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NEW COCKROACHES (DICTYOPTERA: BLATTINA) FROM BAL TIC AMBER, WITH THE DESCRIPTION OF A NEW GENUS AND SPECIES: *STEGOBLATTA* *IRMGARDGROEHNI*

L.N. Anisyutkin^{1*} and C. Gröhn²

¹Zoological Institute of the Russian Academy of Sciences, Universitetskaya Emb. 1, 199034 Saint Petersburg, Russia;
e-mail: dictyoptera@zin.ru

²Bünebüttler Weg 7, D-21509 Glinde/Hamburg, Germany; e-mail: ambertop@t-online.de

ABSTRACT

A new genus and species of cockroaches, *Stegoblatta irmgardgroehni* gen. et sp. nov. is described from Baltic Amber. The taxonomic position of the new genus is discussed and it is concluded that it belongs to the family Blaberidae. The male of *Paraeuthyrrapha groehni* (Corydiidae, Euthyrrhaphinae) is described for the first time.

Key words: Baltic Amber, Blaberidae, cockroaches, Dictyoptera, *Paraeuthyrrapha groehni*, *Stegoblatta irmgardgroehni* gen. et sp. nov.

НОВЫЕ ТАРАКАНЫ (ДИКТЮПТЕРА: ВЛАТТИНА) ИЗ БАЛТИЙСКОГО ЯНТАРЯ, С ОПИСАНИЕМ НОВОГО РОДА И ВИДА: *STEGOBLATTA* *IRMGARDGROEHNI*

Л.Н. Анисюткин^{1*} и К. Грөн²

¹Зоологический институт Российской академии наук, Университетская наб. 1, 199034 Санкт-Петербург, Россия;
e-mail: dictyoptera@zin.ru

²Bünebüttler Weg 7, D-21509 Glinde/Hamburg, Germany; e-mail: ambertop@t-online.de

РЕЗЮМЕ

Новый род и вид тараканов (*Stegoblatta irmgardgroehni* gen. et sp. nov.) описывается из балтийского янтаря. Обсуждается таксономическое положение нового рода, предположительно отнесенного к семейству Blaberidae. Впервые описывается самец *Paraeuthyrrapha groehni* (Corydiidae, Euthyrrhaphinae).

Ключевые слова: балтийский янтарь, Blaberidae, тараканы, Dictyoptera, *Paraeuthyrrapha groehni*, *Stegoblatta irmgardgroehni* gen. et sp. nov.

INTRODUCTION

Baltic amber is one of the most famous sources of fossil insects. Stratigraphically most of it is dated as Late Eocene (Eskov 2002; Standke 2008) however an older Mid-Eocene date was suggested based on the radioactive dating of Glauconite (Weitschat and

Wichard 2010). The cockroach fauna from Baltic amber is more or less similar to the modern one in taxa composition (Shelford 1910, 1911; Weitshat and Wichard 2002). In this paper two peculiar cockroaches are described: *Stegoblatta irmgardgroehni* gen. et sp. nov. (Blaberidae, subfamily placement uncertain) and previously unknown male of *Paraeuthyrrapha groehni* Anisyutkin, 2008 (Corydiidae, Euthyrrhaphinae).

*Corresponding author / Автор-корреспондент

MATERIAL AND METHODS

Insect amber inclusions were prepared according to standard technique (Weitshat and Wichard 2002). Pictures were taken with a WILD M20 microscope (photo lens: ZEISS Luminar 16mm, 40mm, 63mm) equipped with a Canon EOS 450D digital camera.

The authors follow classification of Beccaloni and Eggleton (2011).

The term “tegmenised” is used to denote the strongly sclerotized forewings with completely lost venation.

All examined material, including holotype, is currently retained in the collection of C. Gröhn and will be deposited in the museum of Geological-Palaeontological Institute of the University of Hamburg (GPIH, Hamburg, Germany).

SYSTEMATICS

Family Blaberidae Brunner von Wattenwyl, 1865

Subfamily incertae sedis

Genus *Stegoblatta* gen. nov.

Type species: *Stegoblatta irmgardgroehni* sp. nov.

Etymology: The name originates from the Latin “stego” (roof) and “blatta” (cockroach). The gender is feminine.

Differential diagnosis. The new genus is defined by the following characters:

1. Tegmina (fore wings) transformed into elytra: entirely sclerotized, with reduced venation (Figs 1A, B, 2A, B, 3C, D);
2. Appendiculate field (*sensu* Rehn 1951) of hind wings well developed (Figs 1A, *a.f.*, 2A, 3D);
3. Armament of tibiae reduced (Figs 1B, 2B);
4. Tarsal segments short, with well developed euplantulae and arolia (Figs 1B, 2B);
5. Hypandrium rounded, styli entirely absent (Figs 1B, 2B, D).

Taken separately, these characters are not unique and occur in several taxa of modern cockroaches. However the complex of characters listed above is unique for the suborder Blattina Latreille, 1810 (= Blattodea Brunner von Wattenwyl, 1882, cockroaches *sensu stricto*).

Taxonomic position. The taxonomic position of the genus *Stegoblatta* gen. nov. is uncertain.

The presence of a well developed appendiculate field (Figs 1A, *a.f.*, 2A, 3D) exclude the new genus

from the superfamilies Corydioidea Saussure, 1864 or Blattoidea Latreille, 1810. The new genus is similar to the genus *Euthyrrhapha* Burmeister, 1838 (Corydiidae, Euthyrrhaphinae) in having entirely sclerotized tegmina, but clearly differs from it in the structure of wings, the strongly reduced armament of tibiae, the completely absent styli, and the structure of cerci. In representatives of Euthyrrhaphinae wings lack an appendicular field, tibial armament and styli are well developed, cerci are comparatively long, with bead-like segments (see Bohn and van Harten 2006; Anisyutkin 2008 for details).

The new genus readily differs from the fossil Umenocoleidae Chen et Tian, 1973 in the structure of the pronotum with large paranota (Figs 1A, 2A, B, 3B), the tegmina without “cup-like cells” (Figs 2A, 3C, D), and the presence of an appendiculate field (Figs 1A, 2A, 3D). In representatives of Umenocoleidae the paranota are reduced, the tegmina equipped with a very characteristic “cup-like cells” and the appendicular field is absent (see Vršanský et al. 2002; Vršanský 2003).

In the very diverse family Ectobiidae [= Blattellidae, see Beccaloni and Eggleton (2011)] representatives of the genera *Anaplecta* Burmeister, 1838, *Anaplectella* Hanitsch, 1928, *Plectoptera* Saussure, 1864, and *Prosoplecta* Saussure, 1864 are somewhat similar to the *Stegoblatta* gen. nov. in the structure of more or less sclerotized fore wings with variably reduced venation and the hind wings with more or less developed appendiculate field. The genera *Anaplecta* and *Anaplectella* differ from the new genus in having the less tegmenised fore wings with at least main veins visible and the presence of styli (Roth 1990, 1996). In *Anaplecta javanica* Saussure, 1895 hypandrium probably lacks styli (Hanitsch 1928), but this species readily differs from the *Stegoblatta* gen. nov. in the shape of the pronotum and the visible venation on tegmina (Hanitsch 1928). The genus *Prosoplecta* differs from the new genus in the structure of hypandrium: i.e. the clearly visible styli and the deeply incised caudal margin of hypandrium (Roth 1991, 1994). The genus *Plectoptera* differs from the genus *Stegoblatta* gen. nov. in the more or less oval body shape and the developed interstyler protrusion of hypandrium (Rehn and Hebard 1927; Pruna 1974; Anisyutkin 2009).

The loss of styli occurs in both families Ectobiidae and Blaberidae. This state appears independently in several ectobiid genera, which were examined by

Roth (1989, 1993) and otherwise clearly not related to *Stegoblatta* gen. nov. Among the blaberid genera, the styli loss in all representatives of the subfamily Panesthiinae Brunner von Wattenwyl, 1865 and some representatives of Perisphaeriinae Brunner von Wattenwyl, 1865 e.g. in *Perisphaerus punctatus* Bey-Bienko, 1969 (Anisyutkin 2003). The very specialized Panesthiinae are entirely dissimilar morphologically from *Stegoblatta* gen. nov. (Roth 1977).

The family Ectobiidae, including the above mentioned genera, is characterized by the well developed armament of tibiae and comparatively long tarsal segments. These structures in *Stegoblatta* gen. nov. are noticeably different (Figs 1B, 2B). The comparatively short legs, the strongly reduced tibial and femoral armament and the noticeably shortened tarsal segments are characteristic of the family Blaberidae.

The genera somewhat similar to the genus *Stegoblatta* gen. nov. can be found in the family Blaberidae. Such genera as *Diploptera* Saussure, 1864, *Diplopterina* Princis, 1963, *Notolampra* Saussure, 1862, *Phlebonotus* Saussure, 1862, *Phorasapis* Serville, 1831, and *Thorax* Saussure, 1862 are characterized by the completely tegmenised fore wings, the more or less shortened tarsal segments with well developed euplantulae and the more or less weakened armament of tibiae. These genera belong to the subfamilies Diplopterinae Walker, 1868 (*Diploptera* and, probably, *Diplopterina*) and Epilamprinae Brunner von Wattenwyl, 1865 (*Notolampra*, *Phlebonotus*, *Phorasapis*, and *Thorax*). However, all these genera are clearly dissimilar to *Stegoblatta* gen. nov. since they always have tibial armament, at least several clearly visible spines, in contrast to the new genus which is entirely devoid of tibial armament (Figs 1B, 2B). Among these genera, only *Diploptera* and *Diplopterina* have an appendicular field, but both clearly differ from *Stegoblatta* gen. nov. in having the comparatively long tarsal segments, the specialized cerci and the presence of styli (Anisyutkin 2002, 2007; for *Diplopterina* – personal observations). The representatives of the genera *Notolampra*, *Phlebonotus*, and *Thorax* further differ from the new genus in having the markedly convex dorsal surface.

The genus *Stegoblatta* gen. nov. is most similar to the extant genus *Phorasapis*, in structure of tegmina, pronotum and tarsi, but readily differs from it in the weakly emarginated caudal margin of pronotum (Figs 1A, 2A, 3B, C) (angularly protruding in *Phorasapis* spp. – Roth 1972, figs 122–129), completely

reduced tibial armament (clearly visible in *Phorasapis* spp.) and absence of styli (present in *Phorasapis* spp.).

The new genus is somewhat similar to some genera of Perisphaeriinae in the shape of pronotum (compare Figs 1A, 2A, 3B, C and figs 23, 29, 31, 32, 60 in Anisyutkin 2003), structure of tarsi and hypandrium. The new genus readily differs from all known extant representatives of the Perisphaeriinae in the presence of an appendicular field and entirely tegmenised fore wings. It should be noted, that *Stegoblatta* gen. nov. seemingly lacks lateral carinae on the ventral side of the pronotum. The presence of lateral carinae may represent a synapomorphy of the subfamilies Paranauphoetinae, Perisphaeriinae, and Panesthiinae (Anisyutkin 2003).

The following two alternative hypotheses on the relationships of the *Stegoblatta* gen. nov. may be proposed: either the new genus is a highly advanced representative of some extant subfamily, most likely Epilamprinae or Diplopterinae, or it represent more basal offshot on the phylogenetic tree of the family Blaberidae. Additional data on the morphology of the *Stegoblatta* gen. nov. and extant blaberids are badly needed to support each of the above mentioned hypotheses.

Included species. The type species only.

***Stegoblatta irmgardgroehni* sp. nov.**

(Figs 1A–C, 2A–D, 3A–D)

Etymology: this species is named in honour of the late mother of C. Gröhn.

Material. Holotype. Male, inclusion in Baltic Amber, GPIH 4544, coll. C. Gröhn no. 7137.

Description. Holotype (male). General colour from light yellow to nearly black (Figs 2A–D, 3A–D): medial part of pronotum and tegmina dark, nearly black, lateral parts of pronotum and tegmina along with costal margin yellowish; tegmina with 2 pairs of light spots (Figs 1A, 2A). Body dorsoventrally compressed. Surfaces smooth and lustrous; tegmina, especially in proximal half, with distinct punctation (Figs 2A, 3C). Head elongated, apparently longer than wide; eyes large, shifted onto the dorsal part of head, approximate to but not contacting the area of vertex (Figs 1A, C, 2A–C, 3A, B). Antennae filiform (Figs 1C, 2A–C). Pronotum transverse, anterior and lateral margins widely arcuate, posterior weakly emarginated caudally; medial part slightly prominent (Figs 1A, 2A, B, 3A–C). Scutel-

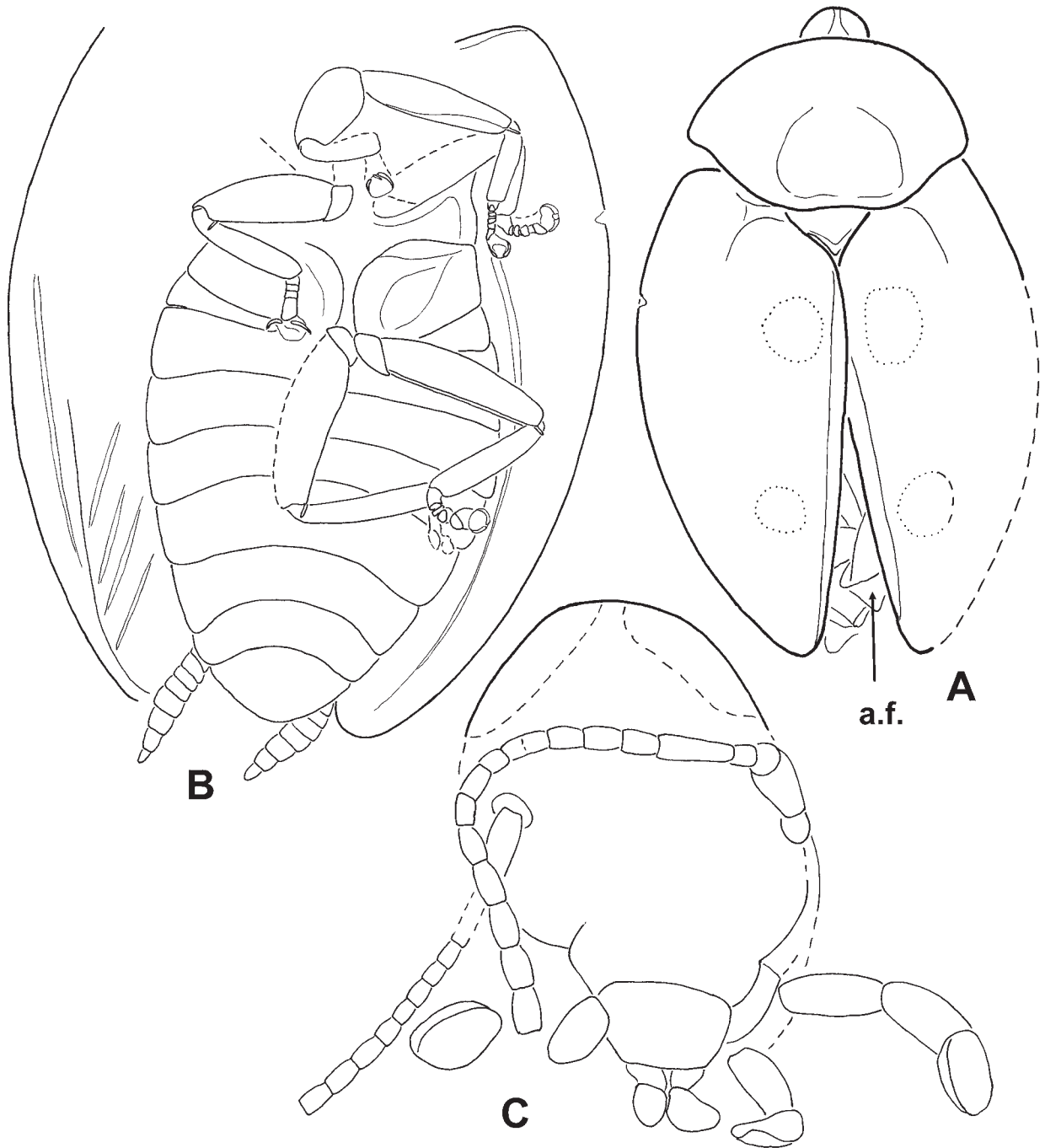


Fig. 1. *Stegoblatta irmgardgroehni* gen. et sp. nov., male, holotype. General view from above (A), thorax and abdomen from below (B), head in frontal view (C). Abbreviations: a.f. – appendicular field.

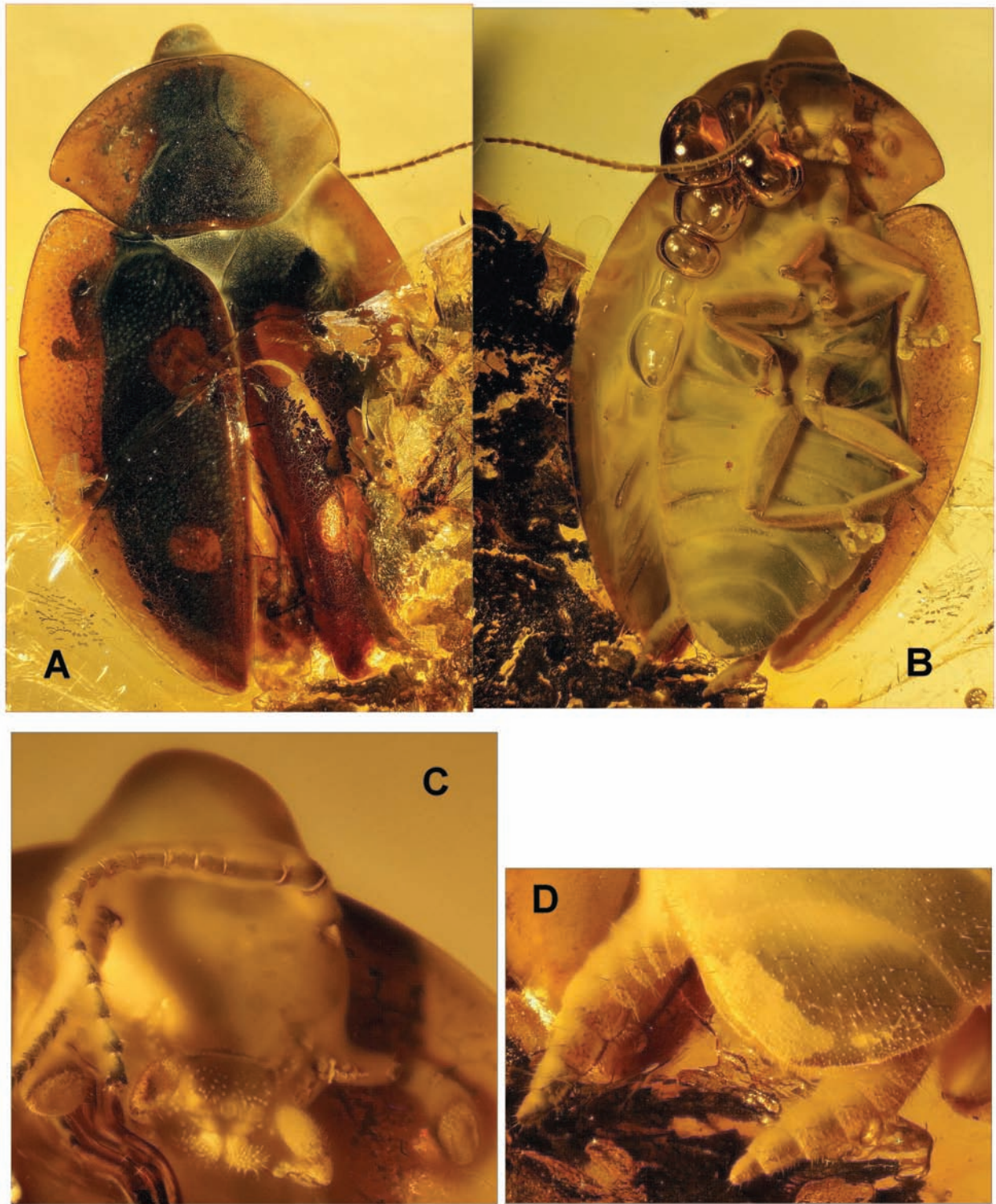


Fig. 2. *Stegoblatta irmgardgroehni* gen. et sp. nov., male, holotype (photos). General view from above (A), below (B), head in frontal view (C) and abdominal apex from below (D).

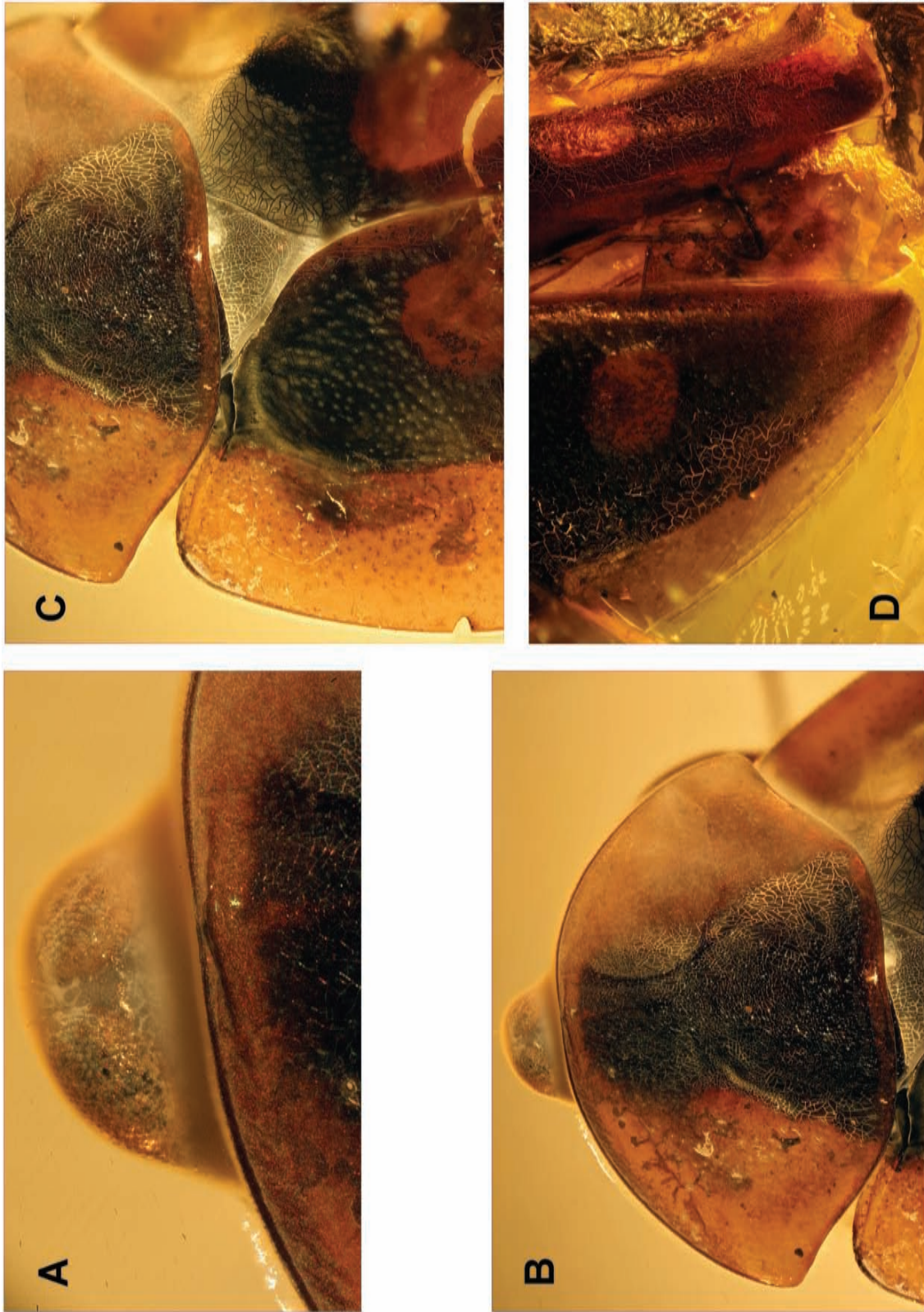


Fig. 3. *Stegoblatta imgarigroehni* gen. et sp. nov., male, holotype (photos). Head and anterior part of pronotum (A), scutellum and proximal part of tegmina (B), distal parts of tegmina and wings (C), distal parts of tegmina and wings (D) from above.

lum exposed, large, more or less triangular (Figs 1A, 2A, 3C). Tegmina and wings completely developed. Tegmina subtriangular in shape; anterior (costal) margin widely rounded, posterior one nearly straight; apex narrowed; with long and thin depressed area along with posterior margin (evidently correspond to area where right and left tegmina overlapped at rest) (Figs 1A, B, 2A, B, 3C, D). Wings completely developed, with several incrassate veins (anterior rami of R?) at anterior (costal) margin (Figs 1B, 2B); appendicular field distinct, flat folded, not rolled up, no more than one third of tegmina in length (Figs 1A, *a.f.*, 2A, 3D). Legs comparatively short and weak (Figs 1B, 2B); anterior margins of femora including fore ones armed according to the type C (*sensu* Bey-Bienko 1950; Roth 2003), with single apical spine (Fig. 1B); tibiae with reduced armament, spines absent (Figs 1B, 2B); tarsi with short segments, 5th (ultimate) segment slightly longer than other segments; euplantulae and arolium well developed; claws large, probably symmetrical (Figs 1B, 2B). Abdomen with 6 clearly visible sternites and hypandrium (Figs 1B, 2B); sternites without any visible specializations; hypandrium symmetrical, widely rounded, without styli; cerci comparatively elongated, with about 7–8 distinct segments (Figs 1B, 2B, D).

Female unknown.

Measurements (mm) (approximately, due to distortion of inclusion). Length: head 1.65; pronotum 2.3; tegmina 6.8. Width: head 1.25; pronotum 3.9; tegmina 2.9.

Comparison. As given for the genus.

Note. Photo of the holotype of *S. irmgardgroehni* sp. nov. was published as unidentified cockroach (Weitschat and Wichard 2002, p. 107, plate 34b).

Family Corydiidae Saussure, 1864

Subfamily Euthyrrhaphinae Handlirsch, 1925

Genus *Paraeuthyrrhapha* Anisyutkin, 2008

Paraeuthyrrhapha groehni Anisyutkin, 2008 (Fig. 4A–D)

Material. Male, inclusion in Baltic Amber, GPIH 4414, coll. C. Gröhn no. 7142.

Description. Male. General colour reddish-brown, head, pronotum, scutellum and proximo-anterior (sclerotized) part of tegmina darker (Fig. 4A–D). Surfaces smooth; head and, to lesser degree, pronotum punctured (Fig. 4A, B); pronotum, scutel-

lum and proximal part of tegmina covered with recumbent bristles (Fig. 4A, B). Head widely rounded (Fig. 4A, B), slightly wider than high; postclypeal shield (postclypeus) large, reaching dorsal border of antennal sockets; distance between eyes larger than length of eye; ocelli small; distance between antennal sockets about 1.5–2 scape length. Antennae long, pedicellum and 4th segment of about equal length, succeeding segments more elongated toward apex. Pronotum more or less trapezoidal, with anterior and lateral margins rounded, posterior margin nearly straight (Fig. 4A). Scutellum triangular, large (Fig. 4A). Anterior margin of fore femur armed according to the type C (*sensu* Bey-Bienko 1950; Roth 2003), with 2 apical spines; tarsi comparatively long, hind metatarsus a little longer than other segments combined; euplantulae probably present on 1st–4th tarsal segments, small and apical; claws symmetrical, aroliums large. Tegmina and wings completely developed, about the same length (Fig. 4A, C). Tegmina more or less oval, with distinctly prominent anterior margin; divided obliquely into two portions: sclerotized proximo-anterior part and membranous distal-posterior part; proximo-anterior part with weakly visible (probably due to state of inclusion) R and 4–5 anterior branches of R; distal-posterior part with numerous (more than 29) more or less regularly pectinate branches of R, M and CuA (Fig. 4A, C); venation in anal area absent (Fig. 4A). Wings apically membranous, without visible veins (Fig. 4C). Cerci elongated, bead-like, with more than 7 segments (Fig. 4D). Hypandrium (Fig. 4D) probably similar to that of *Euthyrrhapha pacifica* (Coquebert, 1804) (Anisyutkin 2008, fig. 2H).

Measurements (mm) (approximately, due to distortion of inclusion). Length: head 1.15, pronotum 1.45; tegmen 5.2. Width: head 1.25; pronotum 2.35; tegmen 1.9.

Notes. This species was originally described from a single female (Anisyutkin 2008), while male has not been previously described.

The newly described male is morphologically similar in the shape of head, pronotum, tegmina, wings and legs to the previously known female (Anisyutkin 2008). The sexual dimorphism is weak, as it was predicted in the original description.

The absence of veins in the apical part of the wing occurs in some Euthyrrhaphinae, for instance in representatives of the genus *Holocompsa* Burmeister, 1838 (Rehn 1951). In previously described female of

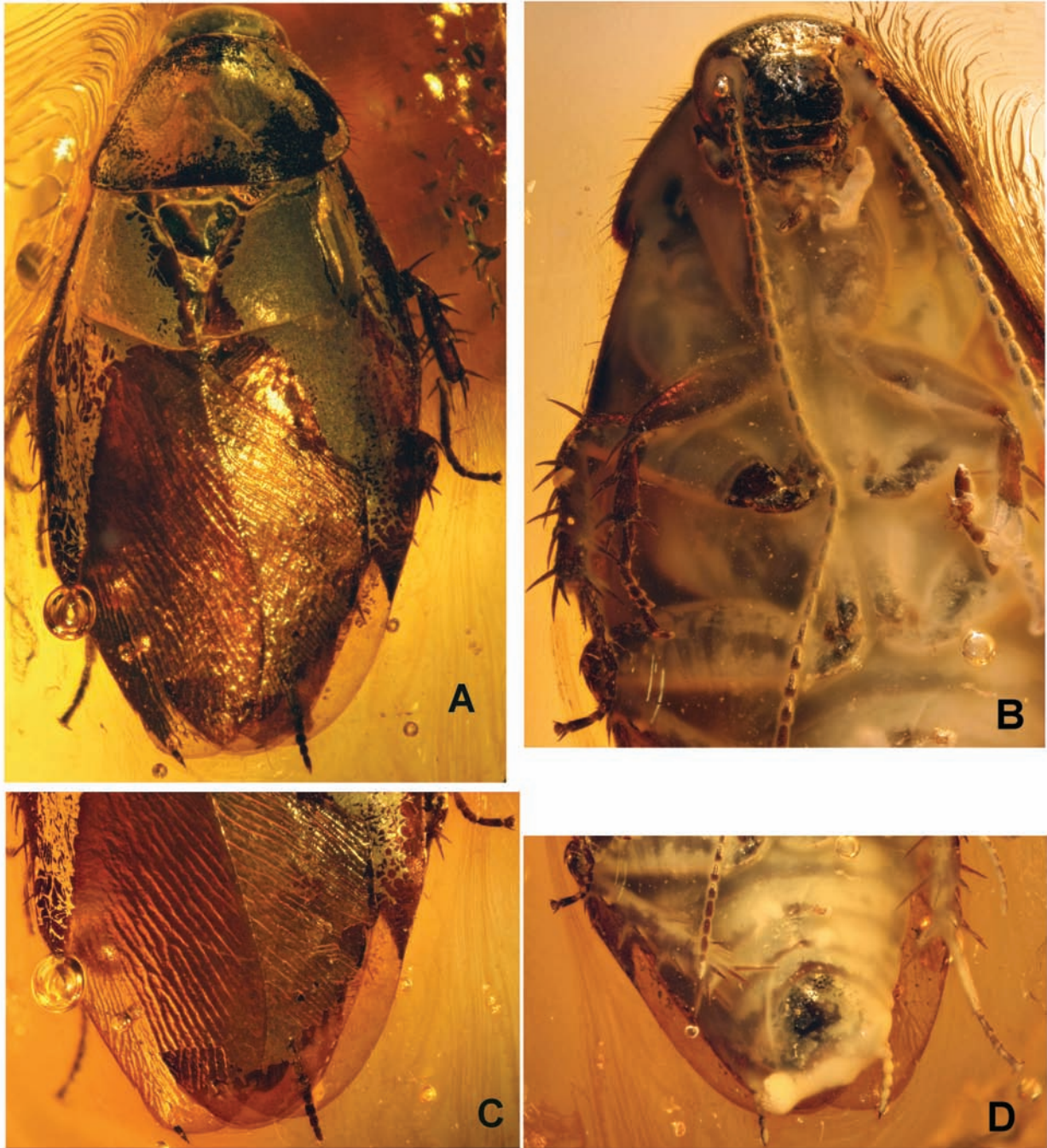


Fig. 4. *Paraeuthyrhapha groehni* Anisyutkin, 2008, male (photos). General view from above (A), anterior part of body from below (B), posterior part of body from above (C) and below (D).

P. groehni the apical part of the wing bears numerous and comparatively weak veins (Anisyutkin 2008, figs 2B, 5).

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