

***Baptista vetai* sp.n. (Heteroptera: Veliidae), a microveliine bug from Eocene Baltic amber**

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Abstract

Baptista vetai sp.n. is described from a Baltic amber inclusion. Its systematic position is surprising, because the new species can be clearly placed in the *Baptista femoralis* group, an extant complex of species which nowadays inhabits southern and southeastern Asia. This indicates an early diversification of *Baptista* DISTANT, 1903, and of Microveliinae in general.

Key words: amber, fossil, Baltic, Gerromorpha, Microveliinae, *Baptista femoralis* group, new species, taxonomy

Zusammenfassung

Baptista vetai sp.n. wird nach einer Inkluse in Baltischem Bernstein beschrieben. Die neue Art ist der heute im südlichen und südöstlichen Asien verbreiteten *Baptista femoralis*-Gruppe zuzuordnen. Dies weist auf eine frühe Diversifizierung der Gattung *Baptista* DISTANT, 1903 sowie der Unterfamilie Microveliinae insgesamt hin.

Introduction

The presence of water insects in amber, that originates from the resin of extinct trees, seems on principal to be contradictive. However, the already known fauna of aquatic insects from Baltic amber is very diverse. WICHARD & al. (2009) presented an excellent overview of hundreds of species in nine insect orders.

Aquatic Heteroptera in general, including Gerromorpha (the water striders in a broad sense), are sparsely documented in the fossil record. In a recent reinterpretation DAMGAARD (2008) lists 34 taxa, which doubtless belong to Gerromorpha. Five species have to be added to that list: The hebrid *Miohebrus anderseni* GARROUSTE & NEL, 2010, the mesoveliid *Mesovelia dominicana* GARROUSTE & NEL, 2010, the hydrometrid *Metrocephala schaeferi* ZETTEL & HEISS, 2011, and the gerrids *Succineogerris larsoni* ANDERSEN, 2000 and *Succineogerris anderseni* ZETTEL & HEISS, 2011 (GARROUSTE & NEL 2010, ZETTEL & HEISS 2011). According to GRIMALDI & ENGEL (2005), the oldest fossil gerromorphan bug is a mesoveliid from the Upper Jurassic (152 Ma) of Kazakhstan, but the assignment of that fossil was not accepted by ANDERSEN (1998) and was doubted by DAMGAARD (2008). Following DAMGAARD (2008: tab. 1), the oldest Gerromorpha are Mesozoic Hydrometridae from the Lower Cretaceous (110 Ma) of Brazil and a Gerridae from the Lower Cretaceous (100 Ma) of France. The majority of fossil Gerromorpha were described from inclusions in Baltic (40 - 35 Ma) and Dominican Amber (20 - 17 Ma).

The fossil described in the present study belongs to the Microveliinae of the Veliidae and is placed in the extant genus *Baptista* DISTANT, 1903. Other published fossil records of Microveliinae are three species of *Microvelia* from Dominican amber inclusions only (ANDERSEN 2000, 2001).

The genus *Baptista* is based on *Baptista gestroi* DISTANT, 1903 from Myanmar (DISTANT 1903). ANDERSEN (1989) taxonomically revised the genus, redescribed the type species, and described three further new species, which are closely related to each other, but morphologically distant from the type species. Subsequently, KOVAC & YANG (2000) named this clade the *Baptista femoralis* group. ANDERSEN (1989) also described *Lathriovelis collaris* ANDERSEN, 1989; this species was transferred to *Baptista* by KOVAC & YANG (2000). *Baptista collaris*, *B. hoedli* ZETTEL, 2004, and some undescribed species from southeast Asia belong to the well-defined *B. collaris* group (see ZETTEL 2004). The three clades (*B. gestroi*, *B. femoralis* group, *B. collaris* group) are very distinct, and in a future phylogenetic system of Microveliinae they may turn out to be separate genera.

Material and methods

The type specimen lies in a polished piece of amber (ca. 14.3 × 9.3 mm) which is deposited in the Ernst Heiss Collection, Innsbruck.

Stacked digital images were taken with a Leica DFC camera attached to a Leica MZ16 binocular microscope and processed using Leica Application Suite V3. They were then stacked with Zerene Stacker 64-bit and processed with Adobe Photoshop 7.0.

Measurements were taken with a micrometer eyepiece and are given in millimetres.

Description of species

***Baptista vetai* sp.n.** (Figs. 1 - 10)

Etymology: The new species is dedicated to Marius Veta (Palanga, Lithuania) who made this and other interesting Baltic amber inclusions available to the second author for study.

Type material: Holotype (apterous male) in piece of Baltic amber with red label "Holotype *Baptista vetai* sp.n. des. H. Zettel & E. Heiss 2011" and kept in a box labelled "He-Aq-3 BB-Veliidae coll. Heiss".

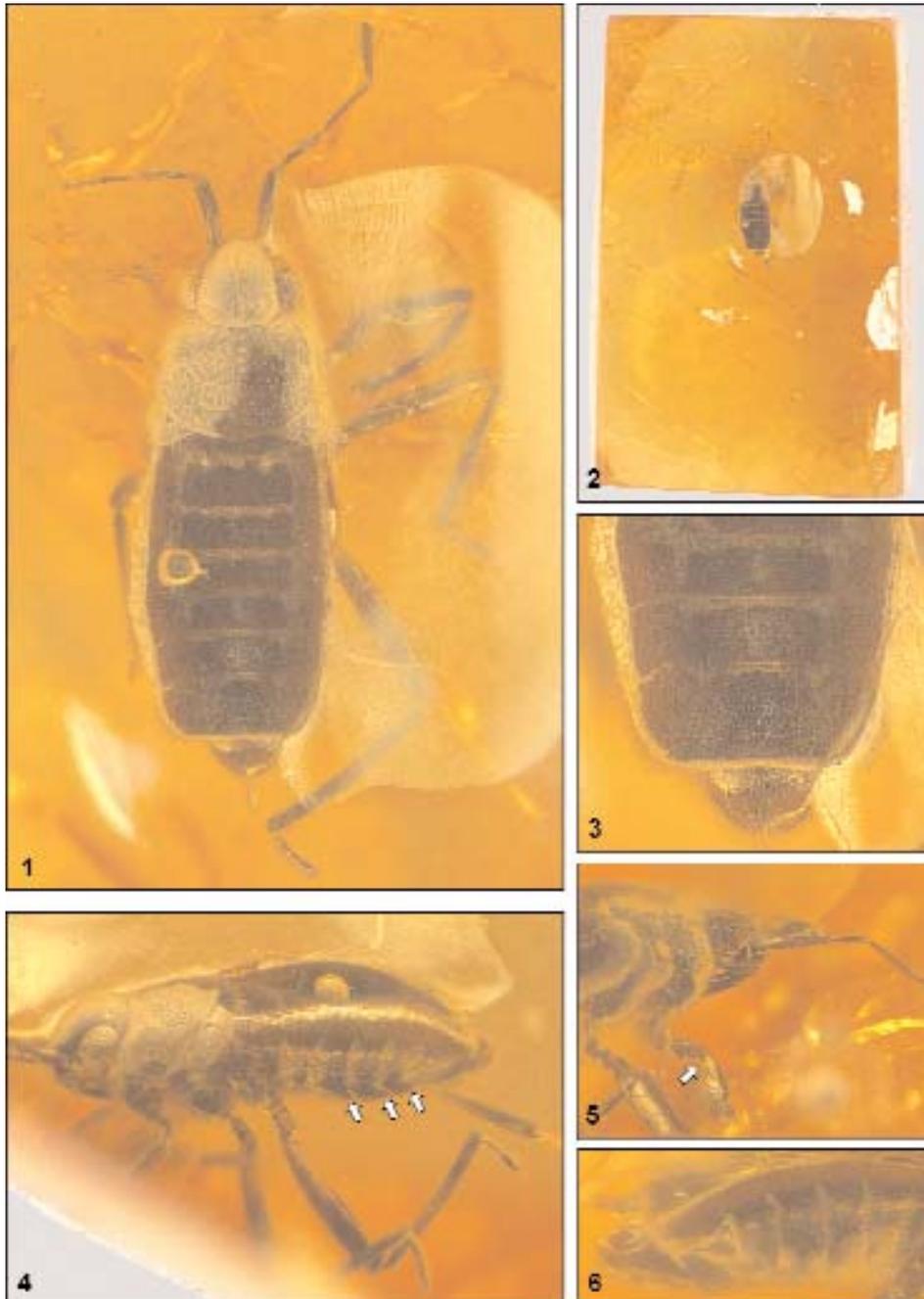
Diagnosis: Head inserted in deep emargination of anterior margin of pronotum, posterior margin of head distinctly convex. Antennomere 1 longest, 2 shortest, 3 and 4 of subequal lengths. Number of tarsomeres on fore-, middle, and hind leg, 1, 2, 2. – Male: Profemur strongly curved in basal half, protibia moderately curved. Meso- and metafemur slightly constricted in basal half. Abdomen wide. Abdominal tergites without modifications. Abdominal sternites 4 - 6 with lateral protuberances bearing brushes of posteriorly directed setae. Abdominal segment 8 with blunt, setose lateral ridges, ventrally concave.

Description: Measurements: Body length 3.18 mm, width (at abdominal segment 5) 0.98 mm. Head length 0.45 mm, width (including eyes) 0.64 mm. Lengths of antennomeres 1 - 4, 0.44 mm, 0.27 mm, 0.40 mm, 0.39 mm. Pronotum length (medianly) 0.56 mm, width 0.82 mm. Lengths of leg segments: profemur 0.86 mm, protibia 0.78 mm, protarsus 0.32 mm, mesofemur 0.98 mm, mesotibia 0.84 mm, mesotarsus 0.18 + 0.25 mm, metafemur 1.07 mm, metatibia 1.02 mm, metatarsus 0.17 + 0.22 mm.

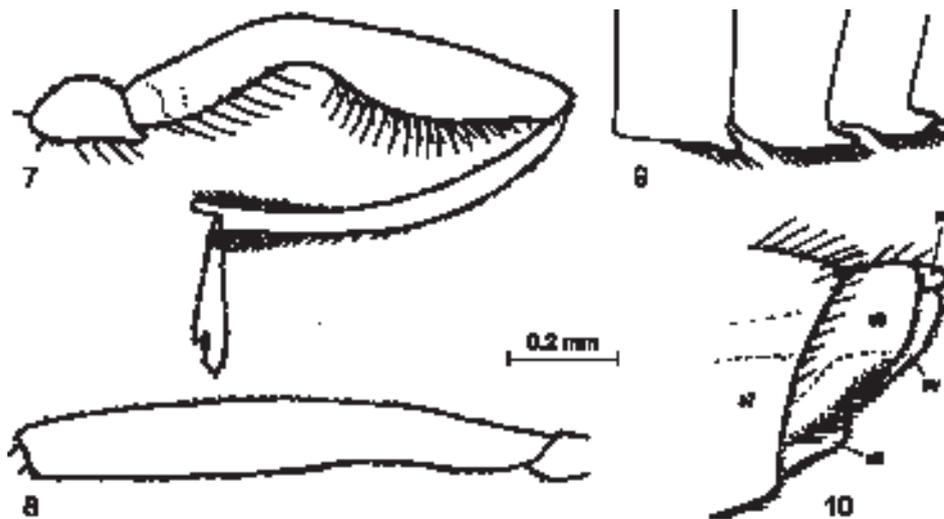
Colour: Entire body blackish brown, except sides of laterotergites and dorsal parts of sternites light brown; such pattern agrees with that observed in many extant Microveliinae. Silverish patches of setae, as frequently observed in extant Microveliinae, not visible, except for narrow median stripes on abdominal tergites 6 and 7. Legs dark brown, bases of meso- and metafemur pale.

Structural characteristics: Head (Fig. 1) ca. 1.4 times as wide as long, posteriorly inserted in anterior margin of pronotum, ventrally without extension, bearing short, inconspicuous pilosity. Eyes comparatively small, posteriorly reaching anterolateral margin of pronotum; their minimum distance (anteriorly) ca. 0.6 times head width. Antenna (Fig. 1) 0.47 times as long as body, relatively short, if compared with congeners. Thorax bearing short, inconspicuous pilosity. Pronotum (Fig. 1) long, posteriorly reaching abdominal tergite 1; width 1.45 times median length; anterior margin laterally produced and medially concave; surface with numerous distinct patches. Legs long, as compared with most extant Microveliinae. Protrochanter with small apical tooth. Profemur (Figs. 1, 5, 7) in basal half slender and strongly curved, in distal half strongly thickened; flexor side, except concavity, with row of long setae. Protibia (Figs. 1, 7) entirely curved, with long spur distal of tarsal insertion; distally with long pilosity; due to this pilosity and some intransparency of amber, length of grasping comb not recognisable. Mesofemur and metafemur (Fig. 8) with weak constriction at basal half. Metatibia slightly curved. Abdomen (Figs. 1, 3, 4, 6, 9) comparatively high, in dorsal aspect of almost squared shape. Tergites without modifications (Fig. 3), with short pilosity, except tergites 5 - 7 laterally with rather long, posteriorly directed hairs. Sternites at dorsal parts and laterotergites with long pilosity, more distinct at posterior segments. Sternites 4 - 6 with lateral modifications (Figs. 4, 9), each with posteriorly directed protuberance bearing a tuft of short stiff setae; protuberance small and rounded on sternite 4, large and pointed at sternites 5 and 6. Sternite 7 (Figs. 4, 6) with lateral impression. Sternites 4 - 7 ventrally flattened (ventral outline of abdomen even slightly concave in lateral aspect) and with dense layer of short setae. Segment 8 (Figs. 6, 10) laterally with distinct, but blunt ridge, bearing dense short pilosity; ventrally with pair of large impressions; protruding dorsally and almost completely covering genital capsule. Pygophore and proctiger small, no modifications recognisable.

Comparative notes and discussion: The placement of this species in the genus *Baptista* is well supported. ANDERSEN (1989) presented a synoptic table of selected microveliine genera and 13 morphological characters. Of the characteristics noted for *Baptista*, in *B. vetai* sp.n. nine characters are present and three characters (dealing with forewings and paramere) are not assessable. Only the structure of the antenna (Fig. 1) does not fully agree with the diagnosis of *Baptista*: In extant species of *Baptista*, antennomeres 3 and 4 are distinctly narrower and longer than antennomeres 1 and 2; such antennal structure is interpreted as an adaptation to a semi-terrestrial environment (e.g., ŠTYS 1976, ANDERSEN 1982, 1989, ZIMMERMANN 1984). In contrast, in *B. vetai* sp.n., antennomere 1 is slightly longer than antennomeres 3 and 4, and antennomere 4 is thicker than antennomere 3 (however, the left antennomere 4 is lacking and it cannot be excluded that the thick right antennomere 4 is deformed; see Fig. 1). This antennal structure resembles more the antenna of *Pseudovelgia* and possibly indicates a water-surface habitat.



Figs. 1 - 6: *Baptista vetai* sp.n., apterous male (holotype). (1) Habitus, dorsal aspect. (2) Entire piece of amber. (3) Abdominal tergites 5 - 7 and genitalia, dorsal aspect. (4) Habitus, lateral aspect (slightly dorsal); arrows indicate pilose protuberances. (5) Anterior part of body, lateral aspect, illustrating head with rostrum, propleura, and curvature of profemur (arrow). (6) Abdomen, lateral aspect.



Figs. 7 - 10: *Baptista vetai* sp.n., apterous male (holotype). (7) Right foreleg, reconstruction (contains also information from left leg). (8) Metafemur. (9) Protuberances on sternites 4 - 6, dorsolateral aspect. (10) Apex of abdomen, lateral aspect. pr – proctiger, py – pygophore, s7 – sternite 7, s8 – segment 8.

The strongly curved profemur (Figs. 1, 5, 7), the lateral protuberances of sternites 4 - 6 (Figs. 4, 9), and the ventrally impressed abdominal segment 8 (Fig. 6) of the holotype are strikingly similar to extant species of the *Baptista femoralis* group, especially *B. femoralis* ANDERSEN, 1989, a species occurring in Thailand and West Malaysia. However, in *B. femoralis* the protuberances are on sternites 6 and 7 (and reduced to setose areas in small males; ANDERSEN 1989). Moreover, *B. femoralis* is a slender species, and tergite 6 of the male has paired lobes at its hind margin; this character is absent in *B. vetai* sp.n. (Fig. 3).

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REFERENCES

- ANDERSEN N.M., 1982: The Semiaquatic Bugs (Hemiptera, Gerromorpha). Phylogeny, adaptations, biogeography and classification. – Entomograph 3, 455 pp.
- ANDERSEN N.M., 1989: The Old World Microveliinae (Hemiptera: Veliidae). II. Three new species of *Baptista* DISTANT and a new genus from the Oriental region. – Entomologica scandinavica 19: 363-380.
- ANDERSEN N.M., 1998: Water striders from the Paleogene of Denmark with a review of the fossil record and evolution of semiaquatic bugs (Hemiptera: Gerromorpha). – Det Kongelige Danske Videnskabernes Selskab, Biologiske Skrifter 50: 1-152.
- ANDERSEN N.M., 2000: *Microvelia polhemi*, n. sp. (Heteroptera: Veliidae) from Dominican amber: The first fossil record of a phytotelmic water strider. – Journal of the New York Entomological Society 107(2-3): 135-144.

- ANDERSEN N.M., 2001: Fossil water striders in the Oligocene/Miocene Dominican amber (Hemiptera, Gerromorpha). – *Insect Systematics & Evolution* 31: 411-431.
- DAMGAARD J., 2008: Evolution of the semi-aquatic bugs (Hemiptera: Heteroptera: Gerromorpha) with a re-interpretation of the fossil record. – *Acta Entologica Musei Nationalis Pragae* 48(2): 251-268.
- DISTANT W.L., 1903: The fauna of British India, including Ceylon and Burma. Rhynchota 2(1). – Taylor & Francis, London, X + 242 pp.
- GARROUSTE R. & NEL A., 2010: First semi-aquatic bugs Mesoveliidae and Hebridae (Hemiptera: Heteroptera: Gerromorpha) in Miocene Dominican amber. – *Insect Systematics & Evolution* 41(2): 93-102.
- GRIMALDI D. & ENGEL M.S., 2005: Evolution of the insects. – Cambridge University Press, Cambridge, N.Y., XV + 755 pp.
- KOVAC D. & YANG C.M., 2000: Revision of the Oriental bamboo-inhabiting semiaquatic bug genus *Lathriovelina* ANDERSEN, 1989 (Heteroptera: Veliidae) with description of *L. rickmersi*, new species, and notes on the genus *Baptista* DISTANT, 1903. – *The Raffles Bulletin of Zoology* 48(1): 153-165.
- ŠTYS P., 1976: *Velohebria antennalis* gen. n., sp. n. – a primitive terrestrial Microveliinae from New Guinea, and a revised classification of the family Veliidae (Heteroptera). – *Acta entomologica bohemoslovaca* 73: 388-403.
- WICHARD W., GRÖHN C. & SEREDSZUS F., 2009: Wasserinsekten im Baltischen Bernstein – Aquatic insects in Baltic Amber. – Verlag Kessel, Remagen – Oberwinter, 335 pp.
- ZETTEL H., 2004: *Baptista hoedli* sp.n. (Insecta: Heteroptera: Veliidae) from Laos, and definition of the *B. collaris* species group. – *Annalen des Naturhistorischen Museums in Wien, Serie B*, 105: 441-445.
- ZETTEL H. & HEISS H., 2011: New species of water striders (Hemiptera: Heteroptera: Gerromorpha: Hydrometridae, Gerridae) from Eocene Baltic amber. – *Annalen des Naturhistorischen Museums in Wien, Serie A*, 113: 543-554.
- ZIMMERMANN G., 1984: Heteroptera aus dem Nepal-Himalaya. *Geovelina* n. gen., eine Gattung terrestrischer Microveliinae (Insecta: Gerromorpha: Veliidae). – *Senckenbergiana biologica* 65 (1/2): 65-74.

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