et al.;

fig. 20: Types of dorsal opisthosomal bristles of Latrodectus lilianae (A) and L. tredecimguttatus with enlarged bifid bristles (B). – Taken from MELIC (2000);

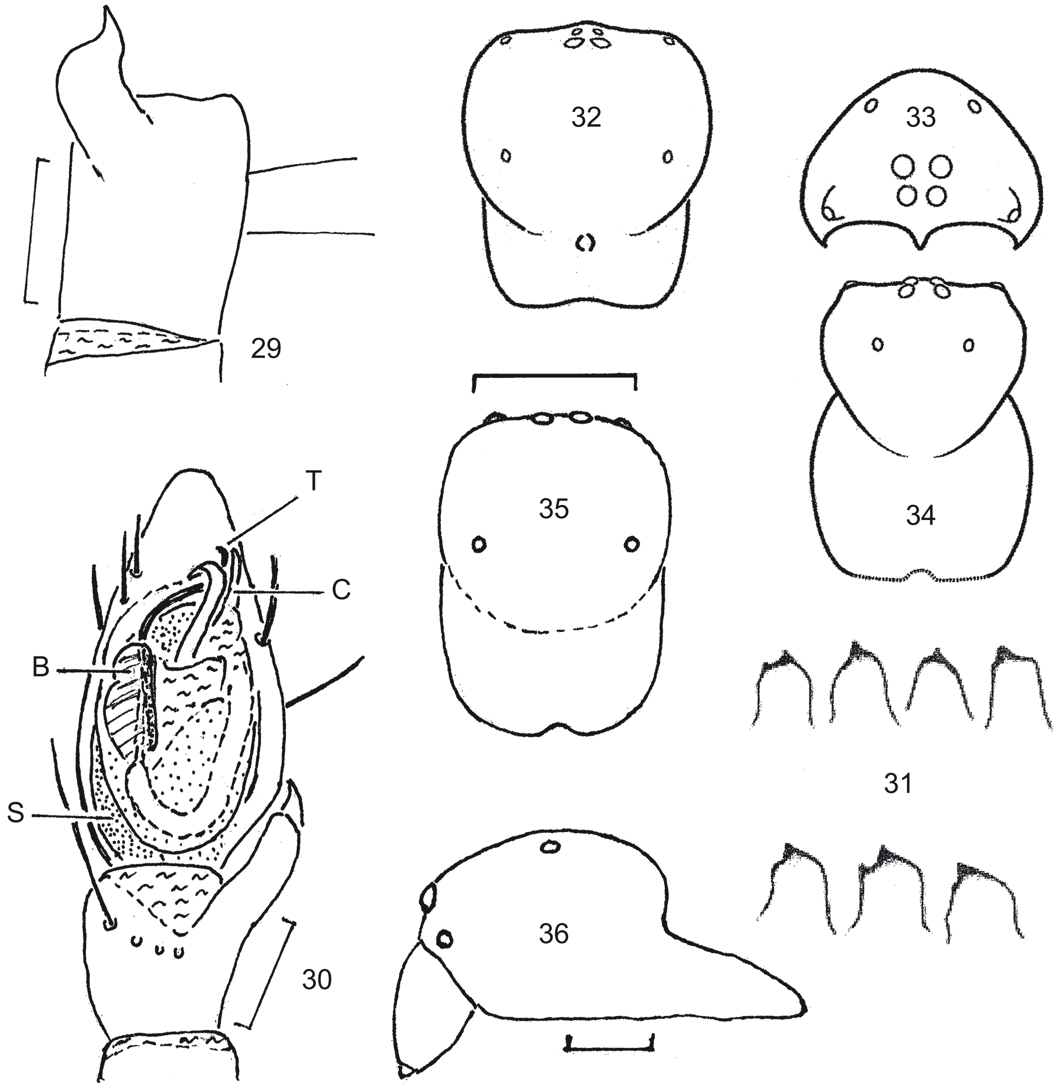


21) <u>*Latrodectus lilianae*</u> MELIC 2000, ♂ (Spain: Almeria), distal part of the right embolus. The arrow points to the „breaking“ point. – Scale bar = 0.1 mm;

figs. 22-23: <u>*Zodarion robertbosmans*</u> **n. sp.**, ♂; 22) ventral aspect of the left pedipalpus. The arrow points to the median apophysis which is shown separately in a retroventral and slightly apical position; 23) retrolateral aspect of the left pedipalpus. Note three dorsal tibial trichobothria. – Scale bars 0.2 mm;

figs. 24-27: <u>*Gnaphosa artaensis*</u> WUNDERLICH 2011; 24) holotype ♂ from Mallorca, ventral aspect of the right metatarsus I (hairs not drawn); 25-27) ♀ from Portugal near Fuzeta; 25) ventral aspect of the right metatarsus I (hairs not drawn); 26-27) epigyne and dorsal aspect of the vulva. – Scale bars = 0.5 mm in figs. 24-25, 0.2 mm in figs. 26-27;

fig. 28) <u>*Macarophaeus taborensis*</u> (LEVY 2009), ♂ (S-Portugal), retrolateral aspect of embolus and conductor of the right pedipalpus. – Scale bar = 0.05;



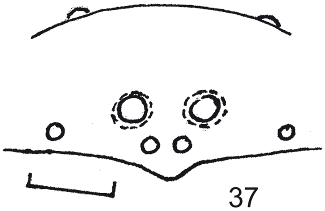
figs. 29-30: *Scotophaeus torretrencada* **n. sp.**, ♂; 28) retrolateral aspect of the tibia of the left pedipalpus; 29) ventral aspect of the left pedipalpus. Only few hairs are drawn. – B = basal shield on the embolus, C = scinny conductor, S = subtegulum, T = tip of the embolus. Scale bars = 0.2 mm;

fig. 31) *Evarcha jucunda* (LUCAS 1846), , lateral aspect of the tibial apophysis of the left pedipalpus, variability. – Taken from HANSEN (2000);

figs. 32) *Eresus* sp., dorsal aspect of the ♂-prosoma. -Taken from MILLER et al. (2012).

figs. 33-34: *Stegodyphus lineatus* (LATREILLE 1817), anterior and dorsal aspect of the ♂-prosoma. – Taken from MILLER et. al. (2012);

figs. 35-40: *Adonea algarvensis* **n. sp.**, ♂; 35-37) dorsal, lateral and anterior aspect of the prosoma; 38) prolateral aspect of the right pedipalpus. Hairs are not drawn; 39) ventral aspect of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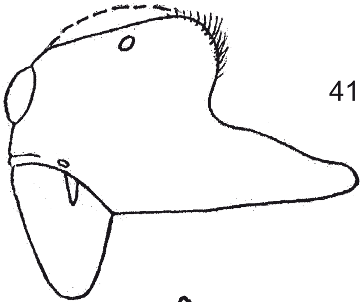
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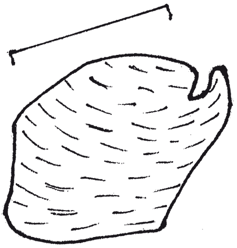
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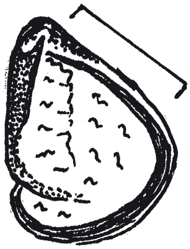
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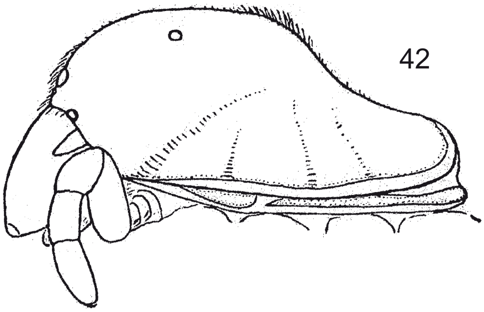
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embolus and conductor of the right pedipalpus; 40) retrolateral aspect of the conductor of the right pedipalpus. – Scale bars 2.0 in fig. 35, 1.0 in fig. 36, 0.5 in figs. 37 and 38, 0.2 in figs. 39-40;

fig. 41) Adonea fimbriata SIMON 1873, ♂, lateral aspect of the prosoma. Taken from KRATOCHVIL & MILLER (1940). The dotted line shows the different shape of the cephalic part of the male holotype of Eresus lucasi SIMON 1873 (?= *E. albopunctatus* SIMON 1873). – Taken from SIMON (1873), see EL-HENNAWY (2016: Fig. 9);

fig. 42) Storkaniella janinensis KRATOCHVIL & MILLER 1940, ♀ holotype from Greece, lateral aspect of the prosoma. – Taken from KRATOCHVIL & MILLER (1940).

BEITR. ARANEOL., 10 (2017: 327–330)

A NEW EXTANT SPIDER GENUS FROM MYANMAR (BURMA) (ARANEAE: DICTYNIDAE: DICTYNINAE)

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Abstract: *Myanmardictyna longifissum* **n. gen n. sp**. (Araneae: Dictynidae: Dictyninae) is described from Myanmar (Burma).

Key words: *Ajmonia*, *Anaxibia*, Araneae, Burma, Dictynidae, *Dictynomorpha*, Myanmar, *Myanmardictyna*.

Dictyninae is a diverse family of spiders in SE-Asia. In 1898: 271-272 THORELL described a dictynine spider based on the female sex of *Anaxibia caudiculata* n. gen. n. sp. from Myanmar (Burma). Here I describe a new genus which I not regard as strongly related to *Anaxibia*.

***Myanmardictyna* n. gen.**

Etymology: The name refers to the terra typica, Myanmar, and the confamilial genus name Dictyna.

The gender of the name is feminine.

Type species (by monotypy): *Myanmardictyna longifissum* n. sp.

Diagnosis (♂; ♀ unknown): Thoracal fissure quite long; pedipalpus (figs. 2-5): Tibia with a bipartite ventral-apical apophysis (a retrolateral apophysis is absent), and a long prodistal bristle, cymbium long and spiny, bearing a blunt retrobasal apophysis and an apical claw, bulbus with a retroapical translucent structure, a complicated divided conductor and a long embolus which describes at least half a circle.

Further characters: small spiders, body length 2.2 mm, labium (fig. 1) wide as long, basal cheliceral articles unmodified, numerous long leg bristles; femoral and patellar humps or apophyses are absent.

Relationships: According to the structures of the male pedipalpus and the absence of a ventral pedipalpal femoral hump *Ajmonia* CAPORIACCO 1934 may be most related, see MARUSIK et al. (2010, 2015); in the strongly related genus *Dictynomorpha* SPASSKY 1939 exists a ventral pedipalpal femoral hump. In contrast to *Ajmonia* and *Myanmardictyna* a strong prodistal pedipalpal tibial bristle, a cymbial claw, and a translucent apical structure of the bulbus exist; furthermore in *Ajmonia* the labium is distinctly longer than wide and pointed, and the pedipalpal patella bears an apophysis. The body length of *Ajmonia smaragdula* (SIMON 1905) from Sri Lanka is 4-5 mm, the male pedipalpus is different, a cymbial claw is absent. – In the female of *Anaxibia caudiculata* THORELL 1898 from Myanmar (the male is unknown) the length of the body and the shape of the labium are similar to *Myanmardictyna*, but – according to THORELL – prosoma and opisthosoma are quite different: stout, only slightly longer than wide.

Distribution: Myanmar (Burma).

***Myanmardictyna longifissum* n. gen. n. sp.** (figs. 1-5) photo 135

Etymology: The species name refers to the long fissures on the thoracal part and on the labium as well, from fissum (lat.) = fissure.

Material: Myanmar (Burma), near Bagan, JW leg. in II 2013, holotype ♂, R160/AR/CJW. The right pedipalpus has been separated and put in a small tube.

Diagnosis, relationships and distribution: See above.

Description (♂):
Measurements (in mm): Body length 2.2, prosoma: Length 1.1, width 0.8, opisthosoma: Length 1.2, width 0.75; leg I: Femur 0.85, patella 0.3, tibia 0.65, metatarsus 0.65, tarsus 0.45, tibia II 0.6, tibia III 0.55, tibia IV 0.7; diameter of a posterior median eye 0.53.
Colour: Prosoma dark brown, opisthosoma almost black; legs: Femora dark brown, most remaining articles yellowish but patellae and tibiae III-IV slightly darkened.
Prosoma (fig. 1, photo) 1.4 times longer than wide, smooth, thoracal fovea very long, 8 eyes of median size in a wide field, anterior lateral eyes largest, anterior median eyes smallest, posterior row straight, posterior median eyes spaced by slightly more than their diameter, clypeus short, basal cheliceral articles fairly large, without modifications, anterior margin of the fang furrow with 3 large teeth, posterior margin with 2 teeth, fangs and gnathocoxae long, labium as wide as long, bearing a wide fissure, sternum as long as wide, a posterior elongation bears long hairs. – Legs (photo) only fairly long, order IV/I/II/III, hairs fairly long, bristles numerous, long and thin, femora prolaterally with a subapical bristle, patellae and tarsi bristleless, tibia I: 1 ventrally basally (only on the left tibia), a ventral pair in the distal half and a ventral-apical one, tibia IV 9 bristles mainly ventrally, metatarsus I 2 ventral pairs, 1 retrolaterally and 2 apical, metatarsus IV bears 7 bristles and apicals. Most hairs of the calamistrum are rubbed off. Metatarsus and tarsus I bear a long and a short trichobothrium each, but I am not sure that the short hair is realy a trichibothrium. – Opisthosoma (photo) 1.6 times longer than wide, hairs short, 3 pairs of large spinnerets, cribellum apparently undivided. – Pedipalpus (figs. 2-5) (see above): Femur and patella without humps or apophyses.

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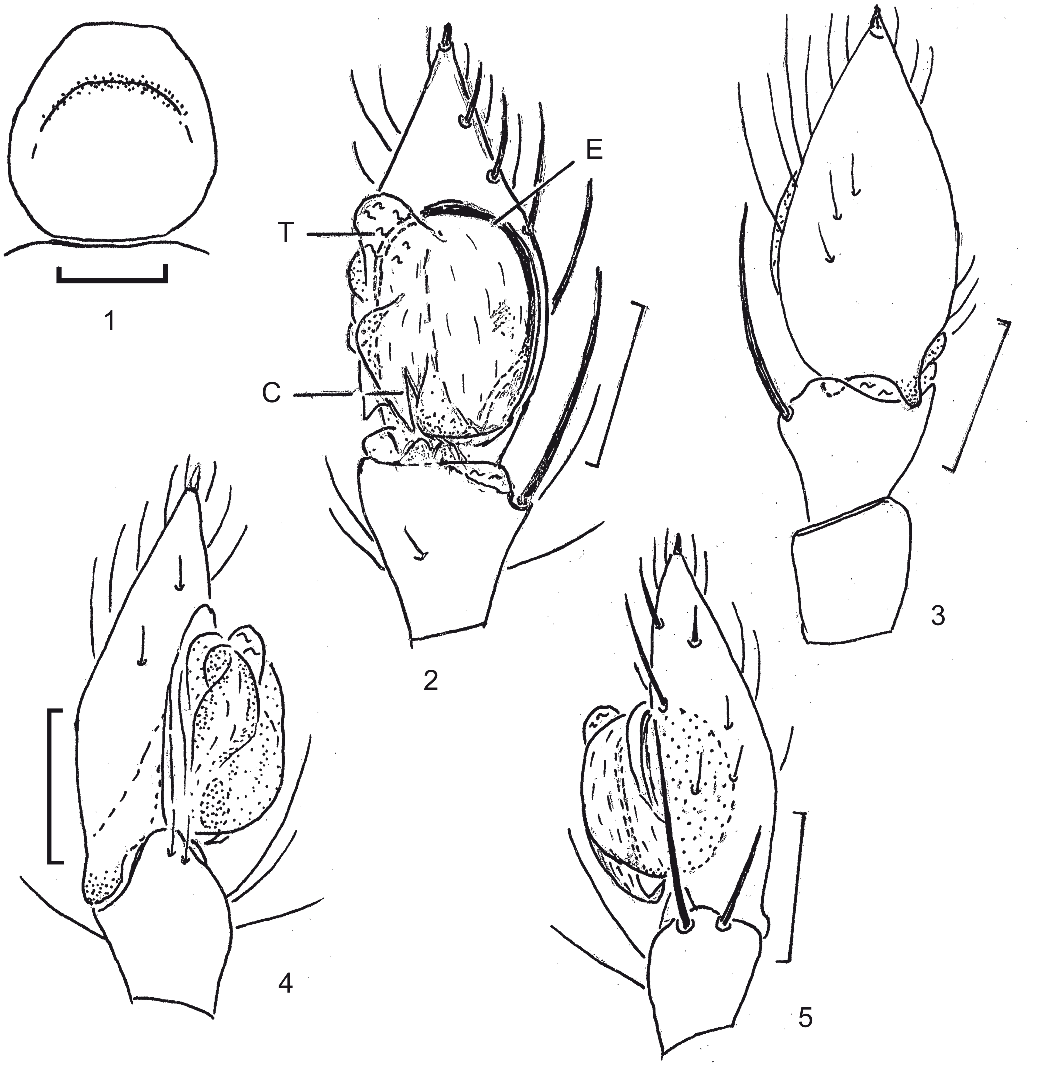

Figs. 1-5: *Myanmardictyna longifissum* **n. gen. n. sp.**, ♂; 1) labium. Note the wide fissure; 2-5) ventral, dorsal, retrolateral and prolateral aspects of the right pedipalpus. C = cymbium, E = embolus, T = translucent apophysis. Scale bars 0.1 mm in fig. 1, 0.2 mm in the remaining figs.

BEITR. ARANEOL., 10 (2017: 231–232)

CORRECTIONS AND ADDITIONAL REMARKS CONCERNING VOL. 9 OF THE BEITR. ARANEOL. (2015): MESOZOIC SPIDERS BY J. WUNDERLICH (ED.)

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The correct ISBN no. at the end is 0 but not 3.

P. 65, 92, 93 and 101: The family Liphistiidae in Burmite has to delete and the families Burmadictynidae n. fam., Burmathelidae n. fam., Cretaceothelidae n. fam., Parvithelidae n. fam. Praearaneidae n. fam. and Veteratoridae WUNDERLICH 2015 n. stat. (elevated from subfamily rank of the family Spatiatoridae) have to add to the fauna in Burmite.

P. 97, no. 23 and 23 -: The correct no. is 134a but not 34a.

P. 98, no. 27 - - (Eopsilodercidae): (1) The clypeus is not protruding but quite short in *Praepholcus* n. gen. (2) add „... and *frequently* a peculiar long retrolateral bristle,...“.

P. 99, no. 33 (to no. 34): Numerous metatarsal bristles exist in the Zarqaraneini.

P. 103, second line from below: WUNDERLICH (2012) but not (2011).

P. 113: The correct family name is now regarded as Austrochilidae but not Thaididae.

P. 139 (Plumorsolidae): In *Burmorsolus crassus* WUNDERLICH 2015 the hairs of the claw tufts are not spatulate but thin and the leg bristles are thick in contrast to the type species and the remaining species of *Burmorsolus*. *Crassus* is designed by monotypy as the type tpecies of the new genus *Pseudorsolus* (this volume).

BEITR. ARANEOL., 10 (2017: 333–354)

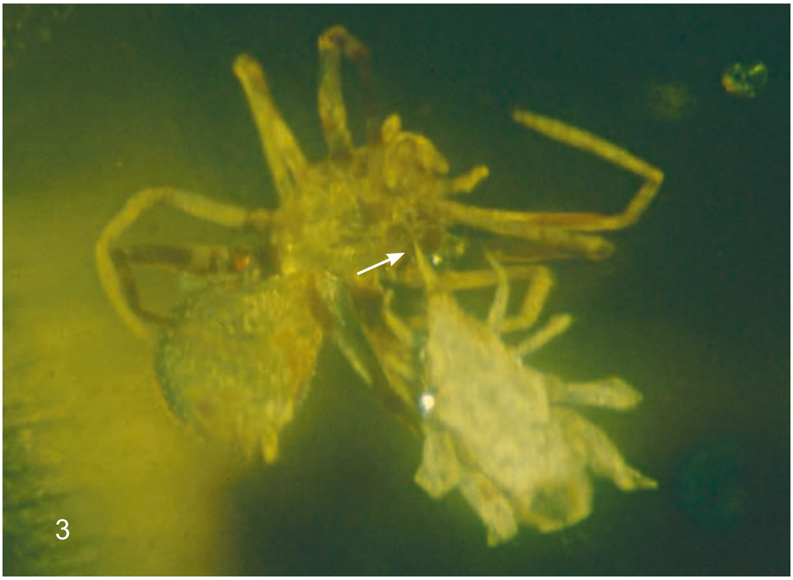
The photos

If not otherwise noted the photos refer to holotypes in Burmese amber.
Frequently the spiders are deformed and/or embedded in more or less
muddy amber together with numerous tiny droplets which prevent a clear view/aspect.

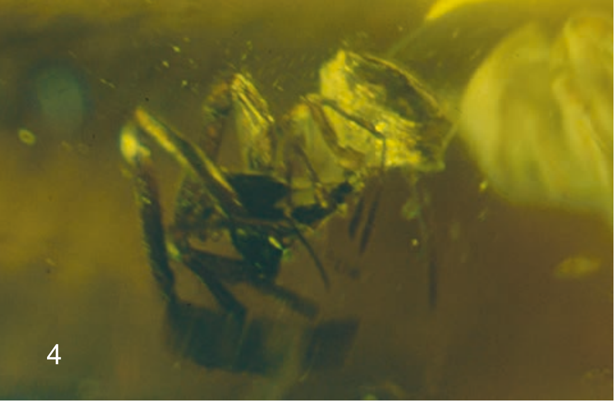
Sequence of the photos:

Nr. 1-2:	An extant spider (Araneae) from Africa.
Nr. 3:	Attack of a fossil spider by a mite in Burmese amber.
Nr. 4–14:	Fossil spiders in Eocene Baltic amber.
Nr. 15–37:	Fossil Ricinulei in Mid Cretaceous Burmese amber.
Nr. 38–127	(if not noted otherwise): Fossil spiders (Araneae) in Mid Cretaceous Burmese amber.
Nr. 128–129:	A fossil spider in Miocene Ethiopian amber.
Nr. 130–135:	Extant spiders from Europe.

1-2: *Thanatus nentwigi* **n. sp.**, Philodromidae, (extant, Africa), ♀ in alcohol, body length 3.8 mm; 1) dorsal aspect of the spider; 2) dorsal aspect of the anterior part of the prosoma.



3) Female spider (Araneae: Oonopidae: *Burmorchestina* sp. indet., body length 0.8 mm), attacked by a mite (Acari: Bdellidae), ventral aspect of the spider (at the left) and dorsal aspect of the mite. With the long „snout“ (proboscis) (in the centre of the photo, arrow) the mite is sucking out the spider at a skinny area between the sternum and the coxae I-II. Mid Cretaceous Burmese amber. See p. 10.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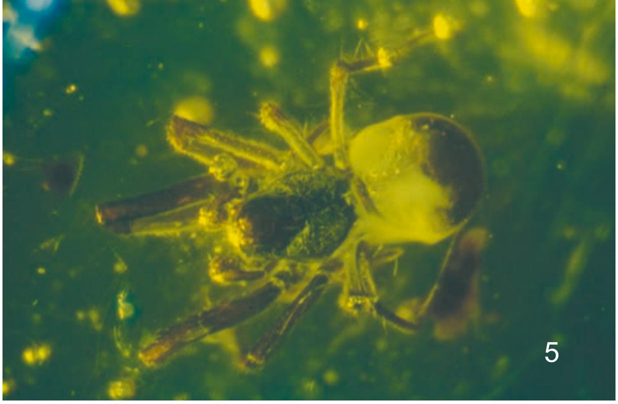
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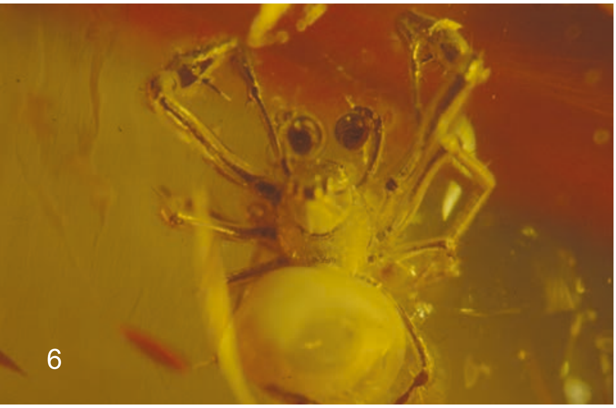
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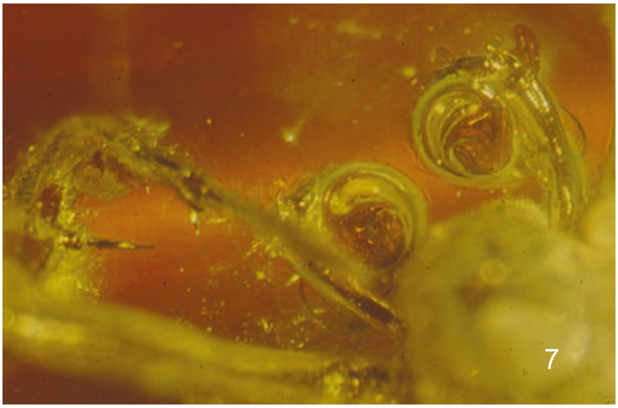
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4) *Balticonopsis ludwigi* **n. sp.**, Anapidae, male holotype and paratype, body length 1.5 mm, left aspect. Baltic amber.

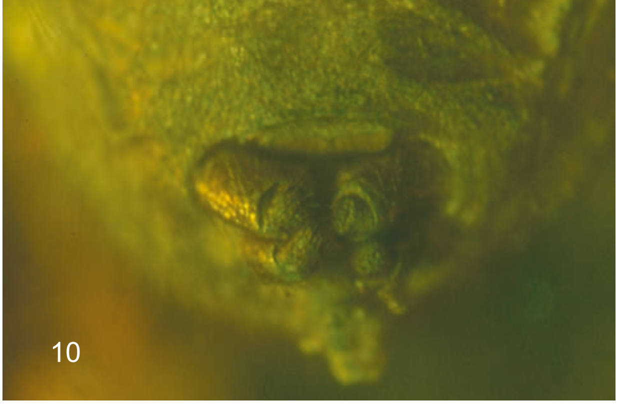
5) *Balticonopsis metatarsalis* **n. sp.**, Anapidae, Baltic amber, ♂, body length 1.6 mm. A bubble and an emulsion exist on the opisthosoma. Baltic amber.

6-7: *Balticonopsis dunlopi* **n. sp.**, Anapidae, ♂, body length 2.0 mm, Baltic amber; 6) dorsal aspect but bulbi ventral aspect; 7) bulbi ventral and left leg I prolateral.

8) *Cymbioropsis palpussutura* **n. gen. n. sp.**, Zoropsidae, ♂, body length 3.1 mm, dorsal aspect. Note the small eyes left of the centre of the photo. Baltic amber.

9-11: *Eomatachia* sp. indet., Zoropsidae, ♀ F2880/BB/CJW, body length 5 mm, Baltic amber; 9) dorsal aspect of the body; 10) cribellum and spinnerets; 11) epigyne.

12-13: *Pseudoeoprychia triplex* **n. gen. n. sp.**, Zoropsidae, Baltic amber, ♂ paratype, body length 10 mm; 12) lateral aspect of the spider in muddy amber and covered with an emulsion; 13) anterior aspect with the eyes.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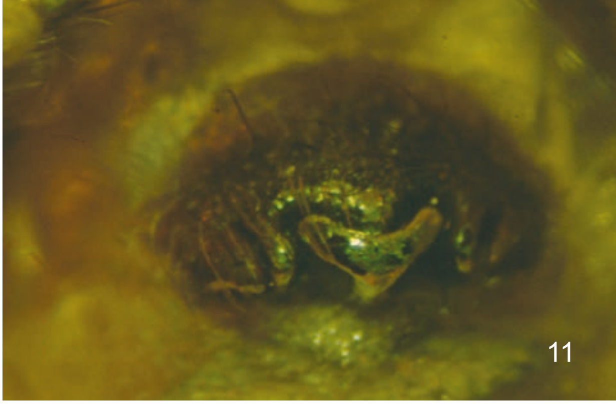
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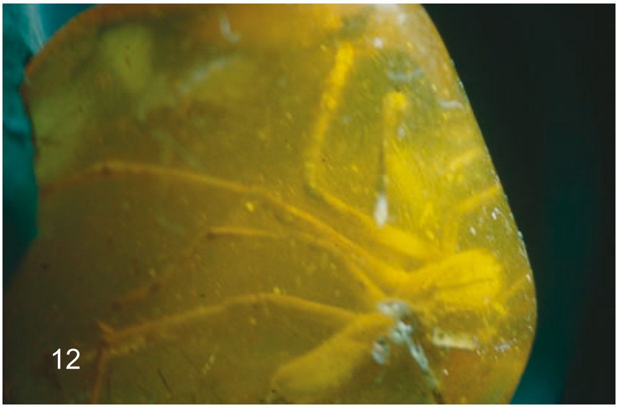
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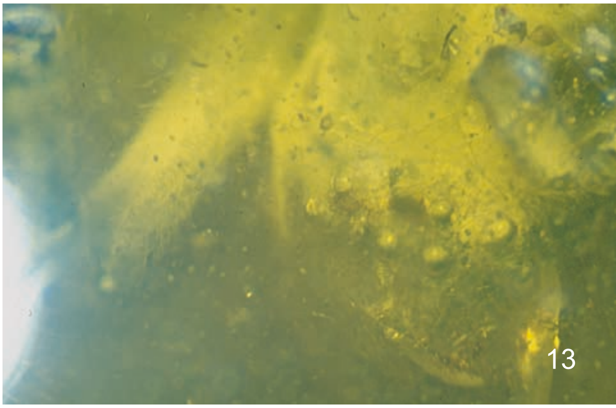
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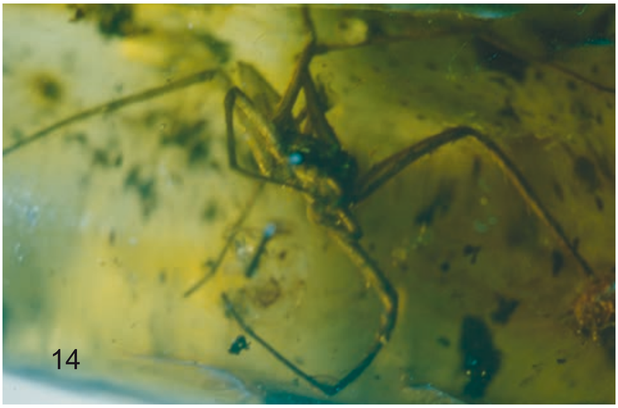
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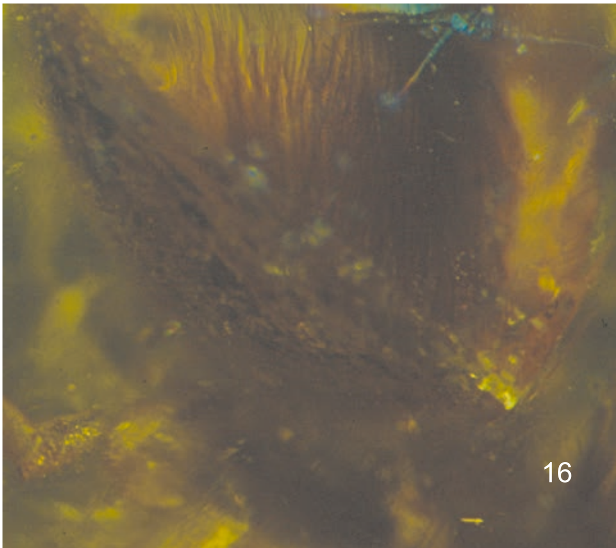
14) *Eoprychia clara* **n. sp.**, Zoropsidae, ♂, body length 5.8 mm, lateral aspect of the spider. Baltic amber.

15-17: *Hirsutisoma bruckschi* **n. gen. n. sp.**, Ricinulei: Hirsutisomidae **n. fam.**, ♂, body length 2.8 mm. Mid Cretaceous Burmese amber; 15) dorsal and slightly right aspect. Note the triplett of the right eyes which is well recognizable; 16) dorsal-right aspect of the opisthosoma. Note the dense field of bristle-shaped hairs in the anterior two thirds of the opisthosoma; 17) anterior aspect. – C = cucullus, G = gonopods (legs III), T = right tarsus IV.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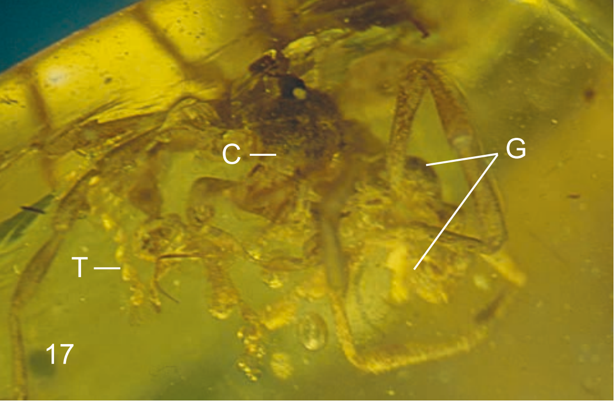
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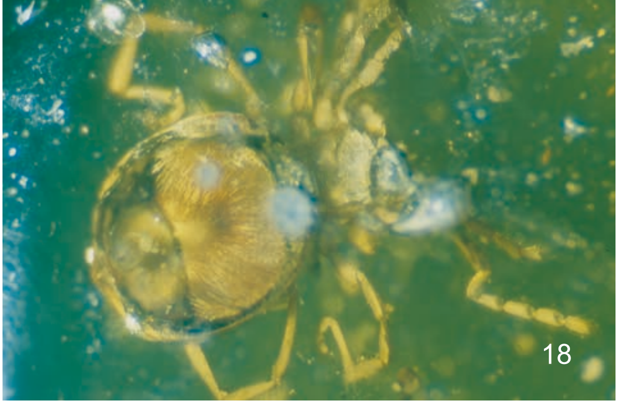
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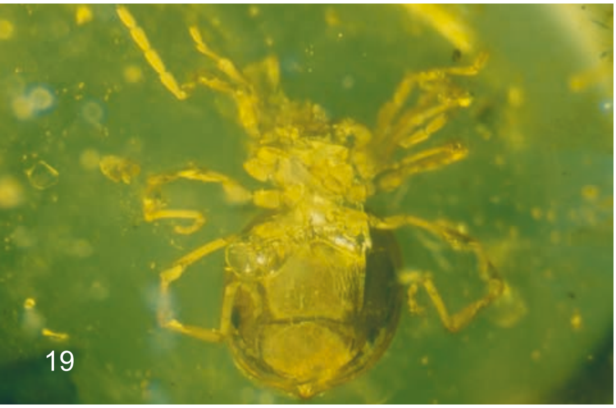
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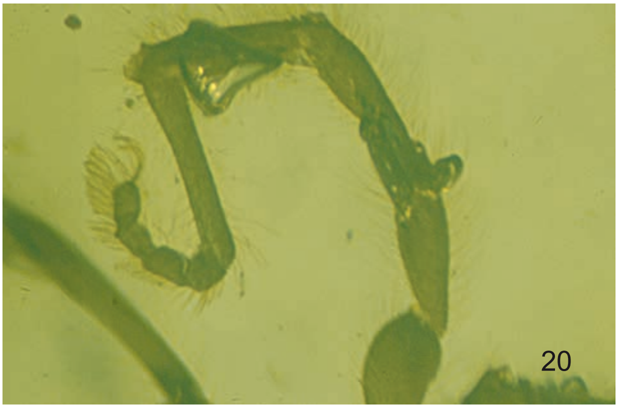
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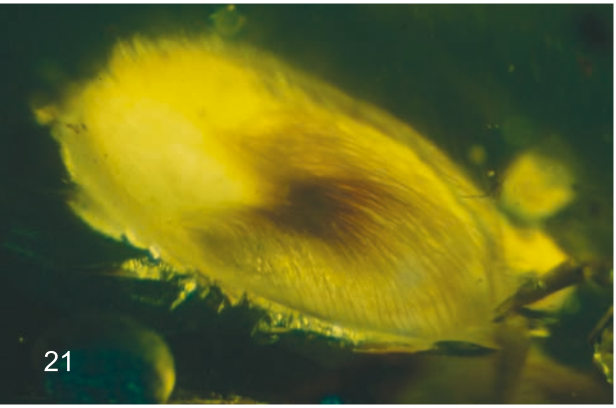
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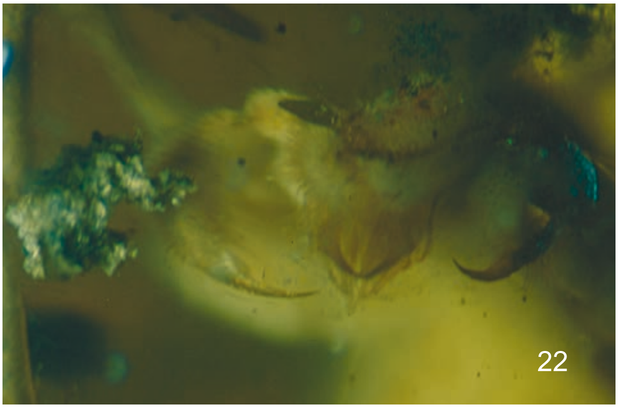
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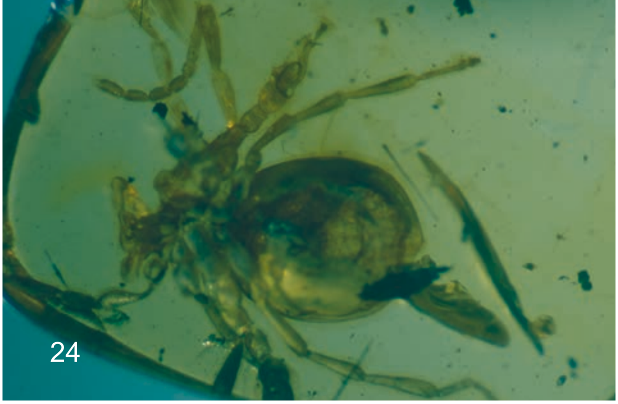
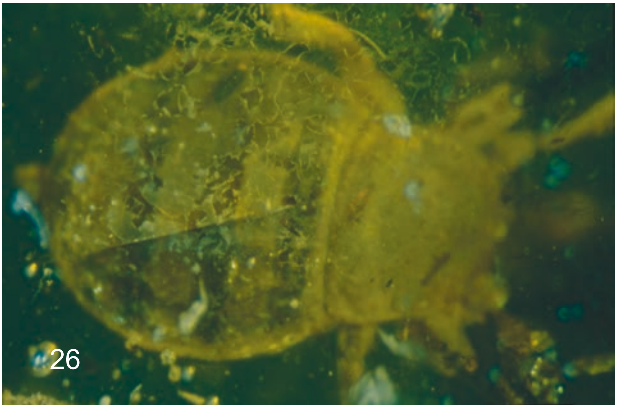
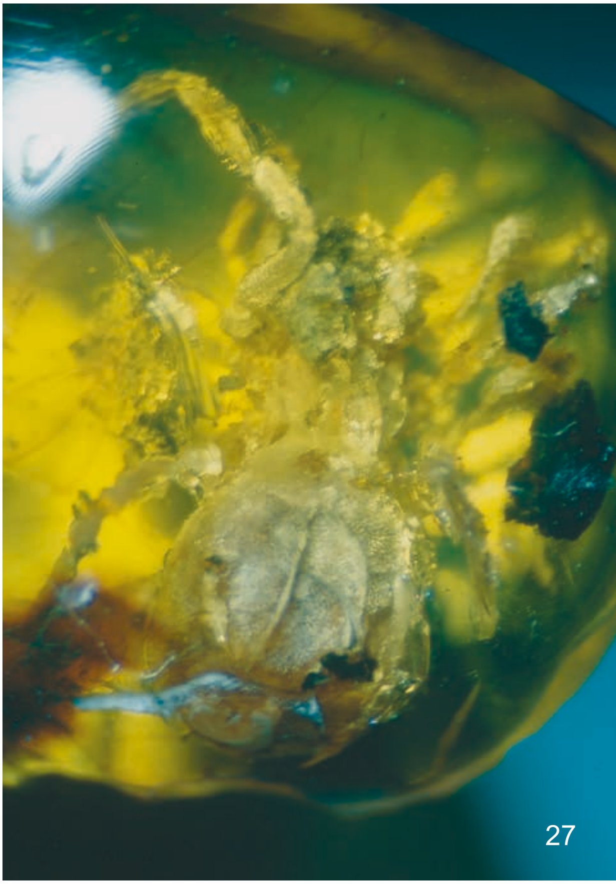
18-20: *Hirsutisoma acutiformis* **n. gen. n. sp**., Ricinulei: Hirsutisomidae **n. fam**., ♀, body length 3.1 mm; 18) dorsal aspect; 19) ventral aspect; 20) prolateral aspect of the right leg III.

21-22: *Hirsutisoma dentata* **n. gen. n. sp**., Ricinulei: Hirsutisomidae **n. fam**., ♀, body length ca. 3.5 mm; 21) dorsal-right aspect of the opisthosoma. Note the field of dense hairs in the anterior part; 22) anterior aspect of the mouth parts and the pedipalpi.

23-24: *Hirsutisoma* sp. indet., Ricinulei: Hirsutisomidae **n. fam**., ♂, body length 4 mm, coll. PATRICK MÜLLER; 23) dorsal aspect; 24) ventral aspect.







25) Ricinulei: Posterricinulei indet., ♀, coll. PATRICK MÜLLER BUB-82, body length 3.3 mm, dorsal aspect. Note the longitudinal furrow which is recognizable on the left side of the opisthosoma.

26) Ricinulei: Posterricinulei indet., juv., coll. PATRICK MÜLLER BUB-22, body length 1.85 mm, dorsal aspect.

27-28: *Monooculricinuleus semiglobosus* **n. gen. n. sp**., Ricinulei: Monooculricinuleidae **n. fam**., badly preserved juv., body length 6 mm; 27) dorsal aspect; 28) ventral aspect. See drawings p. 71.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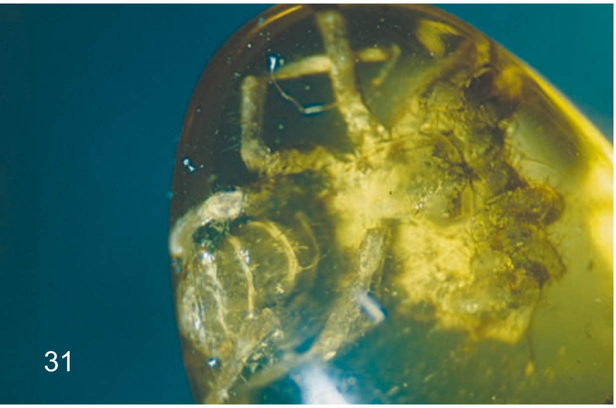
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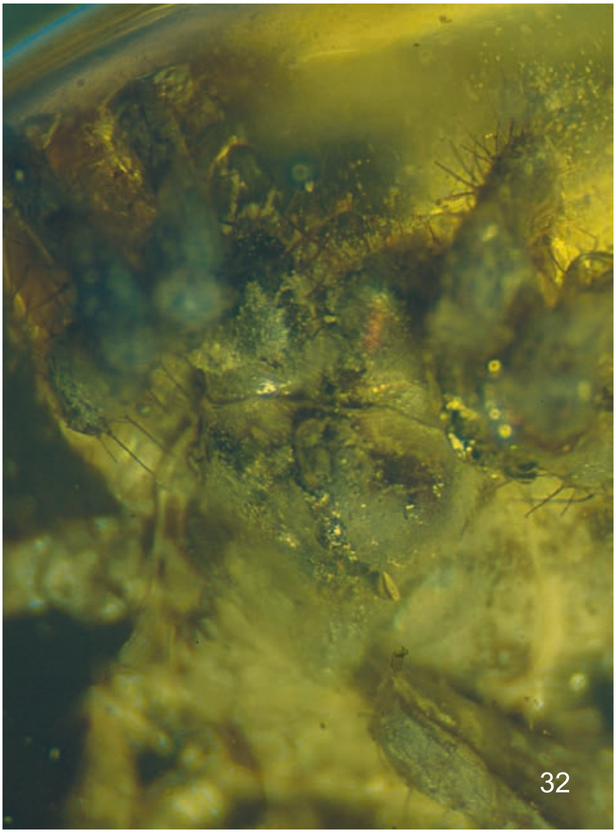
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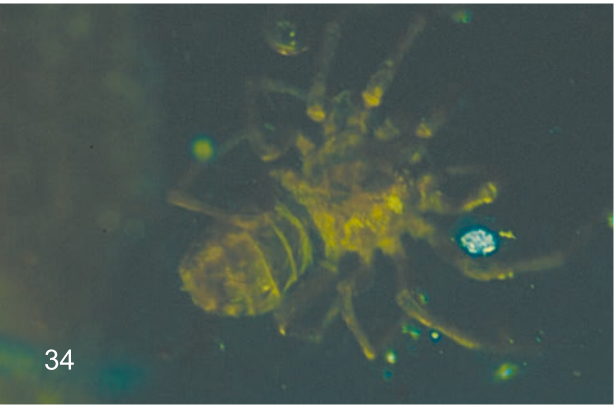
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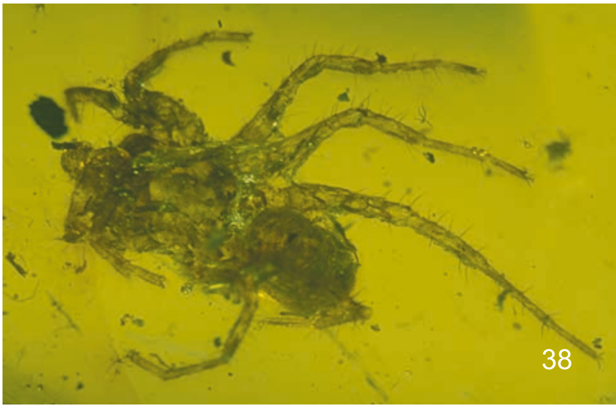
29-30: Monooculricinuleus incisus **n. gen. n. sp.**, Ricinulei: Monooculricinuleidae **n. fam.**, juv., body length 2.5 mm; 29) dorsal aspect; 30) ventral aspect.

31-33: *Burmathele biseriata* **n. gen. n. sp.**, Mesothelae: Burmathelidae **n. fam.**; 31-32) ?ad. ♀ holotype, body length 5 mm; 31) dorsal aspect of the spider; 32) dorsal aspect of the prosoma. Note the small eyes in the centre of the photo; 33) juv. paratype, body length 2.4 mm, dorsal aspect.

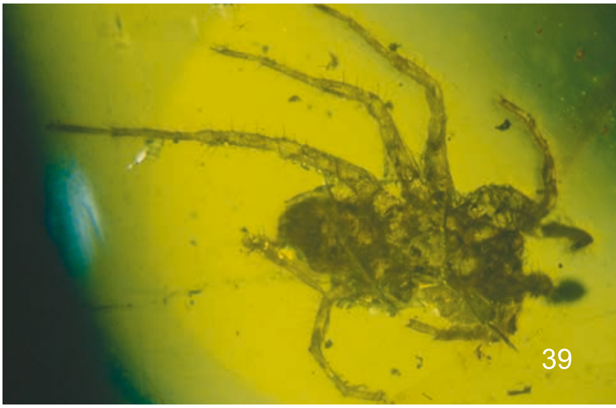
34) *Burmathele* sp. indet., Mesothelae: Burmathelidae **n. fam.**, juv., body length 2 mm, dorsal aspect of the spider.



35-36) *Parvithele muelleri* **n. gen. n. sp**., Mesothelae: Parvithelidae **n. fam**., ♂, body length 7 mm; probably the spider has been the prey of a spider; 35) dorsal aspect of the spider; 36) retrodorsal aspect of tibia IV.

37) *Parvithele spinipes* **n. gen. n. sp**., Mesothelae: Parvithelidae **n. fam**., ♂ in a muddy piece of amber, body length ca. 3.8 mm, dorsal aspect.

38-40: *Pulvillothele haupti* **n. gen. n. sp**., Mesothelae: Parvithelidae **n. fam**., juv., body length 3.2 mm; 38) dorsal aspect of the spider; 39) ventral aspect; 40) ventral aspect of the right tarsus II.

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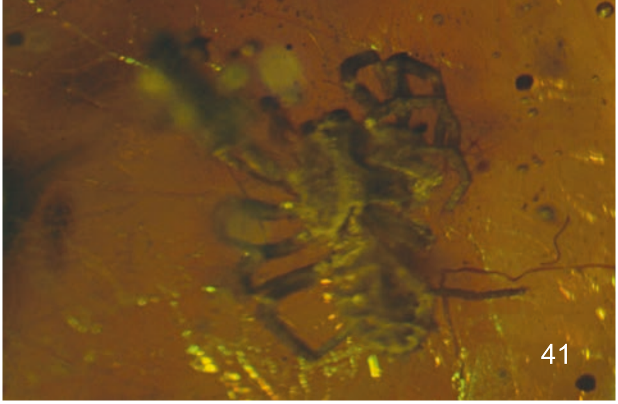
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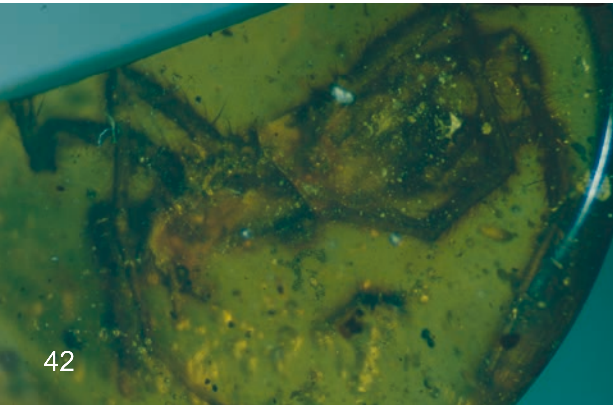
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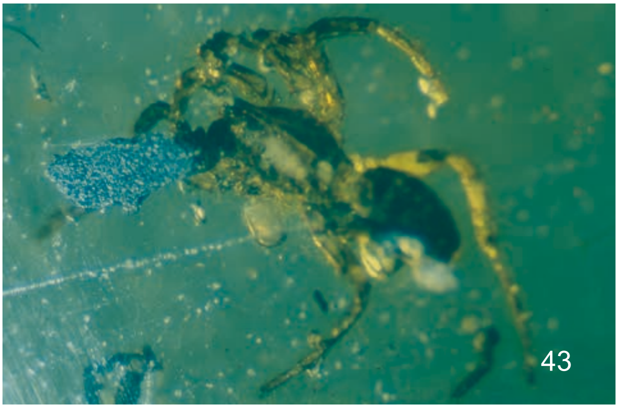
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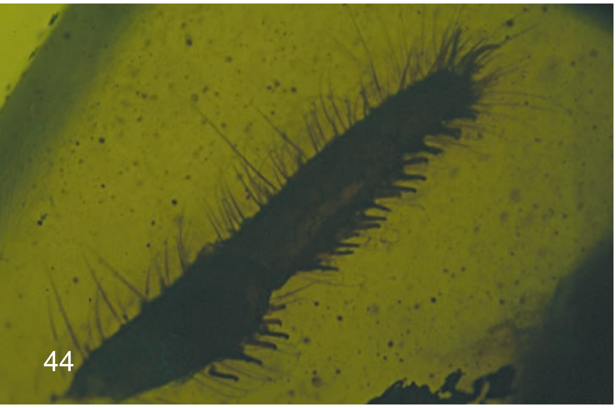
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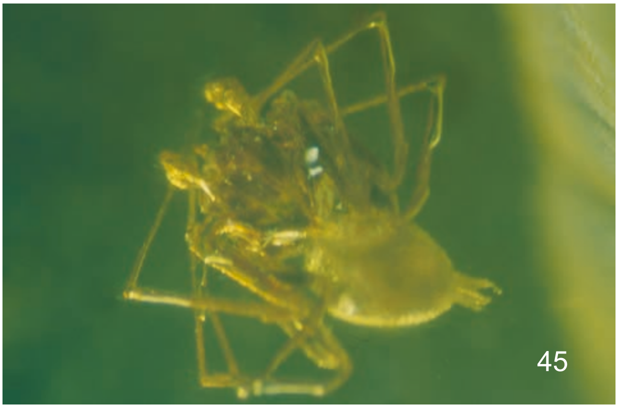
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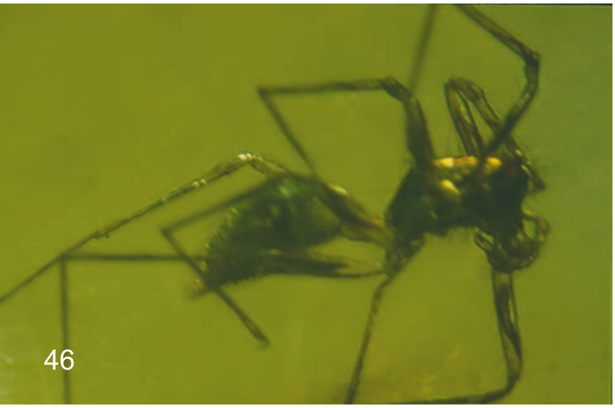
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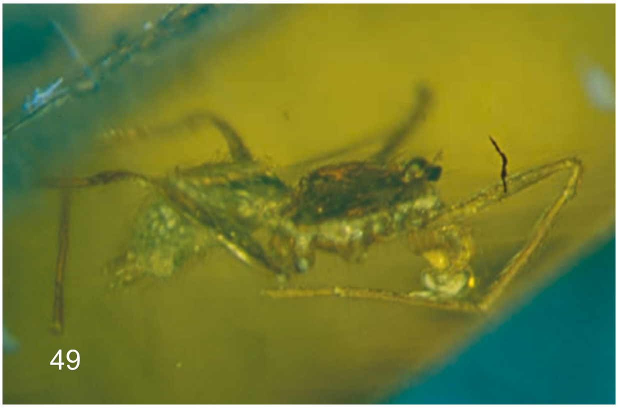
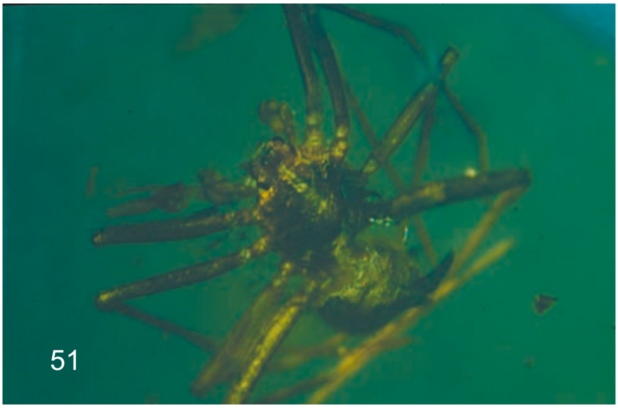
41) Mesothelae indet., juv., coll. PATRICK MÜLLER, body length 1.3 mm, dorsal aspect.

42) *Cethegoides patricki* **n. gen. n. sp.**, Mygalomorpha: Dipluridae, ♂ in a muddy piece of amber, body length 5 mm, rigth aspect of the spider.

43) Mygalomorpha indet., juv., coll. PATRICK MÜLLER, body length 2.1 mm, dorsal aspect.

44) ?Mygalomorpha (Ctenizidae?) indet., ?♀ F3009/BU/CJW, distal parts of a leg, lateral aspect.





45) *Burmorchestina acuminata* **n. sp**, Oonopidae, ♂, body length 1.1 mm, dorsal aspect.

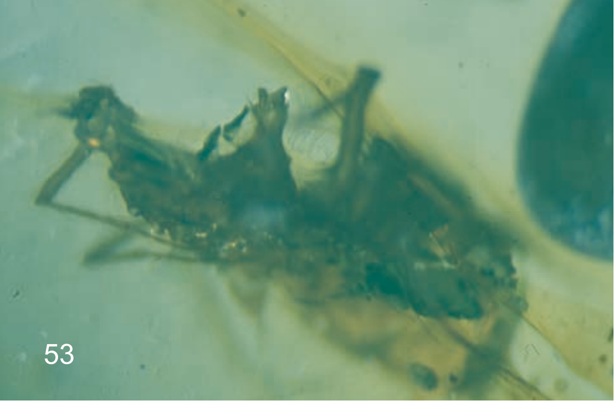
46) *Burmorchestina biangulata* **n. sp**., Oonopidae, ♂, body length 1.4 mm, lateral aspect.

47-49) *Burmorchestina plana* **n. sp**., Oonopidae, ♂ holotype, body length 1.0 mm; 47) ventral aspect; 48) dorsal aspect; 49 lateral aspect.

50) *Burmorchestina* ?*pulcher* WUNDERLICH 2008, Oonopidae, ♂ F2019/BU/CJW, hyphae on the deformed opisthosoma.

51) *Burmorchestina pulcheroides* **n. sp**., Oonopidae, ♂, body length 1.1 mm, dorsal aspect.

52) *Burmorchestina tuberosa* **n. sp**., Oonopidae, ♂, body length 1.2 mm, dorsal aspect.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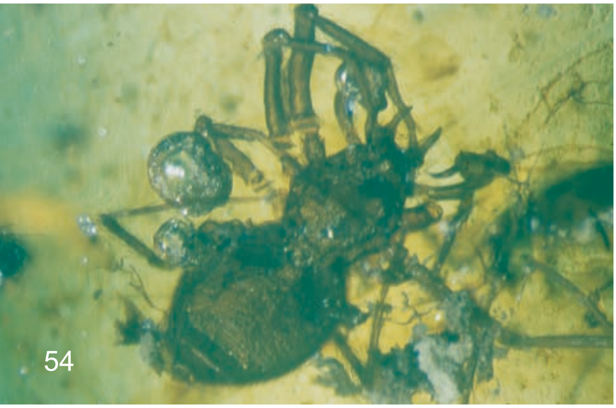
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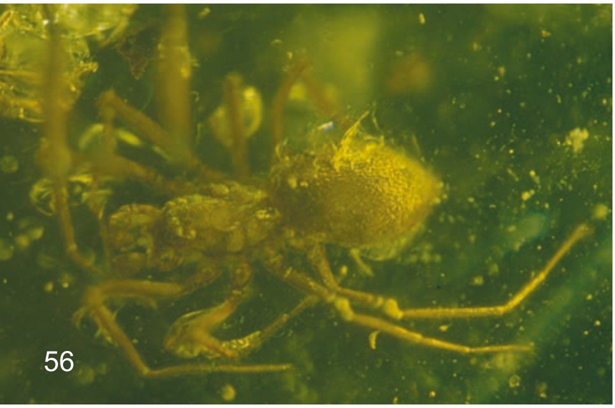
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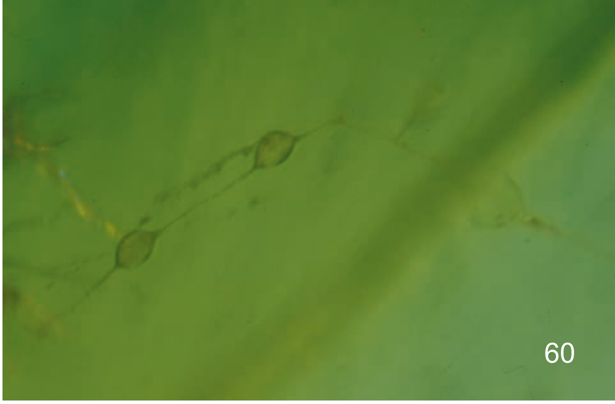
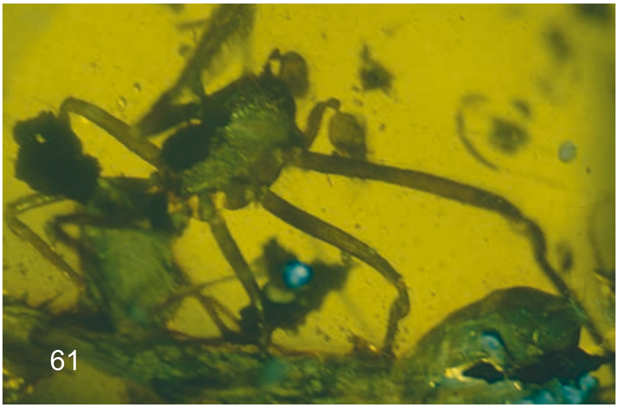
58

53) *Brignoliblemma bizarre* **n. gen. n. sp.**, Tetrablemmidae, ♂, body length 1.5 mm, anterior-lateral aspect. Note the distinctly elevated and horny dorsal outgrowth of the prosoma.

53a) *Brignoliblemma nala* **n. gen. n. sp.**, Tetrablemmidae, ♂, body length 1.4 mm, dorsal and slightly lateral aspect. Bubbles are preserved in front of the spider.

54) *Brignoliblemma paranala* **n. gen. n. sp.**, Tetrablemmidae, ♂, body length 1.4 mm, ventral aspect of the spider.





55) *Cymbioblemma corniger* **n. gen. n. sp.**, Tetrablemmidae, ♂, body length 2.2 mm, dorsal aspect of the spider.

56) *Eogamasomorpha hamata* **n.sp.**, Tetrablemmidae,♂, body length 1.0 mm, dorsal aspect.

57) ?*Eogamasomorpha unicornis* **n. sp.**, Tetrablemmidae, ♂, body length 1.1 mm, dorsal aspect of the spider.

58) ?*Eogamasomorpha* sp. indet., Tetrablemmidae, ♂ F2824/BU/CJW, body length 0.95 mm, dorsal aspect of the spider.

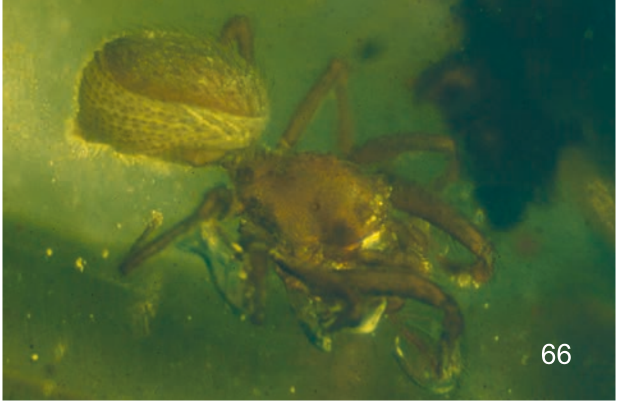
59) ?*Eogamasomorpha* sp. indet., Tetrablemmidae, ♀ F3002/BU/CJW, ventral aspect.

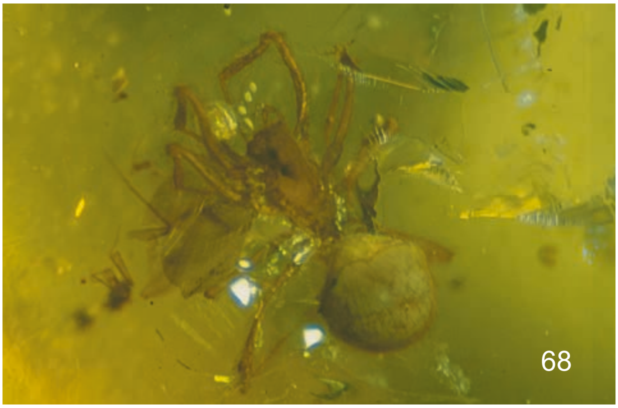
60) Capture web threads with sticky droplets near ?*Eogamasomorpha* sp. indet., Tetrablemmidae, ♀ F3002/BU/CJW.

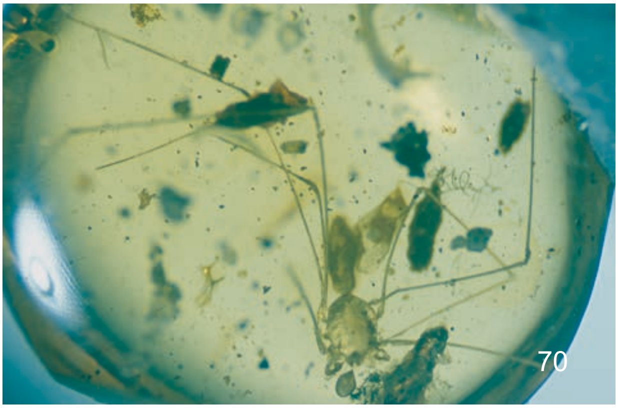
61) *Furcembolus grossa* **n. sp.**, Tetrablemmidae, ♂, body length 4 mm, dorsal aspect.

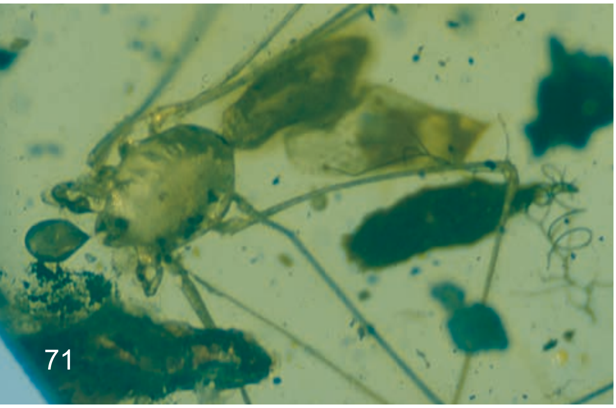
62) *Furcembolus longior* **n. sp.**, Tetrablemmidae, ♂, body length 3 mm, lateral aspect.

63-64: *Longissithorax myanmarensis* **n. gen. n. sp.**, Tetrablemmidae, ♂, body length 1.1 mm; 63) dorsal aspect; 64) ventral aspect.







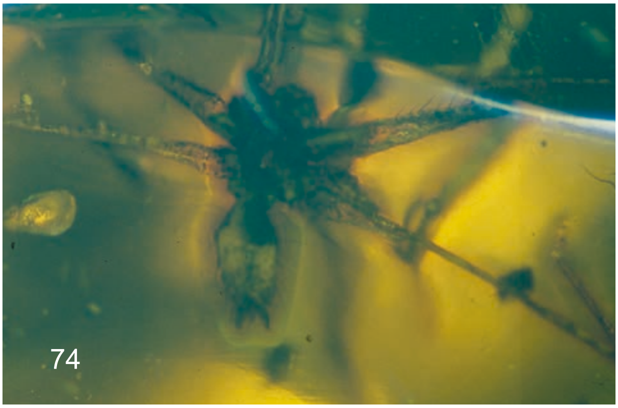


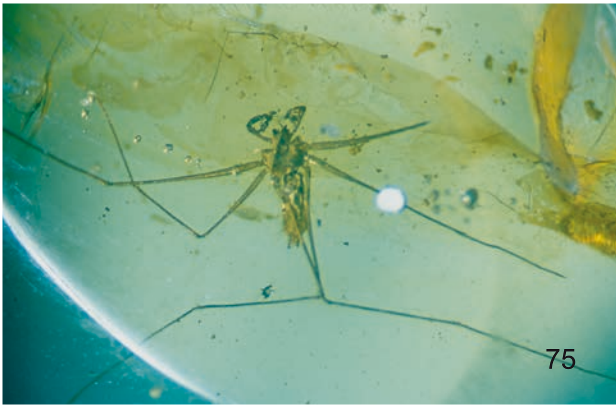
65) *Longithorax furca* **n. gen. n. sp.**, Tetrablemmidae, ♂, body length 1.6 mm, dorsal aspect.

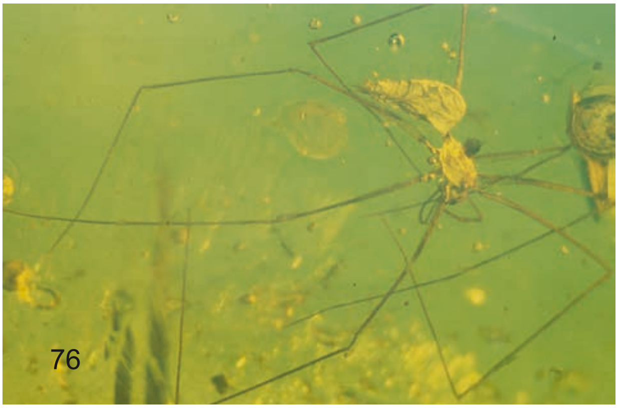
66-67: *Palpalpaculla pulcher* **n. sp.**, Tetrablemmidae, ♂, body length 2.2 mm; 66) dorsal aspect; 67) ventral aspect.

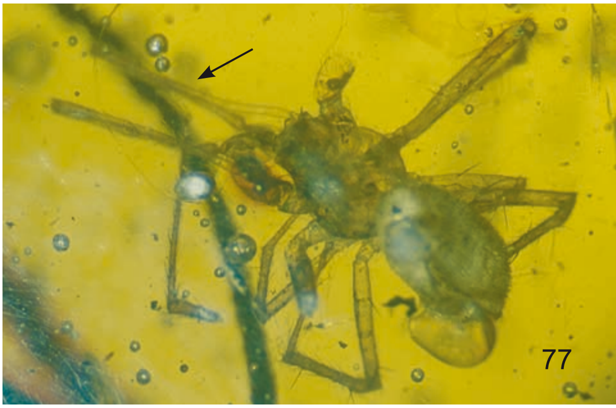
68) Tetrablemmidae indet., ♀ F2938/BU/CJW, body length 2.2 mm, dorsal aspect.

69) *Eopsiloderces* ?*filiformis* (WUNDERLICH 2012), Eopsilodercidae, ♂ F2891/BU/CJW, body length 1.6 mm, dorsal aspect.









70-71: *Praepholcus huberi* **n. gen. n. sp.**, Eopsilodercidae, ♂, body length 2.5 mm; 70) dorsal aspect of the spider; 71) dorsal aspect of the enlarged body.

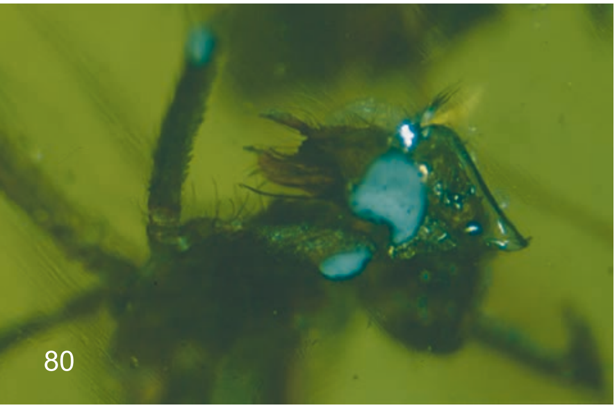
72-73: *Loxoderces longicymbium* **n. gen. n. sp.**, Eopsilodercidae, ♂; 72) holotype, body length 1.3 mm, dorsal-anterior aspect; 73) paratype F3033/BU/CJW, body length 1.8 mm, anterior-dorsal aspect.

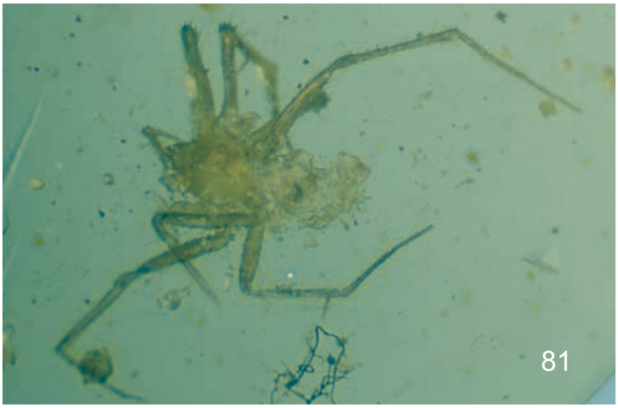
74) *Aculeatosoma pyritmutatio* **n. gen. n. sp.**, Psilodercidae, badly preserved ♂, body length 1.3 mm, ventral aspect.

75) *Priscaleclercera paucispina* **n. gen. n. sp.**, Psilodercidae, ♂, body length 1.6 mm, dorsal aspect.

76) *Priscaleclercera* sp. indet., Psilodercidae, ♀ F3008/BU/CJW, body length 1.7 mm, lateral aspect.

77) *Longissipalpus cochlea* **n. sp.**, Mongolarachnidae, ♂, body length 2.5 mm. The arrow points to the very long right pedipalpus.





78) Pholcochyrocer altipecten **n. sp.**, Pholcochyroceridae, ♂ in a muddy piece of amber, body length 2.8 mm, dorsal aspect.

79-80: Palaeoleptoneta crus **n. sp.**, Leptonetidae, ♂, body length ca. 1.5 mm; 79) dorsal-left aspect of the spider; 80) retrolateral aspect of the left pedipalpus which is partly cut off.

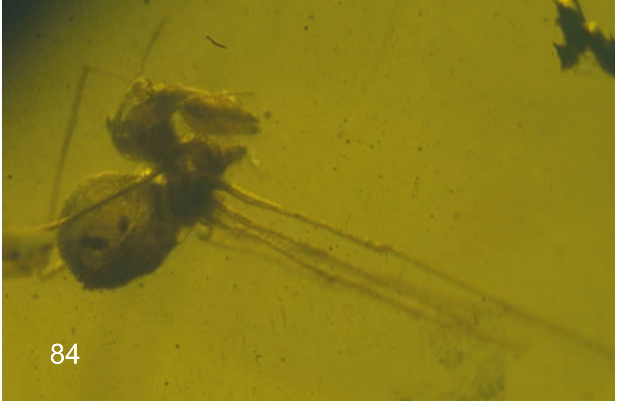
81) Palaeoleptoneta sp. indet., Leptonetidae, ?ad. ♀ F2926/BU/CJW, which is partly decomposed, body length 1.5 mm, dorsal aspect.

82) Burmesarchaea alissa **n. sp.**, Archaeidae, ♂, body length 2.2 mm, lateral aspect.

83) Burmesarchaea caudata **n. sp.**, Archaeidae, ♀, body length 2.8 mm, lateral aspect. A small fissure exists above the eyes. This species may represent a case of mimesis.

84) Burmesarchaea crassicaput **n. sp.**, Archaeidae, ♀ in a fairly muddy piece of amber, body length 2.1 mm, lateral aspect.

85) Burmesarchaea crassichelae **n. sp.**, Archaeidae, ♂, body length 2 mm, lateral aspect.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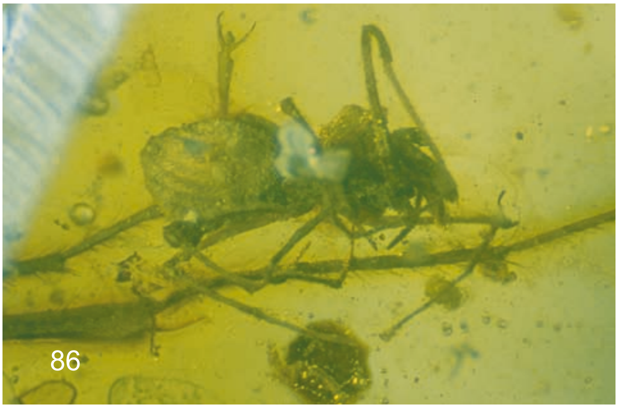
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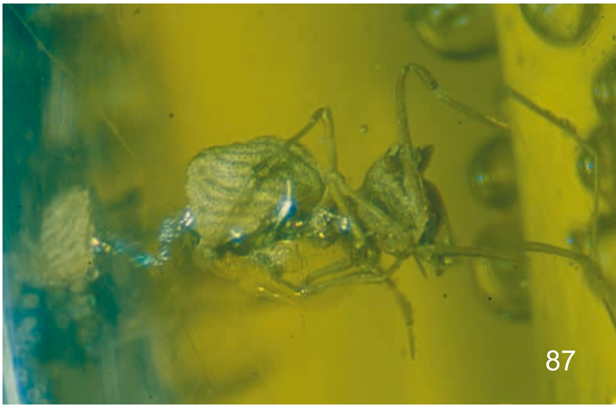
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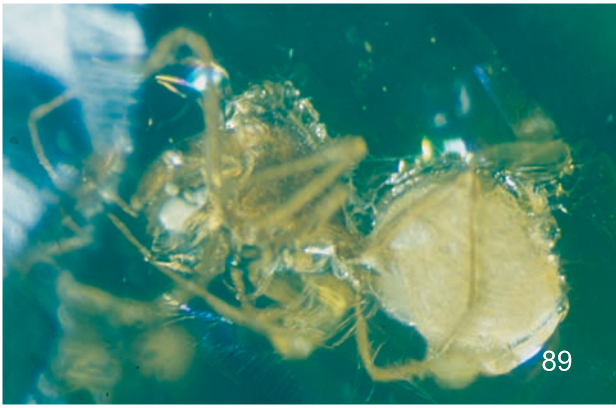

89

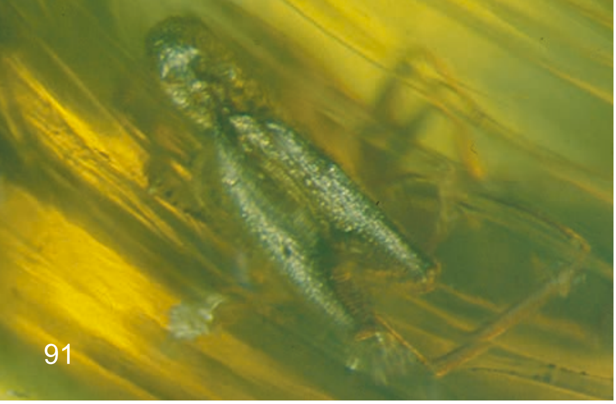
86) *Burmesarchaea gibber* **n. sp.**, Archaeidae, ♂, body length 1.9 mm, lateral aspect.

87-88: *Burmesarchaea gibberoides* **n. sp.**, Archaeidae, ♂, body length 1.9 mm, lateral aspect, enlarged in photo 88. The distal parts of the right pedipalpus are observable near the middle of the right femur I.

89) *Burmesarchaea gibbosa* **n. sp.**, Archaeidae, ♀, preserved with some fissures of the amber, body length 2.2 mm .

90) *Burmesarchaea longicollum* **n. sp.**, Archaeidae, ♀, body length 2.2 mm, lateral aspect.


90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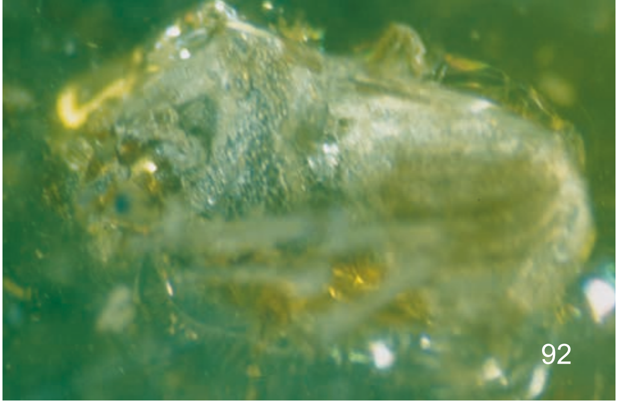
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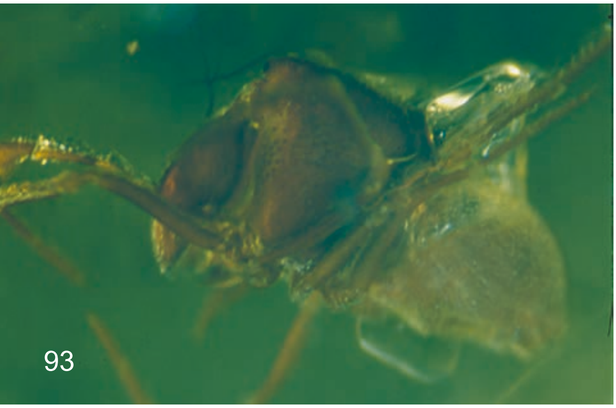
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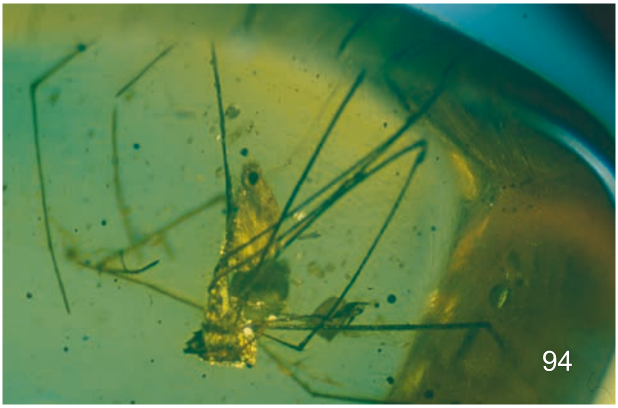
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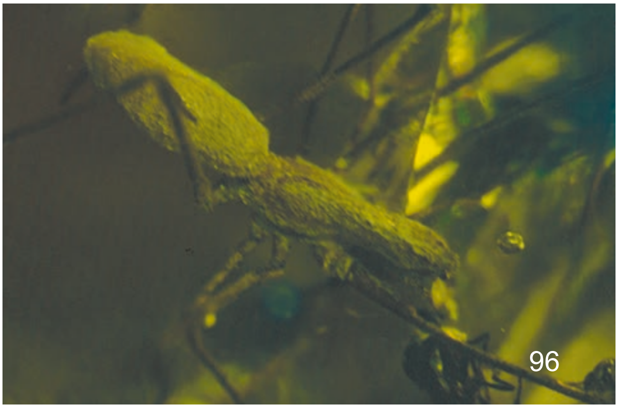
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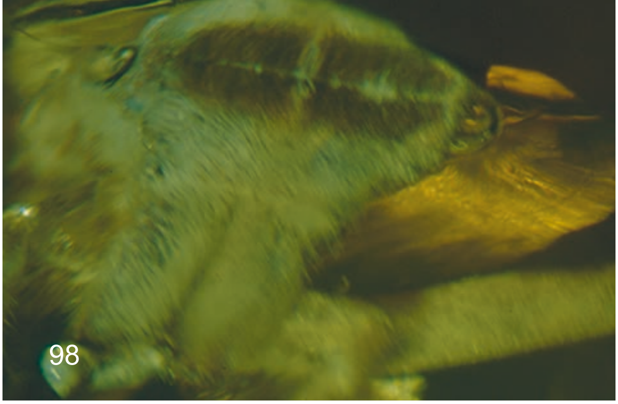
91) *Burmesarchaea propinqua* **n. sp.**, Archaeaidae, ♂, body length 1.9 mm, depressed between layers of the amber, anterior aspect.

92) *Burmesarchaea pustulata* **n. sp.**, Archaeidae, ♂, body length 1.6 mm, lateral aspect.

93) *Burmesarchaea quadrata* **n. sp.**, Archaeidae, ♂, body length 1.7 mm, lateral aspect. A bubble is preserved on the body.

94) *Eomysmauchenius dubius* **n. sp.**, Archaeidae, ♂, body length 2.3 mm, lateral aspect. The spider is darkened and deformed by heating and pressure of the amber. A piece of detritus is preserved behind the left pedipalpus dorsally of the prosoma.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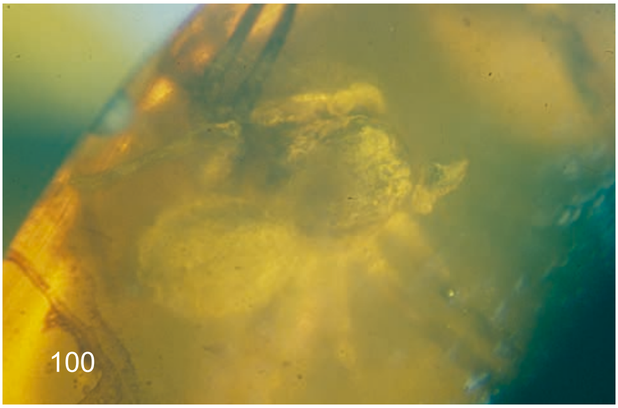
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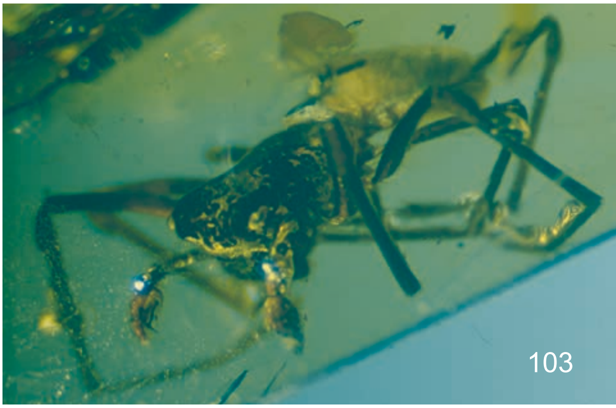

103

95-96 *Planarchaea oblonga* **n. sp.**, Archaeidae, ♀, body length 3.4 mm, dorsal-lateral aspect of the spider which is enlarged in photo 96). Note the extremely long legs; femur I is longer than the body. Two small Diptera are preserved in front of the prosoma.

97-98: *Albiburmops annulipes* **n. gen. n. sp.**, Lagonomegopidae, ♂, body length 3.5 mm; 97) lateral aspect with a wasp in front of the spider; 98) anterior aspect. Note the large eyes in the lateral position and the field of dense white and black clypeal hairs.

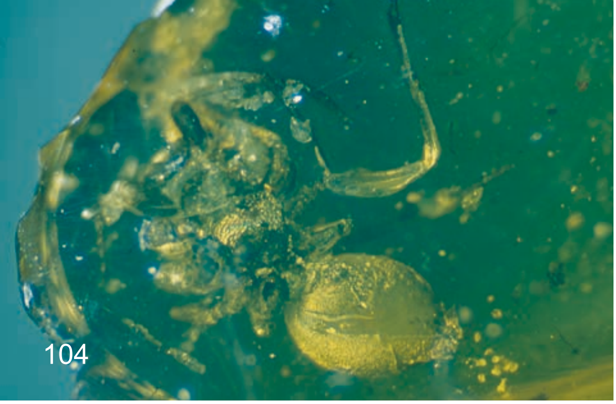
99) *Lineaburmops hirsutipes* WUNDERLICH 2015, Lagonomegopidae, ♂ holotype, body length 5 mm, dorsal aspect.

100) *Parviburmops brevipalpus* WUNDERLICH 2015, Lagonomegopidae, ♂ in muddy amber, body length 3.2 mm, dorsal aspect.

101) ?*Parviburmops bigibber* **n. sp.**, Lagonomegopidae, ♂, body length 3.5 mm, lateral aspect. Note the large eyes in the lateral position.

102) ?*Paxillomegops cornutus* **n. sp.**, Lagonomegopidae, ♂, body length 4 mm , dorsal aspect.

103) *Planimegops parvus* **n. gen. n. sp.**, Lagonomegopidae, ♂, body length 2.8 mm, anterio-lateral aspect.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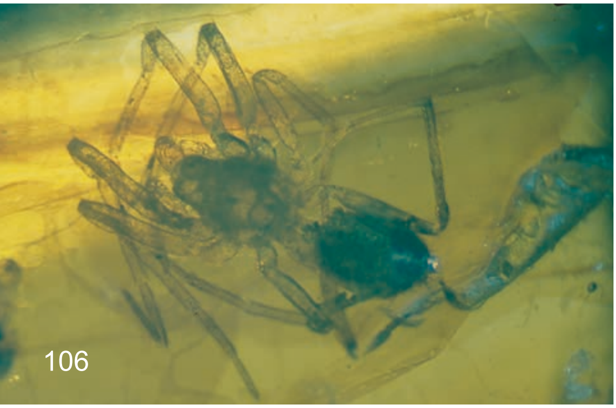
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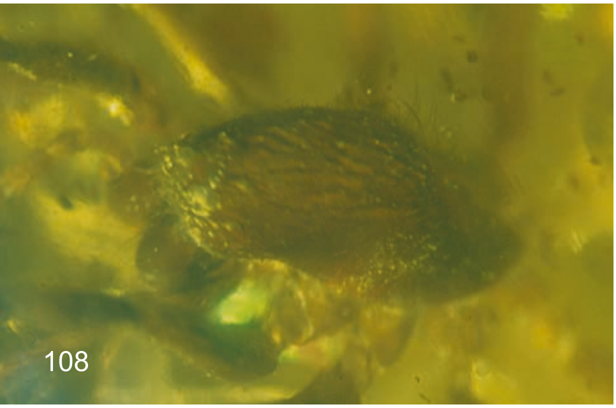
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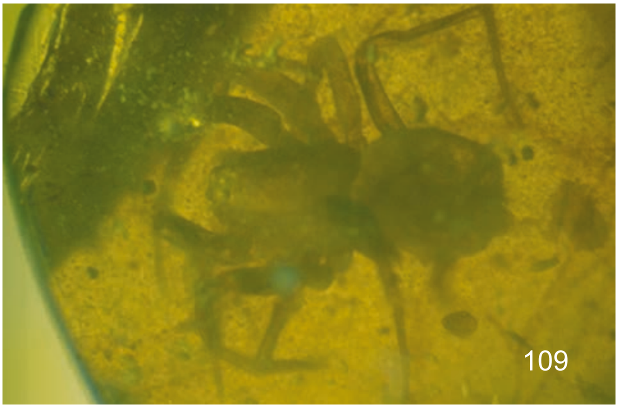

109

104) *Spatiator* sp. indet., Spatiatoridae, ♀, body length 2.8 mm, ventral aspect of the spider. The prosoma is partly hidden.

105) *Vetiator* (?)*gracilipes* WUNDERLICH 2015, Vetiatoridae, ♂ F2954/BU/CJW, body length 2.1 mm, dorsal aspect.

106) *Pekkachilus vesica* **n. gen. n. sp.**, Vetiatoridae, ♂, body length 2.2 mm, dorsal aspect.

107) ?*Pekkachilus* sp. indet., ♀ F3053/BU/CJW, Vetiatoridae, body length 2.8 mm. Note the drop of blood (remains of a leg) below the middle of the photo.

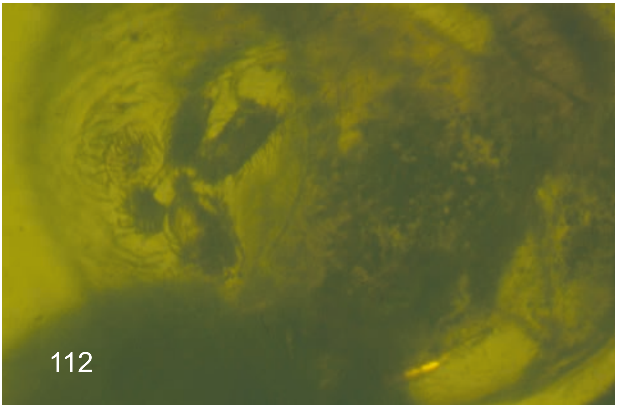
108) *Micropalpimanus poinari* WUNDERLICH 2008, Micropalpimanidae, ♀ F2871/BU/CJW, body length 3 mm, dorsal aspect.

109) Palpimanidae indet., Palpimanidae, ?ad. ♀ in muddy amber, body length 2.6 mm, dorsal aspect.

110) *Deinopedes tranquillus* **n. gen. n. sp.**, ?Deinopidae, badly preserved ♂ in a muddy piece of amber, body length 6.5 mm, dorsal-anterior aspect.


110


111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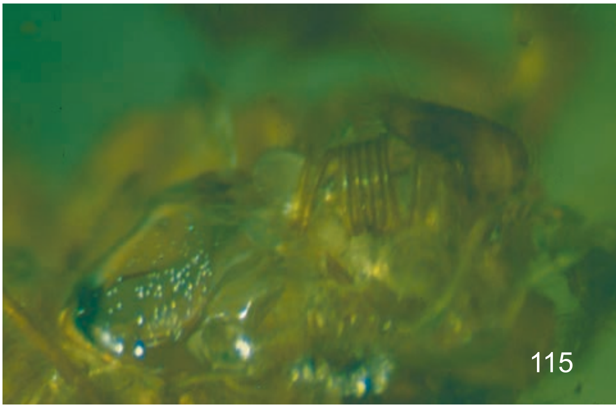
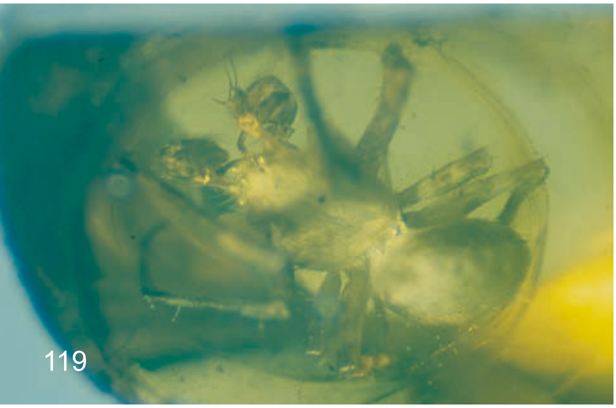

115

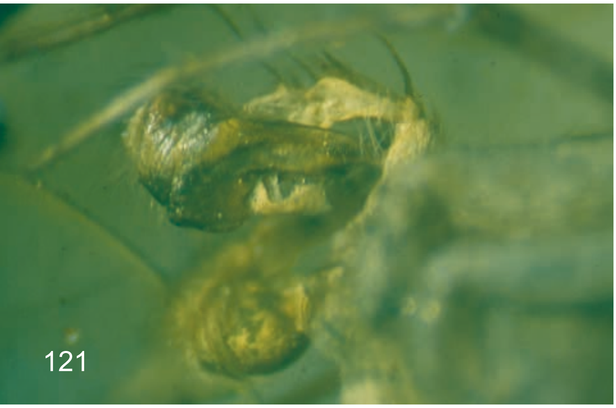
111-112: Burmadictyna sp. indet., Burmadictynidae, ♀ F2959/BU/CJW, body length 2.8 mm; 111) dorsal aspect of the spider; 112) ventral aspect of the opisthosoma, spinnerets and cribellum.

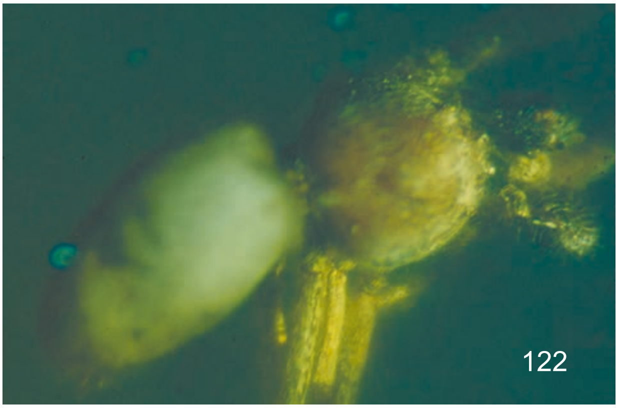
113-115: Burmadictyna postcopula **n. sp.**, Burmadictynidae, ♂, body length 2.7 mm; 113) dorsal aspect of the spider; 114) left metarsus IV. Note the long calamistrum; 115) retrolateral aspect of the left pedipalpus. Note the spiral embolus in the middle.

116) Eodeinopis longipes **n. gen. n. sp.**, Uloboridae, ♂, body length 1.7 mm, dorsal aspect.


116





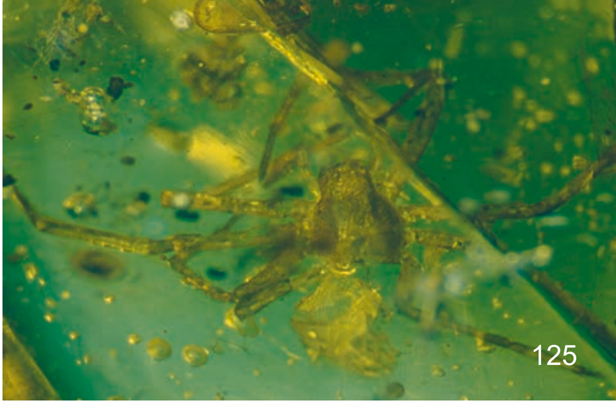


117-118: *Kachin fruticosoides* **n. gen. n. sp.**, Uloboridae, ♂, body length 2.7 mm; 117) dorsal aspect of the spider; 118) ventral aspect of the spider.

119-121: *Kachin fruticosus* **n. gen. n. sp.**, Uloboridae, ♂, body length 2.5 mm; 119) dorsal aspect; 120) lateral aspect; 121) retrolateral aspect of the large left pedipalpus in the middle of the photo.

122) *Furculoborus patellaris* **n. sp.**, Uloboridae, ♂, body length 2 mm, dorsal aspect of the body.


124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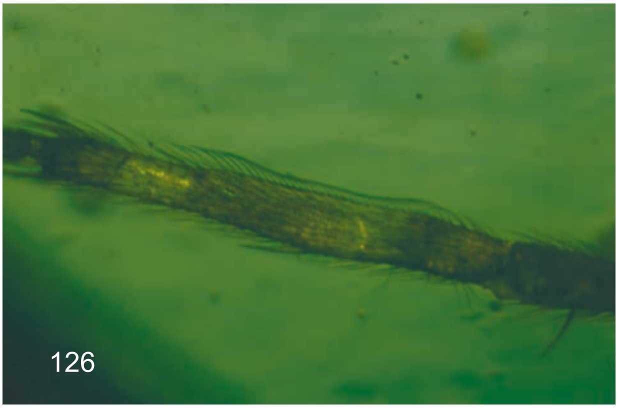
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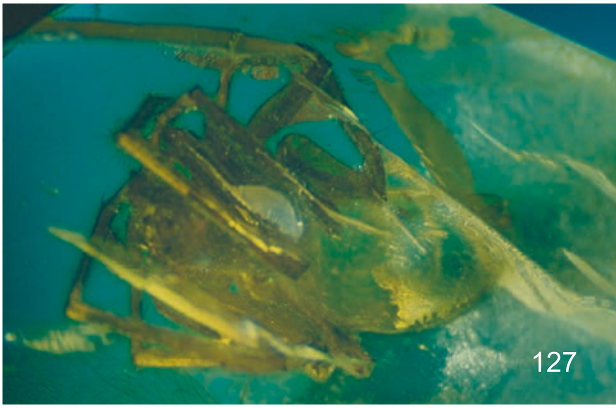
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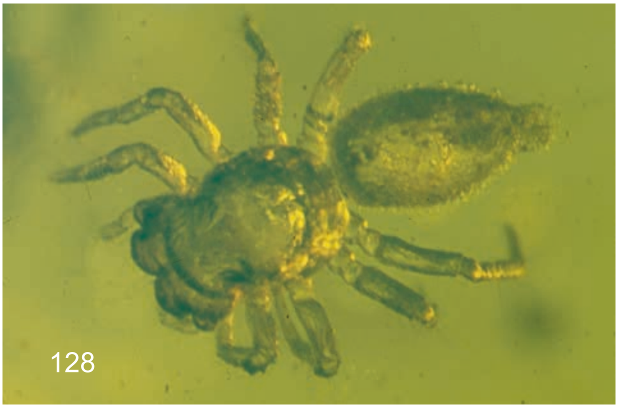
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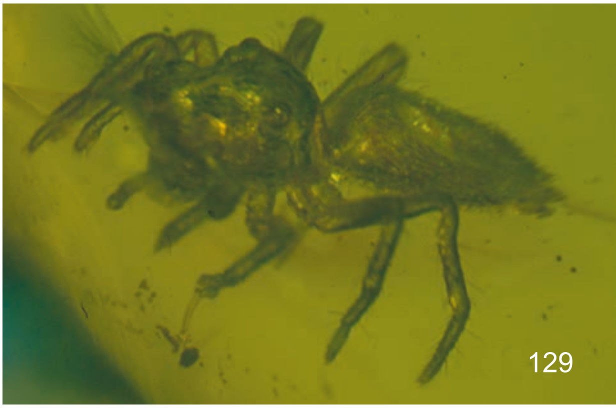
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123-124: *Praearaneus bruckschi* **n. gen. n. sp.**, Praearaneidae **n. fam.**; 123) ♂ holotype, body length 5.5 mm, dorsal aspect. Few large bubbles exist and a small bubble (not an eye!) near the middle of the prosoma; 124) paratype, subad. ♂, body length 6.5 mm, dorsal aspect. The distal part of the opisthosoma is cut off.

125-126: ?*Praearaneus* sp. indet., Praearaneidae **n. fam.**, juv. ♀ F3064/BU/CJW, body length 3.8 mm; 125) dorsal aspect of the spider which opisthosoma is dissected; 126) prodorsal aspect of the right metatarsus IV. Note the long calamistrum.

127) Araneae indet, quite unsure member of the RTA-clade, ♂ F3021/BU/CJW, body length 3.6 mm, dorsal aspect of the spider. Burmite.

128-129: ?*Gorgopsina scharffi* **n. sp.,** Salticidae, juv., body length 2 mm. Fairly muddy Ethiopian amber; 128) dorsal aspect of the spider; 129) dorsal-lateral aspect.


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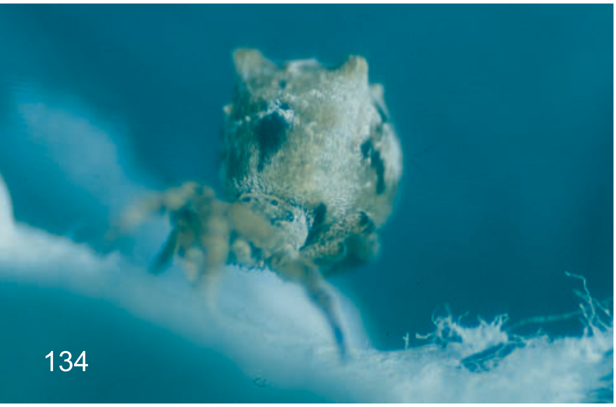
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130) *Adonea algarvensis* **n. sp.**, Eresidae, dorsal aspect of 2♂ in alcohol, body length 5 and 7 mm. Extant, Europe, S-Portugal.

131) *Eresus* sp. indet., Eresidae, ♂ in alcohol, dorsal aspect, body length 9 mm. Extant, S-Europe.

132-134: *Hyptiotes flavidus* (BLACKWALL 1862), Uloboridae;132) ♂ ♀ in alcohol, body length ♀ 3.2 mm, dorsal aspect; 133-134) lateral and anterior aspect of an egg-bearing ♀ in alcohol body length 3.2 mm. Extant, SW-Germany, CJW.

135) *Myanmardictyna longifissura* **n. gen. n. sp.**, Dictynidae, ♂ in alcohol, body length 2.2 mm, dorsal aspect. Extant, Myanmar.

WANTED 1 million reward!

– Because of offence against humanity and violation of international law –

DEAD (killed by drones or Black Widows?) or – better – ALIVE for keeping in prison:

- BASCHAR AL ASSAD, president of Syria (1),
- XI JINGPING, president of the People's Republic of China (2),
- BENJAMIN NETANJAHU, prime minister of Israel (3),
- BARACK OBAMA, president of the United States of America (4),
- WLADIMIR PUTIN, president of Russia (5),
- KIM JONG UN, dictator of North Corea (6).

This quite incomplete premium list can easily be prolonged.

---

(1) ASSAD destroyed a large part of Syria, his bombs and poison gas killed ten thousands of humans, millions of people are actually homeless, refugees in various countries. (In contrast to the remaining countries in question fortunately could not develop atomic bombs in Syria).

(2) According to Amnesty International more than two thirds of the executions worldwide are enforced in China, thousands every year, most often not justified, organs are removed (!). The Chinese administration occupied Tibet, overcrowded the country (nowadays more Han Chinese than Tibetians live in Lhasa), numerous Tibetians were killed by Chinese soldiers, Tibetian culture and language are suppressed. Critical Chinese journalists are kept in prison, the secret number of executions is apparently very high, great parts of the environment are destroyed. The Uigures are strongly suppressed. Xi Jingping in his function as president is regarded as being responsible among others for this situation in China.

(3) This man and his administration are responsible for the occupation of large parts of the land of Palestine people, for killing numerous inhabitants, destroying their houses, stealing their sweet water, turning out millions of people (actually most (!) inhabitants of Jordan are refugees from Palestine); these criminal activities are done contrary to various UN-resolutions (!).

(4) He is responsible for the death of more than two thousand civilians including numerous children who were killed by US-drones. As it is known, every Tuesday OBAMA personally gives the killing orders without any court procedure. Remarkably this smart

and clever man never gave back his Nobel Peace Prize as he was required by me among others. The US administration supports a secret army and allows tortures in hidden prisons in several countries, both not under the supervision of parliament (*). In my opinion it is a shame that „God's own country“, has decayed to an undemocratic and dangerous oligarchy: Trusts and billionaires rule the country and critical intellectuals like N. CHOMSKY have been kept in prison.

(*) See publications by N. CHOMSKY like (1999): The Umbrella of U.S. Power. (In German: „Der Schutzschirm der Amerikanischen Macht“ (2013); info@lowellfactory-books.de) or CHOMSKY & VLTCHEK (2014): Der Terrorismus der westlichen Welt.
See also D. GANSER (2016): Illegale Kriege.

(5) The property of this autocrat is allegedly at least 40 billion US dollars. (So he must be a hard worker and possess numerous lives!). He eliminated the largest part of the free media in Russia, may be responsible for the death of several oppositional persons and now has his own war in Syria, bombing, killing civilians, and supporting the monster ASSAD.

(6) Under the regime of this brutal dictator the army was strongly expanded although numerous people were and are starving, an unknown number was tortured or killed. Atomic bombs were developed and certain countries like the USA and South Korea were threatened with a nuclear preventive strike by the political leader.

In my opinion the uncontrolled and improper use of the vast power by certain political leaders – and their political/economic/military systems – seriously threaten democratic structures and even the human way of civilisation as well as the existence of mankind at all and an intact environment. As can be seen, e. g. on the Internet, numerous people regard the political leaders in question – and their supporters – as criminals.

Is it not a shame that mankind is ruled by numerous dangerous, incompetent, corrupt, criminal and murderous persons?

THESE DESTRUCTIVE MACHINATIONS (see above) CAN NOT BE ACCEPTED AND ALL HUMANS ARE CALLED TO PROTEST AGAINST THEM!

Apparently it is a long stretch to a fundamentally alternative way of democratic life considering the unjustified and illegitim rule over people by oligarchs, imperialists and capitalists. Weakly controlled political regimes may be predestined to produce „inhuman monsters“ as leaders. Probably ideas like communalism and direct democracy in the sense of MURRAY BOOKCHIN and the anarcho-syndicalism in the sense of NOAM CHOMSKY may point to a useful future direction: Scepticism concerning domination, unjustified authority and hierarchy. Really free media in combination with more referendums may be progressive.

Personal responsibility of VIPs in a mass society is very important, and their realization is an unsolved problem.

JW

P. 213, fig. D: See the remarks below the family Micropalpimanidae in this volume.

P. 177, no. 4 – -: Tibia I USUALLY thickened...

P. 213: (a) A long, slender and pointed labium exists not only in the Spatiatoridae and Stenochilidae but also in certain Palpimanidae. (b) In contrast to the Lagonomegopidae tarsal trichobothria are absent in the Micropalpimanidae (see fig. 267 p. 393; long sensory hairs of another kind exist), spatulate hairs of the legs I and II exist and the eyes are quite different. Therefor the family Micropalpimanidae is transferred from the Lagonopid branch to the Archaeid branch, as member or as sister of the Palpimanid subbranch (in contrast to the palpimanid subbranch the posterior spinnerets are not reduced).

P. 287 (fig. G): (a) Existence of cheliceral stridulatory files within the Hypochilomorpha s. l. apparently only in the Austrochilomorpha. – (b) Origin of feathery hairs in the Cleistospermiata? I found this type of hairs in the Austrochilidae but not in the Gradungulidae and Hyphochilidae, and also not in the Filistatidae and Synspermiata.

P. 304 (Diagnosis): The numbers of the figs. are 326-327 but not 226-227.

P. 378: The number of the fig. in the middle left (153) has erroneously placed in the middle of the tab. below.

P. 410, fig. 346: The „C“ was not printed at the end of the line in front of the cribellum.

P. 410: (a) Araneae: If the Uraraneida is regarded as a suborder its sister group should be called Araneida. – (b) Opiliones: Recently a further and extinct suborder has been described: the Tetrophthalmi GARWOOD et al. 2014. – (c) Ricinulei: The correct spelling of the first suborder is Primoricinulei.

P. 416: Add to the plesiomorphies of Ricinulei and Trigonotarbida: „opisthosomal scuta dorsally divided longitudinally“.

P. 417: Diagnosis: (a) The opisthosomal scuta may be divided; (b) the pedipalpal articles are strongly thickened.

P. 434: In the legend the no. „5)“ has to add before „dorsal-right aspect of the flagellum...“.

P. 447: *Gnaphosa monteserra* has turned out to be a junior synonym of *G. artaensis* WUNDERLICH 2011.

TEN PAPERS ON FOSSIL AND EXTANT SPIDERS

BEITR. ARANEOL., 10 (2017)

Joerg Wunderlich (ed.)

During about 400 million years probably several million species of spiders inhabited all continents of the earth (probably more than 100 000 species live today, ca. 46 000 species have already been described). This volume focuses on the ancient spider fauna which existed in the Burmese amber forest (today: Myanmar) 1 million years ago in the Mid Cretaceous. The existence of questionable "missing links" of higher spider taxa and the reasons for numerous extinctions – even of numerous families – are discussed.

The remaining papers treat few extant spiders as well as spiders in Ethiopian and Baltic amber. Furthermore a pictured key to Mesozoic and extant arachnid orders is provided.

Orders of this book directly to the author:

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