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Thaumastotingis areolatus nov.gen., nov.sp. a conspicuous new Thaumastocoridae from Baltic Amber (Hemiptera: Heteroptera)

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A b s t r a c t : Two inclusions of Baltic Amber bugs belonging to the same taxon, resembling Thaumastocoridae as well as Tingidae could not be placed in any of the fossil or extant genera. A new genus *Thaumastotingis* nov.gen., sharing characters of both families is proposed to accomodate the type species *Thaumastotingis areolatus* nov.sp. This genus and species are tentatively assigned to Thaumastocoridae subfamily Xylastodorinae and represent only the second Thaumastocoridae described from Eocene Baltic Amber. Its taxonomic position is discussed.

K e y w o r d s : Hemiptera, Heteroptera, Thaumastocoridae, new genus, new species, fossil, Baltic Amber.

Introduction

Thaumastocoridae are a small family including presently 6 genera and 19 species (CASSIS et. al. 1999), showing a world wide distribution. They are primarily characterized by the male asymmetrical male genitalia, the anteriorly produced genae and the absence of ovipositor in females. These 6 extant genera are placed in three subfamilies: Thaumastocorinae and Xylastodorinae, most of those occurring in the Southern Hemisphere (South America, Caribbean, Australia and Southern India) where they are known as palm bugs (SCHUH & SLATER 1995) and Thaicorinae with only one species from Thailand and Java (HEISS & POPOV 2002).

So far four fossil species belonging to subfamily Xylastodorinae are described: *Palaeodoris lattini* POINAR & SANTIAGO-BLAY, 1997 and *Discocoris dominicanus* SLATER & BARANOWSKI, 2000 from Dominican Amber, *Proxylastodoris gerdae* (BECHLY & WITTMANN, 2000) from Baltic Amber originally assigned to *Xylastodoris*, which however is a Neotropical genus (HEISS & POPOV 2002) and *Protodoris minusculus* NEL et al., 2004 from Eocene Amber of the Paris Basin.

The new taxon from Baltic Amber shows differences to the three fossil genera recorded from Europe for which a new genus *Thaumastotingis* nov.gen. is erected to accommodate *areolatus* nov.sp.

Material and methods

The amber inclusions upon this study is based will be deposited in the collection of the Geologisch-Paläontologisches Institut der Universität Hamburg (holotype) (GPIH) and in author's collection at the Tiroler Landesmuseum Ferdinandeum Innsbruck (paratype) (CEHI).

Photos were taken through an Olympus SZX 10 binocular microscope with Olympus E 3 digital camera and processed with Helicon Focus 4.3 software and using Adobe Photoshop and Lightroom 2.3 (Figs. 4-6) and Canon Eos 450D Zeiss binocular (Figs. 1-3).

Because of their position in the amber piece, the impurities, cracks and air bubbles in the stone, not all parts of the insects are clearly visible.

Measurements were taken with a micrometer eyepiece, 40 units = 1 mm.

Taxonomy

Systematic position:

Order: Hemiptera

Suborder: Heteroptera

Infraorder: Cimicomorpha LESTON, PENDERGRAST & SOUTHWOOD, 1954

Family: Thaumastocoridae KIRKALDY, 1907

Subfamily: cf ? Xylastodorinae BARBER, 1920

Genus: *Thaumastotingis* new genus

Type species: *Thaumastotingis areolatus* new species by monotypy.

D i a g n o s i s : Body of oval outline. Head short and wide, its preocular part converging anteriorly, head dorsally without visible tubercles. Eyes rather large and laterally produced. Bucculae (juga auct.) not flattened, lateral margins parallel or slightly widening posteriorly, separated by wide truncate clypeus, its apex not exceeding. Antennae 4-segmented. The ratio of antennal segments lengths are I<II<III>IV. Apex of labium reaching posterior margin of middle coxa.

Pronotum without longitudinal carinae and a median triangular projection, paranota areolate, their posterior margin slightly convex. Scutellum fully visible from above.

Hemelytra including membrane completely areolate except their apex. Corium divided into costal, subcostal, discoidal and sutural areas by longitudinal elevated veins. Clavus separated from corium by a comissura.

Male ninth abdominal segment (genital capsule) is clearly asymmetric, rather elongate, turned with its terminal opening to the left side. Parameres paired, hook-like.

Tarsi 3-segmented. Claws with large oval pulvilli (arolia auct.).

C o m p a r i s o n a n d d i s c u s s i o n : The new genus shows characters of two families: Tingidae and Thaumastocoridae. Areolate structure of hemelytra including membrane, separation of corium into costal, subcostal, discoidal and sutural areas by longitudinal elevated veins, presence of areolate paranota and paired parameres are features relating this new genus to Tingidae. Absence of pronotal posterior triangular projection and fully visible scutellum as well as clavus separated from the corium by a comissura are characteristic features of tribe Phatnomini (Cantacaderinae) (or subfamily Phatnominae sensu B. LIS 1999). This character is in Phatnomini combined with the presence of spines or tubercles on head as well as with longitudinal pronotal carinae. However, these structures of head and pronotum are missing in the new genus.

Despite the above mentioned features connecting the new genus with Tingidae, several important characters indicate, that this genus most likely belongs to Thaumastocoridae.

These features are as follows.

- Distinctly asymmetric male genital segment. An assumption that the asymmetry of genital segment of holotype may be an artifact of the amber inclusion is very unlikely, because this segment is rather elongate and narrow. Such shape of male genital capsule is characteristic to Thaumastocoridae and not inherent for Tingidae (male genital segment in the latter family is short and wide).
- Bucculae finger-like with lateral margins parallel and slightly widening posteriorly, separated by wide truncate clypeus.
- Tarsi with distinct pulvilli which are common in Xylastodorinae (Thaumastocoridae) (absent in Tinginae, in Cantacaderinae only seta-like parempodia are present). Already DRAKE AND SLATER 1957 stated, that these characters are clearly referring to Thaumastocoridae.
- Furthermore, the very wide head with laterally produced eyes as well as the very thin second and third antennal segments compared to thick first segment are also specific features of Thaumastocoridae and not of Tingidae
- The lack of longitudinal carinae on the pronotum is uncommon for Tingidae.

Based on this complex combination of most important characters, we tentatively assign *Thaumastotingis* nov.gen. to Thaumastocoridae. Within this family, the presence of enlarged pulvilli and rather short bucculae (juga) not exceeding apex of clypeus resemble and seem therefore be related to taxa of the subfamily Xylastodorinae (DRAKE & SLATER 1957), where the new genus may be tentatively placed.

In addition three-segmented tarsi are a unique feature of the new genus and not characteristic for either Tingidae, nor for Thaumastocoridae. Tarsi of members of these two families are two-segmented. Nearly complete areolate structure of hemelytra, areolate paranota and presence of two parameres are characters that distinguish *Thaumastotingis* nov.gen. from all genera of Thaumastocoridae.

This genus combines features of this family and Tingidae and deserves probably the rank of a particular subfamily of Thaumastocoridae e.g. Thaumastotinginae.

E t y m o l o g y : Refers to the combined characters of Thaumastocoridae and Tingidae.

***Thaumastotingis areolatus* nov.sp. (Figs. 1-6)**

Holotype: Male, preserved in an elongate piece of Baltic Amber (25x8x4mm), dorsal and ventral side visible, an air bubble obscures partly the apex of genital segment. Antennae complete, bent ventrally, legs partly displaced. This specimen is designated as holotype and will be deposited in GPIH as: "GPIH Nummer 4569, Sammlung Gröhn Nummer 5394".

Paratype: Female, Baltic Amber inclusion embedded in a block of artificial resin (11x17x4mm), dorsal and ventral side visible, antennae and legs complete, the latter bent ventrally. This specimen shares all characters of the holotype and is therefore regarded and designated as a paratype. Deposited in CEHI as BB-THAU-1.

D e s c r i p t i o n : Holotype male, submacropterous. Body oval, elongate, 2.56 x as long as wide; surface of hemelytra covered by areolae of oval, pentagonal and hexagonal shape; costal area of hemelytra with subrectangular areolae. Coloration of pronotum and hemelytra brown, head darker brown.

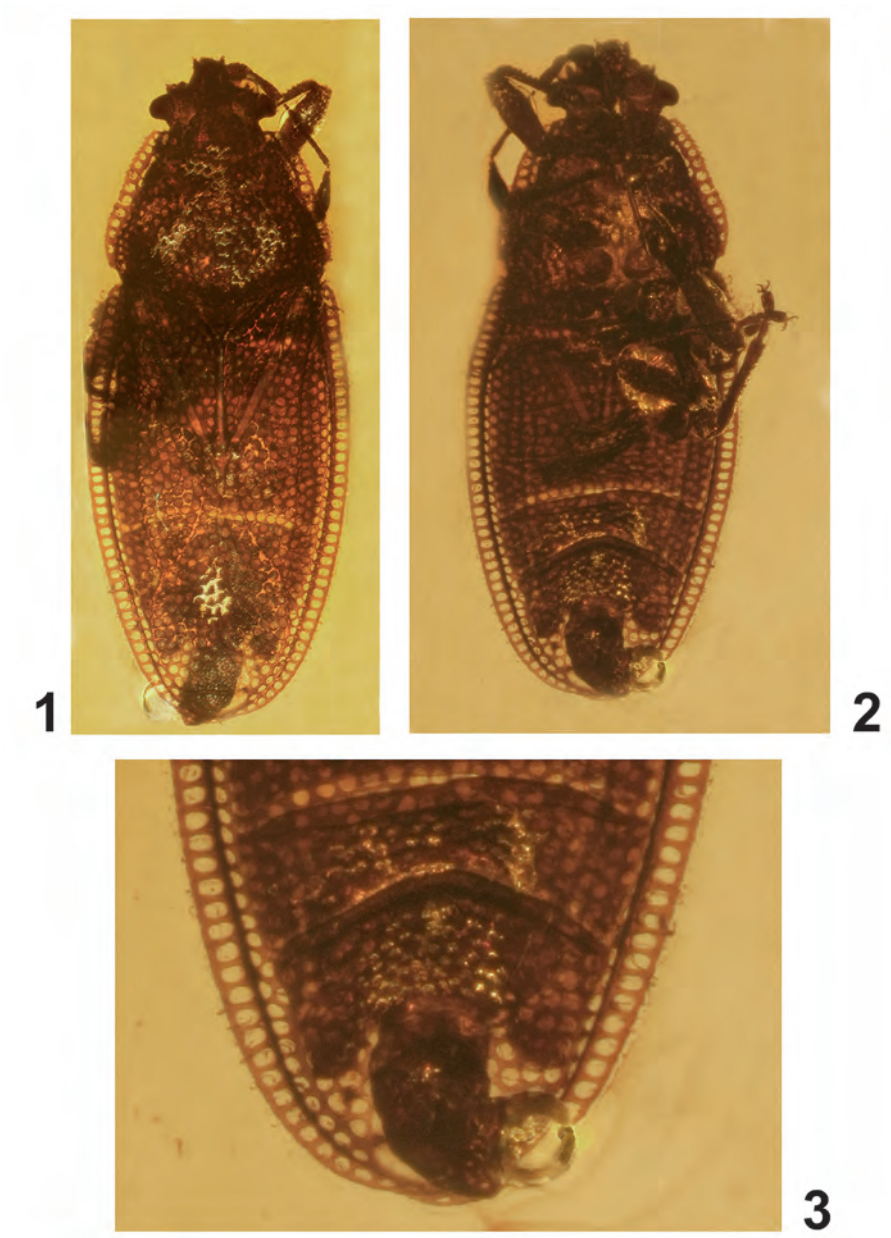
H e a d : Short and wide, width across eyes about 1.58 x as wide as length of head (19/12); preocular part rather short. Dorsal side without visible spines or tubercles. Bucculae (juga) with lateral margins parallel and slightly widening posteriorly, separated by wide truncate clypeus, its apex not exceeding. Antenniferous lobes small and subacute. Antennae 4-segmented. The first segment is rather thick, except the base; the second and third segments are thin, especially the third one; fourth segment fusiform, thicker than the second and third segments, but thinner than the first one; the third segment and the base of the fourth segment with minute tubercles bearing very fine hairs. Eyes of oval outline and laterally produced, their inner margins are not clearly visible. Postocular lobes short, converging posteriorly.

P r o n o t u m : 1.41x wider than long (34/24). Anterior margin slightly concave, lateral margins nearly straight. Disk deeply punctured, slightly elevated, without longitudinal carinae. Paranota distinctly narrowing posteriorly, with a complete row of larger areolae along lateral margin and a few smaller ones on inner side of anterior third of their length. Posterior margin slightly convex, without median triangular projection.

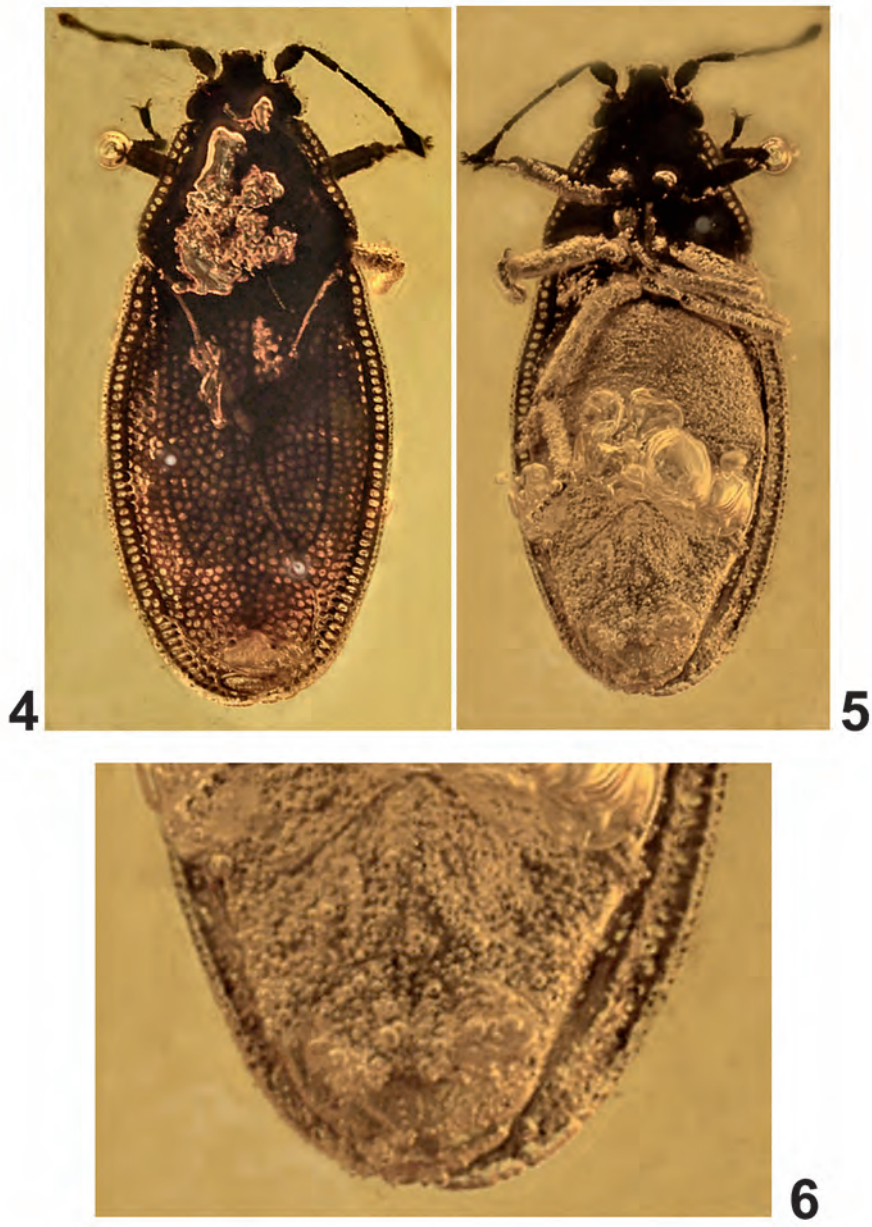
S c u t e l l u m : Completely visible, relatively small, of elongate triangular shape.

H e m e l y t r a : Submacropterous, their apices overlapping abdominal apex of genital capsule in male but not exceeding it. Hemelytra completely areolate, including the membrane, leaving only an oval smooth membraneous spot at apex. Corium divided into costal, subcostal, discoidal and sutural areas by longitudinal elevated veins. Costal area with 1 row of transverse oval areolae; subcostal and discoidal areas with 4 and 6 rows of areolae at their widest parts respectively, sutural area with 1 row of areolae fusing with membrane posteriorly. Clavus distinct and exposed, triangular, anteriorly uncovered by pronotum, separated from corium by a comissura, with 5 rows of areolae at its widest part and 8 areolae along the midline. Membrane with 11-12 rows of areolae at its widest part.

V e n t e r : Apex of labium reaching posterior margin of middle coxa. Lateral margins of abdomen delimited by hypocostal lamina, which shows one row of areolae (although not always clearly visible). Pregenital abdominal segments symmetrical and without particular modifications to accommodate the ninth segment or pygophore. The latter is clearly asymmetric, turned and apically opened to the left side, rather elongate and narrow. Parameres paired, hook-like, with thickened base and obtuse apex.



Figs 1-3: Holotype male of *Thaumastotingis areolatus* nov.gen., nov.sp.: (**1**) dorsal view, (**2**) ventral view; (**3**) terminal segments ventral view.



Figs. 4-6: Paratype female of *Thaumastotingis areolatus* nov.gen., nov.sp.: (**4**) dorsal view, (**5**) ventral view; (**6**) terminal segments ventral view.

L e g s : Femora and tibiae cylindrical, the former moderately thickened at middle, the latter with some stiff bristles. Tarsi 3-segmented. Two first tarsal segments short and thin, the third one rather thick, equal in length to the first two segments taken together. Claws with large oval pulvilli (arolia auct.).

F e m a l e : Shares all structural characters of male; body more stout, 2.35 x as long as wide.

Ventral pregenital segments with larger sternite VII, sternite VIII seemingly split into two plates and narrow sternite IX exposed.

M e a s u r e m e n t s (in mm): The first figure refers to the male holotype, the second to the female paratype. Body length 2.50-2.65; abdomen width 0.975-1.125; head length 0.3-0.275; head width 0.475-0.462; width of clypeus incl. genae 0.162; antennal segments I/II/III/IV = 0.15/0.175/0.3/0.2 - 0.15/0.175/0.29/-0.225; pronotum length 0.6-0.65; pronotum width 0.85-0.875; width of pronotal anterior margin 0.5-0.475; ratio pronotum width/length 1.41-1.35; ratio length of antennae/width of head 1.74-1.81.

E t y m o l o g y : Named after the unusual areolate structure of pronotum and abdomen.

D i s c u s s i o n : Distinguished from Eocene Baltic Amber taxon *Proxylastodoris gerdae* (BECHLY & WITTMANN, 2000) by elongate, subparallel habitus (egg-shaped); surface with large Tingidae-like cells (finely punctate); shorter rostrum reaching middle of mesosternum (longer, reaching posterior border of metasternum); antenniferous lobes small but distinct (lacking); claval suture about 2.5x as long as scutellum (slightly longer than scutellum); membrane areolate (not sclertotized). The second known Eocene Amber species is *Protodoris minusculus* NEL et.al 2004 described from Le Quesnoy amber in France, which is at once distinguished by much wider and sinuate paranota and the lack of pulvilli.

D i s t r i b u t i o n a n d E c o l o g y : This is the second known representative of Thaumastocoridae from Baltic Amber. Few recent records of the introduced alien Australian Eucalyptus pest *Thaumastocoris peregrinus* CARPINTERO & DALLAPÉ, 2006 to Italy (LAUDONIA & SASSO 2012, SASSO et al. 2014), Portugal (GARCIA et al. 2013) and to Sicily (CARAPEZZA 2014) indicate its presence and expansion in Europe and hence the temperate Palaearctic Area. As all other extant species of this family are primarily recorded from palms (hence "palm bug") in the Southern Hemisphere or are pests of Eucalyptus in Australia and New Zealand (CASSIS et al. 1999, NOACK et al. 2001, SOPOW & BADER 2013) and South Africa (JACOBS & NIESER 2005), it might be assumed that the subtropical climate and the flora of Eocene time offered similar conditions for the development of Thaumastocoridae in regions where Baltic and French Amber originated.

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Zusammenfassung

Zwei Exemplare, offensichtlich gleicher Artzugehörigkeit, in baltischem Bernstein weisen Merkmale der Familien Tingidae und Thaumastocoridae auf und können keiner fossilen oder rezenten Gattung zugeordnet werden. Dafür wird eine neue Gattung *Thaumastotingis* nov.gen. für deren Typusart *Thaumastotingis areolatus* nov.sp. errichtet. Die neue Gattung wird aufgrund der Merkmalskombination zweier Familien mit Vorbehalt zu den Thaumastocoridae gestellt, wo sie – ebenfalls mit Vorbehalt – der Unterfamilie Xylastodorinae zugeordnet werden kann. Das neue Taxon ist erst die zweite aus dem Baltischen Bernstein beschriebene Thaumastocoridae. Ihr taxonomischer Status wird diskutiert.

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