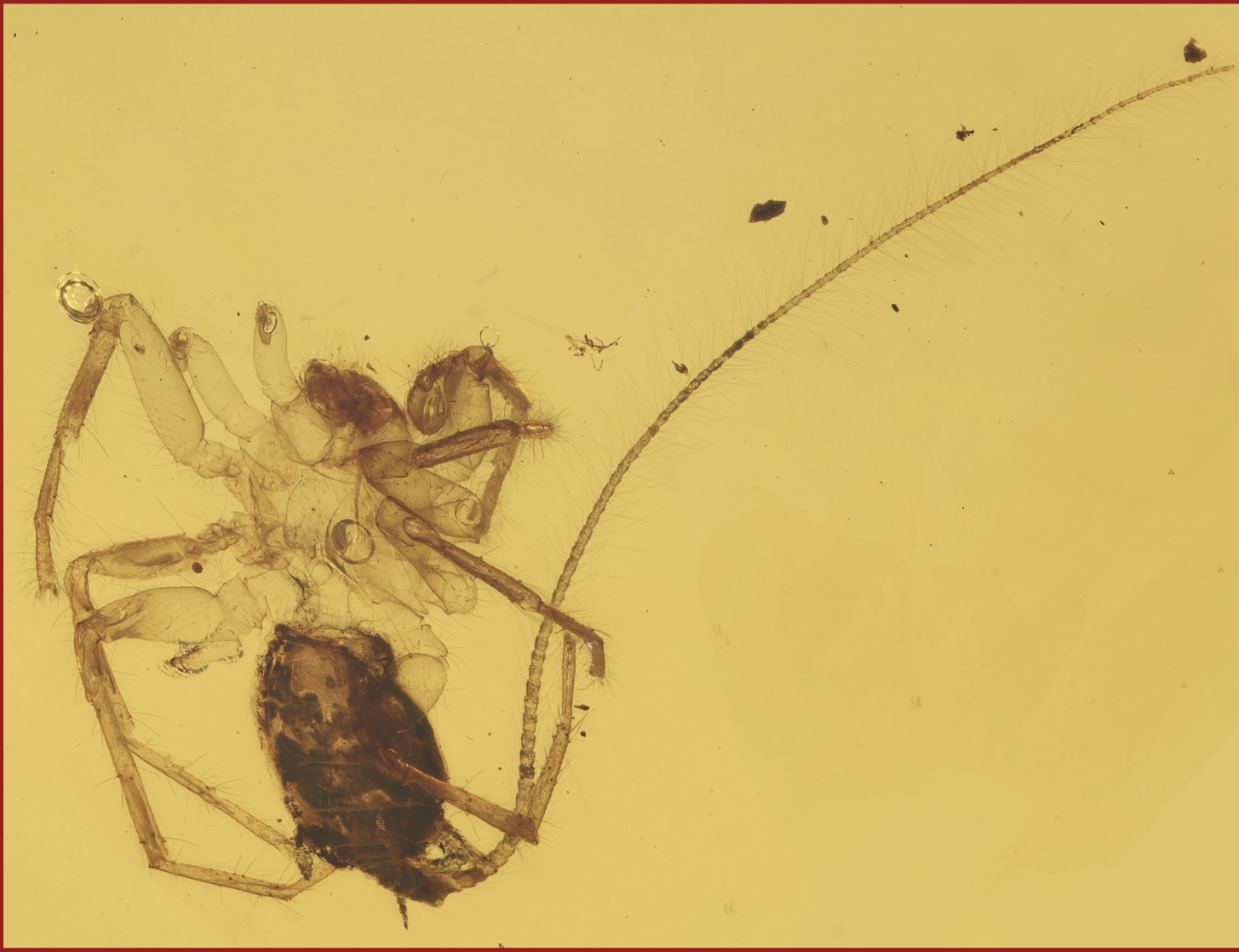
BEITR. ARANEOL., 17 (2024) JOERG WUNDERLICH

SIX PAPERS ON TAXONOMY AND EVOLUTION OF FOSSIL AND EXTANT SPIDERS (ARANEIDA)



BEITR. ARANEOL., 17 (2024)

SIX PAPERS ON TAXONOMY AND EVOLUTION OF FOSSIL AND EXTANT SPIDERS (ARANEIDA)

BEITRAEGE ZUR ARANEOLOGIE (BEITR. ARANEOL.), 17 (2024: 1-103)

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Photo on the front cover: Tailed fossil spider *Chimerarachne* sp. (family Chimerarachnidae) in 100 million years old amber from Myanmar (Burma), adult female, body length without tail ca. 2.7 mm, ventral aspect. Coll. JW Nr. F3874. Foto A. Beigel.

Acknowledgment: I thank very much my wife Ruthild Schöneich for having so much patience and for correcting large parts of the manuscript.

In this volume 17 of the Beitr. Araneol. (2024) six papers by Jörg Wunderlich on extant and fossil spiders are united.

The **material** is stored in the collection of J. Wunderlich (CJW) and will most probably be given to the Leibnitz Institution Hamburg, Danilo Harms, Museum of Nature (Zoology), and Ulrich Kotthoff, Palaeontology.

BEITR. ARANEOL., 17 (2024)

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BEITR. ARANEOL., 17 (2024: 4-6)

PSEUDOTAPINOPA COTOPAXI N. GEN. N. SP. (ARANEIDA: ARANEAE: LINPHIIDAE) FROM ECUADOR

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Abstract: *Pseudotapinopa cotopaxi* **n. gen**. **n. sp**. (Araneida: Araneae: Linyphiidae) from Ecuador is described by the male sex.

Acknowledgement: I thank Gustavo Hormiga very much for helpful remarks and hints regarding relevant papers of linyphiid taxa from South America.

Pseudotapinopa n. gen.

Etymology: The name of the new genus refers to its seemingly relationships to the genus *Tapinopa* WESTRING 1851 and pseudes (gr.) = false.

Type species (by monotypy): *Pseudotapinopa cotopaxi* n. sp.

The gender of the name is feminine.

Diagnostic characters (♂; ♀ unknown): Clypeus short, only as long as the diameter of an anterior median eye, three large teeth at each of the anterior and posterior margin of the fang furrow (fig. 1); pedipalpus (figs. 2-5): Tibia long, ventrally not bulging, bearing a small blunt prodorsal-apical apophysis, cymbium with a divided dorsal-basal outgrowth which is directed basally, paracymbium quite long, most sclerites of the bulbus in an unusual distal position, embolus hidden in the not expanded sclerites (fig. 5).

Relationships: In some respect *Pseudotapinopa* is similar to *Tapinopa* WESTRING 1851 – the clypeus is also quite short, the anterior margin of the fang furrow bears large teeth and the cymbium bears a large dorsal-basal outgrowth – but the anterior median eyes are distinctly the largest in *Tapinopa*, the teeth of the posterior margin of the fang furrow are small, the pedipalpal tibia is ventrally bulging and an apophysis is absent, the cymbial outgrowth is directed forewards, the shape of the paracymbium and the sclerites of the bulbus (and their position as well) are quite different.

Distribution: Ecuador.

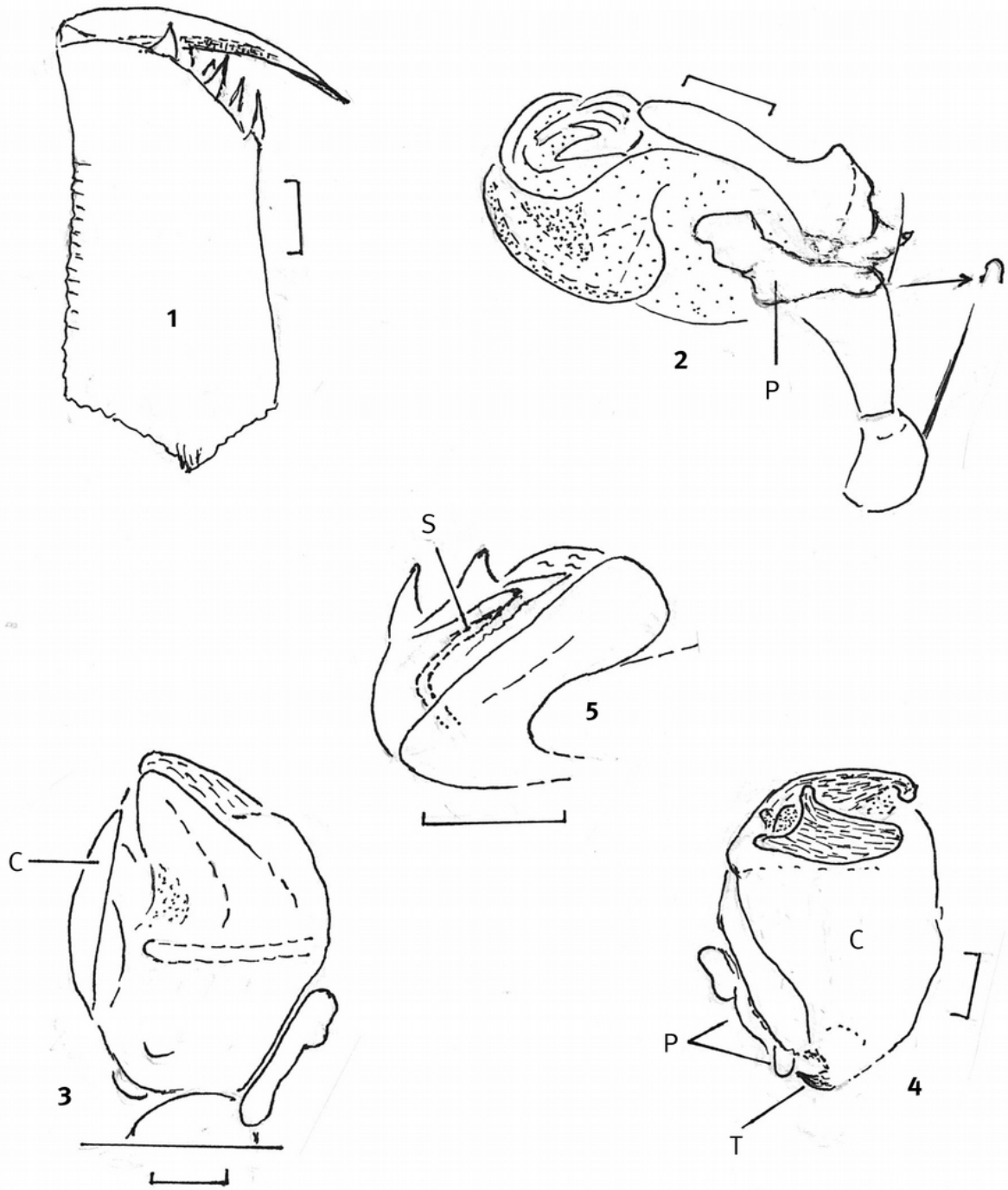
***Pseudotapinopa cotopaxi* n. gen. n. sp**. (figs. 1-5)

Etymology: The name of the species refers to the place of discovery of the present holotype near the base of the volcano Cotopaxi in Ecuador.

Material: Ecuador, few km south of the base of the volcano Cotopaxi, 2♂ JW beaten from a bush, leg. in VIII 1979; holotype R306/JW, paratype (right pedipalpus lost, left chelicera and left pedipalpus stored in a separate small tube), R307/CJW. - Notes: both males are strongly bleached; therefore the structures of the pedipalpus are difficult to recognize and probably partly not correctly drawn. - The material is kept in the collection of Joerg Wunderlich and will most probably be given to the Zoolog. Museum Hamburg.

Diagnostic characters, relationships and distribution: See above.

Description (♂):
Measurements (holotype, in mm): Body length 3.5 and 4.0 (paratype); prosoma: Length 1.6 (paratype 1.9), width 1.2; opisthosoma: Length 2.0, width 1.5; leg I: Femur 3.1, patella 1.0, tibia 2.75, metatarsus 3.5, tarsus 1.2; tibia II 1.7, tibia III 0.7, tibia IV 1.2.
Colour: yellowish, opisthosoma with numerous small white spots of guanine.
Prosoma (fig. 1) 1.33 times longer than wide, fovea well developed, 8 small eyes in two wide rows, posterior median eyes slightly larger than anterior median eyes, spaced by less than their diameter, posterior row straight, lateral eyes almost contiguous, clypeus see the diagnosis of the genus, basal cheliceral articles long, bearing each 3 large teeth on the margins of the fang furrow, lateral files indistinct or even absent (a stridulatory prolateral tooth of the pedipalpal femur is apparently absent), fangs long, sternum not elongated between the coxae IV. - Legs long and slender, order I/II/IV/III, I distinctly the longest, III distinctly the shortest, most hairs and bristles rubbed off, femoral bristles existing. - Opisthosoma 1.33 times longer than wide, hairs and spinnerets short. - Pedipalpus (figs. 2-5; see the diagnosis of the genus) with slender articles, cymbium quite wide.



Figs. 1-5: *Pseudotapinopa cotopaxi* **n. gen. n. sp.**, ♂; 1) anterior aspect of the left chelicera; 2) retrolateral aspect of the left pedipalpus; the arrow points to the partly hidden small proapical tibial apophysis; 3) ventral aspect of the bleached left pedipalpus; 4) dorsal aspect of the left pedipalpus; 5) proapical aspect of the distal sclerites of the left bulbus. - C = cymbium, P = paracymbium, S = sperm duct within the embolus whose apical part is hidden, T = tooth of the cymbial outgrowth. Scale = 0.2 mm.

BEITR. ARANEOL: 17 (2024: 7-51)

NEW AND ALREADY KNOWN SPIDERS OF SEVEN FAMILIES OF THE ALGARVE, PORTUGAL (ARANEIDA: ARANEAE)

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Abstract: The hitherto unknown male of *Iberina harmae* WUNDERLICH 2023 (Hahniidae) as well as the hitherto unknown females of *Zelotes baeticoides* WUNDERLICH 2023 and *Euophrys marusiki* (Salticidae) are described. - **Notes** are given on *Harpactes tavirensis* WUNDERLICH 2020 (Dysderidae), *Holocnemus hispanicus* WIEHLE 1933, *Episinus truncatus* LATREILLE 1809 (Teridiidae), *Centromerus succinus* (SIMON 1884), *Palliduphantes lancea* WUNDERLICH 2023 (both Linyphiidae), *Eratigena feminea* (SIMON 1870) (Agelenidae), *Zelotes baeticoides* WUNDERLICH 2023, *Zelotes* (*Marinazelotes*) *bardiae* CAPORIACCO 1928 (both Gnaphosidae) and *Pseudeuophrys lanigera* SIMON 1871) (Salticidae). - The following species are **described**: *Harpacea fontetareja* **n. sp**. and *Harpactea planembolus* **n. sp**. (both Dysderidae), *Ariadna amandahorta* **n. sp**. (Segestriidae), *Asthenargus desbaratoensis* **n. sp.**, Pelecopsis hillyardi **n. sp**. and *Silometopus furcatus* **n. sp**. (all Linyphiidaee), *Scotina zoraoides* **n. sp**. (Liocranidae), *Zelotes lapicidinae* **n. sp**. and *Zelotes latapophysis* **n. sp.** (both Gnaphosidae). The genera *Asthenargus* SIMON & FAGE 1922 and *Silometopus* SIMON 1914 are new to the fauna of Portugal. Some “hidden species” from the Algarve are listened. - **New synonymy**: *Zodarion tuber* WUNDERLICH 2023 =

Zodarion maculatum (SIMON 1870) (Zodariidae), *Berlandina collisarenaria* WUNDERLICH 2023 = *Berlandina plumalis* (O. PICKARD-CAMBRIDGE 1872) (Gnaphosidae). - A hair on the tegulum of *Zelotes lapicidinae* n. sp. (Gnaphosidae) is documented.

Material: The new material is kept in the collection of Joerg Wunderlich (CJW) and will most probably be given to the Zoolog. Museum Hamburg, few probably to Senckenberg (SMF).

Selected localities of collection near Sao Bras de Alportel: (1) Fonte Tareja 37.180232-7.875262; (2) a garden in Mesquita Alta N37°09'11" W07°50'29". See below and Beitr. Araneol., 16 (2023: 6-7). In the years 2022-2024 I used up to 17 pit falls in 4 localities.

During 13 years I collected spiders (Araneae) in the Algarve, Portugal, and described/published 40 valid species of a dozen families for the first time; see the Beitr. Araneol. 6 (2011) -17 (2024), my website and the World Spider Catalog. Several further species were reported for Portugal for the first time. In this paper I describe 9 new species of 5 families.

Mainly of the following taxa I expect the discovery of further undescribed species of the Algarve: Dysderidae: *Harpactea*, Linyphiidae: Species of several genera of the Erigoninae as well as Gnaphosidae: *Zelotes*. Undetermined specimens of several families are kept in my private collection.

I consider the following species described by me to be "hidden species"; the list is not complete. Certain of these species – like *Hahnia harmae* and *Zora manicatoides* - I collected not very rarely around Sao Bras de Alportel; some of these species are probably more widely distributed in the Iberian Peninsula and were mistaken as quite similar species:

Harpactea fontetareja n. sp. (Dysderidae),
Ariadna sp., e. g., *amandahorta* n. sp. (Segestriidae),
Pelecopsis hillyardi n. sp. (Linyphiidae),
Zodarion parastyliferum WUNDERLICH 2022 (Zodariidae),
Iberina harmae WUNDERLICH 2023 (Hahniidae) (?? = *candida*, see below),
Scotina zoraoides n. sp. (Liocranidae),
Zora manicatoides WUNDERLICH 2023 (Miturgidae: Zorinae),
Thanatus virgulatipes WUNDERLICH 2023 (Philodromidae),
Drassodes arenosus WUNDERLICH 2023 (Gnaphosidae),
Zelotes baeticoides WUNDERLICH 2023 (Gnaphosidae),

Agyneta pseudorurestris WUNDERLICH 1980 (Linyphiidae) is a prominent example of such "hidden species". After its separation from the quite similar *A. rurestris* (C. L. KOCH 1836) the species turned out to be widely distributed in the Western Palearctic; in the Algarve it is one of the most frequent spiders.

DESCRIPTION OF THE SPECIES AND NOTES

Family DYSDERIDAE

Dysdera algarvensis WUNDERLICH 2023

Material: Portugal, Algarve, Mesquita Alta, 5 km E Sao Bras de Alportel, in a garden, locality of the type material, under a stone, 1♀ JW leg. 14. IV. 2024, CJW.

The body length of the spider is 7.3 mm, its prosoma length is 2.7 mm.

Distribution: Portugal, Algarve.

Harpactea BRISTOWE 1939

Recently RECAC et al. (2023) described 7 new species from Portugal of this very diverse genus. Several species possess a quite restricted distribution and are difficult to identify, e. g., members of the *minoccii* subgroup. To my knowledge in the genus *Harpactea* the number and the position of the teeth of the anterior margin of the fang furrow may be intraspecificly variable, see figs. 1-2.

Here I add some notes on *H. tavirensis* WUNDERLICH 2020 and describe two new species from the Algarve.

Harpactea tavirensis WUNDERLICH 2020 (figs. 1-3)

The female of this species has recently been described for the first time by REZAC et al. (2023). Below I add the description based on material collected by me.

New material: Portugal, Algarve, Mesquita Alta, 4 km E Sao Bras de Alportel, in a garden, under stones in the shadow, 2♂ 2 ♀ JW leg. in I-II 2024, R311/CJW.

Description:
Measurements (♀ in mm): Body length 4.3 and 4.6; prosoma: Length 1.65 and 1.85, width 1.25 and 1.35; femur I 1.1 and 1.2, tibia I 1.05 and 1.1, tibia IV 1.15 and 1.25; pedipalpal tarsus 0.45 and 0.5.
Colour: Prosoma medium to dark brown, legs light to medium brown, opisthosoma dorsally medium to almost dark brown, ventrally light grey.
Prosoma 1.3 times longer than wide (♀),, fang furrow (figs. 1-2): Posterior margin with 2 teeth which are widely spaced, anterior margin with 2 teeth close together or an single (fused) tooth which is divided at the tip. - Claw of the female palpal tarsus well developed and smooth. - Legs: Order IV/I/II/III; bristles (♀) quite similar to the male: Femora I-II 1 prodorsally-distally, femora III-IV with 3-4 dorsally, tibiae and metatarsi I-II bristle-less, tibiae and metatarsi III-IV with numerous bristles. Position of the metatarsal trichobothria ca. 0.78 on IV, and 0.88 on I-III. - The genital field is without marking, vulva as in fig. 3.

Distribution: Portugal.

***Harpactea fontetareja* n. sp.** (figs. 4-8)

Etymology: the species is named after the locus typicus in the Algarve, the Fonte Tareja.

Material: Portugal, ca. 5 km E Sao Bras de Alportel, Fonte Tareja, pit fall in a mixed oak forest, 1♂ holotype JW leg. in III 2024, R321/CJW. The left pediplpus of the male is transferred in a small tube.

Diagnostic characters (♂; ♀ unknown): Fang furrow (fig. 5) with two widely spaced lager anterior teeth and two smaller posterior teeth close together. Pedipalpus (figs. 4, 6-8)): Patella and cymbium dorsally distinctly convex, cymbium quite long, bulbus oval, bearing a long and pointed conductor and a strongly bent and flattened embolus.

Description (♂):
Measurements (in mm): Body length 3.4; prosoma: Length 1.4, width 1.0; opisthosoma: Length 2.0, width 0.9; leg I: Femur 1.5, patella 1.0, tibia 1.3, metatarsus 1.1, tarsus 0.5; tibia II 1.2, tibia III 0.9, tibia IV 1.5; width of the eye field 0.25; pedipalpus: Femur 0.9, patella 0.55, tibia 0.45, cymbium 0.65, bulbus 0.45.

Colour: Prosoma light brown, legs yellow brown, opisthosoma light grey brown and slightly reddish.
Prosoma (fig. 5) 1.4 times longer than wide, distinctly narrowed anteriorly, finely wrinkled, thoracic fissure long, 6 eyes in a narrow group, anterior eyes largest, posterior median eyes close together, basal cheliceral articles, fangs, gnathocoxae and labium long and slender, teeth of the fang furrow see above, basal cheliceral articles with a distinct lateral depression, sternum small but distinctly spacing coxae IV. - Legs fairly long and slender, order IV/I/II/III, hairs short and indistinct, 3 tarsal claws, claw tufts and scopulae absent. Bristles on I: Femur 1 prolaterally in the distal half, and a pair of short apical bristles, remaining articles none; II: Femur 0-1 dorsally near the middle and prodorsally 1/1, remaining articles none; III-IV with numerous bristles, IV: Femur 2-3, tibia and metatarsus about 1 dozen; metatarsus III bears a brush of ventral preening hairs in the distal third. All metatarsi bear a long trichobothrium, its position on I in ca. 0.83. - Opisthosoma 2.2 times longer than wide, almost cylindrically, dorsal hairs slightly thickened in almost their whole length, about 0.06 mm long. - Pedipalpus: See above.

Relationships: See *H. planembolus* n. sp. from the same locality. - According to the teeth of the fang furrow the key given by REZAC et al. (2023) lead to *H. adicensis* REZAC 2023 in which the anterior margin of the fang furrow bears a large tooth and a conductor is absent. In the following species the teeth of the fang furrow are different. In *H. magnibulbus* MACHADO & FERRANDEZ 1991 (Algarve, Barranco de Velho, district Monchique) the cymbium is dorsally not convex and the shape of embolus and conductor is different. In *H. korrenkoi* REZAC 2023 (Aljezur) the dorsal side of the cymbium is almost straight and the embolus is shorter. In *H. algarvensis* FERRANDEZ 1990 (Barranco de Velho and near Sao Bras de Alportel) the cymbium is distinctly shorter and the tip of the conductor is sickle-shaped bent.

Distribution: Portugal, Algarve.

***Harpactea planembolus* n. sp.** (figs. 9-12)

Etymology: The name of the species refers to its distinctly flattened embolus, from (lat.) planus = flat.

Material: Portugal, Algarve, ca. 5 km E Sao Bras de Alportel, Fonte Tareja, pit fall in a mixed oak forest at the margin of a reed area, 1♂ holotype JW leg. In V 2024, R337/CJW. - Notes: The male has slightly been dried out in the pit fall. Both chelicerae, the left leg I and the left pedipalpus are cut off and kept separately.

Diagnostic characters (♂; ♀ unknown): Femur I with a prolateral bristle in the distal half but without apical bristles, teeth of the fang furrow (from a single male only!) as in fig. 9; pedipalpus (figs. 10-12): Patella fairly slender, dorsally only slightly convex, cymbium dorsally almost straight, embolic division complicated, embolus distinctly flattened (not recognizable flattened in certain positions).

Description (♂):
Measurements (in mm): Body length 3.15; prosoma: Length 1.5, width 1.15; opisthosoma (deformed, slightly shrunk): Length 1.7, width 0.75; leg I: Femur 1.35, patella 0.85, tibia 1.1, metatarsus 1.0, tarsus 0.4; tibia II 1.0, tibia III 0.8, tibia IV 1.05; pedipalpus: Patella 0.45 (height 0.14), tibia 0.4, cymbium 0.58, bulbus 0.43, height 0.33.
Colour: Prosoma light yellow to red brown, legs yellow brown, opisthosoma medium grey.
Prosoma 1.43 times longer than wide, distinctly narrowed anteriorly, finely wrinkled, thoracic fissure long, 6 eyes in a narrow group, anterior eyes largest, posterior median eyes close together, basal cheliceral articles, fangs, gnathocoxae and labium long and slender, teeth of the fang furrow as in fig. 9, basal cheliceral articles with a distinct lateral depression, sternum small but distinctly spacing coxae IV. - Legs fairly long and slender, order IV/I/II/III, hairs short and indistinct, 3 tarsal claws, claw tufts and scopulae absent. The right leg II is a malformation, only a strongly shortened coxa exists. Bristles on I: Femur 1 prolaterally in the distal half, no apically, remaining articles none; II: Femur 1/1 prodorsally, remaining articles none; III-IV with numerous bristles, IV: Femur 2-3, tibia and metatarsus about 1 dozen. All metatarsi bear a long trichobothrium, its position on IV in ca. 0.81. - Opisthosoma 2.3 times longer than wide, dorsal hairs thin and up to 0.1 mm long. - Pedipalpus: See above.

Relationships: In *H. fontetareja* n. sp. (from the same locality) the teeth of the fang furrow and the leg bristles are slightly different, the teeth near the anterior margin are wider spaced (but their position may be intraspecifically variabel), the patella of the pedipalpus is dorsally stronger convex, the embolic division is distinctly different.

Distribution: Portugal, Algarve.

Family SEGESTRIIDAE

In the Algarve I found rarely members of the genus *Segestria* but frequently juveniles of several species of *Ariadna*, in which the short-living males are quite rare, see WUNDERLICH (2011). In Ariadna-species known to me I did not recognize patellar bristles. In this paper I describe the new species *A. amandahorta* whose specimens live under stones in contrast

to members of *algarvensis* which I collected in tubes in the shadow on natural walls, and in contrast to *inops* which lives among low plants in dunes in the Algarve and has recently also been reported from dunes in Spain (near Barcelona) (see WSC).

***Ariadna amandahorta* n. sp.** (figs. 13-21), photo 1.

Etymology: Specimens of the new species were collected in a garden, and the name refers to amanda (lat.) = loving and to horta (lat.) = garden.

Material: Portugal, Algarve, Mesquita Alta 5 km E Sao Bras de Alportel, N37°09'11" W07°50'29", in the shadow, on the lower side of stones close together, 1♂1♀ JW leg. in V 2024, holotype ♂ R333/CJW, ♀ paratype R334/CJW. - Notes: The left pedipalpus of the male is a malformation, reduced in size, the tarsus is strongly deformed. The right pedi-palpus and the right leg I of the male are separated, its right leg III is lost by autotomy beyond the coxa, the stump is not sclerotized/healed. The left leg I of the female is lost by autotomy beyond the coxa, the stump (fig. 21) is sclerotized/healed.; the right leg I has been cut off for the study.

Diagnostic characters: Posterior eye row straight (fig. 13); ♂: Prosoma (photo) 1.4 times longer than wide, tibia I 5.5 times longer than high, leg I as in figs. 14-17, pedipalpus (figs. 18-19): See below. - ♀: Prosoma long (photo), 1.76 times longer than wide , tibia I (fig. 20) with two rows of 6/5 ventral bristles, metatarsus I with 7 pairs of ventral bristles.

Description:
Measurements (in mm): ♂: Body length 5.0; prosoma: Length 2.5, width 1.75; opisthosoma: Length 2.75, width 1.65; leg I: Femur 2.1, patella 0.9, tibia 2.2 (height 0.33), metatarsus 3.9, tarsus 0.8; tibia II 2.4, tibia III 1.5, tibia IV 2.0; femur IV: Length 2.0, height 0.55; pedipalpal tibia: length 0.7, height 0.47. - ♀: Body length 7.0; prosoma: length 3.0, width 1.7; opisthosoma: Length 4.2, width 2.0; pedipalpal tarsus: Length 0.65, height 0.29; leg I: Femur 2.9, patella 0.9, tibia 1.65 (height 0.3), metatarsus 1.5, tarsus 0.55; tibia II 1.55, tibia III 1.0, tibia IV 1.6; femur IV: Length 1.85, height 0.7.
Colour: Prosoma dorsally and ventrally dark brown, legs light to medium grey, opisthosoma medium grey, lateral light stripe indistinct, spinnerets light grey.
Prosoma (figs. 13-14) sexually strongly differing (!), 1.4 times longer than wide in the male but 1.76 times longer than wide in the female, finally rugose, hairs not long, fovea more distinct in the male, 8 eyes as in fig. 14, posterior row straight, basal cheliceral articles slender, fangs stout, posterior margin of the fang furrow smooth, anterior margin with two teeth - ♀-. pedipalpus with stout articles, tarsal claw existing. - Legs (figs. 14-17, 20): Order I/II/IV/III, hairs not distinct, no scopula or similar hairs, femur IV distinctly thickened in both sexes; bistles (only a single male!), tibia I with 6 proventrally; ♂-metatarsus I bent and bearing 1/1 proventral club-shaped bristles. Position of the metatarsal I-IV trichobothrium in 0.85-0.88. ♀ -leg I: See above. - Opisthosoma (photo) 1.7 (♂) - 2.1 (♀) times longer than wide, hairs not long. - ♂-pedipalpus (figs. 18-19): Tibia ventrally distinctly bulging in the basal half, embolus

about as long as the globular bulbus, distally strongly bent and bearing an indistinct seam. - ♀-genital area and vulva not studied.

Relationships: The key to the European species of the genus *Ariadna* - see WUNDERLICH (2011: 181-182) - lead to a sp. indet. from S-France, in which the tibia of the ♂-pedipalpus ventrally-basally is not distinctly bulging. *A. algarversis* WUNDERLICH 2011 from the Algarve is also related but the ♂-tibia I is 7 times longer than heigh, the tibia of the ♂-pedipalpus is ventrally also stronger bulging but the tip of the embolus and ♂- metatarsus I are different. - Note: the different leg spination of the ♂-leg I may be a hint, that the specimens published by WUNDERLICH (2011: 197, figs. 39-42) under *algarvensis* from Bordera (Aljezur) and from Manta Rota are not conspecific.

Distribution: Portugal, Algarve.

Family PHOLCIDAE

Pholcidae is a distinctive family of spiders in which the very long and slender legs are easily lost beyond the coxa by autotomy. The European species possess 6 or 8 eyes.
In Europe exists about a dozen established pholcid genera besides members of few introduced genera. The 8-eyed genera *Holocnemus* SIMON 1873 and *Crossopriza* SION 1893 are members of the “dotted leg-clade” of the subfamily Smeringopinae in which the legs bear black spots, the opisthosoma may be elongated above the spinnerets, and the femora and tibiae of the anterior legs may bear ventral spines in the male sex (fig. 22). The intraspecific ventral opisthosomal colouration of *Holocnemus* is quite variable.
Besides the widely spread *pluchei* (SCOPOLI 1763), the generotype, the species of *Holocnemus* are basically endemics of the Iberian Peninsula.
Holocnemus is – according to HUBER (2022) - not a monophyletic genus. It is similar in some respect to *Crossopriza* in which only the chelicerae bear lateral stridulatory files in the male sex (such files are absent in the female sex of *Crossopriza*.as well as in females of *Holocnemus caudatus*, see HUBER (2022: 44).
Here I give a key to the European species of *Holocnemus* and some notes on *H hispanicus* WIEHLE 1933, especially on the unusual leg I spines of a male (fig. 23).

Key to the European species of the genus *Holocnemus*:

See HUBER (2022: 9).

1 In adult and juvenile specimens opisthosoma strongly elongated above spinnerets. Tarsus of the ♀-pedipalpus not thickened. Iberian Peninsula..... 2

- Opisthosoma oval, not elongated above spinnerets. Tibia and tarsus of the ♀-pedipalpus strongly thickened. Widely spread over the world …..... *pluchei*

2(1) Sternum with a posterior as well as lateral depression(s). ♀-chelicerae according to HUBER (2022: 44) without lateral stridulatory files …..... *caudatus*

- Sternum without such depressions. ♂-pedipalpus as in figs. 24-28. ♀: chelicerae with a narrow field of stridulatory files (fig. 29), genital area as in fig. 30 …..... *hispanicus*

Holocnemus hispanicus WIEHLE 1933 (figs. 23-30)

Material: Portugal, Algarve, near So Bras de Alportel, e. g., Fonte Tareja, 37.180232 – 7.875262, near a stream, partly in the shadow under a cork oak, collected mainly from the inside of a larger piece of rolled oak bark on the ground, 1♂, several ♀ and inad..specimens, JW leg. in II-IV 2024, R316/CJW; 1♂ Fonte Tareja, JW leg. In II 2024, R313/CJW.

Diagnostic characters: ♂♀-opisthosoma strongly elongated above the spinnerets; ventral colouration of the opisthosoma quite variable. ♂: Anterior femora with a row of ventral spines (macrosetae) similar to fig. 22 (*), ♂-pedipalpus (figs. 24-28): Procursus with a pointed and slightly bent ventral sclerite and a pointed and almost triangular prolateral translucent process. ♀ with a narrow field of cheliceral stridulatory files (fig. 29), genital area as fig. 30, see below.

(*) but bearing long and only slightly thickened *hairs* (fig. 23) in a single male (R313/CJW) – a malformation?

Description ♂:

Measurements (in mm): Body length 3.5; prosoma: Length 1.1, width 1.05; opisthosoma: Length 2.6 (ventrally 1.6 in front of the spinnerets, 1.3 behind the spinnerets), width 0.9, height 1.0; legs: Femur 6.5, patella 0.45, tibia 5.9, metatarsus 8.8, tarsus 1.9; tibia II 4.0, tibia III 3.0, tibia IV 3.5; diameter of a lateral eye 1.1, diameter of an anterior median eye 0.9; field of the cheliceral stridulatory files 2.0 long and 0.8 wide. - The body length of the largest inad. specimens is. 3.0, their opisthosoma is a bit less elongated than in the adult male.

Colour (photo): Prosoma mainly light grey, fovea light brown, around the eyes black, sternum dark brown, legs light grey, with numerous white and black spots, opisthosoma mainly light grey, bearing white and black spots, ventrally in front of the dark spinnerets with a wide longitudinal dark band.

Prosoma slightly longer than wide, fovea deep, 8 eyes and chelicerae, anterior median eyes in frontal view in as straight row, anterior median eyes smallest, cheliceral stridulatory field well developed, 2.5 times longer than wide, occupying half of the lateral width of the chelicerae. Sternum without depressions. - Legs (fig. 30) very long (see above) and slender, I distinctly the longest, usually bearing spines but see the diagnosis - Pedipalpus (figs. 24-28.): Tibia very thick, prolaterally translucent process of the procursus pointed and almost triangular, ventral sclerite slightly bent and pointed.

Description ♀:
Measurements: Body length 4.2-6.5, prosomal length 1.1-1.5; larger ♀ in mm: Body length 4.9; prosoma: Length and width 1.4; opisthosoma: Length 3.5, width 1.4, height in the middle 1.5; leg II: Femur 5.3, patella 0.45, tibia 4.0, meta tarsus 6.1, tarsus 1.25, tibia III 3.0, tibia IV 3.9; pedipalpus: Femur 0.33, patella 0.19, tibia 0.25, tarsus 0.32. Prosoma length of a smaller ♀ 1.2.
Colour partly similar to the male but in contrast to the male the longitudinal dark ventral opisthosomal band includes three light bands. The prosoma bears each in front and behind the fovea shorter divided longitudinal bands. The pedipalpal tarsus is dark grey, the remaining articles are light grey. - Body and legs quite similar to the male; the pedipapal articles are not thickened. - Genital area (fig. 30) rather flat; in the frontal half the receptacula seminis are shining through the cuticula which bears a pair of slightly bent furrows (grooves, G); a low concave border of the cuticula (C) is vaulting a bit a depression in front of a field of special hairs which exists in front of a pigmented wide field. These hairs possess large bases (arrow).

Relationships: See the key above.

Distribution: Iberian Peninsula.

Family THERIDIIDAE

Episinus truncatus LATREILLE 1809 (photo 2)

Material: Portugal, Algarve, Mesquita Alta, ca. 5 km E Sao Bras de Alportel, pit fall in a mixed oak forest, 1♂ JW leg. In IV-V 2024, R332/CJW:

The colouration of body and legs of the present male is remarkable (photo), the body is almost black, femur I is black, all remaining femora are whitish except their blackish distal part. The expanded left bulbus shows the free and quite long curved embolus.

Distribution: Europe to Iran, N-Africa.

Family LINYPHIIDAE

Centromerus succinus (SIMON 1884) (figs. 31-32)

Material: Portugal, Algarve, ca. 2 km N Sao Bras de Alportel, Fonte Ferrea, under a stone at the margin of an oak forest, 1♀ (epigyne separated), JW leg. in I 2024, CJW.

The structures of the wide and fairly protruding epigyne (figs. 31-32) are hard to observe and are quite different drawn by various authors. The wide convex scape is partly covering a very wide pit; a posterior not sclerotized tongue-like outgrowth is flanked by a pair of stronger sclerotized outgrowths which are a bit shorter. The very long introductory ducts are not or indistinct observable, the receptacula are divided.

Distribution: Western Mediterranean.

Palliduphantes lancea WUNDERLICH 2023

New material: Portugal, Algarve, few km E Sao Bras de Alportel: 1♀ Fonte Ferrea, JW leg. in XI 2021 under a stone, CJW; 1♀ Mesquita Alta, JW leg. under a stone In XII 2023, CJW; 1♂ 1♀ Fonte Tareja, pit fall, JW leg. in I-III 2024, CJW.

In 2023 the description of the female sex of *P. lancea* was only based on a subad. specimen and an adult specimen which was dried out. In the present females the dorsal part of the mainly dark opisthosoma is light grey in the middle and bears light grey transverse bands in the posterior half or the opisthosoma is almost black, with the epigaster white (♀ from Fonte Tareja). Furthermore a wide depression on the distal half of the scape is well recognizable.

Distribution: Portugal.

Asthenargus SIMON & FAGE 1922

In the erigonine genus *Asthenargus* the sequence of the dorsal tibial bristles is 2/2/1/1, the position of the metatarsal I-III trichobothria is usually in ca. 0.35 (but see the new species) and the epigyne is an intranslucent strongly sclerotized dark plate which reaches beyond the epigastric furrow. - The genus *Asthenargus* is new to the fauna of Portugal; the only known congeneric species from the Iberian Peninsula is *longispina* (SIMON 1915) from Spain.

***Asthenargus desbaratoensis* n. sp**. (figs. 33-35)

Etymology: The name of the species refers to the small village Desbarato, Portugal.

Material: Portugal, ca. 5 km E Sao Bras de Alportel, Desbarato, Mesquita Baixa, ca. 3Km S Mesquita Alta (see above), pit fall in a rocky meadow, holotype ♀ JW leg. in II 2024, R315/CJW; 2♀ paratypes, JW leg. In the same pit fall in III 2024, R320/CJW. - The opisthosoma of the holotype is loose, the epigyne is pending at the prosoma. - Note: In the same pit fall in IV 2024 3 ♂ (CJW) of *Nemesia fagei* FRADE & BACELAER 1931 (Nemesiidae) were preserved which body/prosoma length are 7-11/2.8-4.3 mm. Nearby in III 2024 (CJW) I found a ♀ of *Castianeira badia* (SIMON 1877) (Phrurolithidae) below a stone. Furthermore on the dry meadow orchids of *Ophrys* sp. and *Epipactis* sp. were flowering in III-IV.

Diagnostic characters (♀; ♂ unknown): Position of the metatarsal I-III trichobothrium in about 0.58, colour of the prosoma dark brown, epigyne (fig. 33) a wide intranslucent and strongly sclerotized plate which slightly reaches beyond the epigastric furrow and bears a pair of introductory openings; vulva (figs. 34-35) with two thin-walled and partly overlapping receptacula seminis.

Description (♀):
Measurements (holotype in mm): Body length 1.4; prosoma: Length 0.65, width 0.545; opisthosoma: Length 1.0, width 0.78; width of the posterior eye row 0.21; leg I: Femur 0.45, patella 0.18, tibia 0.33, metatarsus 0.25, tarsus 0.21; tibia II 0.3, tibia III 0.25, tibia IV 0.44. - Paratypes: Body length 1.4, prosoma length 0.6.
Colour: Prosoma dark brown, with a dark "star patch" in front of the middle, legs yellow orange, opisthosoma dark grey. - Prosoma 1.18 times longer than wide, oval (laterally only weakly smaller, profile slightly convex behind the eye field, 8 fairly small eyes, posterior row straight, posterior median eyes spaced from each other by 2 ½ of their diameter, clypeus not protruding, about as long as the eye field, basal cheliceral articles robust, lateral stridulatory field existing, fangs long, sternum spacing coxae IV by their diameter. - Legs fairly short, order IV/I/II/III, hairs of medium length, tibial bristles short, apparently partly rubbed off, sequence most probably 2/2/1/1, position of the metatarsal I-III trichobothrium in ca. 0.58 (in the ♀ paratypes in 0.5-0.6). - Opisthosoma 1.28 times longer than wide, soft, oval, bearing short hairs. - Epigyne/vulva: See the diagnostic characters.

Relationships: The position of the metatarsal trichobothrium of the other congeneric species is in the basal half. In the only known congeneric Iberian species, *A. longispina* (♂ unknown), the colour of the prosoma is orange, the position of the metatarsal I trichobothrium is in 0.34 and the structures of epigyne/vulva are quite different.

Distribution: S-Portugal.

Pelecopsis SIMON 1864

The new species described below is a member of the *Pelecopsis bucephala* species-group which is known from the Western Mediterranean. In most members of this group the female opisthosoma bears a large dorsal scutum as in the male and the very long male pedipalpal tibia apophysis bears retrobasally one (fig. 39) or several bristles.
The new species is geographically separated from its related species in North Africa by the Mediterranean Sea and from members in Spain by the river Guadiana.

***Pelecopsis hillyardi* n. sp**. (figs. 36-46)

Derivation nominis: The new species is dedicated to P. D. HILLYARD, who revised in 1980 the species of the *Pelecopsis bucephala* species group and described the new species *bicornuta* as well as *modica*; *P. pooti* BOSMANS & JOCQUE was described in 1993.

Material: S-Portugal, Algarve, ca. 5 km E Sao Bras de Alportel, Mesquita Alta, 300 m E a garden in N37°09'11" W07°50'29", pit fall in a mixed oak forest, 1♂1♀ JW leg. In IV-V 2024; holotype ♂ R329/CJW (its let pedipalpus and a part of its left leg I are separated); paratype ♀ R330/CJW (its opisthosoma is loose, epigyne and the right pedipalpus are separated).

Diagnosis: Position of the metatarsal trichobothrium I-III in 0.58-0.67. - ♀: Prosoma as in figs. 43-44), epigyne (fig. 45) a strongly sclerotized structure wider than long, vulva as in fig. 46. - ♂: Prosoma as in figs. 36-38, see below. Pedipalpus (figs. 39-42): Patella distinctly thickened, its apophysis long, bearing a long retrobasal bristle and a longitudinal ventral furrow, cymbium with a well developed dorsal-basal hump, tegular apophysis flattened, bent in a right angle and widened distally, embolus long, strongly bent and bearing a long apophysis, conductor a wide, flat and translucent structure.

Description:
Measurements (in mm): ♂: Body length 2.0; prosoma: Length 0.9, width 0.8; opistosoma: Length 1.3, width 1.0; leg I: Femur 0.85, patella 0.25, tibia 0.6, metatarsus 0.58, tarsus 0.4; tibia II 0.58, tibia III 0.5, tibia IV 0.7; pedipalpal patella: Length 0.42, height 0.17. - ♀: Body length 2.6; prosoma: Length 0.9, width 0.8; opistosoma: Length 1.7, width 1.2; leg I: Femur 0.9, patella 0.27, tibia 0.6, metatarsus 0.6, tarsus 0.4, tibia IV 0.8.
Colour: Prosoma medium to dark brown, cephalic part and sternum dark brown, opistosoma dark to black brown, legs light to medium brown, not annulated.
Prosoma (figs. 36-38, 43-44) with numerous punctations, fovea short, 8 eyes in two rows, posterior row procurved, posterior median eyes largest, clypeus long and concave; ♂ with a large dorsal lobe which bears a deep lateral pit, basal cheliceral articles robust, lateral files well developed. Fangs long, posterior margin of the fang furrow with 2 teeth, sternum wide, spacing coxae IV by almost their diameter. Legs only fairly long, order IV/I/II/III, hairs short, bristles thin, sequence 1/1/1/1 in the female, at least as long as the diameter of the tibia, absent on I-II in the male, short on III-IV. Position of the metatarsal trichobothrium 0.58-0.67, absent on IV. - Opisthosoma oval, hairs short bearing a large dorsal scutum in both sexes which covers the whole opisthosoma, lung covers sclerotized, in front of the spinnerets exists a wide scutum. - ♂-pedipalpus: See the diagnosis. - Epigyne (fig. 45, see the diagnosis) a strongly sclerotized plate, wider than long, vulva as in fig. 46.

Relationships: According to the quite similar tibial apophyis of the ♂- pedipalpus and the cymbial hump *P. pooti* BOSMANS & JOCQUE 1993 from Spain is most related, see the key below. Both species may well be sibling species; they are separated by the river Guadiana and possess quite different ecological preferences besides morphological differences.

Distribution: Portugal, Algarve.

Key to the European members of the *Pelecopsis bucephala* species-group (♂):

Notes: See HILLYARD (1980). Several further members of this species group occur in North Africa.

1 Anterior median eyes placed on a widely protruding and anteriorly strongly narrowing clypeus, their position far in front of the remaining eyes. Widely spread in the Western Mediterranean including the Iberian Peninsula. ..... *bucephala*

- Clypeus not widely protruding, position of anterior median eyes less far in front of the remaining eyes. …..... 2

2(1) Pedipalpus: Patella distinctly thickened (not sure to me in *pooti*), tibia apophysis without process (figs. 39-41) …..... 3

- Pedipalpal tibia not thickened, tibia apophysis bearing tooth-like proces(es). …..... 4

3(2) Area of the anterior median eyes less protruding, clypeus distinctly concave (fig. 36), pedipalpus as in figs. 39-42. Portugal: Algarve, near Sao Bras de Alportel; in a mixed oak forest. ..... *hillyardi*

- Area of the anterior median eyes protruding, clypeus straight, copulatory organs differenr but tibia apophysis quite similar. Spain: Andalusia, Huelva; in dunes. …..... *pooti*

4 (2) Pedipalpal tibia apophysis with a dorsal outgrowth basal of the middle. Spain: Prov. Cadiz, ?Portugal (see WSC, spiders of Europe), Morokko. …..... *bicornuta*

- Pedipalpal tibia apophysis with two anterior/ventral apophyses. Spain: Prov. Cadiz. …... …..... *modica*

Silometopus SIMON 1914

In the erigonine genus *Silometopus* the sequence of the indistinct dorsal tibial bristles is 0/0/1/1, the position of the metatarsal I-III trichobothria is usually in 0.7-0-74 (but 0.33 in *furcatus* n. sp.), the cephalic part of the males is more or less raised and bears a pair of depressions (figs. 47-48), the embolus and the suprategular arpophysis (figs. 51-52) are quite long and thin, describing large loops. The shape of the male pedipalpal tibia apophyses is specific in all species.
In Europe about a dozen species of *Silometopus* is known; here I add a further species. The genus is new to the fauna of Portugal.

***Silometopus furcatus* n. sp.** (figs. 47-52)

Etymology: The name of the new species refers to the furcate tibia apophysis of its ♂-pedipalpus, from furca (lat.) = fork.

Material: Portugal,Algarve, ca. 5 km E Sao Bras de Alportel, Mesquita Alta, pit fall in a light mixed oak forest, holotype ♂ JW leg in III 2024, R318/CJW. - Notes: The right pedipalpus of the holotype has been separated in a tiny tube, its bulbus is expanded, the left pedipalpus is lost beyond the end of the femur, the stump is healed and closed by a brown mass; the left leg I is lost beyond the patella by autotomy, the right leg I is almost broken off beyond the patella by autotomy.

Diagnostic characters (♂; ♀ unknown): Prosoma (figs. 47-49) light yellow brown, with a distinct narrow black margin, cephalic part fairly raised and bearing a pair of pits, position of the metatarsal trichobothrium I-III in about 0.33; ♂-pedipalpus (figs. 50-52): Tibia proapically with a furcate pointed apophysis, retroapically with a large blunt apophysis and dorsally distally with a tooth-shaped hook, embolus and suprategular apophyseis describing lange loops.

Description (♂):
Measurement (in mm): Body length 1.3; prosoma: Length 0.58, width 0.55; opisthosoma: Length 0.77, width 0.5; leg I: Femur 0.55, patella 0.16, tibia 0.45, metatarsus 0.31, tarsus 0.25; tibia II 0.36, tibia III 0.3, tibia IV 0.5.
Colour: Prosoma dorsally and sternum light yellow brown, margins of both narrow black, legs yellow orange, opisthosoma black brown, spinnerets white.
Prosoma (figs. 47-49) slightly longer than wide, thoracic fissure absent, cephalic part fairly raised and bearing a pair of pits (depressions), basal cheliceral articles robust, lateral files well developed, anterior margin of the fang furrow with 4 teeth, fangs long, gnathocoxae strongly converging, labium wider than long, strongly reborderd (bearing a transverse furrow), sternum slightly longer than wide, spacing the coxae IV by about ¾ of their diameter. - Legs only fairly long, order IV/I/II/III, hairs indistinct,, bristles few and thin on patellae and tibiae: I-II none, III-IV 1 near the base, position of the metatarsal I-III trichobothrium in about 0.33, absent on IV. - Opisthosoma 1.54 times longer than wide, hairs indistinct, spinnerets short.- Pedipalpus:See above; paracymbium simple, sickle-shaped, conductor skinny.

Relationships: In *S. reuss*i (THORELL1871) (Europe - except Portugal - to Far East) the shape of the prosoma is similar but the position of the metatarsal trichobotrium is in 0.7-0-74 like is most congeneric species and the shape of the pedipalpal tibia apophyses as well of the structures of the bulbus are different.

Distribution: S-Portugal.

Family FONTEFERRIDAE WUNDERLICH 2023

I regarded the single specimen of the dubious family Fonteferridae to be a questionable member of the symphytognathidan branch, see WUNDERLICH (2023). In contrast to most members of this branch the clypeus is short and the structures of the pedipalpal tarsus – in my opinion most probably the bulbus – are quite different; the bulbus bears hairs and its structures are very simple: A small fleshly structure exists as well as a strongly sclerotized, bent and bristle-like structure of medium length in a position far from the end of the article. I regard this structure to be most probably an embolus; it is fixed to the article and is surely not an artefact! The tininess of the pedipalpus and the absence of the second pedipalpus were the reasons that I did not cut off the pedipalpus. A lateral photo must be taken from the pedipalpus before a preparation.
Is this unique spider really adult or only subadult? I am not quite sure about that but in my opinion it is more likely adult: A bristle on a pedipalpal tarsus of certain spiders exists at or near the end of the pedipalpal tarsus but never far from its tip! Furthermore the existence of femoral bristles of the holotype may be a hint that the spider is adult.

Familiy AGELENIDAE

Eratigena feminea (SIMON 1870)

Material: Portugal, Algarve, near Sao Bras de Alportel, Fonte Tareja and Mesquita Alta, in pit falls under stone oaks, ♂♀ JW leg in IV-VI and XII 2023, CJW.

Note: The tibia of the ♂-pedipalpus of *feminea* bears no apophysis, the patella bears distally a retrodorsal as well as a retrolateral apophysis which both are well developed.

Distribution: Iberian Peninsula, Madeira, Algeria.

Family HAHNIIDAE

Iberina harmae WUNDERLICH 2023

The description of this species was based on a single female; the hitherto unknown male was collected about 4 km S of the locus typicus and is treated here.

Material: Portugal, Algarve, 5 km E Sao Bras de Alportel, pit fall below a stone oak, 1♂4♀ JW leg. between XII. 2023 and III 2024, R308/CJW. - Mesquita Alta, under a stone in a garden, 1 probably conspecific ♀, JW leg. In III 2024, R322/CJW. Its epigyne/vulva is incomplete and has been transferred in a small tube.

Measurements of the male (in mm): Body length 1.2, prosoma: Length 0.52, width 0.45, tibia I 0.35. The colour of the body is light grey as in the female holotype. The pedipalpus is quite similar or even identical with *I. candida* (SIMON 1875), shape of the pedipalpal tibia apophysis is as drawn by LOCKET & MILLIDGE (1953).
The colour of most females is a bit darker grey, the prosoma is ca. 0.65 mm long. The probably conspecific ♀ (R322) is strongly pigmentated.

Relationships: I do not want to exclude with certainty the synonymy of *harmae* with *candida* (SIMON 1875) but a weakly pigmented specimen like in *candida* has not been found. In my opinion a revision including a molecular-genetic study is needed. The report of a darker coloured male opisthosoma within a population of light coloured specimens by HARM (1966: 353) from S-Germany is remarkable.

Distribution: Portugal.

Family ZODARIIDAE

Zodarion maculatum **(**SIMON 1870)

After the study of more material of both sexes from the Algarve (locus typicus near Sao Bras de Alportel, CJW) I regard *Zodarion tuber* WUNDERLICH 2023 as a younger synonym of *Z. maculatum* (SIMON 1870) (**n. syn.**).

Family LIOCRANIDAE

Scotina MENGE 1873

The number of the ventral tibial and metatarsal bristles are intraspecific variable The males of the Iberian species are best to be identified by the shape of their embolus.
Four species of *Scotina* are known from Europe and two – *celans* (BLACKWALL 1841) and *palliardi* (L. KOCH 1881) – from the Iberian Peninsula. Here I describe a further species, from Portugal, which is strongly related to the two already known Iberian species.

***Scotina zoraoides* n. sp**. (figs. 53-57), photo 3

Etymology: The name of the species refers to the similar (-oides) coloration of the body to the genus *Zora* C. L. KOCH 1847.

Material: Portugal, Algarve, ca. 5 km E Sao Bras de Altportel, Fonte Tareja, 37.180232-7.875262, pit fall in an oak forest, holotype ♂ JW leg. in II-III 2024, R312/CJW. - Both bulbi are expanded; the left pedipalpus has been separated.

Diagnostic characters (♂; ♀ unknown): Colour (photo) similar to members of the genus *Zora* (C. L. KOCH 1847 (Miturgidae: Zorinae), with wide yellow lateral bands of the prosoma; pedipalpus (figs. 53-57): Embolus very long, describing a long loop, tegulum bearing an long, flat and translucent structure, a questionable conductor.

Description (♂):
Measurements (in mm): Body length 3.0; prosoma: Length 1.45, width 1.05; opisthosoma: Length 1.55, width 0.95; leg I: Femur 1.2, patella 0.45, tibia 1.2, metatarsus 1.0, tarsus 0.65; tibia II 1.0, tibia III 0.85, tibia IV 1.5.
Colour (photo): Prosoma dorsally mainly yellow, with a pair of dark brown longitudinal bands which include a smaller yellow band, ventrally yellowish, legs mainly yellow brown, distinctly annulated, I-II distinctly darkened beyond the femora, opisthosoma dorsally and laterally mainly dark brown, dorsally bearing 6 transverse dark red-brown stripes, ventrally mainly yellowish with dark patches in front of the yellow spinnerets.
Prosoma (photo) 1.45 times longer than wide, almost oval, almost smooth, thoracic fissure long, 8 eyes of medium size, posterior row distinctly procurved, posterior median eyes spaced by less than their diameter, basal cheliceral articles of medium size, posterior margin of the fang furrow bearing two teeth, fangs long, labium a free sclerite, wider than long, sternum 1.17 times longer than wide, weakly elongated between coxae IV. - Legs (photo) only fairly long, order IV/I/II/III, IV distinctly the longest, hairs not distinct, claw tufts and scopulae absent, bristles numerous and partly long, tibia I-II with 6-7 ventral pairs, metatarsi I-II pro-/retrolaterally with 3-5 bristles. - Opisthosoma 1.63 times longer than wide, dorsally hardened (leathery), hairs short, spinnerets stout and close together. - Pedipalpus (figs. 53-57): Tibia apophysis slightly bent sperm ducts as in the figs., embolus: A slender part is followed by a quite thin part in a long loop and bearing an indistinct seam. The tegulum bears a long, flat and translucent structure, probably functioning as a conductor. - Note:During the drawings the conformation of the sclerites of the bulbus have slightly changed their position.

Relationships: The new species is closely related to *palliardi* (L. KOCH 1882 and especially to *celans* (BLACKWALL 1841); especially in *palliardi* the body colour is darker, in both species the embolus and its loop are shorter; the shape of the sperm duct is also different.

Distribution: Portugal: Algarve.

Family CORINNIDAE

Castianeira badia (SIMON 1877)

Material: Portugal, Algarve, 3 km S Mesquita Alta, Desbarato, 5 km SE Sao Bras de Alportel, stony meadow with some bushes, under a stone, 1♀ JW leg. 20. II. 2024, CJW.

The body length of the spider is 8 mm, its prosoma length is 4.0 mm.

Distribution: Iberian Peninsula.

Family PHRUROLITHIDAE

Liophrurillus flavitarsis (LUCAS 1846) (fig. 58)

Material: Portugal, Algarve, near Sao Bras de Alportel, ♂♀ JW leg., 3♀ R323/CJW.

Usually the long ventral tibial and metatarsal bristles I-II of this ant-mimikrying frequent species lie not distinctly close to their article but in some specimens they are distinctly spread off like in one of three of the present females (fig. 58).

Distribution: Most parts of S-Europe, Madeira, N-Africa.

Family GNAPHOSIDAE

Berlandina plumalis (PICKARD-CAMBRIDGE 1872) (figs. 59-60)

(= *Berlandina collisarenosa* WUNDERLICH 2023 (**n. syn**.))

New material: Portugal, SE-Algarve, (1) Altura, in a dune near the beach on the ground within low plants, 1subad. ♂ JW leg. in V 2024, adult in V. 2024, R324/CJW (exuvia and left pedipalpus separated); (2) Fuzeta Island, in dunes near the locus typicus of *B. collisarenosa*, 2 ♂1♀, JW leg in IV 2023, CJW.

Description of the just moulted ♂:
Measurements (in mm): Body length 5.7: prosoma: Length 3.0, width 1.9; opisthosoma: Length 3.0, width 2.0; leg I: Femur 1.9, patella 1.0, tibia 1.5, metatarsus 1.15, tarsus 0.95; tibia II 1.35, tibia III 1.2, tibia IV 1.7.
Colour: Prosoma and legs light (weakly sclerotized and pigmented), legs not annulated.
Body and legs similar to the females of B. collisarenosa, feathery hairs absent, prosoma 1.58 times longer than wide, opisthosoma 1.5 times longer than wide. Leg bristles: Tibia I ventrally a subapical pair of medium length and a retroventral one near the middle, tibia II similar but additionally a retrobasal one. Metatarsi with 2 ventral pairs. Additionally tibia II bears 1 or 1/1 prolateral bristles and metatarsus I bears a prolateral bristle. Patellae: I-II smooth, III-IV with a lateral pair. - Opisthosoma 1.5 times longer than wide. - Pedipalpus (figs. 59-60): The tibia bears 4 prodorsal trichobothria in a row as well as 4 dorsal trichobothria, the median apophysis is placed in a depression and is smaller than in not just moulted males. The conductor of this species possesses a thin black and strongly sclerotized prolateral margin, the embolus is partly/basally hidden.

New synonymy: According to the new material *B. collisarenaria* WUNDERLICH 2023 turned out to be a junior synonym of *B. plumalis* (O. PICKARD-CAMBRIDGE 1872); the female copulatory organ shows a distinct variation.

Distribution: Mediterranean to Asia, W-Africa.

Zelotes beaticoides WUNDERLICH 2023 (figs. 61-62)

New material: Portugal, Algarve, near Sao Bras de Alportel; (1) Fonte Ferrea, below a stone near a stream, 1♂ JW leg. 21. V. 2024, R328/CJW. - Note: The left pedipalpus of the male is lost, the right pedipalpus is loose; (2) Fonte Tareja, pit fall in a mixed oak forest, 1♀ JW leg. In V 2024, R335/CJW (the epigyne has been separated); (3) Desbatato, ca 3 km S Mesquita Alta, pit fall in a meadow, 1♂ JW leg. in VI 2024, R336/CJW.

The male from Desbarato possesses a body length of 6.0 mm, its prosoma is 2.8 mm long.

The female of this species is treated here for the first time: The colour of the prosoma is dark brown; measurements (in mm): Body length 5.5; prosoma: Length 2.5, tibia I 1.4. Epigyne (fig. 61) longer than wide, vulva (fig. 62) with complicated ducts.

Distribution: Portugal, Algarve.

Zelotes* (*Marinazelotes*) *bardiae CAPORIACCO 1928 (figs. 63-64)

Material: Portugal, Algarve, 5 km SE Salo Bras de Alportel, Desbarato, pit fall in a stony meadow, 2♂ JW leg. in IV 2024, JCW.

In 2023 p. 68 I published this mediterranean species under the younger synonym of *Zelotes* (*Marinazelotes*) *costatus* DENIS 1952. ♂-pedipalpus as in figs. 63-64.

***Zelotes lapicidinae* n. sp**. (figs. 67-69)

Etymology: The name of the new species refers to its locus typicus, the area of a quarry, lat. = lapicidinae.

Material: Portugal, Algarve, ca. 5 km ESE Sao Bras de Alportel, ca. 2 km S Mesquita Alta, pit fall within grass near rocks, 2♂ JW leg. in V/VI 2024; holotype R338/CJW, paratype R340/CJW: - Notes: The left legs III-IV and the right legs II-III of the holotype are lost. The left pedipalpus and the left chelicera of the paratype have been cut off and are preserved separately.

Diagnostic characters (♂; ♀ unknown): Colour and legs light brown, tibia and metatarsus I-II bristle-less; pedipalpus (figs. 67-69): Tibia apophysis long, straight, slender and fairly pointed, embolus fairly bent, near its base exists a pointed, slightly bent, not sclerotized, 0.1 mm long hair or hair-shaped structure, see below.

Description (♂):
Measurements (paratype <holotype> in mm): Body length 3.2 <3.9> prosoma: Length 1.6 <1.85>, width 1.2 <1.35>, length of the thoracic fissure 0. 09; opisthosoma 1.8 <2.0>, width 0.9; its dorsal scutum: Length 0.35 <0.4>, width 0.6 <0.7>; leg I: Femur 1.0, patella 0.7, tibia 0.8, metatarsus 0.7, tarsus 0.65; tibia II 0.8, tibia III 0.7, tibia IV 1.1.
Colour: Prosoma and legs light brown, opisthosoma dorsally medium grey, ventrally light grey.
Prosoma 1.33 times longer than wide, hairs and thoracic fissure short, 8 eyes of medium size in a narrow field, posterior row straight, posterior median eyes spaced by about their radius, anterior cheliceral articles robust, anteriorly bearing long hairs, fangs long, posterior margin of the fang furrow with 2 tiny teeth, anterior margin with 4 larger and 2 tiny teeth besides longer hairs. Sternum not elongated between coxae IV. - Legs stout, order IV/I/II/III, femora – especially IV – distinctly thickened, hairs of medium length, claw tufts well developed on I-II, absent on III-IV, tarsal scopulae I-II distinct. Bristles: All patellae usually smooth but the paratype bears a strong bristle on the right patella III; bristles on I-II: Femora dorsally 1/1 and prolaterally 1 in the distal half, thin, tibiae and metatarsi smooth. - Opisthosoma bearing dorsal hairs of medium length and a short anterior scutum.- Pedipalpus: See above. Questionable hair on the tegulum: Unfortunately its insertion/base is hidden. According to its upright position it may well be a sensory hair. Note: Hairs on the tegulum are reported from several families, see WUNDERLICH (2023: 5).

Relationships: In *Zelotes longipes* (L. KOCH 1866) is red- to dark brown, the structures of the sclerites of the bulbus are different.

Distribution: Portugal, Algarve.

***Zelotes* (*Civizelotes*) *latapophysis* n. sp.** (figs. 70-72)

Etymology: The name of the spider refers to the blunt and apically wide shape of its pedipalpal tibia apophysis, from latus (lat.) = wide.

Material: Portugal, East Algarve, the small village Campeiros, 37.248985 N 7.531581 W, 10 km N of Altura, in a spider web on the floor of a house, holotype ♂ JW leg. 5. IV. 2024, R339/CJW. - Note: The male is in a bad condition, it has been dried out for an unknown time, the. opisthosoma is shrunk, some legs are lose, spider threads and remains of questionable digestive fluid exists at the spider which probably has been the prey of a spider

Diagnostic characters (♂; ♀ unknown): Colour of prosoma and legs light brown, opisthosoma medium grey. Pedipalpus (figs. 70-72): Tibia apophysis fairly bent, blunt and distally wide, cymbium with a probasal hump, embolus distally thin, describing a wide loop.

Description (♂):
Measurements (in mm): Body length 3.5; prosoma: Length 2.0, width 1.25; opisthosomal length 1.6; leg I: Femur 1.5, patella 0.7, tibia 1.2, metatarsus 1.05, tarsus 0.75; femur IV 1.5, height 0.5.
Colour see above.

Prosoma 1.6 times longer than wide, anteriorly wide, hairs rubbed off, thoracic fissure short, 8 fairly large eyes in a narrow field, posterior row straight, posterior median eyes largest, oval, spaced from each other by about their radius. Because of the bad condition of the spider chelicerae and moth parts were not studied. The sternum spaces weakly the coxae IV. - Legs stout, order IV/I/II/III, claw tufts existing, scopulae absent. Most bristles are rubbed off, tibia and metatarsus I smooth, I did not find bristles on the patellae. - Opisthosoma soft, bearing dorsally short hairs. - Pedipalpus: See above.

Relationships: In related species like *dentatidens* (SIMON 1914), *gracilis* (CANESTRINI 1858), *ibericus* SENGLET 2012 and *pygmaeus* MILLER 1943 the colour of prosoma and legs is also light brown but the shape of the tibia apophysis of the male pedipalpus is distally slender and the structures of the bulbus are different.

Distribution: Portugal, Algarve.

Family SALTICIDAE

Euophrys marusiki WUNDERLICH 2023 (figs. 73-74)

The female of this species is described here for the first time; see Beitr. Araneol., 16: 73-74, figs. 177-183 (♂).

Material: S-Portugal, Algarve, near Alportel, Fonte Tareja, the same locality like the holotype, in a pit fall, JW leg. In IV 2024, R331/CJW. Opisthosoma and epigyne are kept separately.

Diagnostic characters (♀): Colour: Prosoma and opisthosoma uniformly dark, almost black, cephalic part black, dorsal prosomal hairs may be rubbed off but the clypeus bears distinct white hairs, sternum yellowish, pedipalpi light grey, legs grey, partly distinctly annulated. Epigyne/vulva (figs. 73-74): “Window” of the epigyne quite large, ducts of the vulva rather short, wall of the receptacula seminis thin.

Description (♀):
Measurements (in mm): Body length 4.0, prosoma: Length 1.9, width 1.25; opisthosoma: Length 2.3, width 2.0; leg I: Femur 0.9, patella 0.55, tibia 0.57, metatarsus 0.4, tarsus 0.28; tibia II 0.6, tibia III 0.52, tibia IV 0.85.
Colour: See the diagnostic characters
Prosoma 1.5 times longer than wide, shape rectangular, thoracic furrow absent, 8 eyes in three rows similar to the male, clypeus short, height less than 1/3 of the diameter of a large anterior median eye. - Legs robust, order IV/I/II/III, scopulae absent, claw tufts dense, hairs not distinct. Bristles: Femora dorsally 1/1 and subapically up to 3, patellae dorsally only 1/1 hair-shaped structures and one retrolateral bristle on III-IV., tibiae dorsally none, tibia I ventrally 3 pairs, tibia II only 1/1 retroventrally, metatarsi I-II 2 ventral pairs, tarsi none, tibia and metatarsus III-IV bear numerous bristles. - Opisthosoma 1.15 times longer than wide, hairs indistinct, dorsal scutum absent. - Epigyne/vulva: See the diagnostic characters.

Relationships: In *nigripalpis* SIMON 1937 the hairs of the ♂-clypeus are red-orange (the ♂-clypeus of *marusiki* bears remains of white hairs; in the female exist numerous white hairs), the ducts of the vulva are distinctly longer. In *herbigrada* (SIMON 1871) the colour of the body and the structures of the vulva are distinctly different. In *rufibarbis* (SIMON 1868) the ♂-prosoma is dorsally mainly orange brown, the structures of the vulva are different. In all these species a dorsal scutum of the opisthosoma is absent.

Distribution: S-Portugal, Algarve.

Pseudeuophrys lanigera (SIMON 1871)

Material: Portugal, 1 km S Mesquita Alta, 4 km E Sao Bras de Alportel, under a stone, 1♂ JW leg. 20. I. 2024, R310/CJW.

In the present male the retrolateral tibial apophysis of the pedipalpus is apically not furcate like in most conspecific specimens, see the WSC, Spiders of Europe. I regard the apical shape of this apophysis as intraspecifically variable.

Distribution: Europa, Caucasus, Iran?

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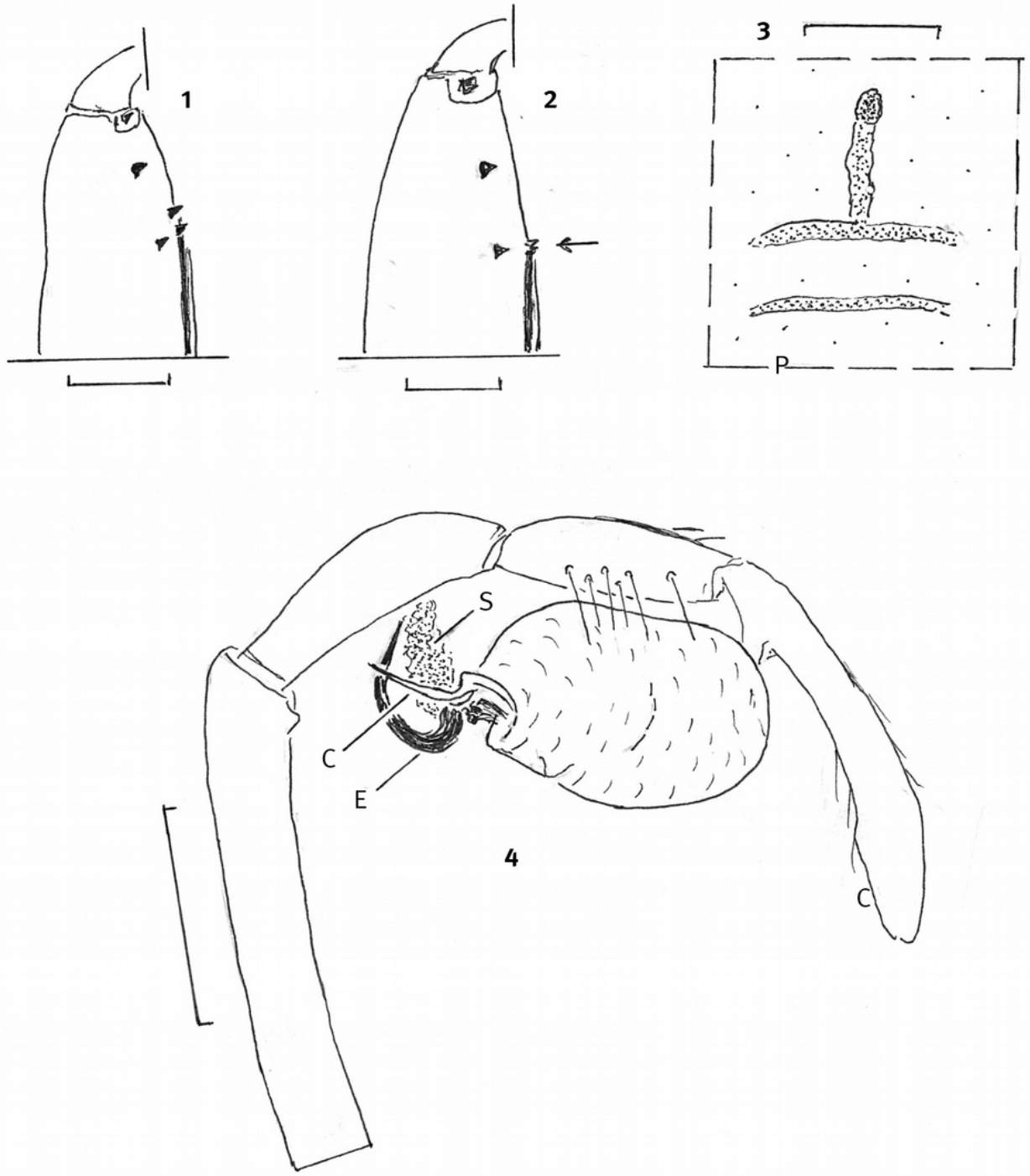
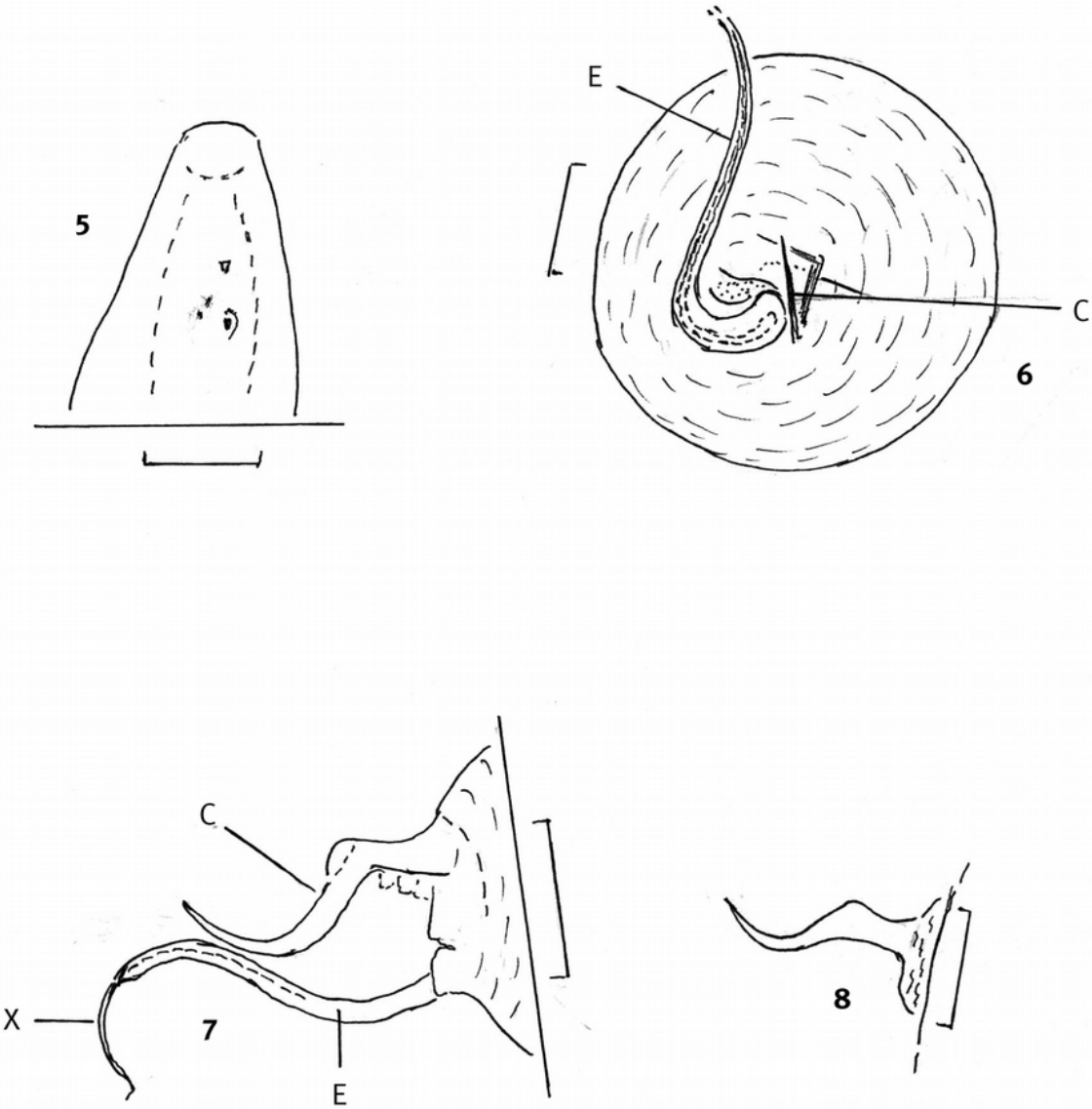
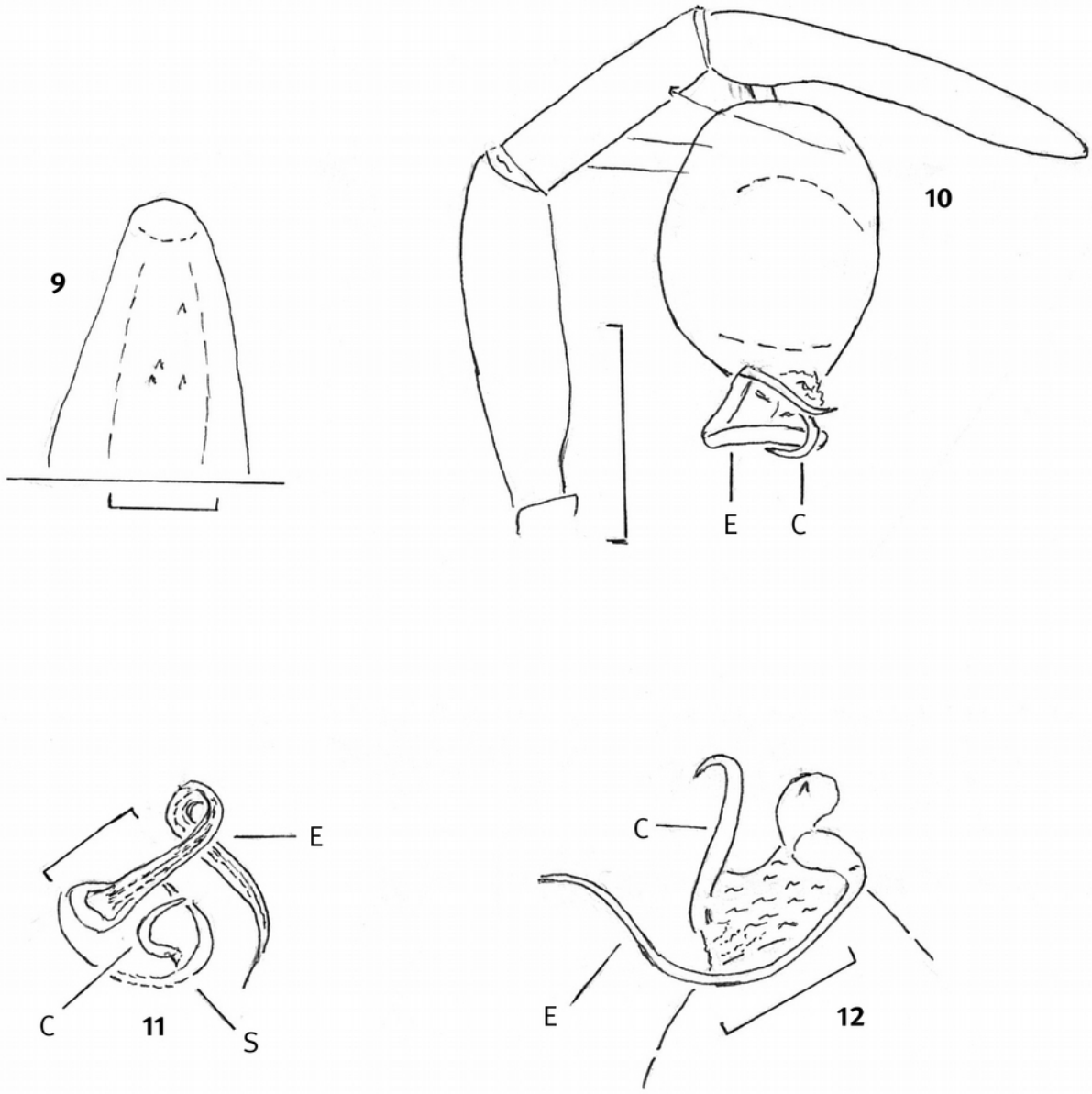


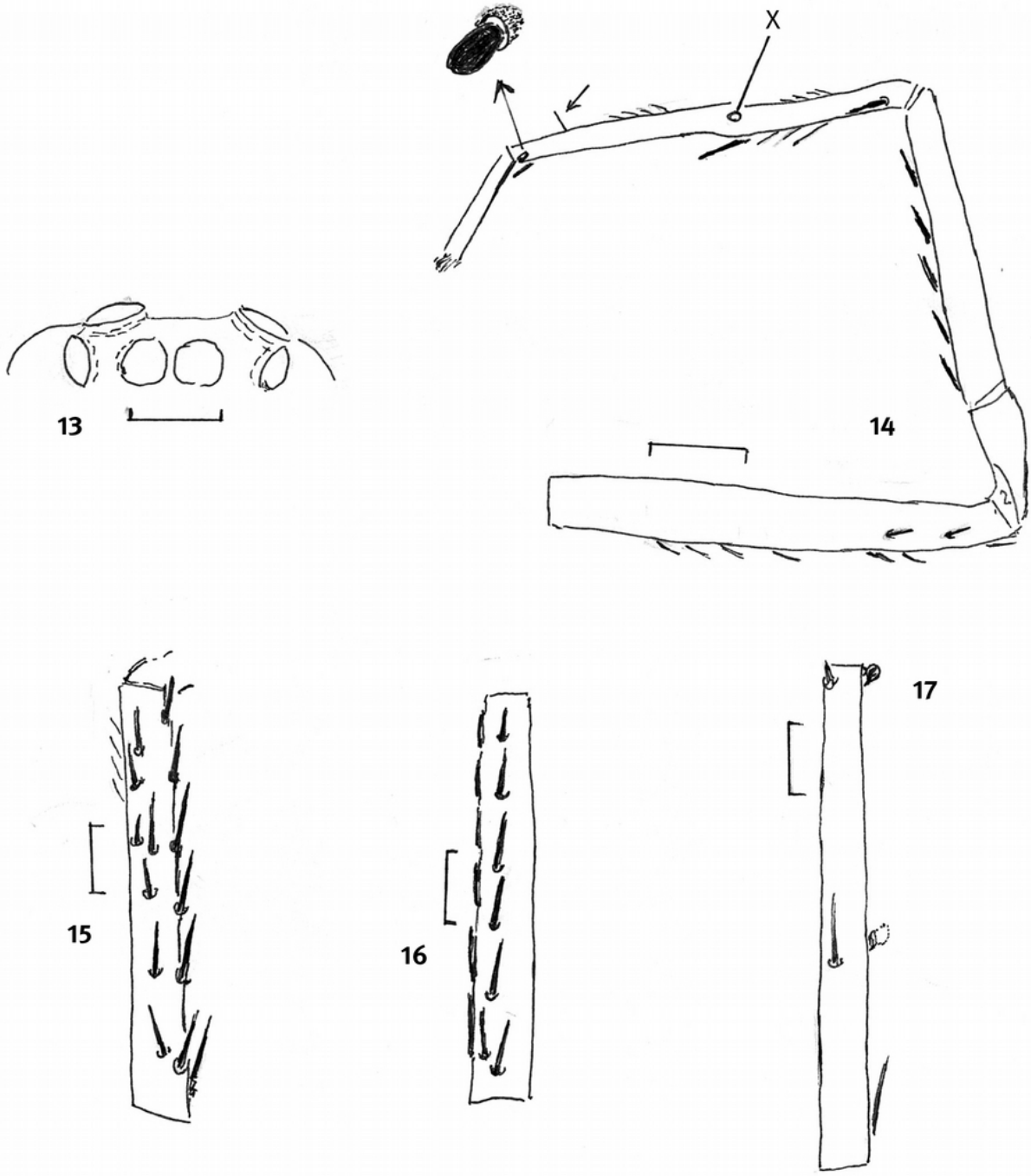
Figs. 1-3: *Harpactea tavirensis* WUNDERLICH 2020, ♀; 1-2) retroventral aspect of the right chelicera. The arrow in fig. 2) points to the divided tooth at the apical end of the medial keel; 3) dorsal aspect of the vulva;
fig. 4) *Harpactea fontetareja* **n. sp.**, ♂, prolateral aspect of the left pedipalpus. Only few hairs are drawn. - C = conductor, E = embolus, S = sperm mass. Scales 0.1 in fig. 3, 0.2 in figs. 1-2, 0.5 in fig. 4.



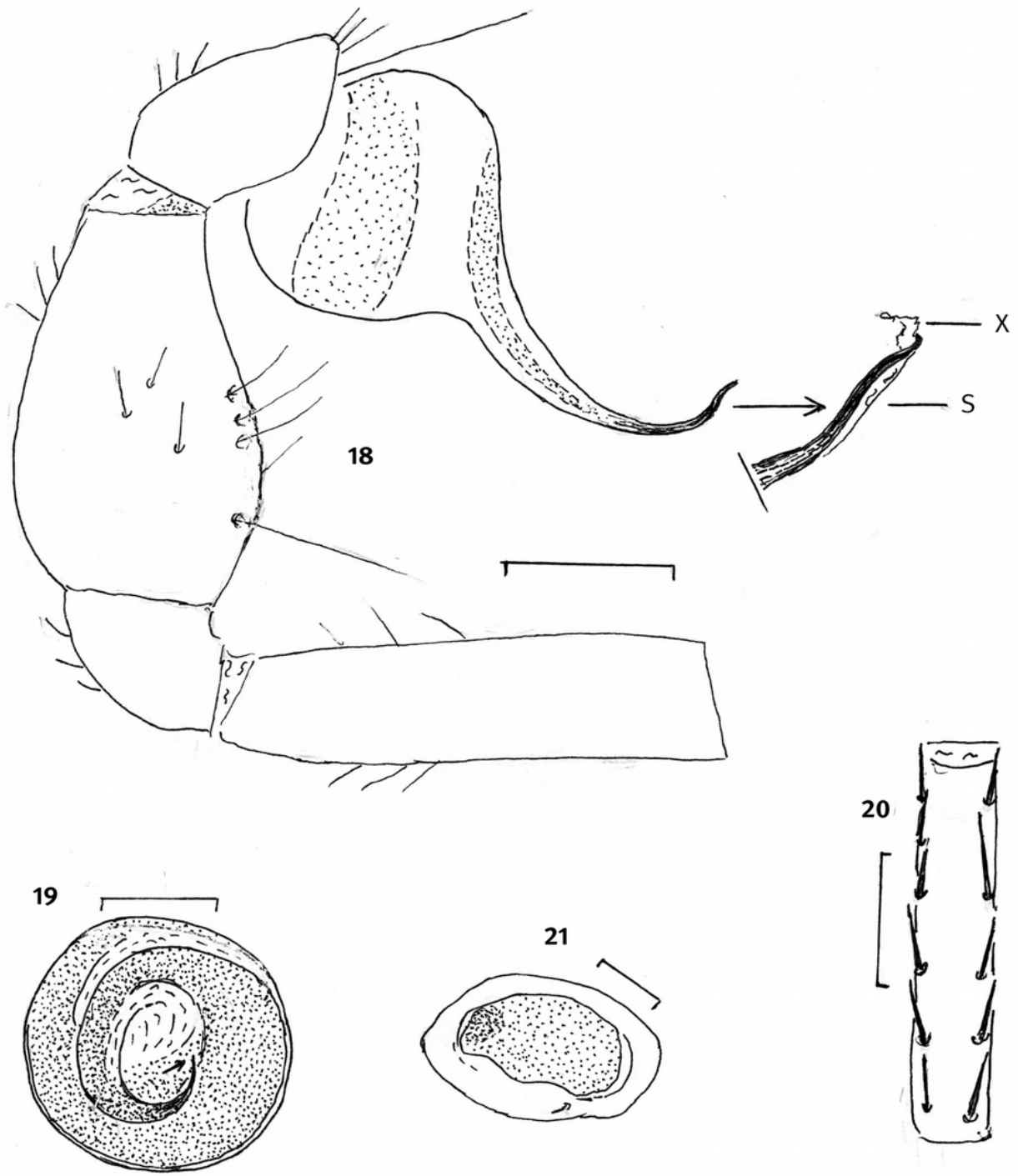
Figs. 5-8: *Harpactea fontetareja* **n. sp**. ♂; 5) proventral aspect of the distal part of the left chelicera; 6) apical aspect of the left bulbus, the tip of the embolus is hidden by sperm; 7) retrolateral aspect of the distal part of the right bulbus; 8) conductor, different aspect. - Scales 0.1 mm. C = conductor, E = embolus, X = secretion.



Figs. 9-12: *Harpactea planembolus* **n. sp**., ♂; 9) prolateral ("ventral") aspect of the distal part of the left chelicera; 10) prolateral aspect of the left pedipalpus; only few hairs are drawn; 11) prolateral aspect of the embolic division of the left bulbus; 12) proventral and slightly distal aspect of the embolic division of the left bulbus. - Scales 0.5 mm in fig. 10), 0.1 in the remaining figs. C = conductor, E = embolus, S = sclerotized surrounding of the base of the conductor.



Figs. 13-17: *Ariadna amandahorta* **n. sp.**, ♂; 13) dorsal aspect – and slight position from the right side – of the eyes; 14) prolateral position of the right leg I. The club-shaped metatarsal bristle from the middle (x) is broken off on this leg; its shape is as in the apical bristle (long arrow, enlarged). The short arrow points to the metatarsal trichobothrium; figs. 15-16) retrolateral and ventral aspect of the right tibia I. Note the single rows of each 7 retroventral and 7 ventral bristles; 17) ventral aspect of the right metatarsus I. - Scales 0.2 mm in fig. 13), 0.5 mm in the remaining figs.



Figs. 18-21: *Ariadna amandahorta* **n. sp**.; 18-19) ♂; 18) retrolateral aspect of the right pedipalpus. The arrow points to the enlarged tip of the embolus with its seam (S) and and a questionable secretion at the tip. Only few hairs are drawn; 19) apical aspect of the right bulbus. The arrow points to the tip of the embolus; 20-21) ♀; 20) ventral aspect of the right tibia I; 21) oblique retroventral aspect of the tip of the left coxa I which has been broken off by autotomy, has been healed and is closed now by a questionable sclerotization (dotted). - Scales 0.5 mm in fig. 20), 0.2 mm in the remaining figs.

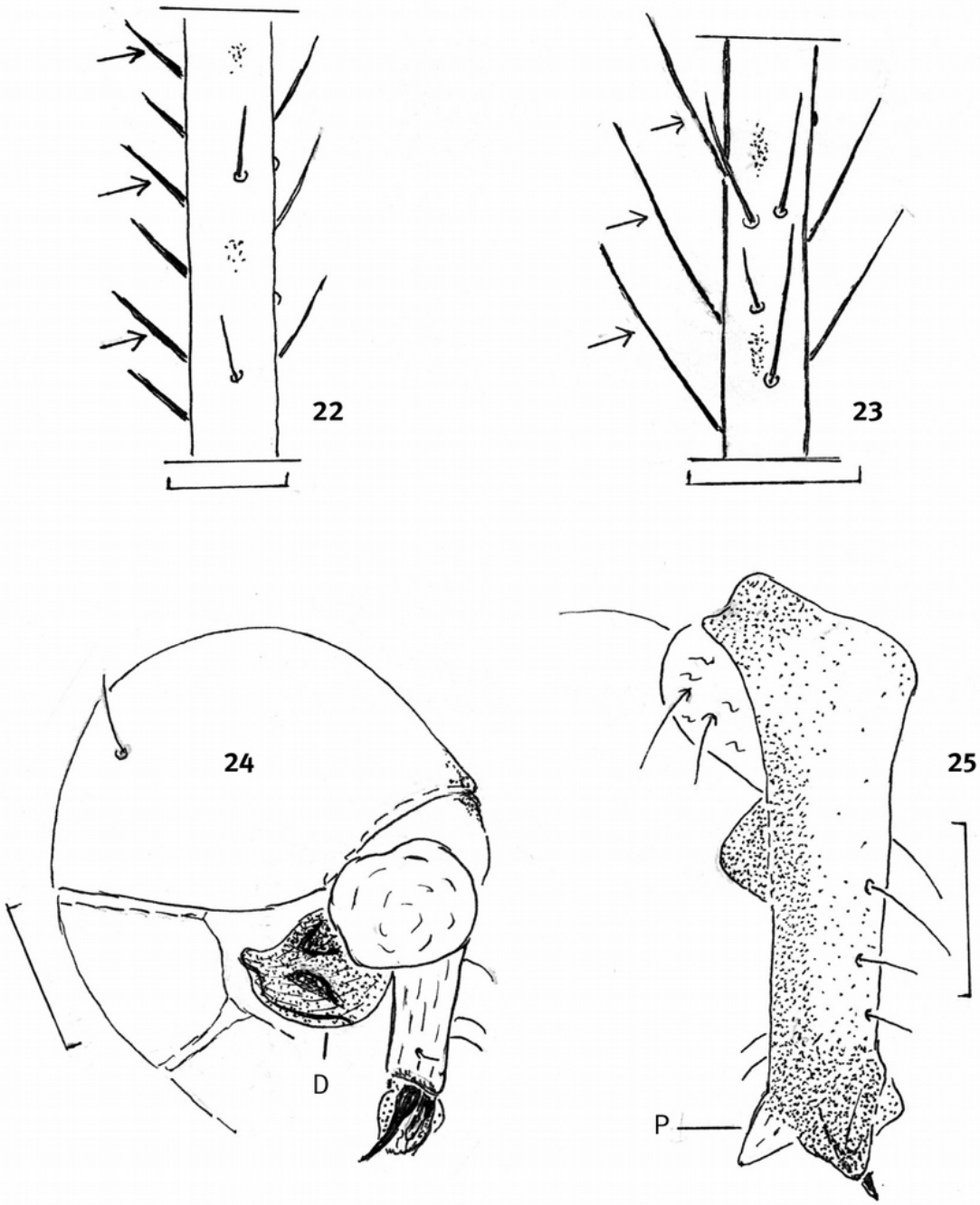
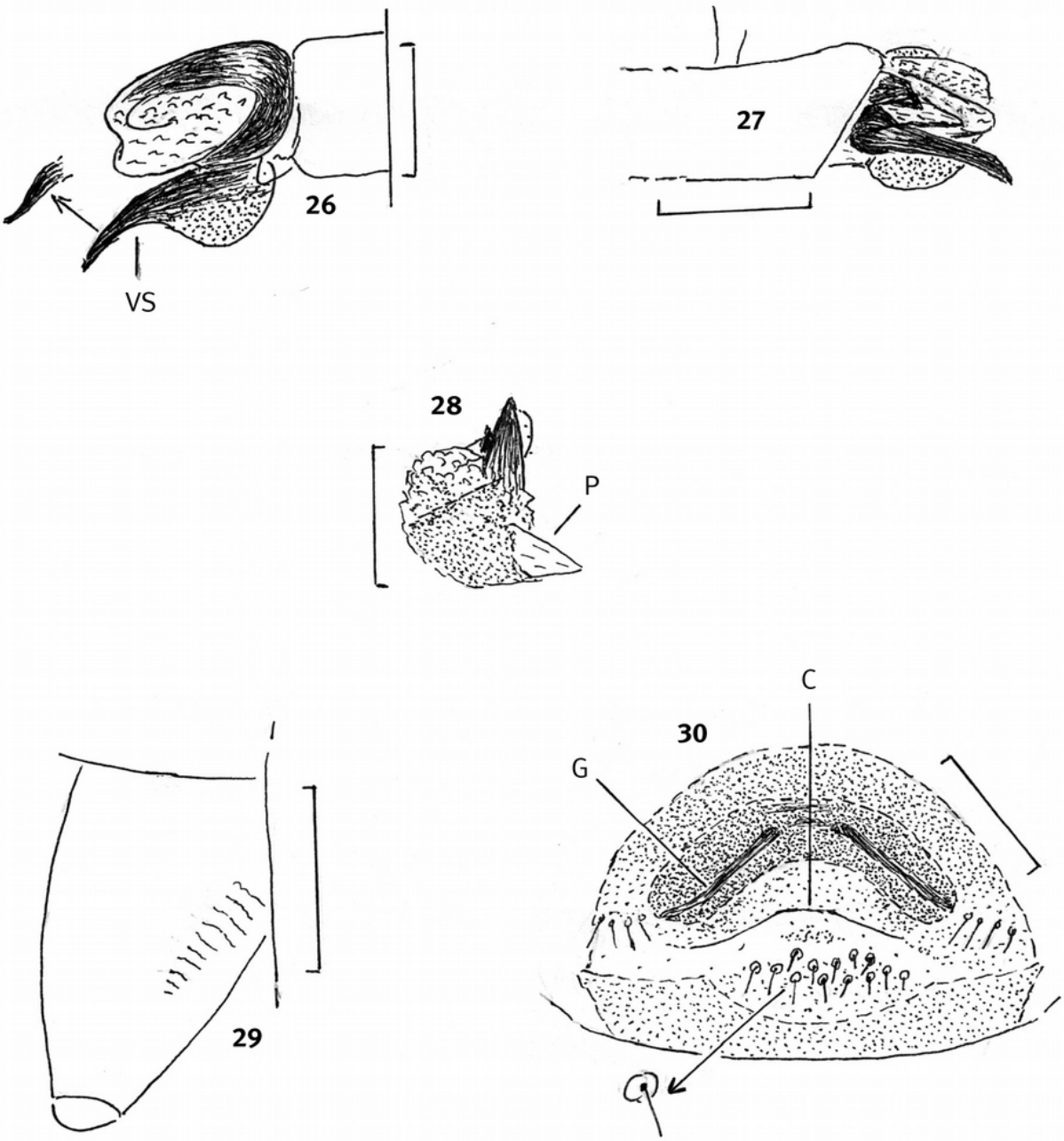
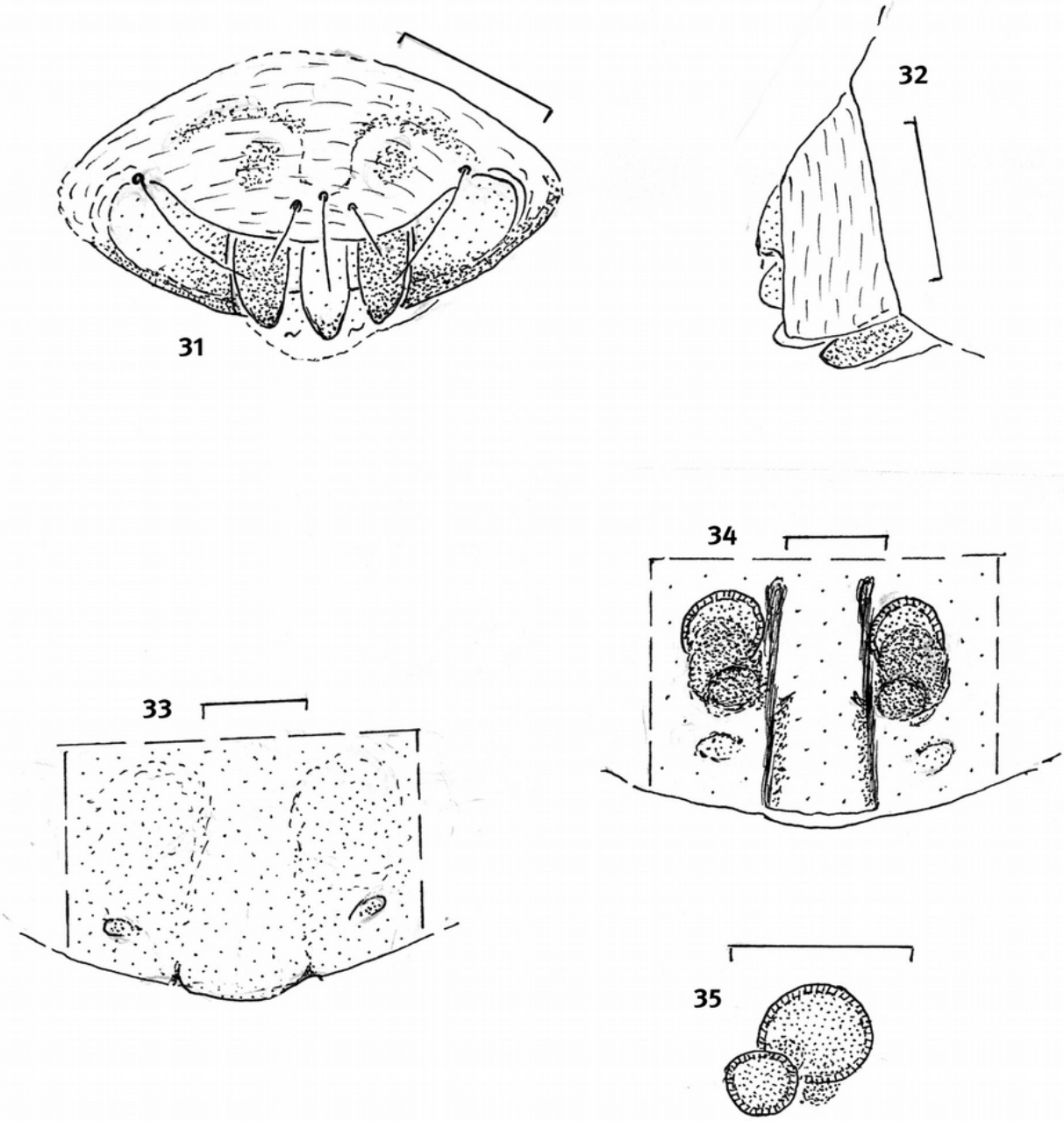


Fig. 22) *Holocnemus pluchei* (SCOPOLI 1763), ♂, near Sao Bras de Alportel (Portugal), retrolateral aspect of a distal part of the left femur I. The arrows point to 3 ventral bristles.

Figs. 23-25: *Holocnemus hispanicus* WIEHLE 1933, ♂ R313/CJW, Fonte Tareja near Sao Bras de Alportel; 23) retrolateral aspect of a short section of the distal part of the left femur I. The arrows point to 3 ventral hair-shaped bristles (or bristle-shaped hairs?); 24) prolateral aspect of the left pedipalpus; 25) dorsal aspect of the procursus of the left pedipalpus. Only few hairs are drawn. - Scales 0.2 in fig. 24), 0.5 mm in the remaining figs. D, P: Dorsal and prolateral sclerite.

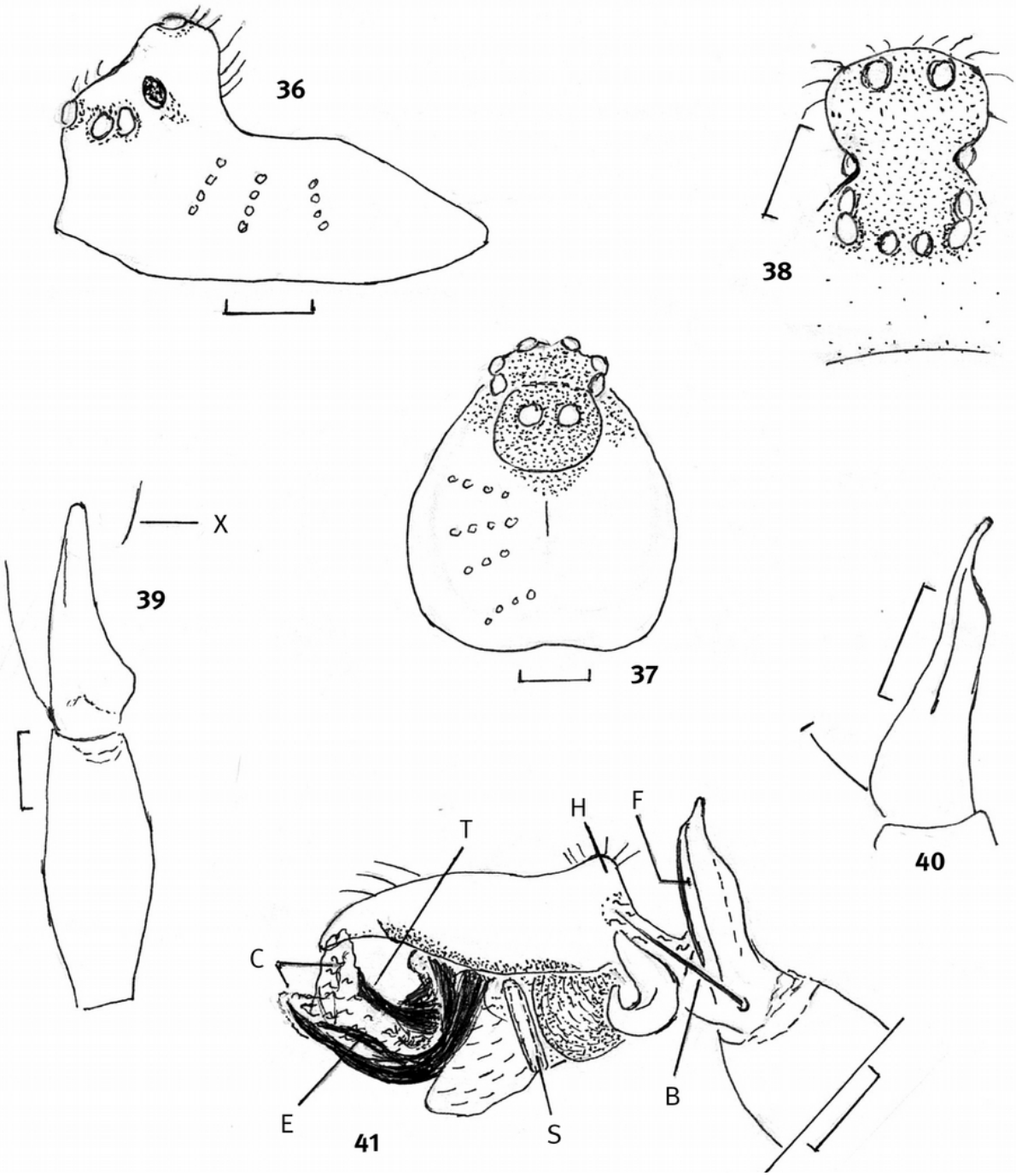


Figs. 26-30: *Holocnemus hispanicus* WIEHLE 1933, 26-28) ♂, retrolateral, prolateral and apical aspects of the distal part of the procursus of the left pedipalpus; 29-30) ♀; 29) retrolateral aspect of the left chelicera, note the stridulatory files; 30) genital area; the arrow points to an enlarged hair of the hairy field; not all hairs are drawn. - Scales 0.2 mm in fig. 29), 0.1 in the remaining figs. C = low border of the cuticula, G = long right grove, P = prolateral sclerite, VS = ventral sclerite, two slightly different aspects.

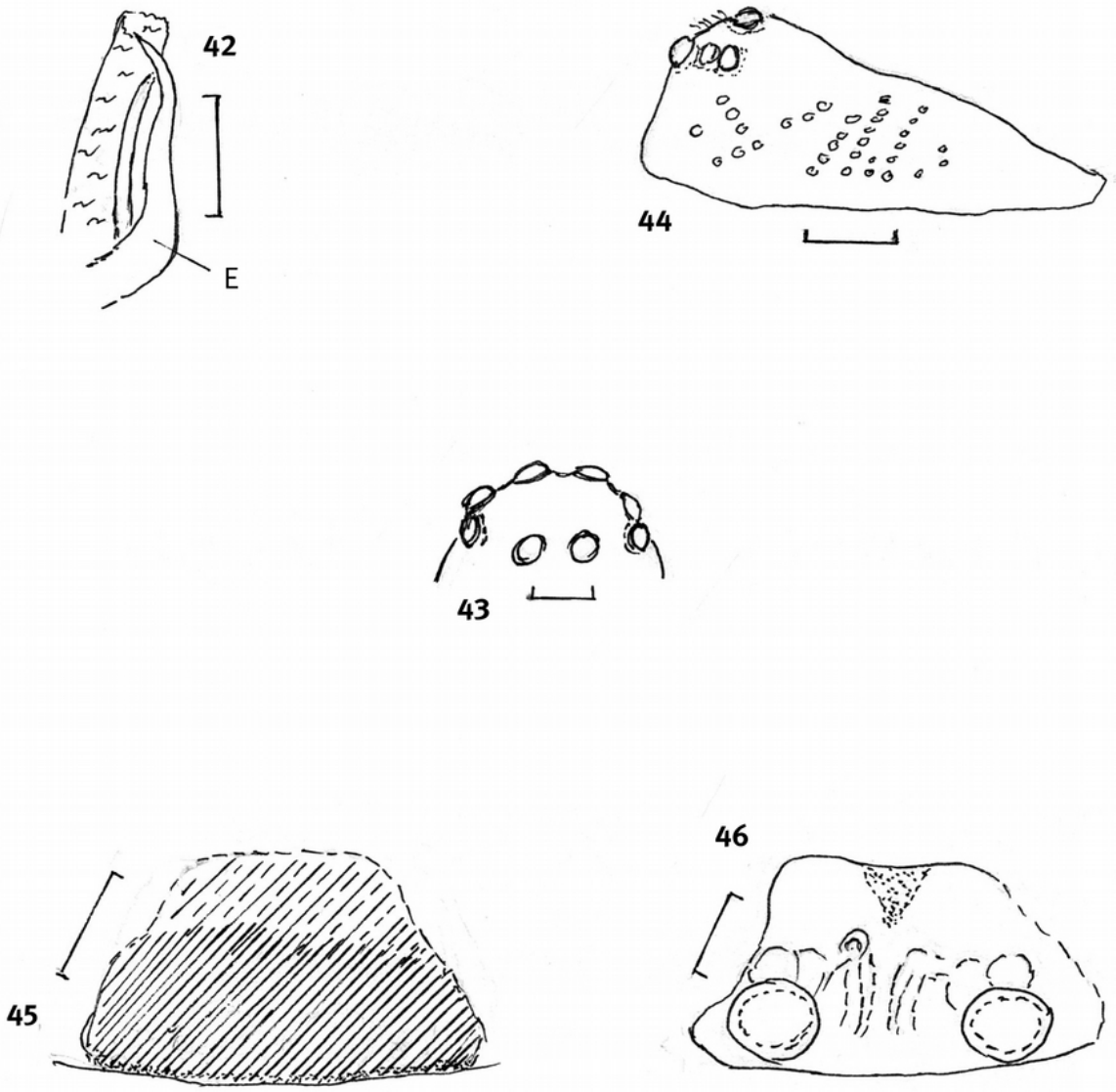


Figs. 31-32: *Centromerus succinus* (SIMON 1884), ♀, ventral and lateral aspect of the epigyne.

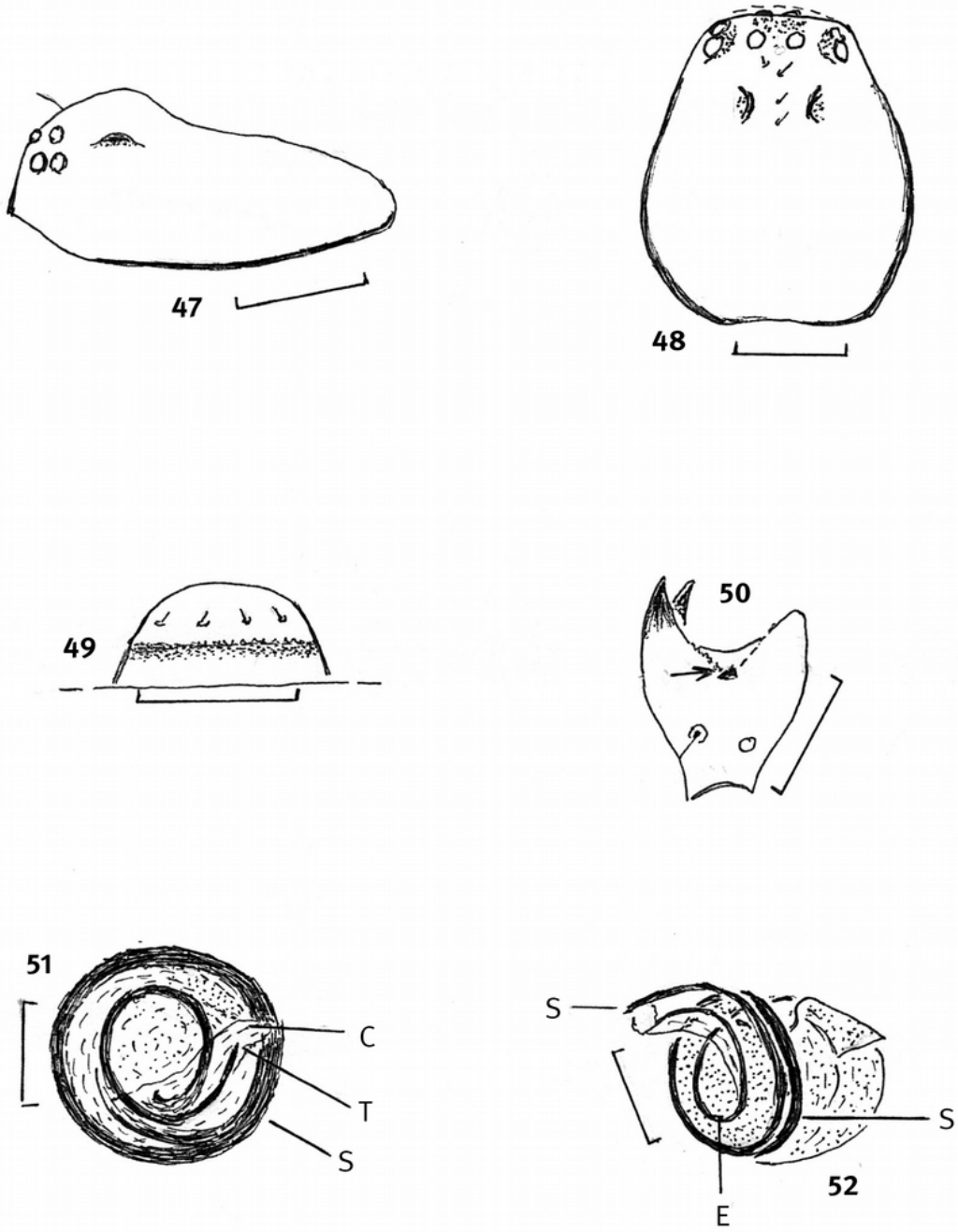
Figs. 33-35: *Asthenargus desbaratoensis* **n. sp**., ♀, 33) epigyne, a stroglc sclerotizes black brown plate; 34) dorsal aspect of the vulva; 35) slightly different aspect of the left receptacula seminis. - Scale 0.1 mm.



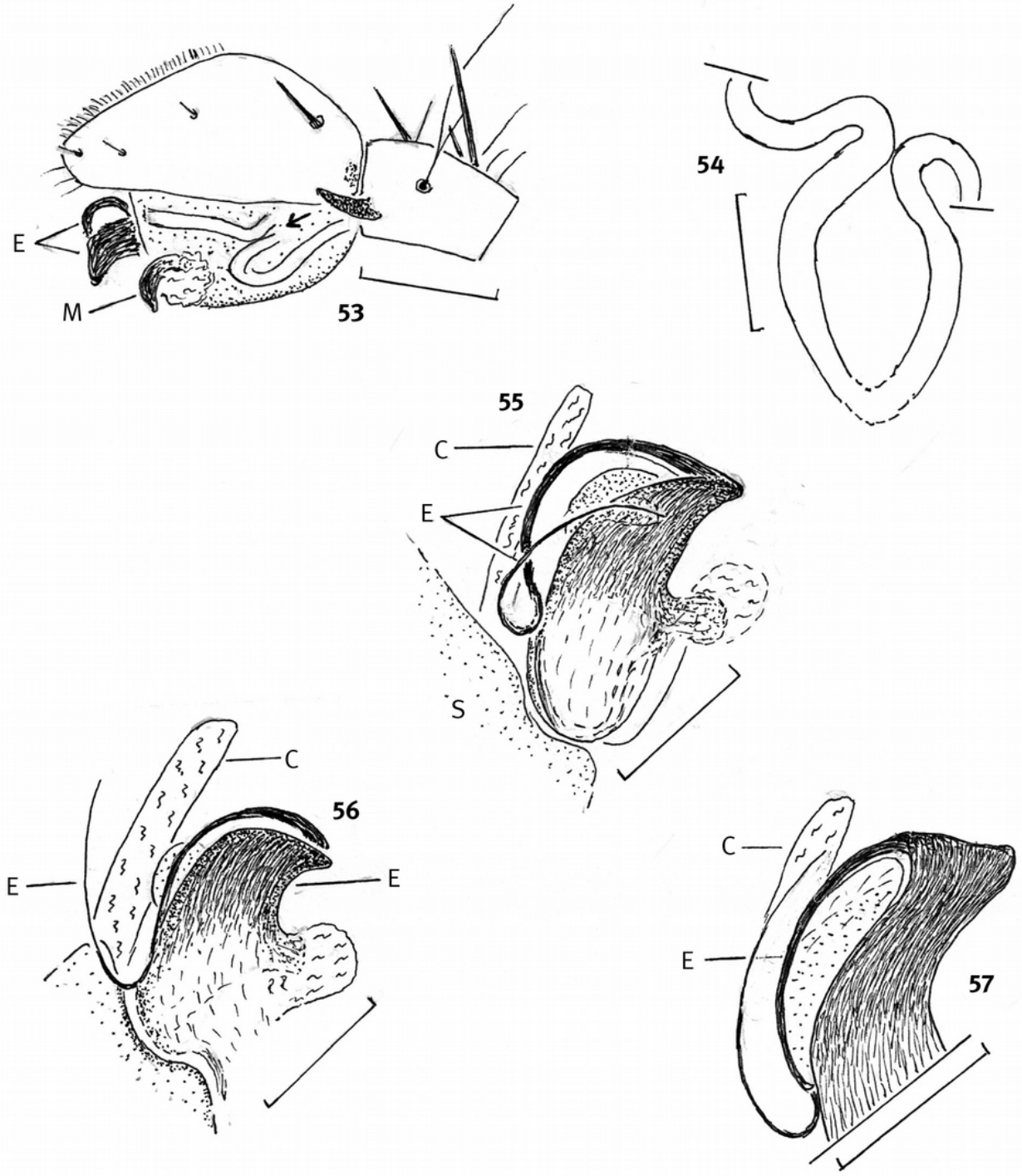
Figs. 36-41: *Pelecopsis hillyardi* **n. sp.**, ♂; 36-38) lateral, dorsal and anterior aspect of the prosoma, only few hairs and depressions are drawn; 39) dorsal aspect of patella and tibia of the left pedipalpus; X = portion of the sharp edge of the cymbial hump; 40) dorsal and slightly retrolateral aspect of the left pedipalpal tibia; 41) retrolateral aspect of the left pedipalpus. - Scales 0.1 mm. B = retrobasal tibial bristle, C = conductor, E = embolus and embolic apopysis, F = longitudinal furrow of the tibial apophysis, H = dorsal cymbial hump, S = sperm duct, T = suprategular apophysis.



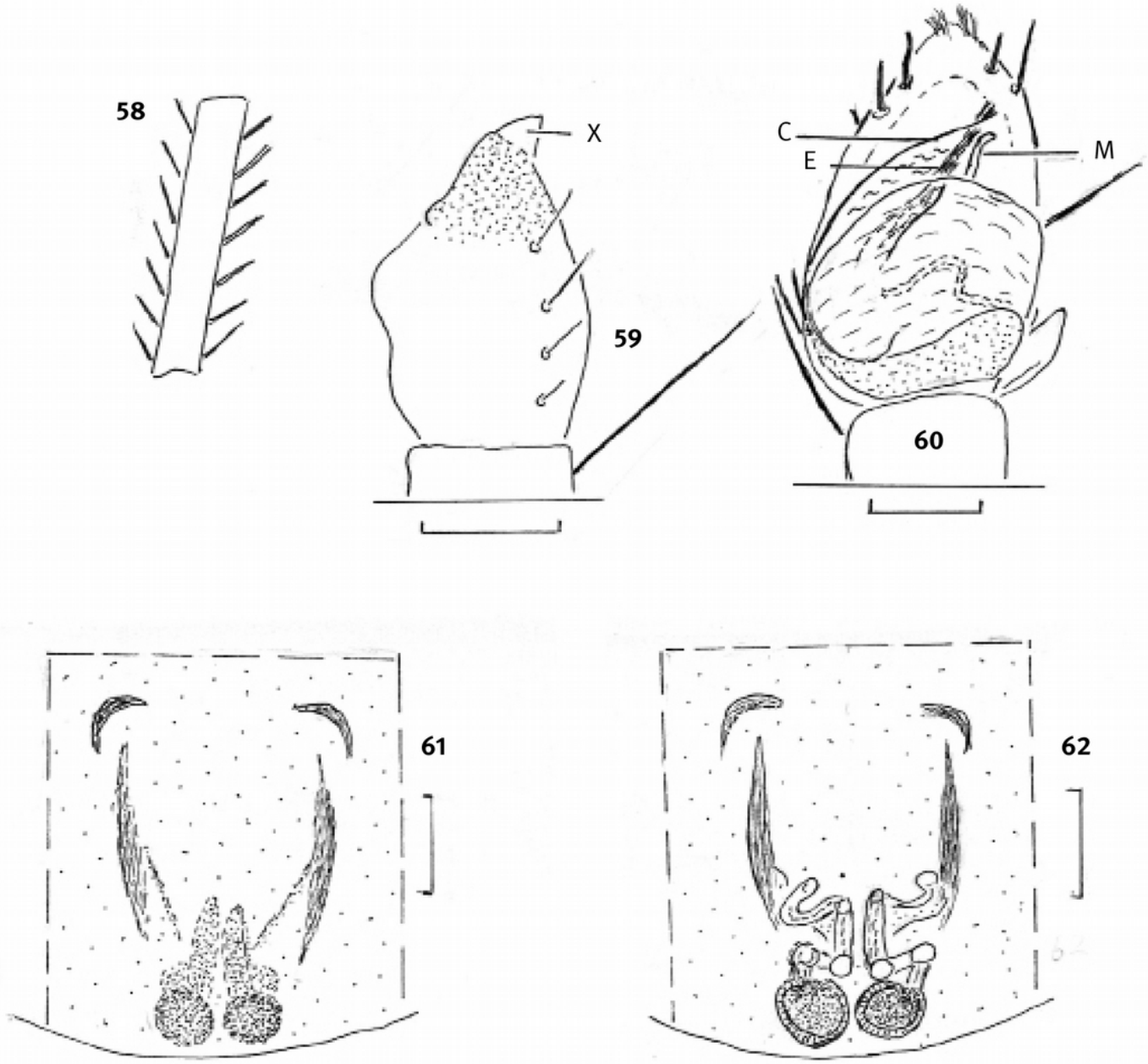
Figs. 42-46: *Pelecopsis hillyardi* **n. sp**.; 42) ♂, prolateral aspect of embolus (E) and conductor; 43-46) ♀; 43) dorsal aspect of the eyes; 44) lateral aspect of the prosoma, only few of the tiny depressions are drawn; 45) epigynal plate which is strongly sclerotized, especially in the posterior half; 46) dorsal aspect of the strongly sclerotized vulva. - Scales 0.2 in fig. 44), 0.1 in the remaining figs.



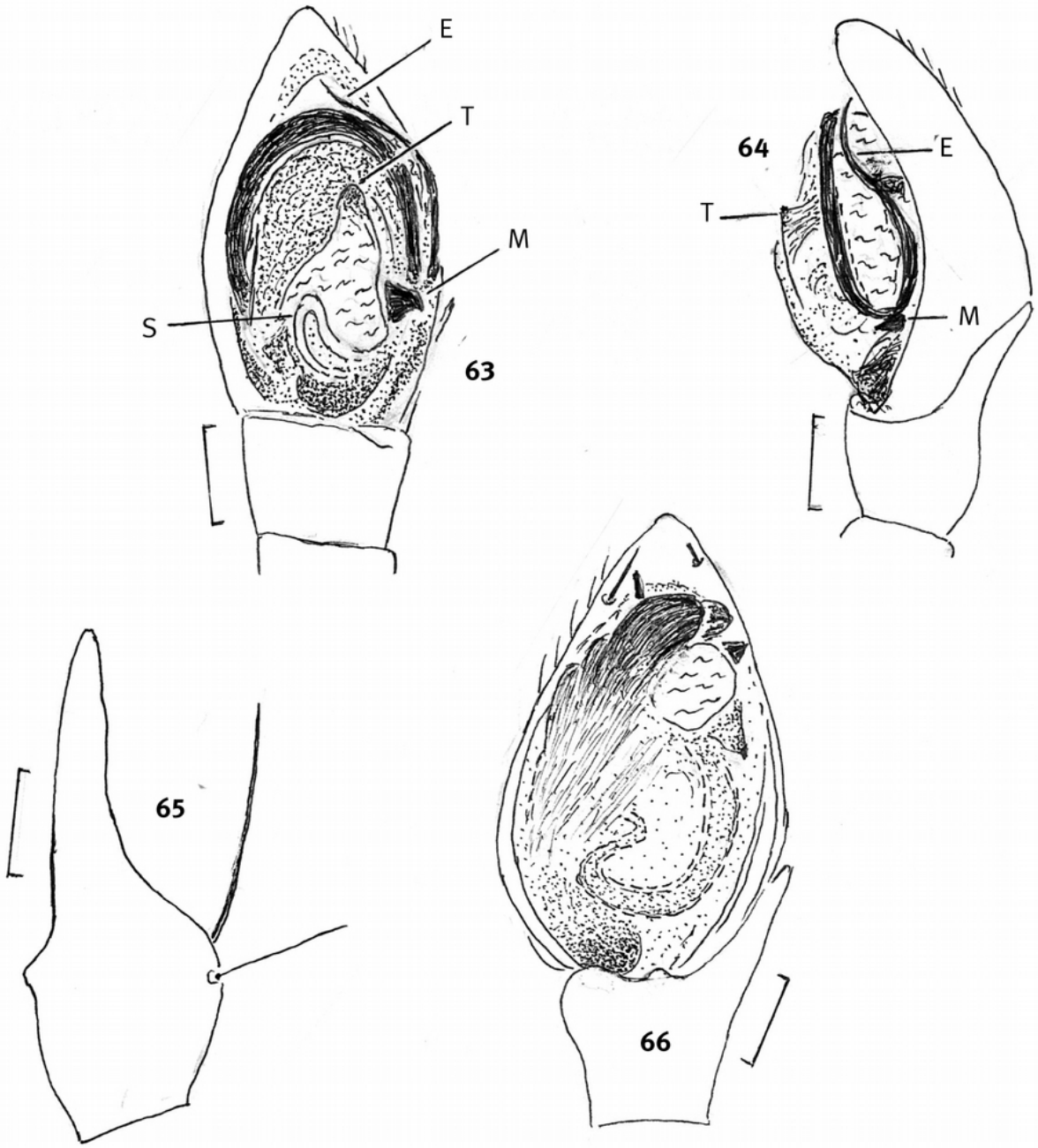
Figs. 47-52: *Silometopus furcatus* **n. sp.**, ♂; 47-48) dorsal and lateral aspect of the prosoma; 49) labium; 50) dorsal aspect of the tibia of the right pedipalpus. The arrow points to the tooth-like dorsal hook; 51-52) apical and ventral aspect of the structures of the expanded right pedipalpus. - Scales 0.2 mm in figs. 1-2, 0.1 mm in the remaining figs. C = conductor, E = embolus, S = suprategular apophysis, T = tip of the embolus.



Figs. 53-57: *Scotina zoraoides* **n. sp**., ♂; 53) retrolateral aspect of the expanded left pedipalpus. The arrow points to the sperm duct which turns prolaterally (inside the bulbus); 54) ventral and slightly retrobasal aspect of the sperm duct of the left pedipalpus; 55-57) different pro- and retrolateral aspects of the embolic division of the expanded left pedipalpus. - Scales 0.2 mm in fig. 53), 0.1 mm in the remaining figs. C = translucent conductor, E = embolus, S = subtegulum.



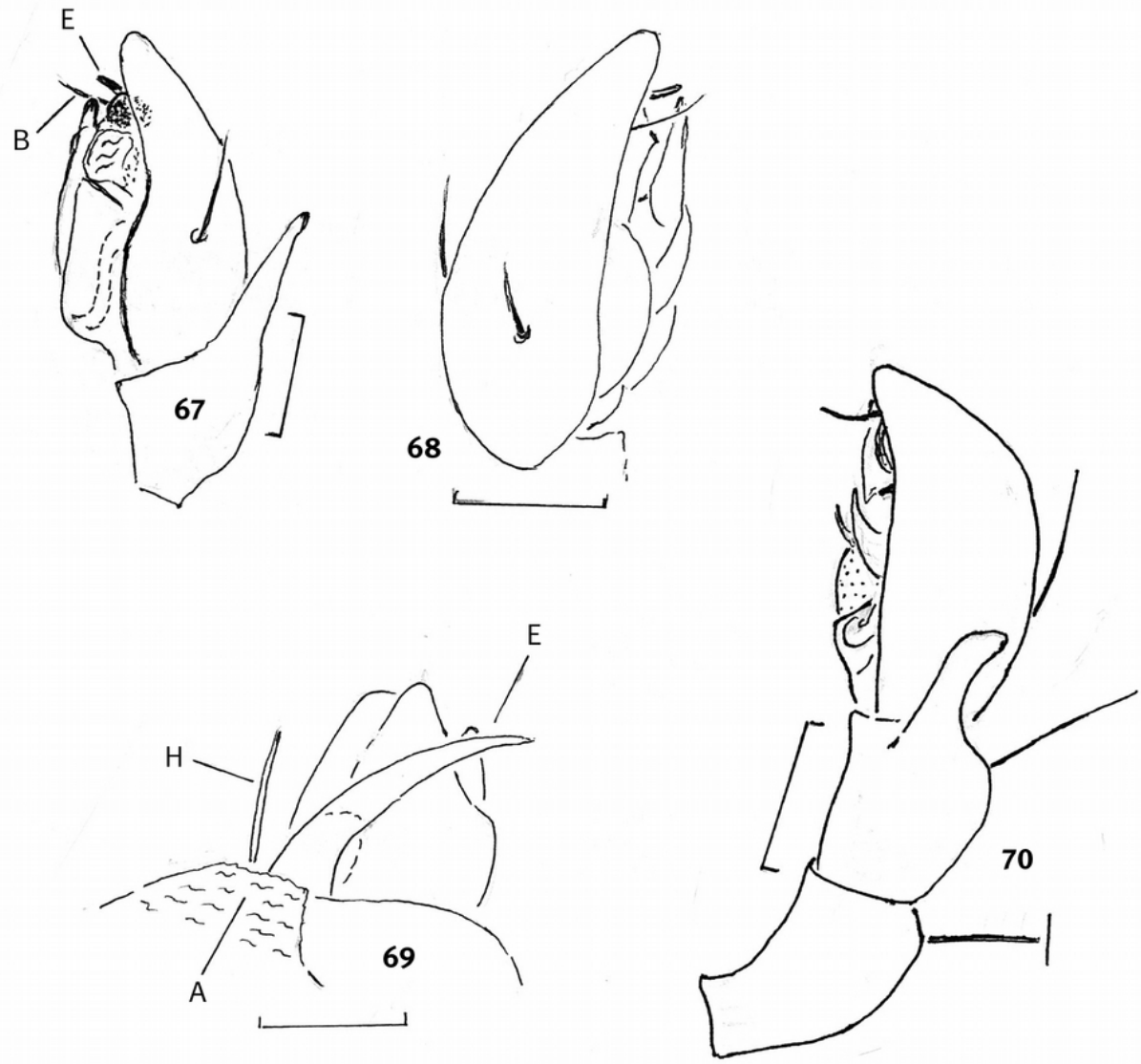
Figs. 58) *Liophrurillus flavitarsis* (LUCAS 1846), ♀, dorsal aspect of the right tibia I with the ventral bristles spread off.
Figs. 59-60: *Berlandina plumalis* (O. PICKARD-CAMBRIDGE 1872), ♂; 59) retrolateral aspect of the tibia of the left pedipalpus. X = flat triangular outgrowth of the tibia apophysis. Note the row of 4 long prodorsal trichobothria; 4 short further trichobothria are not drawn; 60) ventral aspect of the left pedipalpus of the freshly moulted male R324/CJW.
Figs. 61-62: *Zelotes beaticoides* WUNDERLICH 2023, ♀, epigyne and dorsal aspect of the vulva. - Scales 0.2 mm. C = conductor, E = embolus, M = median apophysis.



Figs. 63-64: *Zelotes* (*Marinazelotes*) *bardiae* CAPORIACCO 1928, ♂, ventral and retrolateral aspect of the left pedipalpis.

Figs. 65-66: *Zelotes lapicidinae* **n. sp**., ♂; 65) retrodorsal aspect of the tibia of the left pedipalpus; 66) ventral aspect of the left pedipalpus. Only few hairs are drawn.

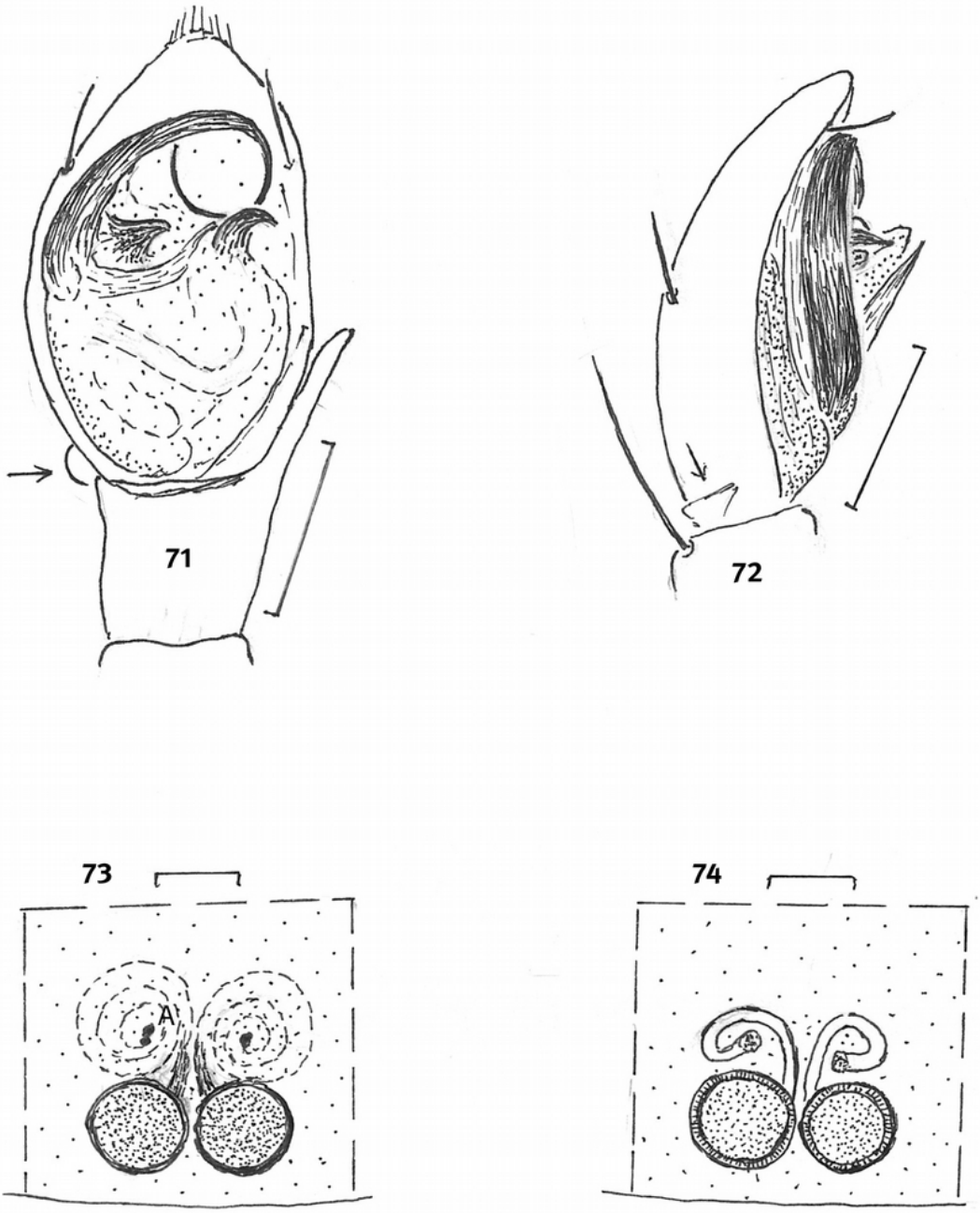
Scales 0.2 mm. E = embolus, M = median apophysis, S = sperm duct, T = tegular apophysis.



Figs. 67-69: *Zelotes lapicidinae* **n. sp.**, ♂; 67) retrolateral aspect of the left pedipalpus; 68) prolateral aspect of cymbium and bulbus of the left pedipalpus; 69) paratypus R340/CJW, prolateral aspect of of the embolic division.

Fig. 70) *Zelotes* (*Civizelotes*) *latapophysis* **n. sp.**, ♂, retrolateral aspect of the left pedipalpus.

Scales 0.1 mm in fig. 69), 0.2 mm in the remaining figs. A = haematodocha, B = bristle, E = embolus, H = hair of the tegulum.



Figs. 71-72: *Zelotes* (*Civizelotes*) *latapophysis* **n. sp.**, ♂, ventral and prolateral aspect of the left pedipalpus. The arrow points to the probasal cymbial hook.

Figs. 73-74: *Euophrys marusiki* WUNDERLICH 2023, ♀, epigyne and dorsal aspect of the vulva. - Scales 0.2 mm in figs. 71-72, 0.1 mm in figs. 73-74.

BEITR. ARANEOL: 17 (2024: 52-63)

NEW FOSSIL SPIDER TAXA IN EOCENE EUROPEAN AMBERS (ARANEIDA: ARANEAE: ARANEIDAE, HERSILIIDAE AND TETRAGNATHIDAE) AND A NOTE ON THE CLIMATE OF THE EOCENE EUROPEAN AMBER FORESTS

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Abstract: The following taxa of spiders (Araneida: Araneae) in Eocene European Baltic, Bitterfeld and Rovno ambers are treated: Family Hersiliidae: *Mengesilia rovnoensis* **n. gen. n. sp**.; family Tetragnathidae: (?) *Anameta tertia* **n. sp**.; family Araneidae: ?*Baltaraneus rotundus* **n. sp**.

Key words: Araneae, Araneidae, Baltic amber, Bitterfeld, Eocene amber forests, Hersiliidae, palaeoclimate, Rovno amber, spiders, Tetragnathidae.

The **material** is kept in the private collection of Joerg Wunderlich (CJW) and will be given most probably to the University of Hamburg.

For almost two hundred years fossil spiders in Eocene Baltic amber have been described and still further taxa are discovered every year. In this paper I describe taxa of three families for the first time.

Family HERSILIIDAE

See WUNDERLICH (2004: 814-821ff) and the paragraph on the Hersiliidae in the paper on Cretaceous spiders of Kachin amber in this volume.

Members of the family Hersiliidae possess certain remarkable and partly quite unusual **diagnostic characters**:

(1) **apomorphic characters**:

- *very* long posterior spinnerets (photo 4) (see (2);
- more than a single metatarsal trichobothrium (fig. 4);
- loss of cribellum and calamistrum;
- usually quite large median eyes (fig. 4);
- in certain taxa divided metatarsi I, II and IV;
- in certain taxa a distinctly elevated eye region (fig. 1);
- in certain taxa – basically? - a life style on surfaces in higher strata, e. g., on tree trunks.

(2) **synapomorphies of Hersiliidae + Oecobiidae (the Oecobioidea):**

- prey encircling/fixing during capturing;
- probably loss of a three-dimensional capture web (a “tent” exists in the Oecobiidae);
- existence of long posterior spinnerets;
- existence of apical cymbial claws/bristle(s) (fig. 3) (frequently a pair, rarely absent/lost as in Cretaceous genera like *Burmesiola* WUNDERLICH 2011; occasionally exist additionally apical or/and retrodistal bristles). This may be a plesiomorphic character;

- most probably existence of a patella-tibia autotomy;
- probably existence of short ventral metatarsal/tarsal – mainly III-IV - bristles (fig. 2).

(3) **Plesiomorphic characters of the Hersiliidae + Oecobiidae** (e. g.):

- the existence of 8 eyes;
- the absence of tarsal trichobothria;
- the existence of an unpaired tarsal claw;
- the existence of feathery hairs on legs and body (at least on the prosoma),
- thickened articles of the ♂-pedipalpus (articles fairly slender, e. g., in *Mengesilia* n. gen. in Baltic amber);
- probably basically *two* pairs of receptacula seminis (an ancient character, too).

Remarks on the phylogeny: (1) According to certain characters listed above I suppose that Oecobioidea and Deinopoidea may be sister taxa. The encircling prey capturing of the Oecobiidae may have been substituted by prey wrapping in the Deinopoidea with the help of a pectunculus. In previous papers I discussed certain similarities of the oecobiid web and the deinopoid orb capture web. I also discussed the similar conformation of the structures of the bulbus of the Cretaceous *Palaeomicromenneus lebanensis* PENNEY 2003, the extant *Deinopis diabolica* KRAUS 1956 (Deinopoidea) and the Cretaceous ?*Burmesiola kachinensis* WUNDERLICH 2020: 154, fig. 145; see also *Breviscauda translucens* WUNDERLICH 2024 (n. sp.) in Kachin (Burmese) amber. - (2) Apparently Hersiliidae and Oecobiidae are sister groups, see above (2). - (3) In my opinion Eresoidea may well be the sister group of Oecobioidea + Deinopoidea; elements similar to the orb web are known in the webs of the Oecobiidae and of the Eresidae as well. But see MIN LI et al. (2022) – especially the "surprising" relationships of the Oecobiidae! - whose results are based mainly on mitochondrial phylogenomics; findings based on important fossil taxa - see, e. g., the taxa listed above as well as the extinct families Lagonomegopidae and Zarqaraneidae - are completely ignored! See also WUNDERLICH (2023: 24-28).

Members of the family Hersiliidae – especially well preserved adult males - are quite rare in Eocene European (and other kinds of) ambers. Among far more than 100 000 spiders in Cretaceous and Eocene ambers I found/know of only a dozen adult males. - Here I describe the first species in Rovno amber from the Ukraine.

Notes: (1) In my opinion two rarely found hersiliid species in Baltic amber described in the 19th century - *Hersilia miranda* KOCH & BERENDT 1854 and *H. longipes* GIEBEL 1854 - may be members of the genus *Hersiliola* THORELL 1870 or a related undescribed genus. A revision is needed, type material is apparently lost. - (2) Several hersiliid specimens indet. (CJW) in Baltic amber are waiting for a study.

Mengesilia **n. gen.**

Etymology: The name of the genus refers (a) to the famous late expert of extant and fossil spiders, ADOLF MENGE, and (b) to part of the family name Hersiliidae.

The gender of the name is feminine.

Type species: *Mengesilia rovnoensis* n. sp.

Diagnostic characters (♂; ♀ unknown): Legs (photo) long and slender, all metatarsi undivided, posterior spinnerets two-jointed, 0.8 times as long as the opisthosoma, cephalic elevation and median eyes (fig. 1) large; feathery hairs distinct on the prosoma and densely on the legs, pedipalpus (fig. 3): Articles relative slender, tibia long, bulbus bearing two tegular apophyses, a questionable conductor and a short embolus.

Relationships to genera in Baltic amber (see also above): In *Gerdia* MENGE 1869 the cephalic elevation is large too, but the eye field is wide, the anterior median eyes are very small and the three-joined posterior spinnerets are as long as the body. In *Gerdiorum* WUNDERLICH 2004 and *Gerdiopsis* WUNDERLICH 2004 the structure of the bulbus is simplier than in *Mengesilia*, only a single median apophysis exists.

Distribution: Eocene Rovno amber forest of the Ukraine.

Mengesilia rovnoensis **n. gen. n. sp**. (figs. 1-3), photo 4.

Etymology: The name of the species refers to its type area Rovno of the Ukraine.

Type material: Holotype ♂ in amber from Rovno of the Ukraine, F3868/UK/CJW.

Preservation and syninclusions: The spider is almost completely preserved in a yellow-orange piece of amber, only most parts of the left leg IV and the tip of the right tarsus IV are cut off, mainly the mouth parts and parts of the bulbus are covered with a white emulsion; the spider's body lies with its dorsal side on a layer/fissure of the amber, the dorsal side of the opisthosoma has largely been injured/hollowed.

Diagnostic characters and relationships: See above.

Description (♂; ♀ unknown):
Measurements (in mm): Body length 5.0; prosomal length ca 2.0; opisthosoma: Length ca. 3.5, width 2.2; leg I: Femur 4.0, patella ca. 0.9, tibia ca. 3.8, metatarsus ca. 3.5, tarsus ca 1.0; tibia II 3.4, tibia III ca. 3.0; anterior spinnerets 0.47, posterior spinnerets: Basal article 0.55, distal article 2.6; pedipalpal tibia ca. 0.6.
Colour medium brown; modified by the preservation.

Prosoma (fig. 1, photo; most parts are hidden) apparently distinctly longer than wide, 8 large eyes on a high elevation, anterior lateral eyes smallest, anterior and posterior eyes widely spaced from each other. - Legs (fig. 2, photo) long, order I/II/IV/III, III distinctly the shortest, hairs short, feathery hairs dense, trichobothria on metatarsus III at least four in two rows, metatarsal III-IV preening comb well developed, paired claws bearing few longer teeth, unpaired claw well developed, bristles numerous and thin, existing from femora to tarsi; I-II: Femora ca. 8, patellae dorsally 1/1 and a lateral pair, tibiae ca. 7, metatarsi at least 6, metatarsus IV with a short ventral-distal bristle, tarsus IV with at least 1/1 ventral bristles in the distal half. - Opisthosoma oval, ca. 1.6 times longer than wide, not widened, hairs short, colulus deformed, anterior spinnerets short, posterior spinnerets two-joined,, 0.8 times as long as the opisthosoma. - Pedipalpus: See above, bulbus partly hidden by a bubble, cymbium with a pair of longer apical bristles.

Distribution: Eocene Rovno amber forest of the Ukraine.

Family TETRAGNATHIDAE

The composition of taxa of the family Tetragnathidae in Eocene Baltic and Bitterfeld ambers is remarkably different from the extant European fauna: 8 Eocene genera are known, see WUNDERLICH (2004: 899f), (2008: 81-83) and (2012: 95f), but only 4 genera are known from Europe today, the – apparently relatively young - genus *Tetragnatha* has not been found in Baltic or Bitterfeld ambers but in younger Miocene Dominican amber. Members of the tetragnathid subfamilies Metinae and Leucauginae were dominant in the Eocene amber forests. Mainly the extinct genera *Anameta, Balticognatha, Corneometa* and *Samlandicmeta* may be not far from extant (sub)tropical genera like *Mesida* and *Tylorida* from Australia (*).

(*) **Note on the climate of the Eocene European amber forests**: Other (sub)tropical higher spider taxa in Eocene ambers – besides certain Tetragnathidae listed above - are, e. g., the tropical Deinopidae, Tetrablemmidae and Thomisidae: Stephanopinae (*) as well as the tropical to subtropical families Anapidae, Archaeidae, Comaromidae, Ctenizidae, Cyatholipidae, Dipluridae, Leptonetidae, Synotaxidae, Telemidae and Theridiosomatidae which existed in the Baltic and/or, Bitterfeld and/or Ukrainian Rovno amber forests, see WUNDERLICH (2004). The existence and the partly high frequency of these more than a dozen spider

families and subfamilies as well as dozens of genera in a mass (!) document in my opinion clearly that these Eocene amber forests possessed several climatic zones separated by space and/or time: moderate climatic areas - probably in mountains in which, for example, members of Linyphiidae: Linyphiinae lived – as well as warm-temperate climate zones, partly southern mediterranean climates, a climate similar to SE-China, see BARTEL (2023), a small tropical zone, and largely subtropical climatic areas as well.
Because of the wide range of the amber forests of probably almost one thousand km from North to South and their long existence of probably more than ten million years were the only few true tropical taxa – see above - (and few specimens as well) probably restricted to the warmest southernmost areas of the Eocene forests and existed furthermore probably only during the earliest time span of the forests.
In short: the composition of the Eocene spider taxa of European amber forests indicate the existence of quite different climatic zones of the former North and Central Europe, mainly from warm-temperate to mediterranean-subtropical.

(*) Further (sub)tropical arachnids in Eocene European ambers are members of the orders Scorpiones and Solifugae which are very rarely preserved in such ambers.

Anametini WUNDERLICH 2008 and the type genus *Anameta* WUNDERLICH 2004

Anameta is the only known genus of the Anametini which is known from Baltic and Bitterfeld ambers; the female is unknown. The taxon is easily recognized by the large, denticulate and erect dorsal horn of the cymbium (fig. 6), apparently an apomorphic character; the kind of its leg autotomy is unknown (completely absent in the three known specimens), its eye position is as in fig. 4 or similar, the clypeus is long, cheliceral stridulatory files and bristles of its pedipalpal articles are absent, the paracymbium is likely to be a free sclerite or – I am not sure – it may partly be fused to the cymbium. (Long ventral hairs of tibia and metatarsus I are absent in *A. tertia* n. sp. in contrast to *A. distenda* WUNDERLICH 2004, the generotype, and in *A. kuntneri* WUNDERLICH 2008).
In 2008: 84 I regarded the enigmatic tribus Anametini as a questionable member of the Tetragnathidae: Diphyinae, and now I am still quite unsure about its relationships. In the Tetragnathidae a leg autotomy is absent, in the linyphiid branch most often a patella-tibia autotomy exists, and the anterior and posterior eyes are close together. I do not want to exclude that Anametini is a member of a derived branch of the Tetragnathidae or a basal branch of the linyphiid branch, and near the Pimoidae.

In this paper I describe a third species of *Anameta*.

***Anameta tertia* n. sp.** (figs. 4-7), photo 5.

Etymology: *Tertia* is the third known species of the genus *Anameta*; the name of the species is based on tertia (lat.) the third.

Material: Holotype ♂ in Eocene Baltic amber, F3866/BB/ CJW.

Preservation and syniclusions: The spider is completely and very well preserved in a yellowish and partly clear piece of amber, its ventral and partly its dorsal side are covered with a white emulsion. - Syninclusions are a Collembola, 2 tiny Diptera: Nematocera, a larger oxidated remain of a plant which is partly cut off, tiny plant hairs, insect excrement and detritus.

Diagnostic characters (♂; ♀ unknown): Only short ventral hairs of tibia and metatarsus I; pedipalpus (figs. 6-7): Cymbium retroapically divided, its large dorsal cymbial outgrowth and its large paracymbium bear cuspules.

Descriptions (♂):
Measurements (in mm): Body length 3.0; prosoma: Length 1.7, width ca. 1.45; opisthosoma: Length 2.0, width 1.5; leg I: Femur 2.2, patella 0.7, tibia 1.9, metatarsus 2.0, tarsus 1.1; tibia II 1.4, tibia III 1.0, tibia IV 1.3.
Colour: Prosoma and legs dark brown, opisthosoma grey brown.
Prosoma (fig. 4, photo) 1.2 times longer than wide, smooth, flat, hairs short, bearing a depression between cephalic and thoracic part, 8 eyes in a wide field, posterior median eyes largest, spaced by more than their diameter, posterior row distinctly recurved, anterior eyes partly hidden, fovea well developed, clypeus long and not protruding, chelicerae, mouth parts and most parts of the sternum hidden. - Legs (fig. 5, photo) of medium length, order I/II/IV/III, hairs not long, bristles thin and partly long, existing from femur to metatarsi, femur I 4 lateral pairs, femur IV 3 dorsally, patellae dorsally 1/1 and usually a small lateral pair, tibia I with 7 bristles, metatarsi I-II with a single dorsal bristle in the basal half, metatarsi III-IV with 3 bristles in the basal half, position of the metatarsal I trichobothrium in 0.9. - Opisthosoma (photo) 1.33 times longer than wide, oval, soft, hairs and spinnerets short. - Pedipalpus (figs. 6-7): Patella and tibia short, bearing long and strong hairs but no bristles, tibia with several long trichobothria, cymbium retroapically divided, bearing a long and erect dorsal-basal outgrowth which bears some cuspules, paracymbium large, bearing long hairs and apparently some cuspules, probably a free sclerite but probably basally fused to the cymbium, subtegulum voluminous, tegulum apparently bipartite; I am not sure about the position of the embolus.

Relationships: In *A. distenda* and in *A. kuntneri* tibia and metatarsus I bear long ventral hairs, the structures of the pedipalpus are different.

Distribution: Eocene Baltic amber forest.

Family ARANEIDAE

See WUNDERLICH (2004: 956f) and (2008: 103).

In the key to most fossil genera of the family Araneidae in Eocene European ambers – see WUNDERLICH (2004: 960-961) - 7 genera are treated but not the Zygiellinae. See also the genera *Anameta* WUNDERLICH 2004 (directly above) and *Eochorizomma* WUNDERLICH 2008 whose relationships are unsure. - Referring to the present taxon the key of 2004 lead to the genus *Bararaneus* WUNDERLICH 2004 (:979), but see below.
In this paper I describe a new species of the subfamily Araneinae whose members are quite rare in Eocene European ambers.

?***Baltaraneus rotundus* n. sp.** (figs. 8-9), photo 6

Etymology: The name of the species refers to the oval/round shape of its paracymbium, from lat. rotundus.

Material: Holotype ♂ in Eocene Baltic amber and a separated piece of amber, F3867/BB/CJW.

Preservation and syninclusions: The spider is well preserved in a clear yellow-orange piece of amber, is not covered with a white emulsion and has probably been slightly heated. Cut off are the right metatarsus and tarsus I, the left patella I as well as the apical part of femur I and the basal part of the left tibia I. - Syninclusions are some tiny stellate plant hairs.

Diagnostic characters (♂; ♀ unknown): Prosoma (photo) as wide as long, with a narrow cephalic part, eyes as in fig. 8, posterior row straight, anterior median eyes relatively large, coxal hooks absent, opisthosoma (photo) oval and soft; pedipalpus (fig. 9): articles with partly long hairs, patella dorsally with a single stronger and longer hair-shaped bristle, tibia quite short and wide, paracymbium simple, oval and not distinctly standing out from the cymbium, questionable median apophysis well developed, embolus unknown.

Description (♂):
Measurements (in mm): Body length 3.7; prosoma: Length 1.5, width 1.5; opisthosoma: Length 2.4, width 1.65; leg I: Femur ca. 1.9, patella 0.7, tibia unknown, metatarsus 2.0, tarsus 0.6; tibia II 1.2, tibia III ca. 0.8, tibia IV 1.2.
Colour: Prosoma and legs medium to dark brown, legs annulated, opisthosoma light grey.
Prosoma (fig. 8, photo) as wide as long, not raised, cephalic part distinctly narrowed, most

hairs of medium length, fovea well developed, 8 eyes in a wide field, posterior row straight, anterior median eyes not reduced, lateral eyes close together, clypeus not much longer than the diameter of the anterior median eyes, basal cheliceral articles robust, distally fairly diverging, condyle absent, teeth hidden, fangs of medium length, mouth parts hidden, sternum not elongated between coxae IV. - Legs (photo) robust, order I/IV/II/III, III distinctly the shortest, hairs indistinct, bristles only fairly long, existing from femora to metatarsi, femur I-II with 2 dorsal bristles, femur I with 9 bristles, femur III-IV bear at least 2 ventral bristles, too (some bristles may be broken off), patellae with 2 dorsal as well as lateral bristles, I bears 2 prolateral and 1 retrolateral bristle, tibial bristles numerous, metatarsi I-II with 0-1 bristle, metatarsi III-IV bear few bristles, position of the metatarsal trichobothrium unknown, 3 tarsal claws, unpaired claw well developed. - Opisthosoma (photo) 1.45 times longer than wide, soft, bearing two pairs of small sigillae and longer hairs, spinnerets short, anal tubercle large. - Pedipalpus with stout articles, see above.

Relationships: In *ovalis* a pedipalpal coxal hook – according to WUNDERLICH (2004: 979) a diagnostic character of the genus *Bararaneus* – is probably absent. Furthermore: Because of the absence of strong bristles of the pedipalpal articles as well as the simple paracymbium I am not quite sure that *rotundus* is really a member of the genus *Bararaneus*. In the other two species of this genus – *B. evolvens* WUNDERLICH 2004 (the generotype) and *B. annulatus* WUNDERLICH 2004 (relationships unsure) – stronger bristles on patella and tibia of the pedipalpus exist, and the shape of the paracymbium and of the structures of the bulbus are different.

Distribution: Eocene Baltic amber forest.

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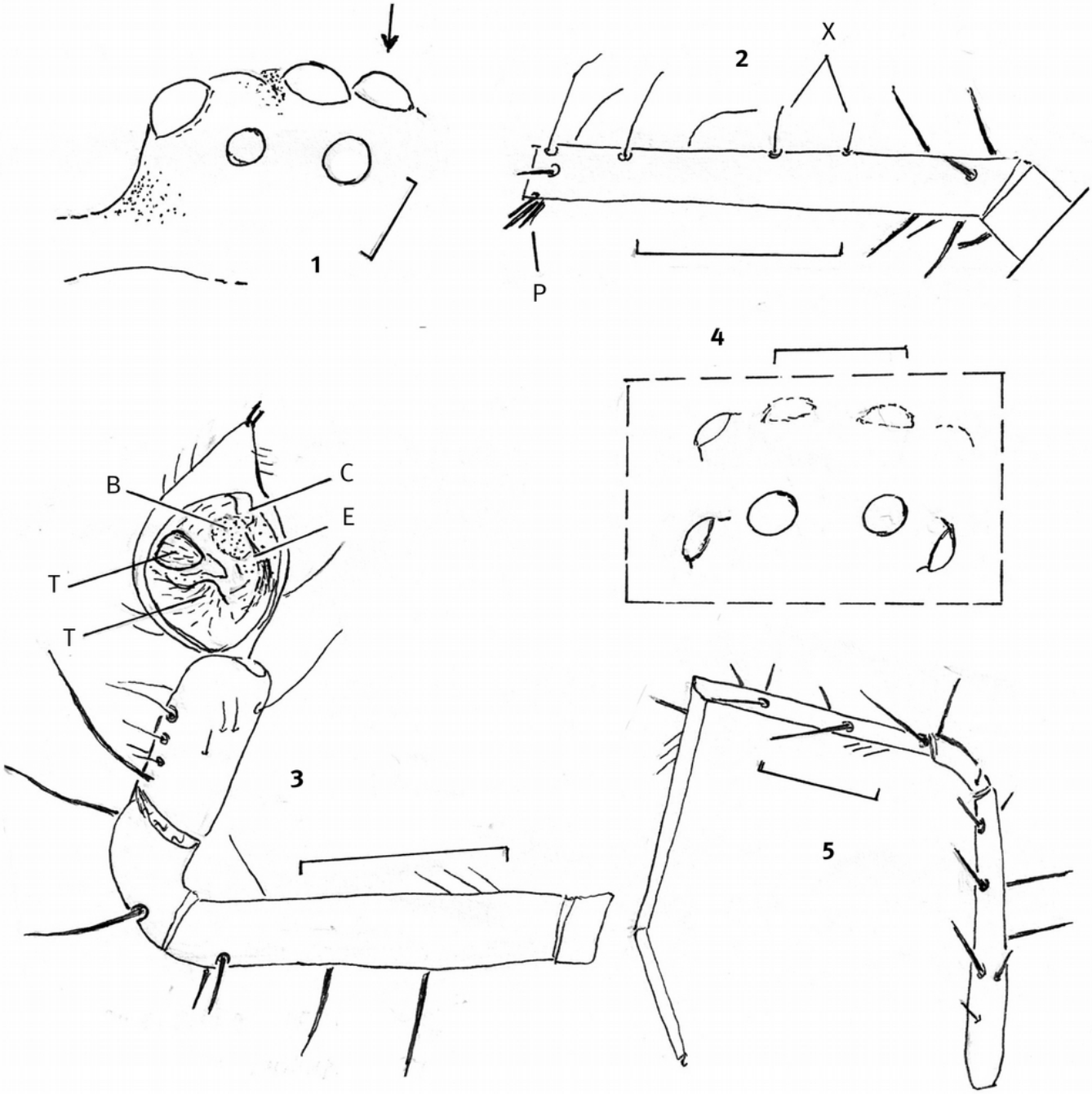
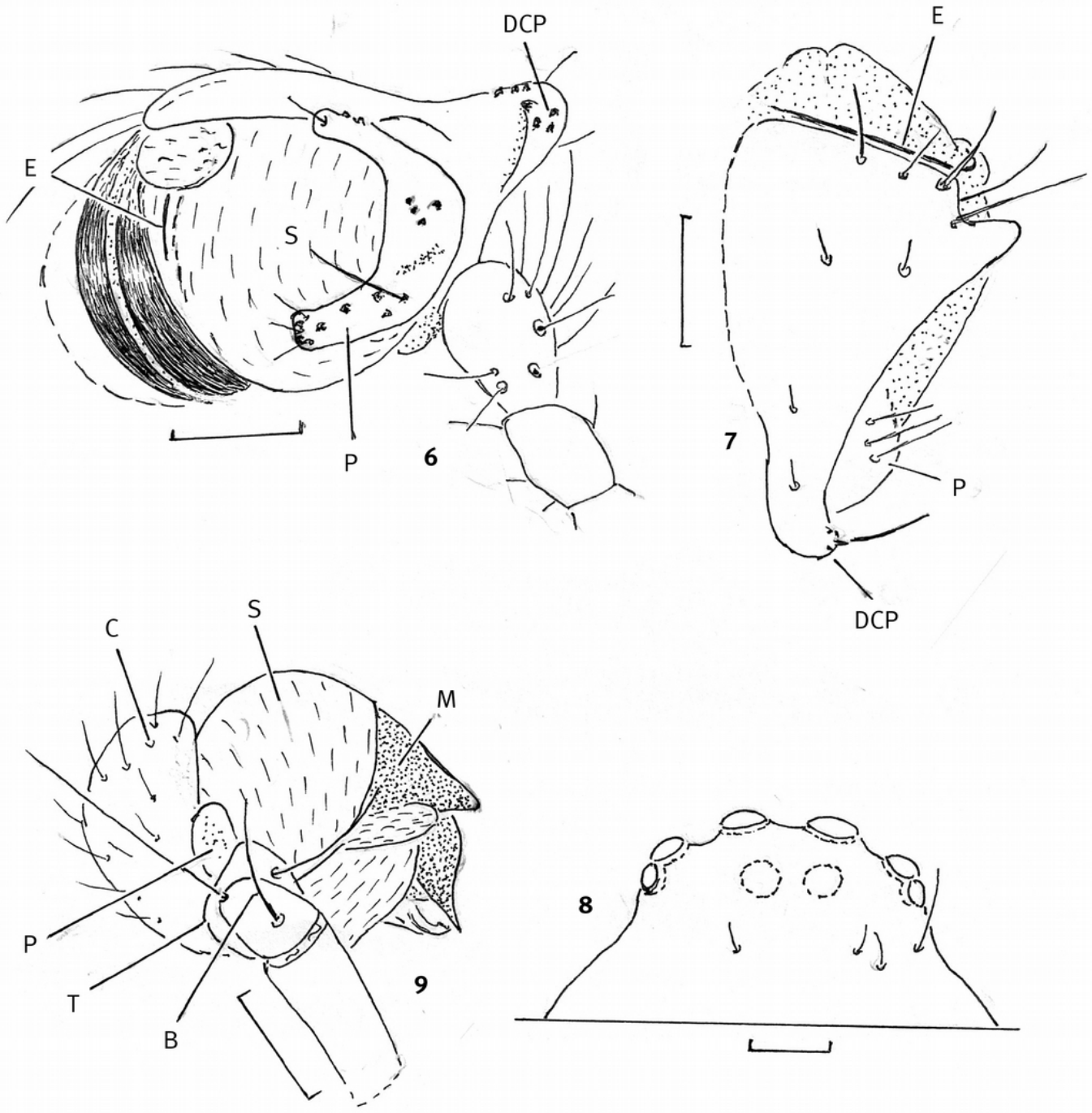


Figs. 1-3: *Mengesilia rovnoensis* **n. gen. n. sp**. (Hersiliidae), ♂; 1) oblique anterior aspect of the elevation of the eyes and the large four right eyes as well as the left posterior median eye (arrow); 2) prolateral aspect of the right metatarsus I. Note the four long trichobothria in two rows in the distal half and two short questionable trichobothria (X). Normal hairs are not drawn; 3) retroventral aspect of the right pedipalpus.

Figs. 4-5: *Anameta tertia* **n. sp**. (Tetragnathidae), ♂; 4) dorsal aspect o the eyes which partly are hidden by an emulsion; 5) retrolateral aspect of the left leg I. - Scales 0.2 mm in figs. 1) and 2), 0.5 mm in fig. 2), 1.0 mm in figs. 3) and 5). B = bubble, C = conducor, E = embolus, T = tegular apophysis.



Figs. 6-7: *Anameta tertia* **n. sp.** (Tetragnathidae), ♂; 6) retrolateral aspect of the left pedipalpus. Only few hairs are drawn; 7) dorsal aspect of cymbium, paracymbium and bulbus of the right pedipalpus.

Figs. 8-9: ?*Bararaneus rotundus* **n. sp**. (Araneidae), ♂, 8) dorsal aspect of the anterior part of the prosoma; 9) retrodorsal aspect of the right pedipalpus. - Scales 0.2 mm. B = thin bristle, C = cymbium, DCP = dorsal cymbial process, E = embolus, M = median apophysis, P = paracymbium, S = subtegulum, T = tibia.

BEITR. ARANEOL:.17 (2024: 64-75)

NEW FOSSIL SPIDER TAXA IN CRETACEOUS BURMESE (KACHIN) AMBER (ARANEIDA: CHIMERARACHNIDA AND ARANEAE)

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Abstract: The following spider (Araneida) taxa in Mid Cretaceous Kachin amber from Myanmar (Burma) are described: (1) Suborder Chimerarachnida: *Chimerarachne* sp. indet. (2♀) (the female of this genus and suborder is in short described here for the first time); (2) suborder Araneae: Family Segestriidae: *Parvosegestria elegans* **n. sp.**; family Hersiliidae: *Breviscauda translucens* **n. gen. n. sp**., family Protoaraneoididae: *Spinipalpitibia* sp. indet.

Key words: Amber, Araneae, Chimerarachnida, Cretaceous, fossils, Kachin amber, Hersiliidae, Protoaraneoididae, Segestriidae, spiders.

The **material** is kept in the private collection of Joerg Wunderlich (CJW) and will be given most probably to the University of Hamburg.

The Kachin amber (Burmit) of Myanmar (Burma) offers the most diverse “window to the past” to the Upper (Mid) Cretaceous. I suppose that thousands of species of spiders (Araneida) of the suborder Araneae and the extinct suborder Chimerarachnida.are preserved in the resin of the large vanished tropical rain forest of Myanmar (Burma), see WUNDERLICH (2019). The exciting tailed members of the Chimerarachnida were described only six years ago. In this paper I describe two further members of tailed spiders (genus *Chimerarachne*) as well as three taxa of the well-known tail-less spiders (Araneae).

I. Suborder CHIMERARACHNIDA WUNDERLICH 2019

See my paper in the present volume: Spider Phylogeny – an “endless story”.

Chimerarachne WANG et al., the only known genus, from Upper (Mid) Cretaceous Kachin amber of Myanmar (Burma).

New material: Two apparently adult females in Mid Cretaceous Kachin amber from Myanmar (Burma), *Chimerarachne* sp. indet., F3873/BU/CJW and *Chimerarachne* sp. indet., F3874/BU/CJW.

Remarks: I know of more than a dozen males of *Chimerarachne* but the female sex of this archaic genus and suborder was unknown up to now. The present females have to study more closely in the future; here I give only short descriptions. In the female sex a pedipalpal metatarsus is absent like in other spiders and arachnids; the term “metacymbium” (fused metatasus and cymbium) of the male pedipalpus – see WUNDERLICH (2023) - may be superfluous.

F3873 (fig. 1, photo 7): The spider is completely and fairly deformed preserved in an oval 0.3 x 0.9 x 1.2 cm large clear yellow orange piece of amber, most spinnerets are hidden, the genital area is covered with an emulsion. - Syninclusions are a small Diptera: Nematocera, a globular piece of insect excrement above the spider's body, a relatively thick thread-like structure right in front of the spider which I not regard to be part of a capture web.
Measurements (in mm): Body length almost 2 mm, metatarsus IV 0.3, tarsus IV 0.25; pedipalpus: Femur ca. 0.5, tarsus 0.2; pygidium ca. 0.2, flagellum ca. 2.6.

The flagellum is only ca. 1.3 times longer than the body. Pedipalpus (fig. 1) Patella short, metatarsus absent, tibia slightly longer than tarsus, I did not recognize a claw of the tarsus.

F3874 (fig. 2, photo. 8): The spider is almost completely, partly injured/decomposed preserved in a clear light orange flat 2.2 x 2.5 cm large piece of amber; its peltidium is lost, the left pedipalpus and the left leg I are regenerates, only each two quite short basal articles beyond the femora exist. - Syninclusions are a 3.3 mm long distinctly segmented questionable insect larva and small particles of detritus.
Measurements (in mm): Body length 2.7, pygidium ca. 0.5, flagellum ca. 7.0; leg IV: Femur ca. 0.77, patella 0.4, tibia 0.88, metatarsus 0.7, tarsus ca. 0.47. The flagellum is 2.6 times longer than the body, the basal cheliceral articles are fairly large, not protruding, knee-shaped but ventrally, the position of the fairly stout fangs (fig. 2) is mediograde (oblique), a pedipalpal metatarsus is absent, a claw of the pedipalpal tarsus is most probably absent. The spinnerets are well preserved, the anterior and posterior lateral spinnerets are long and multi-segmented. I did not recognize remains of the anterior median spinnerets. A pair of small and pointed, 0.1 x 0.05 mm large may be two-segmented and are probably no true spinnerets; they are spaced by ca. 0.5 mm and originate slightly behind the base of the anterior lateral spinnerets. The genital area is well preserved; I did not find a conspicuous structure or opening.

II. Suborder ARANEAE

Araneae in the sense of WUNDERLICH (2017) but see my paper: Spider phylogeny – an “endless story” in the present volume.

Family SEGESTRIIDAE: PARVOSEGESTRIINAE WUNDERLICH 2015

The extinct subfamily Parvosegestriinae includes only about half a dozen species of the genus *Parvosegestria* WUNDERLICH 2015 (= *Denticulsegestria* WUNDERLICH 2015 and *Myganseqestria* WUNDERLICH 2015) in Cretaceous Burmese (Kachin) amber, see WUNDERLICH (2015 131 f.).

The most typical diagnostic character of the subfamily – unique in the family Segestriidae; see WUNDERLICH (2015: 70, fig. A) - is the usually existing dorsal scutum on the ♂-opisthosoma. Leg III may be directed forewards (this is not quite sure), the basal cheliceral articles are strongly protruding, the fangs are quite long (as in *Segestria*), the posterior margin of the fang furrow bears few small teeth, tibia and metatarsus I-II bear long ventral bristles, the pedipalpal tibia may be slender or strongly thickened (fig. 3), the bulbus is attached at the end of the cymbium (*elegans*, fig. 3), near or before the end (*P. obscura*), its shape is quite variable, globular as in *Ariadna* to long oval (e. g., *elegans*, fig. 3), similar to *Segestria*.

***Parvosegestria elegans* n. sp**. (fig. 3), photo 9

Etymology: The name of the species refers to the excellent preservation of the holotype, from lat. elegans.

Material: Holotype ♂ in Mid (Upper) Cretaceous Burmese (Kachin) amber, F3865/BU/CJW.

Preservation and syninclusions: The spider is excellently and almost completely preserved in a flat and clear yellow-orange piece of amber, the legs are preserved in a quite unnatural position, the left leg I is lost beyond the coxa. - Syninclusions are few spider threads, tiny remains of Acari and detritus; a small ?air bubble exists posteriorly on the sternum.

Diagnostic characters (♂; ♀ unknown): Pedipalpus (fig. 3) Patella twice as long as high and slender, tibia distinctly thickened, bulbus attached to the cymbium at the end, its shape oval.

Description (♂):
Measurements (in mm): Body length 2.1; prosomal length ca. 0.8; opisthosoma: Length 1.35, height 0.55; leg I: Femur ca. 1.1, patella ca. 0.38; tibia 1.05, metatarsus 0.9, tarsus 0.35; tibia II 1.05, tibia III 0.77, tibia IV 0.95; basal cheliceral article 0.5, fang 0.23.

Colour: Prosoma and legs light brown, legs not annulated, opisthosoma light grey brown. Prosoma (photo) clearly longer than wide, bearing short as well as few long hairs, 6 eyes in a “segestriid” position, posterior row slightly recurved, median eyes largest, basal cheliceral articles distinctly protruding, long and slender, lateral denticles absent, posterior margin of the fang furrow apparently with few small teeth, gnathocoxae and labium deformed, quite long, sternum partly hidden. - Legs (photo; preserved in a quite unnatural position) slender and fairly long, hairs indistinct, scopula absent, bristles existing from femora to metatarsi, numerous, long and slender, femora 1 dorsally in the basal half, several dorsally and laterally in the distal half, patellae none, tibia I-II ventrally 2 pairs (probably partly unpaired or rubbed off) and distals, III-IV additionally few laterally, metatarsi similar; three long and thin tarsal claws, paired claws placed on an onychium, bearing ca. 10 long and thin teeth, position of the metatarsal IV trichobothrium in 0.85. - Opisthosoma 1.27 times longer than high, covered dorsally with a quite large scutum and numerous very short hairs; three pairs of short spinnerets. - Pedipalpus (fig. 3, photo): Femur and patella long and slender, patella twice as long as high, tibia distinctly thickened, cymbium fairly long, bearing the oval bulbus at its tip, embolus fairly long, slender, only slightly bent.

Relationships: In the remaining congeneric species the bulbus is attached more basally at the cymbium and the shape of the pedipalpal articles is different.

Distribution: Mid (Upper) Cretaceous Burmese amber forest.

Family HERSILIIDAE

See above in this volume, family Hersiliidae in the paper on spiders in European ambers as well as the family Hersiliidae in WUNDERLICH (2011, 2015 and 2020).

Note: Several hersiliid indet. specimens in Kachin amber of the coll. J. WUNDERLICH are still waiting for a closer study:

F3869/BU/CJW: 1juv., body length 2.4 mm; F3870/BU/CJW: 1juv., body length 2.1 mm and F3871/BU/CJW: 1juv. or ad. ♀ , body length 3.7 mm.

Besides a single male in Cretaceous amber from Hungary - see SZABO et al. (2022) - species in Mid Cretaceous Kachin amber from Myanmar (Burma) are the oldest geological

reports of the family Hersiliidae. In this paper I give some notes on the hersiliid phylogeny, compare the known Cretaceous hersiliid taxa and describe a new species and genus in Kachin amber.

Character	*Spinasilia*	*Burmesiola*	*Breviscauda*	Hersiliidae indet. (1)	*Hungarosilia*
Metatarsi I, II and IV	biarticu-late	entire	entire	entire	unknown
cephalic part (eye region)	unknown, pro-bably flat	fairly flat	flat (fig. 4)	flat to fairly flat	unknown
shape of the opisthosoma	fairly long (?)	not much lon-ger than wide	1.75 times longer than wide	ca. as wide as long	as wide as long
posterior spinnerets	as long as the opisthosoma	(2)	2/3 the opis-thosomal length	variable, long	ca. as long as the opisthos.
clasping spine of ♂-tibia I	existing	existing in ?B. kachinensis	unknown	unknown	unknown
tibia of the ♂-pedipalpus	stout	long (in ?B. kachinensis	fairly stout (fig. 6)	unknown	short/ stout

(1) ?*Burmesiola*.

(2) ca. 2/3 the opisthosomal length in the juv. type species; but as long as the opisthosoma in ?*B. kachinensis* WUNDERLICH (♂) whose relationships are unsure. - Note: In the generotype of *Burmesiola*, the juvenile specimen of *B. cretaceous*, the basal article of the posterior spinneret has been drawn too long, see WUNDERLICH (2011: 556, fig. 9).

Tab. A. **Selected characters** of the hersiliid genera in Cretaceous Burmese Kachin and Hungarian (*Hungarosilia*) ambers

Notes on phylogenetics (see the paragraph on the family Hersiliidae in the paper on Eocene Europan amber spiders in this volume):

(1) Quite long spinnerets (photo) already existed in all Mid Cretaceous hersiliid taxa as an autapomorhic character of the family;
(2) several metatarsal trichobothria already existed in all Mid Cretaceous hersiliid taxa as an autapomorphic character of the family;
(3) a simple conformation of the structures of the bulbus – e. g. fig. 4 - existed in the taxa of the Cretaceous Kachin amber, and a long embolus placed in a wide loop may also be an ancient hersiliid character;
(4) Biarticulate metatarsi I, II and IV – known from numerous extant as well as from Eocene taxa - already existed in Mid Cretaceous (*Spinasilia* WUNDERLICH 2015);
(5) an apical cymbial claw is absent (lost) (1) in the Cretaceous Hersiliidae in contrast to other known extant and extinct taxa; only a tiny bristle may exist: in *Breviscauda translucens* (fig. 5);
(6) the cephalic part (fig. 4) of all known Cretaceous taxa is not raised in contrast to some/numerous extant as well as certain Eocene European amber taxa (1). In my opinion the flat cephalic part may well be a basic/ancient (plesiomorphic) character of the family;
(7) a "clasping spine" of the male leg I existed in the Cretaceous genera *Spinasilia* and most probably in *Burmesiola* WUNDERLICH 2004 (2) (it exists also in certain fossil members of the related family Oecobiidae).

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(1) Unknown or unsure existence in *Hungarosilia* in Hungarian amber.
(2) See ?*Burmesiola kachinensis* WUNDERLICH 2020.

Note: Feathery hairs existed in all Cretaceous taxa known to me as a plesiomorphic character of Hersiliidae + Oecobiidae.

Breviscauda **n. gen.**

Etymology: The name refers to the relatively short posterior spinnerets, from (lat.) brevis = short and cauda (lat.) = tail.

The gender of the name is feminine.

Type species (by monotypy): *Breviscauda translucens* n. sp.

Diagnostic characters (♂; ♀ unknown): Prosoma (fig. 4) flat, opisthosoma (photo) 1.75 times longer than wide, legs quite long; pedipalpus (figs. 4-7): tibia fairly stout, apical cymbial claw absent (but see below), bulbus wide, bearing a wide tegular apophysis (T1) which probably bears apically a slender., strongly sclerotized and bent apophysis - this apophysis may originate separately below the large (T1) -, as well as a smaller and stronger sclerotized

apophysis (T2); embolus very long and thin, describing at least two loops, guided by a seam (the distal part of the embolus is disjoined from the seam).

Relationships: See tab. A. *Burmesiola* WUNDERLICH 2011 may be most related; in the supposed male of *Burmesiola*, ?*B. kachinensis*, the opisthosoma is relatively longer, the tibia apophysis of the male pedipalpus is also longer and the structures of the bulbus are different.

Distribution: Upper (Mid) Cretaceous Burmese amber forest of Myanmar.

***Breviscauda translucens* n. gen. n. sp**.(figs. 4-7), photo 10

Etymology: The name of the species refers to the translucent body and legs of the holotype, from (lat.) = translucent.

Material: Holotype ♂ in Upper (Mid) Cretaceous Kachin amber from Myanmar (Burma), F3872/BU/CJW.

Preservation and syninclusions: The spider is incompletely and translucently preserved in a clear yellow-orange piece of amber; the left half of the opisthosoma (within the amber) and most leg articles (at the surface of the amber piece) are cut off (photo), the femora and two tarsi (as well as distal parts of the metatarsi) are preserved, the right pedipalpus and the spinnerets are well preserved, the right leg I is lost beyond the patella by autotomy. - Syninclusions: Three thin threads run backwards from spinules of the right posterior spinneret; a fissure exists at the right side of the spider.

Diagnosis and relationships: See above.

Description (♂; ♀ unknown):
Measurements (in mm): Body length 3.4; prosoma: Length 1.6, width 1.2; opisthosoma : Length 2.1, width 1.2; femur I ca. 2.9, femur II ca. 2.9, femur III ca. 1.6, femur IV ca. 2.9; anterior spinnerets 0.4, distal article of the posterior spinnerets 1.0.
Colour (photo) light, pedipalpi darker.
Prosoma (fig. 4, most parts are hidden) ca. 1.3 times longer than wide, cephalic part not raised, hairs short. - Legs (photo) apparently long (but only few articles are preserved), hairs short, feathery hairs existing, femur I thick, femur IV more slender, bristles thin, femora dorsally usually 3, retrolaterally 1-2, patellae at least 1 dorsally and 1 retrolaterally. - Opisthosoma (photo) 1.75 times longer than wide, not widened, hairs fairly short, anterior spinnerets relatively long, distal article of the posterior spinnerets only 0.48 times of the opisthosomal length. - Pedipalpus (figs. 4-7; see above): Articles farily stout, femur with 3 dorsal and 1 retrolateral bristle(s), tibia with several long hairs and bristles, tip of the cymbium without a claw but with a quite short (0.015 mm long) spine-shaped sclerotized structure.

Distribution: Upper (Mid) Cretaceous Burmese amber forest of Myanmar.

Family PROTOARANEOIDIDAE

Spinipalpitibia WUNERLICH 2015

See WUNDERLICH (2015: 193-194; 2018: 47-58; 2021: 62-63; 2022: 150-152; 2023: 181-182)

Four genera of this extinct family were reported by WUNDERLICH (2018). In the present male of *Spinipalpitibia* sp. indet. F3863/BU/CJW (figs. 9-10) the unpaired tarsal claw is not distinctly reduced - as thought by me to be a diagnostic family character - in contrast to the key to the genera, see WUNDERLICH (2018: 48), and the bulbus is larger, diameter ca. 0.23 x 0.33 mm. The key to the genera as well the diagnosis of the family have be to revise; the number of the genera has probably to reduce. The paracymbium of *Spinipalpitibia* may be entire (fig. 10) or bipartite as in *occulta* WUNDERLICH 2023.

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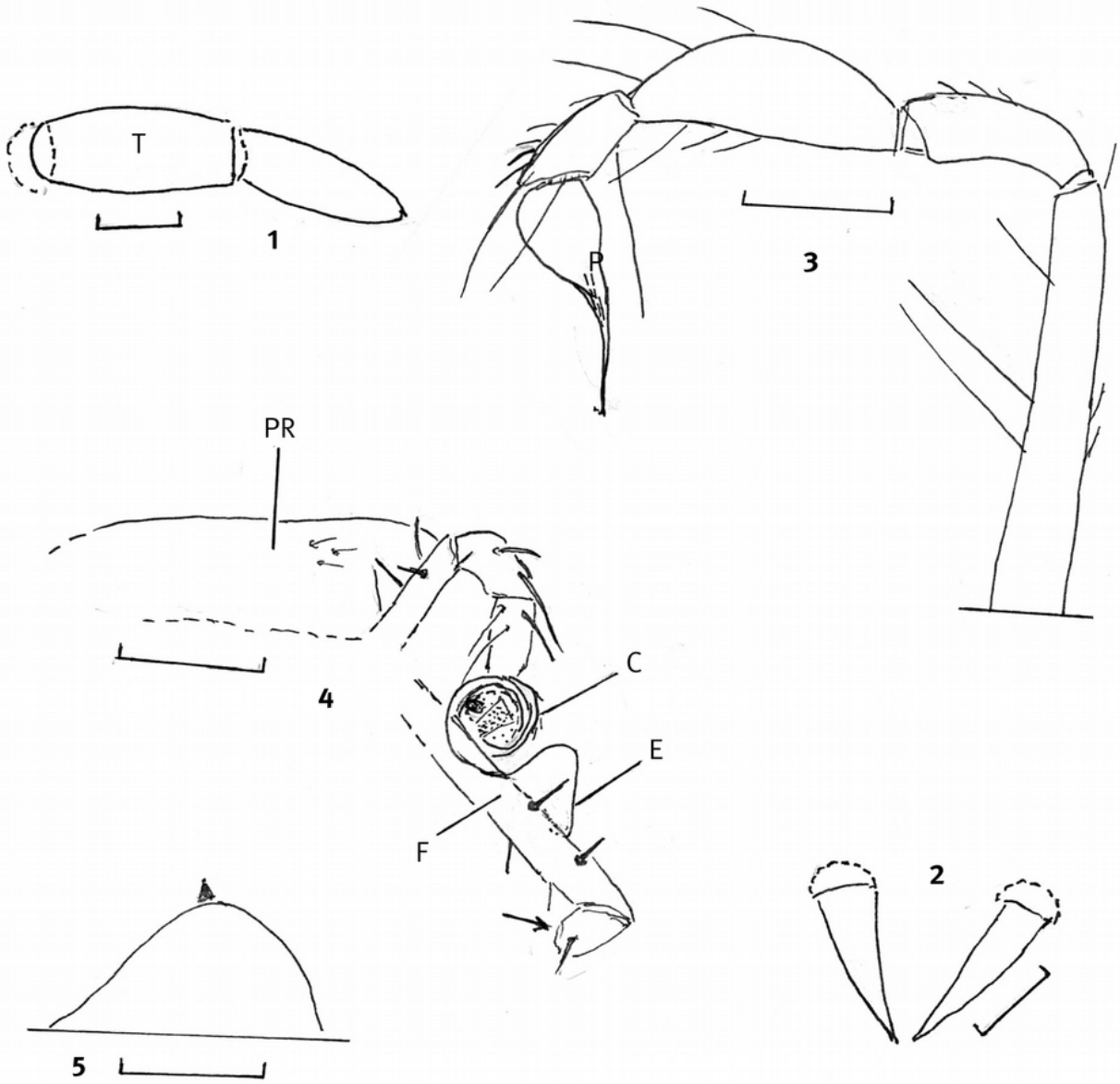
– (2018): Fossil spiders (Araneae) in Cretaceous Burmese amber. – Beitr. Araneol., 11: 1-177.

– (2019): What is a spider? – Beitr. Araneol., 12: 1-32.

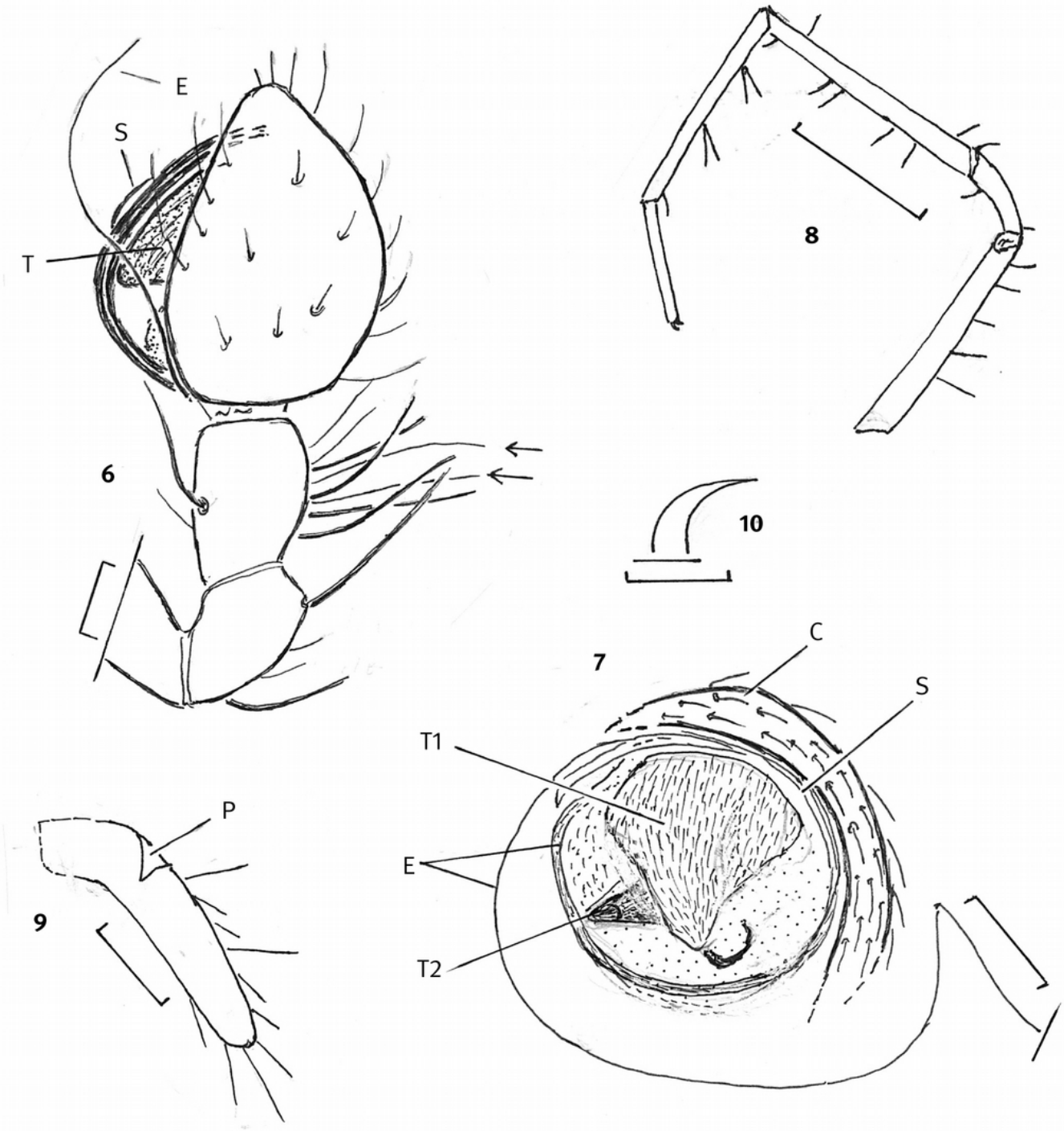
– (2023): Contribution to the spider (Araneida: Araneae and Chimerarachnida) fauna in Upper (Mid) Cretaceous Burmese (Kachin) amber. – Beitr. Araneol., 16: 162-215.



Figs. 1-2: *Chimerarachne* sp. indet. (Chimerachnidae), ♀; 1) ♀ F3873/BU/CJW, dorsal aspect of tibia and tarsus of the left pedipalpus; 2) ♀ F3874/BU/CJW, fangs, ventral aspect.

Fig. 3) *Parvosegestria elegans* **n. sp**. (Segestriidae), ♂, prolateral aspect of the right pedipalpus. Only few hairs are drawn.

Figs. 4-5: *Breviscauda translucens* **n. gen. n. sp**. (Hersiliidae), ♂; 4) retrolateral aspect of the prosoma (partly hidden), the right femur and patella I (the arrow points to the area of the patella-tibia autotomy) and the right pedipalpus; 5) prodorsal aspect of the tip of the right cymbium; bristle and hairs are not drawn.- Scales: 0.05 in fig. 5), 0.1 in figs. 1-2), 0.2 in fig. 3), 1.0 in fig. 4). C = cymbium, E = embolus, F = femur, P = prosoma, T = tibia.



Figs. 6-7: *Breviscauda translucens* **n. gen. n. sp.** (Hersiliidae), ♂; 6) dorsal aspect of the right pedipalpus; the arrows point to two long trichobothria; 7) retrolateral and slightly dorsal aspect of the right pedipalpus; the apical part of the embolus is hidden.

Figs. 8-10: *Spinipalpitibia* sp. indet. (Protoaraneoididae), ♂ F3863/BU/CJW, prolateral aspect of the right leg I; 9) retrolateral aspect of the cymbium of the right pedipalpus; 10) apical aspect of the paracymbium of the left pedipalpus. - Scales 0.1 in figs. 9-10), 0.5 in fig. 8), 0.2 in figs. 6-7). C = cymbium, E = embolus (displaced), F = femur, P = paracymbium, PR = prosoma, S = seam, T = tibia, T1, T2 = tegular apophyses.

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SPIDER PHYLOGENY – AN "ENDLESS STORY"

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ABSTRACT: Based on selected characters of extant and fossil spiders (Araneida) new ideas and new hypotheses regarding the relationships of higher taxa of this order are provided. The higher taxa of the order Araneida (see fig. B) are: The sister suborders Chimerarachnida (**in a new and strongly widened sense**) and Mesothelida (**new**), the sister infraorders Chimerarachnoida (**new**) and Cribellatae (i**n a new sense**) as well as the sister infraorders Mesothelae and Mygalomorpha. The names Araneae, Araneomorphae and Palaeocribellatae in the sense of JOCQUE & DIPPENAAR-SCHOEMAN (2007) are used no longer because they are not considered monophyletic taxa rsp. do not correspond with the opinion of the present author/paper. Some names and ranks are only proposed and are still provisional. The Chimerarachnida contains the tailed extinct infraorder Chimerarachnoida (family Chimerarachnidae) as well as the infraorder Cribellatae which evolved six branches including the group "Praeneocribellatae" (**new**), the Neocribellatae (i**n a new sense**) which includes the by far most diverse cribellate - as well as ecribellate - taxa of extant spiders. The traditional name "Araneae" would have to be cancelled (!). The Mesothelida contains

the infraorders Mesothelae and Mygalomorpha. The traditional name “Opisthothelae” would have to be replaced by Cribellatae (= “cribellate Opisthothelae”) and Mygalomorpha (= “ecribellate Opisthothelae”). A t*otally new* spider system will have to be discussed. In my opinion synspermia originated at least two times convergently; therefore Synspermiata cannot be regarded as a monophyletic taxon. The Dysderoidea – a former part of the Synspermiata – is regarded to be probably more related to Filistatoidea. Another part of the current Synspermiata s. l. - the Synspermiata s. str. - includes, e. g., Pholcoidea, and is regarded as questionable sister group to the branches Praeneocribellatae + Neocribellatae. Hypochilidae is regarded to be a younger and more derived family than Filistatidae. It is assumed that the posterior pair of lungs became lost several times. The cribellum originated only once: In the Cribellatae. The colulus replaced the cribellum in the (ancestor of) the Dysderoidea, in the Synspermiata s. str., within the Praeneocribellatae as well as numerous times within the Neocribellatae. A nippers-shaped fang position evolved several times like in Filistatoidea + Dysderoidea, Synspermiata s. str., Neocribellatae and within the Praeneocribellatae; intermediates exist. - As shown by three question marks in fig. B we are apparently still far from understanding the phylogeny of spiders and the relationships of its higher taxa!

Key words: Araneae, Araneida, Araneoclada, Austrochiloidea, Chimerarachnida, Chimerarachnidae, Chimerarachnoida, cladogram, colulus, Cribellatae, cribellum, Dysderoidea, Filistatoidea, flagellum, fossils, Hypochiloidea, Leptonetoidea, mediograde, Mesothelae, Mesotheli-da, Mygalomorpha, Neocribellatae, Opisthothelae, Palaeocribellatae, “Praeneocribellatae”, Pholcoidea, phylogeny, Praeneocribellatae, pygidium, Scytodoidea, Segestriidae, spiders, synspermia, Synspermiata, venom glands.

Method: (Un)fortunately the present work is not based on computer analyses nor on molecular-genetic analyses but simply on the reflection of – to the author – the most logical sequence of morphological, anatomical, behavioural and ecological characteristics. Included are the tailed spiders *Chimerarachne*, see fig. B and tab. 1.

Acknowledgement: I thank Ivan Magalhaes very much for an intensive and quite helpful discussion, criticism and stimulations as well as for many specific informations.

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character	Mesothelida	Chimer-arachnida	Chimer-arachnidae	Cribellatae	Filistatoidea	Dysderoidea	Hypchiloidea	Synspermiata	"Praeneo-cribellatae"	Neocri-bellatae
pygidium & flagellum	–	**+/–**	+	+	–	–	–	–	–	–
segmented opisthosoma	+/–	**+/–**	+	–	–	–	–	–	–	–
posterior lungs	+	**+/–**	+	**+/–**	–	–	+	–	**+/–**	–
anterior medi-an spinnerets	**+**/–	**+/–**	(1)	–	–	–	–	–	–	–
oblique fang position	+/–	**+/–**	+	**+/–**	–	**+/–**	+	–	**+/–**	–
prosomal ve-nom glands	–	**+**/–	?	**+**/–	+	+	–	+	+	+
cribellum	–	+/–	–	+/–	+	–	+	–	**+/–**	+/–
compact eye field	+	+/–	+	+/–	+	+	–	–	–	–
tarsal tri-chobothria	+	**–**/+	–	**–**/+	–	–	–	–	–	**–**/+
leg-like pedi-palpus (2)	+	–	–	–	–	–	–	–	–	–
synspermia	–	–	–	–	–	+	–	+	–	–

Tab. 1. Distribution of selected characters within most high taxa of the order Araneida

In **bold print:** characters basically existing / occasionally or even frequently lost: **+**/-.

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(1) strongly reduced in the Chimerarachnidae.

(2) The tibia of the male pedipalpus remains enlarged in numerous members of the Chimerarachnida.

The limits and the relationships of higher spider taxa have been controversially discussed for far more than one hundred years, see, e. g., JOCQUE & DIPPENAAR-SCHOEMAN (2007) (*), ESKOV & ZONSTHEIN (1990), LEHTINEN (1967), MAGALHAES & RAMIREZ (2022), RAMIREZ et al. (2021) and WUNDERLICH (2019, 2020, 2023).

In this paper hypothetical relationships and a cladogram (fig. B) of higher spider taxa of the order Araneida are presented. Figure B presents only ideas and should push further discussions. This cladogram may appear quite crazy at first sight if compared with traditional opinions and cladograms which are shown, e. g., in fig. A. Another remarkable and "quite unusual cladogram" was published by ESKOV & ZONSHTEIN (1990) in which the cribellum originated more than a single time and, e. g., the family Filistatidae possesses relationships to the Mygalomorpha. The tailed spiders of the extinct family Chimerarachnidae were still unknown, and the taxon Synspermiata was not defined at that time.
The complicated situation regarding the cribellum was discussed and partly cleared by LEHTINEN (1967) in an important first step, and the history of previously used taxonomical characters and names like "Cribellatae" and "Haplogynae" were also treated by this author.

(*) In their important book Spider Families of the World the authors JOCQUE & DIPPENAAR-SCHOEMAN (2007: 50) reported regarding the Austrochiloidea erroneously "posterior lungs transferred into tracheae", but posterior lungs exist in some taxa of this superfamily, e. g., in certain Gradungulidae.

Besides the shape of the chelicerae two further taxonomical key characters of the Araneida are regarded as the most important morphological characters by various authors: (1) The existence or absence (loss) of the posterior pair of lungs, (2) the existence or absence (loss, modification like a cribellum) of the anterior median spinnerets. According to my current hypothesis the cribellum evolved (replaced the anterior median spinnerets) only once, in the Cribellatae, and became lost or was replaced numerous times by a colulus. The colulus is usually considered a modification of the cribellum but a "colulus" also modified the anterior median spinnerets directly as colulus-like structures within the Mesothelae, in *Heptathele* KISHIDA 1923, as well as in the Chimerarachnidae. A colulus never existed in the Mygalomorpha. - In my opinion a third taxonomical character may be of interest, and has previously not been taken into consideration: It is the position of the embolus, which in the Araneida basically is directed forewards (anteriorly) like in the most archaic Chimerarachnidae (fig. 4), in the Mesothelae as well as usually in the Austrochiloidea. Contrarily the embolus is directed backwards (basally) in the Mygalomorpha (fig. 5), in the Dysderoidea (fig. 6) and apparently in the Filistatidae (figs.7-8). In my opinion in these taxa the bulbus turned around by 180°. This turn may probably be connected with the function of the basal haematodocha and the copulatory position.

Notes, some fundamental critical examination, and comparison of the cladograms A and B. See also the paragraph on Dysderoidea + Filistatoidea below.

I regard the large pedipalpus of Mesothelae and Mygalomorpha – similar to the presumed araneid sister group Amblypygi – as a basal character of the Araneida, the thick tibia of the male pedipalpus, too, and the origin of a small pedipalpus of the Chimerarachnida as an ad-

vanced character. In my opinion an enlarged lengthened or thickened tibia of the male pedipalpus is retained in numerous taxa, e. g. in Filistatidae, Dysderoidea (figs. 6-8), Synspermiata as well as in certain members of Praeneocribellatae and Neocribellatae. - In the most archaic Chimerarachnidae and Mesothelae exists a mediograde (oblique) *fang position* (fig. 4) which in my opinion is the most primitive fang position of the Araneida. A parallel fang position evolved basically in the Mygalomorpha.- see the position of the primitive mygalomorph family Atypidae -, and several reversals occurred in this infraorder. Numerous *intermediate* fang positions exist between oblique and *nippers-shaped*. - I am not quite sure about the basic araneid number of tarsal trichobothria; to my knowledge tarsal trichobothria are absent in Amblypygi.

Does cladogram A reflect the phylogenetic relationships of the oldest spider taxa more likely than cladogram B? According to several characteristics -, e.g., of the spinnerets and mainly to the specialized powerful protruding basal cheliceral articles as well as of the parallel position of the fangs - the relationships of the Mygalomorpha to the Cribellatae appear much weaker than the relationships of the Chimerarachnidae to the Cribellatae. In contrast to the Mesothelida the Chimerarachnida possesses, e. g., no tarsal trichobothria but shorter and knee-shaped basal cheliceral articles, long/slender legs and a smaller pedipalpus, s. fig. B.

If the present scenario is correct *the most successful extant* <u>*capture web-building*</u> <u>groups</u> of spiders evolved *two times separately:* (1), within the Synspermiata s. str., the Pholcoidea, in the families Pholcidae and Tetrablemmidae as well as (2) within the Neocribellateae, in the superfamily Araneoidea which includes very diverse families like Araneidae, Linyphiidae and Theridiidae. All these spiders are ecribellate. If extinct taxa are taken into consideration the diverse *cribellate* superfamily Deinopoidea has to be added to the most successful/diverse capture web-builders.

Three of the <u>main open questions</u> in this respect are: (1) What happened in the fast earliest evolution of spiders? We will probably never get well preserved fossil documents of most needed ancient/archaic taxa, especially not of their important copulatory organs. In my opinion the number of branchings in fossil/extinct taxa during the almost 400 million years of araneid evolution was incredibly high and much more complicated than expected or known today or shown in fig. B. So we may have to speculate. Because of the innumerable number of convergently evolved morphological structures and of numerous losses we will hardly be able to find out the correct way of spider evolution - so the opinion of P. T. LEHTINEN, personal communication in 1992 -, and one may agree. - (2) What are the limits, the branches and relationships of the current “Synspermiata”? See below. - (3) Branchings of the taxa of the basal Cribellatae: I do not want to exclude that Hypochiloidea (the single family Hypochilidae) may be younger than Dysderoidea and Filistatoidea – see fig. B -, and may be a member of the branching which lead in direction to the Neocribellatae which possess a wide eye field, a capture web and no subterranean tube. In higher taxa of this pass (line) – in certain members of the Austrochiloidea - exist a posterior pair of lungs like in the Hypochiloidea but the venom glands extend into the prosoma in contrast to the Hypochiloidea.

Remark on the principle of parsimony in the Araneida, see fig. B.

Advanced structures like knee-shaped bent basal cheliceral articles, a nippers-shaped position of the fangs (see the abstract), an unsegmented opisthosoma, a derived respiratory

system or a modified capture web as well as sticky or cribellate silk may well be innovations which may cause convergently evolved morphological structures as well as behaviours and numerous losses. Examples are the taxa of the quite diverse current "Synspermiata" and the very diverse Neocribellatae (mainly members of the RTA-clade and of the superfamily Araneoidea).

Selected losses of structures of the Araneida (see fig. B):

- loss of the posterior pair of lungs: At least 4 times (synapomorphy of) Filistatoidea + Dys-Dysderoidea, (the ancestor of) Synspermiata s. str., the Neocribellatae and within the Austrochiloidea),
- loss of the "tail": 2 times (in the Mesothelida and in the Cribellatae) (*),
- loss of the opisthosomal segmentation: 2 times (in Mygalomorpha and in Cribellata),
- loss of (true) anterior median spinnerets: 2 times (in Mygalomorpha and Chimerarachnoida),
- loss of tarsal trichobothria: A single time (in the Chimerarachnida) (**),
- loss of the anterior median eyes: In the superfamily Dysderoidea s. str. and in numerous families like Chimerarachnidae and Caponiidae as well as *within* certain superfamilies like Leptonetoidea and families like Pholcidae of the Synspermiata s. str. and Palpimanidae - *Note*: After the loss of the anterior median eyes the posterior median eyes moved frequently more or less to the position of the anterior median eyes,
- loss of the unpaired tarsal claw; it happened numerous times, e. g., in the group "Dionycha" (part of the RTA-clade of the Neocribellatae) and within the family Dysderidae.

(*) Only a single loss exists in fig. A. - Note: A loss of the "tail" happened about a dozen (!) times within the Arachnida.

(**) Three *reversals*: (1) In the extant family Caponiidae (Synspermiata), (2) in the "Praeneocribellatae": In the extinct family Lagonomegopidae of the Palpimanoidea (= Archaeoidea), (3) within the Neocrobellatae: In the RTA-clade. See also above: Note in the paragraph "critical examination". - *Remark*: In 2019 p. 12 I erroneously reported the existence of tarsal trichobothria in the Chimerarachnidae; WANG et al. (2018) reported correctly trichobothria on metatarsi but not on tarsi.

Four phylogenetic "key taxa"

Notes: (a) Conspicuous derived characters may frequently mask the remaining important ancient/primitive characters and may lead to incorrect conclusions regarding the relationships of taxa like Filistatidae, Hypochilidae. - (b) In my opinion - because of their fast branching - molecular genetical findings of very old/ancient taxa may not be helpful in this respect.

(1) The archaic family **Chimerarachnidae** (*) of the suborder Chimerarachnida and the infraorder Chimerarachnoida (fig. B) possesses a mixture of PRIMITIVE characters - like the existence of a segmented opisthosoma bearing a pygidium, a flagellum (**), strongly seg-

mented lateral spinnerets, a compact eye group, a mediograde (oblique) position of the fangs (fig. 4) (***), remains of median spinnerets, a long cymbium, relatively simple structures of the bulbus and apparently no autotomy of legs and flagellum (absent in a dozen specimens known to me) -, but also DERIVED structures like modified true median spinnerets, the loss of anterior median eyes, and a strongly divided cymbium. (The small/slender pedipalpus is an apomorphy of the Chimerarachnida). I regard the losses of pygidium and flagellum of the Cribellatae to be a pattern convergently evolved in the new suborder Mesothelida. The derived absence of tarsal - as well as the existence of only a single metatarsal – trichobothrium, the basal cheliceral articles directed downwards, the more slender legs and the smaller chelicerae and pedipalpus are shared by the infraorders Chimerarachnoida and Cribellatae. These derived characters are in contrast to patterns of the Mesothelida (Mesothelae + Mygalomorpha). Mainly the arrangement of these primitive as well as certain derived characters inspired me to propose the cladogram of fig. B. Also of interest in this respect is the absence of median spinnerets in the Mygalomorpha although from Mygalomorpha in fig. A the cribellate Araneomorpha split off.

(*) The female sex of the Chimerarachnidae and the probably superfluous term "metacymbium" of the male pedipalpus of this family: See the paper on spiders in Kachin amber from Burma in this volume.

(**) In my opinion the existence of a pygdium and a long flagellum contradic the use of a capture web.

(***) In contrast to my previous statement (2019: 12) in the Chimerarachnidae exists no "orthognath" but an oblique position of the fangs.

Remarks: (1) If fossil members of the Chimerarachnidae had never been discovered we would have to event such a taxon; we still would regard the former Mesothelae to be the sister group of the (former) Opisthothelae, and we would not split off the (former) Opisthothelae into the "ecribellate Opisthothelae" (the Mygalomorpha) and the "cribellate Opisthothelae" (the Cribellatae). - (2) In my opinion a fossil *cribellate* taxon – possessing strongly protruding basal cheliceral articles as well as long fangs in a parallel position and lacking tarsal trichobothria – will never be discovered because it never existed.

(2) The ancient and enigmatic superfamily **Filistatoidea** (family Filistatidae, see fig. B) appears to me to be a kind of "*key taxa*" in this respect, too, see also MAGALHAES & RAMIREZ (2022) and above ("open questions"). It possesses a mixture of ancient/ basal/ "primitive" as well as derived characters: (a) ANCIENT characters - similar to Mygalomorpha - are the existence of sternal sigilla, remnants of posterior lungs in spiderlings, of a compact eye group, the existence of coelospermia, a mating position quite similar to Mygalomorpha, moulting of females, an enlarged tibia of the male pedipalpus (figs. 7-8) simple structures of the bulbus (figs. 7-8), sexual-dimorphic longevity in the female sex, living in tubular (subterranean) retreats (but without cover) from which signal lines are spread in all directions – the last two characters exist also in the probably most ancient Segestriidae of the Dysderoidea (!). - (b) DERIVED (apomorphic) characters are the existence of claviform spigots of the cribellum and a specialized calamistrum distinct from other kinds of cribellae and calamistra as well as of several further autapomorphies: Fused chelicerae, an advanced position of the spinnerets and a patella-tibia autotomy. - Relationships: I suggest relationships of the Filistatoidea to the Dysderoidea s. str. (see below) (including at least Dysderidae, Oonopidae, Orsolobidae and Segestriidae) of the current Synspermiata. Filistatoidea and Dysderoidea

share the loss of the posterior pair of lungs in adult spiders, the existence of a nipper-s-shaped fang position, probably – basically - the subterranean life style in tubes, and probably the position of bulbus/embolus directed backwards (basally), figs. 6-8. Dysderoidea lost the cribellum which existed in the ancestor of both taxa. See also above, “open questions“ and below (3).
The cribellate Filistatoidea and the ecribellate Dysderoidea are regarded by me to be probable sister groups. I consider this as an apparently quite close relationship due to the absence of knowledge of further still unknown extinct branches - “fossil gaps” (**).

(*) Spelling in the sense of LEHTINEN (1967), not Mygalomorph*ae*.

(**) The oldest spider **fossils** are known from the late Carboniferous, see DUNLOP & PENNEY (2012: 118). One of the extinct taxa listed in this paper evolved probably *quite early* a (sister) branch to the Cribelltae. - Fossils of several important ancient extant taxa like Filistatidae - only a single species in Miocene Dominican amber is known: *Antilloides didicostae* (PENNEY 2005) – are still unknown: Members of Hypochilidae, Austrochiloidea and Eresidae. Their rare or absent report is probably a matter of their distribution and ecology; furthermore the condition for a good preservation in arid localities – regarding, e. g., Filistatoidea and Eresidae -, may have been bad. I expect the existence of an extinct tailed member of the suborder Mesothelida, see fig. B, but a report/recognition is still absent.

(3) Superfamily **Dysderoidea** and the - in my opinion not monophyletic - **Synspermiata**:
All members of these groups possess synspermia and not a single family of the whole branches is known to be cribellate. The monophyly and taxa of the Synspermiata s. l., e. g., in the sense of RAMIREZ et al. (2021), appears quite unsure to me, see fig. B; and I assume that synspermia evolved at least twice convergently. The authors in question listed five groups of their Synspermiata. Members of the superfamily Dysderoidea (see fig. B and above: Filistatoidea) possess certain primitive/mesothelidomorph characters like the free (not fused) chelicerae, the absence of a capture web, partly – basically, e. g., in the Segestriidae – a sexual-dimorphic longevity in the female sex (*), probably a digging behavour, a subterranean life style in tubes in the earth (a cover is absent) from where signal lines emanate in all directions (similar to the cribellate Filistatidae), stout legs, a compact eye group (not in the Segestriidae) (**), a position of the tracheal spiracles near the epigastral furrow which are widely spaced (e. g., in the Dysderidae) reminding of the pattern in most Mesothelida, and a position of the embolus directed backwards (see figs. 5-8) in contrast to, e. g., most (!) members of the Synspermiata s. str. like Pholcidae, Tetrablemmidae and Diguetidae, whose usually long legged and short-living members possess fused chelicerae and construct capture webs. A colulus is absent in most Dysderoidea; in my opinion its existence in the Orsolobidae is a reversal. - Based on this pattern I regard Dysderoidea more closerly related to Filistatidae than to the Synspermiata s. str. like Pholcidae (excluding Caponiidae and Trogloraptoridae) in which leg bristles are absent (!), see fig. B, with regain in the Plectreuridae. Patellar bristles – at least laterally – are absent (lost) in Dysderoidea and Filistatidae.

(*) Like Filistatidae. Longevity exists also, e. g., in certain basal Neocribellatae like Eresidae.
(**) Its wide eye field indicate a most basal branching within the Dysderoidea.

Summing up all present arguments in this “Process of Circumstantial Evidence”: the cladogram fig. B appears well founded and much more likely to me than “traditional” cladograms like fig. A.

Final remark: This work is a challenge to me, more than a “simple game”. If the present cladogram (fig. B) turns out to be not correct I/we may learn at least that even logical/suitable arguments may easily lead to wrong conclusions.

The high taxa of the order Araneida, see fig. B.

Notes regarding fig. B:
(1) Treated suborders are Mesothelida (new, see below) and Chimerarachnida WUNDERLICH 2019: in a new and strongly widened sense, including the archaic extinct family Chimerarachnidae of the infraorder Chimerarachnoida as well as the tail-less unsegmented, four- and two-lunged, cribellate and ecribellate taxa of the infraorder Cribellatae.
(2) The former order (rsp. suborder) Araneae is not any more regarded to be a monophyletic taxon but it stands for a “sampling group” of all spider taxa except the Chimerarachnida.
(3) The former Opisthothelae is split up into the infraorders Mygalomorpha (= “ecribellate Opisthothelae”) and the Cribellatae (= “cribellate Opisthothelae”).
(4) Note on fossil Araneida: Probably we will discover an archaic fossil member of this order in which four pairs of functioning spinnerets are preserved *and* a male pedipalpus bearing a pear-shaped bulbus as in Mygalomorpha exists which is more primitive/simple than in the Chimerarachnidae or Mesothelae. Furthermore the find of well preserved structures of the male pedipalpus of a primitive/archaic and very old fossil of the Mesothelae would be of great interest!

Mesothelida n. suborder

Etymology: Named with reference to the type taxon Mesothelae.

Included taxa: Mesothelae and Mygalomorpha which are regarded as infraorders.

Diagnostic characters: Pygidium and flagellum absent (lost); existence of anal tubercle, several tarsal and metatarsal trichobothria, densely hairy opisthosoma and stout legs (usually densely hairy), quite large (leg-like) pedipalpus in both sexes, bulbus usually simple and pear-shaped in the Mygalomorpha. Leg autotomy quite rare, between coxa and trochanter.

Relationships: In members of the sister suborder Chimerarachnida pygidium and flagellum exist, tarsal as well as more than a single metatarsal trichobothria are usually/basically absent, the basal cheliceral articles are usually not protruding but knee-shaped directed down-

wards, the legs are usually slender, autotomy is quite frequent (absent, e. g., in Tetragnathidae and Deinopoidea as well as most probably in Chimerarachnidae); the structures of cymbium and bulbus are different.

Chimerarachnida, suborder in a new sense, see fig. B

Etymology: Named with reference to the type taxon and only family Chimerarachnidae.

Diagnostic characters: Tarsal trichobothia as well as more as a single metatarsal trichobothria usually absent/lost (3 reversals: Caponiidae, Lagonomegopidae and RTA-clade; see above: Losses of structures), basal cheliceral articles usually not protruding but *knee-shaped bent downwards*, legs usually slender and not densely hairy, *autotomy* quite frequent (except, e. g., in the Tetragnathidae and Deinopoidea as well as most probably in the Chimerarachnidae), anterior median spinnerets reduced or modified to a cribellum or colulus, *pedipalpus smaller, never leg-shaped*, pygidium and flagellum existing only in the extinct family Chimerarachnidae.

Relationships: In the sister suborder Mesothelida, tarsi and metatarsi bear several trichobothria, the legs are usually stout and quite hairy, the opisthosoma is usually densely hairy, the bulbus is usually simple and pear-shaped in the Mygalomorpha; see fig. B but complicated in the Mesothelae.

Included taxa: The extinct infraorders Chimerarachnoida with the single family Chimerarachnidae, and numerous taxa of the very diverse infraorder Cribellatae, see fig. B.

Chimerarachnoida n. infraorder. See fig. B

Etymology: Named with reference to the type taxon and only family Chimerarachnidae.

Diagnostic characters: Strongly divided cymbium (fig. 4), loss of anterior median eyes and true median spinnerets, small pedipalpus, leg autotomy most probably absent.

Relationships: In the sister infraorder, the Cribellatae, the anterior median spinnerets are basically modified to a cribellum or colulus (it may be absent); pygidium, flagellum, an opisthosomal segmentation as well as a strong segmentation of the lateral spinnerets are lost.

Included taxon: The extinct family Chimerarachnidae in Kachin amber from Myanmar (Burma).

Infraorder Cribellatae in a new sense

Diagnostic characters: Absence (loss) of pygidium, flagellum, scutate opisthosomal segmentation and multi-segmentation of lateral spinnerets; frequently cribellate; strong tendency for leg autotomy (autospasy).

Relationships: In the sister infraorder Chimerarachnoida a cribellum is absent, pygidium, flagellum, a strong segmentation of the opisthosoma and of the lateral spinnerets exist, anterior median eyes and true (thread-producing) median spinnerets are absent.

Included taxa: 6 branches, see fig. B.

The unnamed group of Dysderoidea + Filistatoidea is weakly defined, e. g., by the existence of venom glands extending to the prosoma. These glands are restricted to the chelicerae in the **Hypochiloidea** (= Palaeocribellatae) as in the Mesothelida. In fig. B. prosomal venom glands may be a basal character of Dysderoidea + Filistatoidea (or even an apomorphy of the infraorder Cribellatae), lost in the Hypochiloidea and evolved a second time in the sister branch of the Hypochiloidea. Or Hypochiloidea is a more basal taxon in which venom glands never extended to the prosoma? Note that Dictynidae of the Neocribellatae lost its venom glands completely(!). - Or these branching is incorrect and Dysderoidea is not related to Filistatoidea.

Branch Neocribellatae in a new wide sense (see fig. B)

Diagnostic characters: Loss of the posterior pair of lungs, existence of a nippers-shaped fang position; cymbium enclosing the bulbus. Basically cribellate but tendency to displace or loss this structure. Existence of tarsal trichobothria as well as several metatarsal trichobothria (reversal in the RTL-clade), an enlelegyn stage, a complex bulbus and a long and coiled embolus.

Subbranches: numerous superfamilies like Eresoidea, Deinopoidea, Araneoidea as well as the RTA-clade.

Retalionships: “Praeneocribellatae” is the sister goup, see below and fig. B.

Group "Praeneocribellatae" nov.

Etymology: Named with reference to the related and more derived Neocribellatae, adding prae- (lat.) = before.

Characters (an apomorphic character is unknown): Cymbium long and slender, enclosing the bulbus, feathery hairs existing, usually ecribellate, exceptionally (few Austrochiloidea) four-lunged.

Relationships: Praeneocribellatae is a provisional name, used here for a "sampling group" which has to study and differentiate more closely in the future. Neocribellatae may be the sister group, see above and fig. B.

Taxa: Austrochiloidea, Palpimanoidea and Leptonetoidea.

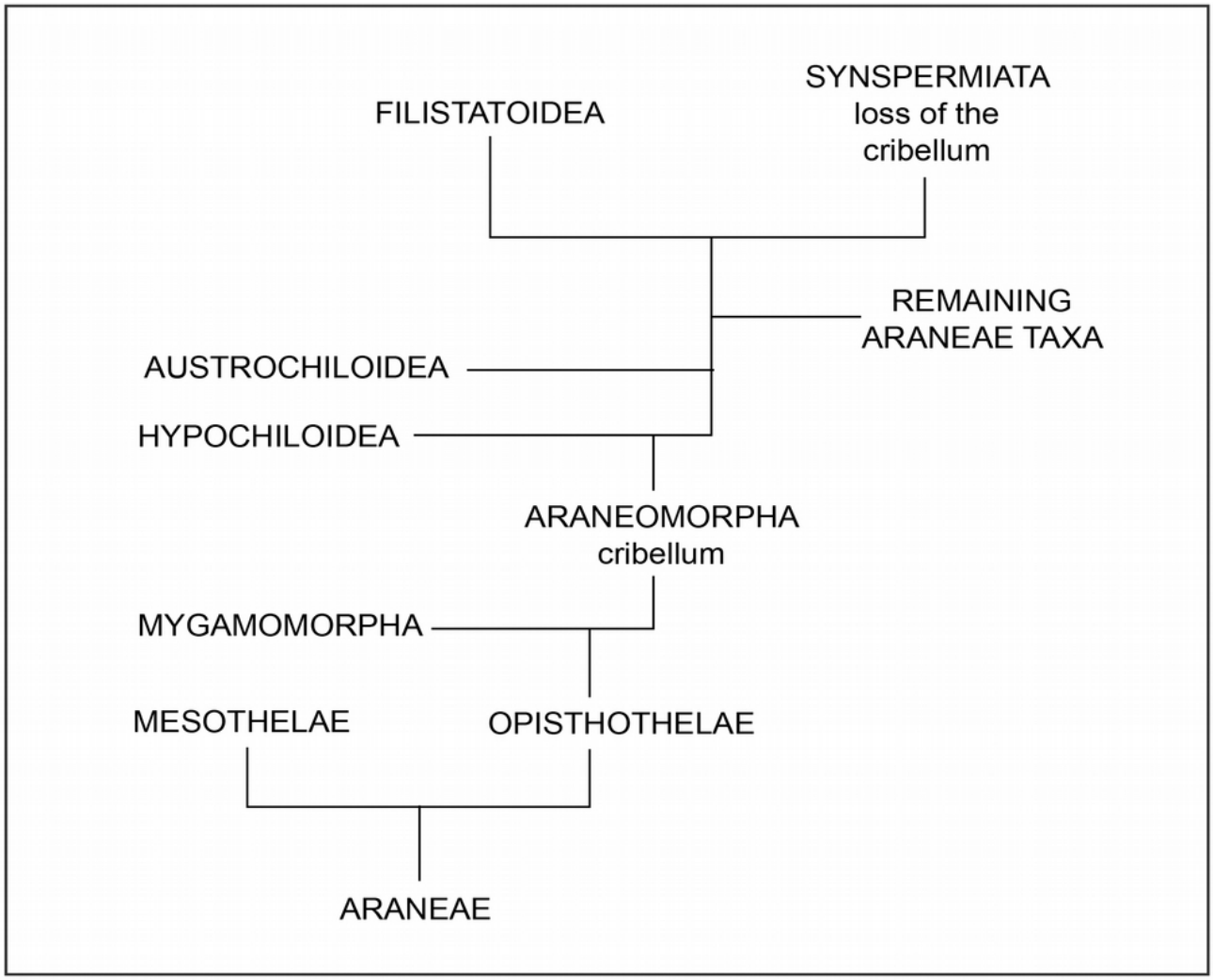

Fig. A. An example of traditional relationships of high spider (Araneae) taxa,
The extinct family Chimerarachnidae (see fig. B) is not included; it would here represent the sister taxon of the Araneae.

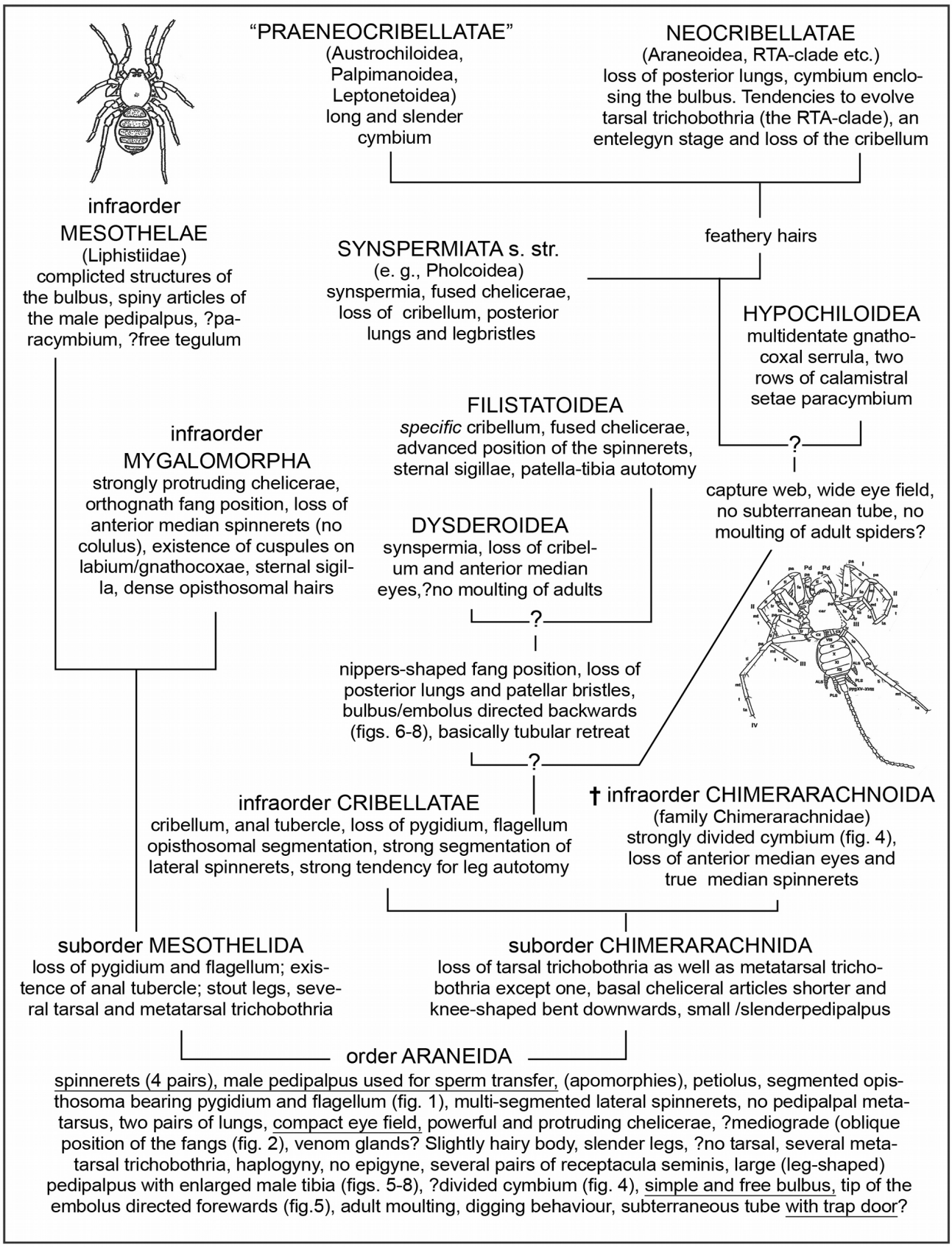

Fig. B. PROPOSED CLADOGRAM OF HIGHER SPIDER (ARANEIDA) TAXA
Note that the characters concern the basic patterns but usually not the derived patterns.

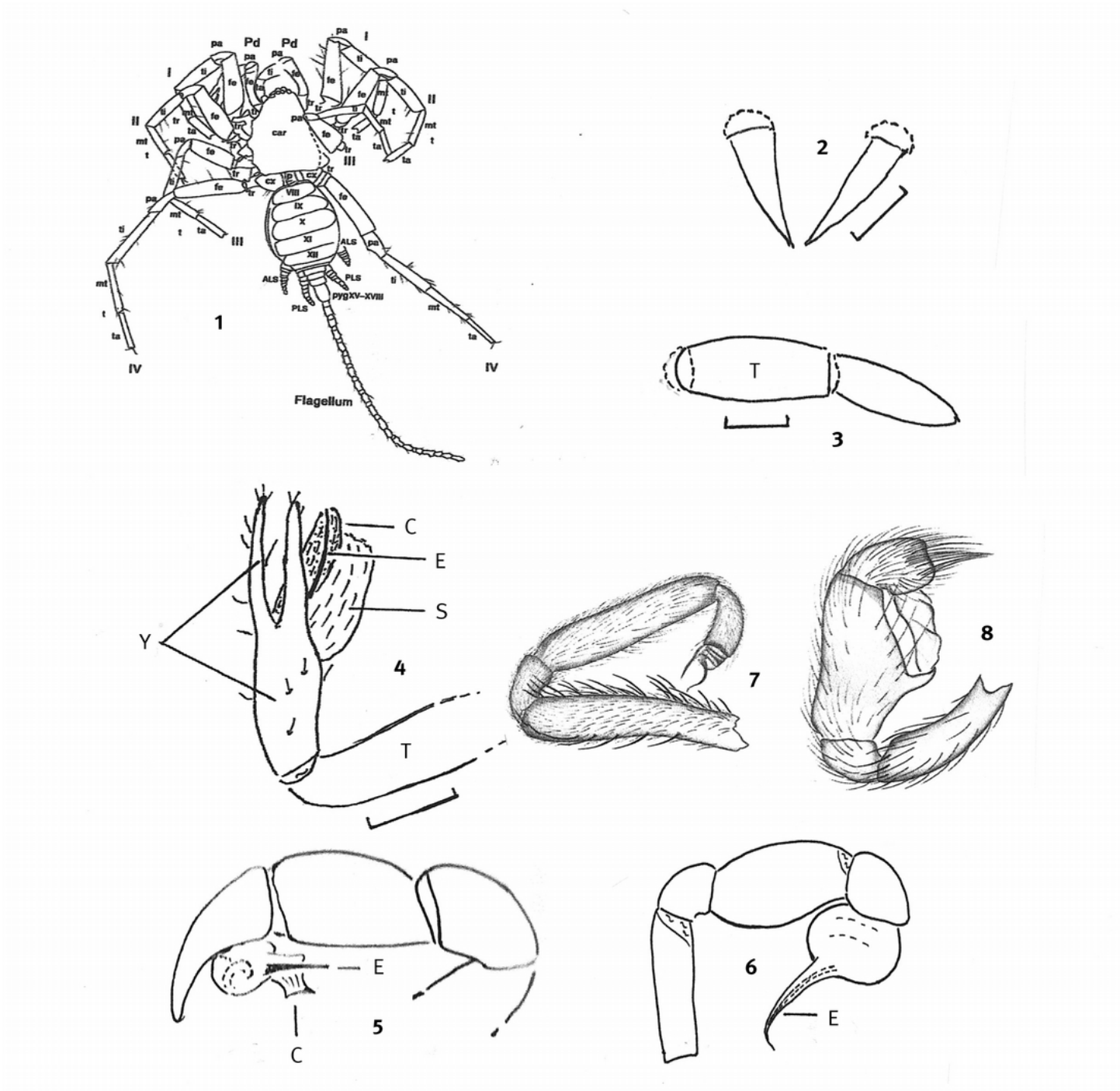

Fig. 1) Dorsal aspect of *Chimerarachne yingae* WANG et al. 2018 (fossil Chimerarachnidae in Cretaceous Kachin amber from Myanmar), ♂ holotype, body length including pygidium but without the thin flagellum 2.42 mm; taken from WANG et al. (2018). - 2) Fossil *Chimerarachne* sp. indet., ♀, R3874/BU/CJW, “mediograde” position of the slightly deformed fangs. 3) Fossil *Chimerarachne* sp. indet., ♀ R3873/BU/CJW, dorsal aspect of tibia (T) and tarsus of the left pedipalpus. A metatarsus is absent. - 4) Fossil *Chimerarachne beigeli* WUNDERLICH 2023, ♂ holotype, dorsal and slightly prolateral aspect of the fairly deformed left pedipalpus. - 5) *Atypus* sp. (Mygalomorpha: Atypidae), lateral aspect of the ♂-pedipalpus. - 6) *Ariadna* sp. (Synspermiata: Segestriidae), lateral aspect of the ♂-pedipalpus. - 7-8) lateral aspect of the male pedipalpus of *Kukulcania* sp. and *Filistatinella* sp. (Filistatidae); both taken from UBICK et al. (2017).Scales = 0.1 mm. C = cymbium, E = embolus, S = subtegulum, T = tibia, Y = cymbium.

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(*) The corrected name of the species is now *yingae*. - Does the term “origin**s**” mean that according to the opinion of the authors spiders probably possess more than a single origin?

BEITR. ARANEOL., 17 (2024: 92-100)

BESASSEN FRÜHERE SPINNEN SCHWÄNZE?

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Abstract: The relationships of fossil spiders of the genus *Chimerarachne* WANG et al. 2018 (Araneida: Chimerarachnida) are treated.

Dank: Für wertvolle Anmerkungen danke ich meinem Sohn Erik.

Siehe auch WUNDERLICH (2021).

Bestimmte Fossilien (nicht nur Spinnen) dokumentieren eindrucksvoll und ausschnittartig bestimmte Abläufe der Evolution über Zeiträume hinweg, die wir uns nicht wirklich vorstellen können! Gelegentlich sind besonders interessante Arten oder Gruppen erhalten, die man als „Zwischenformen“, als „Bindeglieder“ oder „missing links“ bezeichnen kann.

In dieser Arbeit wird einer der wissenschaftlich sensationellsten Fossilfunde in Bernstein vorgestellt. Diese kleinen „Spinnen-Schimären“ (Abb. 1), Körperlänge ohne Schwanzanhang nur etwa 2 mm, wurden erst vor wenigen Jahren beschrieben und rufen bei den Betrachtern immer wieder ungläubiges Erstaunen hervor. Sind es tatsächlich *Spinnen*? Handelt es sich um „missing links“ oder aber vielleicht um Fälschungen? Oder um einen Aprilscherz?

Diese ungewöhnlichen Tierchen kennen wir ausschließlich aus dem etwa 100 Millionen Jahre alten Burmesischen Bernstein in Myanmar. Sie haben mit gut 200 Millionen Jahren deutlich länger unseren Planeten bevölkert als die Dinosaurier. Wir wissen weder wieso sie ausstarben, noch kennen wir die Funktion ihres bis zu dreimal körperlangen Schwanzanhangs.
Die fossilen Funde der letzten Jahre erfordern eine enorme Veränderung/Modifizierung des Systems der Spinnen. Ich versuche im Folgenden, die etwas verwirrend erscheinende Anordnung und Benennung der größten Gruppen der Spinnen dem „Nicht-Spezialisten“ zu veranschaulichen und – auch zeitliche – Hinweise auf die Evolution der Spinnen zu geben.

Das (Abb.1) soll eine Spinne sein? Eine Spinne mit Schwanz? So etwas gibt es doch nicht!

Andere Achtbeiner wie Skorpione besitzen auch schwanzartige Körperanhänge!

Woran erkennt man wohl überhaupt eine Spinne?

Wie der Name sagt, denke ich, sollte das Tierchen – neben vier Paar Beinen – ein Spinnvermögen besitzen, also auch SPINNWARZEN, aber keineswes einen schwanzartigen Anhang! Der abgebildete Achtbeiner (*Chimerarachne*) besaß tatsächlich Spinnwarzen (Abb. 1). Diese sind selbst in der Ansicht von oben erkennbar!

***Wo finde ich derartige Lebewesen außer auf Fotos*?**

Man findet sie ausschließlich eingeschlossen in hundert Millionen Jahre altem Bernstein aus der Kreidezeit von Myanmar (Burma); ihr Körper ist nur etwa 2 mm lang. Diese Fossilien sind sehr selten; sie wurden im Internet zunächst zu horrenden Preisen angeboten.

Sind vielleicht ähnliche Tiere bekannt, und liegt hier eine Verwechslung vor?

Tatsächlich existieren noch heute Spinnentiere, die einen ähnlich langen, dünnen und gegliederten Schwanzanhang besitzen, nämlich die Palpenläufer! Sie sind ebenfalls nur wenige Millimeter lang, besitzen aber verschiedene andersartige Merkmale und *keine* Spinnwarzen!

***Könnte es sich nicht um Fälschungen handeln? Mit denen lässt sich ja viel Geld verdienen! Ich denke auch an FAKES (Fotomontagen) wie das Internetfoto vom „Papst im Pelzmantel“! Und sind diese fossilen Tierchen tatsächlich in echtem Bernstein eingeschlossen*?**

Die betreffenden Bernsteine haben sich als zweifellos echt erwiesen! Die geschwänzten Fossilien – man könnte sie auch „Spinnenschimären“ nennen – sind erst vor wenigen Jahren unter dem Namen *Chimerarachne* wissenschaftlich beschrieben worden. Als „Schimäre“ wird übrigens ein aus zwei unterschiedlichen Organismen zusammengesetztes Wesen bezeichnet.

Wie ist es zu erklären, dass es vor langer Zeit einmal Spinnen mit Schwänzen gab?

Ohne Überlegungen zur Evolution der Spinnen, der Klärung einiger Begriffe und ohne die Kenntnis von Fossilien ist keine ausreichend verständliche und befriedigende Antwort auf diese Frage möglich! Spinnen sind übrigens – neben den Milben – die diverseste Großgruppe der Spinnen*tiere*, der „Achtbeiner“, zu denen z. B. auch Weberknechte und Skorpione gehören. Skorpione besitzen bekanntlich eine „schwanzartige“ Verlängerung des Hinterkörpers, der am Ende einen Giftstachel trägt. Ein Giftstachel fehlt bei *Chimerarachne* allerdings.

An dieser Stelle möchte ich diese fiktive Diskussion beenden und durch einige Überlegungen, Beobachtungen und Fakten ergänzen. Der kreidezeitliche Burmesische Bernstein (Burmit, seit einigen Jahren Kachin-Bernstein benannt) stammt aus der nördlichen Provinz Kachin in Myanmar (früher Burma) und ist 100 bis 110 Millionen Jahre alt. Als die Spinnen-Fossilien erst vor wenigen Jahren in diesem Bernstein beschrieben wurden – siehe die unten aufgeführten Schriften –, waren sie eine wissenschaftliche Sensation: Weder waren fossile noch heute lebende enge Verwandte der Spinnen bekannt, die einen schwanzartigen An-

hang besitzen! Vor allem aus diesem Grund habe ich sie kürzlich – (2020, S. 9) - in eine eigene Großgruppe (Unterordnung Chimerarachnida, siehe die Übersicht unten) der Spinnen gestellt, als „Geschwänzte Spinnen“ (oder „Schwanzspinnen“, „Spinnenschimären“). Benannt wurde ihre einzige bekannte Gattung als „*Chimerarachne*“ (*).

Als vor 8 Jahren ein erster derartiger und zunächst rätselhafter Bernstein-Einschluss (Abb. 1) – übrigens für 20 000 Euros (!) – im Internet angeboten wurde, waren selbst Spezialisten von diesem Fund überrascht, obwohl der Bernstein dieses früheren tropischen Waldes bereits für seine ungewöhnlichen Einschlüsse wie Frösche oder gefiederte Teile von Dinosauriern (!) bekannt war.

Die Burmesische Lagerstätte ist weltweit die einzige, in der sämtliche heutige Großgruppen (Ordnungen) der Spinnen*tiere* neben den Spinnen erhalten sind, z. B. Skorpione, Weberknechte und Milben; die Palpenläufer = „Tasterläufer“ sind die einzige Ausnahme. Außerdem sind auch alle Großgruppen der Spinnen in dieser Bernsteinart konserviert worden, siehe die unten stehende Übersicht: Schwanzspinnen (ausgestorben; Abb. 1–3) Gliederspinnen (Abb. 4), Längskieferspinnen wie Vogelspinnen sowie einige der „modernen“ Querkieferspinnen, etwa Speispinnen und Urspinnen (Archaeidae), die auch vom Baltischen Bernstein bekannt sind. Andere Querkieferspinnen – wie die wohl jedem bekannten hoch entwickelten Kreuzspinnen, Springspinnen (Abb. 5) und Wolfspinnen – sucht man allerdings im Burmesischen Bernstein vergeblich. Offenbar existierten sie damals noch nicht (und auch nicht im weentlich jüngeren Baltischen Bernsteinwald). Sie entwickelten sich wohl erst nach dem Einschlag des Asteroiden und nach dem Aussterben der Dinosaurier vor 66 Millionen Jahren!

Spinnwarzen unten am Ende des Hinterkörpers sind das wichtigste Merkmal der Spinnen neben ihren besonders gestalteten männlichen Pedipalpen („Kieferntastern“): Diese ungewöhnlichen Gliedmaßen waren ursprünglich einmal Beine; sie sind während der Evolution stark abgewandelte worden und liegen direkt vor den deutlich größeren vier Beinpaaren, die zum Laufen geeigneten sind. Die Pedipalpen dienen – wenigstens bei allen heutigen Spinnen – als Überträger-Organe für die Spermien zur weiblichen Geschlechtsöffnung, denn Spinnen besitzen keinen Penis, also kein Organ, das die Spermien *direkt* von den Hoden zur weiblichen Geschlechtsöffnung zu übertragen vermag. Es handelt sich um ein im Tierreich einzigartiges Merkmal und Verhalten, das ausschließlich bei Spinnen existiert. Bei männlichen *Chimerarachne* waren die Pedipalpen zwar ziemlich klein; wie die stilettartigen Teile der Endglieder ihrer Pedipalpen – die eigentlichen Samenüberträger (die Emboli, Abb. 3) belegen, waren sie allerdings zweifellos für die Übertragung von Spermien geeignet.

Inwieweit kann dieses ungewöhnliche „Zwitterwesen“ (Chimerarachne) (*) als „missing link“ (**) bezeichnet werden? Was kann es uns über die Stammesgeschichte der Spinnen erzählen?

Die auffälligsten Merkmale dieses Fossils sind – neben den besonderen männlichen Pedipalpen – der schwanzartige Anhang und der deutlich gegliederte Hinterkörper. Diese beiden Merkmale fehlen bei den hochentwickelten modernen Spinnen – wie etwa den Kreuzspinnen, den Springspinnen (Abb. 5) und auch den urtümlicheren Vogelspinnen -, die alle einen ungegliederten und schwanzlosen Hinterkörper besitzen. Die geologisch ältesten und ursprünglichsten heute noch lebenden Spinnen, die Gliederspinnen (Abb. 4), besitzen zwar noch einen gegliederten Hinterkörper wie die Schwanzspinnen; ein Schwanzanhang fehlt ihnen dagegen, er ist schon früh während der Evolution verloren gegangen und ihre Pedipalpen sind fast so groß wie die zum Laufen geeigneten Beine.

Ein deutlich gegliederter *und* schwanzartig verlängerter Hinterkörper (***) ist ein uraltes Merkmal der Achtbeiner (Spinnen*tiere*, Arachnida); er existierte bereits bei den ursprünglichsten Spinnentieren, den Skorpionen, die bereits vor mehr als 400 Millionen Jahren lebten. Das besondere Merkmal der Skorpione, der Giftstachel, hat vermutlich dazu beigetragen, dass sie bis heute überlebt haben; ein Giftstachel fehlt bei *Chimerarachne*.

Vergleicht man die ausgestorbenen Schwanzspinnen (Abb. 1) mit den heute noch existierenden ursprünglichen Gliederspinnen (Abb. 4) sowie mit den weiter entwickelten ungegliederten Spinnen (Abb. 5; siehe auch die unten stehende Übersicht), so fällt auf, dass ...

(a) alle bis heute überlebenden Spinnen den Schwanzanhang im Verlaufe der Evolution verloren haben (vermutlich als Rest existiert ein kleiner Anal-Deckel über den Spinnwarzen),
(b) bei den ursprünglichen Gliederspinnen die Gliederung des Hinterkörpers (als hintereinander liegende Schildchen erkennbar, Abb. 4) erhalten geblieben ist und
(c) bei den „modernen“ Springspinnen (Abb. 5) und ihren Verwandten außer dem Schwanzanhang auch die Gliederung des Hinterkörpers verloren ging. Im Verlaufe der Evolution der Spinnen von weit mehr als 300 Millionen Jahren muss somit eine Reduktion der beiden Merkmale in ZWEI Schritten erfolgt sein.

Auffällig und überraschend ist, dass die schwanztragenden Spinnen der Gattung *Chimerarachne* fossil lediglich im vergleichsweise jungen („nur“ 100 Millionen Jahre altem) kreidezeitlichen Burmesischem Bernstein nachgewiesen worden sind, nicht aber in den zahlreichen älteren fossilen Lagerstätten und Zeitaltern der 200 Millionen Jahre zuvor, z. B. aus dem Zeitalter des Karbon, dem Steinkohlewald, der vor deutlich mehr als 300 Millionen Jahren existierte. In dieser Zeit lebten bereits die ebenfalls urtümlichen Gliederspinnen; bereits vor dieser Zeit müssen die Vorfahren von *Chimerarachne* entstanden sein. Denn da lebten bereits ihre noch urtümlicheren Verwandten (Uraraneida), siehe unten (***), und hier oder später – in den Zeitaltern des Perm, der Trias und dem Jura – würde ich Verwandte erwarten. Es existiert aber kein einziger Nachweis (!), obwohl etwa in China (Liaoning) unzählige Fossilien in Stein aus dem Erd-Mittelalter entdeckt und beschrieben wurden. Sind ihre fossilen Reste in den verschiedenen Lagerstätten bisher übersehen worden oder verhinderte die Lebensweise von *Chimerarachne* ihre fossile Überlieferung? Ihre gar nicht so extrem seltenen Funde sind auch dadurch erklärbar, dass die Lagerstätte des Burmesischen Bernsteinwaldes die älteste und - neben dem Baltischen Bernstein - *umfangreichste* der bisher bekannten Bernstein-Lagerstätten überhaupt ist.

(*) Als Schimäre (Chimaere, aus dem Griechischen) wird bekanntlich ein Organismus bezeichnet, der mosaikartig gemischt Merkmale zweier verschiedenartiger Lebewesen besitzt, so auch *Chimerarachne*. Ein deutscher Name für *Chimerarachne* existiert bisher nicht. Ich nenne sie „Schwanzspinnen“ in Anlehnung an Namen wie Schwanzlurche oder Springschwänze. Bisher wurden vier Arten dieser Schwanzspinnen beschrieben; die Beschreibung des bisher unbekannten Weibchens bereite ich vor.

(**) Einschub zum Begriff „Brückentier“ („missing link“). Dieser Begriff kann missverstanden werden und bedarf daher der Erläuterung. Nach üblicher Definition handelt es sich um eine ausgestorbene Art von Lebewesen, die zeitlich zwischen einer früher existierenden ausgestorbenen „Stammart“ und einer aus ihr hervor gegangenen Art oder Gruppe lebte oder noch lebt (siehe unten (3). Dabei ist zu bedenken, dass ...

(a) alle Arten einer Gruppe von verwandten Arten von nur einer einzigen Art abstammen. So sind alle heute lebenden mehr als 5000 Arten von Springspinnen die Nachkommen *einer einzigen* (!) – unbekannten ausgestorbenen – Art, die vielleicht fossil überhaupt nicht erhalten ist! So stammen auch alle

Insekten von einer einzigen Art ab und ebenso alle Spinnen. Diese Form der Vervielfältigung kann man durchaus als „explosionsartig“ bezeichnen; sie ist keineswegs selten.
(b) grundsätzlich nur die wenigsten der Arten, die früher gelebt haben, fossil erhalten geblieben sind. Dass ausgerechnet die „Stammart“ einer solchen Linie fossil dokumentiert ist, muss – bei einer sicher enormen Anzahl unbekannter früherer Verzweigungen als – ÄUSSERT UNWAHRSCHEINLICH gelten. Die Entdeckung einer „Zwischenform“ (einer „Mischform“, eines „Bindeglieds“) eines Seitenzweiges in der Evolution, die sowohl urtümliche als auch weiter entwickelte (abgeleitete) MERKMALE „mosaikartig“ in sich vereint, ist dagegen viel eher zu erwarten. In diesem Sinne ist ein „Brückentier“ („missing link“) zu verstehen. Zur Veranschaulichung im Folgenden drei Beispiele, die Dinosaurier/Vögel und Spinnen betreffen:

(1) „Der“ Urvogel *Archaeopteryx* (heute sind mehrere Arten bekannt) ist sicher nicht als der direkte Vorfahr der heutigen Vögel anzusehen, sondern als der Vertreter einer ausgestorbenen Seitenlinie der Dinosaurier. Der Urvogel vereinigt in sich Merkmale sowohl der Dinosaurier: etwa Zähne, eine lange Schwanzwirbelsäule und Krallen an den Flügelknochen, als auch der Vögel: z. B. große Augen und ein „verschmolzenes“ Gabelbein. Eine Befiederung ist Dinosauriern und Vögeln gemein; geflügelte Arten sind auch von verschiedenen Dinosaurier-Arten bekannt.
(2) Die Schwanzspinnen (Chimerarachne) vereinen urtümliche Merkmale der Spinnentiere wie einen Schwanzanhang und Spinnwarzen des Hinterkörpers als auch abgeleitete Merkmale wie den Verlust eines Augenpaares, Verzwergung und eine besondere Ausbildung des männlichen Pedipalpus. Sie konnten im Burmesischen Bernsteinwald als „lebende Fossilien“ gelten.
(3) Die Gliederspinnen (Mesothelae, Abb. 4), besitzen noch den urtümlichen gegliederten Hinterkörper der Schwanzspinnen (Abb. 1), haben aber den ebenfalls urtümlichen Schwanzanhang bereits verloren und besitzen weiter entwickelte Merkmale (siehe unten) wie ein komplizierter gebautes männliches Paarungsorgan (Abb. 3 von *Chimerarachne* zeigt ein einfacher gebautes Organ) und anders gestaltete Kiefer. Man kann sie als „lebende Fossilien“ bezeichnen. Wären sie mit dem Burmesischen Bernsteinwald ausgestorben, würde man ihre damaligen Vertreter (Abb. 1) als „missing links“ bezeichnen, die zu den „modernen“ Spinnen überleiten. Als verbindend sind hier also Merkmale wie der gegliederte Hinterkörper der Gliederspinnen gemeint, der bei den weiter entwickelten Längskieferspinnen (wie den Vogelspinnen) und den „sehr modernen“ Querkieferspinnen (wie den Springspinnen, Abb. 5) zu einem ungegliederten (einheitlichen) Körperteil „verschmolzen“ ist.

(***) Bei verschiedenen Großgruppen (Ordnungen) der Spinnentiere ist ein gegliederter schwanzartiger Anhang des Hinterkörpers erhalten geblieben, so neben den Skorpionen bei den Geisselskorpionen, den Palpenläufern und den Vertretern der ausgestorbenen Ordnung Uraneida, die ich deutsch „Altspinnen“ nennen möchte (der Name „Urspinnen“ ist bereits für die Familie Archaeidae vergeben). Die Geschwänzten Spinnen standen offenbar den Altspinnen verwandtschaftlich recht nahe. Bei verschiedenen anderen Achtbeinern ist der Schwanzanhang dagegen im Verlaufe der Evolution verloren gegangen, so neben allen *heute* lebenden Spinnen auch bei den Weberknechten, den Milben, den Pseudoskorpionen und den im Baltischen Bernstein extrem seltenen Walzenspinnen.

PROVISORISCHE ANORDNUNG und BENENNUNG der **Großgruppen** im System der Spinnen.

Ordnung *Spinnen* (Araneida) (*)

Bei ihnen trägt der Hinterkörper nahe dem Ende unten Spinnwarzen. Der männliche Pedipalpus palpus (Abb. 3) dient bei der Kopulation der Übertragung der Spermien; ihm fehlt ein Metatarsus.

A. Unterordnung *Geschwänzte Spinnen* (Schwanzspinnen) (Chimerarachnida) (Abb. 1).

Verlust eines Augen-Paares, somit nur 6 Augen (Abb. 2), Verzwergung; Pedipalpus: Abb. 3. Weitere Merkmale: Siehe oben.
Diese tropischen, ungewöhnlichen und urtümlichen Spinnen sind vermutlich während der Kreidezeit ausgestorben.

B. Unterordnung *Ungeschwänzte Spinnen* (Araneae) (**). (Abb. 4-5).

Alle übrigen Spinnen. Bei ihnen ist der Schwanzanhang verloren gegangen. Die ursprüngliche Anzahl von 8 Augen ist nicht selten reduziert.

(a) Zwischenordnung *Gliederspinnen* (Mesothelae). Tropische Spinnen.

Sie besitzen einen stark gegliederten und plattenartig stark gepanzerten Hinterkörper (Abb. 4).

(b) Zwischenordnung *Ungegliederte Spinnen* (Opisthothelae) (Abb. 5).

Sie besitzen einen ungegliederten Hinterkörper, der bei manchen Arten gepanzert ist.

1. Kleinordnung *Längskieferspinnen* (Mygalomorphae). Meist (sub)tropische Spinnen.

Zu ihnen gehören z. B. die Vogelspinnen. Ihre stark und oft fast waagerecht vorstehenden Oberkiefer tragen meist nahezu parallel angeordnete Giftklauen, deren Spitzen *nach hinten* oder schräg nach hinten zeigen (vermutlich ein ursprüngliches Merkmal).

2. Kleinordnung *Querkieferspinnen* (Araneomorphae) (Abb. 5).

Zu ihnen gehören die allermeisten heute lebenden Spinnen wie Radnetz-, Wolf- und Springspinnen (Abb. 5). Ihre *meist* wenig vorstehenden und nach unten gerichteten Oberkiefer tragen Giftklauen, deren Spitzen meist *zueinander* zeigen, die damit also zangenartig gegeneinander zubeißen.

(*) Benennung nach WUNDERLICH (2019, 2020). Siehe auch meinen neuen Beitrag *Spider phylogeny – an „endless story“* in diesem Band, der viel Diskussionsstoff bietet!. – Vor der Entdeckung der Schwanzspinnen wurden bis vor kurzem – oder werden sogar immer noch – *alle* Spinnen (jetzt Araneida) unter dem seit langem geltenden wissenschaftlichen Namen Araneae geführt. – Die Spinnen (*Araneida*) sind einer der artenreichsten Großgruppen (Ordnungen) der Spinnentiere. Sie sind nächst-verwandt mit der noch älteren – bereits aus dem Devon-Zeitalter stammenden – ausgestorbenen Ordnung der Altspinnen (*Uraraneida*), die, wie die ursprünglichsten Spinnen (*Chimerarachne*) noch einen Schwanzanhang besaßen. Zwar hatten sie Sprinndrüsen im Hinterleib sowie Spinn*düsen* (mehr seitlich am Hinterkörper), aber keine Spinn*warzen* nahe dem Ende des Hinterkörpers. Über den genauen Aufbau ihres männlichen Pedipalpus ist bisher nichts bekannt.

(**) Grundsätzlich und ursprünglich existieren bei Spinnen **8** (4 Paar) SPINNWARZEN, so bei einigen Gliederspinnen. Ihre Anzahl kann stark reduziert sein, im Extrem sogar bis auf eine einzige (!). Die Zahl **8** gilt auch für die ursprüngliche Anzahl der AUGEN (4 Paar). Diese können ebenfalls stark reduziert sein, nicht selten auf 6, im Extrem bis auf ein einziges, und manche Höhlenspinnen sind sogar vollständig augenlos. Schließlich ist die Anzahl von **8** (4 Paar) BEINEN ein typisches Merkmal nahezu *aller* Spinnen*tiere* (Arachnida); einige Milben (z. B. viele Larven) besitzen allerdings nur 3 Paar Beine. – (Sofern Beine durch Autotomie abgeworfen wurden – bei Angriffen sind viele Weberknechte und Spinnen sowie manche Milben dazu in der Lage – kann ihre Anzahl geringer sein). Ursprüngliche Spinnen wie Gliederspinnen besitzen 4 (2 Paar) LUNGEN (die meisten Spinnen nur 1 Paar, manchen (meist winzigen) Spinnen fehlen Lungen vollständig). – Bemerkenswerterweise existieren – wenigstens beim urtümlichen Spinnenkörper - verschiedene Strukturen als *zwei oder sogar vier Paare,* ganz im Gegensatz zu den *sechs*-beinigen Insekten mit ihrem *drei*-teiligen Körper – Kopf, Brust und Hinterkörper - während bei Spinnentieren lediglich *ein* Vorderkörper und *ein* Hinterköper vorhanden ist; ein abgesetzter Kopf dagegen fehlt. Schließlich existieren bei den Spinnen – wie bei allen Spinnen*tieren* – 7 Glieder der Beine; bei den Gruppen der Insekten ist die Anzahl der Beinglieder sehr unterschiedlich.

<u>Einschub für speziell Interessierte,</u> die sich auch für hinter den oben aufgeführten Merkmalen verborgene Hinweise zur stammesgeschichtlichen Entwicklung (*Evolution*) der Spinnen interessieren:

Grundsätzlich werden von Biologen zwei Gruppen von Merkmalen unterschieden, die ich im Folgenden versucht habe, stark vereinfacht und verständlich darzustellen:

(1) Die *ursprünglichen* Merkmale sind solche, die bereits bei ihren Vorfahren existierten. Ein Beispiel ist die Existenz eines Schwanzanhangs bei den Geschwänzten Spinnen (A in der Übersicht), da dieser Anhang ein ursprüngliches Merkmal *aller* Spinnen*tiere* ist und bereits bei den stammesgeschichtlich uralten Skorpionen vorhanden ist (*). Ein anderes Beispiel ist die Existenz von 8 Beinen bei Spinnen, da auch diese Anzahl ein ursprüngliches Merkmale *aller* Spinnen*tiere* – also auch etwa der Skorpione – ist. Schließlich ist der Besitz von 8 Augen ein ursprüngliches Merkmale aller *Spinnen* (nicht aber der Spinnen*tiere*, bei denen - z. B. bei den Weberknechten - die Anzahl sehr unterschiedlich sein kann), siehe oben: (**). - Derartige ursprüngliche Merkmale existieren bei den Vertretern der Gruppen so selbstverständlich, dass sie oben im System der Spinnen NICHT aufgeführt sind.
Beim Menschen sind ursprüngliche Merkmale z. B. das Säugen der Nachkommen sowie das Vorkommen von Haaren, und von Ohrmuscheln, da sie ursprüngliche (alte) Merkmale *aller Säugetiere* sind. Auch die Schwanzlosigkeit ist ein ursprüngliches Merkmal des Menschen, da sie ein gemeinsames Merkmal *aller Menschenaffen* einschließlich des Homo sapiens und somit keine Neuentwicklung dieser/unserer Art ist.

(2) Die *neu entwickelten (fortgeschrittenen oder abgeleiteten)* Merkmale (**) sind solche, die für *nur eine* besondere Gruppe oder Art neu sind und diese kennzeichnen. Sie SIND im System oben aufgeführt, und kennzeichnen jeweils sogar *alle* folgenden Spinnen als „Großgruppe“, weil sie allen gemeinsam sind. Beispiele für neu entwickelte Merkmale sind das Fehlen (der Verlust) des „Schwanzanhangs“ bei den Ungeschwänzten Spinnen, siehe B (auch ein Verlust kann ein abgeleitetes Merkmal sein), der ungegliederte Hinterkörper bei den Ungegliederten Spinnen, B (b), und die zangenartige Position der Giftklauen bei den Querkieferspinnen, B (b 2). - Beim Menschen sind der aufrechte Gang, der weitgehende Verlust von Haaren und das voluminöse Großhirn Beispiele für abgeleitete Merkmale.

(*) Der Verlust eines Schwanzanhangs bei verschiedenen Großgruppen (Ordnungen) der Spinnen*tiere* – etwa den Weberknechten, den Milben sowie den Ungeschwänzten Spinnen, siehe (B) - ist *für diese Gruppen jeweils* dagegen ein neu entstandenes (abgeleitetes) Merkmal. Der Verlust eines Schwanzanhangs ist also ein Ereignis, das während der Evolution bei Spinnentieren mehrmals vorkam. Gewöhnlich – soweit man von Fossilien bisher weiß – passierte dieser Verlust somit *am Beginn* der Evolution der genannten Großgruppen. Wie man erst seit Entdeckung der Schwanzspinnen weiß, geschah dieser Verlust bei den Spinnen (Araneida) dagegen ausnahmsweise erst *im Verlaufe* ihrer Evolution, nämlich bei den Araneae, siehe (B): Die geologisch ältesten (ersten) Spinnen besaßen somit alle Schwanzanhänge.

(**) Der Fachbegriff ist *apomorphe* Merkmale. Derartige abgeleitete (abgewandelte, fortentwickelte) – aber auch ursprüngliche (*plesiomorphe*) – Merkmale betreffen analog auch nicht-biologische Bereiche wie Sprachwissenschaften. So könnten neue Wortschöpfungen durchaus als *abgeleitete* Merkmale einer Sprache oder eines Dialektes betrachtet werden. Beispiele finden sich in der Jugendsprache, andere stehen im Zusammenhang mit Dialekten, so für die Begrüßung „Guten Tag“, z. B. „Moin“ im Norden Deutschlands und „Grüß Gott“ im Süden Deutschlands. – Ein bekanntes *ursprüngliches* (offenbar sehr altes und vielleicht sogar das älteste) Wort zahlreicher Sprachen (sogar des Chinesischen) ist Mama für Mutter.

Zitierte **SCHRIFTEN**

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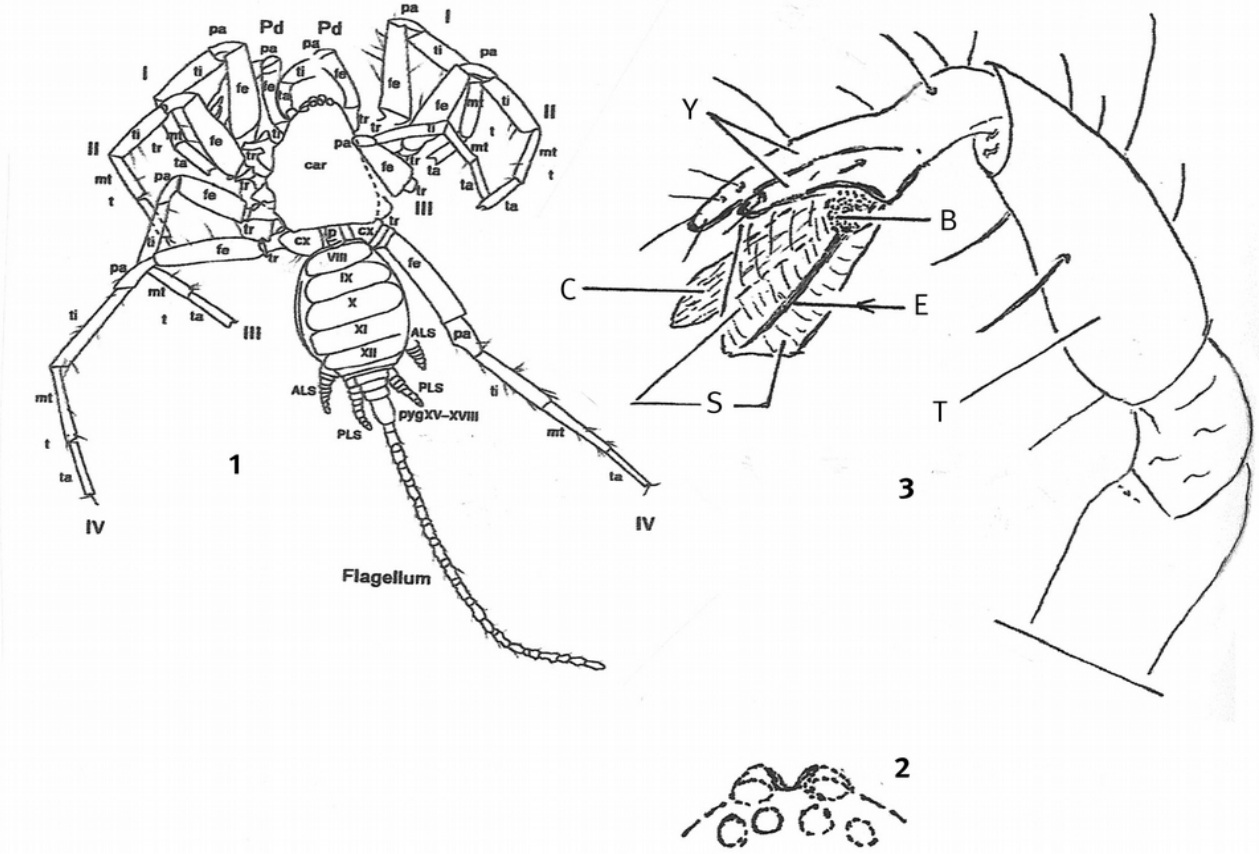
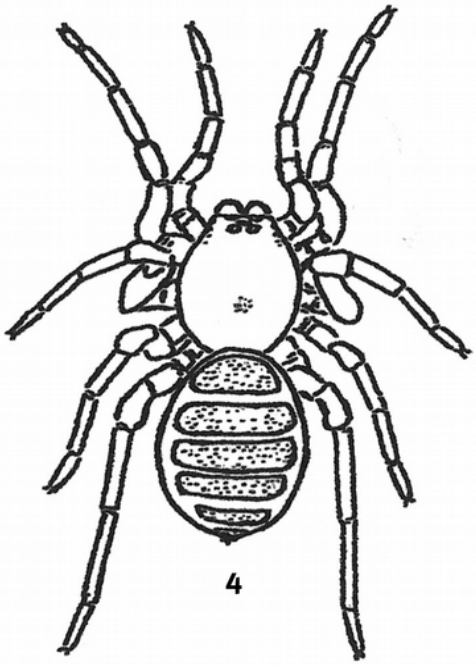


Abb. 1-3) Ausgestorbene Geschwänzte Spinne (Spinnenschimäre, *Chimerarachne*) in Burmesischem Bernstein, Körperlänge etwa 2 mm; (1) Spinne von oben, nach WANG et al. (2018); (2) Position der 6 Augen; (3) männlicher Pedipalpus mit dem stilettartigen Überträger der Samenzellen (Pfeil). - Im Gegensatz zu den überwiegend *acht*äugigen heutigen Spinnen existierten bei diesen Spinnen lediglich sechs Augen.



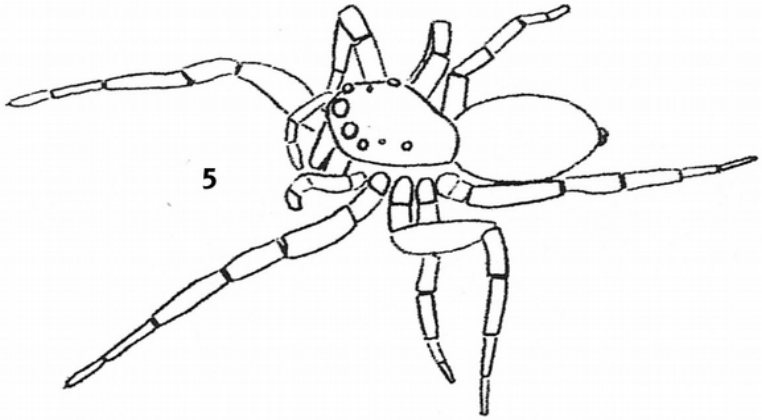


Abb.4) Gliederspinne (Mesothelae), Körperlänge ca. 4 mm. Man beachte den mit Platten versehenen gegliederten Hinterkörper, wie er ähnlich auch bei den Schwanzspinnen existierte (allerdings mit Schwanzanhang). - Diese Spinnen leben noch heute in den Tropen. Im tropischen Burmesischen Bernsteinwald waren sie divers; vom viel jüngeren und kühleren – überwiegend subtropischen - Baltischen Bernstein sind sie nicht bekannt, auch von keiner anderen Bernstein-Lagerstätte.

Abb. 5) Springspinne, ein weit entwickelter Vertreter der ungegliederten Querkieferspinnen, Körperlänge 4 mm. Man beachte ihre ungewöhnlich großen und scheinwerferartig nach vorn gerichteten vorderen Mittelaugen! Verwandte Springspinnen (Familie Salticidae) sind heute und waren im 35-40 Millionen Jahre altem Baltischen Bernsteinwald nicht selten; sie fehlten aber noch im zweieinhalb mal älteren Burmesischen Bernsteinwald. Ihre (ausgestorbenen) Vorfahren sind unbekannt. Wie mögen ihre Augen ausgesehen haben?

BEITR. ARANEOL., 17 (2024: 101-103)

The PHOTOS

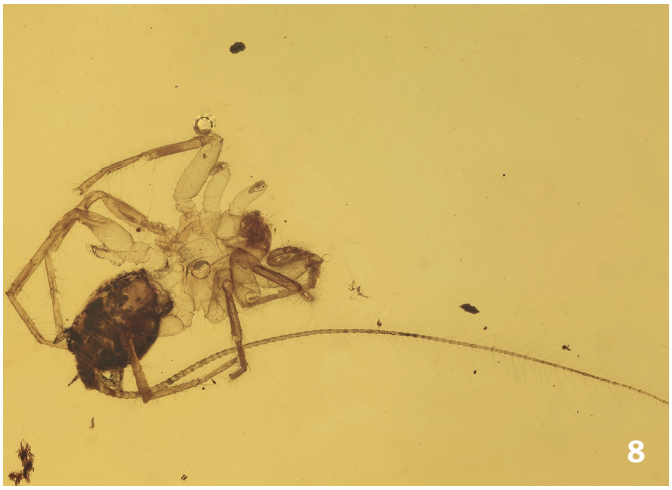
(1) *Ariadna amandahorta* n. sp. (Segestriidae), ♀, paratypus, body length 7.0 mm, lateral aspect.

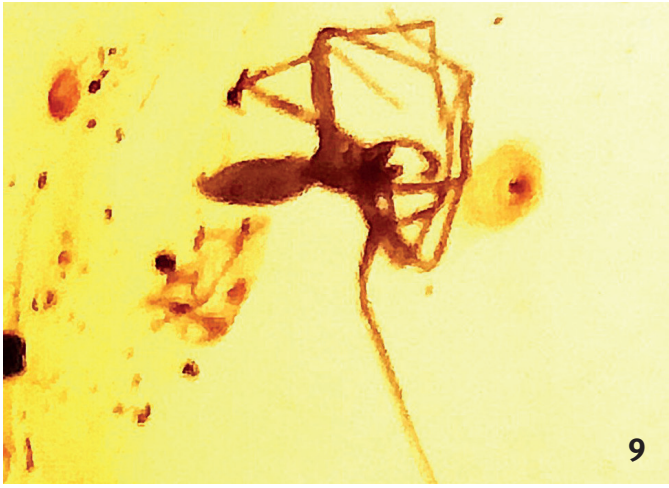
(2) *Episinus truncatus* (LATREILLE 1809) (Theridiidae), ♂, retrodorsal aspect. The right leg I and the left pedipalpus are loose.

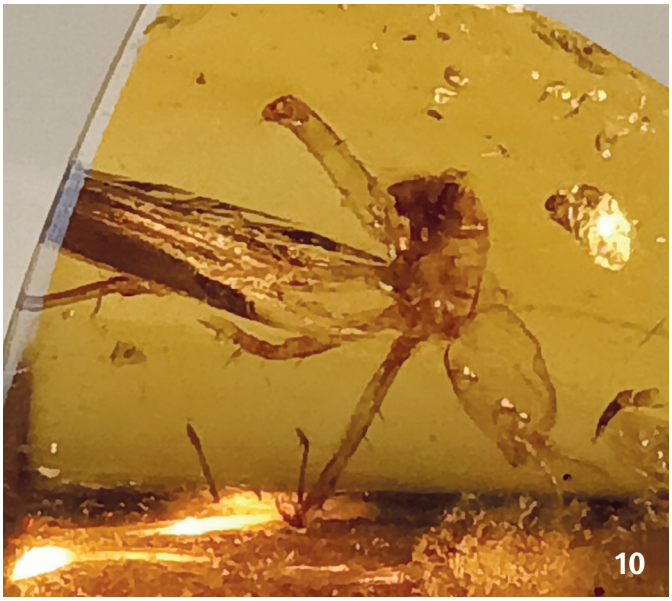
(3) *Scotina zoraoides* n. sp. (Liocranidae), ♂, body length 3.0 mm, dorsal aspect.

(4) *Mengesilia rovnoensis* n. sp. (Hersiliidae), ♂, body length 5.0 mm, dorsal aspect.

(5) *Anameta tertia* n. sp. (Tetragnathidae), ♂, body length 3.0 mm, dorsal aspect.







(6) *?Bararaneus retundus* (Araneidae), ♂, body length 3.7 mm, dorsal aspect.

(7) *Chimerarachne* sp. indet.(Chimerarachnidae), ♀ F3873/BU/CJW, body length without tail 2.0 mm, dorsal aspect.

(8) *Chimerarachne* sp. indet. (Chimerarachnidae), ♀ F3874/BU/CJW, body length without tail 2.7 mm, ventral aspect.

(9) *Parvosegestria elegans* n. sp. (Segestriidae), ♂, body length 2.1 mm, dorsal aspect.

(10) *Breviscauda translucens* n. sp. (Hersiliidae), ♂, body length 3.4 mm, lateral aspect.