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The Phasmatodea and *Raptophasma* n. gen., Orthoptera
incertae sedis, in Baltic amber (Insecta: Orthoptera)

OLIVER ZOMPRO, Plön *)

With 58 figures

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Abstract

The stick insects (Orthoptera: Phasmatodea) in Baltic amber are revised. A new family of Areolatae, Archipseudophasmatidae n. fam., is introduced based on the genus *Archipseudophasma* n. gen., with the type-species *A. phoenix* n. sp., differing from the closely related two families, Heteronemiidae and Pseudophasmatidae, in the strongly elongated third segment of the antennae and the fully developed tegmina, projecting beyond the abdomen. It includes two subfamilies, of which only one is named. The second is based on nymphs only, which are useless to describe as new taxa. *Pseudoperla lineata* PICTET & BERENDT, 1854, represents a new genus of Archipseudophasmatinae:

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Balticophasmatini n. trib., *Balticophasma* n. gen., and is not a synonym of *Pseudoperla gracilipes* PICTET & BERENDT, 1854, as stated by HAGEN in GERMAR & BERENDT in BERENDT (1856: 39). *Electrobaculum* SHAROV, 1968, is the only genus of Pseudophasmatidae: Pseudophasmatinae: Electrobaculini n. trib. Several of the specimens sent to the author for study are actually not phasmids but Orthoptera incertae sedis represented by *Raptophasma* n. gen., with the type-species *R. kerneggeri* n. sp. Even though this genus from the first glance looks quite similar to Mantodea, it appears to show more features characteristic of Phasmatodea.

Zusammenfassung

Die Stabschrecken (Orthoptera: Phasmatodea) im Baltischen Bernstein werden revidiert. Eine neue Familie der Areolatae, Archipseudophasmatidae n. fam., wird auf *Archipseudophasma* n. gen. mit der Typus-Art *A. phoenix* n. sp. begründet. Sie unterscheidet sich von den nahe verwandten Familien, den Heteronemiidae und den Pseudophasmatidae, durch das stark verlängerte dritte Segment der Antennen und die das Hinterleibsende erreichenden Tegmina. Sie beinhaltet zwei Unterfamilien, von denen aber nur eine benannt wird, da die zweite nur durch die Untersuchung von Larven bekannt wird, deren Beschreibung sinnlos erscheint. *Pseudoperla lineata* PICTET & BERENDT, 1854, repräsentiert eine neue Gattung der Archipseudophasmatinae: Balticophasmatini n. trib., *Balticophasma* n. gen., und ist nicht synonym zu *Pseudoperla gracilipes* PICTET & BERENDT, 1854, wie von HAGEN in GERMAR & BERENDT in BERENDT (1856) behauptet wurde. *Electrobaculum* SHAROV, 1968, ist die einzige Gattung der Pseudophasmatidae: Pseudophasmatinae: Electrobaculini n. trib. Mehrere der dem Autor zugänglichen Exemplare waren keine Phasmiden, sondern Orthoptera incertae sedis, repräsentiert durch die Gattung *Raptophasma* n. gen., deren Typus-Art *R. kerneggeri* n. sp. ist. Auch wenn diese Gruppe auf den ersten Blick mehr einer Gottesanbeterin ähnelt, überwiegen dennoch die Merkmale der Phasmiden.

I. Introduction

Stick insects from the Eocene Baltic amber forests are still quite poorly-known, only three species have been described previously. All descriptions were based on nymphs though. Altogether, about 140 Baltic amber specimens of which were believed to be phasmids were sent to the author for examination. Of them, 20 were actually not phasmids but represented a new genus of Orthoptera incertae sedis described below, while one further specimen, [59] Coll. C. GRÖHN, belongs to Plecoptera. The remaining (about 120) specimens are true members of Phasmatodea and provide a lot of interesting information about the stick insects living in NW-Europe some 40-50 Ma. years ago. None of them belonged to a tribe distributed in this area today, since the two species of *Pseudoperla* BERENDT & PICTET, 1854, are members of an extinct new family of Areolatae, Archipseudophasmatidae fam. n., which finds its nearest relatives in the Heteronemiidae and Pseudophasmatinae currently restricted to South America. *Electrobaculum* SHAROV, 1968, belongs to an extinct tribe, Electrobaculini n. trib, of Pseudophasmatidae: Pseudophasmatinae. The Archipseudophasmatidae fam. n. differ from the related families in the third antennomere being strongly elongated, more than twice as long as both scapus and pedicellus combined, a character unknown in Recent Areolate phasmids. Furthermore, if winged, the tegmina are fully developed and reach the apex of the abdomen.

The Archipseudophasmatidae are possibly the ancestors of the Recent Heteronemiidae and Pseudophasmatidae. Further research is in progress, the results will be published by the author in another paper, after a revision of the Heteronemiidae and Pseudophasmatidae.

The relationship to the South East Asian Heteropterygidae, which are also being revised by the author at present, is not clear; the Archipseudophasmatidae lack the ventroapical spine of the area apicalis and sensory areas on the prosternum which are present in Heteropterygidae, furthermore, all specimens examined lack spines on the body and are very slender and not spinose and broad like the Heteropterygidae. No particularly close relations exist with the Asian group Aschiphasmatae, which has been allotted family rank by BRAGG (2001) based on wing venation and the serration of the claws, a trait not exhibited by any specimen examined from Baltic amber.

The wing venation of the two adult Archipseudophasmatidae examined indicates a closer relationship to the Pseudophasmatidae, since the radial vein is branched. Only three specimens represent the suborder Anareolatae, which is dominant among the Recent phasmids and includes the majority of the genera and species. Yet most of the Baltic Eocene phasmids cannot be concluded to have belonged to the Areolatae, as the abundance might well be influenced by the way of life of the species. Indeed, several Areolatae, e.g. the Pseudophasmatidae in Neotropical areas, and the Aschiphasmatae in Asia, are much more active and move around in the branches, thus greatly increasing the chances of getting stuck in fresh resin and, consequently, of being preserved in amber.

Like in Recent phasmids, the number of antennomeres in the fossils grew during ontogeny, the nymphs always having less segments than adults. This was sometimes helpful in determining the stadium of the nymphs; as was the size of the head in relation to the body, since the early stages have a comparatively larger head. In phasmids males have four, females five, nymphal instars.

It is noteworthy that the whole family Archipseudophasmatidae from Baltic amber appears extinct nowadays; POINAR & POINAR (1999) present a picture of a phasmid egg from Dominican amber, which seems to belong to a Recent species, *Paraphanocles kerato-skeleton* (OLIVIER, 1792), a member of Diapheromeridae: Diapheromerinae: Diapheromerini: *Phanocles*-group, see ZOMPRO (2001). Eggs of stick insects in Baltic amber are possibly not recognized because of their striking similarity to plant seeds. A selection of phasmid eggs is shown in fig. XX Anybody who discovers similar eggs in their amber collection is welcome to contact the author.

HAGEN (in GERMAR & BERENDT, 1856) records 19 Baltic-amber phasmids from the Coll. MENGE, including one exuvie and one adult specimen (♂). This material could not be traced.

I. 1. Historical review

Only three species of Phasmatodea have hitherto been described from Baltic amber, *Pseudoperla gracilipes* PICTET & BERENDT, 1854, *P. lineata* PICTET & BERENDT, 1854, and *Electrobaculum gracile* SHAROV, 1968.

The first descriptions of stick insects in Baltic amber were executed in the middle of the 19th century, but the publication data and authorships of the genus *Pseudoperla* and its two species described have always been confused, as all subsequent authors mention PICTET alone.

PICTET did a lot of research on Neuroptera, and at a first glance he attributed the specimens which he later described as *P. gracilipes* and *P. lineata* to the order, and obviously communicated his preliminary results. As a consequence, HAGEN (1852) published the name *Pseudoperla gracilipes* in his paper „Ueber die Neuropteren der Bernsteinfauna“, attributing

both genus and species to PICTET. An earlier publication by PICTET from 1845 (sometimes cited in error as having been published in 1844) just includes some notes on the astonishingly good preservation of some Neuroptera in Baltic amber. The first publication of both of the two species was in 1854, included in a book published by PICTET, which included the formal description of the genus *Pseudoperla*, with an explicit naming of the authors as BERENDT & PICTET, while the authors of the two species included are PICTET & BERENDT; actually, the species were just named, but not described; nevertheless this procedure is usually accepted as valid in publications of this age. The heading of this chapter was „Pseudoperlides“, used as a family name, but in a French, not a Latin form and therefore neither valid nor available.

The exact information about the history of the species descriptions are provided by HAGEN in GERMAR & BERENDT in BERENDT, 1856, in the introduction („Vorrede“) and on p. 41. PICTET described the two species included, *gracilis* and *lineata*, in French, and in 1845 his, still unpublished, descriptions had been forwarded to HAGEN for a translation into Latin and German. Shortly before his death, PICTET asked HAGEN to finish his works on his amber specimens, and in January 1850 HAGEN got PICTET's specimens and descriptions. HAGEN included the translations of PICTET's description in the publication normally cited as GERMAR & BERENDT, 1856, nevertheless, both of them had already died already before this year.

The figure in GERMAR & BERENDT (1856) was forwarded, but not executed by BERENDT. HAGEN (1856) comments on PICTET's description, but his comments are less correct than PICTET's description. His observations were the basis for HAGEN's decision to synonymize *P. gracilipes* and *P. lineata*. This was an error, as discussed below.

I. 2. Material and methods

Material was examined from the following collections: British Museum of Natural History, Department of Palaeontology (London, England); Geologisch-Paläontologisches Institut der Universität (Hamburg, Germany); Paläontologisches Museum der Humboldt-Universität (Berlin, Germany); J. DAMZEN (Vilnius, Lithuania), M. GLINK (Buxtehude, Germany), C. GRÖHN (Glinde, Germany), A. HERRLING (Bramsche, Germany), C. & H. W. HOFFEINS (Hamburg, Germany), J.-W. JANZEN (Seevetal, Germany); F. KERNEGGER (Hamburg, Germany), R. KRULL (Bad Münde), Dr. A. KRYLOV (Kaliningrad, Russia); S. URBONAS / J. VEILANDAS (Klaipeda, Lithuania), J. VELTEN (Idstein, Germany), Dr. W. WEITSCHAT (Geologisch-Paläontologisches Institut, University of Hamburg, Germany), J. WUNDERLICH (Straubenhardt, Germany), and O. ZOMPRO (Max-Planck-Institute für Limnologie, Plön, Germany; affiliated with Zoologisches Museum der Christian-Albrechts Universität, Kiel, Germany); material figured in various publications was examined as well.

As not all specimens had a special acquisition number, a label with the author's examination number was added. This number is given in square brackets ([]) in the text. References in the text are only made to this number.

Examination was executed with a Zeiss-Citival-2 stereoscope, drawings were made using a drawing-tube, a few photos were taken with a Pentax-Super-A camera attached to this stereoscope. Most of the photos have been supplied by T. KUJAWSKI, ASA Agency, Flintbek, Germany. The drawings were digitalized by Ms. A. TESCHKE, Berlin, Germany. Measurements were taken using an MBC-9 stereoscope and a special scale ocular, both Russian make.

II. Systematic descriptions

II.1. Phasmatodea

The Phasmatodea are divided into three suborders, the Timematodea, with only three tarsal segments, the Anareolatae and the Areolatae, both with five tarsomeres, the latter group also exhibiting an impressed triangular area on the tibiae ventro-apically (figs. 1-2).

II. 1. 1. Order Phasmatodea

Suborder Areolatae

ZOMPRO (2001b) clarified the actual systematic position of the family Heteronemiidae by placing it in the Areolatae. Indeed, since the genus *Bacunculus* BURMEISTER, 1838, which

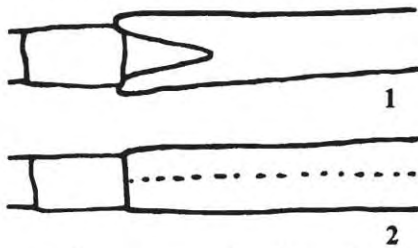


Fig. 1: Apex of a tibia of an areolatae phasmid, ventral aspect.

Fig. 2: Apex of a tibia of an anareolatae phasmid, ventral aspect.

was formerly treated as a member of Pseudophasmatidae, is actually a junior synonym of *Heteronemia* GRAY, 1835, the type genus of Heteronemiidae, a part of the Pseudophasmatidae has to be transfer-red to the Heteronemiidae. The latter differ from the Pseudophasmatidae by the third antennomere being triangular in cross-section, a character which is sometimes difficult to see.

The genera of Heteronemiinae auct. that actually belong to the Anareolatae: Diapheromeridae: Diapheromerinae have been revised by ZOMPRO (2001a).

The families of Areolatae are distinguished as shown in the following key:

Key to suborders of Phasmatodea and families of Areolatae

1. Tarsi apparently 3-segmented.....Timematodea
- Tarsi clearly 5-segmented..... 2.
2. Meso- and metatibiae without impressed, triangular area ventroapically..... Anareolatae
- Meso- and metatibiae with impressed, triangular area (area apicalis) ventroapically.....3. Areolatae
3. Tergites and sternites of abdomen strongly foliaceous dilatated; leaf like.....Phylliidae
- At best tergites of abdomen foliaceous dilatated; not leaf-like..... 4.
4. First abdominal segment (median segment) at best one third as long as metanotum, antennae shorter than profemora.....Bacillidae
- Median segment at least half as long as metanotum, antennae distinctly longer than profemora, often as long as body.....5.
5. Third antennomere at best as long as scapus and pedicellus

- combined.....6.
- Third antennomere strikingly elongated, considerably more than twice as long as previous two segments combined.....Archipseudophasmatidae
- 6. Third antennomere triangular in cross-section.....Heteronemiidae
- Third antennomere round in cross-section.....7.
- 7. Area apicalis with a spine medioapically and / or prosternum with two sensory areasHeteropterygidae
- Area apicalis without a spine medioapically, prosternum without sensory areas.....8.
- 8. Radial vein branched, claws not serrated.....Pseudophasmatidae
- Radial vein not branched, and / or claws serrated.....Aschipseudophasmatidae

Family Archipseudophasmatidae n. fam.

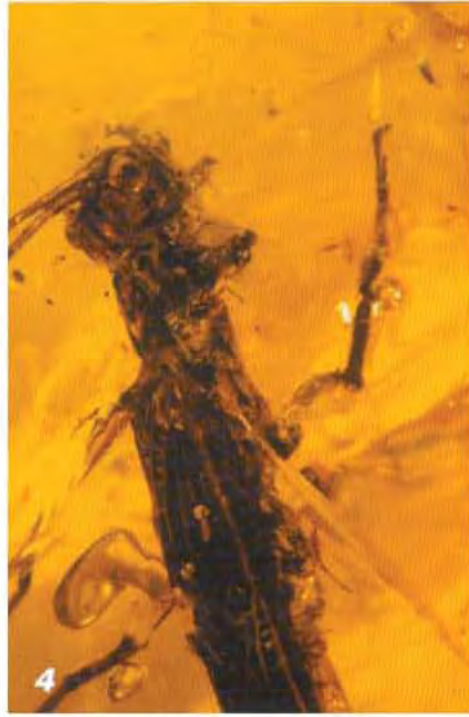
Pseudoperlides PICTET, 1854.

Diagnosis: Small areolate Phasmatodea, abdomen not dilatated foliaceously, median segment longer than half length of metanotum, third antennomere at least twice as long as scapus and pedicellus combined, area apicalis without spine medioapically, prosternum without sensory areas. Ocelli absent.

The extinct Archipseudophasmatidae differ from Heteronemiidae and Pseudophasmatidae in the striking third antennomere, which is strongly elongated and at least two times as long as scapus and pedicellus combined, often much longer, a character not known from any Recent areolate phasmid. Ocelli are absent. The family is divided into two subfamilies, the Archipseudophasmatinae n. subfam. and an unnamed „Subfamily 2“; the latter subfamily could be examined by nymphs only. It is useless to described and name them as species, because it would be almost impossible to recognize this species in further material with certainty. Members of both groups were obviously common in the Baltic amber forests.

PICTET (1854) named this group „Pseudoperlides“, using only the French form and not a Latin one. Therefore this name is not available. Since it wrongly indicates a relationship to the Perlidae (Plecoptera), the author prefers to establish a new family name based on Archipseudophasma n. gen., which shows the relation to and within the Phasmatodea.

Figs. 3-4: *Archipseudophasma phoenix* n. gen. n. sp. **3:** [4] holotype, ♂ in Baltic amber, lateral aspect; coll. Geologisch-Pläontologisches Institut und Museum der Universität Hamburg, Germany, no. 4300, (ex coll. C. GRÖHN no. 166); **4:** [83] Paratype, ♂ in Baltic amber, dorsolateral aspect; coll. J. DAMZEN no. 200; **Fig. 5:** *Pseudoperla gracilipes* (PICTET & BERENDT, 1854): [99] ♂ nymph of stage IV in Baltic amber. Coll. Paläontologisches Museum der Humboldt-Universität, Berlin, no. 1076, (ex coll. BERENDT no.2); **Fig. 6:** *Pseudoperla* sp.: [26] ♀ nymph of III stage in Baltic amber; coll. S. URBONAS no. 281.



Key to subfamilies and genera Archipseudophasmatidae

- 1. Profemora straight, not or only slightly depressed basally 2. Archipseudophasmatinae
 - Profemora distinctly depressed and curved basally.....Subfamily 2
- 2. Basitarsus at least as long as following three segments combined
 -3. Archipseudophasmatini
 - Basitarsus only slightly longer than second tarsomere.....Balticophasmini
 - Balticophasma* n. gen.
- 3. Lateral margins of pronotum straight.....*Pseudoperla* BERENDT & PICTET
 - Lateral margins of pronotum distinctly concave in the middle
 -*Archipseudophasma* n. gen.

This key holds valid for the specimens examined, but it will definitely have to be modified when further material becomes known. Genitalic characters and some other features are certain to become more important, especially for the division into tribes.

Subfamily Archipseudophasmatinae n. subfam.

Diagnosis: In this subfamily of Archipseudophasmatidae, the profemora are straight and at best slightly depressed basally, and both tegmina and alae are fully developed.

Tribus Archipseudophasmatini n. trib.

Diagnosis: In this tribe of Archipseudophasmatinae, the basitarsus is at least as long as the following three segments combined.

Genus *Archipseudophasma* n. gen.

(figs. 3-17)

Type species: *Archipseudophasma phoenix* n. sp.

Etymology: Referring to extinct, archaic phasmids related to Pseudophasmatidae.

Diagnosis: Tegmina and alae fully developed, antennomere III, at least in nymphs more than twice as long as scapus and pedicellus combined, in adults indistinctly divided in anterior one-third. Basitarsus as long as following four tarsomeres combined (exclusive of unguis).

Description: Small phasmids. Head subglobose, slightly compressed, antennomere III more than twice as long as scapus and pedicellus combined. Following segments elongated, antennae projecting beyond tip of abdomen. Eyes projecting hemispherically. Pronotum as long as head, with a curved, transverse impression medially. Both tegmina and alae fully developed, reaching the end of abdomen. Main vein (radius) of tegmina branched. Shoulder of tegmina projecting, acute. The alae can not be examined, because they are covered by the tegmina. Profemora straight basally, roundly-quadrate in cross-section, protibiae same in structure and length but not as wide. Meso- and metafemora as profemora. Edges of femora and tibiae bristled. Probasitarsus as long as following three segments combined, length of tarsomeres II to IV decreasing in length, V as long as II and III combined. Area apicalis present. Median segment almost as long as metanotum. Abdominal sternites II to VI increasingly

longer, VII as long as VI. Subgenital plate flat and bulgy, as long as sternite VIII and IX combined. Cerci straight, flat, roundly-rectangular, tip bristled ventrally.

Archipseudophasma phoenix n. sp.

(figs. 3-4, 7-11)

Holotype: [4] ♂ in Baltic amber (fig. 3, 7-11). Coll. Geologisch-Paläontologisches Institut und Museum der Universität Hamburg, no. 4300. (ex Coll. C. GRÖHN no.1661).

Paratype: [83] ♂ in Baltic amber (fig. 4); Coll. J. DAMZEN (Vilnius), no 200.

Etymology: Phoenix, a bird from a Greek legend that lives for half a millenium, finally burns itself but gets reborn from the ashes. Refers to the rediscovery after millions of years.

State of preservation and co-occurring fossils: Holotype: The left half of the tergum must have been eaten. The left antenna is broken off. No other fossils are included. Some parts are not clearly visible, therefore the description is comparatively brief.

Paratype: Left antenna fragmented, tegmina broken off, only fragments of legs present. The specimen can only be examined from its left side in a dorsolateral view.

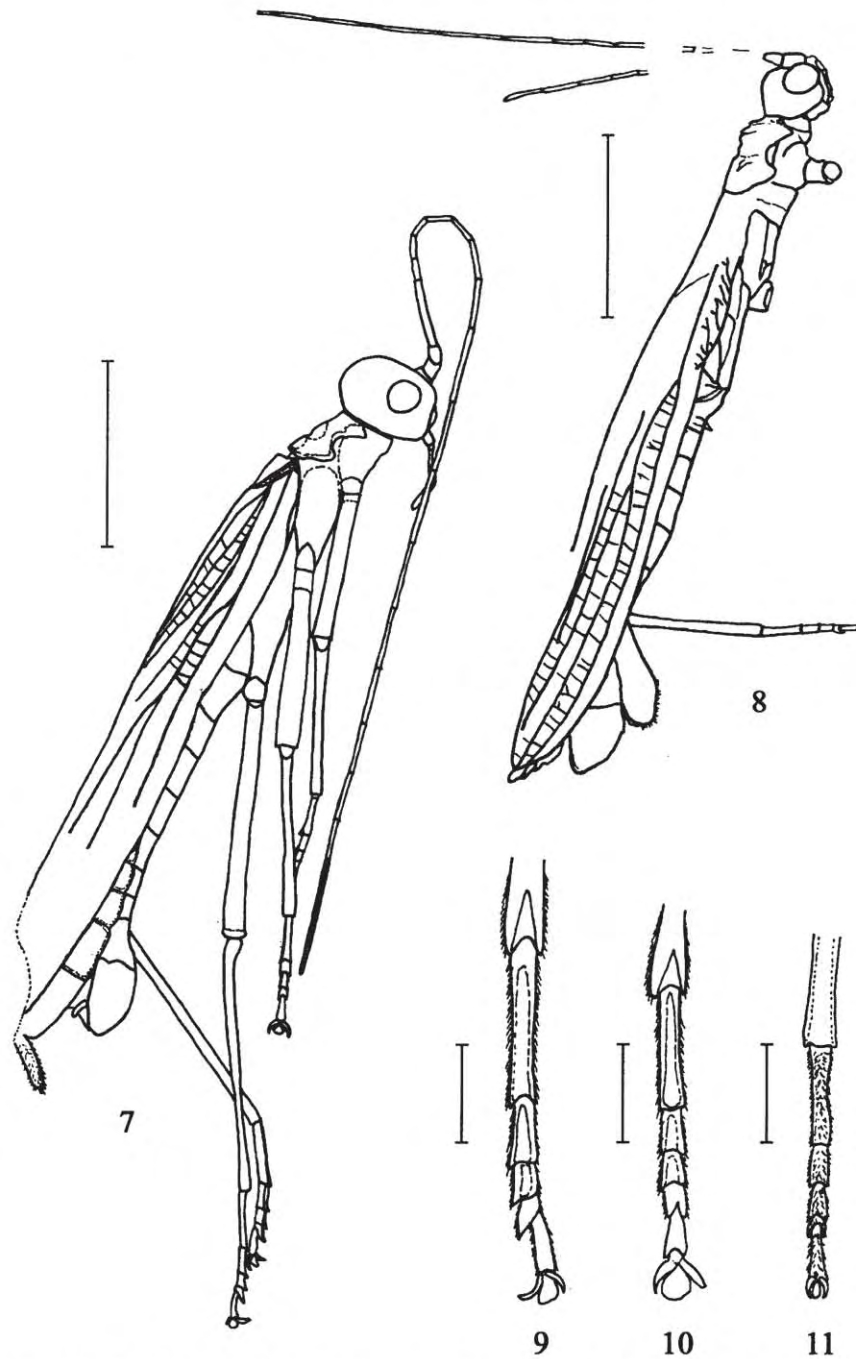
Dimensions (in mm): [4] Adult ? (HT): Body length: 20.55; head: 2.40; pronotum: 2.10; mesonotum: 2.75; metanotum: 2.00; mediansegment: 2.90; profemora: 4.05; protibiae: 4.05; protarsus: 3.60; mesofemora: 4.40; mesotibiae: 4.35; mesotarsus: 3.20; metafemora: 6.25; metatibiae: 6.30; metatarsus: 3.50; antennae: 26.5; antennomeres: 21 (left antenna).

[83] Adult ? (PT): Body length: 20.25; head: 2.35; pronotum: 2.05; protarsus: 2.40; mesotarsus: 2.25; metatarsus: 3.20; antennae: 19.15; antennomeres: 10, broken (left antenna) 20 (right antenna).

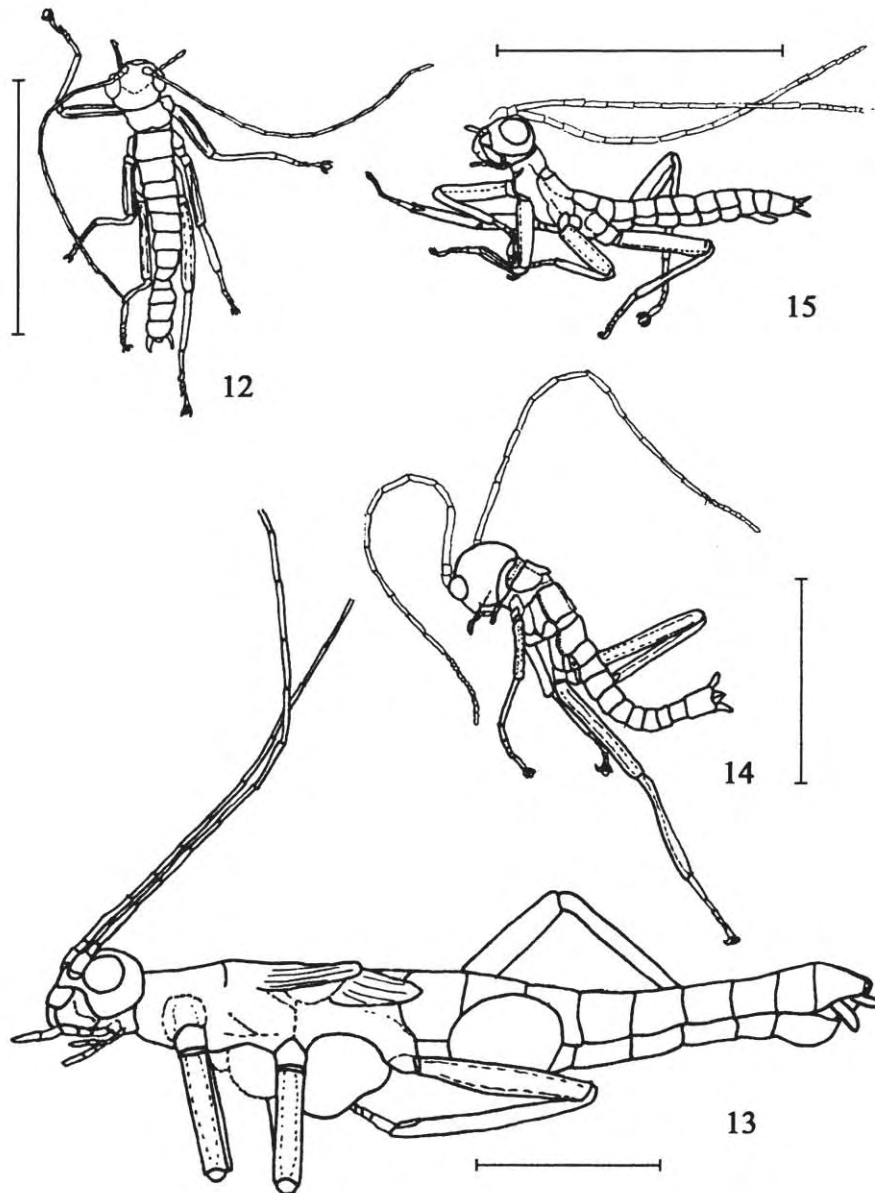
Additional material of *Archipseudophasma* n. gen.: [16] Coll. J. VELTEN, ♀ nymph of stage I, 7.50 mm; [23] Coll. A. HERRLING, no. 536, ♂ nymph of stage IV, 20.20 mm; [24] Coll. S. URBONAS, no. 279, ♂ nymph of stage I, 5.60 mm (figured in WEITSCHAT & WICHARD, 1998: 113 fig. b); [36] Coll. C.&H.W. HOFFEINS, no.759, ♀ nymph of stage I, 5.50 mm; [40] Coll. C. & H. W. HOFFEINS, no. 1152/1, nymph of stage V, 6.25 mm. The smallest species examined. Unfortunately it is in too poor condition for further conclusions to be drawn. Head and extremities are not clearly visible.; [50] Coll. A. HERRLING, no.537, ♀ nymph of stage II, 5.70 mm; [51] Coll. A. HERRLING, no.540, ♀ nymph of stage I, 5.50 mm; [81] Coll. W. WEITSCHAT, ♂ nymph of stage I, ca. 8.00 mm; [96] Coll. Pal. Mus. Berlin no. 1073, ex Coll. BERENDT, nymph, 8.80 mm; [98] Coll. Pal. Mus. Berlin no. 1075, ex Coll. BERENDT, nymph, 7.10 mm; [127] Coll. VON HOLT no. AWPh7, ♀ nymph of stage I, 6.10 mm; [128] Coll.v. HOLT no. AWPh8, nymph of stage I.

Diagnosis: Characterized by the S-shaped lateral margin and the impressions on the disc of the pronotum.

Description: Adult ♂. Head subglobose, slightly compressed dorsolaterally, smooth. Eyes projecting hemispherically. Scapus subcylindrical, pedicellus slightly shorter and narrower, third segment half as wide as scapus, as long as previous two segments combined. Fourth segment much shorter, following segments increasingly longer. Longest segments in the middle. Antennae projecting beyond apex of abdomen. Pronotum with a flat transverse impression, anterior and posterior edges slightly elevated laterally, lateral margin S-shaped. Tegmina and alae fully developed, reaching the apex of abdomen. Tegmina with an acute and projecting shoulder. Profemora straight, not curved basally. All femora quadrate in cross-section, dorsal edges rounded, ventral edges produced. Tibiae round in cross-section, each with a short area apicalis. Basitarsi longer than following three segments combined, second tarsomere less than half as long, two times as long as third, fourth half as long as third, terminal segment deeply inserted into fourth. Mid- and hindlegs like forelegs. Midlegs as long as forelegs, hind legs one-third longer. Abdominal segment II longer than III, IV longer than III, as long as V, IV as long as III, VI shorter than V, VII shortest segment. Tergites marginated laterally. VIII longer than VIII, IX longer than VIII, X longer than IX. Cerci as long as X, straight, with long, black bristles ventro-apically. Subgenital plate bulgy, slightly emarginated posteriorly. Phallus visible in holotype.

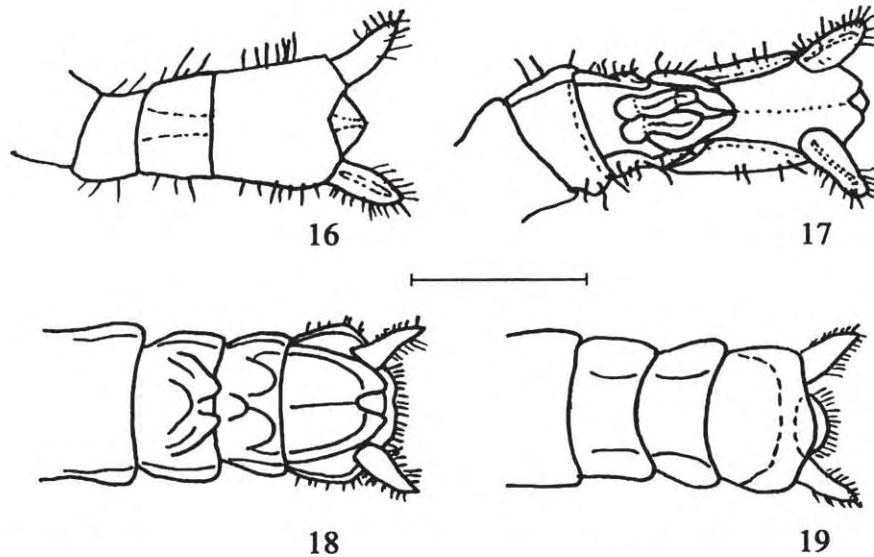


Figs. 7-11: *Archipseudophasma phoenix* n. gen. n. sp.; **7:** [4] holotype, ♂ in Baltic amber, lateral aspect; coll. Geologisch-Paläontologisches Institut und Museum der Universität Hamburg, no.4300, (ex coll. C. GRÖHN no.1661). Scale: 5 mm.; **8:** [83] paratype, ♂ in Baltic amber, lateral aspect; coll. J. DAMZEN no. 200. Scale: 5 mm, **9:** [4] holotype, ♂ protarsus, ventral aspect; **10:** holotype, ♂ mesotarsus, ventral aspect; **11:** [4] holotype, ♂ mesotarsus, dorsal aspect. Scale: 1mm.



Figs. 12-15: *Archipseudophasma* sp., nymphs in Baltic amber; **12:** [24] ♂ of stage I, dorsal aspect, coll. S. URBONAS no.279; **13:** [23] ♂ of stage IV, lateral aspect, coll. A. HERRLING no.536; **14:** [16] ♀ of stage I, dorsolateral aspect, coll. J. VELTEN no.1; **15:** [50] ♀ of stage II, lateral aspect, coll. A. HERRLING no.537. Scale: 5 mm.

Comments concerning *Archipseudophasma* n. gen.: In *Archipseudophasma* n. gen. the ♀ nymphs of stage I exhibit strikingly elongated subgenital valves, which will form the subgenital plate at a later stage of development. (figs. 16-17). They are much shorter in their Recent relatives, for example in the genus *Anisomorpha* GRAY, 1835, a member of Pseudophasmatidae: Pseudophasmatinae: Anisomorphini (figs. 18-19).



Figs. 16-19: Apex of abdomen of ♀ nymphs of stage I; **16:** *Archipseudophasma* sp.: [16] ♀ stage I, tip of abdomen, dorsal aspect, coll. J. VELTEN no. 1; **17:** *Archipseudophasma* sp.: [16] ♀ of stage I, tip of abdomen, ventral aspect, coll. J. VELTEN no. 1; **18:** *Anisomorpha* sp.: ♀ of stage I, tip of abdomen, dorsal aspect; **19:** *Anisomorpha* sp.: ♀ of stage I, tip of abdomen, ventral aspect. Scale: 1 mm.

Genus *Pseudoperla* BERENDT & PICTET, 1854

(figs. 5-6, 20-24)

Pseudoperla BERENDT & PICTET, 1854: 363; HAGEN, 1852: 228; PICTET, 1856: 37; CARPENTER, 1992: 186.

Type species: *Pseudoperla gracilipes* PICTET & BERENDT, 1854, by subsequent designation of CARPENTER, 1992 (In error recorded as original designation by PICTET).

Diagnosis: A typical member of Archipseudophasmatini, characterized by the quadrate and very flat pronotum and the very short legs. Eyes projecting more than hemispherically. Basitarsi as long as following three segments combined. Legs shorter than in *Archipseudophasma* n. gen. Tegmina and alae present.

Complementary description: Typical Archipseudophasmatini. Head as long as wide, slightly globose. Eyes projecting slightly more than hemispherically. Third antennomere more than twice as long as scapus and pedicellus combined. Antennae longer than body. Thoracic segments quadrate, flat dorsally, of similar length to each other. The adult insect with both tegmina and alae fully developed and reaching end of abdomen. Legs strikingly short, femora straight, almost quadrate in cross section, tibiae round in cross section. Protarsi as long as following three tarsomeres combined, these decreasing in length. Median segment about two thirds as long as metanotum. Following segments of similar length, VIII to X increasingly longer.

Pseudoperla gracilipes PICTET & BERENDT, 1854

(figs. 5, 20)

Pseudoperla gracilipes PICTET & BERENDT, 1854: 365, atlas pl. 40: 25; HAGEN, 1852: 228; PICTET, 1856: 38, pl. 4: 9; HAGEN, 1856: 39; ANDRÉE, 1951: 50; WEIDNER, 1956: 88; KEILBACH, 1982: 215; CARPENTER, 1992: 187, fig. 120: 2; SPAHR, 1992: 37; nec WEIDNER, 1956: 88, fig. a-c. *Pseudoperla lineata*: BACHOFEN-ECHT, 1949: 85, fig. 74.

Holotype: [99] ♂ nymph of stage IV in Baltic amber (figs. 5, 20) Coll. Paläontologisches Museum der Humboldt-Universität, Berlin, no. 1076, ex Coll. BERENDT no. 2.

State of preservation and co-occurring fossils: The piece of amber which includes the holotype is broken in three pieces of which the medium-sized one contains the insect. The largest piece exhibits an impression of the specimen's abdomen, which clearly shows the subgenital plate of a male. The holotype is damaged. Antennae broken at the third antennomere, protibiae missing or not clearly visible. Left mesotarsus missing. Right hindleg broken off, but present, also fragments of its tarsus. The metabasitarsus is the only tarsus that can be examined.

Additional material of *Pseudoperla* BERENDT & PICTET, 1854: [1] Coll. C. GRÖHN, no. 456, ♀ nymph of stage I, 5.70 mm; [26] Coll. S. URBONAS, no. 281, ♀ nymph of stage III, 11.40 mm; [35] Coll. C. & H. W. HOFFEINS, no. 723/2, nymph of stage II, 7.50 mm; [46] Coll. Geol.-Pal. Inst., Univ. Hamburg, ♀ nymph of stage V, 17.20 mm; [56] Coll. C. GRÖHN, no. 2721, nymph of stage III, 10.20 mm; [88] Coll. J.-W. JANZEN, ♀ nymph of stage I, ca. 6 mm; [89] Coll. W. WEITSCHAT no. 7, ♂ nymph of stage III, 12.15 mm; [101] Coll. Pal. Mus. Berlin no. 1078, ex Coll. BERENDT, nymph, 7.20 mm; [107] Coll. Brit. Mus. Pal. no. 18280, ♀ nymph of stage II, 10.50 mm; [111] Coll. A. KRYLOV, ♂

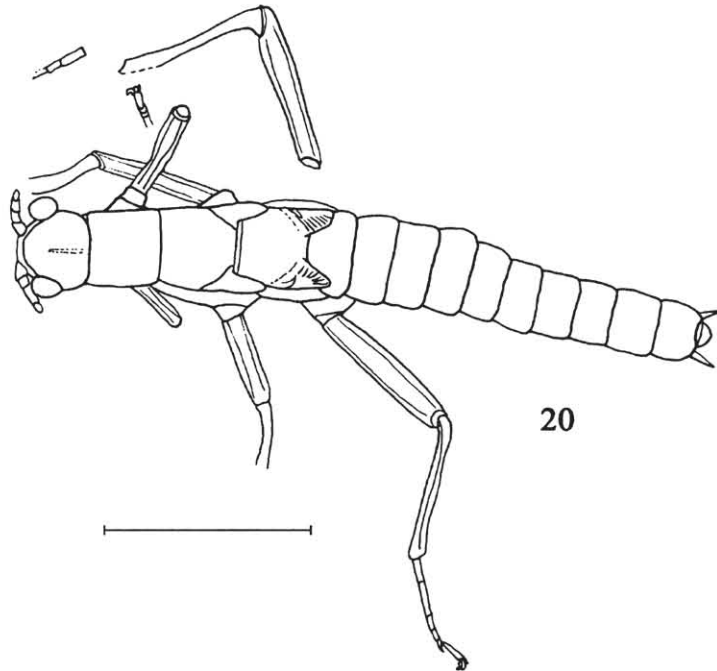
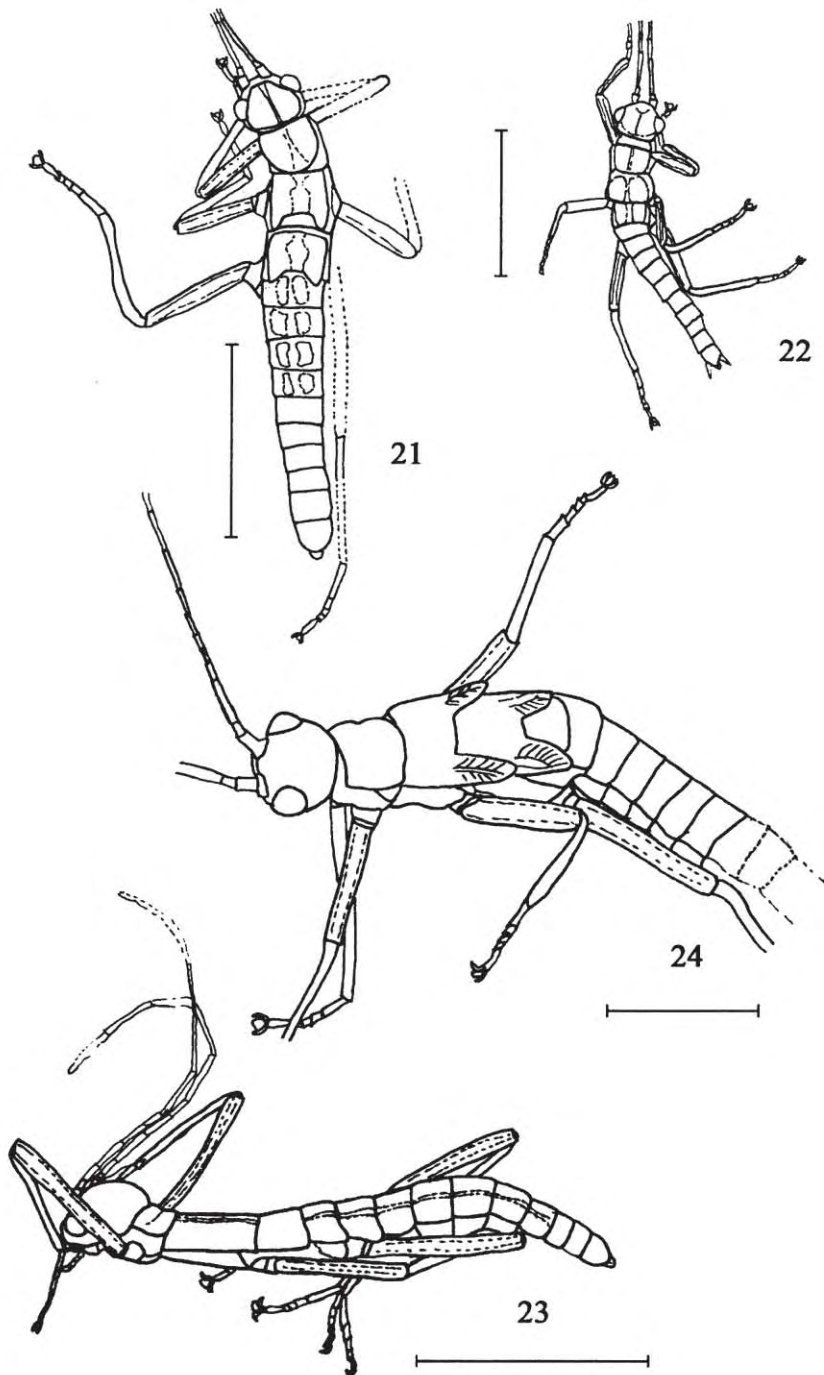


Fig. 20: [99] *Pseudoperla gracilipes* PICTET & BERENDT, 1854, holotype, ♂ nymph of stage IV in Baltic amber, in situ, dorsal aspect, coll. Paläontologisches Museum der Humboldt-Universität, Berlin, no.1076, ex Coll. BERENDT no.2. Scale: 5 mm.



Figs. 21-24: *Pseudoperla* sp., nymphs, in Baltic amber; **21:** [89] ♂ of stage III, dorsal aspect, coll. W. WEITSCHAT no.7; **22:** [1] ♂ of stage I, dorsal aspect, coll. C. GRÖHN no. 456; **23:** [26] ♂ of stage III, lateral aspect, coll. S. URBONAS, no.281; **24:** [46] ♂ of stage V, dorsal aspect, coll. Geol.-Pal. Inst., Univ. Hamburg. Scale: 5 mm.

nymph of stage IV, 19.50 mm; [114] Coll. A. KRYLOV, ♀ nymph, 6.60 mm; [132] Coll. J. WUNDERLICH no. 355, ♂ nymph, 6.90 mm.

Redescription: Head as long as wide, slightly globose. Anterior margin semicircular. Vertex with distinctly raised median line. Eyes projecting slightly more than hemispherically. Scapus depressed, rectangular. Pedicellus cylindrical, two thirds as long and wide as scapus. Third antennomere strongly elongated. Antennae distinctly longer than body. Pronotum almost quadrate, with broad, flat anterior margin, posterolateral edges rounded. Lateral margins straight, slightly narrower than anterior margin. Median line indistinct, but present. Prothoracic glands present. Mesonotum slightly longer than pronotum, also quadrate, in its anterior half with a semicircular impression. Metanotum slightly shorter and narrower than mesonotum, also quadrate. Tegmina and alae present. The tegmina are longer than the alae; therefore it can be assumed that the tegmina are fully developed in the adult insect, like in *Archipseudophasma* n. gen. Legs strikingly short. Profemora straight, neither curved nor depressed, basally slightly trapezoidal in cross section, edges distinct. Protibiae round in cross section, almost as long as tibiae. Mid- and hindlegs as forelegs. Metabasitarsus as long as following three segments combined, the latter decreasing in length. Fourth tarsomere flat, elongated and projecting ventrally. Fifth tarsomere slightly shorter than basitarsus, curved. Median segment about two thirds as long as metanotum. Following segments of similar length. Abdominal segments II to IX with distinct lateral margin. Posterior margin of X convex. Cerci simple, projecting beyond X by the half length of X. A small supraanal plate is present. Subgenital plate in ♂ moderately swollen, in ♀ flat, not projecting beyond abdomen.

Dimensions (in mm): / nymph of stage IV, holotype of *Pseudoperla gracilipes* PICTET & BERENDT, 1854: body: 16.30; head: 1.65; pronotum: 1.55; mesonotum: 1.70; metanotum: 1.55; median segment: 1.05; profemora: 2.45; mesofemora: 2.65; mesotibiae: 2.60; metafemora: 3.55; metatibiae: 3.50; metatarsus: 2.25.

Comments concerning *Pseudoperla gracilipes* PICTET & BERENDT, 1854: The specimen [89] (fig. 21) obviously belongs in this genus, but features a nice „colouration“ of the thorax and first abdominal segments. Young nymphs, in which the tarsi are not clearly visible, are difficult to distinguish from nymphs of *Balticophasmini*. The feature which is easiest to recognize are the stronger sclerotized abdominal segments in the latter.

Tribus *Balticophasmini* n. trib.

Diagnosis: In this tribe of *Archipseudophasmatinae*, the basitarsus is distinctly shorter than the second to fourth tarsomere combined. Head and thoracic segments with distinct median line. The abdomen seems to be strongly sclerotized, while parts of the thorax look comparably „soft“.

Genus *Balticophasma* n. gen.

(figs. 25-31)

Type species: *Pseudoperla lineata* PICTET & BERENDT, 1854.

Etymology: Combined from the origin, the Baltic area, and the ordinal name *Phasmatodea*.

Diagnosis: Characterized within the *Archipseudophasmatinae* by the short basitarsi, which are only slightly longer than the second segment. Metanotum shorter than mesonotum. Abdominal segments seem to have been strongly sclerotized.

Description: Small *Archipseudophasmatinae*. Head roundly quadrate, compressed. Eyes projecting slightly less than hemispherically. Third antennomere considerably longer than a flattened scapus and a cylindrical, narrower pedicellus combined. Antennae in young nymphs almost as long as body, in adults possibly longer. Pronotum about as long as head. Mesonotum longer than pronotum, metanotum of similar length. Profemora straight, roundly-quadrate in cross-section, protibiae round in cross-section. Probasitarsus longer than second tarsomere, but distinctly shorter than the second to

fourth tarsomere combined, second to fourth disc-like, their length decreasing, fifth slightly longer than basitarsus. Mid- and hindlegs as forelegs. Median segment half as long as metanotum, abdominal segments II to VII of similar length, VIII to X distinctly longer, X roundly-quadrate, supraanal plate projecting semicircularly. Cerci simple, projecting beyond tip of X by half of the segment's length.

Balticophasma lineata (Pictet & Berendt, 1854)

(figs. 25-27, 31)

Pseudoperla lineata Pictet & Berendt, 1854: 364; Pictet, 1856: 38, pl. 4: 10a-f; Andrée, 1951: 50; Weidner, 1956: 88; Larsson, G. S., 1978: 127, fig. 42; Keilbach, 1982: 215 (Nec *Pseudoperla lineata*: Bachofen-Echt, 1949: 85, fig. 74).

Holotype: [94] Nymph of uncertain sex of stage II in Baltic amber (fig. 25). Coll. Paläontologisches Museum der Humboldt-Universität, Berlin, no. 1071. Ex Coll. Berendt no. 10.

Additional material of *Balticophasma lineata* (Pictet & Berendt, 1854): [13] Coll. M. Glink, no. 5, nymph of stage II, 7.20 mm; [22] Coll. A. Herrling no. 541, ♂ nymph of stage II, 7.30 mm (figured in Weitschat & Wichard, 1998: 113 fig. a).

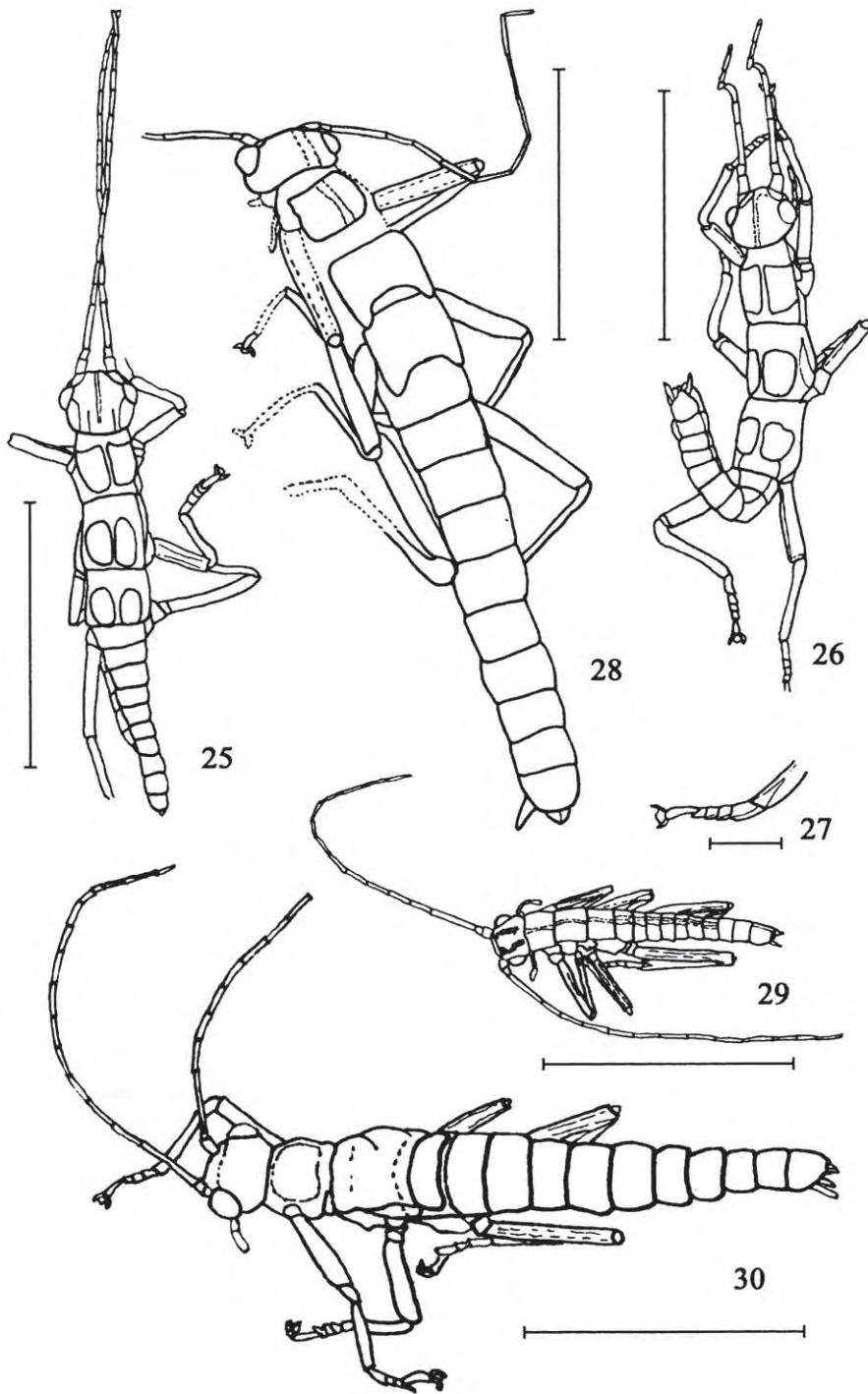
Material of *Balticophasma* n. gen.: [5] Coll. C. Gröhn no. 1677, ♀ nymph of stage I, 5.60 mm; [14] Coll. M. Glink no. 6, nymph of stage II, 6.90 mm; [17] Coll. J. Velten no. 2, ♀ nymph of stage II, 7.50 mm; [32] Coll. Geol.-Pal. Inst., Univ. Hamburg, nymph of stage III or IV, depending on the sex, no. 1006, 9.10 mm. One of the smallest species examined. The specimen is in too poor condition for a closer examination to be made.; [33] Coll. Geol.-Pal. Inst., Univ. Hamburg, no. 1200, ♂ nymph of stage III, 14.10 mm; [37] Coll. C. & H. W. Hoffeins, no. 800, ♀ nymph of stage I, 5.00 mm; [39] Coll. C. & H. W. Hoffeins, no. 1096/2, nymph, 4.25 mm; [42] Coll. C. & H. W. Hoffeins no. 1152/3, ♀ nymph of stage I, 3.75 mm; [52] Coll. A. Herrling, no. 539, nymph of stage II, 7.90 mm; [53] Coll. A. Herrling, no. 538, nymph, 8.80 mm; [69] Coll. J. Wunderlich, no. W6, nymph, 6.00 mm; [72] Coll. C. Gröhn, no. 2726, nymph of stage I, 5.45 mm; [74] Coll. C. Gröhn, no. 2727, nymph of stage I, 5.50 mm; [92] Coll. Pal. Mus. Berlin no. 1069, ex Coll. Berendt, ♀ nymph of stage II, 10.70 mm; [95] Coll. Pal. Mus. Berlin no. 1072, ex Coll. Berendt, ♀ nymph of stage II, 8.10 mm; [102] Coll. Pal. Mus. Berlin no. 1079, ex Coll. Berendt, nymph 7.70 mm; [108] Coll. Brit. Mus. Pal. no. 18847, ♂ nymph of stage II, 10.50 mm (figured in Ross, 1998: 47, fig. 118); [115] Coll. A. Krylov, nymph, 6.75 mm; [119] Coll. A. Krylov, nymph, ca. 6.5 mm; [130] Coll. J. Wunderlich no. 353, nymph of stage I, 6.55 mm.

Not examined: nymph of stage II, ♂, figured in Weitschat & Wichard, 1998: 113, fig. c; nymph of stage III, ♂, figured in Weitschat & Wichard, 1998: 113, fig. d; nymph of stage I, ♂, figure in Weitschat & Wichard, 1998: 113, fig. e; nymph of stage II ♂, figured in Weitschat & Wichard, 1998: 113, fig. g.

Redescription: Members of *Balticophasma lineata* (Pictet & Berendt, 1854) in amber appear yellow with brown, stronger sclerotized parts of the body. Head flat, compressed dorsoventrally, roundly quadrate, with distinct, pale median line. Eyes projecting less than hemispherically. Scapus

Figs. 25-27: *Balticophasma lineata* (Pictet & Berendt); **25:** [94] holotype, nymph of uncertain sex stage II in Baltic amber, lateral aspect, coll. Paläontologisches Museum der Humboldt Universität Berlin, no. 1071; (ex Coll. Berendt no. 10); **26:** [22] ♂ nymph of stage II, dorsal aspect, coll. A. Herrling, no. 541; **27:** [22] ♂, nymph of stage II, left mesotarsus, lateral aspect, coll. A. Herrling, no. 541. Scale 5mm.

Fig. 28: *Balticophasma* sp. [33] ♂ nymph of III stage, in Baltic amber, dorsolateral aspect, coll. Geologisch-Paläontologisches Institut und Museum der Universität Hamburg, no. 1200; **Figs. 29-30:** *Balticophasmatini* sp., nymphs in Baltic amber; **29:** [5] ♀ of stage I, dorsolateral aspect, coll. C. Gröhn no. 1677; **30:** [17] ♀ of II stage, dorsal aspect, coll. J. Velten no. 2. Scale: 5 mm.



almost rectangular, pedicellus slightly narrower and only two thirds as long. Third antennomere more than two thirds as long as scapus and pedicellus combined, following segments elongated, but less than half as long as third antennomere. Antennae about as long as body, in adults possibly longer, in young nymphs the antennae consisting of about 16 segments. Pronotum about as long as head, with two stronger sclerotized plates, which are brown in specimens preserved in amber. The less sclerotized parts of segments pale. Mesonotum longer than pronotum, also with pale less sclerotized parts and two stronger sclerotized, brown plates. Metanotum as previous segment. All femora strongly sclerotized, brown, straight, roundly quadrate in cross-section, with distinct edges. Tibiae round in cross-section. Basitarsi at most as long as following two tarsomeres combined. Second tarsomere slightly longer than third segment, almost disc-like, fourth segment shorter than third, terminal segment as long as previous three combined. Fifth segment longer than basitarsus, curved. Femora and tibiae of foreleg about as long as in midleg, in hindleg distinctly longer. Median segment half as long as metanotum. Abdominal segments strongly sclerotized, of similar length to each other, VIII to X distinctly longer than previous segments. Abdominal segment X rounded posteriorly, supraanal plate slightly projecting beyond posterior margin of X. Cerci long, slender, slightly curved, projecting beyond abdominal segment X by half of the segment's length. Subgenital plate of ♂ slightly swollen, of ♀ flat, not projecting beyond abdomen.

Dimensions (in mm): Nymph of uncertain sex of stage II, holotype of *Balticophasma lineata* (PICTET & BERENDT, 1854): Body length: 8.75; head: 1.15; pronotum: 1.05; mesonotum: 1.35; metanotum: 1.05; median segment: 0.45; profemora: 1.05; protibiae: 1.15; protarsus: 1.00; mesofemora: 1.05; mesotibiae: 1.15; mesotarsus: 1.05; metafemora: 2.00; metatibiae: 1.85; metatarsus: 1.45; antennae: 6.70; antennomeres: 16.

Comments concerning species of *Balticophasma* n. gen.: Further material of older nymphs is urgently required to draw further conclusions about this genus. In the specimen [37] the third segment of the right antenna consists of two segments, the left antenna is built as usual. Variation of numbers and lengths of antennal segments is often found in phasmids, and is therefore not a contradiction to the diagnosis of the family. The strongly sclerotized plates on the thoracic segments and the also the strongly sclerotized segments are not found in Recent phasmids. HAGEN (1856) criticises inaccuracies in PICTET's description; actually PICTET's description is more precise than HAGEN's comments, who also considered *P. gracilipes* and *P. lineata* to represent different stages of the same species, which is not correct.

Additional material of Archipseudophasmatinae: In the material listed below the taxonomic position cannot be decided with certainty, as the material is in poor condition or the amber obscures important features.

Archipseudophasma (?): [38] Coll. C. & H. W. HOFFEINS no. 1096/1, ♀ nymph of stage I, 2.9 mm; [65] Coll. J. WUNDERLICH nymph of stage III, 11.25 mm; [86] Coll. A. HERRLING no. 542, exuvie of nymph.

Pseudoperla (?): [30] Coll. Geol.-Pal. Inst., Univ. Hamburg, no. 454, nymph of stage II, 9.15 mm (figured in WEITSCHAT & WICHARD, 1998: 113 fig. h); [48] Coll. Geol.-Pal. Inst., Univ. Hamburg, ♀ nymph of stage IV, 10.20 mm; [70] Coll. J. WUNDERLICH, W7, nymph of stage V, 11.20 mm; [76] Coll. C. GRÖHN, no. 2724, nymph of stage II, 8.50 mm; [90] Coll. W. WEITSCHAT no. 14, nymph of stage III, 7.35 mm; [100] Coll. Pal. Mus. Berlin no. 1077, ex Coll. BERENDT no. 8, nymph, 7.20 mm.

Fig. 31: *Balticophasma lineata* (PICTET & BERENDT, 1854): [22] ♂ nymph of stage II in Baltic amber, coll. A. HERRLING no. 541; **Fig. 32:** Subfamily 2 sp.: [54] ♀ nymph of II stage in Baltic amber, dorsal aspect coll. A. HERRLING no. 535; **Fig. 33:** *Anareolatae* sp.: [6] ♀ nymph in Baltic amber, dorsal aspect, coll. C. GRÖHN no. 2632; **Fig. 34:** Phasmatodea: Eggs of several recent species, coll. O. ZOMPRO.



The specimens above might belong to *Archipseudophasma* or *Pseudoperla*. The important features can not be examined with certainty. They are definitely all members of Archipseudophasmatini.

Balticophasma (?): [93] Coll. Pal. Mus. Berlin no. 1070, ex Coll. BERENDT no. 4, nymph, ca. 13 mm; [118] Coll. A. KRYLOV, nymph, ca. 9 mm.

Balticophasmatini: [2] Coll. C. GRÖHN, no. 867, nymph of stage I, exuvie, 2.50 mm. Almost complete, only the antennae and the right foreleg are missing.; [25] Coll. S. URBONAS, no. 280, nymph of stage IV, 10.60 mm; [27] Coll. S. URBONAS, no. 282, ♂ nymph of stage I, 5.80 mm; [55] Coll. C. GRÖHN, no. 2722, ♀ nymph of stage III, 10.20 mm; [62] Coll. J. WUNDERLICH, ♀ nymph of stage I, 5.00 mm; [63] Coll. J. WUNDERLICH, nymph, 7.50 mm; [78] Coll. C. GRÖHN, no. 2728, nymph, 6.50 mm; [97] Coll. Pal. Mus. Berlin no. 1074, ex Coll. BERENDT, ♂ nymph, 7.50 mm; [123] Coll. VON HOLT AWP3, ♂ nymph of stage III, 11.40 mm; [125] Coll. VON HOLT AWP5, ♂ nymph of stage I, 9.80 mm; [126] Coll. VON HOLT AWP6, ♀ nymph of stage II, 9.75 mm.

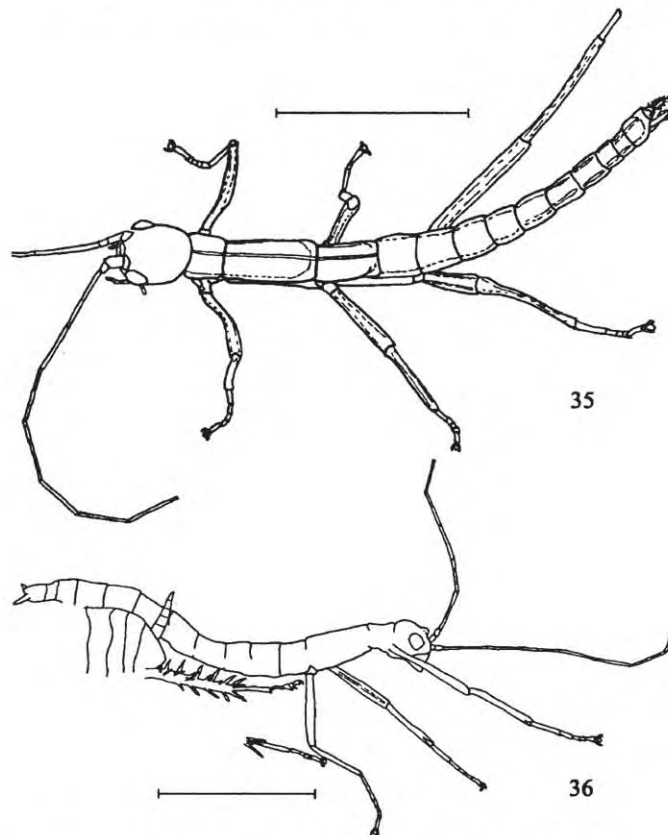
Balticophasmatini (?): [66] Coll. J. WUNDERLICH, no. W3, nymph, 6.20 mm; The specimen is too incomplete to decide about its position for sure.; [122] Coll. VON HOLT AWP2, ? nymph of stage II, 8.60 mm.

In all probability the specimens above belong to Balticophasmatini, but, since important

characters are difficult to examine, a more exact determination is impossible.

Archipseudophasmatinae:

[9] Coll. M. GLINK no. 1, nymph, ca. 8.00 mm. Only head, thorax, left antenna, first segments of right antenna, left profemur and tibia and right mesofemur and tibia left.; [11] Coll. M. GLINK no. 3, nymph of stage I, 5.40 mm; [19] Coll. J. VELTEN, no. 4, ♀ nymph of stage II, ca. 11.20 mm. It differs from all other material examined in the eyes being very small, their diameter half as short as genae. Only midlegs preserved, tarsi not clearly visible. The specimen is in too poor condition to draw further conclusions; [64] Coll. J. WUNDERLICH, nymph of stage II, 10.45 mm. An elongated, slender species. As the extremities and head are not clearly visible, a closer examination is impossible.; [77] Coll. C. GRÖHN, no. 2725, nymph, ca. 12 mm; [82] Coll. C.



Figs. 35-36: Archipseudophasmatidae, subfamily 2, nymphs, in Baltic amber; **35:** [54] Nymph, dorsal aspect, coll. A. HERRLING, no.535; **36:** [49] Nymph, with remains of a cockroach, lateral aspect, coll. Geol.-Pal.Inst.Univ. Hamburg, no.7. Scale: 5 mm.

GRÖHN, ♀ nymph of stage II, 7.85 mm; [84] Coll. J. VELTEN, ♀ nymph of stage III, 7.48 mm; [91] Coll. W. WEITSCHAT, ♂ nymph of stage II, ca. 8 mm; [109] Coll. Brit. Mus. Pal. no. 18939, nymph, 8.95 mm; [124] Coll. VON HOLT AWP4, ♀ nymph of stage I, 6.20 mm; [117] Coll. A. KRYLOV, nymph, ca. 8 mm; [121] Coll. VON HOLT AWP1, ♀ nymph of stage IV, ca. 17 mm.

A more exact determination than subfamily level appears impossible.

Archipseudophasmatidae: [105] Coll. Brit. Mus. Pal. no. 18082, nymph, 18.30 mm; [106] Coll. Brit. Mus. Pal. no. 18084, nymph, 10.01 mm; [131] Coll. J. WUNDERLICH no. 354, nymph, 11.50 mm.

Definitely members of Archipseudophasmatidae, and obviously closely related to Archipseudophasmatinae. The only thing that can be stated for sure is that they do not belong to the following second subfamily of Archipseudophasmatidae.

Archipseudophasmatidae

Subfamily 2

Diagnosis: In this subfamily of Archipseudophasmatidae, which is not named because all specimens examined are nymphs making it nonsense to describe a species based on the present material, the profemora are curved and distinctly depressed basally. The strongly elongated third antennomere is not round in cross-section, but exhibits distinct edges. The lateral margins of the abdominal segments are often broadly flattened, but not foliaceous. The body is elongate.

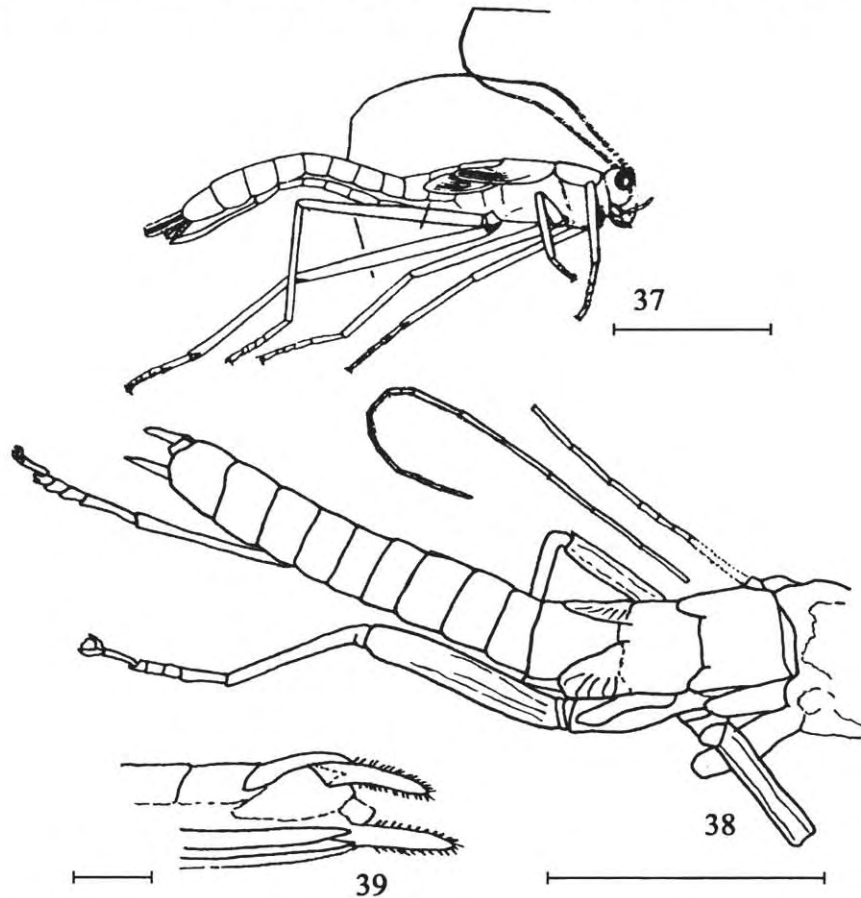
Material: [7] Coll. C. GRÖHN, no. 2657, nymph, 12.3 mm; [18] Coll. J. VELTEN, no. 3, nymph, 11.15 mm; [20] Coll. J. VELTEN, no. 5, nymph, 15.75 mm; [21] Coll. A. HERRLING, no. 534, nymph, 10.80 mm; [29] Coll. Geol.-Pal. Inst., Univ. Hamburg, no. 196, nymph, 14.70 mm; [31] Coll. Geol.-Pal. Inst., Univ. Hamburg, no. 727, ex Coll. SCHEELE, nymph, 18.70 mm; [49] Coll. Geol.-Pal. Inst., Univ. Hamburg, no. 7, nymph, 13.40 mm, including a nymph of a cockroach; [54] Coll. A. HERRLING, no. 535, nymph, 15.20 mm; [58] Coll. C. GRÖHN, no. 2715, fragments of two legs, femur 8.00 mm, tibia 6.00 mm; [60] Coll. J. WUNDERLICH, nymph, 11.00 mm; [61] Coll. J. WUNDERLICH, nymph, 15.75 mm; [79] Coll. J. WUNDERLICH, nymph, 11.55 mm; [80] Coll. J. WUNDERLICH, nymph, 11.60 mm; [103] Coll. Pal. Mus. Berlin no. 1080, ex Coll. BERENDT, nymph, 11.80 mm; [104] Coll. Pal. Mus. Berlin no. 1081, ex Coll. BERENDT, nymph, anterior half of body only; [112] Coll. A. KRYLOV, nymph, 10.85 mm; [113] Coll. A. KRYLOV, nymph, ca. 18 mm; [133] Coll. J. WUNDERLICH no. 356, nymph, 14.00 mm; [134] Coll. J. WUNDERLICH no. 357, nymph, 13.95 mm; [135] Coll. J. WUNDERLICH no. 358, nymph, 8.20 mm (the smallest specimen examined).

Not examined: Figure of *Phasma*? MENGE, 1856: 122, pl. 4: 11; 1 nymph, BACHOFEN-ECHT, 1949: 85, fig. 74; 1 nymph, WEITSCHAT & WICHARD, 1998: 112, fig. 51.

Description: Elongated Archipseudophasmatidae. Head subglobose, vertex elevated, sometimes with tubercles between eyes, depressed dorsoventrally, wider than thorax. Eyes projecting hemispherically, antennae almost as long as body. Scapus cylindrical. Pedicellus half as long and two-thirds as wide as scapus, also cylindrical. Third segment elongate, more than twice as long as previous two segments combined, as wide as pedicellus. Following segments strongly elongated. Antennae consisting of more than nine segments, presumably as long as or projecting beyond body, broken off in all specimens examined. Pronotum transversely roundly-rectangular, slightly shorter and considerably narrower than head; mesonotum almost 3 times as long as pronotum, of same width, roundly-rectangular, metanotum almost quadrate, two-thirds as long as mesonotum and of same width. Thoracic segments with median line dorsally. Wings not produced in the nymphs examined. Profemora curved basally, slightly trapezoidal in cross-section, edges lamelliform and bristled. Tibiae roundly-quadrate in cross-section, area apicalis present. Meso- and metafemora trapezoidal in cross-section, tibiae as protibiae. Edges distinctly and regularly bristled. Tibiae each with an area apicalis. Basitarsi as long as following segments combined. Median segment slightly shorter than metanotum. Margins of abdominal segments appear flattened, II to VI of similar length and width, VII to IX shorter, X as long as VIII.

Lateral margins of II to X slightly flattened. Supraanal plate present, roundly-triangular, with a median carina. Cerci simple, straight or slightly curved, projecting beyond X by half of their length. Subgenital plate flat, boat-like, acute, in one of the nymphs examined [20] already reaching the end of X, in the adult female presumably projecting beyond X.

Discussion: The diagnosis for this subfamily is brief; further material of older nymphs or adults might cause changes. A better characterization is impossible, because the material present is too immature. From the development of the genital apparatus and the general impression, most specimens examined appear to be stage II nymphs. The elongated third antennomere clearly places them in the Archipseudophasmatinae. Nevertheless, specimen [49] shows a character which, in the Areolatae, is only known in one species of the recent genus *Heteronemia* GRAY, 1835 and unknown from other phasmids in this suborder. The vertex of this specimen bears two tubercles, of which the right one is larger than the left one. The elongate third antennomere clearly places this group in the Archipseudophasmatinae. The fragments of two legs in [58] are interesting, as they are the only sample of a phasmid with lamellate carinae of the legs, a character common in modern Anareolatae but rarely seen



Figs. 37-39: Electrobaculini: **37:** *Electrobaaculum gracile* SHAROV, 1968: holotype, ♀ nymph of V stage, lateral aspect, after SHAROV (1968). Scale: 5 mm; **38:** [3] ♀ nymph of stage IV, dorsal aspect, head damaged, coll. C. GRÖHN no.1504. Scale: 5 mm; **39:** [3] ♀ nymph of stage IV, apex of abdomen, ventrolateral aspect, coll. C. GRÖHN no.1504. Scale: 1 mm.

in Areolatae. The complete specimen would be the largest phasmid found in Baltic amber, with an approximate body length of 50 to 55 mm. This estimate is based on examination of nymphs of various stages of *Heteronemia mexicana* GRAY, 1835, in the author's collection. MENGE in GERMAR & BERENDT (1856: 122, pl. 4: 11) provides a detailed description of a nymph of this tribe from his collection. The description of the „*Phasma-Larve*“ in GERMAR & BERENDT (1856) was written by MENGE, a teacher from Danzig, based on the specimen in his collection.

Pseudophasmatidae

Electrobaculini n. trib.

Diagnosis: ♀ nymph. Characterized within the Pseudophasmatidae by the cerci being slightly longer than abdominal segment X and the subgenital plate projecting beyond this segment. From the Archipseudophasmatidae it differs in the third antennomere being at most as long as the scapus and pedicellus combined.

Electrobaculum SHAROV, 1968

Type-species: *Electrobaculum gracile* SHAROV, 1968, by original designation.

Material of (?) *Electrobaculum* SHAROV, 1968: [3] Coll. C. GRÖHN no. 1504, / nymph of stage IV, ca. 13 mm.

Diagnosis: ♀ V stage-nymph. Typical Pseudophasmatidae of average size. Characterized within the whole Pseudophasmatidae by the elongated cerci and subgenital plate.

Complementary description: See redescription of species.

Electrobaculum gracile SHAROV, 1968

Electrobaculum gracile SHAROV, 1968: 119, 120, 195, fig. 45G; SPAHR, 1992: 38; CARPENTER, 1992: 188, fig. 120: 3.

Redescription (based on SHAROV's figure): ♀ nymph of stage V. Body length approximately 21 mm, based on SHAROV's figure. Head depressed dorsoventrally, longer than wide, eyes projecting hemispherically. Scapus slightly wider than pedicellus, third antennomere shorter than scapus and pedicellus combined. Following segments increasingly elongate, antennae slightly shorter than body.

Pronotum slightly shorter than mesonotum, the latter slightly longer than metanotum. Tegmina and alae completely developed when adult. Median segment produced, slightly shorter than metanotum and slightly longer than abdominal segment II. Following abdominal segments of similar length to each other. Cerci straight, strikingly elongate, projecting beyond abdominal segment X by its length. Subgenital plate projecting beyond tip of abdomen.

Profemora straight. Metatibia with area apicalis (SHAROV's figure, as that of CARPENTER, does not show an area apicalis on the mesotibiae; this is certainly based on inaccuracy). Basitarsus elongated, as long as following three segments combined, these decreasing in length.

Comments concerning *Electrobaculum* SHAROV, 1968: SHAROV's paper includes some contradictions and omissions. On p. 120 he states that „the ovipositor of some Tertiary Phylliidae was still rather long and probably without a subgenital plate“, but draws attention to the presence of a subgenital plate in *E. gracile* in its description on p. 195. Nevertheless, the whole elongate apparatus seems to represent the subgenital plate, which appears in nymphs often to be divided from the abdominal sternite VIII. The description of *Electrobaculum gracile* is very brief, and does not include enough significant information. It fits for almost all species in Pseudophasmatinae, except for the elongated ovipositor.

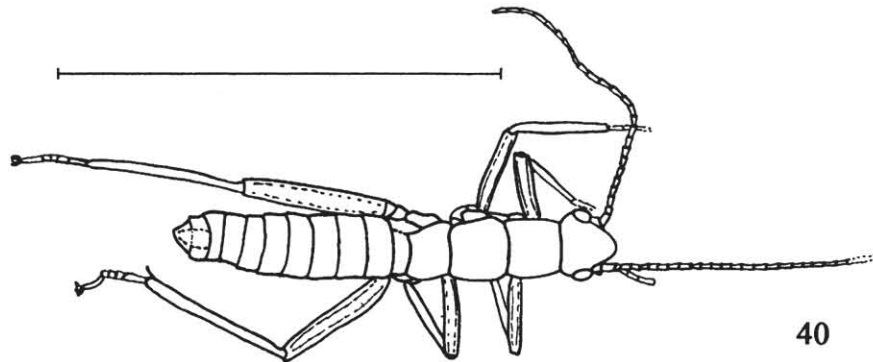


Fig.40: *Anareolatae* sp., nymph in Baltic amber; : [6] ♀ nymph, dorsal aspect, coll. C. GRÖHN no.2623. Scale: 5 mm.

SHAROV discusses the wing-venation referring to *Ctenomorpha titan*, which correctly would be referred to as *Acrophylla titan* MACLEAY, 1826. The name „*Electrobaculum*“ is confusing also: The genus *Baculum* SAUSSURE, 1861, type-species *B. ramosum* SAUSSURE, 1861, is actually a monotypic genus from Brazil, a member of the Anareolatae. This genus was misunderstood by almost all authors, with the consequence, that more than 100 species have been described in this genus or transferred here - all originate from Asia. *Baculum* is characterized by the strongly carinated tarsi, a character not exhibited by any other species referred to this genus. Last but not least, *Electrobaculum* (as *Pseudoperla*) was established for a nymph; this is from today's point of view more or less useless and should be strongly avoided, as it is almost impossible to distinguish nymphs of recent species, even from cultures. Consequently, this genus can not be recognized with certainty even when using the extended description above.

II.1. 2. Phasmatodea Anareolatae

Anareolatae incertae sedis

Material: [6] Coll. C. GRÖHN, no. 2632, ♀ nymph, 5.00 mm; [67] Coll. J. WUNDERLICH, ♀ nymph, 5.00 mm [116] Coll. A. KRYLOV, nymph, 5.60 mm.

Diagnosis: The only Anareolatae known from Baltic amber, characterized by the roundly triangular structure of the head, and the uniform length of the antennomeres.

Description of nymph: Lateral margins of body subparallel. Head compressed dorsoventrally, roundly-triangular, eyes projecting hemispherically. Antennae with distinctly separated segments, projecting beyond posterior margin of abdominal segment IV (nymph, in adult presumably longer). Scapus cylindrical, tip emarginated; pedicellus short, narrower. Following segments of uniform length, club-like, irregularly elongated. Pronotum roundly-subquadrate, as long as head but slightly narrower, mesonotum roundly-rhomboid, of same length as pronotum. Metanotum one-third shorter than mesonotum, its posterior half narrowed. Adults presumably winged. Profemora slightly depressed but not curved basally, roundly-quadrate, tibiae round in cross-section. Probasitarsus as long as following segments combined, second tarsomere slightly longer than third, fourth tarsomere shortest, metatarsus as long as basitarsus. Mid- and hindlegs like forelegs, metatibiae with two ventro-apical spines. Median segment half as long as metanotum. Abdominal segments short, cylindrical, I to VII of similar length. Median segment integrated in metanotum, but separating line distinct. IX half as long as VIII, X trapezoid, with a broad median impression. Subgenital plate flat, roundly triangular.

Dimensions (in mm): [6] Body length: 5.00; head: 0.55; pronotum: 0.65; mesonotum: 0.70; metanotum: 0.40; median segment: 0.20; profemora: 1.00; protibiae: 1.00; protarsus: 0.35; mesofemora: 1.10; mesotibiae: 1.10; mesotarsus: 0.55; metafemora: 1.80; metatibiae: 2.10; metatarsus: 0.90; antennae: 3.90; antennomeres: 26 / 24+.

Discussion: Among about 110 phasmids examined, only three are to be placed in the Anareolatae. Since in the present day the bulk of species diversity belongs to this suborder, as mentioned above, this relation might be accounted for by their habits. It is difficult to find any Recent relatives, more developed material would be desirable.

Material: [6] Coll. C. GRÖHN, no. 2632, ♀ nymph, 5.00 mm; [67] Coll. J. WUNDERLICH, ♀ nymph, 5.00 mm [116], Coll. A. KRYLOW, nymph, 5.60 mm.

II. 1. 3. Discussion concerning Phasmatodea

The fauna of Phasmatodea of the Eocene Baltic amber forests does not show a close relationship to the Recent one. At present, only Areolatae: Baciliidae are distributed around the Mediterranean, with few members, and Anareolatae: Phasmatidae: Pachymorphinae occur in the form of a few species at the eastern periphery of the Mediterranean region and at the southern borders of the Caucasian region. Most of the specimens examined belong to the (extinct) Archipseudophasmatidae, a new family of Areolatae, with closer relationship to the Pseudophasmatidae than to the Heteronemiidae. The former is currently restricted to Central and South America, the latter to South America. From both, Archipseudophasmatidae differ by the strikingly elongated third antennomere, and the fully developed tegmina, which reach the end of abdomen, both characters absent from any of the modern areolate phasmids. In addition, Archipseudophasmatinae have straight, basally not compressed profemora, a trait not too common in Recent phasmids. In the Recent Areolatae it appears in the Pseudophasmatidae: Pseudophasmatinae: Anisomorphini. One of the most important characters for the systematics of Phasmatodea are provided by eggs. Unfortunately, none is known from Baltic amber.

The Eocene forest probably supported a large variety of species, this conclusion being not too straightforward from the nymphs examined. However, this was probably the case, since even in Recent species it is often almost impossible to distinguish the nymphs of closely related species while fossil specimens are much harder to study.

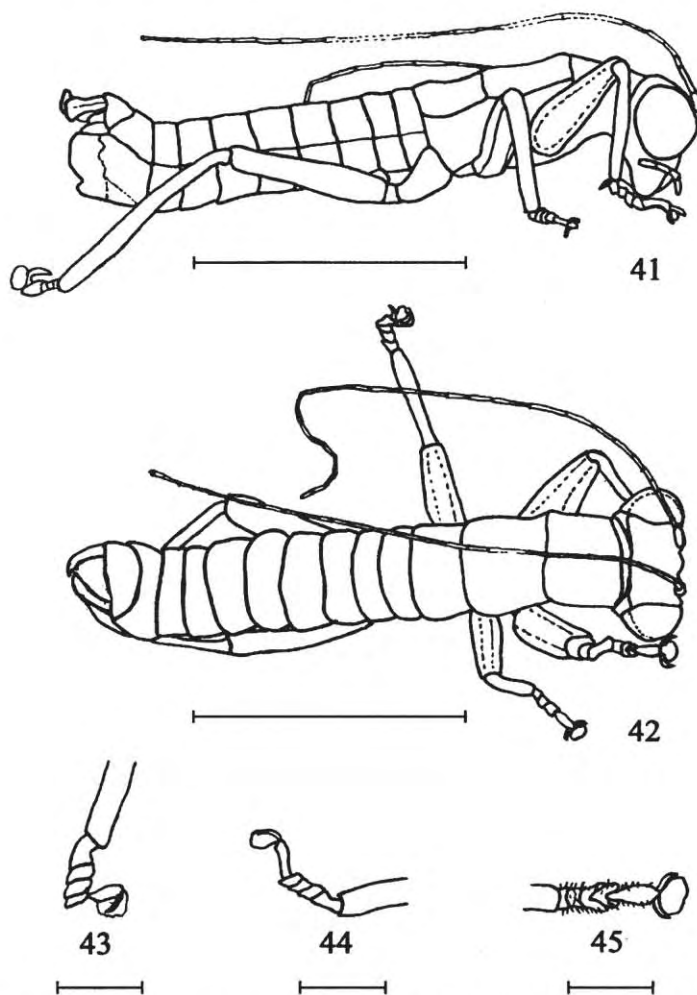
Nowadays the vast majority of Phasmatodea belong to the Anareolatae, of which only three specimens were traced among the material examined. This might prove to be unrepresentative of the true ratio of each of the phasmid suborders that lived in that area. The author's field observations allow the conclusion that members of the Areolatae are more active and use to move around in the branches even in the daytime. So their chances for getting stuck in resin and later being conserved in amber are much higher. Anareolatae have a more cryptic way of life. Hence the proportions of the fossil inclusions representing both suborders are very likely to be strongly biased simply because they differ so strongly in their basic lifestyle. This paper can only be seen as a small step forward in studying the Phasmatodea of the Eocene Baltic amber forests. The author's aim was to work out a foundation for further research. Continuation of this work is planned.

II. 2. Orthoptera incertae sedis

The following specimens were sent to the author as members of Phasmatodea, but their systematic position is not clear.

ARILLO et al. (1997) discussed the systematic position of a specimen and gave a brief description of a nymph of undetermined sex from the collection of J. SERAFIN, Kasparus, (Poland). Its body length measures 6.0 mm. It seems to be a ♀ nymph, as the cerci differ from the males examined and agree with the females.

They left the animal unnamed, considered the specimen to be related to *Pseudoperla* and preferred to make no ordinal assignment, leaving a final decision until a revision of this genus has been accomplished. As adult males have finally become available, a far clearer picture emerges. The structure of the coxae and head in this creature is typical of Dictyoptera but differs distinctly from Phasmatodea, Caelifera and Ensifera. In contrast, the subgenital plate is formed by the sternite VIII and not by VII as in Dictyoptera, which proves a closer relationship to Phasmatodea. Although dealers of amber specimens obviously treat this



Figs.41-45: *Raptophasma kerneggeri* n. gen. n. sp.; **41:** [43] holotype, ♂ in Baltic amber, lateral aspect, coll. Geologisch-Paläontologisches Institut und Museum Universität Hamburg, Germany, Nr.4299, (ex coll. F. KERNEGGER no.13/1992); **42:** dorsal aspect Scale: 5mm; **43:** protarsus, dorsal aspect; **44:** mesotarsus, lateral aspect; **45:** metatarsus, lateral aspect. Scale: 1 mm.

form as belonging in Phasmatodea, in fact members of this group appear to differ from the closely related orders listed below in numerous, often highly important traits.

They differ from the Embioptera in the following respects: Head *Mantis*-like, orthognathous, antennae almost as long as body, coxae narrowed, tarsi consisting of five segments, their basitarsus not broadened, cerci not segmented.

They differ from the Dermaptera in the following respects: Body not depressed dorsoventrally, head orthognathous, pronotum as wide as abdomen, pro- and mesofemora broadened, tarsi consisting of five segments, males and females with ten abdominal segments, cerci not furcate.

They differ from the Notoptera in the following respects: Body not depressed, eyes prominent, antennae almost as long as body, pro- and mesofemora broadened, cerci not segmented.

They differ from the Mantodea in the following respects: Head not distinctly separated, prothorax not independently movable, as long as mesothorax, not strongly elongate, pro- and mesofemora broadened, coxae not as elongated, neither profemora nor protibiae armed ventrally, cerci not segmented, styli absent, fifth tarsomere bearing an arolium, subgenital plate formed by abdominal sternite VIII instead of VII.

They differ from the Blattodea in the following respects: Body not depressed dorsoventrally, head not distinctly separated, entirely or at least partly not covered by pronotum, pro- and mesofemora broadened, first sternite and terminal abdominal tergites normal, cerci 1-segmented, styli absent, subgenital plate formed by abdominal sternite VIII instead of VII.

They differ from the Isoptera in the following respects: Carnivorous way of life, whole body sclerotized, cerci 1-segmented (also present in Mastotermitidae), tarsi consisting of five segments. They differ from the Phasmatodea in the following respects: Carnivorous way of life, head *Mantis*-like, orthognathous, with very large eyes, pronotum as long as the mesonotum, not distinctly shorter, first abdominal segment not fused with the metathorax (no median segment), coxae not widely separated, pro- and mesofemora broadened. They differ from the Caelifera and Ensifera in the following aspects: Head *Mantis*-like, meso- and metathorax not fused into a pterothorax, hindlegs not saltatory, tarsi consisting of five segments.

II. 2. 1. Description of *Raptophasma* n.gen.

Raptophasma n.gen.

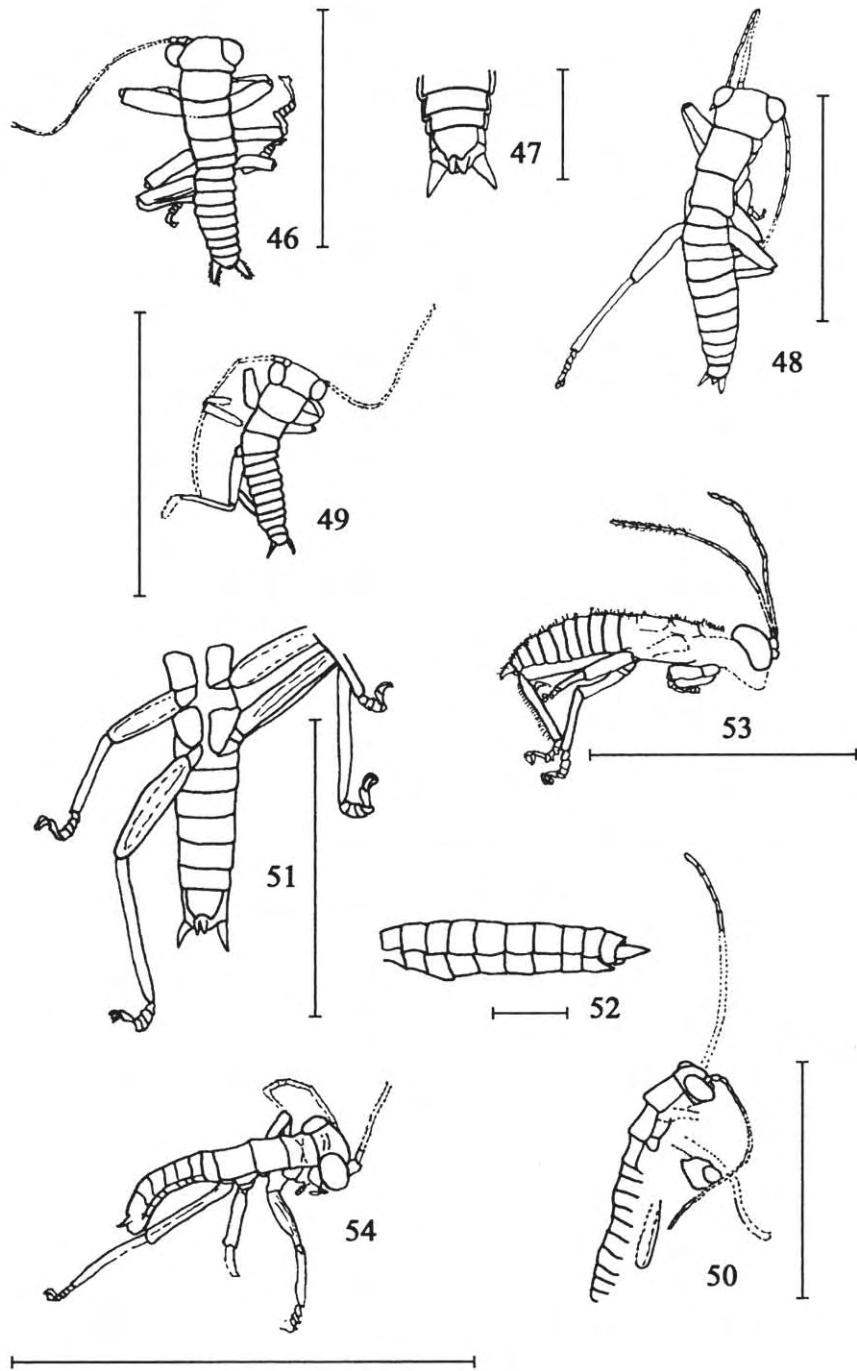
(figs. 41-58)

Type species: *Raptophasma kerneggeri* n. sp.

Etymology: *Raptophasma* refers to the raptorial habits of this group and its possible close relationship to the Phasmatodea.

Description: Head orthognathous, roundly triangular. Eyes prominent, as long as head, projecting more than hemispherically. Antennae filiform, almost as long as body. Pronotum as wide as head behind eyes, subquadrate, as long as mesonotum, metanotum shorter. All ten abdominal segments transverse, from I to V increasingly longer, following decreasing in length. Margins of abdomen subparallel. Cerci not segmented, specialized. Subgenital plate produced by abdominal sternite VIII.

Pro- and mesofemora strongly broadened, not spinose ventrally, metafemora much slenderer. Tarsi 5-segmented, arolium present between unguis, euplantulum present on fourth tarsomere.



Raptophasma kerneggeri n. sp.

(figs. 41-58))

Pseudoperla gracilipes: WEIDNER, 1956: 88, fig. a-c (nec *Pseudoperla gracilipes* PICTET & BERENDT, 1854).

Holotype : [43] adult ♂ in Baltic amber (figs. 41-45, 55-57), Coll. Geologisch-Paläontologisches Institut, University of Hamburg, Germany, Typ.Kat.Nr. 4299, (ex Coll. F. KERNEGGER, no.13/1992).

State of preservation and co-occurring fossils: Holotype: Adult ♂ in perfect conservation, no other fossils.

Paratype: [87] adult ♂ in Baltic amber, coll. A. HERRLING, Bramsche, Germany, no. 543. The amber is not clean, so many parts cannot be measured or examined.

Paratypes: 1 adult ♂, 17 nymphs.

[8] Coll. C. GRÖHN no. 2658, ♀ nymph, 4.95 mm; [10] Coll. M. GLINK no. 2, nymph, 5.80 mm; [12] Coll. M. GLINK no. 4, ♀ nymph, 5.15 mm; [15] Coll. M. GLINK no. 7, nymph, 5.20 mm; [28] Coll. Geol.-Pal. Inst., Univ. Hamburg no. 312, ex Coll. SCHEELE no. 18, ♂ nymph, 6.00 mm (the specimen recorded as *Pseudoperla gracilipes* by WEIDNER, 1956: 88 fig. 1 a-c); [34] Coll. C. & H. W. HOFFEINS no. 723/1, nymph, 3.70 mm; [41] Coll. C. & H. W. HOFFEINS no. 1152/2, nymph, 5.50 mm; [44] Coll. F. KERNEGGER no. 31/1997, ♀ nymph, 4.88 mm; [57] Coll. O. ZOMPRO, no. 2001-69, nymph, 4.90 mm; [68] Coll. J. WUNDERLICH nymph, ca. 2.65 mm; [71] Coll. O. ZOMPRO no. 2001-70, nymph, 4.15 mm; [73] Coll. O. ZOMPRO no. 2001-71, nymph, 3.50 mm; [75] Coll. C. GRÖHN, no. 2723, nymph, 5.00 mm; [85] Coll. Geol.-Pal. Inst., Univ. Hamburg, ♀ nymph, 5.60 mm; [87] Coll. A. HERRLING no. 543, adult ♂, 13.00 mm; [110] Coll. A. KRYLOV, nymph, 3.25 mm; [120] Coll. A. KRYLOV, ♀ nymph, ca. 6 mm; [129] Coll. J. WUNDERLICH no. 352, ♀ nymph, 10.50 mm; [138] Coll. R. KRULL, ♀ nymph, ca. 12.5 mm.

Additional material, not examined: nymph, Coll. J. SERAFIN, Kasparus, Poland, the specimen published by ARILLO et al. (1997). 6.00 mm; nymph, figure in WEITSCHAT & WICHARD, 1992: 113, fig.f.

Etymology: This striking new species is dedicated to Mr. Friedrich KERNEGGER, Hamburg, Germany, who generously donated the holotype of this Orthopteroid to the Geologisch-Paläontologisches Institut of the University of Hamburg, Germany.

Description: Both sexes of similar proportions of body and extremities.

Head rectangular in dorsal view, triangular in front view, as in *Mantis*. Vertex smooth. Eyes prominent, slightly reniform, projecting hemispherically, their diameter as great as head length. Genae very short, almost not visible. Antennae, when stretched back, projecting beyond abdominal segment VII. Scapus flat and wide, pedicellus half as wide and long, subcylindrical, third segment twice as long as scapus and pedicellus combined, following segments elongate, of irregular length. Antennae in adult consisting of 27 to 28 segments, fewer in nymphs. Thoracic segments slightly wider than abdominal segments in male. Pronotum one-fifth longer than head, smooth, slightly dilating posteriad, posterior and lateral margins slightly elevated. Mesonotum structured as pronotum. Metanotum not as dilated as previous segments, margin not elevated. Profemora strikingly swollen, only 2 times as long as wide,

Fig.46-54: *Raptophasma kerneggeri* n. gen. n. sp., paratypes, nymphs in Baltic amber; **46:** [8]: ♀, 4.95 mm, dorsal aspect, coll. C. GRÖHN no.2658; **47:** [8] ♀, 4.95 mm, tip of abdomen, ventral aspect, coll. C. GRÖHN no.2658; **48:** [28]: ♂, dorsal aspect, 6.00 mm., coll. Geol.-Pal. Inst. Univ. Hamburg no. 312, (ex Coll. SCHEELE no. 18); **49:** [34] 3.70 mm, dorsal aspect, coll. C. & H. W. HOFFEINS no.723/; **50:** [41] 5.50 mm, with prey, coll. C. & H. W. HOFFEINS no.1152/2; **51:** [44]: ♀, 4.88 mm, ventral aspect, coll. F. KERNEGGER no. 31/1997; **52:** [44]: ♀, 4.88 mm, abdomen, lateral aspect, coll. F. KERNEGGER no.31/1997; **53:** [57]: 4.90 mm, strongly bristled specimen, lateral aspect, coll. O. ZOMPRO, no. 2001-69; **54:** [68]: ca. 2.65 mm, dorsolateral aspect, coll. J. WUNDERLICH; Scale: 5 mm.

with two prominent carinae dorsally. Meso- and, especially, metafemora slightly narrower. All tibiae unarmed. Tarsi strikingly short but broad. Basitarsus as long as second tarsomere, disc-like, second tarsomere cylindrical, third segment slightly longer than second, deeply split anteriorly, fourth telescoped by half of its length inside third, as long as second, hollow anteriorly, terminal segment telescoped inside fourth by a quarter of its length, spindle-like, unguis strong, a prominent arolium present. Abdominal segment I structured as following abdominal segments, not fused with metathorax. Segments I to IX of similar width, I to IV increasingly longer, V like IV, V to IX decreasing in length. X shorter and narrower than IX, telescoped into this segment by half of its length. Subgenital plate bulgy, with a flat projection posteroventrolaterally. Cerci in males strong, slightly curved, asymmetric, apex broadened. Left one with a small ventral tooth before apex; in females simple, straight, acute. Subgenital plate of female flat, not projecting beyond X, posterior part bifid and V-shaped emarginated.

Dimensions (in mm): [43] Adult ♂, (HT): Body length: 11.70; head: 1.20; pronotum: 1.50; mesonotum: 1.50; metanotum: 1.00; abdominal segment I: 0.50; profemora: 1.85; protibiae: 2.20; protarsus: 1.50; mesofemora: 1.70; mesotibiae: 2.10; mesotarsus: 1.30; metafemora: 2.15; metatibiae: 3.30; metatarsus: 1.05; antennae: 10.05; antennomeres: 28 (left) / 27 (right).

[87] Adult ♂, (PT): Body length: 13.00; head: 1.65; pronotum: 2.19; mesonotum: 1.75; metanotum: 1.05; abdominal segment I: 0.95.

II. 2. 2. Discussion concerning *Raptophasma* n. gen.

It must be emphasized that the following remarks are a hypothesis based on the author's more than 20-year long experience of culturing phasmids, mantids and cockroaches. Hopefully, additional material will provide further information.

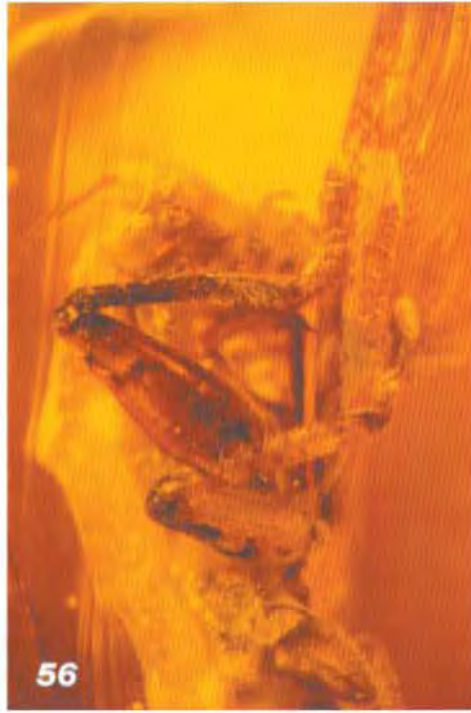
In the material examined, nymphs can be divided into the following groups, which might represent nymphal stages. The smallest specimen [68] measures 2.65 mm in total length, the second smallest [34] 3.70 mm, which would mean a growth of about 25 %, which is a normal addition of body length from one molt to the next in the younger stages. The next group contains specimens ranging in length from 4.88 to 5.20 mm [8, 12, 15, 44, 57], three of them definitely females. Again, this would be an addition of 25 % in body length. The sex of the specimen with 5.5 mm [41] could not be determined, but the following group from 5.80 to 6.00 mm [10, 28] contains a definite male. As at this stage the length differences in the sexes become obvious, the male 6.00 mm long can be considered to represent the next stage, while specimen [41] may represent a fully-grown individual of the previous stage. Between the latter specimens and the adult male holotype 50 % of body length is lacking, which presumably means two more nymphal stages, as the last-stage nymphs normally have almost the size of the adults. Since it is doubtful that the smallest nymph represents the I stage, because it already measures a quarter of an adult male length, at least one or two more stages seem to be involved. This finds support in an increase in the number of antennomeres from stage to stage. Small nymphs have about 8, the next instar about 11, the following about 13, the next bigger about 15, and the adult males 28 antennomeres. The number grows faster in the nymphal stages closer to maturity. This would mean at least 9 nymphal stages in the male sex, and maybe one or more additional stages in the females.

In several specimens the body is strikingly bristled, also in the specimen described by ARILLO et al. (1997). These specimens possibly represent a second species, but more material would be needed for final conclusions.

Fig. 55-58: *Raptophasma kerneggeri* n. gen. n. sp., **55-57:** [43] holotype, ♂ in Baltic amber, coll. Geologisch-Paläontologisches Institut und Museum der Universität Hamburg, Germany, Nr.4299, (ex coll. F. KERNEGGER no.13/199); **55:** dorsal aspect; **56:** head and thorax, lateral aspect; **57:** abdomen, lateral aspect; **58:** [75] ♀ nymph in Baltic amber, dorsal aspect. A strongly bristled specimen of light colour, coll. C. GRÖHN no.2723.



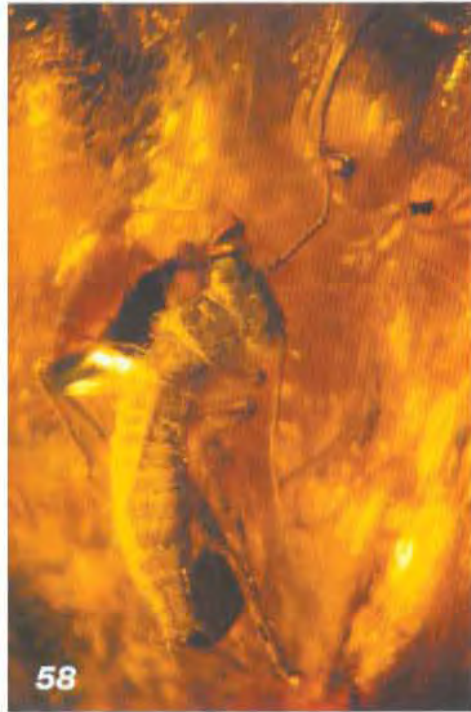
55



56



57



58

The species is obviously carnivorous, probably hunting in a way like the Ensifera: Saginae, jumping upon the prey and holding it with the fore- and midlegs. This theory is confirmed by specimen [41], which still holds a prey in its fore- and midlegs.

Note: The author has just traced an adult ♂ (Tanganyika, 1950, pinned) and an adult ♀ (Namibia, 1909, in alcohol), which feature the same ordinal characters as the specimens in Baltic amber, although they obviously belong to a different genus and species. Meso-, metafemora and tibiae are spinose ventrally. In all probability *Raptophasma* represents a new order of Orthoptera. The results concerning the possible "Raptophasmatodea" and the ordinal placement will be published separately, based also on the Recent material.

In May 2001 the author had the possibility to study the hunting-behaviour of *Saga pedo* (Pallas) (Ensifera: Tettigoniidae: Saginae) in the wild, near Vienna, Austria. The fore- and midlegs are very similar to the species of *Raptophasma*, which allows the conclusion that it hunts in a similar way.

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The author wishes to thank first of all Dr. Wolfgang WEITSCHAT (Geologisch-Paläontologisches Institut, University of Hamburg, Germany) for the helpful discussions and, especially, for the unexpectedly rich supply with specimens and literature, and last but not least for his patience with the delay of the manuscript caused by more and more material; Dr. Antonio ARILLO for a copy of his paper; Mr. Erich TILGNER (University of Georgia, U.S.A.) for a copy of his paper in press; Mr. Thomas KUJAWSKI (Agentur ASA, Flintbek, Germany) for supplying most of the photographs; Ms. Anke TESCHKE (Berlin, Germany) for arranging and digitalizing the drawings; Mr. Jonas DAMZEN (Vilnius, Lithuania), Mr. Freidhelm EICHMANN (Hannover, Germany), Mr. Matthias GLINK (Buxtehude, Germany), Mr. Achim HERRLING (Bramsche, Germany), Mrs. & Mr. Christel & Hans Werner HOFFEINS (Hamburg, Germany), Mr. Jens-Wilhelm JANZEN (Seevetal, Germany); Mr. Friedrich KERNEGGER (Hamburg, Germany), Dr. Andrey KRYLOV (Kaliningrad, Russia); Mr. Christian NEUMANN (Paläontologisches Museum der Humboldt-Universität, Berlin, Germany); Mr. Saulius URBONAS (Klaipeda, Lithuania), Mr. Jürgen VELTEN (Idstein, Germany), Mr. Jörg WUNDERLICH (Straubenhardt), and Mr. Carsten GRÖHN (Glinde, Germany) for the loan of specimens, the latter especially for supplying specimens for the author's collection. Special thanks go to Mr. C. GRÖHN and Mr. F. KERNEGGER for having generously donated the two holotypes of *Archipseudophasma phoenix* and *Raptophasma kerneggeri* to the Geologisch-Paläontologisches Institut, University of Hamburg, Germany.

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