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На титуле: *Ochthera mantis* (De Geer, 1776) поедает *Scatella tenuicosta* Collin, 1930 (Diptera: Ephydriidae).  
Фотография Н.Е. Вихрева (с изменениями)

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## Two new species of *Diostracus* Loew, 1861 (Diptera: Dolichopodidae) from the Caucasus with a key to species from the region

© I.Ya. Grichanov<sup>1</sup>, B.I. Volf<sup>2, 3</sup>

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**Abstract.** *Diostracus khevsureticus* sp. n. from highlands of Georgia and *D. osseticus* sp. n. from highlands of South Ossetia are described and illustrated and associated with the subgenus *Lagodechia* Negrobov et Tsurikov, 1996, comprising now three Caucasian species and three species from Oriental China. *Diostracus kustovi* Grichanov, 2013 is firstly recorded from Georgia. A key to five *Diostracus* Loew, 1861 species known from the Caucasus is provided.

**Key words:** long-legged flies, Palaearctic region, Georgia, South Ossetia, *Diostracus*, new species.

### Два новых вида рода *Diostracus* Loew, 1861 (Diptera: Dolichopodidae) с Кавказа с определителем видов региона

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**Резюме.** Описаны и иллюстрированы *Diostracus khevsureticus* sp. n. из высокогорий Грузии и *D. osseticus* sp. n. из высокогорий Южной Осетии. Они помещены в подрод *Lagodechia* Negrobov et Tsurikov, 1996, в который теперь входят три кавказских вида и три вида из Ориентального Китая. *Diostracus kustovi* Grichanov, 2013 впервые указывается для Грузии. Составлен определитель пяти видов рода *Diostracus* Loew, 1861, известных на Кавказе.

**Ключевые слова:** мухи-зеленушки, Палеарктика, Грузия, Южная Осетия, *Diostracus*, новые виды.

## Introduction

The genus *Diostracus* Loew, 1861 is known by 110 species described from the Palaearctic, Oriental and Nearctic regions, but with rich diversity in highlands of the Himalayas and Tibetan Plateau. It was reviewed by Yang et al. [2011] for the Chinese fauna, Grichanov [2013] for the West Palaearctic fauna, and Wang et al. [2015] for the Himalayan fauna. Later Pusch [2015] described *D. lemavajulorum* from Corsica (France), and Zhu et al. [2023] described six new species of *Diostracus* from Tibet (China). In the East Palaearctic fauna, *Diostracus* is known also from Russia (Republic of Buryatia, Primorskiy Region, Sakhalin), Japan and Korea [Grichanov, 2024]. Almost all species are endemic to mountainous countries or maritime territories. With the new species described here, the Palaearctic fauna of *Diostracus* now totals 34 species including five species inhabiting the Caucasus.

## Material and methods

The types of two new species are housed at the Zoological Institute of the Russian Academy of Sciences (ZIN, St Petersburg, Russia). Specimens have been studied and photographed with a ZEISS SteREO Discovery.V12 microscope and an AxioCam MRc5 camera. Morphological terminology and abbreviations follow Cumming and Wood [2017] and Grichanov and Brooks [2017]. The lengths of

the antennomeres and podomeres are given in millimetres. Body length is measured from the base of the antenna to the tip of the abdominal segment 6. Wing length is measured from the base to the wing apex. Antenna length is measured from the base of the scape to tip of the arista-like stylus. The figures showing the hypopygium in lateral view are oriented as it appears on the intact specimens. Line drawings of the hypopygium are not provided, because they cannot show correctly the shape of appendages in lateral view; instead, the micrographs of hypandrium, phallus, epandrial lobe, surstylus and cercus from various aspects are given.

### Genus *Diostracus* Loew, 1861

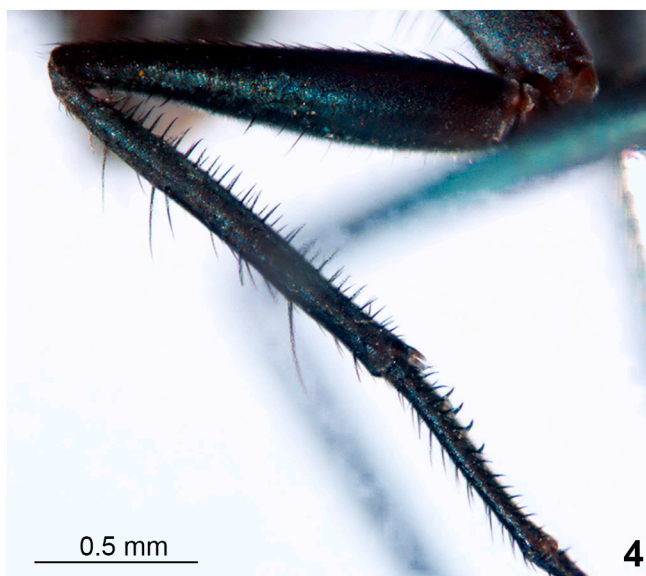
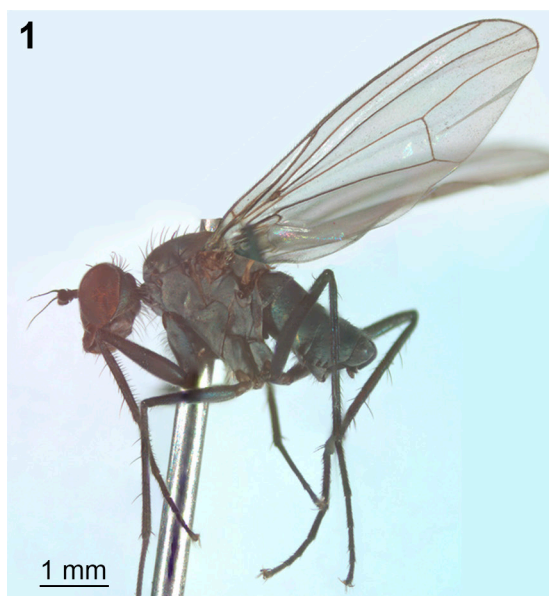
*Diostracus* Loew, 1861: 43 (type species *Diostracus prasinus* Loew, 1861, by monotypy).

**Notes.** See Grichanov [2013] for diagnosis of the genus *Diostracus* and Pusch [2015] for a review of ecological preferences of species. Grichanov [2013] recognised two subgenera of the genus in the Caucasus, i.e. *Sphyrotarsus* Mikk, 1874, and *Lagodechia* Negrobov et Tsurikov, 1996. *Diostracus* (L.) *spinulifer* Negrobov et Tsurikov, 1988 is known from Georgia; *D. (S.) caucasicus* (Negrobov, 1965) inhabits Adygea and Krasnodar Region (Russia); *D. (S.) kustovi* Grichanov, 2013 has been described from Karachay-Cherkessia of Russia, being reported here from Georgia. Two new species of the genus are described and illustrated below. *Diostracus khevsureticus* sp. n. from Georgia and *D. osseticus* sp. n. from South Ossetia are

associated here with the subgenus *Lagodechia*. At present, three more species of this subgenus are known from Oriental China (Yunnan, Guizhou, Hunan and Sichuan) [Grichanov, 2017].

**Key to *Diostracus* species (males) from the Caucasus**

1. Scutellum with 1–2 pairs of long bristles and with some short lateral setae or hairs (subgenus *Lagodechia*) ..... 2
- Scutellum with 3 pairs of almost equally long bristles (subgenus *Sphyrotarsus*) ..... 4
2. Sterna 2–4 of abdomen without strong setae, with short white hairs; fore basitarsus with 5 short ventral hooked setae in basal half (Fig. 4); body 4.9 mm long ..... *D. khevsureticus* sp. n.
- Sterna 2–4 of abdomen each with groups of strong setae; fore basitarsus with ventral row of 15–20 very short blunt setae in middle half (Fig. 15) ..... 3
3. Wing cross-vein dm-m more than 2 times as long as distal part of  $M_4$ ; hind basitarsus with 3 long light posterodorsal setae at base, nearly half as long as basitarsus; body 5–6.5 mm long ..... *D. spinulifer*
- Wing cross-vein dm-m about 1.5 times as long as distal part of  $M_4$ ; hind basitarsus without long setae; body 6.5 mm long ..... *D. osseticus* sp. n.
4. Sterna 2 and 3 of abdomen each with strong black spines; body 9.4 mm long ..... *D. kustovi*
- Male abdominal sternites without strong spines; body 6 mm long ..... *D. caucasicus*



Figs 1–5. *Diostracus (Lagodechia) khevsureticus* sp. n., male, holotype.

1 – habitus, lateral view; 2 – head, anterior view; 3 – left antenna, outer lateral view; 4 – fore femur, tibia and basitarsus, posterior view; 5 – fore tarsomeres 3–5, ventral view.

Рис. 1–5. *Diostracus (Lagodechia) khevsureticus* sp. n., самец, голотип.

1 – внешний вид, сбоку; 2 – голова, спереди; 3 – левый усик, снаружи сбоку; 4 – передние бедро, голень и базитарзус, сзади; 5 – 3–5-й членики передней лапки, снизу.



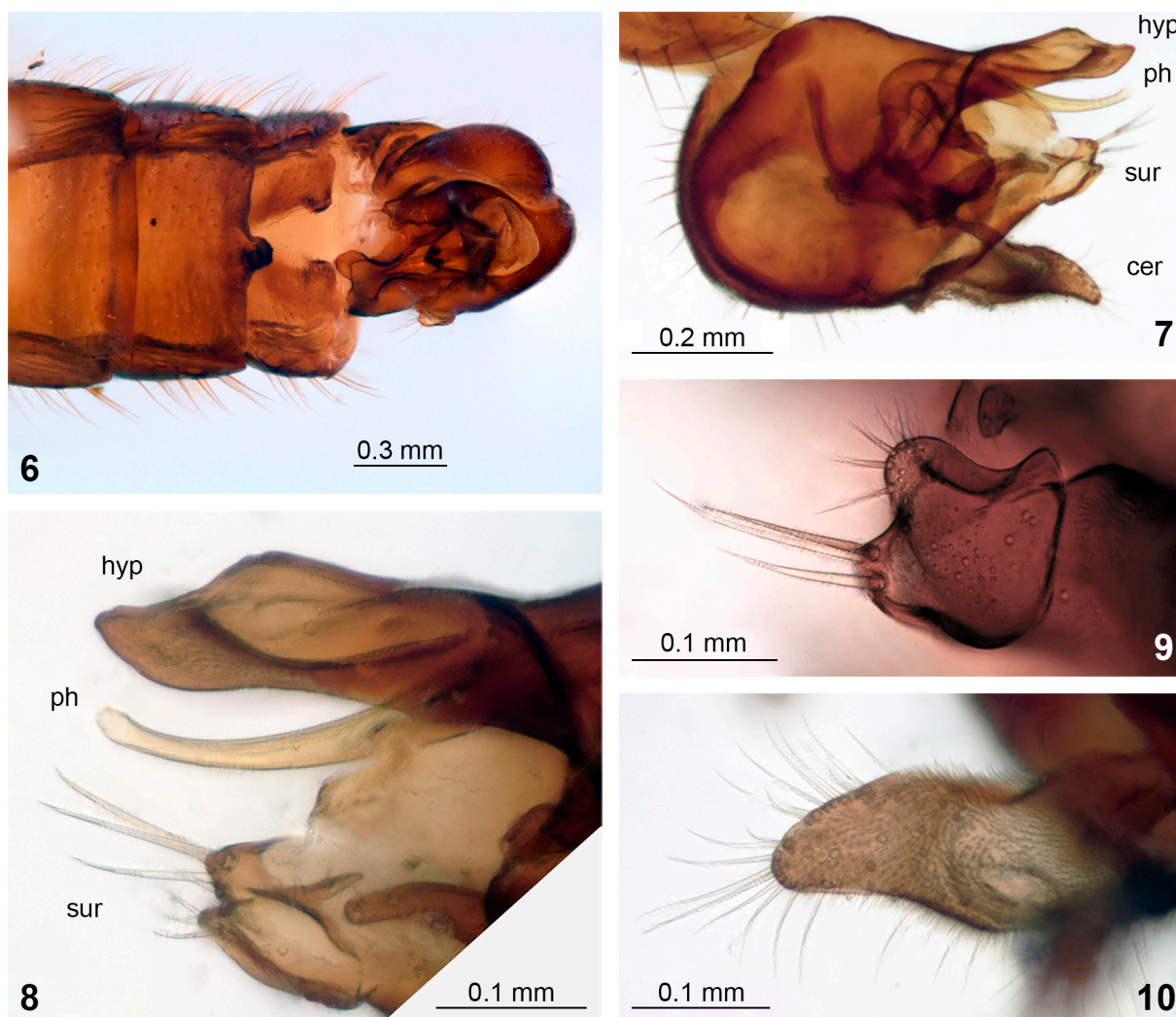
*Diostracus (Lagodechia) khevsureticus* sp. n.  
(Figs 1–10)

**Material.** Holotype, ♂ (ZIN): Georgia, Mtskheta-Mtianeti Region, Dusheti Municipality, Khevsureti, Greater Caucasus Range, SW slope of Tanie Mt [42.38°N / 45.00°E], 2850 m, 19.07.2014 (D.A. Zhrebilo) (in Russian Cyrillic).

**Diagnosis.** According to Grichanov [2013], the new species belongs to the subgenus *Lagodechia*, which differs from other subgenera in the absence of dorsal setae on antennal scape, presence of one or two pairs of long bristles on scutellum, short postpedicel with dorsal stylus. *Diostracus khevsureticus* sp. n. differs from males of other two Caucasian species of the subgenus in the absence of strong setae on the abdominal sterna 2–4 that have only short white hairs; male fore basitarsus bears five short ventral hooked setae in its basal half. *Diostracus spinulifer* and *D. osseticus* sp. n. males are somewhat larger, bear

groups of strong setae on sterna 2–4 of the abdomen and ventral row of 15–20 very short blunt setae in the middle half of fore basitarsus.

**Description.** Male (Fig. 1). Length (mm): body without antennae 4.9, antenna 1.1, wing 5.6/1.8. Head (Fig. 2): black, grey pollinose; clypeus shining, 1/3 as wide as head, 1.6 times as wide as high; face nearly as wide as clypeus, 1.6 times as wide as height of postpedicel; ocellar bristles strong, vertical bristle short; postvertical bristle slightly longer than upper postocular bristle; about 10 upper postocular setae black, strong, finer and whitish below; ventral 1/2 of postcranium clothed with many long white hairs; antenna (Fig. 3) black, with glabrous vase-like scape; pedicel with ring of short setae; postpedicel as long as high, rounded distally, with short hairs, with dorsoapical simple arista-like stylus; basal segment of stylus thickened; length (mm) of scape, pedicel, postpedicel, arista-like stylus (aristomeres 1 and 2), 0.14 : 0.08 : 0.18 : 0.11 : 0.68; palpus ovate, 1.5 times as long as wide, 1/3 as long as eye height, slightly dilated at middle; palpus brown, silvery white pollinose, bearing black hairs and setae; proboscis moderately large, brown.



Figs 6–10. *Diostracus (Lagodechia) khevsureticus* sp. n., male, holotype.

6 – segments 3–5 and 8 of abdomen and hypopygium, ventral view; 7 – hypopygium, right lateral view; 8 – hypandrium, phallus and surstylus, lateral view; 9 – surstylus, ventral view; 10 – cercus, lateral view. Abbreviations: cer – cercus; hyp – hypandrium; ph – phallus; sur – surstylus.

Рис. 6–10. *Diostracus (Lagodechia) khevsureticus* sp. n., самец, голотип.

6 – сегменты 3–5 и 8 брюшка и гипопигий, снизу; 7 – гипопигий, справа сбоку; 8 – гипандрий, фаллус и сурстиль, сбоку; 9 – сурстиль, снизу; 10 – церка, сбоку. Сокращения: cer – церка; hyp – гипандрий; ph – фаллус; sur – сурстиль.

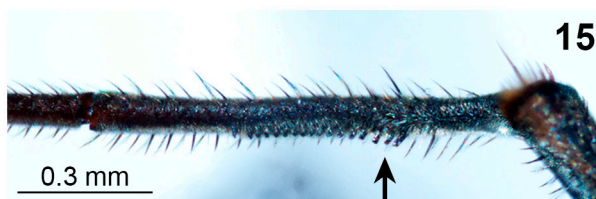
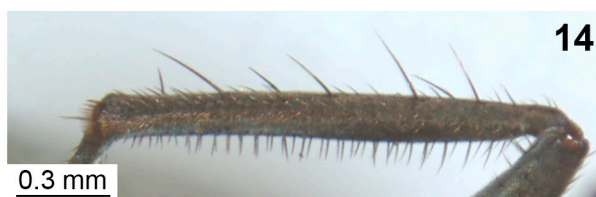
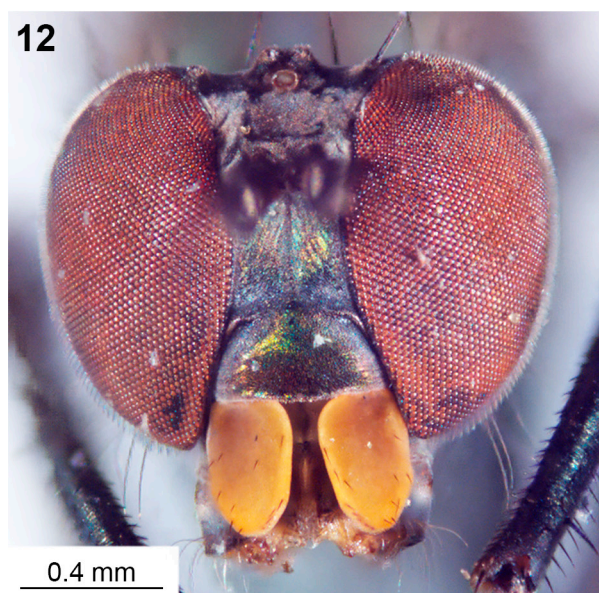
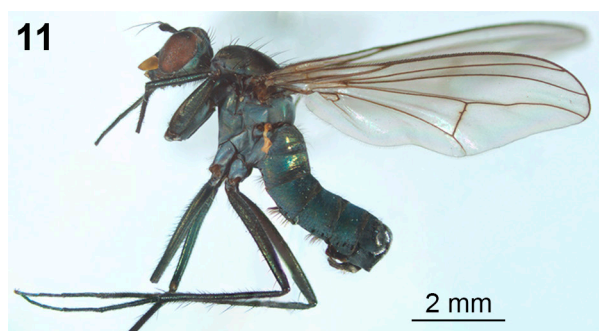
Thorax: greenish black, with grey pollinosity; mesonotum with pair of blackish longitudinal stripes; acrostichals absent; 7 pairs of dorsocentrals; 2 humeral setae, 1 posthumeral, 2 notopleurals, 1 sutural, 1 postsutural, 1 supra-alar, 1 postalar; scutellum with 2 pairs of strong scutellars; proepisternum with 7–8 white hairs on its upper portion and 7–8 white setae on its lower portion; scutellum about 3 times wider than long; postscutellum about 3 times as long as scutellum.

Legs: rather long, black, with black major setae; fore coxa on anterior surface with long white hairs, with 6 short black apical setae; fore femur (Fig. 4) simple, moderately thick in basal half, with irregular posteroventral row of 12–14 setae in distal half, shorter than femur height; fore tibia slightly thickened, bearing 2 anterodorsal, 2 posterodorsal bristles in basal 1/3, 1 strong dorsal bristle at 2/3, 2 ventral rows of short erect black setae, 1 long apical seta; fore basitarsus long, covered with semi-erect black setulae, with 5 short ventral hooked setae in basal half (Fig. 5); tarsomeres 2–4 simple, bearing semi-erect black setulae, ventrally bare; tarsomere 4 with pair of apicoventral setae; tarsomere 5 elongated; pulvilli not reduced, but small, empodium well developed and ventrally ciliated, claws about half as long as tarsomere 5; mid coxa bearing long white hairs; mid femur simple, with setulae only; mid tibia straight, with 3 anterodorsal and 2 posterodorsal bristles and 5 short apical setae; mid tarsus

slender, simple; tarsomere 4 with pair of apicoventral setae; tarsomere 5 with small claws, pulvilli and empodium; hind coxa bearing short white seta at apex; hind femur long and simple, with anterior preapical bristle; hind tibia slender, bearing 3 anterodorsal and 4 posterodorsal bristles and 5 short apical setae, short setae on ventral surface; hind tarsus slender and simple; tarsomere 4 with pair of apicoventral setae; claws, pulvilli and empodium small. Femur, tibia and tarsomere (from first to fifth) length (mm): fore leg: 1.57 : 1.43 : 0.75 : 0.35 : 0.26 : 0.16 : 0.27; mid leg: 1.98 : 2.12 : 1.05 : 0.32 : 0.25 : 0.16 : 0.34; hind leg: 2.37 : 2.49 : 0.89 : 0.48 : 0.34 : 0.19 : 0.26.

Wing (Fig. 1): long and narrow, evenly greyish, with black veins; Sc developed; C slightly thickened behind  $R_1$ ;  $R_{2+3}$  and  $R_{4+5}$  weakly convex anteriorly, almost parallel in middle half of wing, then divergent distally;  $R_{4+5}$  and  $M_{1+2}$  almost parallel at wing apex;  $M_{1+2}$  almost straight; ratio of part of costa between  $R_{2+3}$  and  $R_{4+5}$  to this between  $R_{4+5}$  and  $M_{1+2}$ , 0.65 : 0.35; ratio of cross-vein dm-m to distal part of  $M_4$ , 0.62 : 0.39; dm-m almost perpendicular to longitudinal wing axis; calypter brownish, with white cilia; halter brownish yellow with brown knob.

Abdomen (Fig. 6): greenish black, with grey pollinosity, with short black setae; terga with black hairs; sterna normal, with short white hairs; sternum 4 with small median distal tubercle; sternum 5 divided into 2 sclerites, each with small distal



Figs 11–16. *Diostracus (Lagodechia) osseticus* sp. n., male, paratype.

11 – habitus, lateral view; 12 – head, anterior view; 13 – left antenna, outer lateral view; 14 – fore tibia, anterior view; 15 – fore basitarsus, posterior view, with arrow showing blunt setae; 16 – abdomen, lateral view.

Рис. 11–16. *Diostracus (Lagodechia) osseticus* sp. n., самец, паратип.

11 – внешний вид, сбоку; 12 – голова, спереди; 13 – левый усик, снаружи сбоку; 14 – передняя голень, спереди; 15 – передний базитарзус, сзади (стрелка показывает тупоконечные щетинки); 16 – брюшко, сбоку.



tubercle; tergum 6 small, shortly setose; tergum 7 reduced to semicircular arc, with some short setae; segment 8 large, covered with black hairs; hypopygium (Fig. 7) black, moderately large, with black appendages; hypandrium (Fig. 8) elongated, flat, widened at apex, with distal emargination (ventral view); phallus simple; epandrial lobe (Fig. 9) short, finger-like; dorsal and ventral lobes of surstylus thick, fused at base; dorsal lobe of surstylus with 5 short setae; ventral lobe of surstylus with 3 long setae; cercus (Fig. 10) black, 2/3 length of epandrium, elongate-ovate, with long yellow setae.

Female unknown.

**Distribution.** Georgia.

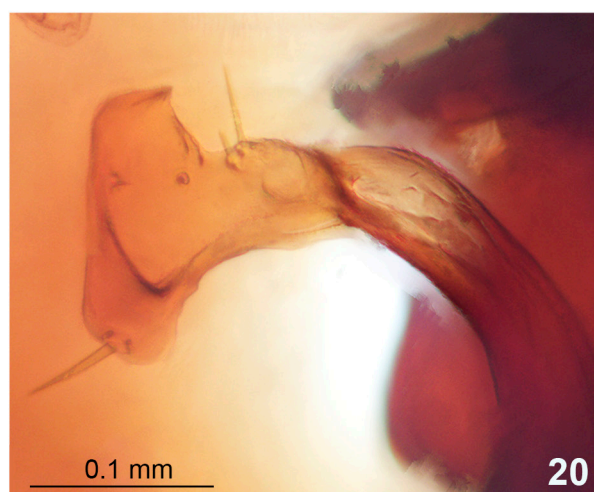
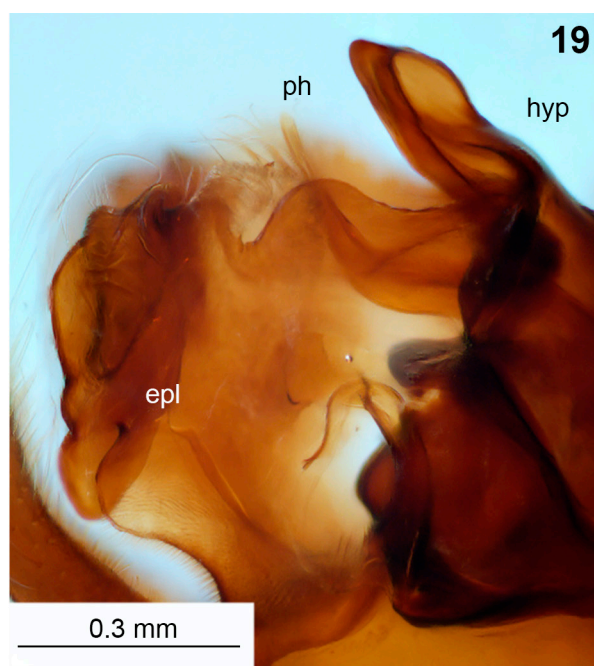
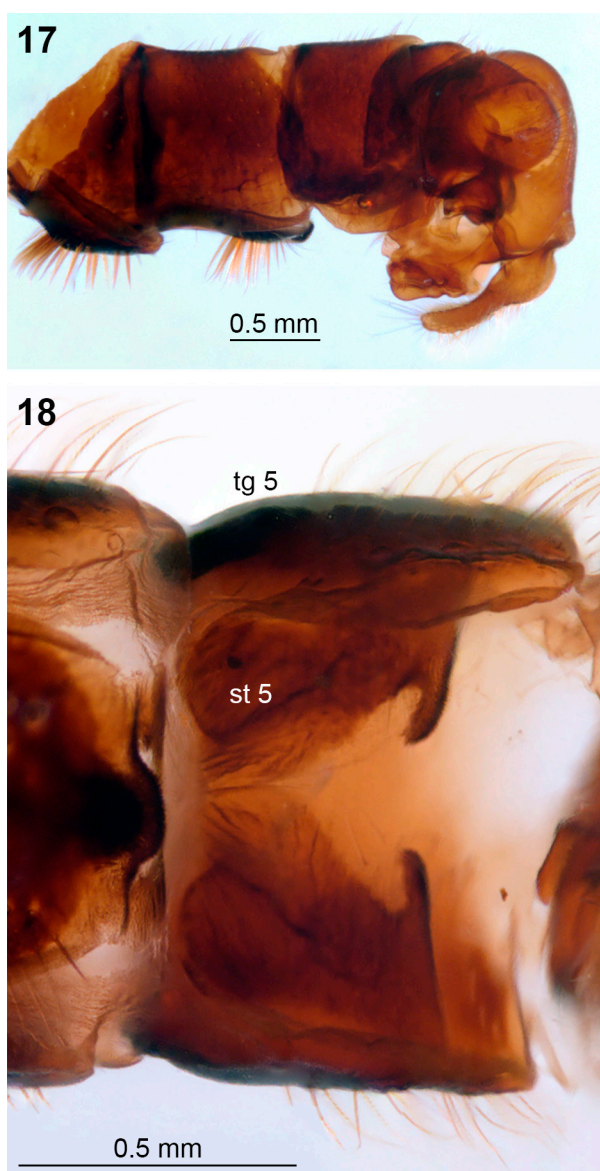
**Etymology.** The species is named after the type locality, a historical-ethnographic region Khevsureti in eastern Georgia.

**Note.** The new species was collected together with males and females *Diostracus kustovi*, originally described (in the subgenus *Sphyrotarsus*) from the Karachay-Cherkessia Republic of Russia (Sofiyskie waterfalls).

*Diostracus (Lagodechia) osseticus* sp. n.  
(Figs 11–20)

**Material.** Holotype, ♂ (ZIN): Central Caucasus, South Ossetia, Gudisskiy Range, Britatdon River head, N slopes of Mangavtsek Mt [42.38°N / 45.00°E], 2700 m, 21.07.2013 (D.A. Zhrebilo) (in Russian Cyrillic). Paratype: 1 ♂ (ZIN), same data as for the holotype.

**Diagnosis.** According to Grichanov [2013], the new species belongs to the subgenus *Lagodechia*, being very



Figs 17–20. *Diostracus (Lagodechia) osseticus* sp. n., male, paratype.  
17 – segments 3–5 and 8 of abdomen and hypopygium, lateral view; 18 – segment 5 of abdomen, ventral view; 19 – hypandrium, phallus and epandrial lobe, lateral view; 20 – surstylus (partly obscured), lateral view. Abbreviations: tg – tergite; st – sternite; epl – epandrial lobe; hyp – hypandrium; ph – phallus.  
Рис. 17–20. *Diostracus (Lagodechia) osseticus* sp. n., самец, паратип.

17 – сегменты 3–5 и 8 брюшка и гипопигий, сбоку; 18 – 5-й сегмент брюшка, снизу; 19 – гипандрий, фаллус и лопасть эпандрия, сбоку; 20 – сурстий (частично скрыт), сбоку. Сокращения: tg – тергит; st – стернит; epl – лопасть эпандрия; hyp – гипандрий; ph – фаллус.



close in habitus to *D. spinulifer*, differing from the latter in shorter wing cross-vein dm-m, about 1.5 times as long as distal part of  $M_4$  and the absence of long setae on hind basitarsus. In *D. spinulifer* male, cross-vein dm-m is 2.2 times as long as distal part of  $M_4$ ; hind basitarsus bears three long light posterodorsal setae at base, nearly half as long as basitarsus; podomere ratios are also different.

**Description.** Male (Fig. 11). Length (mm): body 6.5, antenna 1.3, wing 6.9/2.2. Head (Fig. 12): greenish black, weakly pollinose; clypeus shining, 1/3 as wide as head, 2 times as wide as high; face shining, 0.8 times as wide as clypeus, 1.6 times as wide as height of postpedicel; ocellar and vertical bristles strong; postvertical bristle slightly longer than upper postocular bristle; about 9 upper postocular setae black, strong, finer and whitish below; ventral 1/2 of postcranium clothed with many long white hairs; antenna (Fig. 13) mostly black, scape brownish ventrally, glabrous, vase-like; pedicel with ring of short setae; postpedicel slightly higher than long, rounded distally, with short hairs, with dorsoapical simple arista-like stylus; basal segment of stylus thickened; length (mm) of scape, pedicel, postpedicel, arista-like stylus (aristomeres 1 and 2), 0.14 : 0.08 : 0.15 : 0.14 : 0.81; palpus ovate, 1.5 times as long as wide, 1/3 as long as eye height, slightly dilated at middle; palpus orange yellow, shining white, bearing sparse black hairs; proboscis moderately large, brown.

Thorax: greenish black, with grey pollinosity; mesonotum with pair of blackish longitudinal stripes; acrostichals absent; 6–7 pairs of dorsocentrals; 3 humeral setae, 1 posthumeral, 2 notopleurals, 1 sutural, 1 postsutural, 1 supra-alar, 1 postalar; scutellum with 2 pairs of strong scutellars; proepisternum with 7–8 white hairs on its upper portion and 7–8 white setae on its lower portion; scutellum about 2 times wider than long; postscutellum 2.5 times as long as scutellum.

Legs: rather long, black, with black major setae; fore coxa on anterior surface with short white hairs, with 6 short black apical setae; fore femur simple, moderately thick in basal half, without remarkable setation, with 3 short posteroventral subapical setae, shorter than femur height; fore tibia (Fig. 14) slightly thickened, bearing 3 anterodorsal, 2 posterodorsal bristles in basal 1/3, 1 strong dorsal bristle at 2/3, 2 ventral rows of short erect black setae, 1 short apical seta; fore basitarsus long, covered with semi-erect black setulae, with ventral row of about 20 very short blunt setae in middle half (Fig. 15); tarsomeres 2–4 simple, bearing semi-erect black setulae, ventrally bare; tarsomere 4 with pair of apicoventral setae; tarsomere 5 elongated; pulvilli reduced, empodium very short, claws about 1/3 as long as tarsomere 5; mid coxa bearing short and long white hairs; mid femur simple, with row of about 10 stiff erect ventral hairs in distal half, with few ventral white hairs right behind middle, with all hairs at most as long as femur height; mid tibia straight, with 3 anterodorsal and 2 posterodorsal bristles and 5 short apical setae; mid tarsus slender, simple; tarsomere 4 with pair of apicoventral setae; tarsomere 5 with small claws, reduced pulvilli and empodium; hind coxa bearing few short white hairs laterally and 1 short black seta at apex; hind femur long and simple, with group of about 10 white hairs at base and 5 anteroventral bristles in distal half, with hairs and bristles about as long as femur height; hind tibia slender, bearing 3–4 anterodorsal and 3–4 posterodorsal bristles and 5 short apical setae, short setae on ventral surface; hind tarsus slender and simple; tarsomere 4 with pair of apicoventral setae; tarsomere 5 with small claws, reduced pulvilli and empodium. Femur, tibia and tarsomere (from first to fifth) length (mm): fore leg: 1.65 : 1.67 : 0.95 : 0.53 : 0.36 : 0.21 : 0.25; mid leg: 2.42 : 2.72 : 1.46 : 0.58 : 0.35 : 0.21 : 0.27; hind leg: 3.05 : 3.14 : 1.27 : 0.79 : 0.49 : 0.23 : 0.25.

Wing (Fig. 11): long and narrow, evenly greyish, with black veins; Sc developed;  $R_{2+3}$  and  $R_{4+5}$  weakly convex anteriorly, almost parallel in middle half of wing, then divergent distally;  $R_{4+5}$  and  $M_{1+2}$  almost parallel at wing apex;  $M_{1+2}$  weakly convex; ratio of

part of costa between  $R_{2+3}$  and  $R_{4+5}$  to this between  $R_{4+5}$  and  $M_{1+2}$ , 0.72 : 0.53; ratio of cross-vein dm-m to distal part of  $M_4$ , 0.79 : 0.51; dm-m almost perpendicular to longitudinal wing axis; calypter brownish, with white cilia; halter yellow.

Abdomen (Fig. 16): with concave dorsal side, shining blackish blue, with short black setae; terga with black hairs; sterna 2–4 each with groups of strong brown setae; sternum 5 divided into 2 sclerites, each with distal process (Fig. 18); tergum 6 small, shortly setose; tergum 7 reduced to semicircular arc; segment 8 large, covered with brown hairs; hypopygium black, moderately large, with black appendages; hypandrium (Fig. 19) short and thick, bilobed at apex; phallus simple; epandrial lobe (Fig. 19) flat and broad, subquadrate, irregularly shaped, setose ventrally; surstylus (Fig. 20) small, hidden under epandrial lobe, with few setae; cercus (Fig. 17) black, 3/4 length of epandrium, elongate-triangular, with long yellow setae.

Female unknown.

**Distribution.** South Ossetia.

**Etymology.** The species is named after the Republic of South Ossetia, where the types have been collected.

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## Two new species of *Malthinus* Latreille, 1805 (Coleoptera: Cantharidae) from Georgia

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**Abstract.** Two new species of soldier beetles of the genus *Malthinus* Latreille, 1805, *M. meskhetinus* sp. n. and *M. mitarbiensis* sp. n., are described from the Mitarbi valley in the Meskheta Mountains, Georgia. The total number of *Malthinus* species registered in Georgia is thus raised to ten, three of them being endemic to the country. *Malthinus turcicus* Pic, 1899 is for the first time recorded from Georgia, with its aedeagus illustrated by photographs for the first time. Provided is an identification key to the *Malthinus facialis* Thomson, 1864 species group of the area.

**Key words:** Coleoptera, Cantharidae, Malthininae, *Malthinus*, new species, key, Caucasus, Palearctic region.

### Два новых вида *Malthinus* Latreille, 1805 (Coleoptera: Cantharidae) из Грузии

© С.В. Казанцев<sup>1,2</sup>

**Резюме.** Из долины Митарби в Месхетинском горном массиве Грузии описаны два новых вида жуков-мягкотелок рода *Malthinus* Latreille, 1805, *M. meskhetinus* sp. n. и *M. mitarbiensis* sp. n. Общее число известных из Грузии видов *Malthinus*, таким образом, увеличивается до десяти, три из них эндемичны для страны. *Malthinus turcicus* Pic, 1899 впервые указан для Грузии, а его эдеагус впервые проиллюстрирован фотографиями. Приведена определительная таблица для группы видов *Malthinus facialis* Thomson, 1864 региона.

**Ключевые слова:** Coleoptera, Cantharidae, Malthininae, *Malthinus*, новый вид, определительная таблица, Кавказ, Палеарктика.

## Introduction

The species-rich soldier beetle genus *Malthinus* Latreille, 1805, widely distributed in the Holarctic realm, also penetrating into the Neotropics and the Oriental region, accounts for over 350 species, the greater part of which, about 300 species, occur in the Palearctic region [Delkeskamp, 1977; Kazantsev, Brancucci, 2007]. Identification of *Malthinus* species in most cases is possible only by males, as the classification of the genus is based exclusively on the shape and structures of the male hind tibia and aedeagus [Brancucci, 1980].

The first two *Malthinus* species were described from Georgia in the last quarter of the twentieth century [Wittmer, 1974]. In 1992 the first review of *Malthinus* of the Caucasus was published, which listed six *Malthinus* species in the Georgian fauna [Wittmer, 1992]. Studies on the fauna of the region resumed at the turn of the century and added one more local species to the genus [Švihla, 1990, 1997; Kazantsev, 2001]. An updated review of the genus, where yet another species from Georgia was described, was published 30 years after and indicated seven species of *Malthinus* for this country [Kazantsev, 2024].

An opportunity to study the new *Malthinus* material collected during the 2024 expedition to the Meskheta Mountains in Georgia allowed discovering two new species in the area, one represented by five specimens, the other – by just one. At a first glance, the mentioned six specimens were attributed to *M. turcicus* Pic, 1899, the only known Caucasian *Malthinus* with slightly curved male hind tibiae, as their male hind tibiae had precisely the same shape. However, a closer look at their copulatory organs demonstrated that

they represent two distinct, unknown to science species occurring sympatrically with *M. turcicus*, which, in its turn, had not been registered in Georgia either. The description of these new taxa is given below, with a key to the *Malthinus facialis* Thomson, 1864 species group of the area.

## Material and methods

The studied beetles were glued on cardboard plates. Before the examination, they were relaxed in water, then their detached abdomens were kept for several hours in 10% KOH at room temperature. The KOH treated aedeagi and terminal abdominal segments were then placed in microvials with glycerin for photographing.

MSP-1 zoom stereoscopic dissecting microscope with 8–80 times magnification range was used for examination of diagnostic characters. Photographs were taken with a Canon EOS 6D camera and Canon MP-E 65 mm lens and processed with Zerene Stacker and Adobe Photoshop software.

The body length was measured from the anterior part of head to apices of folded wings.

The following acronym is used the text: ICM – Insect Center (Moscow, Russia).

**Family Cantharidae Imhoff, 1856 (1815)**  
**Subfamily Malthininae Kiesenwetter, 1852**  
**Tribe Malthininae Kiesenwetter, 1852**  
**Genus *Malthinus* Latreille, 1805**  
**Subgenus *Malthinus* Latreille, 1805**

*Malthinus* Latreille, 1805: 261 (type species *Cantharis flaveola* Herbst, 1786, subsequent designation by Delkeskamp [1977]).

= *Apteromalthinus* Escalera, 1913: 322 (type species *Apteromalthinus pithanoides* Escalera, 1913 (by monotypy)).

= *Malachidius* Motschulsky, 1860: 62 (type species *Malthinus conspicuus* Kiesenwetter, 1852 (original designation)).

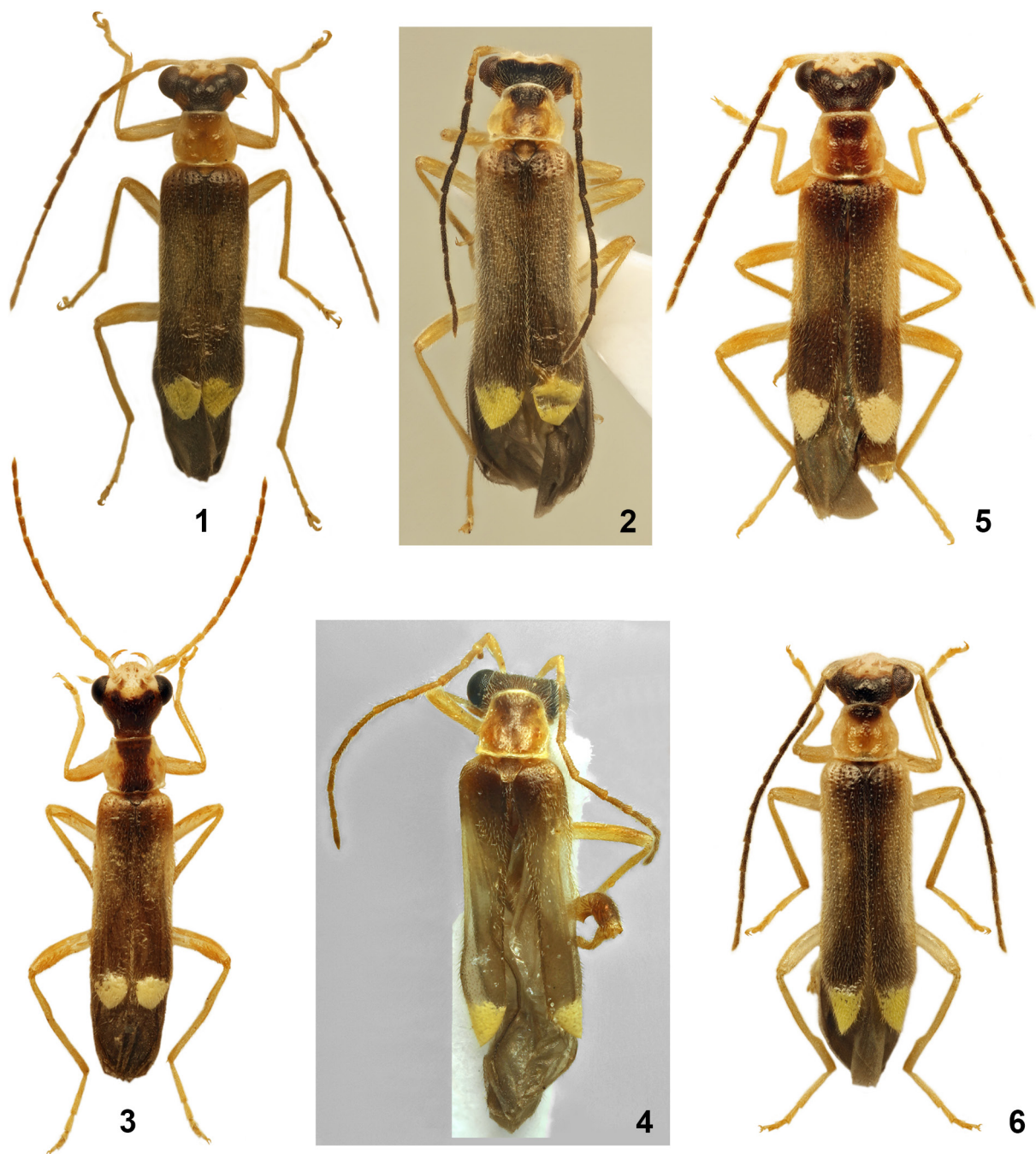
= *Progeutes* Abeille de Perrin, 1894: 92 (type species *Malthinus longipennis* P.H. Lucas, 1846 (subsequent designation by Delkeskamp [1977])).

= *Ymnis* Des Gozis, 1886: 23 (type species *Malthinus flaveolus* Herbst, 1786 (original designation)).

*Malthinus meskhetinus* Kazantsev, **sp. n.**  
(Figs 1, 7, 8)

**Material.** Holotype, ♂ (ICM): "Georgia, env. Bakuriani, env. Patara Mitarbi, 1350–1440 m, 41.76°N 43.57°E, 17–19.VII.2024, S. Kazantsev leg.". Paratypes: 2♂ (ICM), same label; 1♂ (ICM), "Georgia, env. Bakuriani, S Borzhomi, 1–2 km W Sadgeri, 1050–1150 m, 41.80°N 43.41°E, 16.VII.2024, S. Kazantsev leg."

**Description.** Male. Dark brown to black; head in front of eyes, palps, antennomeres 1–3, pro- and mesosternum, pronotum,



Figs 1–6. *Malthinus*, males, general view.

1 – *M. meskhetinus* **sp. n.**, holotype; 2 – *M. mitarbiensis* **sp. n.**, holotype; 3 – *M. turcicus*; 4 – *M. romashovi*; 5 – *M. alicae*; 6 – *M. facialis*.

Рис. 1–6. *Malthinus*, самцы, общий вид.

1 – *M. meskhetinus* **sp. n.**, голотип; 2 – *M. mitarbiensis* **sp. n.**, голотип; 3 – *M. turcicus*; 4 – *M. romashovi*; 5 – *M. alicae*; 6 – *M. facialis*.



except anterior margin, legs yellowish testaceous; head behind eyes laterally reddish brown; elytral middle third pale brown; elytral apices sulphur yellow (Fig. 1).

Head transverse, without eyes about as wide as pronotum. Eyes relatively large, spherical, interocular distance ca 1.4 times greater than eye diameter in dorsal view. Vertex glabrous in the centre, roughly punctured posteriorly. Ultimate maxillary and labial palpomeres narrow, noticeably longer than wide. Antennae filiform, attaining to elytral three fourths; antennomere 3 subequal in length to pedicel (antennomere 2) and ca 1.2 times shorter than antennomere 4; antennal pubescence moderately long and sub-erect (Fig. 1).

Pronotum transverse, almost 1.2 times wider than long, widest at the middle, abruptly narrowed anteriorly from the middle, with short rounded anterior and posterior angles, slightly convex anteriorly and indistinctly bisinuate posteriorly; in fine scarce punctures (Fig. 1).

Elytra elongate, ca 3 times longer than wide at humeri, parallel-sided, leaving posterior fourth of folded wings uncovered; elytral punctures arranged in distinct rows; elytral pubescence uniform, short and sub-erect. Scutellum large, narrowing distally, almost truncate at apex (Fig. 1).

Legs long and slender; posterior trochanters distally retracting; posterior tibia slightly curved in proximal fourth (Fig. 1).

Ultimate sternite elongate, slightly narrowing distally and almost non-emarginate at distal margin; ultimate tergite trapezoidal, slightly concave distally.

Aedeagus elongate, semi-rectangular, with elongate, narrowing distally and apically rounded lobes of ventral plate, interophyses attaining to apices of ventral plate and triangular distally in lateral view, centrophyse deeply cleft basally in dorsal view, with triangular in lateral view apical portion (Figs 7, 8).

Body length: 4.2–4.7 mm; width (at humeri): 0.8–0.9 mm.

Female unknown.

**Diagnosis.** *Malthinus meskhetinus* sp. n. closely resembles *M. turcicus* Pic, 1899 distributed in the Northern Caucasus, Transcaucasia, Turkey and Southeast Europe, also in the shape of male hind tibia, differing in the aedeagal structures, with interophyses attaining to the apices of ventral plate, and deeply cleft basally in dorsal view centrophyse, with triangular in lateral view apical portion (Figs 1, 7, 8).

**Etymology.** The new species is named after the historical province and the mountains where it was collected.

*Malthinus mitarbiensis* Kazantsev, sp. n.  
(Figs 2, 9, 10)

**Material.** Holotype, ♂ (ICM): "Georgia, env. Bakuriani, 2–3 km ESE Patara Mitarbi, 1500–1770 m, 41.77°N 43.59°E, 19.VII.2024, S. Kazantsev leg."

**Description.** Male. Dark brown to black; head in front of eyes, palps, antennomeres 1–2, pro- and mesosternum, pronotum, except anterior margin, legs yellowish testaceous; head behind eyes laterally reddish brown; elytral middle third pale brown; elytral apices sulphur yellow (Fig. 2).

Head transverse, without eyes about as wide as pronotum. Eyes relatively large, spherical, interocular distance ca 2 times greater than eye diameter in dorsal view. Vertex shining, with fine scarce punctures in the centre, rough punctured posteriorly. Ultimate maxillary and labial palpomeres narrow, noticeably longer than wide. Antennae filiform, attaining to elytral five sixths; antennomere 3 subequal in length to pedicel (antennomere 2) and ca 1.1 times shorter than antennomere 4; antennal pubescence relatively long and erect (Fig. 2).

Pronotum transverse, almost 1.3 times wider than long, widest behind the middle, abruptly narrowed anteriorly from the middle, with rounded anterior and short posterior angles, slightly convex anteriorly and indistinctly bisinuate posteriorly; in fine scarce punctures (Fig. 2).

Elytra elongate, ca 3 times longer than wide at humeri, parallel-sided, leaving posterior fifth of folded wings uncovered; elytral punctures arranged in distinct rows; elytral pubescence uniform, relatively long and sub-erect. Scutellum large, narrowing distally, rounded at apex (Fig. 2).

Legs long and slender; posterior trochanters distally not retracting; posterior tibia slightly curved in proximal third (Fig. 2).

Ultimate sternite elongate, slightly narrowing distally and non-emarginate at distal margin; ultimate tergite gradually narrowing distally, non-emarginate at distal margin.

Aedeagus elongate, sub-oval, with transverse, slightly diverging and obliquely truncate apically lobes of ventral plate; interophyses inwardly directed and hooked in lateral view, centrophyse forming a circular structure distally in dorsal view (Figs 9, 10).

Body length: 4.2 mm; width (at humeri): 0.8 mm.

Female unknown.



Figs 7–12. *Malthinus*, aedeagi.

7–8 – *M. meskhetinus* sp. n.; 9–10 – *M. mitarbiensis* sp. n.; 11–12 – *M. turcicus*; 7–10 – holotypes; 7, 9, 11 – dorsally; 8, 10, 12 – laterally. Scale bars 0.5 mm.

Рис. 7–12. *Malthinus*, аедеагусы.

7–8 – *M. meskhetinus* sp. n.; 9–10 – *M. mitarbiensis* sp. n.; 11–12 – *M. turcicus*; 7–10 – голотипы; 7, 9, 11 – сверху; 8, 10, 12 – сбоку. Масштабные линейки 0.5 мм.

**Diagnosis.** *Malthinus mitarbiensis* sp. n., resembling both *M. turcicus* and *M. meskhetinus* sp. n. in the shape of the male hind tibia, is readily distinguished by the apparently different structure of the aedeagus, with transverse, slightly diverging and obliquely truncate apically lobes of ventral plate, inwardly directed and hooked in lateral view interophyses, and forming a circle in dorsal view centrophyse apically (Figs 2, 9, 10).

**Etymology.** The new species is named after the location (Mitarbi River valley) where the new species was collected.

*Malthinus turcicus* Pic, 1899  
(Figs 3, 11, 12)

*Malthinus turcicus* Pic, 1899: 206.

**Material.** 1♂ (ICM), "Georgia, env. Bakuriani, 2–3 km ESE Patara Mitarbi, 1500–1770 m, 41.77°N 43.59°E, 19.VII.2024, S. Kazantsev leg."

**Notes.** *Malthinus turcicus* is sympatrically distributed in the Mitarbi valley with *M. mitarbiensis* sp. n. and the apparently closely related *M. meskhetinus* sp. n. This is the first record of the species in Georgia.

All three above listed species belong to the *Malthinus facialis* Thomson, 1864 species group, which is characterised by the second antennomere subequal in length to or somewhat longer than antennomere 3, pronotum distinctly narrowed in anterior half, and elytra bearing rows of punctures, sometimes inconspicuous. The group lists six species in Georgia, three of which, *M. romashovi* Kazantsev, 2024, *M. meskhetinus* sp. n. and *M. mitarbiensis* sp. n., are endemic to the country. A key to this species group of Georgia is given below.

#### A key to the *Malthinus facialis* Thomson, 1864 species group of Georgia

- 1(2). Male hind femur with a spine in the middle; male hind tibia deeply semi-elliptically incised near base (Fig. 4) ..... *M. romashovi*
- 2(1). Male hind femur unmodified; male hind tibia, if modified, not incised near base.
- 3(4). Male hind tibia straight and unmodified (Fig. 5) ..... *M. aliciae* Švihla, 1990
- 4(3). Male hind tibia slightly bent before the middle or abruptly widened before apex (Figs 1–3, 6).
- 5(6). Male hind tibia abruptly widened before apex (Fig. 6) ..... *M. facialis*
- 6(5). Male hind tibia not widened before apex, but slightly bent before the middle (Figs 1–3).
- 7(8). Elytra with rather inconspicuous rows of punctures. Aedeagus with interophyses attaining to the middle of ventral plate and rounded distally in lateral view; centrophyse heart-shaped basally in dorsal view, with semi-circular in lateral view apical portion (Figs 3, 11, 12) ..... *M. turcicus*
- 8(7). Elytra with conspicuous rows of punctures (Figs 1, 2).
- 9(10). Posterior trochanters distally retracting. Aedeagus with elongate, narrowing distally and apically rounded lobes of ventral plate, interophyses attaining to apices of ventral plate and triangular distally in lateral view,

centrophyse deeply cleft basally in dorsal view, with triangular in lateral view apical portion (Figs 7, 8) .....

- ..... *M. meskhetinus* sp. n.
- 10(9). Posterior trochanters distally not retracting. Aedeagus with transverse, slightly diverging and obliquely truncate lobes of ventral plate, apically inwardly directed and hooked in lateral view interophyses; centrophyse forming a circular structure distally in dorsal view (Figs 9, 10) .....
- ..... *M. mitarbiensis* sp. n.

## Discussion

The number of *Malthinus* species known in the Caucasian fauna now is 13, whereas in Asia Minor it is over 50 [Kazantsev, Brancucci, 2007]. Apparently, although the species richness of the genus in this region diminishes from west to east, following the relative humidity pattern, in the Western Caucasus, where the relative humidity is as high as in the Turkish Black Sea coast, one would expect more taxonomic variety. So, it is actually not surprising that the number of *Malthinus* species registered in Georgia has risen from six a year ago to ten, i.e. almost by 67%, with three of the added four species being new to science. The problem with *Malthinus*, and with malthinines in general, lies not only in their small size and external similarity, when only examination of their genitalia may help attributing them to the right taxon. It could also be connected with collecting habits of most entomologists who do not bother to collect them at all, or collect not more than two or three specimens at one location, believing that they all belong to one species. There is little doubt that more collecting in the area would bring the number of *Malthinus* in the Caucasus and Transcaucasia closer to that in Turkey.

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## Data to the knowledge of the fauna of plume moths (Lepidoptera: Pterophoridae) of Georgia

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**Abstract.** An annotated list of species of Pterophoridae (Lepidoptera) from Georgia is compiled based on our material and literature data. The material was collected in 11 localities in 2022–2024. To date, 45 species of Pterophoridae are known from Georgia, 13 of which are recorded for the first time for the fauna of the country.

**Key words:** Lepidoptera, plume moths, biodiversity, Transcaucasia, Georgia.

### Материалы к познанию фауны пальцекрылок (Lepidoptera: Pterophoridae) Грузии

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**Резюме.** Приведен аннотированный список видов Pterophoridae (Lepidoptera) Грузии на основе собственного материала и литературных данных. Материал был собран в 11 местонахождениях в 2022–2024 годах. На сегодняшний день в Грузии выявлено 45 видов пальцекрылок, 13 из которых впервые указаны для фауны страны.

**Ключевые слова:** Lepidoptera, пальцекрылки, биоразнообразие, Закавказье, Грузия.

Plume moths (Lepidoptera: Pterophoridae) of Georgia have been already mentioned by Arenberger [1995, 1998, 2002, 2005, 2007], Bigot and Picard [1996], Gielis [2003], Ustjuzhanin et al. [2015], Ustjuzhanin and Kovtunovich [2018], Nedoshivina et al. [2023] and Hobern [2024]. In total, 45 species of Pterophoridae have been identified to date, 13 of which are listed in this paper as new for the region.

### Material and methods

The collection of Pterophoridae is the result of research during scientific expeditions to Georgia in 2022–2024, organized by the Upper Silesian Museum in Bytom (Poland) in cooperation with the Institute of Entomology, the Agricultural University of Georgia and the Ilia State University in Tbilisi and members of the Polish Entomological Society. Pterophoridae specimens were collected by the last author. Standard methods of moths trapping were used, including battery-powered black light traps (3 × 6 W) from dusk to dawn and mixed light screens (mix 2 × 250 W) and black light (8 V) from dusk to 3:00–4:00 a.m. All Pterophoridae were caught either on black light or on illuminating sheets with mixed light. The studies were conducted in the following 11 localities:

Bakuriani: Samtskhe-Javakheti Region, 41°44'N / 43°32'E, 2005 m.

Borjomi: Borjomi-Kharagauli National Park, 41°47'N / 43°14'E, 1005 m.

Chachuna: Chachuna Managed Reserve, 41°13'N / 45°58'E, 250 m.

Dalis (Dam): 41°17'N / 45°54'E, 320 m.

Didi Ateni (Fig. 1): 10 km S of Gori, 41°53'N / 44°5'E, 782 m.

Gudanii: Gudanii village, 42°32'N / 44°57'E, 1720 m.

Roshka: Roshka village, 74 km NE from Dusheti, 42°32'N / 44°57'E, 2005 m.

Vardzia (Fig. 2): 70 km S from Borjomi, 41°13'N / 45°58'E, 1270 m.

Mijniskure: Vashlovani National Park, 41°12'N / 46°23'E, 93 m.

Pantishara: Vashlovani National Park, 41°14'N / 46°21'E, 380 m.

Visitors Center (Fig. 3): Vashlovani National Park, 41°09'N / 46°34'E, 350 m.

The studied specimens are deposited in the collection of the Zoological Institute of the Russian Academy of Sciences (St Petersburg, Russia), and in the private collections of the first two authors.

The species newly recorded for Georgia are marked with an asterisk.

\**Agdistis adactyla* (Hübner, [1823])

**Material.** 1♂, Vardzia, 13–14.07.2023.

**Distribution.** Western Europe, Russia (European part, Caucasus, Siberia, Russian Far East), Georgia, Azerbaijan, Armenia, Turkey, Iran, Kazakhstan, Turkmenistan,



Figs 1–3. Some localities of Pterophoridae in Georgia.

1 – Didi Ateni village, about 10 km south of Gori; 2 – Vardzia, the Kura River valley, southern Georgia near the border with Turkey; 3 – Visitors Center, Vashlovani National Park. Photographs by L. Matuszewski.

Рис. 1–3. Некоторые местонахождения Pterophoridae в Грузии.

1 – Диди-Атени, 10 км к югу от Гори; 2 – Вардзия, долина Куры на юге Грузии недалеко от границы с Турцией; 3 – Центр посетителей, национальный парк «Вашловани». Фотографии Л. Матушевского.

Kyrgyzstan, Tadzhikistan, Afghanistan, China (Beijing, Tianjin, Hebei, Inner Mongolia, Shaanxi, Gansu, Ningxia, Xinjiang), Mongolia [Gielis, 2003; Li et al., 2003; Hobern, 2024].

*Agdistis caradjai* Arenberger, 1975

= *Agdistis karabachica* Zagulajev, 1990.

**Material.** 1♂, Didi Ateni, 6–8.06.2022; 3♀, Visitors Center, 11.05.2023; 1♀, same place, 8.10.2023; 1♀, Pantishara, 12.05.2023; 1♂, Mijnskure, 14.04.2024.

**Note.** Recorded for Georgia as *Agdistis karabachica* [Nupponen, 2022].

**Distribution.** Russia (Dagestan), Georgia, Azerbaijan, Turkey, Turkmenistan [Ustjuzhanin, Kovtunovich, 2018].

*\*Agdistis frankeniae* (Zeller, 1847)

**Material.** 2♂, Dalis (Dam), 30.05.2022; 1♀, Chachuna, 16–18.07.2023.

**Distribution.** Western Europe, European part of Russia, Russian Caucasus, Georgia, Azerbaijan, Asia Minor, Iran, Kazakhstan [Ustjuzhanin, Kovtunovich, 2018].

*\*Agdistis ingens* Christoph, 1885

**Material.** 1♂, 1♀, Dalis (Dam), 30.05.2022; 1♂, Chachuna, 16–18.07.2023.

**Distribution.** The south-east of the European part of Russia, Georgia, Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan, Tajikistan, Afghanistan, China (Gansu), Mongolia [Ustjuzhanin, Kovtunovich, 2016].

*Agdistis sissia* Arenberger, 1987

**Material.** 1♀, Didi Ateni, 30.05.2022; 9 ex., same place, 6–8.06.2022; 9 ex., Vardzia, 2–5.06.2022; 5 ex., Visitors Center, 11.05.2023.

**Note.** Recorded for Georgia by Nupponen [2022].

**Distribution.** Georgia, Armenia, Azerbaijan, Turkey, Iran, Turkmenistan [Hobern, 2024].

*Paraplatyptilia metzneri* (Zeller, 1841)

**Material.** 1♀, Vardzia, 2–5.06.2022; 1♂, same place, 13–14.07.2023; 1♂, Gudanii, 20.07.2023; 1♂, Didi Ateni, 23–24.07.2023.

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** Europe, Russia (European part, Caucasus, South Ural, southern Siberia), Georgia, Armenia, Azerbaijan, Asia Minor, Iran, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Northwestern China, Mongolia [Gielis, 2003; Ustjuzhanin, Kovtunovich, 2019; Hobern, 2024].

*\*Platyptilia calodactyla*  
(Denis et Schiffermüller, 1775)

**Material.** 1♂, Bakuriani, 15.07.2023.

**Distribution.** North Africa, Western Europe, Russia (European part, Siberia, Far East), Georgia, Asia Minor, Kazakhstan, Middle Asia, China, Mongolia [Ustjuzhanin, 1996].

*\*Platyptilia gonodactyla*  
(Denis et Schiffermüller, 1775)

**Material.** 1♂, Didi Ateni, 23–24.07.2023.

**Distribution.** North Africa, Western Europe, Russia (European part, Siberia, Russian Far East), Georgia, Asia Minor, Kazakhstan, Middle Asia, China (Xinjiang), Mongolia [Ustjuzhanin, 1996].

*Gillmeria pallidactyla* (Haworth, 1811)

**Material.** 1♂, Vardzia, 13–14.07.2023; 1♂, Roshka, 21–22.07.2023.

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** Western Europe, Russia (European part, Caucasus, Ural, Siberia, Far East), Georgia, Armenia,

Iran, Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan, China, Korea, Japan, North and South America [Hobern, 2024].

*Amblyptilia acanthadactyla* (Hubner, [1813])

**Note.** Recorded for Georgia by Arenberger [1998].

**Distribution.** Western Europe, Russia (European part, Caucasus, Siberia, Far East), Georgia, Armenia, Azerbaijan, Asia Minor, Kazakhstan, China (Jiangsu), Mongolia, Japan [Ustuzhanin, Kovtunovich, 2012; Ustjuzhanin, Kovtunovich, 2019; Hobern, 2024].

*Amblyptilia punctidactyla* (Haworth, 1811)

**Material.** 1♀, Gudanii, 20.07.2023; 1♂, Vardzia, 9–10.04.2024.

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Western Europe, Russia (European part, Caucasus, Siberia, Far East), Georgia, Armenia, Azerbaijan, Asia Minor, Kazakhstan, China (Jiangsu), Mongolia, Japan [Ustuzhanin, Kovtunovich, 2012], Canada, USA [Arenberger, 2007].

*Cnaemidophorus rhododactyla*  
(Denis et Schiffermüller, 1775)

**Material.** 5 ex., Vardzia, 13–14.07.2023.

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** Western Europe, Russia (European part, Caucasus, Ural, Siberia, Far East), Georgia, Armenia, Azerbaijan, Turkey, Iran, Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan, Pakistan, India, China, Korea, Japan, North America [Hobern, 2024].

*Stenoptilia arida* (Zeller, 1847)

**Material.** 1♂, Visitors Center, 12.05.2023; 1♀, Didi Ateni, 23–24.07.2023.

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** North Africa, Southern Europe, Georgia, Armenia, Azerbaijan, Turkey, Kazakhstan, Afghanistan [Ustjuzhanin, Kovtunovich, 2018; Hobern, 2024].

*Stenoptilia bipunctidactyla* (Scopoli, 1763)

**Material.** 2♂, Borjomi, 5.06.2022.

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** North Africa, Western Europe, Russia (European part, Polar Ural, southern Siberia, Far East: south of Primorskiy Region), Georgia, Israel, Iran, Mongolia [Ustjuzhanin et al., 2020; Ustjuzhanin, Maksimov, 2023].

*Stenoptilia dolini* Arenberger, 2007

**Distribution.** Georgia [Arenberger, 2007].

*Stenoptilia graphodactyla* (Treitschke, 1833)

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** Western Europe, Russia (European part, Siberia), Georgia, Armenia, Kazakhstan, China (Shanxi, Xinjiang) [Ustjuzhanin et al., 2015].

*\*Stenoptilia mannii* (Zeller, 1852)

**Material.** 6 ex., Gudanii, 20.07.2023.

**Distribution.** Morocco, Southern Europe, Russia (south of the European part, Dagestan), Azerbaijan, Armenia, Turkey, Syria, Israel, Iraq, Iran, Kazakhstan, Uzbekistan, Kyrgyzstan, Pakistan [Arenberger, 2005; Ustjuzhanin, Kovtunovich, 2019], Georgia.

*\*Stenoptilia pneumonanthos* (Buttner, 1880)

**Material.** 1♀, Roshka, 21–22.07.2023.

**Distribution.** Western Europe, Russia (European part, southern Siberia, Yakutia), Georgia, Kazakhstan, China (Xinjiang) [Arenberger, 2005].

*\*Stenoptilia poculi* Arenberger, 1998

**Material.** 1♀, Gudanii, 20.07.2023.

**Distribution.** North Caucasus (Russia: Kabardino-Balkarian Republic), Georgia, Armenia [Arenberger, 2005; Ustjuzhanin et al., 2015].

*Stenoptilia pterodactyla* (Linnaeus, 1761)

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Western Europe, Russia (European part, Caucasus, Siberia, Far East (?)), Georgia, Armenia, Azerbaijan, Turkey, Kazakhstan, Kyrgyzstan, North America [Ustjuzhanin, 1996; Arenberger, 2005].

*Stangeia siceliota* (Zeller, 1847)

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** Western Europe, Georgia, Armenia, Turkey, Syria, Lebanon, Israel, Jordan, Saudi Arabia, Yemen, Iraq, Iran [Ustjuzhanin et al., 2015], Turkmenistan, Kyrgyzstan, Afghanistan, China (Hunan) [Arenberger, 2002].

*Procapperia kuldschaensis* (Rebel, 1914)

**Note.** Recorded for Georgia by Arenberger [2002].

**Distribution.** Ukraine, Russia (South Ural, Altai, Kemerovo, Tuva, Khakassia), Georgia, Turkey, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Afghanistan, Pakistan, China (Xinjiang), Mongolia [Ustjuzhanin, Kovtunovich, 2016].

*Procapperia linariae* (Chretien, 1922)

**Note.** Recorded for Georgia by Ustjuzhanin et al. [2015].

**Distribution.** Southern Europe, Russia (Crimea, southern part of European Russia, Caucasus), Georgia, Armenia, Asia Minor [Ustjuzhanin et al., 2015].



*Procapperia maculata* (Constant, 1865)

**Material.** 1♂, 1♀, Didi Ateni, 6–8.06.2022; 5 ex., same place, 23–24.07.2023.

**Note.** Recorded for Georgia by Arenberger [1998].

**Distribution.** Southern Europe, Ukraine, Armenia, Asia Minor [Ustjuzhanin et al., 2015], Georgia.

*Paracapperia anatolica* (Caradja, 1920)

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Georgia, Armenia, Turkey, Syria, Iran, Turkmenistan, Tajikistan [Hobern, 2024].

*\*Capperia celeusi* (Frey, 1886)

**Material.** 2♂, Vardzia, 2–5.06.2022; 7 ex., 13–14.07.2023; 5 ex., Visitors Center, 8.10.2023.

**Distribution.** Western Europe, Russia (southern part of European Russia, Caucasus, Ural), Armenia, Azerbaijan, Turkey, Lebanon, Iran, Kazakhstan, Turkmenistan [Hobern, 2024], Georgia.

*Capperia maratonica* Adamczewski, 1951

**Material.** 1♀, Pantishara, 29.05.2023.

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** Southern Europe, Ukraine, Russia (Crimea, Caucasus), Georgia, Armenia, Turkey, Israel, Turkmenistan [Hobern, 2024].

*Capperia salanga* Arenberger, 1995

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** Georgia, Turkey, Iran, Turkmenistan, Uzbekistan, Tajikistan, Afghanistan [Arenberger, 2002].

*Crombrugghia distans* (Zeller, 1847)

**Material.** 1♀, Dalis (Dam), 30.05.2022; 3 ex., Vardzia, 2–5.06.2022; 1♂, same place, 13–14.07.2023; 7 ex., Didi Ateni, 6–8.06.2022.

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Canary Islands, North Africa, Western Europe, Ukraine, Russia (Crimea, European part, Caucasus, southern Siberia), Georgia, Armenia, Turkey, Iran, Kazakhstan, Turkmenistan, Uzbekistan, Kyrgyzstan, Tajikistan, Afghanistan, Pakistan, India, Nepal, China (Xinjiang) [Arenberger, 2002; Ustjuzhanin, Kovtunovich, 2019; Hobern, 2024].

*Oxyptilus parvidactylus* (Haworth, 1811)

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** Western Europe, Russia (European part, West Siberia), Georgia, Armenia, Turkey, Syria, Israel, Iran [Arenberger, 2002; Ustjuzhanin, Kovtunovich, 2019; Hobern, 2024].

*Oxyptilus pilosellae* (Zeller, 1841)

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Western Europe, Russia (European part, Caucasus, South Ural), Georgia, Turkey, Iran, Kazakhstan [Ustjuzhanin, Kovtunovich, 2019; Hobern, 2024].

*Pselnophorus poggei* (Mann, 1862)

**Material.** 1♂, Bakuriani, 15.07.2023.

**Note.** Recorded for Georgia by Gielis [2003].

**Distribution.** Ukraine, southern part of European Russia, Russian Caucasus, Georgia, Azerbaijan, Turkey, Iran [Ustjuzhanin, Kovtunovich, 2019; Hobern, 2024].

*Hellinsia didactylites* (Strom, 1783)

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Western Europe, Russia (European part, Caucasus, South Ural, Siberia, Far East), Georgia, Armenia, Turkey, Kazakhstan, Kyrgyzstan, Tajikistan, China (Shaanxi, Jilin) [Hobern, 2024].

*Hellinsia osteodactyla* (Zeller, 1841)

**Material.** 1♂, Gudanii, 20.07.2023; 1♂, Roshka, 21–22.07.2023.

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Western Europe, Russia (European part, Siberia, Far East), Georgia, Turkey, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, China (Heilongjiang, Shandong, Shanxi, Xinjiang, Yunnan, Ningxia), Mongolia, Japan [Li et al., 2003; Hobern, 2024].

*Hellinsia tephrodactyla* (Hübner, [1813])

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Western Europe, Russia (European part, Caucasus, South Ural, Siberia, Transbaikalia, Yakutia, Kamchatka), Georgia [Ustjuzhanin, Kovtunovich, 2019].

*\*Oidaematophorus lithodactylus* (Treitschke, 1833)

**Material.** 1♀, Didi Ateni, 23–24.07.2023.

**Distribution.** Western Europe, Russia (European part, Caucasus, Southern Ural, Siberia, Far East), Georgia, Turkey, Iran, Uzbekistan, Kyrgyzstan, China (Xinjiang), Japan [Li et al., 2003; Ustjuzhanin, Kovtunovich, 2019].

*Emmelina monodactyla* (Linnaeus, 1758)

**Material.** 1♀, Didi Ateni, 6–8.06.2022; 6 ex., same place, 23–24.07.2023; 2♀, Pantishara, 12.05.2023; 1♀, same place, Pantishara, 29.05.2023; 6 ex., Vardzia, 13–14.07.2023; 17 ex., same place, 9–10.04.2024; 1♂, Chachuna, 16–18.07.2023; 2♀, 1♂, Gudanii, 20.07.2023; 5 ex., Visitors Center, 4.10.2023.

**Note.** Recorded for South Ossetia by Nedoshivina et al. [2023].

**Distribution.** North Africa, Western Europe, Russia (European part, Siberia east to Tuva), Georgia, Armenia, Azerbaijan, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, India, China, Mongolia, Philippines, North and South America [Ustjuzhanin et al., 2017].

*Emmeline pseudojezonica* Derra, 1987

**Note.** Recorded for Georgia as *Emmeline argoteles* by Bigot and Picard [1996].

**Distribution.** Western Europe, southern part of European Russia, Azerbaijan [Ustjuzhanin, Kovtunovich, 2018].

*Adaina microdactyla* (Hübner, [1813])

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Western Europe, southern part of European Russia, Georgia, Azerbaijan, Turkey, Israel, Iran, Nepal, China, Japan, Vietnam, Philippines, Indonesia, New Guinea, Solomon Islands, tropical and subtropical Africa, Madagascar [Ustjuzhanin, Kovtunovich, 2018].

*Calyciphora nephelodactyla* (Eversmann, 1844)

**Note.** Recorded for Georgia by Gielis [2003].

**Distribution.** Western Europe, Russia (European part, Caucasus, South Ural), Georgia, Turkey, Syria [Gielis, 2003; Ustjuzhanin, Kovtunovich, 2019].

\**Tabulaephorus decipiens* (Lederer, 1870)

**Material.** 1♀, Didi Ateni, 23–24.07.2023.

**Distribution.** Russian Caucasus, Armenia, Azerbaijan, Iran, Kyrgyzstan, Tajikistan [Ustjuzhanin, Kovtunovich, 2018], Georgia.

*Merrifieldia leucodactyla*  
([Denis et Schiffermüller], 1775)

**Note.** Recorded for Georgia by Arenberger [2007].

**Distribution.** North Africa, Western Europe, Russia (European part, Southern Ural, Siberia, Yakutia, Far East), Georgia, Armenia, Turkey, Iran, Kazakhstan, China (Shanxi), Mongolia [Bigot, Picard, 1996; Hobern, 2024].

\**Merrifieldia tridactyla* (Linnaeus, 1758)

**Material.** 3♂, 1♀, Didi Ateni, 6–8.06.2022.

**Distribution.** Western Europe, Russia (European part, Southern Ural, south of West Siberia, western Yakutia), Georgia, Azerbaijan, Turkey, Iran, Kazakhstan, Kyrgyzstan [Ustjuzhanin, Kovtunovich, 2018].

\**Wheeleria obsoleta* (Zeller, 1841)

**Material.** 1♂, Didi Ateni, 6–8.06.2022.

**Distribution.** Southern Europe, Ukraine, Russia (southern part of European Russia, Dagestan), Armenia, Turkey, Jordan, Iran, Turkmenistan [Ustjuzhanin, Kovtunovich, 2018], Georgia.

*Pterophorus pentadactylus* (Linnaeus, 1758)

**Material.** 1♂, Vardzia, 13–14.07.2023; 1♂, Gudanii, 20.07.2023.

**Note.** Recorded for Georgia by Bigot and Picard [1996].

**Distribution.** Western Europe, Ukraine, Russia (European part, Caucasus, West Siberia, Far East),

Georgia, Armenia, Azerbaijan, Turkey, Israel, Iran, Kazakhstan, Kyrgyzstan, China (Jilin, Sichuan, Yunnan, Xinjiang, Taiwan), Mongolia [Li et al., 2003; Ustjuzhanin, Kovtunovich, 2011; Hobern, 2024].

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# *Pseudarge taurica* sp. n. from Crimea, and a new synonymy in *Pseudarge* Gussakovskij, 1935 (Hymenoptera: Argidae)

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**Abstract.** *Pseudarge taurica* sp. n. is described from Crimea. This is the first species of the genus *Pseudarge* Gussakovskij, 1935 known from the territory of Crimea and the second in the fauna of Russia. The new species is distinguished from *Pseudarge* species found in Central Asia and Southern Europe by its completely black head and dark thorax with a blue metallic reflection. The new synonymy is introduced: *Pseudarge rubicunda* Gussakovskij, 1935 = *Arge tigrata* Blank, Liston et Taeger in Blank et al., 2009, **syn. n.**

**Key words:** Argidae, *Pseudarge*, new species, new synonym, fauna of Russia.

## *Pseudarge taurica* sp. n. из Крыма и новая синонимия в роде *Pseudarge* Gussakovskij, 1935 (Hymenoptera: Argidae)

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**Резюме.** С полуострова Крым описан новый вид *Pseudarge taurica* sp. n. Это первый вид рода *Pseudarge* Gussakovskij, 1935, обнаруженный на территории Крымского полуострова, и второй, указанный для фауны России. Новый вид отличается от видов *Pseudarge* из Центральной Азии и Южной Европы полностью черной головой и темной грудью с синим металлическим блеском. Установлена новая синонимия: *Pseudarge rubicunda* Gussakovskij, 1935 = *Arge tigrata* Blank, Liston et Taeger in Blank et al., 2009, **syn. n.**

**Ключевые слова:** Argidae, *Pseudarge*, новый вид, новый синоним, фауна России.

## Introduction

The genus *Pseudarge* Gussakovskij, 1935 includes only six described species, all of which are distributed in the Palaearctic Region [Taeger et al., 2010]. Koch and Goergen [2008] resurrected it from the synonymy with *Alloscenia* Enderein, 1919 and confirmed that six previously described species are valid [Koch, Goergen, 2008]. Recently, supplementary information about the males of two of these species was published [Basov, 2023].

Specimens of this genus are very scarce in museum collections. Recently we received additional material of Argidae, among which two large specimens with a strong blue metallic sheen stood out. Upon detailed study, it turned out that they belong to a previously unknown species of *Pseudarge*.

Furthermore, during examination of the collection of the Zoological Institute of the Russian Academy of Sciences (ZISP, St Petersburg, Russia), it was found that the basal part of the anal cell of the forewing of the single specimen representing *Arge tigrata* Blank, Liston et Taeger in Blank et al., 2009 are not closed. Further study of this and some additional characters showed that this specimen from Turkmenistan belongs to the species *Pseudarge rubicunda* Gussakovskij, 1935. Only one crumpled wing is preserved, which prevented V.V. Gussakovskij from seeing this feature,

which led to further misidentification. After study of the relevant morphological characters and comparison of the original descriptions, the introduction of a new synonymy is considered necessary.

## Material and methods

The study was performed based on the collections of ZISP.

An Olympus SZ61 stereomicroscope was used for examination of specimens. Photos were taken in the Laboratory of Insect Systematics of ZISP using an Olympus SZX10 stereomicroscope with an Olympus OM-D EM1 camera, and processed with Helicon Focus 5.0 software. Images of genitalia were taken using Nikon DS-Ri2 digital microscopy camera via Nikon SMZ25 stereomicroscope.

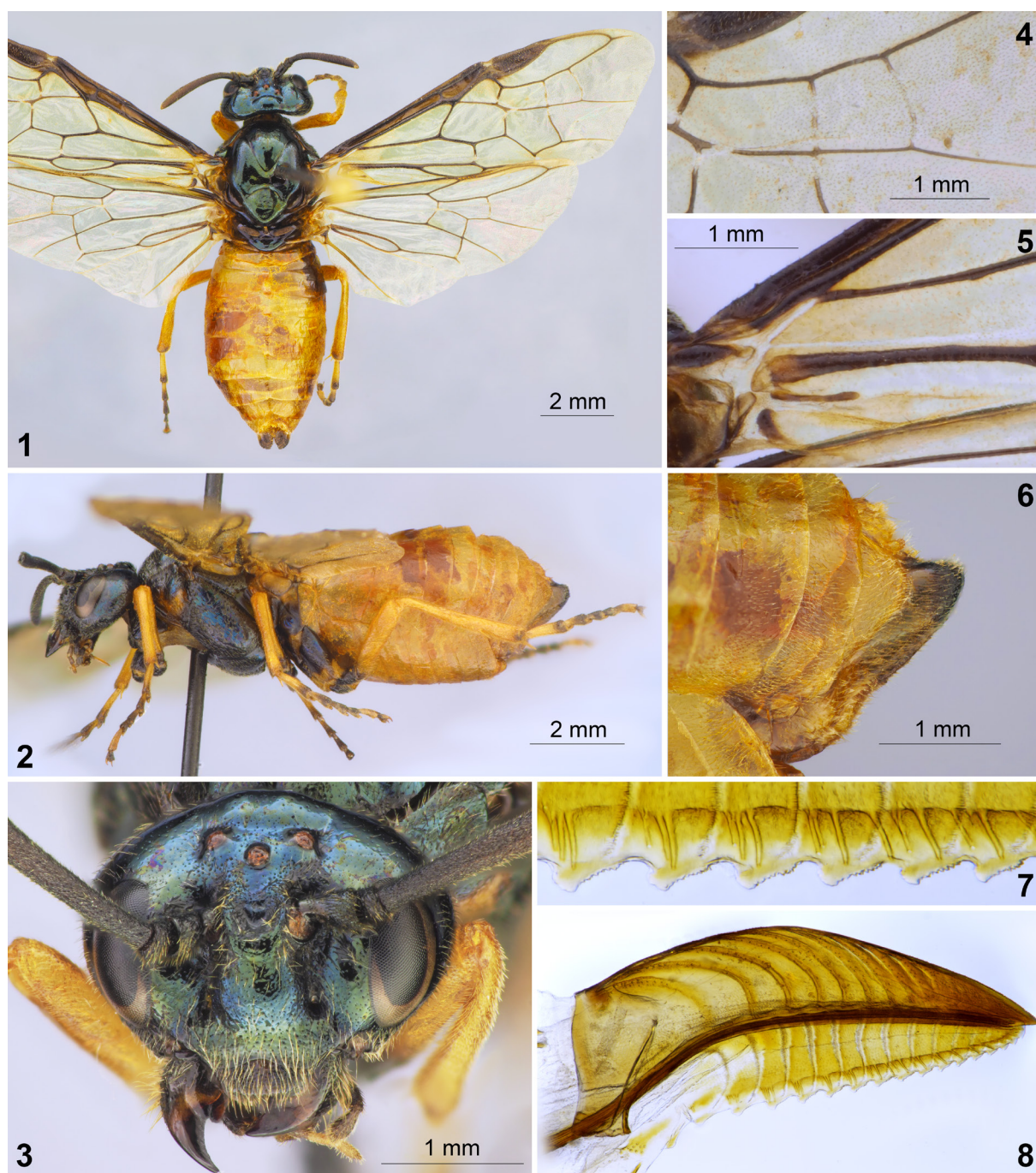
The terminology of the female genitalia follows Ross [1945].

## Genus *Pseudarge* Gussakovskij, 1935

*Pseudarge* Gussakovskij, 1935: 223, 394; Koch, Goergen, 2008: 49; Taeger et al., 2010: 144.

Type species *Pseudarge rubicunda* Gussakovskij, 1935 (by original designation).





Figs 1–8. *Pseudarge taurica* sp. n., female, holotype, general view and details of structure.

1 – habitus, dorsal view; 2 – habitus, lateral view; 3 – head, front view; 4 – forewing, cell 1Rs2; 5 – forewing, anal cell; 6 – sawsheath, lateral view; 7 – median serrulae of lancet; 8 – saw, lateral view.

Рис. 1–8. *Pseudarge taurica* sp. n., самка, голотип, общий вид и детали строения.

1 – внешний вид, сверху; 2 – внешний вид, сбоку; 3 – голова, спереди; 4 – переднее крыло, ячейка 1Rs2; 5 – переднее крыло, анальная ячейка; 6 – ножны, сбоку; 7 – срединные зубцы пики; 8 – яйцеклад, сбоку.

*Pseudarge taurica* sp. n.  
(Figs 1–8)

**Material.** Holotype, ♀ (ZISP): Russia, Crimea, Pervomayskiy District, vicinity of Voykovo, 45°35'52"N / 33°52'11"E, 22.05.2016 (A.V. Fateryga). Paratype: 1♀ (ZISP), same data as for the holotype.

**Description.** Female (Fig. 1). Length 10.5–10.7 mm; fore wing 9.5–9.6 mm.

**Colour.** Head, thorax and apex of sawsheath black with metallic reflection; abdomen yellow. Flagellum dark brown to black. Mandible basally and apically blackish, in middle reddish. Palpi dark brown to black. All legs yellow, coxae, trochanters, apical part of tibia and four basal tarsomeres or just their apex black with metallic reflection. Wings hyaline; intercostal cell infusate; pterostigma and veins blackish-brown. Setae yellowish. Surface generally smooth and polished, weakly punctate.

Head behind eyes distinctly expanded. Distance between eyes 1.5 times vertical diameter of eye; eye with vertical diameter 2 times its horizontal diameter. Postocellar area strongly convex, with anterior and short lateral furrows; width 2 times its length. Area between ocelli and frontal area weakly concave. POL 1.1 times OCL or OOL. Median fovea not deep. Interantennal carinae blunt, dorsally separated from each other, ventrally converge towards each other but do not fused together (Fig. 3). Supraclypeal area distinctly convex and without median carina; smooth with distinct individual punctures. Malar space 1.1 times width of front ocellus. Clypeus weakly sunk, then almost flattened ventrally, rugose; its ventral margin roundly concave medially to one third of its length. Labrum densely punctate.

Antenna. Antennal length 1.1–1.2 times maximum head width; flagellum not compressed, clavate, with a single carina on anterior side, weakly curved basally and widely rounded at apex.

Thorax. Mesonotum smooth and shiny with scattered punctures; scutellum flat.

Legs. Middle and hind tibiae with pre-apical spurs; spurs simple.

Wings. In fore wing, cell 1Rs2 with anterior length 0.8 times its posterior length, crossvein 3r-m weakly curved (Fig. 4); in both wings, wing margin between veins Rs and Cu not ciliate, without glabrous marginal area. Basal and cubital veins converge to one point.

Abdomen with basal tergites nearly glabrous dorsally; apical four tergites weakly setose. Sawsheath ventrally broadly rounded, sawsheath valves not tightly closed, their tips diverge; ventrally, with long black setae directed backwards; in lateral view acute, articulated at right angles (Fig. 6); interior surface slightly convex. Lance with several linear membranous areas (Fig. 8) and groups of very minute setae along ventral margin; its dorsal margin apically crested and finely serrate. Lancet dorsally curved, with concave ventral margin and 17 serrulae (Fig. 8). Lancet with short, simple annular spines (ctenidia) most pronounced on 7–17 annuli. Basal annuli curved, others nearly straight. Serrulae triangular with a blunt, rounded apex, clearly dentate along anterior edge, with short almost straight or slightly concave back slope (Fig. 7).

Male unknown.

**Comparative diagnosis.** In colouration, the female of *P. taurica* sp. n. differs greatly from the other three known species from Central Asia and Southern Europe in the completely black colour of the head, thorax and wing veins, while in *P. rubicunda* Gussakovskij, 1935, *P. ushinskii* Gussakovskij, 1935 and *P. eversmanni* Gussakovskij, 1935 these parts are always partly pale. The Chinese *P. wui* Wei et Nie, 1998 and *P. tricineta* Wei et Nie, 2001 have partly or entirely black abdominal tergites in contrast to the yellow abdomen of *P. taurica* sp. n. Using the recently compiled key [Basov, 2023], *P. taurica* sp. n. runs to *P. sinica* Wei et Nie, 1998 described from China on the basis of the body colouration, but differs from the latter by right-angled and pointed sawsheath (in lateral view) and yellow legs. In lancet structure, *P. taurica* sp. n. is most similar to *P. eversmanni*, but its serrulae are significantly shorter and the length of lancet is 3–4 times its height (only in 2 times in *P. eversmanni*), its apex bluntly rounded (hook-like in *P. eversmanni*) and the anterior edge of the teeth more dentate (less dentate in *P. eversmanni*). Moreover, *P. taurica* sp. n. has a body length of more than 10 mm (8.5–9 mm in *P. eversmanni*), the ventral edge of the clypeus is roundly concave in the middle for one third of its length (with wide shallow emargination in *P. eversmanni*), and the wide of postocellar area is 2 times its length (in 1.5 times in *P. eversmanni*).

**Host plant.** Unknown. Imago was collected from flowers of *Euphorbia virgate* Waldst. et Kit., 1803 (Euphorbiaceae).

**Distribution.** Russia: Crimea.

**Etymology.** The name of this species comes from the Greek name for the Crimean Peninsula, where the type specimens were collected.

*Pseudarge rubicunda* Gussakovskij, 1935

*Pseudarge rubicunda* Gussakovskij, 1935: 294, 431–432.

*Hylotoma versicolor* André, 1882: 438, nomen preocc., not *Hylotoma versicolor* Klug, 1834.

*Arge tigrata* Blank, Liston et Taeger in Blank et al., 2009: 16 (replacement name for *Hylotoma versicolor* André), **syn. n.**

**Material.** 1♂ (ZISP), Turkmenistan, "Kopet-Dag, Syulyukli, K.D. Anger".

**Notes.** The name *Hylotoma versicolor* André, 1882 is a junior primary homonym of *Hylotoma versicolor* Klug, 1834 (= *Ptilia versicolor*). Due to homonymy, it was replaced with the new name, *Arge tigrata* [Blank et al., 2009]. The types or specimens of this species have not been found in the Zoological Museum of Moscow State University (Moscow, Russia), where the type should have been preserved. Thus, the type is assumed to be lost.

Kuznetsov-Ugamskij [1927] and Gussakovskij [1935] clarified *Arge versicolor* (André, 1882) based only on males known to them as well as the original description by André [1882]. However, our re-examination of the only specimen present in the collection demonstrated that it belongs to *Pseudarge rubicunda*.

*Pseudarge rubicunda* was described by Gussakovskij based only on females, but its male was described recently [Basov, 2023]. The original descriptions by André [1882] and Gussakovskij [1935] of *Arge versicolor* are not detailed, but do not disagree with the description of *Pseudarge rubicunda* males. Descriptions and illustrations by Kuznetsov-Ugamskij [1927] of *Arge versicolor* clearly identify it as *Pseudarge*. In addition, as previously noted by Basov [2023], *P. rubicunda* was described from the same type locality as *Hylotoma versicolor*. According to articles 23.1 and 23.9 of International Code of Zoological Nomenclature [1999], if the senior synonym is not available, the junior one should be considered the valid name. *Hylotoma versicolor* André, 1882 is primary homonym. *Pseudarge rubicunda* Gussakovskij, 1935 is the oldest available name. Thus, the new synonymy is introduced: *Pseudarge rubicunda* Gussakovskij, 1935 = *Arge tigrata* Blank, Liston et Taeger in Blank et al., 2009, **syn. n.**

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## Фауна кровососущих комаров (Diptera: Culicidae) Армении

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**Резюме.** Приведен аннотированный список кровососущих комаров Республики Армения, включающий 40 видов. Исследования проводились с марта по декабрь в 2021–2023 годах. Обследовано свыше 30 биотопов на высотах 394–2142 м, материал отобран из 30 местонахождений, главным образом из центральной и северной частей страны. Идентификацию 1607 экземпляров имаго и 392 экземпляров личинок комаров проводили по морфологическим признакам особей или кладок, а также методами молекулярной диагностики и цитогенетики. В результате наших исследований выявлено 23 вида комаров, из которых пять видов впервые указаны для фауны Армении: *Aedes cyprius* Ludlow, 1920, *A. euedes* Howard, Dyar et Knab, 1913, *A. excrucians* (Walker, 1856), *A. riparius* Dyar et Knab, 1907, *Culex quinquefasciatus* Say, 1823. Первые четыре вида отловлены на высоте свыше 2000 м. *Culex quinquefasciatus* впервые обнаружен на южной границе с Ираном в 2022 году, а в 2023 году отмечен в Араратской долине. Проведено сравнение фауны кулицид Армении с фаунами сопредельных стран (Грузия, Азербайджан, Турция, Иран), а также Северного Кавказа.

**Ключевые слова:** Culicidae, кровососущие комары, фауна, Армения.

### The fauna of mosquitoes (Diptera: Culicidae) of Armenia

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**Abstract.** An annotated list of 40 species of mosquitoes of the Republic of Armenia is presented. The mosquito fauna was studied from March to December in 2021–2023 at 394–2142 m above sea level. The material collected from 30 localities, covering more than 50 habitats, primarily in the central and northern parts of the country. In addition to using cytogenetic and molecular diagnostic methods, the larvae and adults morphological characteristics or egg chorion pattern were used to identify 1607 adults and 392 larvae. As a result of our research, 23 species of mosquitoes were identified, five of them (*Aedes cyprius* Ludlow, 1920, *A. euedes* Howard, Dyar et Knab, 1913, *A. excrucians* (Walker, 1856), *A. riparius* Dyar et Knab, 1907, and *Culex quinquefasciatus* Say, 1823) are recorded for the first time for the fauna of Armenia. The first four species were found at altitudes above 2000 meters. *Culex quinquefasciatus* was initially found in 2022 on the southern border with Iran and then was collected in the Ararat Valley in 2023. The faunas of Culicidae of Armenia and surrounding areas (the North Caucasus, Georgia, Azerbaijan, Turkey, Iran) are compared.

**Key words:** Culicidae, mosquitoes, fauna, Armenia.

## Введение

Мировая фауна кровососущих комаров (Diptera: Culicidae) насчитывает свыше 3500 видов, более 100 из них – специализированные переносчики возбудителей

заболеваний человека. По данным Всемирной организации здравоохранения, в мире за год от вирусных лихорадок и малярии умирает свыше миллиона человек. Комары служат передаточным звеном инфекции (инвазии) между млекопитающими и птицами, что может

вызывать эпизоотии, принося колоссальные экономические убытки. Поэтому видовой состав, особенности распространения, поведения, наследственные качества и другие аспекты детально изучаются с целью выработки успешных стратегий борьбы с переносчиками, снижения давления патогенов и паразитов. Пристальное внимание уделяется действующим или потенциальным очагам трансмиссивных заболеваний, что позволяет своевременно предпринимать надлежащие меры для предотвращения эпидемий и эпизоотий, а также оперативного устранения их последствий [Bertola et al., 2022; Morchón et al., 2022].

Фауна кровососущих комаров Армении изучена неполно как в ландшафтно-биотопическом, так и в таксономическом отношении. Увеличение интенсивности сборов и количества обследованных местообитаний за 2010–2020 годы позволило внести в реестр комаров Армении 14 ранее не указывавшихся видов: *Aedes cinereus* Meigen, 1818, *A. annulipes* (Meigen, 1830), *A. cataphylla* Dyar, 1916, *A. flavescens* (Müller, 1764), *A. punctor* (Kirby, 1837), *A. albopictus* (Skuse, 1895), *Culex torrentium* Martini, 1925, *C. martinii* Medschid, 1930, *Culiseta fumipennis* (Stefens, 1825), *C. morsitans* (Teobald, 1901), *C. alaskaensis* (Ludlow, 1906), *C. subochrea* (Edwards, 1921), *Coquillettidia richiardii* (Ficalbi, 1889), *Uranotaenia unguiculata* Edwards, 1913 [Robert et al., 2019; Paronyan et al., 2020]. Как правило, мониторинговые исследования проводили в связи с угрозой появления трансмиссивных заболеваний, а образцы собирали в антропогенных ландшафтах [Гордеев, Москаев, 2013; Robert et al., 2019; Paronyan et al., 2020], где под влиянием деятельности человека происходит снижение видового разнообразия комаров [Chaves et al., 2011; Ferraguti et al., 2016]. На этом фоне заметно слабее изучены природные биоценозы. С учетом географического положения, высотной поясности, ландшафтно-биотопического разнообразия Кавказа, а также актуальных ареалов кулицид [Халин, Горностаева, 2008; Becker et al., 2010] становится очевидным, что выявленное количество видов является далеко не предельным. Кроме того, существует проблема редких видов, обнаруживаемых тем надежнее, чем детальнее изучены природные станции, а также проблема видов-двойников, различимых лишь по строению самцов, личинок, кладок или свойствам генома. Отчасти это подтвердили сборы из Араратской долины и южных приграничных территорий, выявившие для Армении еще 3 вида: *Aedes refiki* (Medschid, 1928), *A. cretinus* Edwards, 1921, *Culex pussilus* Maquart, 1850 [Слободяник и др., 2020; Щербаков и др., 2022; Shcherbakov et al., 2023]. Общее число видов в Армении, таким образом, выросло до 35.

Коррективы в состав региональных фаун вносят перемены климата, обострившие проблему инвазивных видов [Мусолин, Саулич, 2012; Capelli et al., 2018; Kondrashin et al., 2022], среди которых часто фигурируют переносчики возбудителей заболеваний паразитарной (филяриозы, протозоозы) и вирусной (лихорадки Западного Нила, Чикунгунья, Денге, Зика, долины Рифт и др.) этиологии [Becker et al., 2010; Farajollahi et al., 2011; Capelli et al., 2018; Bertola et al., 2022]. Один из таких инвазивных переносчиков, азиатский тигровый

комар *Aedes albopictus*, недавно обнаружен в Армении [Robert et al., 2019; Paronyan et al., 2020], что можно расценивать как сигнал к необходимости увеличения числа и качества мониторинговых исследований фауны кровососущих комаров, усиления мер предосторожности ввиду возможного появления заболеваний.

К моменту написания данного сообщения в Армении было выявлено 35 видов кровососущих комаров, в Грузии и Абхазии – 35, в Азербайджане – 32, в Турции – 62, в Иране – 67, на Северном Кавказе – 60, что в сумме составило 98 видов [Robert et al., 2019; Paronyan et al., 2020; Слободяник и др., 2020; Щербаков и др., 2022; Shcherbakov et al., 2023].

В задачи исследования входило изучение видового состава кровососущих комаров Араратской долины, приграничных и высокогорных территорий, а также сравнительный анализ фаун сопредельных стран с целью выявления потенциально новых для фауны Армении видов. В настоящей публикации 5 видов кровососущих комаров впервые указаны для фауны Республики Армения, приведены краткие заметки по их распространению, экологии и значению для человека.

## Материал и методы

Сборы комаров проведены в Республике Армения в период с 23.05.2021 по 2.12.2023 на высотах от 394 до 2142 м н.у.м. (рис. 1). В ходе исследования сделано 39 выборок, определено 1607 экземпляров имаго (самки) и 392 экземпляра личинок. Материал был собран О.В. Щербаковым (местонахождения 1, 13–17, 19, 21–26), Г.Н. Артемовым (местонахождения 1, 3–11, 18–20, 26–30) и В.А. Бурлаком (местонахождения 1, 2, 4–7, 11, 12, 18, 20, 29, 30) и определен О.В. Щербаковым (местонахождения 1, 3, 13–18, 21–25), Ю.А. Андреевой (местонахождения 9, 12, немалярийные комары), Г.Н. Артемовым, М.К. Хайдарой, Е.С. Соболевой и С.С. Алексеевой (малярийные комары). Образцы хранятся в лаборатории экологии, генетики и охраны окружающей среды Томского государственного университета (имаго и личинки малярийных комаров) и лаборатории молекулярной паразитологии Научного центра зоологии и гидроэкологии Национальной академии наук Республики Армения (имаго и личинки немалярийных комаров).

Имаго малярийных и немалярийных комаров собирали аспиратором в закрытых от ветра надворных постройках (хлевы, сараи, пристройки домов, вольеры собачьего питомника) с потолка и стен. Сбор имаго комаров родов *Aedes* Meigen, 1818, *Culex* Linnaeus, 1758, *Culiseta* Felt, 1904 проведен: 1) энтомологическим сачком или пробиркой при нападении на ловца; 2) энтомологическими световыми ловушками; 3) ловушкой Mosquito Magnet Executive (Woodstream corp., США). Комаров собирали в энтомологические садки и использовали для прижизненного анализа в лаборатории. Личинок комаров ловили пипетками Пастера, обследуя небольшие порции воды, собранные с поверхности природных водоемов пластиковыми поддонами. Личинок рода *Anopheles* Meigen, 1818 четвертого возраста помещали в свежеприготовленный раствор Кар-

нуа (3 части 96%-го этанола и 1 часть ледяной уксусной кислоты), транспортировали при +4 °С и хранили при –20 °С. Имаго и личинок других родов фиксировали 96%-м этанолом и хранили при –20 °С.

Местонахождения и даты сборов (в списке номера в скобках после географических названий и номера на рисунке 1 соответствуют номерам местонахождений):

1 (5 выборок): с. Ранчпар, 40°01'41.6"N / 44°22'23.0"E, 832 м: вечер 7.06.2021, коровник, сбор аспиратором; утро 8.06.2021, светоловушка; вечер 11.05.2023, сбор сачком во дворе; утро 12.05.2023, коровник, сбор аспиратором; 26.05.2023.

2 (1 выборка): с. Ранчпар, р. Севджур, 40°01'38.5"N / 44°22'20.4"E, 832 м, 8.06.2021, река, по всей ширине русла густо заросшая, у берега – шелковник, ряска малая, тростник; дно заиленное, течение медленное.

3 (1 выборка): с. Норамарг, 40°01'31.0"N / 44°27'9.9"E, 826 м, 11.06.2021, 20:00–8:00, двор частного дома, яблоневый сад, ловушка Mosquito Magnet Executive.

4 (2 выборки): Арташат, 39°57'23.2"N / 44°32'43.7"E, 838 м, 11.06.2021, 13.05.2023, собачий питомник, закрытые вольеры, сбор аспиратором.

5 (1 выборка): с. Маргара, 40°01'58.1"N / 44°10'4.1"E, 846 м, 10.06.2021, коровник, сбор аспиратором.

6 (1 выборка): с. Варданашен, 40°03'22.5"N / 44°11'46.1"E, 841 м, 10.06.2021, водный канал, растительность – роголистник с вкраплениями элодеи и ряски, сбор пипеткой.

7 (2 выборки): с. Гарибджанян, коровник 1 – 40°44'20.5"N / 43°47'47.4"E, коровник 2 – 40°44'17.3"N / 43°47'45.0"E, 1470 м, 9.06.2021, сбор аспиратором.

8 (1 выборка): с. Гарибджанян, р. Ахуриан, 40°44'31.1"N / 43°47'6.9"E, 1465 м, 9.06.2021, растительность – нитчатка, сбор пипеткой.

9 (1 выборка): с. Гетк, 40°43'6.0"N / 43°46'59.8"E, 1473 м, 9.06.2021, русло пересыхающей реки, растительность – злаки, залитые водой, сбор пипеткой.

10 (1 выборка): с. Еразговорс, 40°42'30.4"N / 43°47'2.3"E, 1479 м, 9.06.2021, верховое болото недалеко от трассы, растительность – рогоз, нитчатка, сбор пипеткой.

11 (1 выборка): с. Лчашен, 40°30'41.1"N / 44°57'23.6"E, 1917 м, 13.06.2021, берег оз. Севан, мелкий пруд 150 × 50 м, растительность – роголистник, нитчатка, сбор пипеткой.

12 (1 выборка): биостанция выше с. Хорс, 39°51'31.9"N / 45°11'49.2"E, 2142 м, 12.06.2021, луговое разнотравье, кустарник до 3–4 м высотой, сбор сачком.

13 (1 выборка): урочище Ластивер, окрестности с. Енокаван, 40°54'26"N / 45°04'02"E, 1310 м, 13.07.2022, мезофитный широколиственный лес с преобладанием бука восточного, граба восточного, бересклета кавказского и ясеня.

14 (1 выборка): Киранц-Самсонское ущелье, 41°01'13"N / 45°02'26"E, 830 м, 12.07.2022, мезофитный широколиственный лес с преобладанием бука восточного, бересклета кавказского, мушмулы германской и ясеня.

15 (2 выборки): с. Алванк, 38°55'01"N / 46°20'16"E, 394 м, 27.08.2022, 17.06.2023, пойма р. Аракс с преобладанием тополя евфратского, ив и рогоза.



Рис.1. Точки сбора комаров в Республике Армения в 2021–2023 годах.

Fig. 1. Collection points of mosquitoes in the Republic of Armenia in 2021–2023.

16 (2 выборки): с. Карчеван, 38°51'17"N / 46°12'20"E, 565 м, 21.08.2022, 25.03–8.07.2023, пойма р. Аракс с преобладанием ив, вяза, камыша и рогоза.

17 (1 выборка): с. Дсех, 40°58'40"N / 44°39'32"E, 1136 м, 18.09.2022, родник в ущелье р. Марц, мезофитный широколиственный лес с преобладанием граба восточного и дуба восточного.

18 (1 выборка): окрестности монастыря Хор Вирап, 39°53'09.4"N / 44°35'30.4"E, 820 м, 11.05.2023, край поля с зерновыми и лесополоса, сбор сачком и пробиркой.

19 (1 выборка): с. Джанфида, 40°02'40"N / 44°01'40"E, 865 м, 15.05.2023, коровник, сбор аспиратором.

20 (1 выборка): с. Таперакан, 39°55'22"N / 44°35'38"E, 835 м, 11.05.2023, болото, растительность – цветущая уруть, сбор пипеткой.

21 (1 выборка): Ереван, Эребуни, 40°09'35"N / 44°30'32"E, 940 м, 18.05–2.12.2023, квартира в густонаселенной части города недалеко от впадения р. Гетар в р. Раздан, сильно урбанизированный ландшафт с остаточными элементами полупустынной растительности с преобладанием верблюжьей колючки, астрагалов и каперса колючего.

22 (1 выборка): урочище Зикатар, окрестности с. Кохб, 41°06'38"N / 44°54'30"E, 1845 м, 13.07.2023, мезофитный широколиственный лес с преобладанием бука восточного, граба восточного, бересклета кавказского и ясеня.

23 (1 выборка): урочище Асни, окрестности с. Армаш, 39°48'03"N / 44°51'12"E, 1460 м, 4.06.2023, полупустынный ландшафт с преобладанием солянок и астрагалов.

24 (1 выборка): с. Гукасан, 40°07'34"N / 44°25'04"E, 845 м, 12.06.2023, двор частного дома, фруктовый сад.



25 (2 выборки): государственный заказник «Вордан Кармир», с. Аразап, 40°02'37"N / 44°07'36"E, 900 м, 27.06, 17.07.2023, полупустынный ландшафт с преобладанием солянок, верблюжьей колючки и астрагалов.

26 (1 выборка): Иджеван, 40°51'03.5"N / 45°07'07.2"E, 732 м, 17.05.2023, водоем в пойме р. Агстев, сбор пипеткой.

27 (1 выборка): с. Норамарг, 40°01'47.9"N / 44°25'40.7"E, 827 м, 17.05.2023, сбор аспиратором.

28 (1 выборка): с. Баграмян, 39°58'29.5"N / 44°30'02"E, 830 м, 12.05.2023, сбор пипеткой.

29 (1 выборка): с. Джарби, 40°06'06.7"N / 44°14'37.5"E, 835 м, 16.05.2023, заболоченность вдоль дороги, глубокий водоем, заросший по берегу тростником, дно вязкое, растительность – роголист, нитчатка, сбор пипеткой.

30 (1 выборка): с. Джанфида, 40°03'35.9"N / 44°02'28.1"E, 865 м, 15.05.2023, заболоченность на окраине села, открытый водоем с прибрежной водной растительностью, сбор пипеткой.

Виды родов *Aedes*, *Culex*, *Anopheles* (*A. claviger* (Meigen, 1804) и *A. hyrcanus* (Pallas, 1771)), *Culiseta* определяли по морфологическим признакам с использованием определительных таблиц [Гуцевич и др., 1970; Becker et al., 2010; Identification keys, 2021]. По рисунку хориона яиц в кладках идентифицировано 46 самок рода *Anopheles*. Определение *Culex quinquefasciatus* Say, 1823 подтверждено с помощью секвенирования нуклеотидной последовательности митохондриального гена цитохромоксидазы I (COI) в присутствии праймеров LCO1490 (5'-GGTCAACAAATCATATAAGATATTGG-3')

и HCO2198 (5'-TAAACTTCAGGGTGACCA-AAAAATCA-3') по предложенному протоколу [Folmer et al., 1994]. Полученные ПЦР-продукты секвенировали и сравнивали с базами нуклеотидных последовательностей с помощью BLAST [2021].

Видовой состав комаров рода *Anopheles* подгруппы *maculipennis* определяли по дисковому рисунку политенных хромосом клеток слюнных желез и трофоцитов яичников самок, сравнивая его с цитогенетическими картами *A. sacharovi* [Стегний, 1976; Artemov et al., 2018], *A. maculipennis* [Стегний, Кабанова, 1978], либо по длине второго внутреннего транскрибируемого спейсера рДНК (ITS2) [Proft et al., 1999]. Давленные препараты политенных хромосом готовили по стандартной методике и окрашивали лактоацетоорсеином [Кабанова и др., 1972]. Для различения видов *A. sacharovi* и *A. maculipennis* s. str. использовали цитогенетические маркеры хромосомы 3. В районах 26А–27В 3R плеча *A. sacharovi* (рис. 2) и 24С–25С 3R плеча *A. maculipennis* (рис. 3) находится последовательность трех ярких равноудаленных дисков, завершающаяся характерным более узким участком политенной хромосомы. Ориентация этой последовательности и положение районов относительно центрального и теломерного концов плеча у видов различаются. «Птичий глаз» – другой маркерный район, расположенный в плече 3L (в районе 38В у *A. sacharovi* и 35В у *A. maculipennis*), – представлен очень коротким, почти круглым диском («зрачок») и следующим за ним широким диском нормальной длины («веко»).

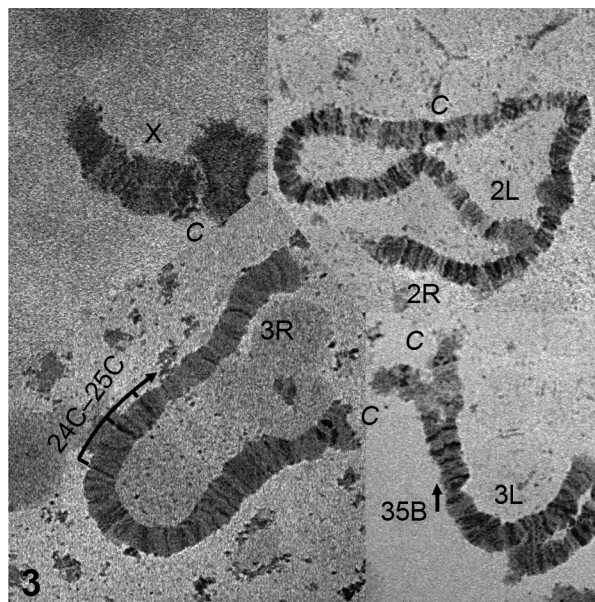
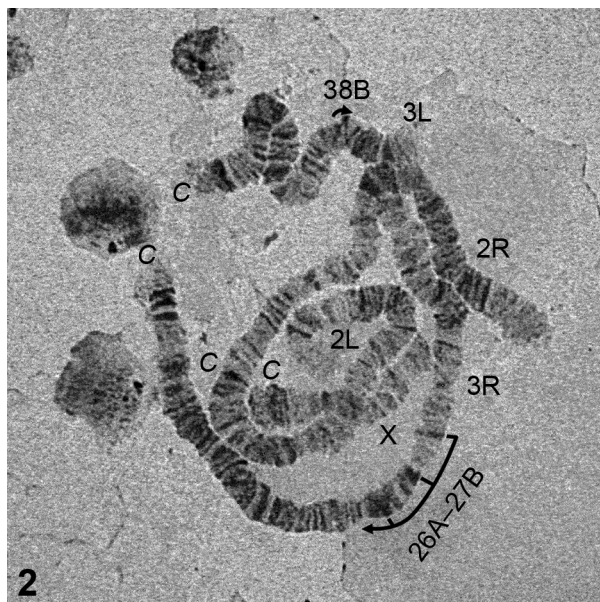


Рис. 2–3. Политенные хромосомы трофоцитов яичников малярийных комаров рода *Anopheles*.

2 – *A. sacharovi*; 3 – *A. maculipennis*. X – X-хромосома, 2R, 2L, 3R, 3L – плечи аутосом, C – центромерный конец плеча, или прицентромерный район. Стрелками обозначена ориентация порядка расположения дисков видоспецифичных маркерных районов относительно центромерного и теломерного концов (районов).

Figs 2–3. Polytene chromosomes of *Anopheles* nurse cells.

2 – *A. sacharovi*; 3 – *A. maculipennis*. X – X chromosome, 2R, 2L, 3R, 3L – autosome arms, C – centromere end of the chromosome arms or near-centromere region of the chromosome. Arrows show the orientation of the banding pattern of landmark regions relative to the centromeric and telomeric ends (regions).



Последовательность дисков в 3L у видов неодинакова, при этом у *A. sacharovi* «птичий глаз» находится вблизи теломерного конца (рис. 2), тогда как у *A. maculipennis* – в центромерной половине хромосомы (рис. 3). Дополнительные маркеры для разделения видов – уникальный дисковый рисунок и своеобразие прицентромерного гетерохроматина X-хромосомы в трофоцитах яичников [Шарахова и др., 1997]. Личинок видов подгруппы *maculipennis*, собранных в 2023 году (местонахождения 26–30), определяли по длине ITS2 с помощью мультиплексной ПЦР с использованием универсального праймера 5.8S-UN (5'-TGTGAACTG-CAGGACACATG-3') и видоспецифичных праймеров к ITS2 *A. sacharovi* (ASAC, 5'-CAAG-AGATGGATGTTTACG-3'), а также *A. maculipennis* (AMAC, 5'-TATTTGAGGCCC-ATGGGCTA-3') в соответствии с протоколом [Proft et al., 1999]. Длина ITS2 *A. sacharovi* 180 п.н., *A. maculipennis* s. str. – 410 п.н. Разница в длине фрагментов составляет 230 п.н. и хорошо заметна на электрофореграмме (рис. 4).

Показания среднегодовых и среднемесячных температур взяты с сайта «Погода и Климат» [http://www.pogodaiklimat.ru/] для Еревана (40°11'N / 44°31'E, 900–1300 м), Ленкорани (Азербайджан, 38°45'13"N / 48°51'04"E, 76 м) и Ставрополя (Россия, 45°02'N / 41°58'E, 620 м) (рис. 5). Корреляционный анализ проводили при помощи пакета программ Microsoft Excel. Индекс Жаккара вычисляли по стандартной формуле:  $IЖ = c / (a + b - c) \times 100 \%$ , где  $c$  – число общих видов;  $a$  – число видов в регионе А;  $b$  – число видов в регионе В [Песенко, 1982].

При составлении аннотированного списка использовали данные по распространению и медицинскому значению кровососущих комаров [Редькина, Островерова, 2007; Халин, Горностаева, 2008; Azari-Hamidian et al., 2009; Becker et al., 2010; Гордеев и др., 2011; Ledesma, Harrington, 2011; Виноградова и др., 2012; Ганушкина и др., 2013; Гордеев, Москаев, 2013; Малькова и др., 2013; Намазов, 2013; Kemenesi et al., 2014; Börstler et al., 2016; Kurucz et al., 2017; Silaghi et al., 2017; Capelli et al., 2018; Übles et al., 2018; Moradi-Asl et al., 2019; Shaikevich et al., 2019; Федорова и др., 2018; Paronyan et al., 2020; Слободяник и др., 2020; Гаджиева, 2021; Полторацкая и др., 2021; Bertola et al., 2022; Jansen et al., 2022; Фёдорова и др., 2022; Щербakov и др., 2022; Shcherbakov et al., 2023]. Подробнее даны сведения о распространении видов на Кавказе и особенно в Армении.

## Результаты

Для исследованных биотопов Армении идентифицировано 2 вида малярийных комаров подгруппы *maculipennis* – *Anopheles sacharovi* и *A. maculipennis* s. str. Цитогенетический анализ не выявил полиморфных хромосомных перестроек у этих видов. В трех биотопах обнаружены имаго *A. claviger*, в одном – *A. hyrcanus*. Собрано 11 видов рода *Aedes* (*A. cinereus*, *A. vexans* (Meigen, 1830), *A. geniculatus* (Olivier, 1791), *A. annulipes*, *A. caspius* (Pallas, 1771), *A. cyprius* Ludlow, 1920, *A. euedes* Howard, Dyar et Knab, 1913, *A. excrucians* (Walker, 1856), *A. flavescens*, *A. riparius*

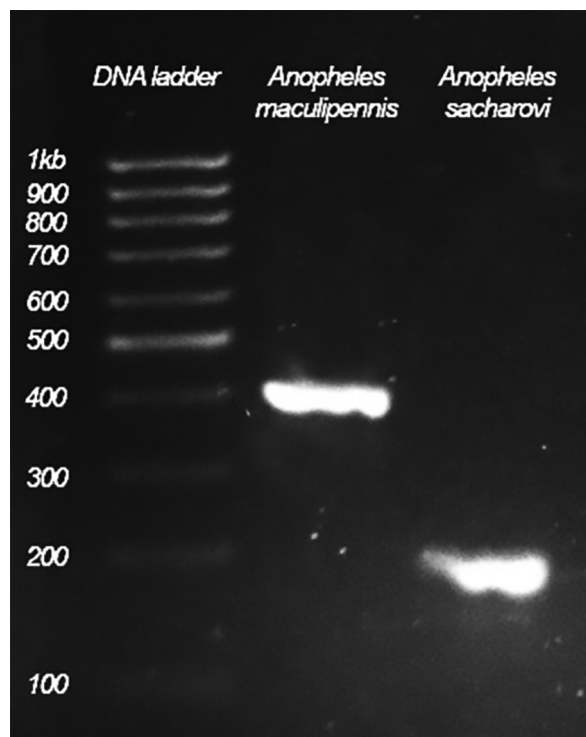


Рис. 4. Электрофореграмма ПЦР-продуктов ITS2 *Anopheles maculipennis* и *A. sacharovi*, выловленных в Республике Армения.

Fig. 4. An electrophoregram of the ITS2 PCR-products of *Anopheles maculipennis* and *A. sacharovi* from Republic of Armenia.

Dyar et Knab, 1907, *A. albopictus*), 5 видов рода *Culex* (*C. modestus* Ficalbi, 1889, *C. pipiens* Linnaeus, 1758, *C. quinquefasciatus*, *C. theileri* Theobald, 1903, *C. territans* Walker, 1856) и 2 вида рода *Culiseta* (*C. longiareolata* (Macquart, 1838), *C. annulata* (Schrank, 1776)). Пять видов – *Aedes cyprius*, *A. euedes*, *A. excrucians*, *A. riparius* и *Culex quinquefasciatus* – впервые указаны для фауны Армении.

Данные о находках видов в Армении за последнее десятилетие приведены в таблице 1, сравнительные характеристики фауны Culicidae Армении и сопредельных регионов – в таблице 2 и на рисунке 6.

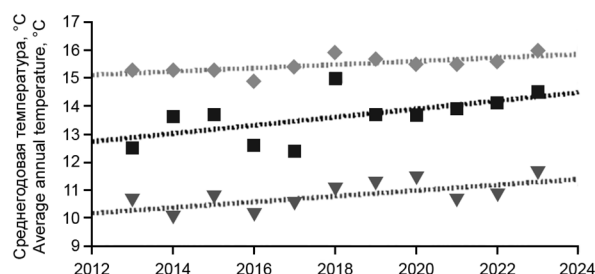


Рис. 5. Тренды среднегодовых температур в Армении, Азербайджане и России в 2013–2023 годах: ромбы – Ленкорань (сила корреляции 44%); квадраты – Ереван (сила корреляции 35%); треугольники – Ставрополь (сила корреляции 46%).

Fig. 5. The trends of the average annual temperatures in Armenia, Azerbaijan, and Russia in 2013–2023: phombs – Lenkoran (correlation strength 44%); squares – Yerevan (correlation strength 35%); triangles – Stavropol (correlation strength 46%).

Таблица 1. Расширение списка видов кровососущих комаров Армении.  
Table 1. Expanding the list of mosquito species in Armenia.

№	Вид / Species	1989–2013*	2019**	2016–2018***	2023****
1	<i>Anopheles (Anopheles) maculipennis</i> Meigen, 1818	+	+	+	+
2	<i>Anopheles (Anopheles) sacharovi</i> Favre, 1903	+	+	+	+
3	<i>Anopheles (Anopheles) claviger</i> (Meigen, 1804)	+	+	+	+
4	<i>Anopheles (Anopheles) hyrcanus</i> (Pallas, 1776)	+	+		+
5	<i>Anopheles (Anopheles) plumbeus</i> Stephens, 1828	+	+	+	
6	<i>Anopheles (Cellia) superpictus</i> Grassi, 1899	+	+		
7	<i>Aedes (Aedes) cinereus</i> Meigen, 1818			+	+
8	<i>Aedes (Aedimorphus) vexans</i> (Meigen, 1830)	+	+	+	+
9	<i>Aedes (Finlaya) geniculatus</i> (Olivier, 1791)	+	+	+	+
10	<i>Aedes (Ochlerotatus) annulipes</i> (Meigen, 1830)		+	+	+
11	<i>Aedes (Ochlerotatus) caspius</i> (Pallas, 1771)	+	+	+	+
12	<i>Aedes (Ochlerotatus) cataphylla</i> Dyar, 1916		+	+	+
13	<i>Aedes (Ochlerotatus) cyprius</i> Ludlow, 1920				+
14	<i>Aedes (Ochlerotatus) dorsalis</i> (Meigen, 1830)	+			
15	<i>Aedes (Ochlerotatus) euedes</i> Howard, Dyar et Knab, 1913				+
16	<i>Aedes (Ochlerotatus) excrucians</i> (Walker, 1856)				+
17	<i>Aedes (Ochlerotatus) flavescens</i> (Müller, 1764)		+	+	+
18	<i>Aedes (Ochlerotatus) punctor</i> (Kirby, 1837)		+		
19	<i>Aedes (Ochlerotatus) riparius</i> Dyar et Knab, 1907				+
20	<i>Aedes (Rusticoides) refiki</i> (Medschid, 1928)				+
21	<i>Aedes (Stegomyia) albopictus</i> (Skuse, 1895)		+	+	+
22	<i>Aedes (Stegomyia) cretinus</i> Edwards, 1921				+
23	<i>Culex (Barraudius) modestus</i> Ficalbi, 1889	+			+
24	<i>Culex (Barraudius) pussilus</i> Macquart, 1850				+
25	<i>Culex (Culex) mimeticus</i> Noè, 1899	+			
26	<i>Culex (Culex) pipiens</i> Linnaeus, 1758	+	+	+	+
27	<i>Culex (Culex) quinquefasciatus</i> Say, 1823				+
28	<i>Culex (Culex) theileri</i> Theobald, 1903	+	+	+	+
29	<i>Culex (Culex) torrentium</i> Martini, 1925		+	+	
30	<i>Culex (Maillotia) hortensis</i> Ficalbi, 1889	+	+	+	
31	<i>Culex (Neoculex) martinii</i> Medschid, 1930		+	+	
32	<i>Culex (Neoculex) territans</i> Walker, 1856	+	+	+	+
33	<i>Culiseta (Allotheobaldia) longiareolata</i> (Macquart, 1838)	+	+	+	+
34	<i>Culiseta (Culiseta) fumipennis</i> (Stefens, 1825)		+		
35	<i>Culiseta (Culiseta) morsitans</i> (Theobald, 1901)		+		
36	<i>Culiseta (Culiseta) alaskaensis</i> (Ludlow, 1906)		+		
37	<i>Culiseta (Culiseta) annulata</i> (Schränk, 1776)	+	+	+	+
38	<i>Culiseta (Culiseta) subochrea</i> (Edwards, 1921)			+	
39	<i>Coquillettidia (Coquillettidia) richiardii</i> (Ficalbi, 1889)		+	+	
40	<i>Uranotaenia (Pseudoficalbia) unguiculata</i> Edwards, 1913		+	+	
	Всего видов (из них впервые указанных для региона) / Total species (of which those recorded for the region for the first time)	18 (18)	27 (12)	23 (2)	26 (8)
	Прогресс / Progress	18	30	32	40

**Примечание.** \* – по [Paronyan et al., 2020: table 1]; \*\* – по [Robert et al., 2019]; \*\*\* – по [Paronyan et al., 2020: table 2]; \*\*\*\* – компиляция настоящей и предшествующих публикаций [Слободяник и др., 2020; Щербakov и др., 2022].

**Note.** \* – after Paronyan et al. [2020: table 1]; \*\* – after Robert et al. [2019]; \*\*\* – after Paronyan et al. [2020: table 2]; \*\*\*\* – compilation of own and previous data [Slobodyanik et al., 2020; Shcherbakov et al., 2022].

## Аннотированный список

**Род *Anopheles* Meigen, 1818**  
**Подрод *Anopheles* Meigen, 1818**  
*Anopheles* (s. str.) *claviger* s. str. (Meigen, 1804)

**Материал.** Ранчпар (1): 2♀, 7.06.2021; Арташат (4): 1♀, 11.06.2021; Ереван (21): 3♀, 18.05–2.12.2023.

**Медицинское значение.** Потенциальный переносчик возбудителей малярии, филяриозов и вирусных заболеваний.

**Распространение.** Западная Палеарктика от Западной Европы и Северной Африки до Западной Сибири, Передняя и Средняя Азия. Кавказ: Россия (Адыгея, Дагестан), Грузия, Азербайджан, Армения (Ширакская, Тавушская, Араратская, Гегаркуникская, Вайоцдзорская, Сюникская области).

*Anopheles* (s. str.) *hyrcanus* (Pallas, 1776)

**Материал.** Карчеван (16): 1♀, 21.08.2022.

**Медицинское значение.** Умеренный переносчик филарий, умеренно важный переносчик возбудителей малярии.

**Распространение.** Южно-транспалеарктический вид, распространен от Северной Африки до Японии, в России – на восток до Урала (Челябинская область). Кавказ: Россия (Адыгея, Дагестан), Азербайджан, Армения (Арагатская, Сюникская области).

*Anopheles* (s. str.) *plumbeus* Stephens, 1828

**Медицинское значение.** Локально – переносчик филарий, на Кавказе – основной переносчик возбудителей малярии.

**Распространение.** Западная Палеарктика от Британских островов и Северной Африки через Турцию и Иран до Средней Азии; в Европе на север до Южной Швеции и Эстонии, на восток до Урала (Челябинская область России). Кавказ: Россия (Дагестан), Азербайджан, Армения (Сюникская область).

*Anopheles* (s. str.) *maculipennis* s. str. Meigen, 1818

**Материал.** Ранчпар (1): 93♀, 7.06.2021, 4♀, 12.05.2023, 5♀, 26.05.2023; Ранчпар (2): 12 личинок, 7.06.2021; Арташат (4): 2♀, 13.05.2021, 7♀, 11.06.2021; Маргара (5): 146♀, 10.06.2021; Вардана-шен (6): 72 личинки, 10.06.2021; Гарибджанян (7): 55♀, 9.06.2021; Гарибджанян (8): 4 личинки, 9.06.2021; Еразгаворс (10): 3 личинки, 9.06.2021; Ачашен (11): 23 личинки, 13.06.2021; Джанфида (19): 10♀, 15.05.2023; Иджеван (26): 17 личинок, 17.05.2023; Норамаг (27): 14 личинок, 17.05.2023; Шаумян (28): 15 личинок, 12.05.2023; Джрарат (29): 48 личинок, 16.05.2023; Джанфида (30): 82 личинки, 15.05.2023.

**Медицинское значение.** Переносчик филарий, умеренно важный переносчик возбудителей малярии, переносчик возбудителей лихорадки Западного Нила.

**Распространение.** Европа (от Южной Скандинавии и Кольского полуострова до Балкан), Турция, Иран. Кавказ: Россия (Адыгея, Карачаево-Черкесия, Дагестан), Грузия, Азербайджан, Армения (повсеместно до высот 2000 м).

*Anopheles* (s. str.) *sacharovi* Favre, 1903

**Материал.** Ранчпар (1): 75♀, 7.06.2021, 17♀, 11.05.2023, 7♀, 26.05.2023; Ранчпар (2): 12 личинок, 7.06.2021; Арташат (4): 2♀, 13.05.2021, 85♀, 11.06.2021; Маргара (5): 1♀, 10.06.2021; Джанфида (19): 1♀, 15.05.2023; Норамаг (27): 3 личинки, 17.05.2023; Джрарат (29): 3 личинки, 16.05.2023.

**Медицинское значение.** Важнейший переносчик возбудителей малярии, роль в переносе филарий окончательно не ясна.

**Распространение.** Центральная и Южная Европа, Турция, Ближний Восток. Кавказ: Россия (Дагестан), Грузия, Азербайджан, Иран, Армения (Арагатская долина, Арагатская, Вайоцзорская области, до высоты 1610 м).

**Подрод *Cellia* Theobald, 1902**

*Anopheles* (*Cellia*) *superpictus* Grassi, 1899

**Медицинское значение.** Умеренный, в Средней Азии важный переносчик возбудителей малярии.

**Распространение.** Юго-западная часть Палеарктики от Средиземноморья до Казахстана и Средней Азии, Иран, Пакистан, Индия. Кавказ: Россия (Дагестан), Азербайджан, Армения (Армавирская, Арагатская области).

**Род *Aedes* Meigen, 1818**

**Подрод *Aedes* Meigen, 1818**

*Aedes* (s. str.) *cinereus* Meigen, 1818

**Материал.** Ранчпар (1): 2♀, 8.06.2021; Норамаг (3): 4♀, 11.06.2021.

**Медицинское значение.** Потенциальный переносчик возбудителей лихорадки Западного Нила и ди-рофиляриоза.

**Распространение.** Западная Европа (от Скандинавии до Средиземноморья), Россия (от Кольского полуострова до Камчатки и Сахалина), Казахстан, Северная Америка. Кавказ: Россия (Карачаево-Черкесия, Дагестан), Грузия, Армения (Арагатская, Гегаркуникская области).

**Подрод *Aedimorphus* Theobald, 1903**

*Aedes* (*Aedimorphus*) *vexans* (Meigen, 1830)

**Материал.** Ранчпар (1): 8♀, 8.06.2021; Норамаг (3): 5♀, 11.06.2021; Алванк (15): 1♀, 17.06.2023; Карчеван (16): 4♀, 21.08.2022; Хор Вирап (18): 11♀, 11.05.2023; Ереван (21): 1♀, 18.05–2.12.2023; Аразап (25): 3♀, 27.06, 17.07.2023.

**Медицинское значение.** Один из наиболее активных переносчиков филарий в Южной и Центральной Европе.

**Распространение.** Почти всемирно, кроме Запо-лярья, Австралии и Южной Америки.

**Подрод *Finlaya* Theobald, 1903**

*Aedes* (*Finlaya*) *geniculatus* (Olivier, 1791)

**Материал.** Урочище Ластивер (13): 30♀, 13.07.2022; Киранц-Самсонское ущелье (14): 5♀, 12.07.2022; Дсех (17): 1♀, 18.09.2022.

**Медицинское значение.** Переносчик ди-рофилярий, вируса Синдбис.

**Распространение.** Северная Африка, Европа (южнее 58°N), европейская часть России (до Челябинской области), Передняя и Средняя Азия. Кавказ: Россия (Северный Кавказ), Абхазия, Грузия, Армения (Тавушская, Котайкская, Вайоцзорская области, до высоты 1200 м).

**Подрод *Ochlerotatus* Lynch-Arribálzaga, 1891**

*Aedes* (*Ochlerotatus*) *annulipes* (Meigen, 1830)

**Материал.** Норамаг (3): 2♀, 11.06.2021.

**Медицинское значение.** Переносчик вируса Тягина.

**Распространение.** Западная и Центральная Европа (от Швеции до Балкан), Россия (от Карелии до Крыма и Западной Сибири), Турция. Кавказ: Армения (Арагатская долина, Гегаркуникская, Вайоцзорская, Лорийская области).

*Aedes* (*Ochlerotatus*) *caspius* (Pallas, 1771)

**Материал.** Ранчпар (1): 19♀, 7.06.2021; Норамаг (3): 12♀, 11.06.2021; Гетк (9): 23 личинки, 9.06.2021; Киранц-Самсонское

ущелье (14): 2♀, 12.07.2022; Карчеван (16): 2♀, 21.08.2022, 11♀, 25.03–8.07.2023; Хор Вирав (18): 50♀, 11.05.2023; Ереван (21): 2♀, 18.05–2.12.2023; Асни (23): 3♀, 4.06.2023.

**Медицинское значение.** Переносчик вирусов лихорадки Западного Нила, Тягиня, кроличьей миксомы, туляремии, один из основных переносчиков дирофилярий.

**Распространение.** Северная и Северо-Западная Африка, Западная Европа от Великобритании и Финляндии до Средиземноморья, центр и юг европейской части России, Сибирь, Ближний Восток, Казахстан и Средняя Азия, Индия, Монголия, Северный и Западный Китай. Кавказ: Россия (Северный Кавказ), Абхазия, Грузия, Турция, Азербайджан, Армения (повсеместно, до высоты 1500 м).

*Aedes (Ochlerotatus) cataphylla* Dyar, 1916

**Распространение.** В Евразии от пояса тундры на севере до европейских и азиатских степей на юге, южная граница ареала от Турции и Закавказья на западе до Северного Китая и Монголии на востоке. Кавказ: Россия (Северный Кавказ), Азербайджан, Армения (Гегаркуникская область, Арагатская долина, на высотах 800–2000 м).

*Aedes (Ochlerotatus) cyprius* Ludlow, 1920

**Материал.** Хорс (12): 34♀, 12.06.2021.

**Медицинское значение.** Переносчик возбудителей туляремии.

**Распространение.** Лесная и лесостепная зоны Палеарктики от Северной и Центральной Европы (Скандинавия, Германия, Польша) и Турции до Хабаровского края и Приморья России. На севере – в лесотундре до Салехарда (67°N), на юге – до степной зоны и Центрального Казахстана. Кавказ: Россия (Северный Кавказ), Армения (на высоте свыше 2100 м, Вайоцзорская область).

*Aedes (Ochlerotatus) dorsalis* (Meigen, 1830)

**Медицинское значение.** Переносчик возбудителей ряда вирусных заболеваний, туляремии и филярий.

**Распространение.** Голарктика. В Палеарктике от Северной Африки, Северной и Центральной Европы до Японии. Северная граница ареала проходит в поясе лесотундры, южная – в Турции, Закавказье, горах Средней Азии (включая Памир), Китае и Японии. Кавказ: Россия (Дагестан), Армения (Арагатская долина).

*Aedes (Ochlerotatus) euedes*  
Howard, Dyar et Knab, 1913

**Материал.** Хорс (12): 19♀, 12.06.2021.

**Медицинское значение.** Переносчик возбудителей омской геморрагической лихорадки и дирофилярий.

**Распространение.** Северная и Восточная Европа, Северная Америка. В России – от тундры до степей. Кавказ: Армения (Вайоцзорская область, на высоте свыше 2100 м).

*Aedes (Ochlerotatus) excrucians* (Walker, 1856)

**Материал.** Хорс (12): 23♀, 12.06.2021; Киранц-Самсонское ущелье (14): 1♀, 12.07.2022.

**Медицинское значение.** Вероятный переносчик возбудителей клещевого энцефалита, омской геморрагической лихорадки, туляремии и нематоды *Dirofilaria immitis* (Leidy, 1856).

**Распространение.** Голарктический вид. Западная Европа (кроме юга и Ирландии), Турция, Россия (от Кольского полуострова и Крыма до Камчатки и Южного Приморья), Восточная Азия до Японии. Кавказ: Армения (Тавушская, Вайоцзорская области).

*Aedes (Ochlerotatus) flavescens* (Müller, 1764)

**Материал.** Хорс (12): 3♀, 12.06.2021; Хор Вирав (18): 12♀, 11.05.2023; Ереван (21): 1♀, 18.05–2.12.2023; Аразап (25): 1♀, 27.06.2023, 1♀, 17.07.2023.

**Медицинское значение.** Возможный переносчик возбудителей туляремии, омской геморрагической лихорадки.

**Распространение.** Голарктика. В Палеарктике от северной тайги до Средней Азии, Монголии, Северного Китая и Южного Приморья России, Иран. Кавказ: Россия (Северный Кавказ), Турция, Армения (Арагатская, Гегаркуникская, Ширакская области).

*Aedes (Ochlerotatus) punctator* (Kirby, 1837)

**Распространение.** Бореальные и тундровые зоны Голарктики. В Палеарктике – Западная Европа, Азия от Восточного Казахстана до Японии. Кавказ: Россия (Северный Кавказ), Грузия, Армения.

*Aedes (Ochlerotatus) riparius* Dyar et Knab, 1907

**Материал.** Хорс (12): 4♀, 12.06.2021; Киранц-Самсонское ущелье (14): 1♀, 12.07.2022.

**Распространение.** В Евразии от тундры до Центральной Европы на западе и Монголии на востоке, в России – европейская часть, Западная Сибирь. Кавказ: Армения (Тавушская, Вайоцзорская области).

**Подрод *Rusticoides* Shevchenko and Prudkina, 1973**

*Aedes (Rusticoides) refiki* (Medschid, 1928)

**Распространение.** Европа от Скандинавии на севере до Испании и Румынии на юге, Малая Азия. Кавказ: Армения (Арагатская долина).

**Подрод *Stegomyia* Theobald, 1901**

*Aedes (Stegomyia) albopictus* (Skuse, 1895)

**Материал.** Дсех (17): 1♀, 18.09.2022.

**Медицинское значение.** Эффективный переносчик вируса Денге, арбовирусов, нематоды *Dirofilaria immitis*.

**Распространение.** Инвазивный вид, распространившийся из Юго-Восточной Азии в Европу, Африку, Австралию, Новую Зеландию, Северную и Южную Америку. Кавказ: Россия (черноморское побережье), Абхазия, Грузия, Армения (Тавушская область, на высотах 400–1200 м).



*Aedes (Stegomyia) cretinus* Edwards, 1921

**Распространение.** Южная Европа (Греция), Малая Азия. Кавказ: Россия (черноморское побережье), Абхазия, Грузия, Армения (Сюникская область, подтверждено секвенированием COI [Щербаков и др., 2022]).

**Род *Culex* Linnaeus, 1758**

**Подрод *Barraudius* Edwards, 1921**

*Culex (Barraudius) modestus* Ficalbi, 1889

**Материал.** Карчеван (16): 1♀, 25.03–8.07.2023; Ереван (21): 17♀, 18.05–2.12.2023.

**Медицинское значение.** Переносчик арбовирусов, возбудителей лихорадки Западного Нила, омской геморрагической лихорадки, туляремии, птичьей малярии, филярий.

**Распространение.** Северная Африка, Западная Европа (центр и юг), Россия (европейская часть, Сибирь, Приморский край), Передняя и Средняя Азия, Пакистан, Индия, Монголия, Китай. Кавказ: Россия (Северный Кавказ, Дагестан), Азербайджан, Турция, Армения (Арагатская, Сюникская области).

*Culex (Barraudius) pussilus* Maquart, 1850

**Распространение.** Северная Африка, Южная Европа (Средиземноморье), Россия (Свердловская, Курганская области), Восточная Турция, Иран, Юго-Западная Азия. Кавказ: Армения (Арагатская долина).

**Подрод *Culex* Linnaeus, 1758**

*Culex (s. str.) mimeticus* Noè, 1899

**Распространение.** Юг Палеарктики: Западная Европа (Средиземноморье), Турция, Иран, Средняя Азия, Дальний Восток России (Приморье). Ориентальная область. Кавказ: Россия (Дагестан), Азербайджан, Армения.

*Culex (s. str.) pipiens* Linnaeus, 1758

**Материал.** Ранчпар (1): 5♀, 8.06.2021; Норамаг (3): 4♀, 11.06.2021; Алванк (15): 1♀, 17.06.2023; Карчеван (16): 1♀, 21.08.2022, 11♀, 25.03–8.07.2023; Таперакан (20): 1 личинка, 11.05.2023; Ереван (21): 737♀, 18.05–2.12.2023; Гукасан (24): 1♀, 12.06.2023; Аразап (25): 3♀, 27.06.2023, 3♀, 17.07.2023.

**Медицинское значение.** Один из основных переносчиков арбовирусов и филярий.

**Распространение.** Палеарктика (кроме тихоокеанского побережья) – от лесотундры на севере до горных степей на юге (включая Турцию). Восточная и Южная Африка, Мадагаскар. Северная и Южная Америка. Кавказ: Россия (Северный Кавказ), Абхазия, Грузия, Азербайджан, Армения (повсеместно).

*Culex (s. str.) quinquefasciatus* Say, 1823

**Материал.** Алванк (15): 2♀, 27.08.2022; Карчеван (16): 2♀, 21.08.2022; 1♀, 25.03–8.07.2023; Армаш (23): 1♀, 4.06.2023. Подтверждено секвенированием гена COI.

**Медицинское значение.** Один из основных переносчиков арбовирусов (возбудителей чикунгуньи, эн-

цефалита Сент-Луис, японского энцефалита, лихорадки Западного Нила и др.), возбудителей лимфатического филяриатоза и нематоды *Dirofilaria immitis*.

**Распространение.** Всесветно, тропическая и субтропическая зоны. Кавказ: Армения (Арагатская долина, Сюникская область).

*Culex (s. str.) theileri* Theobald, 1903

**Материал.** Ранчпар (1): 2♀, 8.06.2021; Ереван (21): 5♀, 18.05–2.12.2023.

**Медицинское значение.** Переносчик вирусов Синдбис, лихорадки Западного Нила, лихорадки Рифт-Валли, диофилярий.

**Распространение.** Афротропическая область, западная часть Ориентальной области, Западная Европа (Средиземноморье), Крым, Ближний Восток, Средняя Азия. Кавказ: Россия (Дагестан), Азербайджан, Армения.

*Culex (s. str.) torrentium* Martini, 1925

**Медицинское значение.** Переносчик альфа-вирусов, возбудителей лихорадки Западного Нила.

**Распространение.** Европа (кроме юга), Россия (европейская часть, Западная Сибирь), Турция, Иран. Кавказ: Россия (Северный Кавказ), Армения (Гегаркуниская, Сюникская области).

**Подрод *Maillotia* Theobald, 1907**

*Culex (Maillotia) hortensis* Ficalbi, 1889

**Распространение.** Северная Африка, Западная Европа (юг и центр), Крым, Передняя и Средняя Азия, Индия. Кавказ: Армения (Лорийская, Ширакская, Котайкская, Арагацотнская, Гегаркуниская, Вайоцзотнская, Сюникская области).

**Подрод *Neoculex* Dyar, 1905**

*Culex (Neoculex) martinii* Medschid, 1930

**Распространение.** Северная Африка, Европа на восток до Оренбургской области России, Малая и Средняя Азия. Кавказ: Армения (Арагацотнская область).

*Culex (Neoculex) territans* Walker, 1856

**Материал.** Ереван (21): 95♀, 18.05–2.12.2023.

**Распространение.** Северная Африка, Европа (кроме Заполярья и Ирландии), Россия (от Карелии на севере до Крыма на юге, Сибирь, Дальний Восток), Передняя и Средняя Азия, Северная Америка. Кавказ: Армения (Тавушская, Котайкская, Ереванская, Арагацотнская, Сюникская области).

**Род *Culiseta* Felt, 1904**

**Подрод *Allotheobaldia* Broelemann, 1919**

*Culiseta (Allotheobaldia) longiareolata* (Macquart, 1838)

**Материал.** Ранчпар (1): 1♀, 8.06.2021; Норамаг (3): 2♀, 11.06.2021; Кохб (22): 1♀, 13.07.2023.

**Распространение.** Африка, Западная Европа (юг и центр), Западная Сибирь (средняя тайга – горнолесной пояс), Ближний Восток, Средняя Азия, Пакистан, Индия. Кавказ: Россия (Дагестан), Грузия, Азербайджан, Армения (Лорийская, Котайкская, Ереванская, Арагацотнская, Вайоцзорская, Сюникская области).

**Подрод *Culicella* Felt, 1904**

*Culiseta (Culicella) fumipennis* (Stefens, 1825)

**Распространение.** Северная Африка, Европа от Скандинавии до Средиземноморья, на восток до Поволжья в России, Малая Азия, Иран. Кавказ: Россия (Северный Кавказ), Грузия, Азербайджан, Армения.

*Culiseta (Culicella) morsitans* (Theobald, 1901)

**Медицинское значение.** Переносчик вируса Океальбо в Швеции.

**Распространение.** Северная Африка, Западная Европа, Малая Азия, Иран, Россия от Ленинградской области до Крыма, Средний Урал, Западная Сибирь. Кавказ: Россия (Северный Кавказ), Грузия, Азербайджан, Турция, Армения.

**Подрод *Culiseta* Felt, 1904**

*Culiseta* (s. str.) *alaskaensis* (Ludlow, 1906)

**Распространение.** Бореальная и тундровая зоны Фенноскандии, Сибири и Аляски. Центральная Европа, Альпы, Турция, Иран, Пакистан, Индия. Кавказ: Грузия, Армения.

*Culiseta* (s. str.) *annulata* (Schrank, 1776)

**Материал.** Хор Вирап (18): 1♀, 11.05.2023; Ереван (21): 2♀, 18.05–2.12.2023.

**Медицинское значение.** Переносчик вируса Тягиня, возбудителей птичьей малярии, дирофилярий, септарий.

**Распространение.** Северная Африка, Западная Европа от Швеции и Норвегии до Средиземноморья, европейская часть России, Малая Азия, Иран, Средняя Азия. Кавказ: Россия (Северный Кавказ), Грузия, Азербайджан, Армения (Ширакская, Тавушская, Ереванская, Арагацотнская, Армавирская, Сюникская области).

*Culiseta* (s. str.) *subochrea* (Edwards, 1921)

**Распространение.** Северная Африка, Западная Европа, Россия (Среднее Поволжье), Передняя и Средняя Азия. Кавказ: Азербайджан, Армения (Ширакская, Тавушская, Котайкская, Армавирская, Арагацотнская, Гегаркуникская, Сюникская области).

**Род *Coquillettidia* Dyar, 1905**

**Подрод *Coquillettidia* Dyar, 1905**

*Coquillettidia (Coquillettidia) richiardii* (Ficalbi, 1889)

**Медицинское значение.** Переносчик возбудителей лихорадки Западного Нила, омской геморрагической лихорадки, нематоды *Dirofilaria immitis*.

**Распространение.** Северная Африка, Западная Европа от южной Фенноскандии до Средиземноморья, Россия (европейская часть, Западная Сибирь), Малая Азия, Иран, Средняя Азия. Кавказ: Россия (Северный Кавказ), Азербайджан, Турция, Армения (Арагатская, Котайкская области).

**Род *Uranotaenia* Lynch Arribálzaga, 1891**

**Подрод *Pseudoficalbia* Theobald, 1912**

*Uranotaenia (Pseudoficalbia) unguiculata* Edwards, 1913

**Медицинское значение.** Переносчик возбудителей лихорадки Западного Нила.

**Распространение.** Северная Африка, Западная Европа (юг и центр), Передняя и Средняя Азия, Пакистан, Индия. Кавказ: Грузия, Азербайджан, Армения (Тавушская, Вайоцзорская области).

## Обсуждение

Интерес к фауне кулицид Армении заметно вырос в связи с усложнением эпидемической ситуации по арбовирусным инфекциям в мире, а также с появлением в регионе эффективного переносчика вирусов и филарий *Aedes albopictus* [Robert et al., 2019; Paronyan et al., 2020], в нескольких странах повлекшего вспышки лихорадок с многочисленными смертельными исходами [Fischer et al., 2013]. Повышенное внимание к переносчикам возбудителей заболеваний проявилось в стремительном пополнении видового реестра кулицид страны.

Чтобы проверить гипотезу о влиянии температуры на продвижение инвазивных видов *Aedes albopictus* и *Culex quinquefasciatus*, мы исследовали температурные тенденции в регионе. Для анализа были выбраны три точки: основная – Ереван (Армения), в качестве сравнения – Ленкорань (Азербайджан) и Ставрополь (Россия). Среднегодовая температура во всех трех точках в период 2013–2023 годов возрастала, однако в Ереване сдвиг оказался наибольшим; в меньшей степени потеплело в Ставрополе, стабильнее всего показателем был в Ленкорани, что объясняется влиянием Каспийского моря. Возрастание температуры имело положительную корреляцию с высотой точек над уровнем моря, однако эта тенденция для трех пар наблюдений может оказаться случайной. Корреляционный анализ среднемесячных температур показал, что в Ереване и Ставрополе наибольшее потепление отмечено в июне – августе, в Ленкорани – в мае – августе (сила связи от 20 до 41%). Наименьшее потепление отмечено в ноябре – январе и апреле (сила связи от 0 до 10%). Увеличение летних температур в выбранных точках минимально сказывается на численности и сезонной сукцессии видов, поскольку температура в эти месяцы повышается до +30 °C и более, что значительно ограничивает летнюю активность комаров или индуцирует их переход в летнюю диапаузу, или анабиоз. Одно из очевидных последствий потепления – сдвиг границ весенней активности комаров к началу, а осенней – к концу года. Возрастание температурного минимума может привести к увеличению численности видов, чувствительных к низ-

Таблица 2. Фауна кулицид Армении в сравнении с фаунами сопредельных стран.  
Table 2. The fauna of Culicidae of Armenia in comparison with the faunas of surrounding countries.

Показатель Parameter	Армения Armenia	Грузия и Абхазия Georgia and Abkhazia	Азербайджан Azerbaijan	Турция Turkey	Северный Кавказ North Caucasus	Иран Iran	Всего Total
<i>Anopheles</i>	6 (0)*	10	8	12	12	27	28
<i>Aedes</i>	16 (12)	12	8	26	31	12	43
<i>Culex</i>	10 (4)	7	8	14	8	20	22
<i>Culiseta</i>	6 (4)	5	5	6	5	5	6
<i>Coquillettidia</i>	1 (1)	0	1	2	1	1	2
<i>Orthopodomyia</i>	0	0	1	1	1	1	1
<i>Uranotaenia</i>	1 (1)	1	1	1	1	1	1
Всего видов Total species	40 (22)	35	32	62	60	67	103
Общих с Арменией видов Species common with Armenia	–	26	23	37	34	26	40
Потенциал проникновения видов Potential for species introductions	–	9	9	25	26	41	63
«Уникальных» видов “Unique” species	0	1	1	6	9	20	–
Сходство фаун (индекс Жаккара), % Similarity of faunas (Jaccard Index), %	100	53.1	46.9	56.9	51.5	32.1	38.8
Площадь страны/территории, км <sup>2</sup> Area of the country/territory, km <sup>2</sup>	29743	65855	86600	783562	346891	1648195	2960846
Плотность, видов/10000 км <sup>2</sup> Density, species/10000 km <sup>2</sup>	13.45	5.16	3.70	0.79	1.73	0.41	0.35
Соотношение плотности видов Species density ratio	1	2.61	3.64	17.03	7.77	32.80	38.43
Протяженность границы с Арменией, км Length of border with Armenia, km	–	216	~1000	311	–	36	1563

**Примечание.** \* – в скобках приведено число видов, впервые указанных после 2013 года.  
**Note.** \* – the number of species first recorded after 2013 is indicated in parentheses.

ким температурам, что повышает вероятность поимки их представителей в полевых сборах (лучшего выявления видов). Рост температуры сказался на экспансии инвазивных видов – *Aedes albopictus* и, вероятно, *Culex quinquefasciatus*. Как повышение температуры влияет на численность и встречаемость других видов, особенно редких, сказать сложно из-за их недостаточной изученности.

Число зарегистрированных в Армении видов кровососущих комаров за 2014–2023 годы выросло на 22 (в среднем на 2.2 вида в год). Основной прирост состоялся за счет родов *Aedes* (12 впервые обнаруженных, прирост 300%), *Culex* и *Culiseta* (по 4, прирост 67 и 200% соответственно), *Coquillettidia* и *Uranotaenia* (по 1, 100%). Это сделало Армению лидером среди стран региона по плотности выявленных видов (13.45 вида / 10 тыс. км<sup>2</sup>) (табл. 2)). Число видов родов *Culiseta*, *Coquillettidia*, *Orthopodomyia* Theobald, 1904, *Uranotaenia* близко к максимально возможному, но видовой состав *Anopheles*, *Aedes*, *Culex* может расширяться. Анализ данных показывает [Shcherbakov et al., 2023], что увеличение количества видов в ходе дальнейших исследований способно составить не менее 20–25%. Из

40 выявленных для Армении видов 26 подтверждены независимыми группами исследователей или сборами из разных районов, 14 видов – *Aedes cyprius*, *A. euedes*, *A. excrucians*, *A. punctator*, *A. riparius*, *A. refiki*, *A. cretinus*, *Culex pusillus*, *C. quinquefasciatus*, *C. mimeticus*, *Culiseta alaskaensis*, *C. fumipennis*, *C. morsitans*, *C. subochrea* – приводятся по 1–2 местонахождениям и требуют дополнительного мониторинга, в том числе документирования фенологии и выявления мест выплода.

Большая часть новых находок относится к экзотическим и орнитофильным видам. Исключение составил инвазивный *Aedes albopictus* и, возможно, *Culex quinquefasciatus*, статус которого окончательно не ясен. Расширение списка после 2013 года происходило параллельно с потеплением в регионе. Тем не менее мы придерживаемся мнения, что большинство впервые зарегистрированных в регионе видов имеет местное происхождение, а их обнаружение осложнено низким обилием, редкой встречаемостью, недостаточно детальным обследованием и высоким ландшафтно-биотопическим разнообразием территорий. Как правило, более 60% фауны комаров в различных биотопах составляют редкие виды, численность которых к тому же

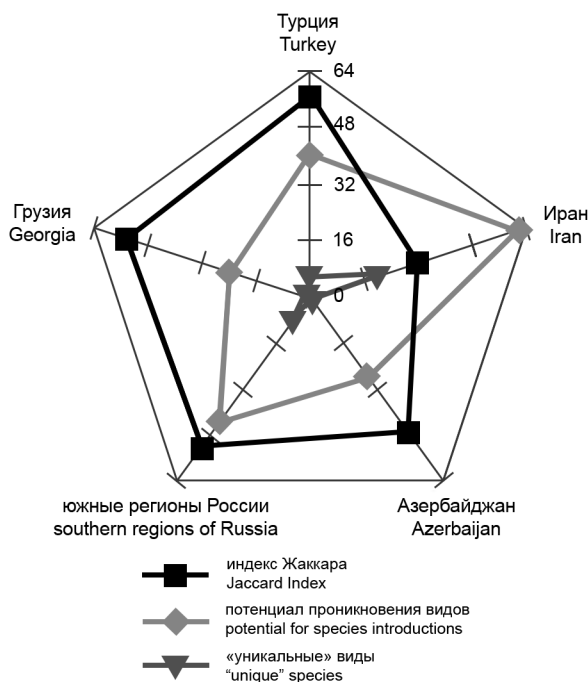


Рис. 6. Показатели сходства фаун (индекс Жаккара), потенциала проникновения видов и доли «уникальных» для Армении видов относительно территорий стран кавказского региона (%).

Fig. 6. Indexes of fauna similarity (Jaccard Index), the potential for species introductions, and the proportion of "unique" species for Armenia relative to the territories of the Caucasian region countries (%).

варьирует от сезона к сезону (в частности, из-за специфики диапаузы на стадии яйца для видов рода *Aedes* или пищевого поведения для *Culex*) [Некрасова, Вигоров, 2011], что требует долговременных наблюдений для установления реального разнообразия фауны.

Наибольшее сходство фаун отмечено для Армении и Турции (индекс Жаккара (ИЖ) = 56.9%), Армении и Грузии (ИЖ = 53.1%), Армении и южных регионов России (ИЖ = 51.5%). Наибольшая протяженность границы у Армении с Азербайджаном (около 1000 км), но сходство фаун ниже ожидаемого (ИЖ = 46.9%). Наименьшим сходство фаун оказалось для Армении и Ирана (ИЖ = 32.1%), что связано с географическим положением стран. Потенциальная возможность проникновения видов, которых нет в Армении (но теоретически они могут мигрировать из другой страны), минимальна со стороны Грузии (23.5%), максимальна со стороны Ирана (61.2%) (рис. 6). Процесс проникновения зависит от природных условий и наличия незанятых экологических ниш, поэтому теоретическое и реальное значения показателя могут различаться довольно существенно.

Мы выделяем категорию «уникальных» видов: большинство видов нельзя назвать эндемиками, поскольку они встречаются за пределами анализируемого макрорегиона, однако среди них могут быть и настоящие эндемики, поэтому мы остановились на определении «уникальный» для макрорегиона, что удобно для дальнейшей статистики. В Армении таких видов нет, в Иране – 20. В идеальном случае число «уникальных» видов отражает ландшафтно-биотопическое своеобра-

зие территории, а также видообразовательный потенциал экосистем. Однако в действительности это показатель практической изученности территорий, а также квалификации специалистов, производящих определение видов.

Очевидно, что во всех рассматриваемых регионах состав фаун не является окончательным. В меньшей степени это касается Турции, Ирана и южных регионов России, где задокументировано по 60 и более видов. Число видов рода *Aedes*, зарегистрированных в Грузии и Азербайджане, явно свидетельствует о недостаточной изученности фауны этих стран, что отражается на индексах *Anopheles/Aedes* и *Culex/Aedes* (значения должны быть порядка 0.3–0.8). В Армении, несмотря на значительное количество видов (40), нет ни одного «уникального». Армения – страна без выхода к морю, что исключает распространение специализированных обитателей приморских экосистем, в первую очередь таких, как малярийные комары *Anopheles atroparvus* Van Tiel, 1927, *A. melanoon* Hackett, 1934 и *A. persiensis* Linton, Sedaghat et Harbach, 2003.

Наличие «уникальных» видов заслуживает отдельного рассмотрения. В Грузии это *Aedes intrudens* Dyar, 1919, отсутствующий (или не найденный) в южных регионах России [Robert et al., 2019]. Наличие вида в Грузии вызывает не меньше вопросов, чем *A. euedes* – в Армении. В Азербайджане «уникальный» вид – *A. sourcofi* (Theobald, 1912), характерный для Западной (но не для Восточной) Европы. Этот вид – «близнец» вида *A. excrucians*, имеющего голарктическое распространение, но отсутствующего в фаунистическом реестре Азербайджана [Becker et al., 2010; Robert et al., 2019]. В Турции «уникальны» два вида комплекса *A. mariae* (Sergent et Sergent, 1903) – *A. phoeniciae* Coluzzi et Sabatini, 1968 и *A. zammitii* (Theobald, 1903), а также *A. lepidonotus* (Edwards, 1920), *A. nigrocanus* Martini, 1927, *A. rusticus* (Rossi, 1790), *Coquillettidia buxtoni* (Edwards, 1923), присущие западной части Турции и побережьям Эгейского и Черного морей [Becker et al., 2010; Robert et al., 2019]. Количество «уникальных» видов для Ирана и южных регионов России вызывает меньше сомнений, поскольку территории этих стран распространяются далеко на юг и север. Однако появляются другие вопросы. Например, *Aedes mercurator* Dyar, 1920, согласно сводке [Becker et al., 2010], должен быть обычен на Кавказе, однако не отмечен ни в одном новом обзоре [Robert et al., 2019; Shcherbakov et al., 2023].

Одна из причин неполного выявления видового разнообразия – несовершенство методик идентификации. Кровососущие комары – группа со множеством видов-двойников и криптических видов. На территории Армении это *Aedes cinereus* и *A. geminus* Peus, 1970 (возможен), *A. geniculatus* и *A. echinus* (Edwards, 1920) (возможен), *A. caspius* (виды А и В), *A. excrucians* и *A. sourcofi* (возможен), *A. annulipes* и *A. cantans* (Meigen, 1818) (возможен), *Culex pipiens* и *C. torrentium*, вклад которых в эпидемическую ситуацию в зонах симпатрии трудно разделить из-за сходства самок [Börstler et al., 2016], *Anopheles superpictus* с семью подвидами и предполагаемыми видами А и В [Becker et al., 2010; Harbach,



2013], а также виды традиционно сложной для определения подгруппы *maculipennis* [Стегний, 1991]. Показателен факт, что число видов кулицид Палеарктики в XXI веке прирастало главным образом за счет описаний новых видов рода *Anopheles* [Sedaghat et al., 2003; Nicolescu et al., 2004; Гордеев и др., 2005] и номинативного подрода рода *Aedes* [Горностаева, 2005], в меньшей степени – других родов [Shcherbakov et al., 2023].

Четыре вида, найденных впервые в Армении, *Aedes cyprius*, *A. euedes*, *A. excrucians*, *A. riparius*, автохтонны: биостанция Хорс (Вайоц Дзор) расположена на высоте 2142 м вдали от населенных пунктов, поэтому ни о какой интродукции речи быть не могло. Виды имеют медицинское значение как переносчики возбудителей омской геморрагической лихорадки, туляремии и филлярий [Ledesma, Harrington, 2011; Малькова и др., 2013; Schaikevich et al., 2019; Полторацкая и др., 2021]. Они обычны для Западной Сибири, в Армении собраны в схожем по типу растительности биотопе (высокогорный луг с высоким кустарником). Три последних высокой экологической пластичностью (от тундры до горных степей), разной специализацией, голарктическими ареалами и образуют устойчивую экологическую группировку на личиночной и имагинальной фазах [Гуцевич и др., 1970; Becker et al., 2010; Некрасова, Вигоров, 2011; Малькова и др., 2013]. Два из них, *A. excrucians* и *A. riparius*, в 2022 году обнаружены в Киранц-Самсонском ущелье на северо-востоке Армении, что демонстрирует их широкую распространенность, в том числе высотную. Идентификация проводилась по строению самок независимо разными специалистами, находки взаимно подтвердились. Зарегистрированные ранее *A. cataphylla* и *A. flavescens* [Robert et al., 2019; Paronyan et al., 2020] верифицированы нами (см. также [Слободяник и др., 2020]). Вид *A. cyprius* известен из Турции [Robert et al., 2019]. Виды *A. refiki*, *A. cretinus*, *Culex pussilus*, об обнаружении которых сообщалось ранее [Слободяник и др., 2020; Щербakov и др., 2022], имеют средиземноморское происхождение [Becker et al., 2010], однако как давно они обитают на территории Армении, неизвестно. В качестве векторов эти виды ранее не отмечены.

Как правило, редкие виды и виды с низкой численностью эпидемиологами в расчет не принимаются. Исключение представляют инвазивные таксоны, как, например, *Aedes albopictus*. Согласно современным концепциям изменение климата может приводить к появлению новых векторов, в частности за счет смены пищевой специализации [Börstler et al., 2016], что повышает значимость редких видов. При этом речь не идет о различиях в векторной компетентности популяций [Silaghi et al., 2017] или подвидов одного вида [Гуцевич, 1967]. Мы также склонны поддержать эту точку зрения, поскольку столкнулись с труднообъяснимой трансзональной сменой векторных свойств *A. cinereus* и *A. vexans*, проявившихся в лесостепной [Shaikevich et al., 2019; Рязанова и др., 2022], но не в таежной зоне [Полторацкая и др., 2021].

Регистрация *A. albopictus* в окрестности села Дсех (1136 м) подтверждает данные о наличии вида в Армении, обнаруженного ранее на участке Баграташен – Ай-

рум (450–550 м) [Paronyan et al., 2020], и фиксирует его продвижение в южном направлении вдоль магистрали Тбилиси – Ереван. Ранее автомобильные шоссе отмечались как внутриконтинентальные трассы потока генов, при этом «шоссейные» популяции отличаются генетической структурой от «природных» [Lainhart et al., 2015; Hopperstad et al., 2019]. Численность *A. albopictus* в настоящее время низка, но при возможном дальнейшем потеплении ситуация может измениться.

Находка близкого к *Culex modestus* вида *C. pussilus* в Арагатской долине [Слободяник и др., 2020] подтверждает тезис о недостаточной исследованности природных биотопов. О том же свидетельствует выявление в турецкой части Приараксинской низменности ряда видов, отсутствующих в Армении (например, *A. pulcritarsis* (Rondani, 1872) [Shcherbakov et al., 2023]).

Обнаружение на юге страны (высоты 394–565 м) характерного для тропиков *Culex quinquefasciatus* из числа наиболее значимых переносчиков возбудителей лимфатического филяриоза, птичьей малярии и лихорадок вирусной этиологии мирового масштаба [Farajollahi et al., 2011] потенциально несет угрозу ухудшения эпидемической ситуации. В провинции Ардебиль на северо-западе Ирана, расположенной примерно на той же широте, что и сёла Алванк и Карчеван в Армении, в 2005–2007 годах вид не был обнаружен [Azari-Hamidian et al., 2009]. В северо-западной провинции Ирана Западный Азербайджан и в Турции *C. quinquefasciatus* также не был зарегистрирован [Amini et al., 2020; Demirci et al., 2021]. В сборах с Большого и Малого Кавказа, в Куро-Араксинской низменности и в Ленкоранской области Азербайджана в 2008–2012 годах был выявлен лишь *C. pipiens* [Намазов, 2013; Виноградова и др., 2012]. При этом инвазивный статус *C. quinquefasciatus* окончательно не ясен: не исключено, что он обитал на территории Армении и ранее как редкий вид или в качестве гибридной формы.

Считается, что *Culex quinquefasciatus*, как и *Aedes albopictus*, имеет восточноазиатское происхождение [Farajollahi et al., 2011]. Появление обоих видов в Армении с разницей в несколько лет выглядит неслучайным, хотя происходило разными путями: *Aedes albopictus* был завезен на Черноморское побережье Кавказа [Ганушкина и др., 2013], впоследствии заселив Армению с севера – через Абхазию и Грузию, – тогда как *Culex quinquefasciatus* продвигался с юга, что, вероятно, связано с потеплением. Потепление – ведущий фактор расширения ареала для *Aedes albopictus* [Федорова и др., 2018]: холодостойкость диапаузирующих яиц умеренно-климатических инвазивных популяций вида ограничивается температурой –10 °C [Tippelt et al., 2020]. Распространение *Culex quinquefasciatus* в Армении не ограничивается приграничными районами на юге: с 2022 по 2023 год он продвинулся почти на градус в северном направлении и найден на высоте до 1500 м в окрестностях села Армаш. Кроме того, самцы *C. pipiens* образуют жизнеспособные гибриды с самками *C. quinquefasciatus*, способствуя продвижению последнего на север.

Не исключено появление в Армении еще двух инвазивных видов – *Aedes aegypti* (Linnaeus, 1762) афри-

канского и *A. koreicus* (Edwards, 1917) азиатского происхождения [Shcherbakov et al., 2023]. При этом надо учитывать, что *A. albopictus* и *A. aegypti* занимают практически идентичные экологические ниши, в результате чего более конкурентоспособный *A. albopictus* вытесняет *A. aegypti* [Hopperstadt et al., 2019].

Особый интерес – как теоретический, так и практический – представляет распределение кровососущих комаров в плане вертикальной поясности. Из-за связи с температурами такое распределение в общих чертах сходно со сменой видов в широтном направлении. Выше 1465 м (Гетк, Хорс) встретились исключительно представители подрода *Ochlerotatus* рода *Aedes* (*A. caspius*, *A. cyprius*, *A. euedes*, *A. excrucians*, *A. flavescens*, *A. riparius*). Кроме того, на сходных высотах обнаружен позднелетний *A. cinereus* [Paronyan et al., 2020]. Такой состав близок к составу кулицид на широте северной тайги и лесотундры [Малькова и др., 2013]. Можно ожидать, что в высокогорье обитает еще несколько не известных для Армении видов. Анализ сезонной сукцессии таксонов выявил присутствие представителей подродов *Finlaya* и *Stegomyia* (род *Aedes*) на высотах 1100–1300 м. Виды рода *Culex* в наших исследованиях встретились на высотах 394–1460 м, но отмечены и выше [Paronyan et al., 2020].

Высокогорные адаптации проявили малярийные комары *Anopheles claviger* [Халин, Горностаева, 2008; Paronyan et al., 2020] и *A. maculipennis* s. str. Личинки последнего отловлены на высоте 1917 м (Лчашен, побережье озера Севан), что не является его высотным пределом. Аналогичный результат получен из Сюникской области (Брнакот, 2000 м) и Апаранской котловины (Кучак, 1894 м) [Гордеев, Москаев, 2013]. Это характеризует *A. maculipennis* s. str. не как предгорный [Гордеев, Москаев, 2013], а как хорошо приспособленный к высотному градиенту вид. В Иране, Турции и России (Дагестан) *A. sacharovi* отмечен на высотах до 2300 м [Yurttas, Alten, 2006; Hanafi-Bojd et al., 2011; Гаджиева, 2021]. В наших исследованиях наиболее высокая точка обнаружения *A. sacharovi* – 865 м, однако ранее вид был зарегистрирован в Агавнадзоре на высоте 1610 м [Гордеев, Москаев, 2013].

Виды *A. messeae* Falleroni, 1826 и *A. daciae* Linton, Nicolescu et Harbach, 2004 подгруппы *maculipennis* на Урале и на Алтае встречались до высот 1300–1600 м [Вигоров и др., 2015; Burlak et al., 2022], но в Армении не обнаружены даже в северных областях на высотах 300–400 м, что может быть связано с микроклиматом или наличием местных видов подгруппы *maculipennis*. Это подтверждает предположение о прохождении границы ареала *A. messeae* и *A. daciae* по Большому Кавказскому хребту [Гордеев, Москаев, 2013], хотя и требует уточнения из-за наличия *A. messeae* в Иране [Shcherbakov et al., 2023]. Виды *A. hyrcanus* и *A. superpictus* встречены до высоты 840 м [Гордеев, Москаев, 2013]. Для детального установления закономерностей вертикального распределения кулицид в Армении собранных данных недостаточно.

В Армении зарегистрировано 6 видов рода *Anopheles*: *A. maculipennis*, *A. sacharovi*, *A. claviger*, *A. plumbeus*, *A. hyrcanus*, *A. superpictus* [Горностаева,

Данилов, 2001, 2002; Гордеев, Москаев, 2013; Robert et al., 2019; Paronyan et al., 2020; Shcherbakov et al., 2023]. В кавказском макрорегионе помимо обнаруженного нами в Ставрополье *A. daciae* (неопубликованные данные) отмечены еще 6 видов рода: *A. messeae*, *A. melanoon*, *A. atroparvus*, *A. persiensis*, *A. algeriensis* Theobald, 1903, *A. pulcherrimus* Theobald, 1902 [Гордеев и др., 2011; Гордеев, Москаев, 2013; Намазов, 2013; Robert et al., 2019; Гаджиева, 2021; Shcherbakov et al., 2023]. Последний найден на южном побережье Каспийского моря [Hanafi-Bojd et al., 2011], однако ни в России, ни в Армении ранее не регистрировался [Горностаева, 2000, 2003; Горностаева, Данилов, 2001; Robert et al., 2019; Shcherbakov et al., 2023], поэтому указания требуют подтверждения. Число видов малярийных комаров в Иране достигает 27 за счет тропического подрода *Cellia* рода *Anopheles* [Shcherbakov et al., 2023]. Также здесь выявлен новый для севера страны *A. pseudopictus* Grassi, 1899 комплекса *hyrcanus* [Azari-Namidian et al., 2009], появления которого также можно ожидать на юге Армении, учитывая экспансию *Culex quinquefasciatus*. Вероятность обнаружения тяготеющих к морскому климату *Anopheles melanoon* (северо-восток Причерноморья) и *A. persiensis* (юг Прикаспия) в Армении низка, *A. atroparvus* – маловероятна из-за высот, *A. algeriensis* – возможна в районе специфических мест выплода, родниковых болот [Горностаева, 2003].

Фауна кулицид Армении в настоящий момент включает 40 видов. Анализ литературы показывает: видовой состав кровососущих комаров Армении нуждается в дальнейшем изучении в связи с изменением климата, а также с появлением инвазивных видов, в основном имеющих эпидемическое и эпизоотическое значение. Большая часть видов (в том числе еще не обнаруженных из-за проблемы редких и криптических видов) – аборигены. Инвазивные виды – *Aedes albopictus* и, возможно, *Culex quinquefasciatus*. Учитывая состав фаун сопредельных территорий, а также активное внедрение методов молекулярной диагностики, позволяющих различать виды-двойники, в ближайшее десятилетие можно ожидать дальнейшего пополнения списка видов.

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## К познанию фауны чешуекрылых Монголии. Семейство хохлатки (Lepidoptera: Noctuoidea: Notodontidae)

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**Резюме.** Приведен аннотированный каталог 21 вида хохлаток, собранных в Монголии в основном энтомологическим отрядом совместной российско-монгольской комплексной биологической экспедиции Российской академии наук и Академии наук Монголии в 2002–2005 и 2007–2008 годах. Впервые для Монголии указан *Pterostoma grisea* (Bremer, 1861). Для отдельных аймаков впервые приведены следующие виды: *Cerura felina* (Butler, 1877) для Сэлэнгэ, Хэнтия и Дорнода, *C. przewalskii* (Alphéraky, 1882) для Завхана и Говь-Алтая, *Furcula aeruginosa* (Christoph, 1872) для Завхана, *Notodonta torva* (Hübner, 1803) для Завхана и Дорнода, *Pheosia rimosa* Packard, 1864 для Хувсгела и Дорнода, *Furcula furcula* (Clerck, 1759), *Nerice davidi* Oberthür, 1881, *Ptilodon capucina* (Linnaeus, 1758), *Phalera bucephala* (Linnaeus, 1758) и *Clostera anachoreta* ([Denis et Schiffermüller], 1775) для Дорнода, *Clostera albosigma* Fitch, 1856 для Завхана, Хувсгела, Хэнтия и Дорнода, *Clostera anastomosis* (Linnaeus, 1758) для Улан-Батора и Дорнода, *Clostera curtula* (Linnaeus, 1758) для Завхана, *Clostera pigra* (Hufnagel, 1766) для Хувсгела и Дорнода и *Pterotes eugenia* (Staudinger, 1896) для Баян-Улгия. Уточнено типовое местонахождение таксонов чешуекрылых, описанных по сборам миссионера-лазариста Армана Давида (1826–1900) из «le nord de la Chine».

**Ключевые слова:** Lepidoptera, Noctuoidea, Notodontidae, новые находки, кормовые растения, систематика, Монголия.

### To the knowledge of the fauna of Lepidoptera of Mongolia. The family prominent moths (Lepidoptera: Noctuoidea: Notodontidae)

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**Abstract.** An annotated catalogue of 21 species of prominent moths collected in Mongolia, mainly by the entomological division of the joint Russian-Mongolian complex biological expedition of the Russian Academy of Sciences and the Mongolian Academy of Sciences in 2002–2005 and 2007–2008, is provided. *Pterostoma grisea* (Bremer, 1861) is reported for Mongolia for the first time. For some aimag the following species are listed for the first time: *Cerura felina* (Butler, 1877) for Selenge, Khentii and Dornod, *C. przewalskii* (Alphéraky, 1882) for Zavkhan and Govi-Altai, *Furcula aeruginosa* (Christoph, 1872) and *Clostera curtula* (Linnaeus, 1758) for Zavkhan, *Notodonta torva* (Hübner, 1803) for Zavkhan and Dornod, *Pheosia rimosa* Packard, 1864 for Khövsgöl and Dornod, *Furcula furcula* (Clerck, 1759), *Nerice davidi* Oberthür, 1881, *Ptilodon capucina* (Linnaeus, 1758), *Phalera bucephala* (Linnaeus, 1758) and *Clostera anachoreta* ([Denis et Schiffermüller], 1775) for Dornod, *Clostera albosigma* Fitch, 1856 for Zavkhan, Khövsgöl, Khentii and Dornod, *Clostera anastomosis* (Linnaeus, 1758) for Ulaanbaatar and Dornod, *Clostera pigra* (Hufnagel, 1766) for Khövsgöl and Dornod, and *Pterotes eugenia* (Staudinger, 1896) for Bayan-Ölgii. The type locality of Lepidoptera taxa described from the collections of the Lazarist missionary Armand David (1826–1900) from “le nord de la Chine” has been clarified.

**Key words:** Lepidoptera, Noctuoidea, Notodontidae, new records, host plants, systematics, Mongolia.

## Введение

Первая находка семейства хохлаток (Lepidoptera: Notodontidae) в Монголии была сделана безымянным казаком, обученным коллекционировать бабочек известным австрийским колеоптерологом, а впоследствии знатоком археологии Восточной Сибири и Монголии Г. Ледером [Борисенко, 2010]. Эта находка единственного самца *Pterotes eugenia* (Staudinger, 1896) была опубликована знаменитым немецким лепидоптерологом Штаудингером [Staudinger, 1900], но первоначальным описанием является рисунок 13 из пятой таблицы, опубликованной в работе о бабочках окрестностей Улиастая (Завхан) [Staudinger, 1896].

В довольно обширных энтомологических сборах экспедиций П.К. Козлова (1905, 1909, 1924–1926

и 1929 годы) [Кержнер, 1972] было обнаружено только шесть экземпляров хохлаток двух видов – *Ptilodon capucina* (Linnaeus, 1758) и *Clostera pigra* (Hufnagel, 1766) [Золотухин, 1994]. В этой же работе также был указан *Pterotes eugenia* впервые для аймаков Дорногови и Дорнода.

Экспедициями Касаба в Монголию (1963–1968) было собрано 41283 экземпляра бабочек [Kasab, 1983], из которых только 55 экземпляров принадлежит к следующим шести видам Notodontidae: *Cerura przewalskii* (Alphéraky, 1882), *Furcula aeruginosa* (Christoph, 1872) (как *Harpyia petri ludovicae* (Püngeler, 1901)), *Furcula furcula* (Clerck, 1759) (как *Harpyia infumata* Staudinger, 1887), *Nerice davidi* Oberthür, 1881, *Ptilodon capucina* (Linnaeus, 1758) (как *Lophopterix camelina* (Linnaeus, 1758)) и *Pterotes eugenia* (Staudinger, 1896) (как *Pteroma*

*eugenia* Staudinger, 1896) [Daniel, 1965a, 1967, 1969, 1970, 1973]. Пять из них, кроме *P. eugenia*, оказались новыми для фауны Монголии.

Позднее была опубликована статья о результатах монгольско-германской биологической экспедиции 1974–1980 годов [Grosser, 1982]. В ней приведено три вида, из которых *Cerura przewalskii* (Alphéraky, 1882) (как *Cerura vinula* Linnaeus, 1758) и *Clostera curtula* (Linnaeus, 1758) впервые указаны для страны.

С начала XXI века был организован ряд лепидоптерологических экспедиций в различные районы Монголии. Результаты многих из них уже опубликованы. В некоторых из них приведена информация о хохлатках. Так, в работе Балинта с соавторами [Bálint et al., 2006] сказано о нахождении восьми видов, из которых *Notodonta torva* (Hübner, 1803) и *Phalera bucephala* (Linnaeus, 1758) впервые отмечены в фауне Монголии. Морозов с соавторами [Morozov et al., 2016] впервые для страны указали два вида: *Pheosia tremula* (Clerck, 1759) и *Notodonta ziczac* (Linnaeus, 1758).

В прекрасно иллюстрированном обзоре хохлаток Палеарктики [Schintlmeister, 2008] имеется информация о 19 видах хохлаток, известных в фауне Монголии. К сожалению, в нем не приведены конкретные места находок, а отмеченные на мелкомасштабной карте точки в большинстве случаев не позволяют узнать местонахождение даже для аймака.

В 2002 году по рекомендации академика РАН Ю.Ю. Дгебуадзе в совместной российско-монгольской комплексной биологической экспедиции РАН и Академии наук Монголии был организован энтомологический отряд. Основной целью отряда была каталогизация чешуекрылых Монголии. За шесть полевых сезонов (2002–2005 и 2007–2008) экспедиционными маршрутами были охвачены все аймаки страны, кроме Баян-Улгия, в которых ранее был собран достаточно обширный материал. По материалам экспедиции был опубликован ряд статей [Пунцагдулам и др., 2005; Тузов и др., 2005; Сидоров и др., 2010; Загоринский и др., 2010; Efetov et al., 2012; Gorbunov, 2023 и др.]. Настоящая статья касается фаунистического состава бабочек-хохлаток (Lepidoptera: Notodontidae) Монголии, собранных во время работы отряда. Немногочисленные сборы были переданы К.А. Колесниченко и В.Ю. Савицким. Дополнительно в обзор включены *Eligmodonta ziczac* (Linnaeus, 1758), *Notodonta dromedarius* (Linnaeus, 1767) и *Pheosia tremula* (Clerck, 1759), которые отсутствуют в наших сборах, но указаны для конкретных местонахождений в литературе.

## Материал и методы

Материал был собран с использованием ртутных ламп ДРЛ-250 и ДРВ-160. Источником электричества служил бензиновый генератор Honda мощностью 2.5 кВт. Фотографии насекомых в природе в 2002–2005 годах сделаны фотоаппаратом Minolta Dynax 7D на пленку Kodak Ectachrom E100, которая сканировалась на слайд-сканере Nikon CoolScan LS-2000, а в 2007–2008 годах – цифровой фотокамерой Konica

Minolta Dynax 5d. Расправленные бабочки сфотографированы цифровой фотокамерой Sony Alpha DSLR α-450. Для всех фотоаппаратов использовался объектив Minolta 50 mm f/2.8 Macro. Под каждую сфотографированную бабочку подколота этикетка, содержащая название семейства, год и номера снимков, например «Notodontidae pictures №№ 0011-0012–2015». Конечная обработка иллюстраций проводилась с использованием Photoshop CC.

Систематика семейства в статье полностью соответствует таковой, принятой во втором издании каталога чешуекрылых России [Матов, Дубатолов, 2019, 2024], но последовательность родов и видов в родах приводится в алфавитном порядке. О наличии подвигов указывается в подразделе «Замечания». В синонимию включены наиболее употребляемые синонимы в основном таксонов из азиатской части Палеарктики. Для каждого таксона в кавычках приведено оригинальное написание из первоначальной публикации. В случае, если работа публиковалась в течение ряда лет, после оригинального написания таксона в квадратных скобках указана действительная дата опубликования.

Для таксонов, описанных с территории Монголии, приведены сведения о номенклатурном типе и месте его хранения.

В подраздел «Указания для страны» включены только те работы, в которых указаны конкретные местонахождения вида в Монголии, и работы, содержащие сведения о биологических особенностях таксона. Все работы с обобщенным указанием распространения таксона в Монголии проигнорированы. Данные о нахождении в Монголии *Furcula bicuspis* (Borkhausen, 1790) были взяты с электронного ресурса iNaturalist [2023].

Географические названия даны в соответствии со справочной картой Монголии [Страны..., 2002].

Экземпляры, собранные К.А. Колесниченко и В.Ю. Савицким, будут переданы в коллекцию Зоологического музея МГУ им. М.В. Ломоносова (Москва, Россия), весь остальной материал передан на хранение в коллекцию Зоологического института Российской академии наук (Санкт-Петербург, Россия). Голотипы описанных из Монголии таксонов хранятся в коллекции А. Шинтльмайстера (A. Schintlmeister, Дрезден, Германия (в тексте CASD)) и в Музее естествознания в Берлине (Naturhistorisches Forschungsinstitut, Museum für Naturkunde, Zentralinstitut der Humboldt-Universität zu Berlin, ZMNB, Берлин, Германия).

### Семейство Notodontidae Stephens, 1829

#### Подсемейство Cerurinae Butler, 1881

#### Род *Cerura* Schrank, 1802

#### *Cerura felina* (Butler, 1877)

(Рис. 1, 2, 40, 41, 54)

«*Dicranura felina*, n. sp.»: Butler, 1877: 474 (типичное местонахождение: «Yokohama» (= Япония: Хонсю, Йокохама)).

= «*Dicranura Askolda*, Oberthür...»: Oberthür, 1880: 59, pl. VIII, fig. 8 (типичное местонахождение: «de l'île Askold» (= Россия: Приморский край, остров Аскольд)).

**Материал.** 1♀ (Notodontidae pictures №№ 0029-0030–2013), Сэлэнгэ, 60 км СВ Дархана, 49°52'N / 106°33'E, 800 м, 22.07.2003 (О.Г. Гор-



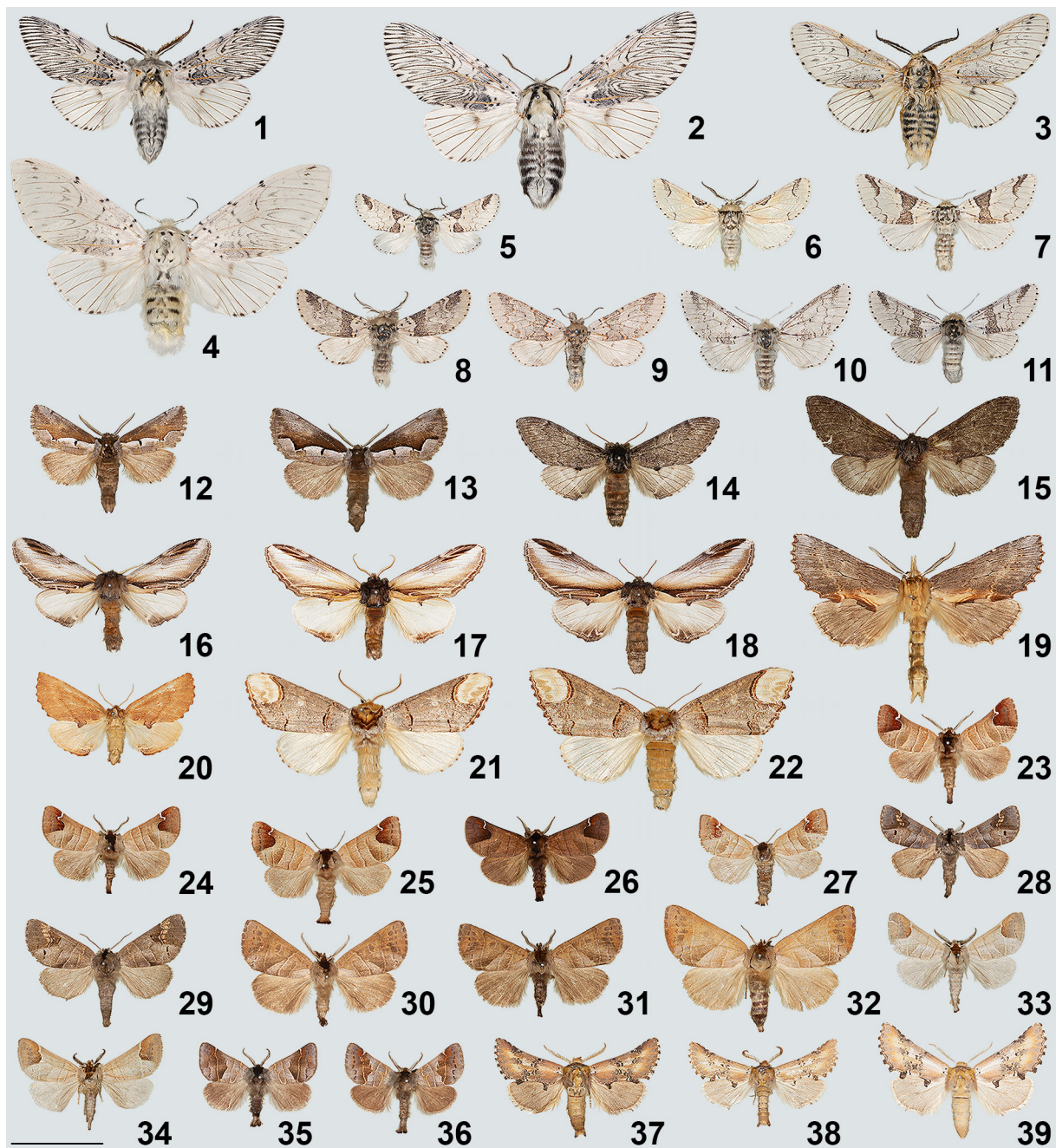


Рис. 1–39. Виды Notodontidae Монголии.

1–2 – *Cerura felina*: 1 – самец (Дорнод), 2 – самка (Дорнод); 3–4 – *Cerura przewalskii*: 3 – самец (Говь-Алтай), 4 – самка (Ховд); 5–7 – *Furcula aeruginosa*: 5 – самец (Завхан), 6 – самец (Ховд), 7 – самка (Ховд); 8 – *Furcula bifida*, самка (Улан-Батор); 9–11 – *Furcula furcula*: 9 – самец (Дорнод), 10–11 – самки (Булган); 12–13 – *Nerice davidi*: 12 – самец (Дорнод), 13 – самка (Сэлэнгэ); 14–15 – *Notodonta torva*: 14 – самец (Завхан), 15 – самка (Дорнод); 16–18 – *Pheosia rimosa*: 16 – самец (Хувсгел), 17 – самец (Дорнод), 18 – самка (Улан-Батор); 19 – *Pterostoma grisea*, самец (Дорнод); 20 – *Ptilodon capucina*, самец (Дорнод); 21–22 – *Phalera bucephala*: 21 – самец (Дорнод), 22 – самка (Дорнод); 23–27 – *Clostera albosigma*: 23 – самец (Улан-Батор), 24–25 – самцы (Дорнод), 26 – самец (Хэнтий), 27 – самка (Завхан); 28–29 – *Clostera anachoreta*: 28 – самец (Дорнод), 29 – самка (Дорнод); 30–32 – *Clostera anastomosis*: 30 – самец (Улан-Батор), 31 – самец (Дорнод), 32 – самка (Дорнод); 33–34 – *Clostera curtula*, самцы (Завхан); 35–36 – *Clostera pigra*: 35 – самец (Дорнод), 36 – самец (Хувсгел); 37–39 – *Pterotes eugenia*: 37 – самец (Архангай), 38 – самец (Дорнод), 39 – самка (Архангай). Масштабная линейка 2 см.

Figs 1–39. Notodontidae spp. of Mongolia.

1–2 – *Cerura felina*: 1 – male (Dornod), 2 – female (Dornod); 3–4 – *Cerura przewalskii*: 3 – male (Gobi-Altai), 4 – female (Khovd); 5–7 – *Furcula aeruginosa*: 5 – male (Zavkhan), 6 – male (Khovd), 7 – female (Khovd); 8 – *Furcula bifida*, female (Ulaanbaatar); 9–11 – *Furcula furcula*: 9 – male (Dornod), 10–11 – females (Bulgan); 12–13 – *Nerice davidi*: 12 – male (Dornod), 13 – female (Selenge); 14–15 – *Notodonta torva*: 14 – male (Zavkhan), 15 – female (Dornod); 16–18 – *Pheosia rimosa*: 16 – male (Khövsgöl), 17 – male (Dornod), 18 – female (Ulaanbaatar); 19 – *Pterostoma grisea*, male (Dornod); 20 – *Ptilodon capucina*, male (Dornod); 21–22 – *Phalera bucephala*: 21 – male (Dornod), 22 – female (Dornod); 23–27 – *Clostera albosigma*: 23 – male (Ulaanbaatar), 24–25 – males (Dornod), 26 – male (Khentii), 27 – female (Zavkhan); 28–29 – *Clostera anachoreta*: 28 – male (Dornod), 29 – female (Dornod); 30–32 – *Clostera anastomosis*: 30 – male (Ulaanbaatar), 31 – male (Dornod), 32 – female (Dornod); 33–34 – *Clostera curtula*, males (Zavkhan); 35–36 – *Clostera pigra*: 35 – male (Dornod), 36 – male (Khövsgöl); 37–39 – *Pterotes eugenia*: 37 – male (Arkhangay), 38 – male (Dornod), 39 – female (Arkhangay). Scale bar 2 cm.





Рис. 40–45. Виды Notodontidae Монголии в природе.

40–41 – *Cerura felina*, взрослая гусеница (Хэнтий, Ундерхаан, правый берег р. Керулен, 47°16'N / 110°37'E, 1350 м, 25.06.2004): 40 – вид сбоку, 41 – вид сверху; 42 – *Cerura przewalskii*, самка (Ховд, 35 км С Уенча, 46°23'N / 92°08'E, 2000 м, 16.06.2007); 43 – *Furcula aeruginosa*, самец (Ховд, 8 км С Уенча, 46°07'N / 92°03'E, 1800 м, 21–22.06.2007); 44–45 – *Furcula furcula*: 44 – самец (Дорнод, 91 км ЮВ Халхгола, 47°00'N / 119°22'E, 875 м, 8–9.07.2008), 45 – самка (Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008).

Figs 40–45. Notodontidae spp. of Mongolia in nature.

40–41 – *Cerura felina*, last instar larva (Khentii, Öndörkhаan, right bank of the Kerulen River, 47°16'N / 110°37'E, 1350 m, 25.06.2004): 40 – lateral view, 41 – dorsal view; 42 – *Cerura przewalskii*, female (Khovd, 35 km N of Uench, 46°23'N / 92°08'E, 2000 m, 16.06.2007); 43 – *Furcula aeruginosa*, male (Khovd, 8 km N of Uench, 46°07'N / 92°03'E, 1800 m, 21–22.06.2007); 44–45 – *Furcula furcula*: 44 – male (Dornod, 91 km SE of Khalkhol, 47°00'N / 119°22'E, 875 m, 8–9.07.2008), 45 – female (Dornod, 17 km ESE of Khalkhol, 47°34'N / 118°49'E, 700 m, 10–11.07.2008).

бунов, Ф. Игари); 1♂, Улан-Батор, база совместной российско-монгольской комплексной биологической экспедиции, 47°55'N / 107°00'E, 1400 м, 5–6.06.2004 (О.Г. Горбунов); 1♂, Хэнтий, Ундерхаан, правый берег р. Керулен, 47°16' N / 110°37' E, 1350 м, 24–25.06.2004 (О.Г. Горбунов); 1♂, Дорнод, 91 км ЮВ Халхгола, 47°00'N / 119°22'E, 875 м, 8–9.07.2008 (О.Г. Горбунов); 1♂ (Notodontidae pictures №№ 0027–0028–2013), 1♀ (Notodontidae pictures №№ 0031–0032–2013) ex l., там же, на Salix sp. (Salicaceae), 9.07.2008, бабочки вывелись 1 и 3.06.2009 (О.Г. Горбунов) (рис. 1, 2).

**Указания для страны.** В работе Шинтмайстера [Schintlmeister, 2008: 117] приведен для Северной Монголии без конкретного местонахождения, хотя на карте стоит значок местонахождения примерно в районе Улан-Батора [Schintlmeister, 2008: fig. 478].

**Биология.** Гусеницы (рис. 40, 41) на Salix spp. (Salicaceae). В других частях ареала также отмечены на Populus spp. (Salicaceae), Alnus japonica и Betula spp. (Betulaceae). Яйца откладывает на верхнюю сторону листа или веточки кормового растения поодиночке или группой по несколько штук. Зимует куколка в плотном коконе, расположенном на ветке или стволе кормового растения. Бабочки в июне – июле в одной генерации.

**Распространение.** Локально в интразональных биотопах, например в приречных лесах, от Алтая и Саян на западе до Сахалина, Южных Курил и Японии на востоке и от юга Магаданской области на севере



до Южного Китая на юге. Считается викарным видом *C. vinula* (Linnaeus, 1758). Монголия (рис. 54): Улан-Батор, Сэлэнгэ, Хэнтий и Дорнод. Впервые приводится для аймаков Сэлэнгэ, Хэнтий и Дорнод.

*Cerura przewalskii* (Alphéraky, 1882)  
(Рис. 3, 4, 42, 55)

«*Harpyia Przewalskii* Alph. n. sp.»: Alphéraky, 1882: 38 (типичное местонахождение: «près du Khorgosse» (= Китай: Синьцзян-Уйгурский автономный район, окрестности Хоргоса)).

**Материал.** 1♂, Завхан, 20 км СЗ Тэса, 49°46.40'N / 95°35.10'E, 1580 м, 2–3.07.2005 (О.Г. Горбунов); 1♀ (Notodontidae pictures №№ 0023-0024–2013), Ховд, 35 км С Уенча, 46°23'N / 92°08'E, 2000 м, 16.06.2007 (О.Г. Горбунов) (рис. 4, 42); 1♀ (Notodontidae pictures №№ 0021-0022–2013), там же, 16–17.06.2007 (О.Г. Горбунов); 1♂, Ховд, 31 км ССВ Булгана, 46°21.5'N / 91°41.1'E, 1930 м, 17.06.2012 (К.А. Колесниченко); 1♂, Ховд, 7 км Ю Алтая, 45°46.2'N / 92°12.2'E, 1290 м, 20.06.2012 (К.А. Колесниченко); 1♂ (Notodontidae pictures №№ 0597-0598–2024), 1♀, Говь-Алтай, 57 км ССЗ Алтая, 46°49.917'N / 95°54.917'E, 2050 м, 25.07.2023 (В.Ю. Савицкий) (рис. 3).

**Указания для страны.** Daniel, 1969: 273; Grosser, 1982: 139 (*Cerura vinula*); Bálint et al., 2006: 100; Makhov et al., 2024: 583.

**Биология.** Неизвестна, но материал в Монголии был собран в приречных лесных зарослях, основными древесными растениями в которых являются *Populus* spp. и *Salix* spp. (Salicaceae). По-видимому, их следует считать кормовыми растениями. Бабочки в июне – июле в одной генерации.

**Распространение.** Локально в интразональных биотопах, например в приречных лесах, в республиках Средней Азии (Узбекистан, Таджикистан, Кыргызстан), в Восточном Казахстане, Западной Монголии и Северо-Западном Китае (Синьцзян-Уйгурский автономный район). Монголия (рис. 55): Ховд, Завхан и Говь-Алтай. Впервые приводится для аймаков Завхан и Говь-Алтай.

**Род *Furcula* Lamarck, 1816**  
*Furcula aeruginosa* (Christoph, 1872)  
(Рис. 5–7, 43, 56)

«*Harpia aeruginosa* nov. sp.»: Christoph, 1872: 4, Taf. 1, fig. 1 (типичное местонахождение не указано (= Россия: Волгоградская область, Сарепта [Schintlmeister, 2013: 167])).

= «*Harpyia Petri* Alph. nov. sp.»: Alphéraky, 1882: 37 (типичное местонахождение: «près du Khorgosse» (= Китай: Синьцзян-Уйгурский автономный район, окрестности Хоргоса)).

= «*Cerura ludoviciae* n. sp.»: Püngeler, 1901: 180, Taf. II, fig. 15 (типичное местонахождение: «von Aksu» [Daniel, 1965b: 22]) (= Китай: Синьцзян-Уйгурский автономный район, Аксу)).

= «*Cerura ludovicior* sp. n.»: Gaede, 1933: 174, pl. 14, row c (типичное местонахождение: «Maral-Bashi» (= Китай: Синьцзян-Уйгурский автономный район, уезд Бачу)).

= «*Harpyia sibirica* sp. n.»: Daniel, 1965b: 33, fig. 12, Taf. 5, fig. 57 (типичное местонахождение: «Sibiria oc., distr. Barnaul, Razskazicha» (= Россия: Алтайский край, Первомайский район, Рассказиха)).

= «*Furcula aeruginosa mongolica* ssp. n.»: Schintlmeister, 1998: 83, pl. 2, figs 7–9, GU 1, fig. 1 (типичное местонахождение: «Mongolia, Chovd aimak, Dsungar Gobi, Bulgan sum» (= Монголия: Ховд, Булган)). Голотип ♂ (CASD).

**Материал.** 1♂ (Notodontidae pictures №№ 0049-0050–2015), Завхан, 15 км З Цагаанхайрхана, 47°28'N / 96°43'E, 1750 м, 4–5.07.2003 (О.Г. Горбунов, Ф. Игари) (рис. 5); 2♂, Ховд, 18 км ССЗ Булгана, 46°14'N /

91°27'E, 1260 м, 20–21.06.2006 (О.Г. Горбунов); 1♀, там же, 19–20.06.2007 (О.Г. Горбунов); 3♀ (Notodontidae pictures №№ 0039-0044–2015), Ховд, 35 км С Уенча, 46°23'N / 92°08'E, 2000 м, 16.06.2007 (О.Г. Горбунов) (рис. 7); 2♂, 1♀, Ховд, 8 км С Уенча, 46°07'N / 92°03'E, 1800 м, 21–22.06.2007 (О.Г. Горбунов) (рис. 43); 5♂ (Notodontidae pictures №№ 0047-0048–2015), там же, 22–23.06.2007 (О.Г. Горбунов) (рис. 6); 3♂ (Notodontidae pictures №№ 0045-0046–2015), Ховд, 6 км ССЗ Уенча, берег р. Тагил-Гол, 19.06.2012 (К.А. Колесниченко).

**Указания для страны.** Daniel, 1969: 273 (*Harpyia petri ludoviciae*); Daniel, 1973: 168 (*Harpyia petri ludoviciae*); Grosser, 1982: 139 (*Harpyia interrupta*); Schintlmeister, 1998: 83, pl. 2, figs 7–9, GU 1, fig. 1.

**Биология.** Кормовое растение гусениц в Монголии неизвестно, но, судя по приуроченности к пойменным лесам, весьма вероятно, что гусеницы питаются *Populus* spp. и/или *Salix* spp. (Salicaceae). Бабочки в июне – июле в одной генерации.

**Замечания.** Вид разделен на 5 подвидов, из которых в Монголии отмечен *F. a. mongolica* Schintlmeister, 1998.

**Распространение.** Локально от Новороссии на западе до Западной Монголии на востоке и от Южного Урала и Томской области на севере до Северо-Западного Китая (Синьцзян-Уйгурский автономный район) на юге. Монголия (рис. 56): Увс, Ховд и Завхан. Впервые приводится для аймака Завхан.

*Furcula bicuspis* (Borkhausen, 1790)  
(Рис. 57)

«*Phal.[aena] Bombyx Bicuspis*»: Borkhausen, 1790: 380 (типичное местонахождение не указано ((? Германия)).

= «*Cerura lanigera*, n. sp.»: Butler, 1877: 474 (типичное местонахождение: «Nakodaté» (= Япония: Хоккайдо, Хакодате)).

= «*Cerura bicuspis* Bkh. *transiens* nova»: Круликовский, 1909: 302 (типичное местонахождение: «в Урж. [уме]» (= Россия: Кировская область, Уржум)).

= «*Cerura bicuspis kurilensis* n. f.»: Matsumura, 1929a: 166 (типичное местонахождение: «Kuriles; ...at Toshokunai» (= Россия: Курильские острова, остров Кунашир, окрестности мыса Петрова)).

**Указание для страны.** iNaturalist, 2023.

**Биология.** Гусеницы на *Betula* spp., *Alnus* spp. (Betulaceae). Гусеница этого вида в Монголии сфотографирована на листе березы (*Betula* sp.) [iNaturalist, 2023, <https://www.inaturalist.org/observations/228406815>]. Яйца откладывает на верхнюю сторону листа и веточки кормового растения. Зимует куколка в плотном коконе, расположенном на ветке кормового растения. Бабочки в мае – июне и в конце июля – августе в двух генерациях.

**Замечания.** Вид разделен на 3 подвида, из которых в Монголии отмечен номинативный.

**Распространение.** Лесная зона Палеарктики от Франции и Англии на западе до Сахалина, Южных Курил и Японии на востоке и от Северной Финляндии на севере до Северной Испании и Южной Кореи на востоке, Северная Америка. Монголия (рис. 57): известен по фотографии из Сэлэнгэ. Кроме этого, в работе Шинтлмайстера [Schintlmeister, 2008: 131] приведен для Монголии без конкретного местонахождения, хотя на карте стоит значок местонахождения примерно в районе Улан-Батора [Schintlmeister, 2008: fig. 545].

*Furcula bifida* (Brahm, 1787)  
(Рис. 8, 58)

«*Phalena bifida*»: Brahm, 1787: 161 (типичное местонахождение: «um Mainz» (= Германия: Рейнланд-Пфальц, Майнц)).

= «*[Phalaena Noctua.] Hermelina*»: Goeze, 1781: 227 (типичное местонахождение не указано («Germany, Frankfurt/Main» [Schintlmeister, 2013: 168] (= Германия: Франкфурт-на-Майне)). Младший первичный ономим *Phalaena Noctua hermelina* Goeze, 1781 (= *Phalaena ludifica* Linnaeus, 1758) (Lepidoptera: Noctuidae)).

= «*Cerura bifida lype* nov. subspec.»: Seifers, 1933: 107, Abb. 1 (типичное местонахождение: «in Lappland in der Umgebung des Torne-Träsk in Höhe von ca. 700 m» (= Швеция: лен Норрботтен, окрестности озера Турнетреск)).

= «*Cerura bifida* Hbn. *septentrionalis* nov. subsp.»: Rangnow, 1935: 190, Abb. II, fig. 15 (типичное местонахождение: «aus Lappland» (= Швеция: лен Норрботтен, Лулео)).

**Материал.** 1♀ (Notodontidae pictures №№ 0085-0086–2015), 40 км ВЮВ Улан-Батора, 47°49'N / 107°26'E, 1400 м, 9–10.06.2004 (О.Г. Горбунов) (рис. 8).

**Указание для страны.** В работе Шинтлмайстера [Schintlmeister, 2008: 132] приведен для Монголии без конкретного местонахождения, хотя на карте стоит значок местонахождения примерно в районе Улан-Батора [Schintlmeister, 2008: fig. 549].

**Биология.** Кормовое растение гусениц в Монголии неизвестно. В других частях ареала гусеницы на *Populus* spp. и *Salix* spp. (Salicaceae). Яйца откладывает на верхнюю сторону листа или веточки кормового растения. Зимует куколка в плотном коконе, расположенном на ветке кормового растения. Бабочки в июне в одной генерации.

**Замечания.** Вид разделен на 2 подвида, из которых в Монголии отмечен номинативный.

**Распространение.** Очень локально от Северо-Западной Африки (Марокко), Португалии, Франции и Англии на западе до Амурской области и Хабаровского края России на востоке и от Северной Швеции и Северной Финляндии на севере до Северо-Западной Африки, Турции и Северо-Западного Китая (Синьцзян-Уйгурский автономный район) на юге. Монголия (рис. 58): Улан-Батор.

*Furcula furcula* (Clerck, 1759)  
(Рис. 9–11, 44, 45, 59)

«*[Phalaena] furcula*»: Clerck, 1759: Tab. 9, fig. 9 (типичное местонахождение не указано (?? Швеция)).

= «*Furcula salicis*»: Lamarck, 1816: 582. Ненужное замещающее название *Phalaena furcula* Clerck, 1759, но с авторством «Fabricius».

= «*Harpyia forficula* Zetteri.»: Fischer, 1820–1822: 62, Tab. III, fig. 1, b–e (типичное местонахождение: «in Gubernio Mosquensi» (= Россия: Московская область)).

= «*Cerura sangaica*»: Moore, 1877: 90 (типичное местонахождение: «Shanghai» (= Китай: Шанхай)).

= «*Harpyia Bicuspis* Hb. var. ? *Infumata* Stgr.»: Staudinger, 1887: 214 (типичное местонахождение «Raddefka» (= Россия: Еврейская автономная область, Облученский район, Радае), по лектотипу [Schintlmeister, 1999: 177, Abb. 2, 45]).

= «*Harpyia intercalaris*, sp. nov.»: Grun-Grshimailo, 1900: 470 (типичное местонахождение: «ad urben Thien-tsing» (= Китай: Тяньцзинь)).

= «*Cerura* Schrnk. 1802 (*Harpyia* O.)... *Lanigera* Butl. ... v. ? *Pulviger* Stgr.»: Staudinger, 1901: 105 (типичное местонахождение: «Arm. c. (Lagodechi)» (= Грузия: Кахетия, Лагодехи)).

= «*C.[erura] bicuspis* Borkh. ... *japonica* form. nov.»: Grünberg, 1912a: 286, pl. 44, row c (типичное местонахождение: «Japanese» (= Япония)).

= «*Cerura furcula* subsp. *salicis*»: Lenz, 1924: 44 (типичное местонахождение: «in Herrsching in Oberbayern» (= Германия: Бавария, Хершинг-ам-Аммерзе)). Младший вторичный ономим *Furcula salicis* Lamarck, 1816.

= «*C.[erura] persica* Brtl.»: Gaede, 1933: 174, pl. 15, row d (типичное местонахождение: «N. Persia» (= Северный Иран)).

= «*Cerura furcula* ssp. n. *songuldakensis* m.»: Daniel, 1938: 2 (типичное местонахождение: «Asia minor sept. occ., Songuldak» (= Турция: провинция Зонгулдак)).

= «*Cerura furcula* ssp. n. *pseudobicuspis* m.»: Daniel, 1938: 2 (типичное местонахождение: «aus dem Elburs, Tacht I Suleiman, Vandarban, 1900–2200 m» (= Иран: провинция Мазендеран, Вандарбан)).

= «*Cerura lanigera* ssp. *urupura* m. (subsp. nova)»: Bryk, 1941: 145, Abb. 1 (типичное местонахождение: «Insel Urup, Tokotan Bay» (= Россия: Курильские острова, остров Уруп)).

= «*Cerura lanigera* ssp. *kansura* m. (subsp. nova)»: Bryk, 1941: 146 (типичное местонахождение: «S. Kansu» (= Китай: юг провинции Ганьсу)).

= «*Furcula furcula caucasica* ssp. n.»: Schintlmeister, 1981: 35, Abb. 5–10 (типичное местонахождение: «UdSSR, Nordkaukasus, Nordossetinische ASSR, Distrikt Alagir, Ortschaft Dshimdon» (= Россия: Республика Северная Осетия, Алагирский район, село Джими)).

= «*Furcula furcula turcica* ssp. nov.»: Schintlmeister, 1998: 79, pl. 1, figs 4–6 (типичное местонахождение: «Asia minor, Aksehir, 1000 m» (= Турция: провинция Конья, Акшехир)).

= «*Furcula furcula altaica* ssp. nov.»: Schintlmeister, 1998: 81, pl. 2, figs 10–12, 15, GU 2, fig. 3 (типичное местонахождение: «Russia, Altai Mts., Gorni-Altaij, Ak-tash, 50.18° N.B., 87.44° E.L. ca. 1500 m» (= Россия: Республика Алтай, окрестности Акташа)).

**Материал.** 1♀ (Notodontidae pictures №№ 0007-0008–2015), Сэлэнга, 13 км ЮЗ Суха-Батора, 50°08'N / 106°06'E, 16–17.07.2003 (О.Г. Горбунов, Ф. Игари); 2♂ (Notodontidae pictures №№ 0009-0012–2015), Дорнод, левый берег р. Нумерийн-Гол, 46°59'N / 119°22'E, 870 м, 20–21.06.2004 (О.Г. Горбунов); 5♀ (Notodontidae pictures №№ 0001-0006–2015), Булган, 12 км СЗ Рашаанта, 47°20'N / 103°40'E, 1250 м, 18–19.07.2004 (О.Г. Горбунов, К.А. Гунина) (рис. 10, 11); 4♂ (Notodontidae pictures №№ 0023-0026–2015, 0029-0030–2015), Дорнод, 91 км ЮВ Халхгола, 47°00'N / 119°22'E, 875 м, 8–9.07.2008 (О.Г. Горбунов) (рис. 44); 1♂, 1♀ (Notodontidae pictures №№ 0019-0020–2015), Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008 (О.Г. Горбунов) (рис. 9, 45); 1♂ (Notodontidae pictures №№ 0027-0028–2015), там же, 11–12.07.2008 (О.Г. Горбунов); 2♂ (Notodontidae pictures №№ 0015-0016–2015, 0021-0022–2015), Дорнод, 62 км СВ Чойбалсана, 48°27'N / 115°06'E, 690 м, 14–15.07.2008 (О.Г. Горбунов); 1♂ (Notodontidae pictures №№ 0013-0014–2015), 29 км Ю Чулухнорота, 49°36'N / 115°42'E, 600 м, 17–18.07.2008 (О.Г. Горбунов).

**Указания для страны.** Daniel, 1973: 168 (*Harpyia infumata*); Schintlmeister, 1998: 92, pl. 1, figs 14, 16; Enkhtur et al., 2021a: 10.

**Биология.** Кормовое растение гусениц в Монголии неизвестно. В других частях ареала гусеницы на *Populus* spp. и *Salix* spp. (Salicaceae). Яйца откладывает на верхнюю сторону листа или веточки кормового растения. Зимует куколка в плотном коконе, расположенном на ветке кормового растения. Бабочки в мае – июне и в конце июля – августе в двух генерациях.

**Замечания.** Вид разделен на 11 подвигов, из которых в Монголии отмечен *F. f. sangaica* Moore, 1877.

**Распространение.** Практически вся Голарктика, кроме экстремальных районов Арктики, высокогорий и пустынь. Монголия (рис. 59): Булган, Улан-Батор, Сэлэнга и Дорнод. Впервые приводится для аймака Дорнод.





Рис. 46–49. Виды Notodontidae Монголии в природе.

46 – *Nerice davidi*, самец (Дорнод, 10 км ЮЗ Матада, 46°52'N / 115°15'E, 880 м, 5–6.07.2008); 47 – *Notodonta torva*, самец (Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008); 48 – *Pheosia rimosa*, самец (Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008); 49 – *Pterostoma grisea*, самец (Дорнод, левый берег р. Халхин-Гол, 47°34'N / 118°49'E, 700 м, 15–16.06.2004).

Figs 46–49. Notodontidae spp. of Mongolia in nature.

46 – *Nerice davidi*, male (Dornod, 10 km SW of Matad, 46°52'N / 115°15'E, 880 m, 5–6.07.2008); 47 – *Notodonta torva*, male (Dornod, 17 km ESE of Khalkhgol, 47°34'N / 118°49'E, 700 m, 10–11.07.2008); 48 – *Pheosia rimosa*, male (Dornod, 17 km ESE of Khalkhgol, 47°34'N / 118°49'E, 700 m, 10–11.07.2008); 49 – *Pterostoma grisea*, male (Dornod, left bank of the Khalkhin Gol River, 47°34'N / 118°49'E, 700 m, 15–16.06.2004).





Рис. 50–53. Виды Notodontidae Монголии в природе.

50 – *Ptilodon capucina*, самец (Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008); 51 – *Phalera bucephala*, самец (Дорнод, 91 км ЮВ Халхгола, 47°00'N / 119°22'E, 875 м, 8–9.07.2008); 52 – *Clostera albosigma*, самец (40 км ВЮВ Улан-Батора, 47°49'N / 107°26'E, 1400 м, 10–11.07.2007); 53 – *Pterotes eugenia*, самец (Дорноговь, 66 км Ю Улаанбадраха, 42°59'N / 110°24'E, 1050 м, 27–28.06.2008).

Figs 50–53. Notodontidae spp. of Mongolia in nature.

50 – *Ptilodon capucina*, male (Dornod, 17 km ESE of Khalkhgal, 47°34'N / 118°49'E, 700 m, 10–11.07.2008); 51 – *Phalera bucephala*, male (Dornod, 91 km SE of Khalkhgal, 47°00'N / 119°22'E, 875 m, 8–9.07.2008); 52 – *Clostera albosigma*, male (40 km ESE of Ulaanbaatar, 47°49'N / 107°26'E, 1400 m, 10–11.07.2007); 53 – *Pterotes eugenia*, male (Dornogovi, 66 km S of Ulaanbadrakh, 42°59'N / 110°24'E, 1050 m, 27–28.06.2008).



**Подсемейство Notodontinae Stephens, 1829****Род *Eligmodonta* Kiriakoff, 1967***Eligmodonta ziczac* (Linnaeus, 1758)

(Рис. 60)

«*Phalaena. Bombyx.*... *Ziczac*.»: Linnaei, 1758: 504 (типичное местонахождение не указано ((?) Швеция)).

= «*N.[otodonta] ziczac* L. ...*pallida* subsp. nov.»: Grünberg, 1912b: 300, pl. 45, row g (типичное местонахождение: «Juldus» (= Китай: Синьцзян-Уйгурский автономный район, Юлдуз), по лектотипу [Schntlmeister, 2013: 288]).

= «*Notodonta ziczac* ssp. n. *derbendica*.»: Daniel, 1965c: 136, Taf. 17, figs 23, 24 (типичное местонахождение: «Iran, Derbend, 25 km N v. Teheran, 2000 m» (= Иран: Тегеран, Дербенд)).

**Указание для страны.** Morozov et al., 2016: 174, figs 3, 5, 8 (*Notodonta ziczac*).

**Биология.** Кормовое растение гусениц в Монголии неизвестно. В других частях ареала гусеницы на *Populus* spp. и *Salix* spp. (Salicaceae). Есть указания о питании также на *Betula* spp. и *Alnus* spp. (Betulaceae). Зимует куколка в легком коконе на почве. Бабочки в мае – июне. Возможно, вторая генерация в июле – августе.

**Замечания.** Вид разделен на 3 подвида. По-видимому, собранный в Монголии экземпляр должен быть отнесен к подвиду *E. z. pallida* Grünberg, 1912.

**Распространение.** Локально от Северо-Западной Африки (Марокко), Испании, Франции и Ирландии на западе до Амурской области России на востоке и от Северной Финляндии и Кольского полуострова на севере до Северо-Западной Африки, Турции и Северо-Западного Китая (Синьцзян-Уйгурский автономный район) на юге. Монголия (рис. 60): Ховд.

**Род *Nerice* Walker, 1855***Nerice davidi* Oberthür, 1881

(Рис. 12, 13, 46, 61)

«*Nerice Davidi*, Oberthür»: Oberthür, 1881: 17, pl. IX, fig. 2 (типичное местонахождение: «le nord de la Chine» (= Китай: Внутренняя Монголия, городской округ Баотоу)).

= «*Nerice davidi alea* ssp. nov.»: Schintlmeister, 2008: 230, pl. 24, figs 1058, 1059 (типичное местонахождение: «China, Shaanxi, Tsinling Mts., Foping Nature Reserve, 33°51' N, 107°57' E 1,600 m» (= Китай: провинция Шэньси, горы Циньлин, заповедник Фопин)).

**Материал.** 1♀, Сэлэнгэ, 13 км ЮЗ Сухэ-Батора, 50°08'N / 106°06'E, 16–17.07.2003 (О.Г. Горбунов, Ф. Игари); 1♀ (*Notodontidae* pictures №№ 0091–0092–2015), там же, 18–19.07.2003 (О.Г. Горбунов, Ф. Игари) (рис. 13); 5♂ (*Notodontidae* pictures №№ 0093–0094–2015), Дорнод, левый берег р. Халхин-Гол, 47°34'N / 118°49'E, 700 м, 15–16.06.2004 (О.Г. Горбунов) (рис. 12); 3♂, Дорнод, 10 км ЮЗ Матада, 46°52'N / 115°15'E, 880 м, 5–6.07.2008 (О.Г. Горбунов) (рис. 46).

**Указания для страны.** Daniel, 1967: 207 (*Nerice davidis* (sic)); Bálint et al., 2006: 100; Enkhtur et al., 2021a: 10.

**Биология.** Гусеницы на *Ulmus pumila* L. (Ulmaceae). Зимует куколка в почве. Бабочки в мае – июне и в июле – августе в двух генерациях.

**Замечания.** Вид разделен на 2 подвида, из которых в Монголии отмечен номинативный.

Этот вид был описан по сборам французского миссионера-лазариста Армана Давида (1826–1900) из Северного Китая («le nord de la Chine» [Oberthür, 1881: 17]). Всего Давид осуществил три крупных экспедиции по Китаю: две последние – в централь-

ные и южные части страны, и только первая из них, 1866 года, была совершена на северо-запад от Пекина, в западную часть современной Внутренней Монголии. Большую часть летнего периода в этой экспедиции Давид провел в окрестностях Баотоу [David, 1867]. Очевидно, городской округ Баотоу Внутренней Монголии (40°39'N / 109°50'E) следует считать типовым местонахождением таксонов чешуекрылых, впоследствии описанных по сборам Давида из «le nord de la Chine».

**Распространение.** Локально от Центральной Монголии на западе до Хабаровского и Приморского краев России на востоке и от Бурятии (Россия) на севере до Сычуани (Юго-Западный Китай) на юге. Монголия (рис. 61): Булган, Туве, Сэлэнгэ, Сухэ-Батор и Дорнод. Впервые приводится для аймака Дорнод.

**Род *Notodonta* Ochsenheimer, 1810***Notodonta dromedarius* (Linnaeus, 1767)

(Рис. 62)

«*Phalaena. Bombyx.*... *dromedarius*.»: Linné, 1767: 827 (типичное местонахождение: «Sweden» (= Швеция), по лектотипу [Mikkola, Honey, 1993: 126]).

= «*Notodonta dromedarius pontica* ssp. n.»: Witt, 1980: 82, figs 22–28 (типичное местонахождение: «Kleinasien, Prov. Rize, NO-Anat. Randgebirge, Kackar-Massiv, 1200 m, Ilica» (= Турция: провинция Ризе, горы Качкар, село Илиджа, 40°47'N / 40°35'E)).

= «*Notodonta dromedarius schintlmeisteri* ssp. n.»: Witt, 1980: 84, figs 15–21 (типичное местонахождение: «Caucasus, Teberda, Djemagat-Tal» (= Россия: Карачаево-Черкесская Республика, Теберда, ущелье Джамагат)).

= «*Notodonta dromedarius sibirica* subspec. nov.»: Schintlmeister, Fang, 2001: 62, pl. X, figs 88a, b (типичное местонахождение: «Russia, W. Siberia, Lake Baikal (West-side), Listvanka, 51°52'N / 104°51'E» (= Россия: Иркутская область, Листвянка)).

**Указания для страны.** Bálint et al., 2006: 100; Enkhtur et al., 2021b: 375.

**Биология.** Кормовое растение гусениц в Монголии неизвестно. В других частях ареала гусеницы – полифаги на *Populus* spp. и *Salix* spp. (Salicaceae), *Betula* spp. и *Alnus* spp. (Betulaceae). Зимует куколка в почве. Бабочки в мае – июне и в июле – августе в двух генерациях.

**Замечания.** Вид разделен на 3 подвида, из которых в Монголии отмечен *N. d. sibirica* Schintlmeister et Fang, 2001.

**Распространение.** Приречные леса от Португалии, Испании и Ирландии на западе до Забайкальского края России на востоке и от Северной Норвегии и Кольского полуострова на севере до Южной Италии и Забайкалья на юге. Монголия (рис. 62): Туве и Сэлэнгэ.

*Notodonta torva* (Hübner, 1803)

(Рис. 14, 15, 47, 63)

«*Bombyx Torva*» [Hübner, 1803]: Hübner, 1803–1838: 108, Tab. 7, fig. 27 (не 29!) (типичное местонахождение: «Deutschland, mehrere Gegenden» (= Германия)).

= «*Phal.[aena] Bombyx balsaminiferae*.»: Brahm, 1790: 261 (типичное местонахождение не указано ((?) Германия)). Nomen oblitum.

= «*Phal.[aena] Bombyx Tremula*.»: Borkhausen, 1790: 396 (типичное местонахождение не указано ((?) Германия)). Младший первичный ономим *Phalaena tremula* Clerck, 1759.



= «*Notodonta Tritophus*, Esper (*Torva Hübner*), var. ? *Uniformis* ♂, Obthr.: Oberthür, 1911: 323, pl. LXVI, fig. 640 (типичное местонахождение: «Sidemi (Mandchourie)» (= Россия: Приморский край, Хасанский район, Безверхово)).

= «*Notodonta sugitanii* n. sp.»: Matsumura, 1924: 31 (типичное местонахождение: «Shinano (Hinokitoge, near Shirahone)» (= Япония: префектура Нагано, Синано)).

= «*Peridea musculus* sp. nov.»: Kiriakoff, 1964: 285, photo 49, fig. 59 (типичное местонахождение: «Tapaishan im Tsinling, Prov. Süd-Shensi, ca. 3000 m» (= Китай: провинция Шэньси, хребет Циньлинь, гора Тайбай, 33°57'18"N / 107°45'48"E)).

**Материал.** 1♀ (Notodontidae pictures №№ 0087-0088–2015), Дорнод, левый берег р. Нумрегийн-Гол, 46°59'N / 119°22'E, 870 м, 17–18.06.2004 (О.Г. Горбунов) (рис. 15); 2♂ (Notodontidae pictures №№ 0089-0090–2015), Завхан, 20 км СЗ Тэса, 49°46.40'N / 95°35.10'E, 1580 м, 3–4.07.2005 (О.Г. Горбунов) (рис. 14); 1♂, Дорнод, 91 км ЮВ Халхгола, 47°00'N / 119°22'E, 875 м, 8–9.07.2008 (О.Г. Горбунов); 1♂, Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008 (О.Г. Горбунов) (рис. 47).

**Указание для страны.** Bálint et al., 2006: 100.

**Биология.** Гусеницы – полифаги на *Populus* spp. и *Salix* spp. (Salicaceae), *Betula* spp. и *Alnus* spp. (Betulaceae). Зимует куколка в почве. Бабочки в июне – июле в одной генерации. В более южных районах возможны две генерации: в мае – июне и в июле – августе.

**Замечания.** Вид разделен на 2 подвида, из которых в Монголии отмечен номинативный.

**Распространение.** Лесная зона от Франции и Англии на западе до Сахалина, Южных Курил и Японии на востоке и от Кольского полуострова на севере до Центральной Италии и Центрального Китая на юге, Северная Америка. Монголия (рис. 63): Завхан, Улан-Батор и Дорнод. Впервые приводится для аймаков Завхан и Дорнод.

#### Род *Pheosia* Hübner, 1819

*Pheosia rimosa* Packard, 1864

(Рис. 16–18, 48, 64)

«*Pheosia rimosa* n. sp.»: Packard, 1864: 358 (типичное местонахождение: «Newport, R.I.» (= США: Род-Айленд, Ньюпорт)).

= «*Pheosia fusiformis* n. sp.»: Matsumura, 1921: 781, pl. LVIII, fig. 21 (типичное местонахождение: «Sapporo» (= Япония: Хоккайдо, Саппоро), по лектотипу [Sugi, 1979: 21, fig. 108]).

= «*Pheosia tremula* (Clerck) ssp. *permagna* m. (subsp. nova)»: Bryk, 1949: 3 (типичное местонахождение: «Shuotsu» (= Северная Корея: провинция Хамгён-Пукто, Кёнсон)).

= «*Pheosia taiwanognoma* Nakamura sp. nov.»: Nakamura, 1973: 53, pl. 9, figs 1, 2, pl. 11, fig. 44 (типичное местонахождение: «Lan-tou» (= Китай: Тайвань, провинция Пиндун, Наньчжоу)).

= «*Pheosia fusiformis continentalis*, Tshistjakov subsp. n.»: Чистяков, 1985: 57, рис. 2, 5 (типичное местонахождение: «Южное Приморье, заповедник „Кедровая Падь“» (= Россия: Приморский край, заповедник «Кедровая Падь»)).

**Материал.** 2♂, Дорнод, левый берег р. Халхин-Гол, 47°34'N / 118°49'E, 700 м, 15–16.06.2004 (О.Г. Горбунов); 1♂, 2♀, Туве, 40 км СВ Мунгенморья, 48°31'N / 108°52'E, 1500 м, 4–5.07.2004 (О.Г. Горбунов, К.А. Гунина); 5♂, Туве, 25 км С Мунгенморья, 48°29'N / 108°33'E, 1500 м, 4–5.07.2004 (О.Г. Горбунов, К.А. Гунина); 1♀, Туве, 20 км СВ Мунгенморья, 48°14'N / 108°40'E, 1400 м, 8–9.07.2004 (О.Г. Горбунов, К.А. Гунина); 1♀, Туве, 20 км СВ Улан-Батора, 48°05'N / 107°04'E, 1500 м, 10–11.07.2004 (О.Г. Горбунов, К.А. Гунина); 1♂ (Notodontidae pictures №№ 0053-0054–2015), Хувсгел, 60 км СВ Хатгала, 50°48'N / 100°47'E, 1700 м, 20–21.06.2005 (О.Г. Горбунов) (рис. 16); 1♀, Улан-Батор, 40 км ВЮВ Улан-Батора, 47°49'N / 107°26'E, 1400 м, 10–11.07.2007 (О.Г. Горбунов); 1♀ (Notodontidae pictures №№ 0051-0052–2015), там же, 12–13.07.2007 (О.Г. Горбунов) (рис. 18); 1♀, там же, 13–14.07.2007 (О.Г. Горбунов); 2♂ (Notodontidae pictures №№ 0055-0056–2015), Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008 (О.Г. Горбунов) (рис. 17, 48).

**Указания для страны.** Bryk, 1949: 3 (*Pheosia tremula permagna*); Bálint et al., 2006: 100 (*Pheosia gnoma*).

**Биология.** Гусеницы – полифаги на *Populus* spp. и *Salix* spp. (Salicaceae), *Betula* spp. и *Alnus* spp. (Betulaceae). Зимует куколка в почве. Бабочки в июне – июле в одной генерации. В более южных районах возможны две генерации: в мае – июне и в июле – августе.

**Замечания.** Вид разделен на 3 подвида, из которых в Монголии отмечен номинативный.

**Распространение.** В лесной зоне от Иркутской области России и Северной Монголии на западе до Камчатки и Чукотки на востоке и севере и до Китая (Тайвань) на юге, Северная Америка. Монголия (рис. 64): Хувсгел, Туве, Улан-Батор и Дорнод. Впервые приводится для аймаков Хувсгел и Дорнод.

*Pheosia tremula* (Clerck, 1759)

(Рис. 65)

«[*Ph. [alaena]*]... *tremula*»: Clerck, 1759: Tab. 9, fig. 13 (типичное местонахождение не указано (??) Швеция)).

= «[*Phalaena. Bombyx*]... *dictaea*»: Linné, 1767: 826 (типичное местонахождение: «Barbaria» (= Северная Африка), по лектотипу [Mikkola, Honey, 1993: 124]).

= «*Pheosia tremula turcica* n. subsp.»: de Freina, 1979: 203, fig. 7a (типичное местонахождение: «Tokat / Sivas (43/46), Çamlıbel-Paß, 1700 m» (= Турция: провинция Сивас, перевал Чамлыбель)).

**Указание для страны.** Morozov et al., 2016: 174, figs 2, 6, 8.

**Биология.** Кормовое растение гусениц в Монголии неизвестно. В других частях ареала гусеницы на *Populus* spp. и *Salix* spp. (Salicaceae), но чаще всего на *Populus tremula* L. Зимует куколка в почве в легком коконе. Единственный самец был собран 11 июля [Morozov et al., 2016].

**Распространение.** От Исландии, Ирландии и Испании на западе до Бурятии (Россия) на востоке и от Северной Финляндии и Кольского полуострова на севере до Турции и Закавказья на юге. Монголия (рис. 65): Баян-Улгий.

#### Подсемейство Ptilodontinae Packard, 1864

Род *Pterostoma* Germar, 1812

*Pterostoma grisea* (Bremer, 1861)

(Рис. 19, 49, 66)

«*Ptilodontis grisea*»: Bremer, 1861: 481 (типичное местонахождение: «im Bureja-Gebirge, und... zwischen der Ussuri-Mündung und dem Noog» (= Россия: Еврейская автономная область, Облученский район, Радде; Приморский край, среднее течение р. Уссури)).

= «*Pterostoma griseum occidenta* ssp. nov.»: Schintlmeister, 2008: 297, pl. 30, fig. 1415b (типичное местонахождение: «China, Shaanxi, Tsinling Mts., S Taibai shan, Dudamon, 33°55' N, 107°44' E, 2,600 m» (= Китай: провинция Шэньси, уезд Чжоучжи, южные склоны горы Тайбай, Дудамон)).

**Материал.** 2♂, Дорнод, левый берег р. Халхин-Гол, 47°34'N / 118°49'E, 700 м, 15–16.06.2004 (О.Г. Горбунов) (рис. 49); 1♂ (Notodontidae pictures №№ 0035-0036–2015), Дорнод, левый берег р. Нумрегийн-Гол, 46°59'N / 119°22'E, 870 м, 17–18.06.2004 (О.Г. Горбунов) (рис. 19); 1♂, там же, 18–19.06.2004 (О.Г. Горбунов); 2♂ (Notodontidae pictures №№ 0037-0038–2015), там же, 20–21.06.2004 (О.Г. Горбунов).



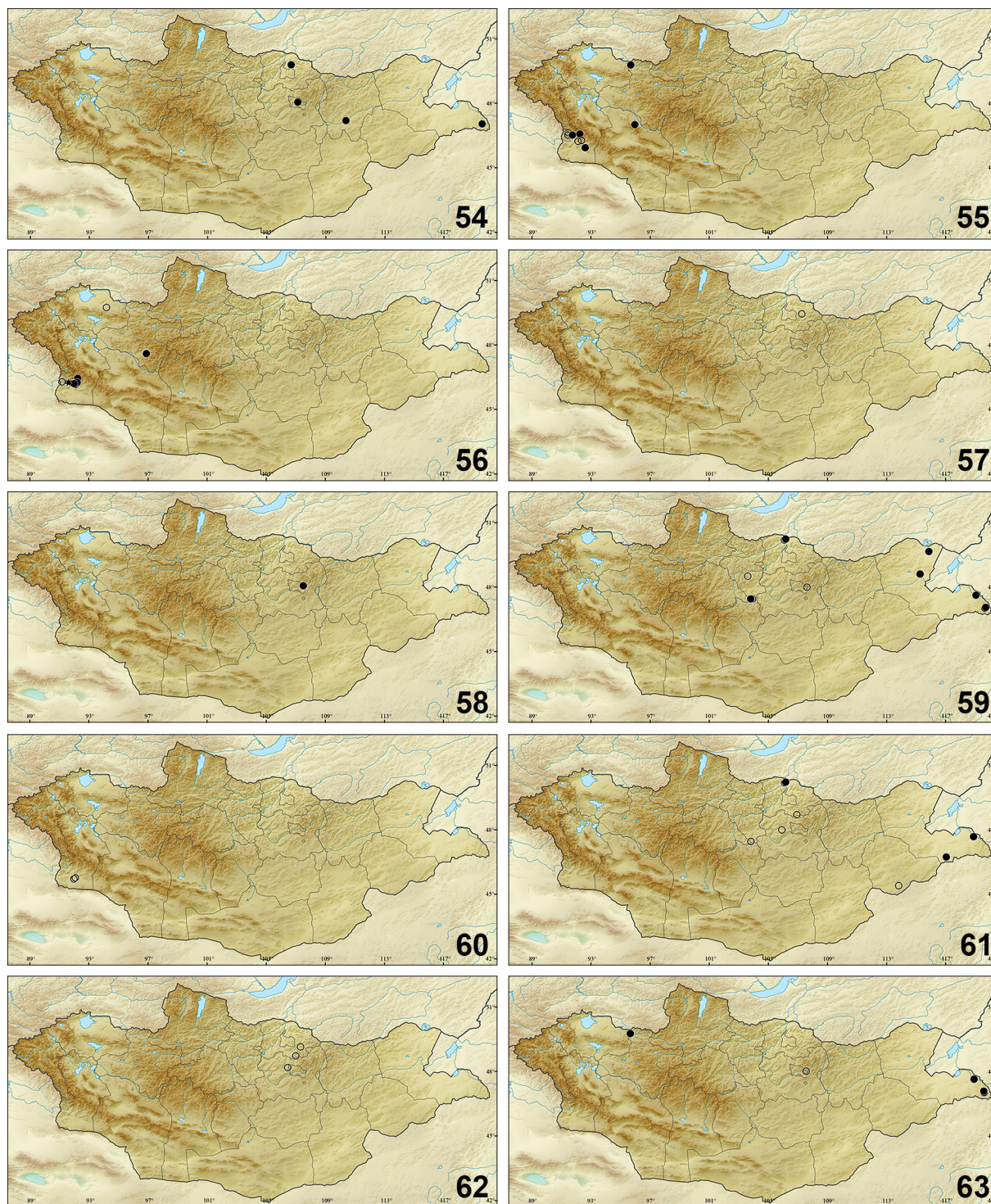


Рис. 54–63. Карты распространения Notodontidae spp. в Монголии. Черными кругами указаны места сбора материала, черными кольцами – местонахождения из литературных источников.

Figs 54–63. Distribution maps of Notodontidae spp. in Mongolia. Black circles indicate places of collection of material, black rings – localities from literary sources.

54 – *Cerura felina*; 55 – *Cerura przewalskii*; 56 – *Furcula aeruginosa*; 57 – *Furcula bicuspis*; 58 – *Furcula bifida*; 59 – *Furcula furcula*; 60 – *Eligmodontia ziczac*; 61 – *Nerice davidi*; 62 – *Notodonta dromedarius*; 63 – *Notodonta torva*.



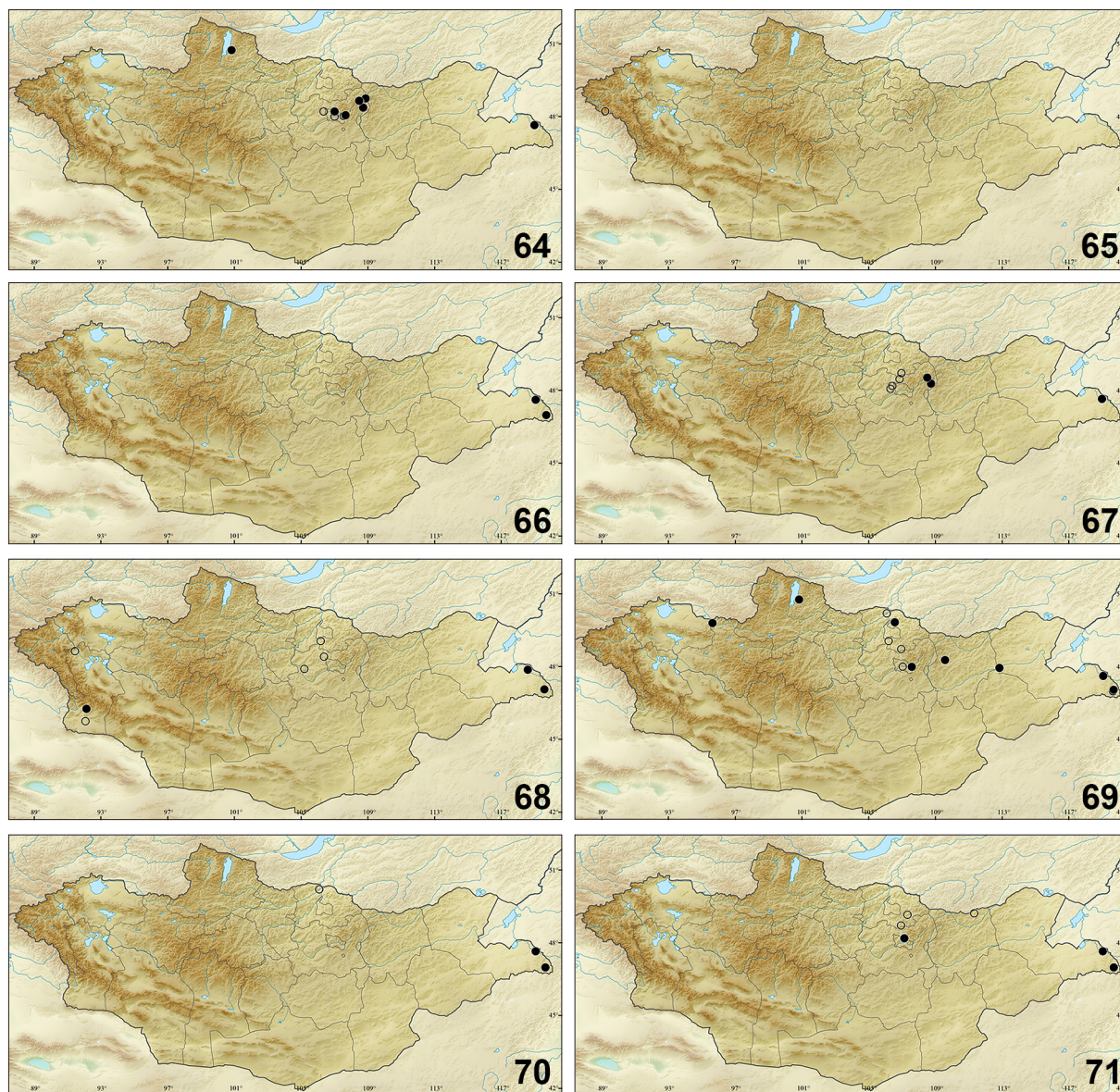


Рис. 64–71. Карты распространения Notodontidae spp. в Монголии. Черными кругами указаны места сбора материала, черными кольцами – местонахождения из литературных источников.

Figs 64–71. Distribution maps of Notodontidae spp. in Mongolia. Black circles indicate places of collection of material, black rings – localities from literary sources.

64 – *Pheosia rimosa*; 65 – *Pheosia tremula*; 66 – *Pterostoma grisea*; 67 – *Ptilodon capucina*; 68 – *Phalera bucephala*; 69 – *Clostera albosigma*; 70 – *Clostera anachoreta*; 71 – *Clostera anastomosis*.

**Биология.** Кормовые растения гусениц в Монголии неизвестны. В других частях ареала гусеница – полифаг на *Maackia amurensis* Rupr. и *Lespedeza* spp. (Fabaceae), *Populus* spp. и *Salix* spp. (Salicaceae). Бабочки в июне в одной генерации.

**Замечания.** Вид разделен на 2 подвида, из которых для Монголии я указываю номинативный.

**Распространение.** Локально от Иркутской области (Россия) на западе и севере до Юньнани (Южный Китай) на юге и Хоккайдо (Япония) на востоке. Монголия (рис. 66): Дорнод. Приводится впервые для фауны Монголии.

#### Род *Ptilodon* Hübner, 1822 *Ptilodon capucina* (Linnaeus, 1758) (Рис. 20, 50, 67)

«[*Phalaena*. *Bombyx*.]... *Capucina*»: Linnaei, 1758: 507 (типичное местонахождение: «Habitat in Europa» (= Европа)).

= «*Phalaena* (*Bombyx*) *camelina*»: Linnaei, 1758: 507 (типичное местонахождение: «Sweden» [Mikkola, Honey, 1993: 117] (= Швеция)).

= «*Lophopteryx kuwayamae* n. sp.»: Matsumura, 1919: 77 (типичное местонахождение: «Nakodate» (= Япония: Хоккайдо, Хакодате), по лектотипу [Sugi, 1979: 15]).

= «*Lophopteryx camelina* f. *sachalinensis* n. f.»: Matsumura, 1934: 155, fig. 5 (типичное местонахождение: «Saghalien; ...at



Keton» (= Россия: Сахалинская область, окрестности поселка Смирных)).

= «*Lophopteryx camelina* (L.) ssp. *signata* m. (subsp. nova)»: Брук, 1949: 6 (типичное местонахождение: «Shuotsu» (= Северная Корея: провинция Хамгён-Пукто, Кёнсон)).

**Материал.** 1♂ (Notodontidae pictures №№ 0095-0096–2015), Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008 (О.Г. Горбунов) (рис. 20, 50).

**Указания для страны.** Daniel, 1965a: 98 (*Lophopterix camelina*); Daniel, 1969: 273 (*Lophopterix camelina*); Золотухин, 1994: 122; Bálint et al., 2006: 100; Enkhtur et al., 2021a: 10 (*Ptilodon kuwayamae*).

**Биология.** Кормовые растения гусениц в Монголии неизвестны. В других частях ареала гусеницы – полифаги на различных древесных растениях из следующих семейств: Aceraceae, Betulaceae, Rosaceae, Salicaceae, Tiliaceae, Ulmaceae. Зимует куколка на или в почве в слабом коконе. Бабочки в мае – августе в двух генерациях.

**Замечания.** Вид разделен на 2 подвида, из которых в Монголии отмечен *P. c. kuwayamae* Matsumura, 1919.

**Распространение.** Лесная зона от Ирландии и Франции на западе до Сахалина, Камчатки и Японии на востоке и от Кольского полуострова, Южной Якутии (Россия) на севере до Южной Италии, Турции и Южной Кореи на юге, Северная Америка. Монголия (рис. 67): Туве, Сэлэнгэ и Дорнод. Впервые приводится для аймака Дорнод.

#### Подсемейство Phalerinae Butler, 1886

##### Род *Phalera* Hübner, 1819

*Phalera bucephala* (Linnaeus, 1758)

(Рис. 21, 22, 51, 68)

«[*Phalaena. Noctua*.]... *bucephala*»: Linnaei, 1758: 508 (типичное местонахождение не указано ((?) Швеция)).

= «*Phalera bucephala* L. var. *infulgens* Graeser»: Graeser, 1888: 146 (типичное местонахождение: «bei Nicol.; ...bei Chab. und Wlad.» (= Россия: Хабаровский край, Николаевск-на-Амуре, Хабаровск; Приморский край, Владивосток)).

= «*Phalera bucephala* ssp. n. *persica* m.»: Daniel, 1938: 3 (типичное местонахождение: «Elburs mts. S., Tacht I Suleiman, Sárdab-Tal, 1900 bis 2200 m» (= Иран: провинция Мазендеран, долина Сардаба)).

**Материал.** 2♂, 1♀ (Notodontidae pictures №№ 0031-0034–2015), Дорнод, 91 км ЮВ Халхгола, 47°00'N / 119°22'E, 875 м, 8–9.07.2008 (О.Г. Горбунов) (рис. 21, 22, 51); 1♂, Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008 (О.Г. Горбунов); 2♂, Ховд, 6 км СЗЗ Уенча, берег р. Тагил-Гол, 19.06.2012 (К.А. Колесниченко).

**Указания для страны.** Bálint et al., 2006: 100; Morozov et al., 2016: 173, figs 1, 5, 8; Knyazev et al., 2020: 194; Enkhtur et al., 2021a: 10.

**Биология.** Кормовые растения гусениц в Монголии неизвестны. В других частях ареала гусеницы – полифаги на различных древесных растениях из следующих семейств: Aceraceae, Betulaceae, Rosaceae, Salicaceae, Tiliaceae, Ulmaceae. Самка откладывает яйца группами (до сотни или даже больше) на нижнюю сторону листа кормового растения. Молодые гусеницы живут группами, взрослые – поодиночке. Зимует куколка в почве в легком коконе. Бабочки в мае – августе в одной или даже двух генерациях.

**Замечания.** Вид разделен на 4 подвида, из которых в Монголии отмечен номинативный.

**Распространение.** Лесная зона от Португалии и Ирландии на западе до Сахалина и Южных Курил на востоке и от Центральной Финляндии, Карелии и Хабаровского края России на севере до Северо-Западной Африки, Ирана и Корейского полуострова на юге. Монголия (рис. 68): Ховд, Туве, Сэлэнгэ и Дорнод. Впервые приводится для аймака Дорнод.

#### Подсемейство Pygaerinae Duponchel, 1845

##### Род *Clostera* Samouelle, 1819

*Clostera albosigma* Fitch, 1856

(Рис. 23–27, 52, 69)

«*Clostera albosigma*, new species»: Fitch, 1856: 274, pl. 2, fig. 4 (типичное местонахождение: «State of New-York» (= США: штат Нью-Йорк)).

= «*Cl.[ostera] Curtuloides* Ersch.»: Ершов, Фильд, 1870: 193 (типичное местонахождение: «Irkutsk» (= Россия: Иркутск)).

= «*Pygaera curtuloides* (Erschoff) ssp. *korecirtula* m. (subsp. nova)»: Брук, 1949: 9 (типичное местонахождение: «aus Shuotsu» (= Северная Корея: провинция Хамгён-Пукто, Кёнсон)).

**Материал.** 4♂ (Notodontidae pictures №№ 0063-0064–2015), 40 км ВЮВ Улан-Батора, 47°48.88'N / 107°26.22'E, 1500 м, 21–22.06.2003 (О.Г. Горбунов) (рис. 23); 1♂, 40 км ВЮВ Улан-Батора, 47°49.98'N / 107°25.49'E, 1600 м, 21–22.06.2003 (О.Г. Горбунов); 1♂, Сэлэнгэ, 59 км СВ Дархана, 49°48'N / 106°35'E, 650 м, 20–21.07.2003 (О.Г. Горбунов, Ф. Игари); 3♂, 40 км ВЮВ Улан-Батора, 47°49'N / 107°26'E, 1500 м, 9–10.06.2004 (О.Г. Горбунов); 1♂ (Notodontidae pictures №№ 0065-0066–2015), Дорнод, 12 км З Хеленбуйра, 47°49'N / 112°45'E, 870 м, 12–13.06.2004 (О.Г. Горбунов); 3♂, 1♀, Дорнод, левый берег р. Халхин-Гол, 47°34'N / 118°49'E, 700 м, 15–16.06.2004 (О.Г. Горбунов); 1♀, там же, 16–17.06.2004 (О.Г. Горбунов); 4♂ (Notodontidae pictures №№ 0067-0068–2015), Дорнод, левый берег р. Нумрегийн-Гол, 46°59'N / 119°22'E, 870 м, 17–18.06.2004 (О.Г. Горбунов) (рис. 24); 3♂ (Notodontidae pictures №№ 0069-0070–2015), 1♀, там же, 20–21.06.2004 (О.Г. Горбунов) (рис. 25); 1♂, Хувсгел, 60 км СВ Хатгала, 50°48'N / 100°47'E, 1700 м, 20–21.06.2005 (О.Г. Горбунов); 1♀ (Notodontidae pictures №№ 0071-0072–2015), Завхан, 20 км СЗ Тэса, 49°46.40'N / 95°35.10'E, 1580 м, 3–4.07.2005 (О.Г. Горбунов) (рис. 27); 1♂, 40 км ВЮВ Улан-Батора, 47°49'N / 107°26'E, 1400 м, 10–11.07.2007 (О.Г. Горбунов) (рис. 52); 1♂, Дорнод, 91 км ЮВ Халхгола, 47°00'N / 119°22'E, 875 м, 8–9.07.2008 (О.Г. Горбунов); 1♂ (Notodontidae pictures №№ 0073-0074–2015), Хэнтий, 51 км СВ Цэнхэрмандала, 48°09'N / 109°23'E, 1350 м, 25–26.07.2008 (О.Г. Горбунов) (рис. 26).

**Указания для страны.** Брук, 1949: 9 (*Pygaera curtuloides korecirtula*); Enkhtur et al., 2021a: 10; Enkhtur et al., 2021b: 375.

**Биология.** Гусеницы – олигофаги на *Populus* spp. и *Salix* spp. (Salicaceae). Зимует куколка в легком коконе между опавшими листьями кормового растения. Бабочки в июне – июле в одной генерации.

**Замечания.** Вид разделен на 2 подвида, из которых в Монголии, как и во всей Палеарктике, отмечен *C. a. curtuloides* Erschoff, 1870.

**Распространение.** Приречные и другие типы леса вблизи водоемов от центра европейской части России на западе до Приморского края, Сахалина (Россия) и Японии на востоке и от Южной Якутии (Россия) на севере до Центрального Китая на юге. Монголия (рис. 69): Завхан, Хувсгел, Улан-Батор, Сэлэнгэ, Хэнтий и Дорнод. Впервые приводится для аймаков Завхан, Хувсгел, Хэнтий и Дорнод.

*Clostera anachoreta* ([Denis et Schiffermüller], 1775)

(Рис. 28–29, 70)

«*B.[ombyx] Anachoreta*»: Denis, Schiffermüller, 1775: 56 (типичное местонахождение: «[Wienergegend]» (= Австрия: окрестности Вены)).

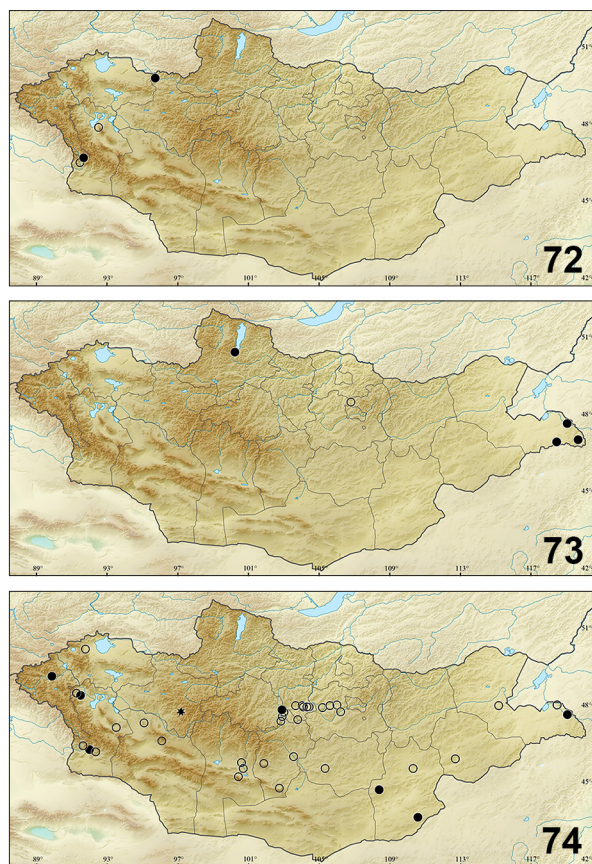


Рис. 72–74. Карты распространения Notodontidae spp. в Монголии. Черными кругами указаны места сбора материала, черными кольцами – местонахождения из литературных источников.

Figs 72–74. Distribution maps of Notodontidae spp. in Mongolia. Black circles indicate places of collection of material, black rings – localities from literary sources.

72 – *Clostera curtula*; 73 – *Clostera pigra*; 74 – *Pterotes eugenia*.

= «*Pygaera anachoreta* ssp. *erema* nov.»: Bryk, 1942: 23 (типовое местонахождение: «Kurilen, Kunashiri, Tomari» (= Россия: Курильские острова, остров Кунашир, Головино)).

= «*Pygaera Anachoreta* var. *Pallida*»: Staudinger, 1887: 101 (типовое местонахождение: «Margelan» (= Узбекистан: Ферганская область, Маргилан), по лектотипу [Schintlmeister, 1999: 182]). Младший вторичный ономим *Nerice pallida* Walker, 1855.

= «*Clostera anachoreta vartianae* nom nov.»: Schintlmeister, 2008: 398. Новое замещающее название *Pygaera anachoreta pallida* Staudinger, 1887.

**Материал.** 1♀, Дорнод, левый берег р. Халхин-Гол, 47°34'N / 118°49'E, 700 м, 15–16.06.2004 (О.Г. Горбунов); 1♀ (Notodontidae pictures №№ 0101-0102–2015), там же, 16–17.06.2004 (О.Г. Горбунов) (рис. 29); 1♂, Дорнод, левый берег р. Нумрегийн-Гол, 46°59'N / 119°22'E, 870 м, 17–18.06.2004 (О.Г. Горбунов); 1♂, там же, 18–19.06.2004 (О.Г. Горбунов); 2♂ (Notodontidae pictures №№ 0103-0106–2015), там же, 20–21.06.2004 (О.Г. Горбунов) (рис. 28).

**Указание для страны.** Enkhtur et al., 2021a: 10.

**Биология.** Гусеницы – олигофаги на *Populus* spp. и *Salix* spp. (Salicaceae). Зимует куколка в легком коконе на почве. Бабочки в июне – июле в одной генерации.

**Замечания.** Вид разделен на 2 подвида, из которых в Монголии отмечен номинативный.

**Распространение.** Приречные и другие типы леса вблизи водоемов от Испании и Англии на западе до Японии, Сахалина и Южных Курил на востоке и от

Карелии и Приамурья на севере до Пакистана и Китая (Тайвань) на юге. Монголия (рис. 70): Сэлэнгэ и Дорнод. Впервые приводится для аймака Дорнод.

*Clostera anastomosis* (Linnaeus, 1758)  
(Рис. 30–32, 71)

«[*Phalaena. Bombyx*.]... *anastomosis*»: Linnaei, 1758: 506 (типовое местонахождение не указано ((?) Швеция)).

= «*Ph.[alaena] alticauda grisea*»: Retzius, 1783: 39 (типовое местонахождение не указано ((?) Швеция)).

= «*Pygaera Anastomosis* L. var. *Orientalis* Fxsn.»: Fixsen, 1887: 350 (типовое местонахождение: «aus Korea» (= Корея)).

= «*Micromelalopha kononis* n. sp.»: Matsumura, 1929b: 45, pl. I, fig. 16 (типовое местонахождение: «Tsuta-onsen» (= Япония: Хонсю, префектура Аомори, окрестности Тобада), по лектотипу [Sugi, 1979: 17]).

= «*Neoclostera insignior* sp. nov.»: Kiriakoff, 1964: 254, photo 6, fig. 8 (типовое местонахождение: «A-tun-tse, ca. 4000 m, Nord-Yünnan» (= Китай: провинция Юньнань, Дечен-Тибетский автономный округ)).

**Материал.** 1♂, Дорнод, левый берег р. Халхин-Гол, 47°34'N / 118°49'E, 700 м, 15–16.06.2004 (О.Г. Горбунов); 3♂ (Notodontidae pictures №№ 0083-0084–2015), 20 км СВ Улан-Батора, 48°05'N / 107°04'E, 1500 м, 10–14.07.2004 (О.Г. Горбунов, К.А. Гунина) (рис. 30); 1♀ (Notodontidae pictures №№ 0081-0082–2015), Дорнод, 91 км ЮВ Халхгола, 47°00'N / 119°22'E, 875 м, 8–9.07.2008 (О.Г. Горбунов) (рис. 32); 2♂ (Notodontidae pictures №№ 0079-0080–2015), Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 11–12.07.2008 (О.Г. Горбунов) (рис. 31).

**Указания для страны.** Корсун и др., 2012: 22; Enkhtur et al., 2021b: 375.

**Биология.** Гусеницы – олигофаги на *Populus* spp. и *Salix* spp. (Salicaceae). Зимует гусеница средних возрастов. Самка откладывает яйца кластерами до сотни яиц. Бабочки в июне – августе в одной генерации или, возможно, в двух генерациях.

**Распространение.** Приречные и другие типы леса вблизи водоемов от Северной Испании и Франции на западе до Сахалина, Южных Курил и Японии на востоке и от Южной Финляндии, Карелии и Южной Якутии (Россия) на севере до Северо-Восточной Турции, Кыргызстана и Центрального Китая на юге. Монголия (рис. 71): Улан-Батор, Сэлэнгэ, Хэнтий и Дорнод. Впервые приводится для Улан-Батора и аймака Дорнод.

*Clostera curtula* (Linnaeus, 1758)  
(Рис. 33, 34, 72)

«[*Phalaena. Bombyx*.]... *curtula*»: Linnaei, 1758: 503 (типовое местонахождение не указано ((?) Швеция)).

= «*Ph.[alaena] alticauda alba*»: Retzius, 1783: 39 (типовое местонахождение не указано ((?) Швеция)).

= «*Pygaera Curtula* L. var. nov. *Canescens*»: Graeser, 1892: 303 (типовое местонахождение: «im Kuldja-Distrikt» (= Китай: Синьцзян-Уйгурский автономный район, Кульджа)).

**Материал.** 2♂ (Notodontidae pictures №№ 0097-0100–2015), За-вхан, 20 км СЗ Тэса, 49°46.40'N / 95°35.10'E, 1580 м, 2–3.07.2005 (О.Г. Горбунов) (рис. 33, 34); 1♂ (Notodontidae pictures №№ 0077-0078–2013), Хова, 31 км ССВ Булгана, 46°21.5'N / 91°41.1'E, 1930 м, 17.06.2012 (К.А. Колесниченко).

**Указания для страны.** Grosser, 1892: 139; Morozov et al., 2016: 174, figs 4, 7, 8.

**Биология.** Гусеницы – олигофаги на *Populus* spp. и *Salix* spp. (Salicaceae). Зимует куколка в легком коконе на почве. Бабочки в июне – июле в одной генерации.

**Замечания.** Вид разделен на 2 подвида, из которых в Монголии отмечен *C. c. canescens* Graeser, 1892.



**Распространение.** Приречные и другие типы леса вблизи водоемов от Шотландии и Испании на западе до Хабаровского края России на востоке и от Центральной Финляндии и Карелии на севере до Китая (Синьцзян-Уйгурский автономный район) и Западной Монголии на юге. Монголия (рис. 72): Ховд и Завхан. Впервые приводится для аймака Завхан.

*Clostera pigra* (Hufnagel, 1766)  
(Рис. 35, 36, 73)

«*Phalaena pigra*»: Hufnagel, 1766: 426 (типовое местонахождение не указано ((?) Германия: окрестности Берлина)).

= «*B.[ombyx] Reclusa*»: Denis, Schiffermüller, 1775: 56 (типовое местонахождение: «Wienergegend» (= Австрия: окрестности Вены)).

= «*Ph.[alaena] alticauda furcata*»: Retzius, 1783: 39 (типовое местонахождение не указано ((?) Швеция)).

= «*Pygaera pigra* Hufn. *superior* nov. subsp.»: Rangnow, 1935: 205, Abb. 3, fig. 26a (типовое местонахождение: «aus Lappland» [= Швеция: лен Норрботтен, Лүлео]).

= «*[Pygaera O.] Pigra* Hfn. ... v. *Ferruginea* Stgr.»: Staudinger, 1901: 112 (типовое местонахождение: «Taur. c. (Hadjin)» (= Турция: провинция Адана, Саимбейли)). Младший вторичный омоним *Ichthyura ferruginea* Moore, 1866.

= «*Clostera pigra staudingeri* (nom. nov.)»: Koçak, 1980: 8. Новое замещающее название *Pygaera pigra ferruginea* Staudinger, 1901.

**Материал.** 3♂, Дорнод, левый берег р. Халхин-Гол, 47°34'N / 118°49'E, 700 м, 15–16.06.2004 (О.Г. Горбунов); 2♂ (*Notodontidae* pictures №№ 0077-0078–2015), Дорнод, левый берег р. Нумрегийн-Гол, 46°59'N / 119°22'E, 870 м, 17–18.06.2004 (О.Г. Горбунов) (рис. 35); 1♂, там же, 18–19.06.2004 (О.Г. Горбунов); 1♂, там же, 20–21.06.2004 (О.Г. Горбунов); 1♂, Дорнод, горы Баруун Эреений нуруу, 46°46'N / 118°17'E, 940 м, 21–22.06.2004 (О.Г. Горбунов); 8♂ (*Notodontidae* pictures №№ 0075-0076–2015), Хувсгел, 55 км ЮЮЗ Хатгала, 50°19'N / 100°07'E, 1600 м, 18–19.06.2005 (О.Г. Горбунов) (рис. 36).

**Указание для страны.** Золотухин, 1994: 122.

**Биология.** Гусеницы – олигофаги на *Populus* spp. и *Salix* spp. (*Salicaceae*). Самка откладывает яйца небольшими группами на верхнюю сторону листа кормового растения. Зимует куколка в легком коконе на почве. Бабочки в июне – августе в одной или даже двух генерациях.

**Замечания.** Вид разделен на 2 подвида, из которых в Монголии номинативный.

**Распространение.** Приречные и другие типы лесных зарослей вблизи водоемов от Ирландии и Испании на западе до Сахалина и Приморского края России на востоке и от Северной Финляндии и Кольского полуострова на севере до Северо-Западной Африки (Марокко), Южного Ирана и Центрального Китая (Шеньси) на юге. Монголия (рис. 73): Хувсгел, Туве и Дорнод. Впервые приводится для аймаков Хувсгел и Дорнод.

#### Род *Pterotes* Berg, 1901

*Pterotes eugenia* (Staudinger, 1896)  
(Рис. 37–39, 53, 74)

«*Pteroma Eugenia* ♂»: Staudinger, 1896: Taf. V, fig. 13 (типовое местонахождение: «bei Uliassutai» [Staudinger, 1900: 352] (= Монголия: Завхан, окрестности Улиастая)). Голотип ♂ (ZMNB).

**Материал.** 1♂, Дорноговь, 2 км СЗ Мандаха, 44°24'N / 108°13'E, 1300 м, 5–6.08.2002 (О.Г. Горбунов); 6♂ (*Notodontidae* pictures №№ 0059-0060–2015), Архангай, северный берег оз. Угий-Нуур, 47°48'N /

102°44'E, 1350 м, 13–14.06.2005 (О.Г. Горбунов) (рис. 37); 1♂, 3♀, там же, 14–15.06.2005 (О.Г. Горбунов); 1♂, 1♀, там же, 15–16.06.2005 (О.Г. Горбунов); 1♂, 1♀ (*Notodontidae* pictures №№ 0057-0058–2015), там же, 17–18.06.2005 (О.Г. Горбунов) (рис. 39); 1♂, Ховд, 8 км С Уенча, 46°07'N / 92°03'E, 1800 м, 21–22.06.2007 (О.Г. Горбунов); 1♀, Дорноговь, 66 км Ю Улаанбадраха, 42°59'N / 110°24'E, 1050 м, 27–28.06.2008 (О.Г. Горбунов) (рис. 53); 1♂ (*Notodontidae* pictures №№ 0061-0062–2015), Дорнод, 17 км ВЮВ Халхгола, 47°34'N / 118°49'E, 700 м, 10–11.07.2008 (О.Г. Горбунов) (рис. 38); 3♂, Баян-Улгий, 16 км ССЗ Улгия, 47°6.65'N / 89°55.08'E, 2085 м, 3.07.2023 (В.Ю. Савицкий); 1♂, Ховд, 20 км ССЗ Кобдо, северный склон горы Халгач-Ула, 30.06.2024 (В.Ю. Савицкий).

**Указания для страны.** Staudinger, 1900: 352 (*Pteroma eugenia*); Daniel, 1965a: 98 (*Pteroma eugenia*); Daniel, 1967: 207 (*Pterosoma eugenia*); Daniel, 1969: 274 (*Pterosoma eugenia*); Daniel, 1973: 168 (*Pterosoma eugenia*); Золотухин, 1994: 122; Bálint et al., 2006: 100 (*Pterostoma eugeniae* (sic)); Knyazev et al., 2020: 194; Makhov et al., 2024: 583.

**Биология.** Неизвестна. Мои наблюдения указывают на то, что вероятным кормовым растением гусениц является *Saragana* spp. (*Fabaceae*), а не *Populus* или *Salix* (*Salicaceae*), как это предполагает Шинтлмайстер [Schintlmeister, 2008: 385]. Бабочки летают в июне – августе, по-видимому, в одной генерации.

**Распространение.** Локально в биотопах с присутствием *Saragana* spp. в России (Республика Тыва и Забайкальский край), Монголия, Китай (Ганьсу, Цинхай и Внутренняя Монголия). Монголия (рис. 74): Баян-Улгий, Увс, Ховд, Завхан, Баянхонгор, Архангай, Булган, Уверхангай, Дундгови, Туве, Дорногови и Дорнод. Впервые приводится для аймака Баян-Улгий.

Таким образом, в настоящее время в фаунистическом составе бабочек-хололаток Монголии я достоверно регистрирую 21 вид из 11 родов пяти подсемейств. В литературе имеются указания, но, к сожалению, без конкретных местонахождений, об обитании в Монголии следующих видов: *Cerura erminea* (Esper, 1783) [Чистяков, Дубатолов, 2016; Efimov et al., 2024], *Notodonta dembowskii* Oberthür, 1879 [Schintlmeister, 2008: fig 957; Чистяков, Дубатолов, 2016; Efimov et al., 2024], *Leucodonta bicoloria* ([Denis et Schiffermüller], 1775) [Schintlmeister, 2008: fig. 1118], *Odontesia brinikhi* Dubatolov, 2006 [Schintlmeister, 2008; Чистяков, Дубатолов, 2016] и *Pygaera timon* (Hübner, 1803) [Schintlmeister, 2008; Чистяков, Дубатолов, 2016; Efimov et al., 2024]. Мне не удалось обнаружить ни экземпляры, ни литературные источники с конкретными данными о местонахождении этих видов в Монголии. Между тем эти виды достоверно известны с приграничных территорий России, и их нахождение в Монголии вполне вероятно. Всего же фауна хололаток Монголии (с учетом литературных данных) включает 26 видов из 14 родов пяти подсемейств.

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## New species and new records of leaf beetles (Coleoptera: Chrysomelidae) from Northern Thailand

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**Abstract.** Six new species of leaf beetles are described from Thailand: *Plagiosterna suwattanae* sp. n., *Luperocella thailandica* sp. n., *Paleosepharia magnitarsis* sp. n., *Paleosepharia rubroapicata* sp. n., *Pyrrhalta khuntanensis* sp. n., *Sinoluperoides chenchirae* sp. n. The figures of general view and genitalia are given for them and some of related species. The aedeagi for two species previously known only from females, *Basilepta subtuberosa* Tan, 1988 and *Bathseba tristis* (Medvedev, 2001), are imaged for the first time. Some diagnostic characters of *Bathseba tristis* and *Pagria vietnamica* Moseyko et Medvedev, 2005 have been clarified. The first identification keys to all known species of the genus *Luperocella* Jacoby, 1900 is proposed. *Platycorynus dilaticollis* (Jacoby, 1892), sp. resurr. is resurrected from synonyms of *P. chalybeus* Marshall, 1864, and *Luperocella hirsuta* Jacoby, 1900, sp. resurr. is resurrected from synonyms of *L. albopilosa* (Jacoby, 1892). The following 17 species are recorded for the first time from Thailand: *Lema mediolineata* Jacoby, 1908, *Lema semiregularis* Jacoby, 1908, *Iphimoides pallidulus* (Jacoby, 1889), *Parascela hirsuta* (Jacoby, 1908), *Platycorynus dilaticollis* (Jacoby, 1892), *Basilepta subtuberosa* Tan, 1988, *Aplosomyx ornatus* (Jacoby, 1892), *Gallerucida moseri* Weise, 1922, *Hoplosaenidea aerea* (Laboissière, 1933), *Kanarella unicolor* Jacoby, 1896, *Vietoluperus alleculoides* Medvedev et Dang, 1981, *Hyphasis limbatipennis* Jacoby, 1889, *Laboissiereia minuta* Medvedev, 2009, *Podontia lutea* (Olivier, 1790), *Xuthea orientalis* Baly, 1865, *Prionispa cheni* Staines, 2007, *Prionispa opacipennis* Chen et Yu, 1962. *Bathseba tristis* is recorded for the first time from Vietnam.

**Key words:** Coleoptera, Chrysomelidae, Eumolpinae, Galerucinae, Cassidinae, Thailand, Vietnam, new species.

### Новые виды и новые указания жуков-листоедов (Coleoptera: Chrysomelidae) из Северного Таиланда

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**Резюме.** Описано шесть новых видов жуков-листоедов из Таиланда: *Plagiosterna suwattanae* sp. n., *Luperocella thailandica* sp. n., *Paleosepharia magnitarsis* sp. n., *Paleosepharia rubroapicata* sp. n., *Pyrrhalta khuntanensis* sp. n., *Sinoluperoides chenchirae* sp. n. Для них и некоторых родственных видов приведены фотографии габитуса и полового аппарата. Впервые даны иллюстрации аedeagus для известных ранее только по самкам *Basilepta subtuberosa* Tan, 1988 и *Bathseba tristis* (Медведев, 2001). Уточнены некоторые диагностические признаки *Bathseba tristis* и *Pagria vietnamica* Moseyko et Медведев, 2005. Дана первая определительная таблица для всех известных видов рода *Luperocella* Jacoby, 1900. *Platycorynus dilaticollis* (Jacoby, 1892), sp. resurr. восстановлен из синонимов *P. chalybeus* Marshall, 1864, а *Luperocella hirsuta* Jacoby, 1900, sp. resurr. – из синонимов *L. albopilosa* (Jacoby, 1892). Впервые для Таиланда указано 17 видов листоедов: *Lema mediolineata* Jacoby, 1908, *Lema semiregularis* Jacoby, 1908, *Iphimoides pallidulus* (Jacoby, 1889), *Parascela hirsuta* (Jacoby, 1908), *Platycorynus dilaticollis* (Jacoby, 1892), *Basilepta subtuberosa* Tan, 1988, *Aplosomyx ornatus* (Jacoby, 1892), *Gallerucida moseri* Weise, 1922, *Hoplosaenidea aerea* (Laboissière, 1933), *Kanarella unicolor* Jacoby, 1896, *Vietoluperus alleculoides* Medvedev et Dang, 1981, *Hyphasis limbatipennis* Jacoby, 1889, *Laboissiereia minuta* Medvedev, 2009, *Podontia lutea* (Olivier, 1790), *Xuthea orientalis* Baly, 1865, *Prionispa cheni* Staines, 2007, *Prionispa opacipennis* Chen et Yu, 1962. *Bathseba tristis* впервые приведен для фауны Вьетнама.

**Ключевые слова:** Coleoptera, Chrysomelidae, Eumolpinae, Galerucinae, Cassidinae, Таиланд, Вьетнам, новые виды.

The present paper is based on the examination of the material collected by the author in Northern Thailand in 2024 (near Thap Sadet village, Doi Saket District of Chiang Mai Province). This is a mountainous area located on the Khun Tan Range. In addition, material from the Zoological Institute of the Russian Academy of Sciences (ZIN, St Petersburg, Russia), from the private collection of J. Bezdek (Brno, Czech Republic) as well as from the author's collection (PR, St Petersburg, Russia) were studied.

All measurements were made using an ocular grid mounted on MBS-20 stereomicroscope. Measurements of all segments were taken at their widest part, unless otherwise specifically stated. All the proportions of antennomeres and tarsomeres are given in standard units

(1 conventional unit = 0.025 mm). Measurements are given only for visible tarsomeres, that is, for ones I–III and V. All photos presented in this article were taken by the author with the exception of photos of *Pyrrhalta kwangtungensis* Gressitt and Kimoto, 1963 taken by J. Bezdek. Author's photographs of habitus were taken using a Canon EOS 80D digital camera with a combined Canon EF 70–200 mm f/4.0L IS USM and inverted following lenses: Olympus OM-System Zuiko Auto-T 100 mm f/2.8 for large species; Minolta MC Rokkor-PF 50 mm f/1.7 or Canon EF-S 60 mm f/2.8 Macro USM for medium size species and Olympus Zuiko Digital 35 mm f/3.5 Macro for *Pagria*. Photographs of aedeagi and spermathecae were taken using a Canon EOS 80D digital camera and a combined Canon EF



70–20 mm f/4.0L IS USM and inverted Canon EF-S 24 mm F2.8 STM lenses (to photograph spermathecae Canon Extender EF 1.4 X II was additionally used). Images at different focal planes were combined using Zerene Stacker Professional 1.04 software.

The present study has resulted in description of six new for science leaf beetle species, and 17 leaf beetle species are recorded for Thailand for the first time. The morphological characters and geographical distribution of some species are clarified, and provisional identification key is proposed for representatives of the genus *Luperocella* Jacoby, 1900.

#### Subfamily Criocerinae Latreille, 1804

*Lema (Lema) mediolineata* Jacoby, 1908

(Fig. 1)

**Material.** 3♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1100m N 18°56'48.3", E 99°21'22.4" 10.V.2024 P. Romantsov leg.”; 1♂ (PR), the same data, but “11.V.2024”; 3♂ (PR), the same locality and collector, but “h~1175-1246m N 18°56'40", E 99°21'50" N 18°56'34", E 99°22'15" 16.V.2024”; 2♂, 2♀ (PR), the same locality and collector, but “h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 18.V.2024”.

**Notes.** Oriental species of *Lema* Fabricius, 1798 were reviewed and keyed by Warchałowski [2011]. *Lema mediolineata* was known only from Myanmar (Burma Ruby Mines).

**Distribution.** Myanmar [Jacoby, 1908; Warchałowski, 2011], Northern Thailand (new record).

*Lema (Lema) semiregularis* Jacoby, 1908

(Fig. 2)

**Material.** 1♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1040-1019m, N 18°57'8", E 99°20'42" N 18°57'26", E 99°20'16 22.V.2024 P. Romantsov leg.”

**Notes.** According to the description of the species given by Jacoby [1908] this species differs from other fulvous species with blue elytra in antennomere III shorter than antennomere IV and in coarse puncturation at the base of the elytra, which looks somewhat confused on account of the transversely rugose interstices.

I have never examined Indian representatives of this species but my specimen fully complies with all the diagnostic characters of *L. semiregularis* given above.

**Distribution.** India (Manipur, Malabar coast) [Jacoby, 1908; Warchałowski, 2011], Northern Thailand (new record).

#### Subfamily Eumolpinae Hope, 1841

*Basilepta subtuberosa* Tan, 1988

(Figs 3, 4, 27, 28)

**Material.** 1♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1175-1265m N 18°56'40", E 99°21'50" - N 18°56'44", E 99°22'15" 17.V.2024 P. Romantsov leg.”; 2♀ (PR), the same locality and collector, but “h~1045-1015m N 18°57'8.5", E 99°20'42" - N 18°57'22", E 99°20'24" 20.V.2024”; 1♂ (PR), the same locality and collector, but “h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 25.V.2024”; 3♂, 1♀ (PR), the same locality and collector, but “h~1226-1400m N 18°56'31", E 99°21'28" - N 18°56'20", E 99°22'28" 27.V.2024”.

**Notes.** This species was described from Southern China (Yunnan) on base of two females (holotype and paratype). The specimens listed above almost completely correspond to all the characters of this species and its

image given by Tan with co-authors [Tan, 1988; Tan et al., 2005]. In addition, thanks to the kindness of A. Moseyko I was able to compare my specimens with the photographs of type specimens of this species. It turned out that this species is characterized by sexual dimorphism: males have less developed tubercles on elytra than females (Fig. 3). The photographs of the habitus (Fig. 4) and the aedeagus (Figs 27, 28) are given for the first time.

**Distribution.** China [Tan et al., 2005; Moseyko, 2024], Thailand (new record).

*Iphimoides pallidulus* (Jacoby, 1889)

(Fig. 5)

**Material.** 3♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1100m N 18°56'48.3", E 99°21'22.4" 10.V.2024 P. Romantsov leg.”; 1♂ (PR), the same data, but “11.V.2024”; 3♂ (PR), the same locality and collector, but “h~1175-1246m N 18°56'40", E 99°21'50" N 18°56'34", E 99°22'15" 16.V.2024”; 2♂, 2♀ (PR), the same locality and collector, but “h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 18.V.2024”.

**Notes.** This species was confused with *Iphimoides (Clisitherella) suturalis* Pic, 1982, considered its synonym for some time and discussed in detail by Romantsov and Moseyko [2019]. *Iphimoides pallidulus* was described from Myanmar, its records from China and Vietnam [Gressitt, Kimoto, 1961] may in fact refer to *I. suturalis*.

**Distribution.** Myanmar (Tenasserim) [Jacoby, 1908], Southern China (?), Vietnam (?) [Gressitt, Kimoto, 1961; Moseyko, 2024], Northern Thailand (new record).

*Pagria vietnamica* Moseyko et Medvedev, 2005

(Fig. 6)

**Material.** 1♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1105-1121m N 18°56'51", E 99°21'16" - N 18°56'58", E 99°20'54" 10.V.2024 P. Romantsov leg.”; 3♂, 1♀ (PR), the same locality and collector, but “1105-1099m, N 18°56'51", E 99°21'16" - N 18°57'1.7", E 99°20'34" 11.V.2024”; 3♂, 1♀ (PR), the same locality and collector, but “h~1105-1108m N 18°56'51", E 99°21'16" - N 18°57'1", E 99°21'8.4" 12.V.2024”; 2♂, 1♀ (PR), the same locality and collector, but “h~1099-1040m N 18°57'1.7", E 99°20'34", N 18°57'8" - N 18°57'8", E 99°20'42" 15.V.2024”.

**Notes.** Oriental species of *Pagria* Lefèvre, 1884 were reviewed and keyed by Moseyko and Medvedev [2005]. In the description of this species, they mentioned unicolour yellow upper side of the body, sometimes with darkened suture. The characters of the specimens that I've collected in Thailand fully correspond to all the characters of this species. All males also have unicolour yellow body, but females can have blurred dark spots on the pronotum and the elytra as well as black suture. These spots may be developed to varying degrees from barely noticeable smears to rather large indistinct spots.

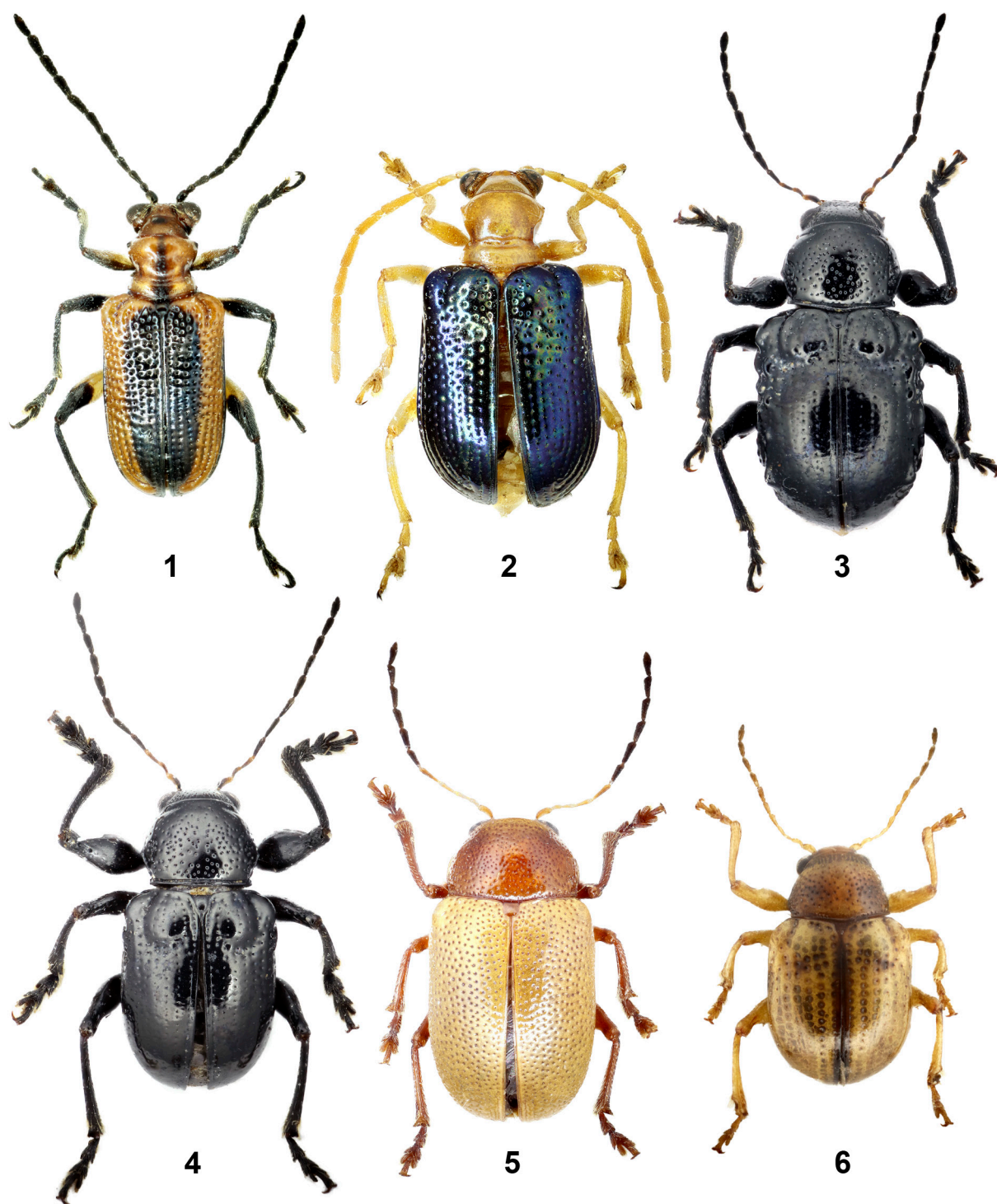
**Distribution.** Vietnam [Moseyko, Medvedev, 2005], Northern Thailand [Moseyko, 2012].

*Parascela hirsuta* (Jacoby, 1908)

(Fig. 7)

**Material.** 1♀ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1175-1246m, N 18°56'56", E 99°21'41" - N 18°56'34", E 99°22'15" 19.V.2024 P. Romantsov leg.”

**Notes.** The genus *Parascela* Baly, 1878 was comparatively recently reviewed and keyed by Romantsov and Moseyko [2019].



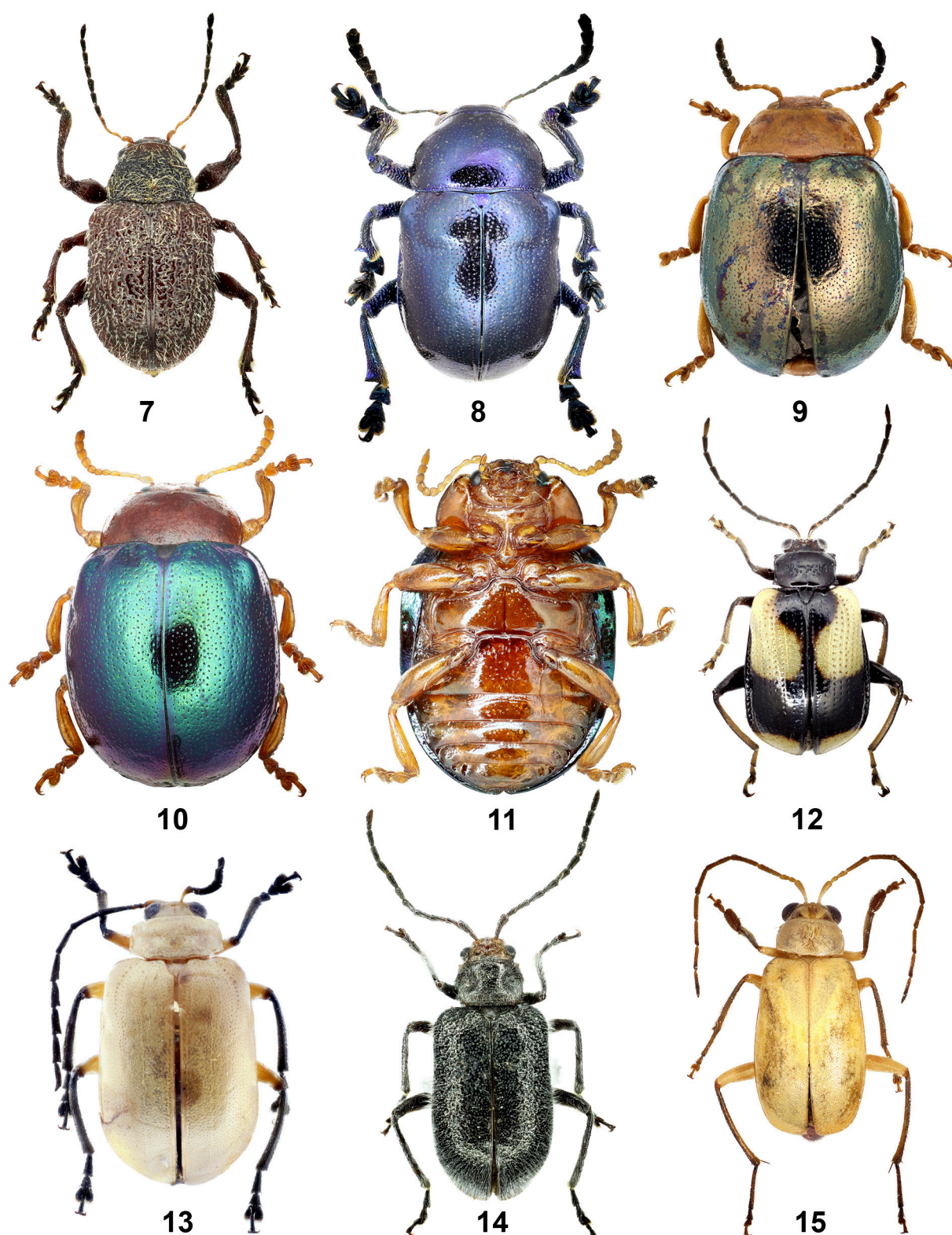
Figs 1–6. Representatives of the subfamilies Criocerinae and Eumolpinae from Thailand, general view.

1 – *Lema mediolineata*, male; 2 – *Lema semiregularis*, male; 3–4 – *Basilepta subtuberosa*: 3 – female, 4 – male; 5 – *Iphimoides pallidulus*, male; 6 – *Pagria vietnamica*, female.

Рис. 1–6. Представители подсемейств Criocerinae и Eumolpinae из Таиланда, общий вид.

1 – *Lema mediolineata*, самец; 2 – *Lema semiregularis*, самец; 3–4 – *Basilepta subtuberosa*: 3 – самка, 4 – самец; 5 – *Iphimoides pallidulus*, самец; 6 – *Pagria vietnamica*, самка.





Figs 7–15. Leaf beetles from Thailand and Nepal, general view.

7 – *Parascela hirsuta*, female; 8 – *Platycorynus dilaticollis*, male; 9 – *Plagiosterna miniaticollis*, male (Nepal); 10–11 – *P. suwattanae* sp. n., male, holotype: 10 – dorsal view, 11 – ventral view; 12 – *Aplosonyx ornatus*, male; 13 – *Gallerucida moseri*, male; 14 – *Luperocella thailandica* sp. n., male, holotype; 15 – *Paleosepharia magnitarsis* sp. n., male, holotype.

Рис. 7–15. Листоеды из Таиланда и Непала, общий вид.

7 – *Parascela hirsuta*, самка; 8 – *Platycorynus dilaticollis*, самец; 9 – *Plagiosterna miniaticollis*, самец (Непал); 10–11 – *P. suwattanae* sp. n., самец, голотип: 10 – вид сверху, 11 – вид снизу; 12 – *Aplosonyx ornatus*, самец; 13 – *Gallerucida moseri*, самец; 14 – *Luperocella thailandica* sp. n., самец, голотип; 15 – *Paleosepharia magnitarsis* sp. n., самец, голотип.



**Distribution.** Northeast India (Assam), Southern China (Yunnan) [Romantsov, Moseyko, 2019; Moseyko, 2024], Northern Thailand (new record).

*Platycorynus dilaticollis*  
(Jacoby, 1892), **sp. resurr.**  
(Fig. 8)

**Material.** 2♂, 1♀ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1040-1019m N 18°57'8", E 99°20'42" - N 18°57'26", E 99°20'16 22.V.2024 P. Romantsov leg."

**Notes.** The identification key for Indochinese species of *Platycorynus* Chevrolat, 1836 was published by Kimoto and Gressitt [1982]. In their work *Platycorynus dilaticollis* was synonymized (without any explanation) with *P. chalybeus* Marshall, 1864. Later, all representatives of this genus from Vietnam were reviewed and keyed by Medvedev and Rybakova [1985] where *P. dilaticollis* is considered as a valid species differing from *P. chalybeus* in the convex, rounded on sides pronotum which is about as wide as the elytra at base and in the head with a narrow shallow transverse groove between eyes. In contrast, *P. chalybeus* has the less convex, more or less conical pronotum which is narrower than the elytra at base and the head with a deep transverse groove on the frons between eyes. In the subsequent revision [Tan et al., 2005] *P. dilaticollis* was introduced as a synonym of *P. chalybeus* again. It seems that Tan et al. [2005] did not know about the work of Medvedev and Rybakova. Finally, this species is listed in the Catalogue of Palaearctic Coleoptera [Moseyko, 2024] as a synonym of *P. chalybeus* (probably based on the mentioned work). I agree with opinion Medvedev and Rybakova and listed this species here as a separate species.

The nominotypical subspecies of this species occurs in Myanmar and Southwestern China while *P. dilaticollis tibialis* L. Medvedev et Rybakova, 1985 was described from Northern Vietnam. It differs from the nominotypical subspecies in pro- and mesotibiae strongly expanded on both outer and inner sides. *Platycorynus dilaticollis dilaticollis* has pro- and mesotibiae expanded only on outer sides. The specimens collected in Northern Thailand belong to the nominotypical subspecies.

**Distribution.** Myanmar, Southwestern China [Medvedev, Rybakova, 1985], Northern Thailand (new record).

*Bathseba tristis* (Medvedev, 2001)  
(Figs 29, 30)

**Material.** 3♂, 2♀ (PR), "N Vietnam, Ninh Binh Prov., ~6 km SW Ninh Binh, h~30 m., N 20°13'32", E 105°56'8" 26.IV.2019 P. Romantsov leg."; 2♀ (PR), the same data, but "27.IV.2019"; 4♂, 4♀ (PR), the same data, but "28.IV.2019"; 3♂ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1100m N 18°56'48.3", E 99°21'22.4" 10.V.2024 P. Romantsov leg."; 1♂ (PR), the same data, but "11.V.2024"; 3♂ (PR), the same locality and collector, but "h~1175-1246m N 18°56'40", E 99°21'50" - N 18°56'34", E 99°22'15" 16.V.2024"; 2♂, 2♀ (PR), the same locality and collector, but "h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 18.V.2024"

**Notes.** *Bathseba tristis* was described from Southern Thailand based on one female, later one female was recorded for Northern Thailand [Romantsov, Moseyko, 2016] as well. Examination of my materials from Vietnam (2019) and Northern Thailand (2024) made it possible to

clarify some diagnostic characters and the distribution of this species as well as to give photographs of its aedeagus (Figs 29, 30) for the first time. It has been established that the body colouration of this species is quite stable and resembles one of the holotype, but some specimens have red fulvous pattern on the pronotum and the elytra less contrasting; body length 4.4–4.8 mm in male and 4.6–5.8 mm in female.

**Distribution.** Thailand [Romantsov, Moseyko, 2016], Vietnam (new record).

#### Subfamily Chrysomelinae Latreille, 1802 Genus *Plagiosterna* Motschulsky, 1860

The genus *Plagiosterna* Motschulsky, 1860 is very close to *Plagiodera* Chevrolat, 1836 from which it differs in the more elongated body with non-concave epipleura, not furcate tarsomere III and in convexity along lateral margins of the elytra. Recently, several works [Ge et al., 2008; Sprecher-Uebersax, Daccordi, 2016a, b] have been published in which a few species new to science were described as well as some important comments on their taxonomy have been made based on the study of type material and some species have been transferred from one genus to another.

*Plagiosterna suwattanae* sp. n.  
(Figs 10, 11, 31, 32)

**Material.** Holotype, ♂ (ZIN): "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1105-1108m N 18°56'51", E 99°21'16" - N 18°57'1", E 99°21'8.4" 12.V.2024 P. Romantsov leg.". Paratype: 1♂ (PR), the same data as in the holotype.

**Description.** Holotype. Antennae, legs and underside brown. Head and pronotum reddish brown. Scutellum black, elytra metallic green. Body length 6.9 mm. General view as in Fig. 10.

Body moderately oblong, slightly widened in middle, 1.41 times as long as wide. Head lustrous, labrum with broadly concave anterior margin. Labrum surface slightly convex, impunctate, lustrous with several setae along margins. Penultimate maxillary palpomere very slightly expanded, apical palpomere rather long (slightly longer than previous one) with oblique truncated apex. Frontoclypeus with almost flat and impunctate clypeal part; frons slightly convex with almost straight anterior and rounded posterior margins, surface covered by rather dense punctures and fine microsculpture with thin groove in middle. Frontal tubercles slightly convex, transverse triangular, almost touching each other with narrow triangular angles but distinctly separated with thin groove; distinctly delimited anteriorly and poorly delimited posteriorly. Surface of frontal tubercles shining and impunctate. Eyes rather large but slightly convex, 1.67 times as long as wide; interocular space 2.67 times as wide as transverse diameter of eye. Vertex rather densely covered with moderately large punctures, surface widely depressed before frontal tubercles with narrow groove in middle. Antennae robust, about 2.8 times shorter than body length. Antennomere I large, stout, antennomere II shortest, antennomere III just little shorter than antennomere I. Antennomeres I–IV lustrous with sparse erected setae. Antennomeres V–XI matte, their rugose surfaces covered with short adpressed setae and with separate erected longer setae on anterior margin. Antennomere XI with triangular apex. Length ratio of antennomeres I–XI as 13 : 7 : 12 : 9 : 8.5 : 8 : 8.5 : 9 : 10 : 9 : 12, width ratio as 9 : 5.5 : 5 : 6.5 : 7 : 7 : 8 : 9 : 9 : 9.

Pronotum transverse, 2.06 times as wide as long (widest at basal third); at level of its posterior angles 1.38 times narrower

than elytra at level of humeral tubercles. Anterior margin almost straight; basal margin almost straight near lateral angles but with middle of pronotal base distinctly protruded opposite scutellum; lateral margins rounded. Anterior and lateral margins distinctly bordered, posterior margins thinner bordered. Anterior angles rounded; posterior angles obtuse. All angles without setigerous pore. Pronotal surface moderately lustrous, punctured with moderately dense, not large punctures and has indistinct microsculpture; with indistinct weak depression in middle of anterior third.

Scutellum triangular (1.37 times as wide as long) with rounded apex; its surface lustrous with microsculpture more developed along base. Elytra 1.1 times as long as wide, with rounded lateral margins, widest around middle. Elytral surface with not very deep depressions: two at base (one between internal margin of humeral callus and anterior margin of elytra; another depression between latter one and scutellum) and longitudinal depression near lateral margin below humeral tubercles; moderately densely and confusedly covered with distinct punctures with slightly convex interstices. Humeral calli well developed. Epipleura not concave. Epipleural surface lustrous and almost impunctate. Macropterous.

Legs robust, bare over most of surface and with short setae only near apex. All tibiae with two long keels (higher in distal part) along entire length on upperside. Protibiae strongly, mesotibiae moderately, and metatibiae very slightly curved; all tibiae without spurs. Length ratio of protarsomeres I–III and V as 12 : 9 : 12 : 23; width ratio of protarsomeres I–III as 14 : 1 : 17. Length ratio of mesotarsomeres I–III and V as 14 : 18 : 14 : 23; width ratio of mesotarsomeres I–III as 14 : 12 : 18. Length ratio of metatarsomeres I–III and V as 15 : 8 : 15 : 23; width ratio of metatarsomeres I–III as 14 : 11 : 17. Tarsomere III shortly incised in the middle; tarsal claws simple, separate.

Ventral side (Fig. 11) very sparsely punctured with punctures bearing a short curved seta. Prosternal process strongly protruding between procoxal cavities, enlarged at apex which enters to hollow of mesoventrite. Surface of prosternal process strongly convex along entire length forming rather high carina. Procoxal cavities open posteriorly. Last abdominal ventrite simple. Pygidium convex with rounded apex.

Aedeagus (Figs 31, 32) about 2.8 times as long as wide, widest at base, then gently narrowing to triangular apex with rounded tip. In lateral view curved with tip turned up. Ventral side of aedeagus slightly concave. Length of aedeagus about 1.8 mm, width 0.65 mm.

Paratype. In colouration and morphological features this male is very similar to the holotype. It had the similar shape of the aedeagus which was later lost during examination of this specimen. Body length 7 mm.

**Differential diagnosis.** This new species belongs to the group of species from Indochina with brown body and metallic elytra, which also includes *Plagiosterna acuticollis* Sprecher-Uebersax et Daccordi, 2016, *P. aeneipennis* (Baly, 1859), *P. confusa* Sprecher-Uebersax et Daccordi, 2016, *P. marginipennis* (Jacoby, 1889), *P. miniaticollis* (Hope, 1831) and *P. seximpressa* (Chen, 1931). *Plagiosterna suwattanae* sp. n. can be easily distinguished from them in entirely yellow antennae, lateral margins of the pronotum rounded, strongly curved protibiae and strongly convex prosternal process along its entire length. In contrast, other species of this group have black or blackened apical antennomeres, almost straight or less curved protibiae and lateral margins of pronotum, weakly convex prosternal process. *Plagiosterna confusa* and *P. miniaticollis* (Fig. 9) having slightly curved protibiae and lateral margins of the pronotum (but less than in *P. suwattanae* sp. n.) are the most similar to those in the new species. However, both these species have other body colouration with black apical

antennomeres (*P. confusa* also with green scutellum) and different shape of the aedeagus with a less curved upwardly tip.

**Etymology.** This new species is named in honour of Suwattana Nasatain who helped me with logistics and accommodation arrangement during field work in Thailand in 2024.

### Subfamily Galerucinae Latreille, 1802

#### *Aplosonyx ornatus* (Jacoby, 1892)

(Fig. 12)

**Material.** 1♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thap Sadet, h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 15.V.2024 P. Romantsov leg.”; 1♂, 2♀ (PR), the same locality and collector, but “h~1175-1265m N 18°56'40", E 99°21'50" - N 18°56'44", E 99°22'15" 17.V.2024”; 2♂, 2♀ (PR), the same locality and collector, but “h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 21.V.2024”; 1♀ (PR), the same locality and collector, but “h~1175-1310m N 18°56'40", E 99°21'50" N 18°56'54", E 99°22'28" 25.V.2024”.

**Distribution.** China (Yunnan), Myanmar, Laos [Kimoto, 1989; Feng et al., 2023; Bemeen et al., 2024], Thailand (new record).

#### *Gallerucida moseri* Weise, 1922

(Fig. 13)

**Material.** 1♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thap Sadet, h~1175-1246m, N 18°56'56", E 99°21'41" - N 18°56'34", E 99°22'15" 19.V.2024 P. Romantsov leg.”; 1♀ (PR), the same locality and collector, but “1226-1400m N 18°56'31", E 99°21'28" N 18°56'20", E 99°22'28" 23.V.2024”; 1♂ (PR), the same locality and collector, but “h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 26.V.2024”.

**Distribution.** China, Vietnam [Gressitt, Kimoto, 1963; Kimoto, 1989; Chinese leaf beetles, 2015], Thailand (new record).

#### *Hoplosaenidea aerea* (Laboissière, 1933)

**Material.** 3♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thap Sadet, h~1105-1099m N 18°56'51", E 99°21'16" - N 18°57'1.7", E 99°20'34" 13.V.2024 P. Romantsov leg.”; 1♀ (PR), the same locality and collector, but “h~1288-1246 m, N 18°56'46", E 99°21'2" - N 18°56'34", E 99°22'15" 14.V.2024”; 1♂ (PR), the same locality and collector, but “h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 18.V.2024”; 1♀ (PR), the same locality and collector, but “h~1175-1246m, N 18°56'56", E 99°21'41" - N 18°56'34", E 99°22'15" 19.V.2024”; 1♂, 2♀ (PR), the same locality and collector, but “h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 21.V.2024”.

**Distribution.** China (Yunnan), Laos [Bezděk, 2009], Thailand (new record).

#### *Kanarella unicolor* Jacoby, 1896

**Material.** 1♂ (PR), “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thap Sadet, h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 15.V.2024 P. Romantsov leg.”; 1♂, 1♀ (PR), the same locality and collector, but “h~1175-1265m N 18°56'40", E 99°21'50" - N 18°56'44", E 99°22'15" 17.V.2024”; 1♂ (PR), the same locality and collector, but “h~1175-1246m, N 18°56'56", E 99°21'41" - N 18°56'34", E 99°22'15" 19.V.2024”; 1♂, 2♀ (PR), the same locality and collector, but “h~1045-1015m N 18°57'8.5", E 99°20'42" - N 18°57'22", E 99°20'24" 20.V.2024”; 1♀ (PR), the same locality and collector, but “h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 21.V.2024”; 1♂ (PR), the same locality and collector, but “1226-1400m N 18°56'31", E 99°21'28" N 18°56'20", E 99°22'28" 23.V.2024; 1♂ (PR), the same data, but “24.V.2024”.

**Distribution.** India, Nepal, China (Yunnan), Laos, Vietnam [Kimoto, 1989; Medvedev, 2019], Thailand (new record).

### Genus *Luperocella* Jakoby, 1900

The genus *Luperocella* was established by Jacoby [1900] with one species *Luperocella hirsuta* Jacoby, 1900. Later, Maulik [1936] described the genus *Alafia* Maulik, 1936 and transferred there *Galerucella albopilosa* Jacoby, 1892, *G. melancholica* Jacoby, 1889 and *G. submetallescens* Baly, 1879. Then Aslam [1972] synonymized *Alafia* with *Luperocella*. Finally, Medvedev [2001] synonymized *L. hirsuta* with *L. albopilosa*. Until now, the distribution of representatives of this genus was limited to Assam and Myanmar only. During fieldwork in Thailand 2024, I've collected a rather large series of representatives of this genus, belonging to a new species. Thanks to the kindness of J. Bezděk I was able to study photographs of the type specimens of all known species of *Luperocella*. This made it possible to describe one new species, introduce taxonomic changes to some known species, and compile the first identification key for all known species of this little-studied genus.

Members of the genus *Luperocella*, belonging to the tribe Galerucini, can be easily distinguished from other Galerucinae genera in following characters: body densely covered with long erect setae; vertex wrinkled; pronotum with anterior and lateral margins unbordered, pronotal surface with four depressions (one deep lateral depression on each side and two smaller ones on longitudinal middle line of which anterior depression is usually larger than posterior one); claws bifid; procoxal cavities open; last abdominal ventrite without incisions.

Medvedev [2001] synonymized *L. hirsuta* sp. resurr. with *L. albopilosa*, suggesting that these species are identical. I was able to study photographs of the type specimens of both these species, which are also completely consistent with the original descriptions [Jacoby, 1892, 1900]. After examination of these photographs I am sure that these are two different species which may be distinguished by the characters given in a key below.

#### *Luperocella thailandica* sp. n. (Figs 14, 33, 34, 47)

**Material.** Holotype, ♂ (ZIN): "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 18.V.2024 P. Romantsov leg.". Paratypes: 1♀ (JB), "NW Thailand, 19.9N, 97 59E Mae Hon Son, 1991 Ban Huai Po, 1600-2000m 9.-16.5., L. Dembický leg."; 1♂ (JB), "THAI, N, Mae Hon Son prov., SE of Soppong, 1500m, 19°27'N, 98°20'E, 23.-27.v.1999, M. Řiha leg."; 1♂, 1♀ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1105-1108m N 18°56'51", E 99°21'16" - N 18°57'1", E 99°21'8.4" 12.V.2024 P. Romantsov leg."; 1♂, 1♀ (PR), the same locality and collector, but "h~1288-1246 m, N 18°56'46", E 99°21'2" - N 18°56'34", E 99°22'15" 14.V.2024; 1♂ (PR), the same locality and collector, but "h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 15.V.2024; 3♂, 4♀ (PR), the same locality and collector, but "h~1175-1265m N 18°56'40", E 99°21'50" - N 18°56'44", E 99°22'15" 17.V.2024; 1♀ (PR), same locality and collector, but "h~1105m, at light N 18°56'51.2", E 99°21'16.6" 18.V.2024; 4♀ (PR), the same date as in holotype; 1♀ (PR), the same locality and collector, but "h~1175-1246m, N 18°56'56", E 99°21'41" - N 18°56'34", E 99°22'15" 19.V.2024; 1♀ (PR), the same locality and collector, but "h~1045-1015m N 18°57'8.5", E 99°20'42" - N 18°57'22", E 99°20'24" 20.V.2024; 2♂, 6♀ (PR), the same locality and collector, but "h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 21.V.2024; 1♀ (PR), the same locality and collector, but "1226-1400m N 18°56'31", E 99°21'28" N 18°56'20", E 99°22'28" 23.V.2024; 1♂, 1♀ (PR), the same locality and collector, but "h~1175-1310m N 18°56'40", E 99°21'50" N 18°56'54", E 99°22'28" 25.V.2024; 1♀ (PR), the same data, but "28.V.2024".

**Description.** Holotype. Antennae black. Head red-brown with large black spot on vertex; pronotum, scutellum and elytra black. Ventral side black with last abdominal ventrite brown. Legs black. Body length 6.7 mm. General view as in Fig. 14.

Body oblong, 2.25 times as long as wide, very slightly widened behind middle; densely covered with rather long (longest on elytra), erected silver setae. Head slightly lustrous, labrum with almost straight apical margin. Labrum surface convex and lustrous with several punctures bearing long pale seta. Penultimate maxillary palpomere slightly expanded; apical palpomere just slightly shorter but distinctly narrower than previous one, conical with sharp tip. Frontoclypeus convex anteriorly; forming posteriorly moderately wide and almost flat ridge in interantennal space; surface of frontoclypeus impunctate but with microsculpture and sparse setae. Genae rather long, just slightly shorter than transverse diameter of eye. Frontal tubercles large, moderately convex, almost square, located close to each other, but distinct separated with deep groove, not very distinctly delimited posteriorly with thin depressed line. Surface of frontal tubercles rather rugose with several punctures bearing long pale seta. Eyes small, slightly convex, oval (1.2 times as long as wide); interocular space 2.36 times as wide as transverse diameter of eye. Vertex slightly convex without longitudinal groove in middle; vertex surface rather rugose with moderately dense sub-erect setae. Antennae rather long, 1.35 times shorter than body length. Antennomere I moderately large, widened at apex; antennomere II shortest, slightly widened before apex. Antennomeres III–VIII slightly widened at apex. Antennomeres IX–XI almost cylindrical; last antennomere with sharp apex. Antennomeres I–IV lustrous covered with longer semi-adpressed setae; rest antennomeres matt, covered with shorter semi-adpressed setae. Length ratio of antennomeres I–XI as 28 : 11 : 17 : 18 : 19 : 17 : 17 : 15 : 16 : 16 : 24, width ratio as 9.5 : 6 : 7 : 7 : 8 : 8 : 8 : 8 : 7 : 6.5 : 6.

Pronotum transverse, 1.58 times as wide as long (widest at anterior third); at level of its posterior angles 1.62 times narrower than elytra at level of humeral tubercles. Anterior margin slightly concave; posterior margin almost straight; lateral margins uneven, angularly widened in anterior third. Anterior and lateral margins unbordered; posterior margin indistinctly and thinly bordered. Anterior and posterior angles tooth-shaped, slightly protruding, at apex bearing long pale seta. Pronotal surface uneven with four depressions: one deep lateral depression on each side and two much smaller ones on longitudinal middle line (anterior depression slightly larger than posterior one); densely punctured, with convex narrow interstices and long erect setae.

Scutellum triangular with rounded apex, 1.62 times as wide as long; its surface lustrous, slightly wrinkled, covered with large and small punctures. Elytra 1.55 times as long as wide; slightly widened behind middle with rounded apex. Elytra without subbasal depression. Elytral surface distinctly wrinkled, confusedly covered with distinct punctures with convex interstices (in places merging into short ridges). Humeral calli developed. Epipleura not wide at anterior third, then gradually narrowing and disappearing approximately at level of posterior third. Epipleural surface uneven, slightly wrinkled with sparse, short, semi-adpressed setae. Macropterous.

Legs long and slender, rather densely covered with long semi-erect setae. Pro- and mesotibiae almost straight, metatibiae slightly curved; all tibiae without spurs. Each tarsomere I not enlarged, narrower than tarsomere III. Length ratio of protarsomeres I–III and V as 19 : 10 : 9 : 23; width ratio of protarsomeres I–III as 8 : 8 : 11. Length ratio of mesotarsomeres I–III and V as 17 : 10 : 9 : 23; width ratio of mesotarsomeres I–III as 8 : 8 : 11. Length ratio of metatarsomeres I–III and V as 20 : 10 : 10 : 24; width ratio of metatarsomeres I–III as 7 : 6.5 : 11. Metatarsomere I straight, slightly widened at apex; about as long as two next tarsomeres combined. Tarsal claws bifid.

Ventral side sparsely covered with adpressed setae and small punctures. Prosternal process reduced to narrow keel which reaches just about middle of intercoxal space. Procoxal cavities



open posteriorly. Last abdominal ventrite with shallow longitudinal triangular depression in apical half; apical margin without incisures, but with small notch at apex. Pygidium convex, triangular with rounded apex.

Aedeagus (Figs 33, 34) about 6 times as long as wide, slightly widened before apex. Apex of aedeagus narrow triangular. In lateral view aedeagus slightly sinuous with tip bent upwards. Ventral side of aedeagus convex without depressions. Length of aedeagus about 2.25 mm, width 0.37 mm.

Paratypes. Males are similar to the holotype; pronotum 1.55–1.63 times as wide as long; body length 6.5–6.6 mm. Females are similar to males, but have slightly more transverse pronotum (about 1.7–1.74 times as wide as long) and last abdominal ventrite simple without depression; body length 7.3–7.5 mm. Specimens from Mae Hong Son Province have pronotum black with widely blurred red-brown sides. Spermatheca as in Fig. 47. Length of spermatheca 0.5 mm.

**Differential diagnosis.** *Luperocella thailandica* sp. n. is closest to *L. albopilosa* but differs in legs entirely black, antennomeres III and IV equal and in the somewhat more transverse pronotum which is 1.55–1.74 times as wide as long. *Luperocella albopilosa* has legs partly testaceous, antennomere III shorter than IV and the pronotum somewhat narrower (1.45–1.55 times as wide as long). See also a key.

**Etymology.** The name of the new species refers to Thailand where the type series have been collected.

#### Key to the species of the genus *Luperocella* Jacoby, 1900

- 1(2). Antennae robust, reach about half of body. Body black. Body length 6.3–7 mm. Myanmar ..... *L. melancholica*
- 2(1). Antennae slender, longer than half length of body.
- 3(4). Pronotum coarsely punctured. Body dorsally black with slight metallic tint, legs and antennae black (two apical antennomeres and edges of last abdominal ventrite may be brownish). Body length about 8.5 mm. India (Assam) ..... *L. submetallescens*
- 4(3). Punctuation of pronotum smaller, less rough. Body not entirely black (dorsal side and/or legs partly testaceous).
- 5(8). Legs partly testaceous. Species from Myanmar.
- 6(7). Head testaceous with a large black spot on vertex; pronotum and elytra from dark brown to black with faint purplish sheen on elytra; femora testaceous, femora-tibial articulation, tibiae and tarsi black. Antennomere IV longer than III. Body length 6.3–7 mm ..... *L. albopilosa*
- 7(6). Body dorsally black with distinct metallic bronzy sheen; legs testaceous, femora-tibial articulation and tarsi black. Antennomeres III and IV equal. Body length 6–6.5 mm ..... *L. hirsuta*
- 8(5). Head testaceous with a large black spot on vertex; pronotum, elytra and legs black. Antennomere III and IV equal. Body length 6.3–7.5 mm. Thailand ..... *L. thailandica* sp. n.

#### Genus *Paleosepharia* Laboissière, 1936

There are many papers devoted to the systematics of the genus *Paleosepharia* Laboissière, 1936. Species of this genus from Indochina were reviewed and keyed by

Medvedev [2014]. There are also identification keys to *Paleosepharia* species in many works [Gressitt, Kimoto, 1963; Kimoto, 1989; Mohamedsaid, 1996; Chinese leaf beetles, 2015; Lee, 2018]. In addition, special mention deserves the work of Mohamedsaid and Furth [2011] about secondary sexual characters in males of Galerucinae, which includes this genus. Several recently published works provide descriptions of the taxa new for science or with species recorded for the first time, as well as taxonomic remarks to already known species from the region under consideration [Mohamedsaid, Constant, 2007; Medvedev, 2013; Rizki et al., 2014, 2016; Nguyen, Gómez-Zurita, 2017, etc.].

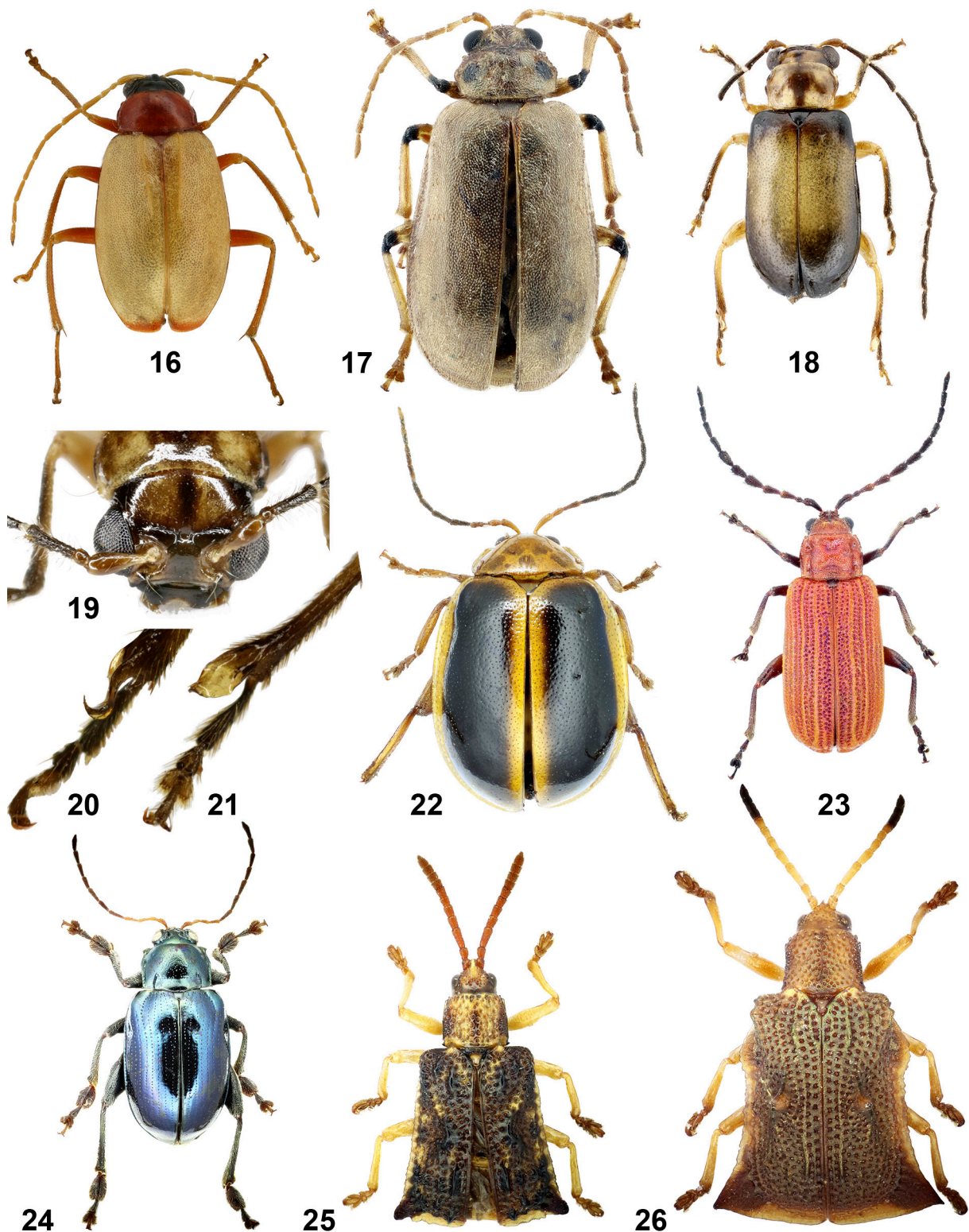
#### *Paleosepharia magnitarsis* sp. n. (Figs 15, 35–37)

**Material.** Holotype, ♂ (PR): "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thap Saket, h~1105m, at light N 18°56'51.2", E 99°21'16.6" 26.V.2024 P. Romantsov leg.:"

**Description.** Holotype. Antennae brown with three first antennomeres light-brown and apical part of last three antennomeres darkened. Head brown with 2 oblique yellow stripes; pronotum and scutellum brown; elytra brown with indistinct lighter areas visible along basal and lateral margins as well as in central part of elytral disk where they look like unclear oblique stripes from humeral tubercles to suture, epipleura reddish brown in basal part. Ventral side brown except metaventricle, last abdominal ventrite and pygidium red-brown; legs light-brown with tibiae and tarsi darkened. Body length 6.1 mm. General view as in Fig. 15.

Body rather oblong, about 2.12 times as long as wide, widest approximately at level of apical third. Head lustrous, labrum with slightly convex apical margin. Labrum surface slightly convex, impunctate, lustrous with several setae along apical margin. Penultimate maxillary palpomere not expanded; apical palpomere long, not narrower than previous one, conical with sharp tip. Frontoclypeus slightly convex, impunctate but with microsculpture, forming moderately wide and slightly convex ridge in interantennal space. Genae very short, about 8.5 times shorter than transverse diameter of eye and about 10.5 times shorter than longitudinal diameter of eye. Frontal tubercles moderately convex, triangular with slightly produced inner anterior angles, located closely and almost touching each other with their inner sides but distinct separated by thin deep groove, distinctly delimited posteriorly by thin depressed line. Surface of frontal tubercles impunctate but with indistinct microsculpture. Eyes large, strongly convex, oval (1.24 times as long as wide); interocular space 1.18 times as wide as transverse diameter of eye. Vertex convex without longitudinal groove in middle or depression before frontal tubercles; surface of vertex sparsely covered with very small, microscopic punctures. Antennae long, slightly longer than body length. Antennomere I moderately large, club-shaped, widened at apex; antennomere II shortest, slightly widened before apex. Antennomeres III–VII slightly widened at apex. Antennomeres VIII–XI almost cylindrical; last antennomere with sharp tip. Antennomeres I–III almost glabrous, other ones not very densely covered with short semi-adpressed setae. Length ratio of antennomeres I–XI as 27 : 8 : 11 : 25 : 30 : 29 : 28 : 26 : 27 : 26 : 29, width ratio as 7 : 4.5 : 5 : 6 : 5.5 : 5.5 : 5 : 4.5 : 4 : 4 : 3.5.

Pronotum transverse, about 1.92 times as wide as long (widest at anterior third); at level of its posterior angles 1.43 times narrower than elytra at level of humeral tubercles. Anterior margin slightly concave; posterior margin convex; lateral margins very weakly rounded, barely noticeable notched before anterior angles. Anterior margin unbordered, lateral margins distinctly bordered; posterior margin distinctly bordered near posterior angles but not bordered opposite of scutellum. Anterior angles almost rectangular, slightly protruding; posterior angles obtuse, slightly



Figs 16–26. Leaf beetles from Thailand, general view and details of structure.

16 – *Paleosepharia rubroapicata* sp. n., male, holotype; 17 – *Pyrrhalta khuntanensis* sp. n., male, holotype; 18–21 – *Sinoluperoides chenchirae* sp. n., male, holotype: 18 – habitus, 19 – head, 20 – metatibia, dorsal view, 21 – metatibia, lateral view; 22 – *Hyphasis limbatipennis*, female; 23 – *Laboissierea minuta*, female; 24 – *Xuthea orientalis*, male; 25 – *Prionispa cheni*, male; 26 – *Prionispa opacipennis*, male.

Рис. 16–26. Листоеды из Таиланда, общий вид и детали строения.

16 – *Paleosepharia rubroapicata* sp. n., самец, голотип; 17 – *Pyrrhalta khuntanensis* sp. n., самец, голотип; 18–21 – *Sinoluperoides chenchirae* sp. n., самец, голотип: 18 – внешний вид, 19 – голова, 20 – задняя голень, вид сверху, 21 – задняя голень, вид сбоку; 22 – *Hyphasis limbatipennis*, самка; 23 – *Laboissierea minuta*, самка; 24 – *Xuthea orientalis*, самец; 25 – *Prionispa cheni*, самец; 26 – *Prionispa opacipennis*, самец.





Figs 27–48. Leaf beetles from Thailand and China, aedeagi and spermathecae.

27–46 – aedeagi; 47–48 – spermathecae. 27–28 – *Basilepta subtuberosa*; 29–30 – *Triclionia tristis*; 31–32 – *Plagiosterna suwattanae* **sp. n.**, holotype; 33–34, 47 – *Luperocella thailandica* **sp. n.**: 33–34 – holotype, 47 – paratype; 35–37 – *Paleosepharia magnitarsis* **sp. n.**, holotype; 38 – *Paleosepharia rubroapicata* **sp. n.**, holotype; 39–41, 48 – *Pyrrhalta khuntanensis* **sp. n.**: 39–41 – holotype, 48 – paratype; 42–43 – *Pyrrhalta kwangtungensis*, paratype (China); 44–46 – *Sinoluperoides chenchirae* **sp. n.**, holotype. 27, 29, 31, 33, 36, 41, 42, 44, 47, 48 – dorsal view; 28, 30, 32, 34, 37, 40, 43, 45 – lateral view; 35, 38, 46 – ventral view.

Рис. 27–48. Листоеды из Таиланда и Китая, эдеагусы и сперматеки.

27–46 – эдеагусы; 47–48 – сперматеки. 27–28 – *Basilepta subtuberosa*; 29–30 – *Triclionia tristis*; 31–32 – *Plagiosterna suwattanae* **sp. n.**, голотип; 33–34, 47 – *Luperocella thailandica* **sp. n.**: 33–34 – голотип, 47 – паратип; 35–37 – *Paleosepharia magnitarsis* **sp. n.**, голотип; 38 – *Paleosepharia rubroapicata* **sp. n.**, голотип; 39–41, 48 – *Pyrrhalta khuntanensis* **sp. n.**: 39–41 – голотип, 48 – паратип; 42–43 – *Pyrrhalta kwangtungensis*, паратип (Китай); 44–46 – *Sinoluperoides chenchirae* **sp. n.**, голотип. 27, 29, 31, 33, 36, 41, 42, 44, 47, 48 – вид сверху; 28, 30, 32, 34, 37, 40, 43, 45 – вид сбоку; 35, 38, 46 – вид снизу.



protruding. Anterior and posterior angles with setigerous pore bearing long pale seta, lateral margin with several additional short setae. Pronotal surface lustrous with wide, transverse, very feeble depression on each side of middle; densely (but more sparsely in depressed areas) punctured with small punctures.

Scutellum triangular with sharp apex, about 1.5 times as wide as long; its surface lustrous without punctures but with microsculpture. Elytra 1.67 times as long as wide; slightly widened behind middle; its apex not sharply truncated. Elytra without sub-basal depression or modified area; just very slightly, almost unnoticeably depressed along suture near scutellum. Elytral surface densely and confusedly punctured with distinct punctures, interstices slightly convex. Humeral calli developed. Epipleura wide at anterior third, then gradually narrowing towards apex and reaching inner elytral angles. Epipleura turned outward at truncate apex so their ventral margin visible from above. Epipleural surface lustrous and impunctate. Macropterous.

Legs long and slender, sparsely covered with semi-erect setae. Protibiae slightly curved without spur, mesotibiae almost straight with short spur, metatibiae slightly curved and noticeably widened at apex with long spur. Protarsomere I enlarged: swollen at underside, flattened at underside (Fig. 15), much wider than tarsomere III. Meso- and metatarsomere I not enlarged, narrower than tarsomere III. Length ratio of protarsomeres I–III and V as 18 : 9 : 11 : 25; width ratio of protarsomeres I–III as 12 : 5 : 9. Length ratio of mesotarsomeres I–III and V as 29 : 10 : 7 : 15; width ratio of mesotarsomeres I–III as 4.5 : 5 : 9. Length ratio of metatarsomeres I–III and V as 47 : 10 : 6 : 15; width ratio of metatarsomeres I–III as 5 : 5 : 8. Metatarsomere I straight with almost parallel margins, about 1.7 times as long as next three tarsomeres combined and 2.17 times shorter than length of tibia. Tarsal claws appendiculate.

Ventral side sparsely covered with adpressed setae and small punctures. Prosternal process reduced to very narrow keel barely visible between coxae. Procoxal cavities closed posteriorly. Last abdominal ventrite trilobed; middle lobe rectangular with slightly rounded lateral angles, longer than lateral lobes, its surface with short and thin longitudinal groove in apical part. Pygidium convex, triangular with rounded apex.

Aedeagus (Figs 35–37) moderately wide in basal half (with maximum width 0.42 mm) then narrowing towards apex (with minimal width before apex 0.05 mm), apex anchor-shaped with three teeth (maximum apex width at level of lateral teeth 0.225 mm). Apex of aedeagus deeply thinly incised. Sub-apical narrow portion with longitudinal groove in dorsal view. In lateral view aedeagus sinuous and strongly bent down (at angle almost 90°) before apex. Ventral side of aedeagus convex in basal half and smooth in other portion. Length of aedeagus about 2.8 mm, width 0.42 mm.

**Differential diagnosis.** *Paleosepharia magnitarsis* sp. n. belongs to the species group with unmodified elytra in male. Members of this group often have shallow depressions on the pronotum. This new species is easily distinguished from other members of this group in brown with indistinct white areas colouration of the dorsal side of body and in unique shape of the aedeagus (anchor-shaped apex in dorsal view and strongly bent down before apex in lateral view). In addition, this species is easily distinguished from all congeners in greatly expanded male protarsomere I. Such sexual dimorphism is not characteristic of other *Paleosepharia* species, both sexes of which have normally wide tarsi. As for *P. tibialis* Chen et Jiang, 1984 from China (Guangxi), it is described based on a single female. This species also has brown body with tibiae and tarsi black, similar colouration of the ventral side, large size of body (7 mm), but differs (according to its original description and study of photographs of the holotype) in scutellum

black and the pronotum without trace of any depressions. *Paleosepharia magnitarsis* sp. n. has brown scutellum and the pronotum with lateral margins very weakly and evenly rounded, pronotal surface with wide, transverse, very feeble depression on each side of middle.

**Etymology.** The name of the new species is a Latinized adjective derived from magnus “large” and tarsis “tarsi”, to reflect the enlarged protarsomere I.

*Paleosepharia rubroapicata* sp. n.  
(Figs 16, 38)

**Material.** Holotype, ♂ (PR): “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1105m, at light N 18°56'51.2", E 99°21'16.6" 21.V.2024 P. Romantsov leg.”

**Description.** Holotype. Antennae brown with tip of last antennomere darkened, head black. Pronotum and scutellum red, elytra brown with red apex. Ventral side red-brown, apices of abdomen and pygidium black; legs brown with femora red-brown. Body length 4.6 mm. General view as in Fig. 16.

Body not very elongate, about 1.92 times as long as wide, widest behind middle. Head lustrous, labrum with slightly convex apical margin. Labrum surface slightly convex, impunctate, lustrous with several setae along apical margin. Penultimate maxillary palpomere very slightly expanded, apical palpomere rather long (barely shorter than previous one), conical with sharp tip. Frontoclypeus very wide and convex, almost impunctate, forming wide convex ridge in interantennal space. Genae very short, about 7.5 times shorter than transverse diameter of eye. Frontal tubercles moderately convex, subquadrate; connected to each other, not delimited anteriorly (connected with interantennal ridge), poorly delimited posteriorly with thin depressed line. Surface of frontal tubercles lustrous with indistinct microsculpture. Eyes large, strongly convex, almost round; interocular space about as wide as diameter of eye. Vertex convex with thin longitudinal groove in middle and with depression before frontal tubercles; vertex surface sparsely covered with small punctures and indistinct microsculpture. Antennae moderately long, about 1.1 times shorter than body length. Antennomere I large, stout, slightly curved, club-shaped, antennomere II shortest, slightly widened before apex. Antennomeres III–V slightly widened at apex. Antennomeres VI–X almost cylindrical. Antennomere XI slightly widened in apical quarter, apex triangular with sharp tip. Antennomeres I–III almost glabrous, other ones not densely covered with short semi-adpressed setae and with separate protruding setae. Length ratio of antennomeres I–XI as 22 : 7 : 9 : 11 : 19 : 19 : 19 : 19 : 18 : 16 : 18, width ratio as 5 : 3.5 : 4 : 7 : 4 : 4 : 3.5 : 3 : 3 : 3 : 3.

Pronotum transverse, about 1.75 times as wide as long (widest at anterior third); at level of its posterior angles 1.3 times narrower than elytra at level of humeral tubercles. Anterior margin almost straight; posterior margin very slightly convex; lateral margins weakly rounded, slightly notched before anterior angles. Anterior margin unbordered; posterior margin thin, lateral margins distinctly bordered. Anterior angles almost rectangular, slightly protruding; posterior angles obtuse, slightly protruding. Anterior and posterior angles with setigerous pore bearing long pale seta, lateral margins with several additional short setae. Pronotal surface lustrous with sparse, very small punctures; without traces of any depressions.

Scutellum triangular with sharp apex, about as wide as long; its surface lustrous with very small punctures and microsculpture. Elytra 1.44 times as long as wide; relatively narrow at base, gradually widened (widest at level of posterior third) and then more abruptly narrowed towards sharply truncate apex. Elytra without sub-basal depression, but with modified area in form of wide, not deep impression along suture limited outside with distinct long keels, almost parallel to suture. Almost all elytral surface very densely

and confusedly covered with distinct punctures with slightly convex interstices. Punctures in modified elytral area sparser and smaller. Humeral calli weakly developed. Epipleura moderately wide at anterior quarter, then gradually narrowing toward truncate apex and disappearing not far from inner elytral angles. Epipleural surface lustrous and impunctate. Macropterous.

Legs long and slender, sparsely covered with semi-erect setae. All tibiae almost straight, very slightly widened at apex; with spurs (longest ones on metatibiae) at apex. Pro-, meso- and metatarsomere I not enlarged, narrower than tarsomere III. Length ratio of protarsomeres I–III and V as 10 : 6 : 5 : 9; of mesotarsomeres I–III and V as 16 : 6 : 5 : 11; of metatarsomeres I–III and V as 36 : 7 : 5 : 12. Metatarsomere I straight with almost parallel margins; approximately twice as long as three next tarsomeres combined and slightly longer than half length of tibia. Tarsal claws appendiculate.

Ventral side covered with pale adpressed setae (denser on ventrites of metathorax). Prosternal process reduced to very narrow keel barely visible between coxae. Procoxal cavities closed posteriorly. Last abdominal ventrite trilobed, middle lobe rectangular slightly longer than lateral lobes, its surface with wide longitudinal triangular depression in apical part. Pygidium convex, triangular with widely rounded apex.

Aedeagus (Fig. 38) with broken apical part. Ventral side of aedeagus convex in basal half and with shallow longitudinal depression in other visible part. Length of aedeagus (excluding broken part) about 1.75 mm, width 0.3 mm.

**Differential diagnosis.** *Paleosepharia rubroapicata* sp. n. differs from other congeners in its colouration: head black, pronotum red, elytra brown with red apex, metasternum and abdomen red-brown, apices of abdomen and pygidium black; as well as in the unusual shape of modified area on the male elytra. This new species is similar to *P. membranacea* Medvedev, 2001 and *P. buonloica* Medvedev, 2014, but the first species has the black pronotum, and the latter one has the entirely brown elytra; in addition, both species have the male elytra without modified area. *Paleosepharia rubroapicata* sp. n. has a wide modified elytral area, almost parallel to suture and limited outside with distinct long keels. The majority of congeners has modified elytral area in the shape of various impressions (drop-like, spindle-form, Y-form); if this impression is more or less parallel to suture (in *P. lingulata* Chen et Jiang, 1984, *P. subsuturalis* Medvedev, 2009, *P. suturalis* Medvedev, 2009 and *P. vietnamica* Medvedev, 2004), it is much narrower than in *P. rubroapicata* sp. n.

**Etymology.** The name of this new species refers to its colouration with red elytral apex.

### Genus *Pyrrhalta* Joannis, 1865

There are many works devoted to the systematics of the genus *Pyrrhalta* Joannis, 1865; here I mention only ones that contain the most important keys for identification of the species of this genus from Indochina [Gressitt, Kimoto, 1963; Kimoto, 1989; Chinese leaf beetles, 2015, etc.]. It should be mentioned separately the species catalogue of *Pyrrhalta* of the World [Xue, Yang, 2010]. Traditionally, the genera *Pyrrhalta* and *Menippus* Clark, 1864 were distinguished by a degree of closure of the procoxal cavity, which is open in *Pyrrhalta* and closed in *Menippus*. This character is commonly used to delimit tribes and subtribes in the Chrysomelidae, but some genera have diverse cavity closure. In the revision of *Menippus* from

Australia [Reid, Nally, 2008: 88] authors mentioned: “the generic keys to Galerucinae of south-east Asia (Kimoto, 1989) and New Guinea (Shute, 1983) fail to identify most Australian species as *Menippus* because this trait varies among Australian representatives of the genus”. In the same work they wrote that *Menippus* easily distinguish from the genera with the pubescent dorsal surface, green or brown colouration and partly depressed pronotal disc by the following [Reid, Nally, 2008: 89]: “green colour ephemeral, absent in dead specimens; pronotum entirely pubescent and not transversely depressed; elytral epipleura abruptly contracted between base and hind coxa; claws bifid”. However, in my opinion, *Menippus* and *Pyrrhalta* cannot be distinguished based on these characters. The latter has similar characteristics, including various different shape of epipleura. In subsequent works devoted to this genus [Lee et al., 2012; Suenaga et al., 2017] only the question of the identity of the genera *Menippus* and *Issikia* Chujo, 1961 is considered, and as for distinguishing the genus *Menippus* from other genera, a reference to the work of Reid and Nally is used. In my opinion the question of the difference between these two genera still remains open and requires further study.

### *Pyrrhalta khuntanensis* sp. n.

(Figs 17, 39–41, 48)

**Material.** Holotype, ♂ (PR): “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1105m, at light N 18°56'51.2", E 99°21'16.6" 16.V.2024 P. Romantsov leg.”. Paratype: 1♀ (ZIN), the same data as in holotype, but “15.V.2024”.

**Description.** Holotype. Antennae brown; dorsal side of body grey-brown, pronotum with oval black spot on each side; legs brown with black femora-tibial articulation. Ventral side grey-brown with abdomen brown. Body length 8 mm. General view as in Fig. 17.

Body moderately oblong, slightly widened posteriorly, about 2.1 times as long as wide. Head densely punctured, labrum with slightly convex apical margin. Labrum surface moderately convex, impunctate, lustrous with several setae along apical margin and with denser and longer setae along connection with frontoclypeus. Penultimate maxillary palpomere almost not expanded (only slightly wider than previous palpomere), apical palpomere long (about as long as previous one), conical with sharp tip. Frontoclypeus wide, rather convex with setae along sides, its surface lustrous above but with finely wrinkled sculpture on lateral slopes. Genae about 2.8 times shorter than transverse diameter of eye. Space between antennal sockets with rather convex ridge. Frontal tubercles moderately convex, subquadrate; narrowly separated to each other with thin groove, distinctly delimited anteriorly with wide groove, poorly delimited posteriorly with thin depressed line. Surface of frontal tubercles shining, distinctly punctured, with several short semi-erect setae. Eyes large, strongly convex, very slightly oval (1.05 times as long as wide); interocular space moderately wide (1.35 times as wide as diameter of eye). Vertex rather densely covered with moderately large punctures and semi-erect setae. Antennae moderately robust, about 1.7 times shorter than body length. Antennomere I large, stout, slightly curved, club-shaped, antennomere II short, slightly widened at apex. Antennomeres III–VIII widened at apex. Antennomeres IX and X almost cylindrical. Antennomere XI slightly widened in apical quarter, apex triangular with sharp tip. Antennomeres I–III sparsely, other ones densely covered with short semi-adpressed setae. Length ratio of antennomeres I–XI as 10 : 5 : 17 : 21 : 21 : 20 : 20 : 18 : 18 : 21, width ratio as 8 : 6 : 6.5 : 7 : 7 : 7 : 7 : 6.5 : 6 : 5.5 : 5.

Pronotum transverse, about 2 times as wide as long (widest at anterior third); at level of its posterior angles 1.35 times as narrow as elytra at level of humeral tubercles. Anterior margin very slightly concave; posterior margin very slightly convex; lateral margins sinuous, protrude roundly to side at level of anterior third and very slightly notched before anterior angles. Anterior and posterior margins unbordered, lateral margins bordered. Anterior angles almost rectangular, slightly protruding; posterior angles obtuse, slightly protruding. Posterior angles with setigerous pore bearing long pale seta, anterior angles without setae, but lateral margin with several short setae. Pronotal surface moderately lustrous, punctured with dense, rather large punctures and covered with semi-adpressed silvery setae; very slightly depressed near middle of each side.

Scutellum triangular with rounded apex, about as wide as long; its surface lustrous with dense, small punctures and rather long adpressed silvery setae. Elytra 1.55 times as long as wide, widened at posterior third. Elytral surface without subbasal depression; very densely and confusedly covered with distinct punctures (with very narrow slightly convex interstices) and silvery setae. Humeral calli well developed. Epipleura moderately wide at anterior quarter, then gradually narrowing and disappearing in apical quarter. Epipleural surface lustrous, impunctate, but with microsculpture. Macropterous.

Legs moderately robust, covered with pale semi-adpressed setae. All tibiae almost straight, slightly widened at apex; without spurs. Protarsomere I very slightly enlarged, narrower than tarsomere III. Meso- and metatarsomere I not enlarged, noticeably narrower than tarsomere III. Length ratio of protarsomeres I–III and V as 10 : 5 : 5 : 8; of mesotarsomeres I–III and V as 8 : 6 : 5 : 11; of metatarsomeres I–III and V as 11 : 7 : 6 : 11. Metatarsomere I almost straight, slightly widened at apex; slightly shorter than length of metatarsomeres I–II combined. Tarsal claws bifid.

Ventral side covered with pale adpressed setae (denser on ventrites of metathorax). Prosternal process reduced to very narrow keel barely visible between coxae. Procoxal cavities rather widely open posteriorly. Last abdominal ventrite with distinct broadly triangular emargination about 1/3 as long as ventrite. Pygidium convex, triangular with widely rounded apex.

Aedeagus (Fig 39–41) about 5.5 times as long as wide, widest at middle part, then gently narrows to triangular apex. In lateral view sinuous, with tip bent to side. Ventral side of aedeagus convex in basal half and with shallow longitudinal lanceolate depression in apical half. Length of aedeagus about 2.3 mm, width 0.42 mm.

Paratype. Female is similar to male, but last abdominal ventrite without emargination. Spermatheca as in Fig. 48. Length of spermatheca 0.72 mm. Body length 8.5 mm.

**Differential diagnosis.** Thanks to the kindness of J. Bezděk I checked the photographs of the habitus of the allotype as well as the habitus and the aedeagus (Figs 42, 43) of one paratype of *P. kwangtungensis* Gressitt et Kimoto, 1963, which I believe is most similar to the species described here. These images completely correspond to the original description including the drawing of the aedeagus. Differences between these two species are given on the basis of the above-mentioned description and photographs.

*Pyrrhalta kwangtungensis* from South China (Guangdong) has the pronotum with similar spots and legs with black femora-tibial articulation, but differs in the paler body colouration (pronotum and elytra ochraceous or yellowish-brown without any metallic tint) and in the shape of the aedeagus (slightly arched in lateral view; gradually and slightly widening to a short distance before apex in dorsal view). *Pyrrhalta khuntanensis* sp. n. has the pronotum and the elytra grey brown with weak metallic bronze tint and the aedeagus slightly sinuous in lateral view, not widening before apex in dorsal view.

Body shape and colouration of *P. khuntanensis* sp. n. is also similar to species of the genus *Menippus*, especially ones having back spots on the pronotum (*M. issikii* (Chûjô, 1961) and *M. hsuehleeae* Lee, Bezděk et Suenaga, 2012). But these species differ in darkened antennae and apex of tibiae as well as in the different shape of aedeagi.

**Etymology.** The name of the new species refers to the collecting locality situated on the Khun Tan Range.

### Genus *Sinoluperoides* Kimoto, 1989

The genus *Sinoluperoides* was established by Kimoto [1989] for four species: *S. maculatus* Kimoto, 1989 (type species), *S. major* Kimoto, 1989 and *S. marginalis* Kimoto, 1989 from Vietnam, and *S. antennatus* Kimoto, 1989 from Laos. Later, Medvedev [2012] described the fifth species *S. costatus* Medvedev, 2012 from Vietnam. Thus, this genus currently comprises five species. *Sinoluperoides* can be distinguished from other Galerucinae genera by the following combination of characters: body elongate, antennal insertions and frontal tubercles widely separated by frons; labrum bilobed apically; genae very narrow; antenna with third segment distinctly longer than second; prothorax with depression in basal third, pronotal anterior margin unbordered, lateral and posterior margins distinctly bordered; elytra irregularly punctured, epipleura wide at base and gradually narrowed to apex; prosternal process not elevated between anterior coxae; procoxal cavities closed posteriorly; meso- and metatibiae with distinct spur at apex, metatarsomere I longer than length of metatarsomeres I–II combined, tarsal claws appendiculate; last abdominal ventrite trilobed. Among other genera *Sinoluperoides* resembles *Hoplosaenidea* Laboissière, 1933, but the latter differs in closely spaced frontal tubercles and entire anterior margin of labrum. Having frontal tubercles widely separated by frons and bilobed labrum *Sinoluperus* Gressitt et Kimoto, 1963 closely resembles this genus but easily differs in procoxal cavities open posteriorly and bordered anterior margin of the pronotum.

In the description of *Sinoluperoides* Kimoto [1989] incorrectly stated that it differs from *Sinoluperus* in having meso- and metatibiae with spur at apex. Actually, both genera have meso- and metatibiae spined at apex. The difference between these genera is given above in the differential diagnosis.

### *Sinoluperoides chenchirae* sp. n. (Figs 18–21, 44–46)

**Material.** Holotype, ♂ (ZIN): “N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1288-1246 m, N 18°56'46", E 99°21'2" - N 18°56'34", E 99°22'15" 14.V.2024 P. Romantsov leg.” Paratype: 1♂ (PR), the same locality and collector as in the holotype, but “h~1105-1099m N 18°56'51", E 99°21'16" - N 18°57'1.7", E 99°20'34" 13.V.2024”.

**Description.** Holotype. Head brown with black labrum, partly darkened frontoclypeus, blurred blackish stroke in middle of frons and blackened areas behind eyes. Pronotum light brown. Elytra brown with basal and apical areas widely blackened, lateral margins and epipleura narrowly blackened. Antennae with antennomere I brown, all other antennomeres darkened. Legs brown with tibiae (except basal part) and tarsi darkened. Ventral side of body brown, metaventrite and apical part of pygidium black. Body length 3.9 mm. General view as in Fig. 18.



Body oblong, very slightly widened posteriorly, about 2.3 times as long as wide. Head (Fig. 19) impunctate, labrum rather large, with deep emargination on apical margin. Labrum surface moderately convex, impunctate, lustrous with several setae along apical margin. Penultimate maxillary palpomere moderately (about 1.5 times wider than previous one) swollen, apical palpomere rather long (just about 1.4 times shorter than previous one), conical. Frontoclypeus trapezoidal, ridged on sides, longitudinally widely concave with two long setae near antennal insertions on each side. Genae very short, about 7.5 times shorter than diameter of eye. Frontal tubercles convex, narrow, strongly transverse and slightly oblique; widely separated to each other with rather deep fossa, delimited behind with thin impressed line, but poorly delimited anteriorly. Surface of frontal tubercles impunctate, smooth, shining. Eyes large, strongly convex, almost round (about as long as wide); interocular space wide (1.67 times as wide as diameter of eye). Vertex covered with microsculpture as well as weak oblique wrinkled behind eyes, with long seta on each side near eye. Antennae filiform, long, 1.27 times as long as body length. Antennomere I large, stout, club-shaped, antennomere II short, almost round. Antennomere III straight, widened at apex. Antennomeres IV–X slightly curved and widened at apex (antennomeres V and X somewhat less curved than rest ones). Antennomere XI almost straight, pointed at apex. Antennomeres I and II glabrous, antennomeres III–X with protruding setae (longer on antennomeres III–VII), last antennomere covered with short semi-adpressed setae. Length ratio of antennomeres I–XI as 15 : 4 : 15 : 22 : 21 : 22 : 22 : 21 : 21 : 20 : 19, width ratio as 6 : 4 : 4 : 4 : 4 : 4 : 4 : 3 : 3 : 3 : 3.

Pronotum transverse, 1.5 times as wide as long (widest at anterior half); at level of its posterior angles about 1.5 times narrower than elytra at level of humeral tubercles. Anterior margin almost straight, posterior margin very slightly convex, lateral margins sinuous, slightly notched before anterior and posterior angles. Anterior margin unbordered, lateral and posterior margins bordered. Anterior angles almost rectangular but slightly blunted, very slightly protruding; posterior angles obtuse, slightly protruding. All angles with setigerous pore bearing long pale seta. Several additional short setae placed on lateral margin. Pronotal surface moderately lustrous, covered with sparse, very small punctures; with ovate depression on each side behind middle.

Scutellum triangular, slightly transverse (1.2 times as wide as long); surface lustrous with sparse, small punctures. Elytra 1.64 times as long as wide, very slightly widened at posterior third. Elytral surface with traces of subbasal depression; moderately densely and confusedly covered with distinct small punctures (on apical slope punctuation weakened) with flat interstices. Humeral calli well developed. Epipleura moderately wide at anterior quarter, gradually narrowing towards apex. Epipleural surface impunctate and glabrous. Macropterous.

Legs moderately long and slender, covered with pale semi-adpressed setae. All tibiae with spurs. Meso- and metatibiae very slightly curved, apex of metatibiae with rather long (only 1.15 times shorter than metatarsomere I) twisted process: flat and wide for most of length but with narrow hook-shaped apical part, tip pointed (Figs 20, 21). Tarsomere I of all legs not enlarged, narrower than tarsomere III. Length ratio of protarsomeres I–III and V as 10 : 6 : 4 : 11; of mesotarsomeres I–III and V as 10 : 5 : 4 : 11; of metatarsomeres I–III and V as 17 : 6 : 5 : 11. Metatarsomere I thin and curved at base then wider and almost straight; longer than length of metatarsomeres I–II combined. Tarsal claws appendiculate.

Ventral side sparsely covered with pale setae (denser and longer on ventrites of abdomen). Procoxal cavities closed posteriorly. Last abdominal ventrite trilobed with wide rectangular median lobe, surface of which deeply longitudinally depressed. Pygidium convex with widely rounded apex.

Aedeagus (Figs 44–46) 5 times as long as wide, very slightly widened in apical half, with short convergent apical processes

forming acute triangular apex. In lateral view almost straight along underside, triangularly widened in apical third of dorsal side with slightly curved upward tip. Ventral side of aedeagus convex in basal two-thirds with deep longitudinal lanceolate depression in apical third. Length of aedeagus about 1 mm, width 0.2 mm.

Paratype. Male is similar to the holotype, but slightly lighter: elytra with only basal area (including epipleura) blackened; black colour on pygidium is only at apex as narrow border. Body length 4 mm.

**Differential diagnosis.** *Sinoluperoides chenchirae* sp. n. is distinguished from all congeners in the combination of antennae with long setae and modified metatibiae. *Sinoluperoides antennatus* having antennae with long setae is similar to this new species but differs in simple metatibiae. All other members of this genus have antennae without long setae and simple metatibiae.

**Etymology.** The new species is named after Chenchira Wongphothisan who helped me with various logistical issues during field work in Thailand in 2024.

#### *Vietoluperus alleculoides* Medvedev et Dang Dap, 1981

**Material.** 2♀ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1175-1246m N 18°56'40", E 99°21'50" - N 18°56'34", E 99°22'15" 16.V.2024 P. Romantsov leg."; 1♂ (PR), the same locality and collector, but "h~1175-1265m N 18°56'40", E 99°21'50" - N 18°56'44", E 99°22'15" 17.V.2024"; 1♂ (PR), the same locality and collector, but "h~1175-1246m, N 18°56'56", E 99°21'41" - N 18°56'34", E 99°22'15" 19.V.2024"; 1♀ (PR), the same locality and collector, but "h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 21.V.2024".

**Distribution.** India (Meghalaya, West Bengal), Laos, Vietnam [Bezdek, 2012], Thailand (new record).

#### *Hyphasis limbatipennis* (Jacoby, 1889) (Fig. 22)

**Material.** 1♀ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1226-1400m, N 18°56'31", E 99°21'28" - N 18°56'20", E 99°22'28" 24.V.2024 P. Romantsov leg."

Type material is not examined, but the image of the type specimen is available in free access on the website of the Harvard University [Database..., 2025, [https://mczbase.mcz.harvard.edu/specimen\\_images/entomology/large/MCZ-ENT00019184\\_Hyphasis\\_limbatipennis\\_had.jpg](https://mczbase.mcz.harvard.edu/specimen_images/entomology/large/MCZ-ENT00019184_Hyphasis_limbatipennis_had.jpg)].

**Notes.** Among the congeners only some specimens of *H. discipennis* (Jacoby, 1903) from India also have blackish elytra with light margins and are similar to this species, but differ in large body length (5.5 mm); *H. limbatipennis* is 4 mm long. The specimen from Northern Thailand has the body length 4 mm and is fully consistent with the photograph of the type specimen of *H. limbatipennis* (exception of slightly lighter suture). This specimen had typical for *Hyphasis* Harold, 1877 strongly dilated claws of metatarsomeres, which were lost during preparation for photography.

**Distribution.** India (Assam, Sikkim), Nepal (Katmandu), Myanmar (Bhamo) [Scherer, 1969], Thailand (new record).

#### *Laboissierea minuta* Medvedev, 2009 (Fig. 23)

**Material.** 1♀ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1105-1099m N 18°56'51", E 99°21'16" N 18°57'1.7", E 99°20'34" 13.V.2024 P. Romantsov leg."

**Notes.** *Laboissierea minuta* was described based on one female from Vietnam [Medvedev, 2009]. My specimen was compared with the holotype of *L. minuta* and they turned out to be identical, except for the shorter body in the specimen from Thailand is 5.7 mm, instead of 6.3 mm in the holotype.

**Distribution.** Vietnam (Thanh Hóa) [Medvedev, 2009], Thailand (new record).

*Podontia lutea* (Olivier, 1790)

**Material.** 1♀ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1105-1108m N 18°56'51", E 99°21'16" - N 18°57'1", E 99°21'8.4" 12.V.2024 P. Romantsov leg."; 1♀ (PR), the same locality and collector, but "1105-1099m N 18°56'51", E 99°21'16" - N 18°57'1.7", E 99°20'34" 13.V.2024".

**Distribution.** Pakistan, India, China, North Korea, Taiwan, Myanmar, Laos, Northern Vietnam, Malay Peninsula, Sumatra, Java, Kalimantan, Sulawesi, Philippines, New Guinea, Australia [Maulik, 1926; Scherer, 1969; Kimoto, 2000; Medvedev, 2009; Chinese leaf beetles, 2015; Lee, Yu, 2021], Thailand (new record).

*Xuthea orientalis* Baly, 1865  
(Fig. 24)

**Material.** 1♀ (PR), "Thailand, Chiang Mai Prov. 100 km N from Chaing Mai, Chiang Dao Hill Resort, 19°33'28.9"N, 99°04'33.3"E, h=494 m, 1. VII. 2017, A. S. Prosvirov leg."; 2♂ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 28.V.2024 P. Romantsov leg."

**Distribution.** India, Nepal, South China, Myanmar, Korea [Maulik, 1926; Scherer, 1969; Kimoto, 2000; Medvedev, 2009; Chinese leaf beetles, 2015; Bezděk, Konstantinov, 2024], Thailand (new record).

**Subfamily Cassidinae Gyllenhal, 1813**

*Prionispa cheni* Staines, 2007  
(Fig. 25)

**Material.** 1♀ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1105-1108m N 18°56'51", E 99°21'16" - N 18°57'1", E 99°21'8.4" 12.V.2024 P. Romantsov leg."; 1♀ (PR), the same locality and collector, but "h~1175-1265m N 18°56'40", E 99°21'50" - N 18°56'44", E 99°22'15" 17.V.2024"; 1♂, 1♀ (PR), the same locality and collector, but "h~1099-1040m N 18°57'1.7", E 99°20'34" - N 18°57'8", E 99°20'42" 18.V.2024"; 1♀ (PR), the same locality and collector, but "h~1175-1310m N 18°56'40", E 99°21'50" N 18°56'54", E 99°22'28" 25.V.2024"; 1♀ (PR), the same data, but "26.V.2024".

**Notes.** This species was described as *Chaeridiona tuberculata* Chen et Yu, 1964 from China (Yunnan), but later transferred to *Prionispa* Chapuis, 1875 and renamed as *Prionispa cheni* Staines, 2007 to eliminate the homonymy [Staines, 2007]. A schematic drawing of its elytra can be found in the original description and the photograph of habitus in the catalogue of Hispinae [Staines, 2015]. *Prionispa cheni* differs from other congeners in uniformly brown antennae and semicircular tubercles on elytra. Until now, this species was known only from Southern China [Staines, 2015; Sekerka, Świętojańska, 2024].

**Distribution.** China (Yunnan), Northern Thailand (new record).

*Prionispa opacipennis* Chen et Yu, 1962  
(Fig. 26)

**Material.** 1♂ (PR), "N Thailand, Chiang Mai Pr., Doi Saket Dist., Thep Sadet, h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28"

21.V.2024 P. Romantsov leg."; 1♂, 2♀ (PR), the same locality and collector, but "h~1226-1400m N 18°56'31", E 99°21'28" - N 18°56'20", E 99°22'28" 23.V.2024"; 1♀ (PR), the same locality and collector, but "h~1175-1310m N 18°56'40", E 99°21'50" - N 18°56'54", E 99°22'28" 28.V.2024".

**Notes.** A very short diagnosis of *Prionispa opacipennis* and a carefully executed drawing of its habitus are given in the description of this species [Chen et al., 1962]. *Prionispa opacipennis* differs from other congeners in the wider body, brown antennae with four last antennomeres black and in very large, prominent, apically acute tubercles on the elytra.

**Distribution.** Southern China (Yunnan) [Staines, 2015; Sekerka, Świętojańska, 2024], Northern Thailand (new record).

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## Новые сведения о кавказских долгоносиках из подрода *Pliadonus* Reitter, 1912 рода *Otiorhynchus* Germar, 1822 (Coleoptera: Curculionidae)

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**Резюме.** Приведены новые данные о морфологии, биологии и распространении *Otiorhynchus decoratus* Reitter, 1888, *O. ciscaucasicus* Korotyaev, 1872 и *O. osseticus* Korotyaev, 1992. Вид *O. ciscaucasicus* впервые указан для фауны Азербайджана, *O. osseticus* – для фауны России. Обозначен лектотип *O. decoratus* Stierlin, 1877. Описан новый вид *Otiorhynchus (Pliadonus) prasolovi* Davidian et Arzanov, **sp. n.** из бассейна реки Джампал в Абхазии. Он наиболее близок к *O. abagoensis* Reitter, 1888, от которого отличается пунктированной скульптурой диска переднеспинки без зернышек, рядом полуприжатых волосков на промежутках надкрылий, треугольной ламеллой эдегуса, а также строением сперматеки без обособленного ramus.

**Ключевые слова:** жуки-долгоносики, *Otiorhynchus*, *Pliadonus*, Кавказ, новый вид.

### New data on Caucasian weevils from the subgenus *Pliadonus* Reitter, 1912 of the genus *Otiorhynchus* Germar, 1822 (Coleoptera: Curculionidae)

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**Abstract.** New data on the morphology, biology and distribution of *Otiorhynchus decoratus* Reitter, 1888, *O. ciscaucasicus* Korotyaev, 1872 and *O. osseticus* Korotyaev, 1992 are given. *Otiorhynchus ciscaucasicus* is firstly recorded for Azerbaijan, and *O. osseticus* Korotyaev, 1992 for Russia. The lectotype of *O. decoratus* Stierlin, 1877 is designated. The new species *Otiorhynchus (Pliadonus) prasolovi* Davidian et Arzanov, **sp. n.** is described from the basin of Dzhampal River in Abkhazia. This new species is closely related to *O. abagoensis* Reitter, 1888, from which it differs in the following features: disc of the pronotum is punctured and without granules, the elytral interstriae with row of subrecumbent hairs, the lamella of the aedeagus is triangular.

**Key words:** weevils, *Otiorhynchus*, *Pliadonus*, Caucasus, a new species.

Подрод *Pliadonus* Reitter, 1912 из комплекса подродов *Tournieria* Stierlin, 1861 в составе рода *Otiorhynchus* Germar, 1822 включает более 20 лесных и альпийских видов жуков-долгоносиков, населяющих Крым, Кавказ, северо-восток Турции и север Ирана [Alonso-Zarazaga et al., 2023]. Среди коллекционных материалов с Западного Кавказа нам известно еще несколько неописанных видов. Здесь приводятся описание одного из них с территории Абхазии и дополнительные данные о видах подрода *Pliadonus*.

### Материал и методы

Материалом для настоящей работы послужила коллекция Зоологического института РАН (ZIN, Санкт-Петербург, Россия), в которую вошли также сборы авторов. Изучена типовая серия *O. decoratus* из Немецкого энтомологического института в Мюнхенберге (SDEI, Senckenberg Deutsches Entomologisches Institut, Германия).

Длина тела жуков измерялась окуляр-микрометром от переднего края глаз до вершины надкрылий. Большая часть приведенных для нового вида промеров относится к голатипу.

Фотографии жуков выполнены на фотокамере Canon-60, фотографии гениталий и терминалий – с препаратов в глицерине на микроскопе Axio Imager M-1 фирмы Carl Zeiss в лаборатории биометода Всероссийского НИИ защиты растений (Санкт-Петербург, Россия).

### Род *Otiorhynchus* Germar, 1822 Подрод *Pliadonus* Reitter, 1912

Типовой вид *Otiorhynchus brachialis* Boheman, 1843, по первоначальному обозначению.

Виды подрода отличаются крупным треугольным зубцом на передних бедрах и обычно шиповидным зубчиком на средних и задних бедрах, иногда задние бедра без зубца. Передние голени на вершине, как правило, не расширены наружу. Значение строения эдегуса в диагностике видов подрода *Pliadonus* невелико. Вооружение эндофаллуса также однообразное, из одинаковых маленьких зернышковидных склеритов со склеротизованной структурой в области агнонопория. К важным диагностическим признакам видов *Pliadonus* относится скульптура диска переднеспинки, а также опушение тела. Большая часть видов, включая *O. brachialis*, с от-

четливыми, иногда полусферическими зернышками на диске переднеспинки, без ясной пунктировки. У некоторых видов (*O. impressiceps* Reitter, 1888) скульптура диска пунктирована без зернышек. Покровы тела только в волосках или в волосках с вкраплениями узких светлых чешуек.

#### *Otiorhynchus ciscaucasicus* Korotyaev, 1992

(Рис. 1, 8, 9)

**Материал.** Россия. 2♂, Ингушетия, Сунженский р-н, территория спортивно-оздоровительного лагеря "Мужичи", 43°03'21.06"N / 44°59'07.15"E, 630 м, 10–11.06.2023 (М.В. и С.В. Набоженко); 17♂, 10♀, там же, 18–19.05.2024 (М.В. Набоженко, Ю.Г. Арзанов).

Азербайджан. 10♂, 8♀, Хызынский р-н, окр. с. Алты-агач, лес, 1.06.1986 (Г.Э. Давидьян).

**Морфологические замечания.** Самец. Глаза крупные, продольный диаметр глаза почти равен ширине лба. Лоб едва шире спинки головотрубки. 3–7-й членики жгутика усиков обычно удлинённые. Диск переднеспинки без явственной пунктировки, в отчетливых блестящих зернышках. 2-й членик передних лапок удлинённый. 5-й абдоминальный вентрит трапециевидный. Чешуйки веретеновидные, заостренные на вершине, желтого цвета с металлическим блеском или бежевые. Пенис почти параллельносторонний, слабо дуговидно изогнут, его ламелла слабо поперечная, почти трапециевидная, на вершине узко притуплена. Пенис приблизительно в 3.25 раза длиннее своей ширины и приблизительно в 1.5 раза короче аподема. Парамеры сросшиеся друг с другом в основании. Длина тела 6.4–7.5 мм, ширина 2.9–3.5 мм.

Самка. Гонококситы мембранозные телескопические. Стилусы субапикальные, почти одинаковой длины и ширины. Сперматека с отчетливо выступающим ramus. Длина тела 7.1–8.3 мм, ширина 3.4–4.2 мм.

**Изменчивость.** Жуки из Ингушетии в чешуйках желтого цвета с металлическим блеском, из Азербайджана – в бежевых чешуйках.

**Сравнительный диагноз.** Наиболее близок к *O. decoratus*, от которого отличается следующими признаками: глаза более крупные, 2-й членик передних лапок удлинённый, ламелла эдеагуса трапециевидная, узко притуплена на вершине, веретеновидные чешуйки немного уже и заострены на вершине.

**Биология.** Большая серия жуков собрана в Сунженском районе Ингушетии в окрестностях села Мужичи в темное время суток на стволах клена платанолистного *Acer platanoides* L., 1753.

**Распространение.** Вид описан по материалам из Ингушетии, Чечни и Дагестана. Здесь *O. ciscaucasicus* впервые приводится для фауны Азербайджана по материалам, собранным отряхиванием с древесно-кустарниковой растительности.

#### *Otiorhynchus decoratus* Stierlin, 1877

(Рис. 2, 5–7)

**Типовой материал.** 1♀ (SDEI), лектотип, обозначен здесь, «Kaukas Leder 114»; «*O. decoratus* Stl.» (рукой Штирлина в двойной фиолетовой окантовке), «Syntypus» (печатная красного цвета), «coll. Stierlin» (печатная), «coll. DEI Müncheberg» (печатная), жук наколот на булавку, утрачены целиком правая передняя нога, а также 3–7-й членики жгутика правого усика с булавой; 1♀ (SDEI), паралектотип, «Kaukas Leder»; «*O. decoratus* Strl. Caucasus Reitter» (рукописная), «Syntypus»

(печатная красного цвета), «DEI coll. von Heyden»; 1♂ (SDEI), паралектотип «Kaukas Leder 114»; «*O. decoratus* Stierl.» (рукописная на этикетке желтого цвета), «Syntypus» (печатная красного цвета); 2♂ на одной булавке (SDEI), паралектотипы, 2 этикетки «Kaukas Leder», «*O. decoratus* Strl. Caucasus», «Coll. Kraatz» (печатная), «Syntypus» (печатная красного цвета), «coll. DEI Müncheberg».

**Материал.** 1♂, 1♀, «Kaukas, Leder». Грузия: 1♀, Самце-Джавехети, «Bakuriani, Distr. Gori, 6000', 15.06.1912»; 1♀, Боржоми, бассейн р. Банишеви, 2100–2400 м, 3.07.1928 (В.В. Богачев); 2♂, 2♀, Рача-Лечхуми, Амбролаури, 29.07.1971 (А.О. Чолокава); 4♂, 3♀, Имеретия, гора Лебеурисмта, 42°25'5.52"N / 43°43'19.56"E, лес, 14–20.08.1987 (Г.Э. Давидьян); 1♂, 1♀, Рачинский хребет, перевал Накерала, окр. Ткибули, 1260 м, 24–25.04.2014 (Д.Д. Фоминых); 1♂, 1♀, Бакуриани, 24.07.1966 (А.О. Чолокава); 1♂, 1♀, дорога из Бакуриани до перевала Цхра-Цхара, ~1900 м, 4.07.2015 (В. Цири); 2♂, перевал Накерала, 26.06.2018 (П.П. Ивлиев).

**Морфологические замечания.** Самец. Глаза среднего размера, продольный диаметр глаза заметно меньше ширины лба. Лоб явственно шире спинки головотрубки. 3–7-й членики жгутика усиков круглые, иногда удлинённые. Диск переднеспинки без явственной пунктировки, в отчетливых блестящих зернышках. 2-й членик передних лапок одинаковой длины и ширины. Вершинный край 5-го абдоминального вентрита обычно округлен. Чешуйки веретеновидные, на вершине узко округлены или притуплены, желтого цвета с ярким металлическим блеском. Ламелла пениса треугольная, на вершине узко округлена. Пенис слабо дуговидно равномерно изогнут, заметно расширен от ламеллы к основанию, в 3.12 раза длиннее своей ширины и в 1.6 раза короче аподема. Парамеры сросшены приблизительно в основной трети. Длина тела 5.7–6.3 мм, ширина 2.65–2.9 мм.

Самка. Гонококситы телескопические, слабо склеротизованы, в 3.5 раза длиннее ширины. Стилусы субапикальные, едва удлинённые. Ламелла *spiculum ventrale* почти квадратная, манубриум приблизительно в 4 раза длиннее ламеллы. Сперматека с отчетливо обособленным ramus, collum заметно подогнут. Длина тела 6–7.8 мм, ширина 3.05–3.83 мм.

**Изменчивость.** Все экземпляры с горы Сырхлабырта (= Лебеурисмта) в регионе Рача-Лечхуми Грузии характеризуются более маленькими размерами тела (длина тела самца 5–5.3 мм, ширина 2.25–2.4 мм, самки 6.2–6.6 и 3.1–3.5 мм соответственно), а также широко округленной вершиной эдеагуса (рис. 7). Для уточнения таксономического статуса этой формы необходимы дополнительные материалы.

**Сравнительный диагноз.** Наиболее близок к *O. ciscaucasicus*, от которого отличается следующими признаками: ширина лба заметно больше продольного диаметра глаза, 2-й членик передних лапок треугольный, одинаковой длины и ширины, ламелла эдеагуса треугольная, узко закруглена на вершине, веретеновидные чешуйки шире, на вершине узко округлены или притуплены.

**Распространение.** Грузия.

#### *Otiorhynchus osseticus* Korotyaev, 1992

(Рис. 10, 11)

**Материал.** Россия. 1♂, Северная Осетия, Мамисонский перевал, 12.07.1997 (Ю.Г. Арзанов).

**Морфологические замечания.** Диск переднеспинки в очень маленьких густых зернышках, с едва намеченным срединным килем. Чешуйки на теле бо-



Рис. 1–4. Виды рода *Otiorynchus*, общий вид самцов.  
 1 – *O. ciscaucasicus*; 2 – *O. decoratus*; 3 – *O. abagoensis*; 4 – *O. prasolovi* **sp. n.**, голотип.  
 Figs 1–4. *Otiorynchus* species, male habitus.  
 1 – *O. ciscaucasicus*; 2 – *O. decoratus*; 3 – *O. abagoensis*; 4 – *O. prasolovi* **sp. n.**, holotype.





Рис. 5–19. Виды рода *Otiorhynchus*, детали строения.

5–7 – *O. decoratus*: 5 – из Бакуриани, 6 – по Коротяеву [1992], 7 – с горы Лебеурисмты; 8–9 – *O. ciscaucasicus* (9 – по Коротяеву [1992]); 10–11 – *O. osseticus* (11 – по Коротяеву [1992]); 12, 14–16 – *O. abagoensis*; 13, 17–19 – *O. prasolovi* **sp. n.** 5–13 – эдеагус, вид сверху; 14, 17 – гонококситы; 15, 18 – сперматека; 16, 19 – spiculum ventrale.

Figs 5–19. *Otiorhynchus* species, details of structure.

5–7 – *O. decoratus*: 5 – from Bakuriani, 6 – after Korotyaev [1992] 7 – from Lebeurismta Mt.; 8–9 – *O. ciscaucasicus* (9 – after Korotyaev [1992]); 10–11 – *O. osseticus* (11 – after Korotyaev [1992]); 12, 14–16 – *O. abagoensis*; 13, 17–19 – *O. prasolovi* **sp. n.** 5–13 – aedeagus, dorsal view; 14, 17 – gonocoxites; 15, 18 – spermatheca; 16, 19 – spiculum ventrale.

лее светлые, слегка крупнее волосков. Penis узкий, в 3.57 раза длиннее ширины. Длина тела самца 5.2–5.9 мм, ширина 2.4–2.7 мм, длина тела самки 6.5–7.2 мм, ширина 3.1–3.5 мм.

**Распространение.** Вид описан по материалам, собранным В.В. Богачевым в грузинском регионе Шида-Картли, в окрестностях горы Ахалшенда и села Эрцо. На оригинальной этикетке указанное местонахождение приводится как «Alchašenda». Мамисонский перевал – это первое местонахождение *O. osseticus* на территории России. Расстояние между типовым местонахождением вида и Мамисонским перевалом составляет по прямой линии приблизительно 25 км.

*Otiorhynchus abagoensis* Reitter, 1888

(Рис. 3, 12, 14–16)

Здесь впервые приводится общий вид жука, а также изображения гениталий самца и самки, имеющих важное значение для идентификации таксона и сравнения с новым видом в этой работе. Для фотографии габитуса использован самец с горы Картуз (Адыгея, Россия), для изображения деталей строения гениталий обоих полов – материалы с горы Ачишхо.

*Otiorhynchus prasolovi* Davidian et Arzanov, sp. n.

(Рис. 4, 13, 17–19)

**Материал.** Голотип, ♂ (ZIN): Кавказ, Абхазия, восточная часть Абхазского хребта, верховья р. Джампал, приток Кодори, урочище Чамхатгара, 2000 м, 31.08.1986 (В.Н. Прасолов). Паратипы: 3♂, 4♀ (ZIN), собраны вместе с голотипом; 4♀ (ZIN), там же, 1200 м, 29.08.1986 (В.Н. Прасолов); 3♂ (ZIN), там же, 2100 м, 30.08.1986 (В.Н. Прасолов).

**Описание.** Самец. Глаза едва удлинненные, умеренно сильно выпуклые, заметно выступают за контуры головы. Верх головы до темени включительно грубо пунктирован, с отчетливыми продольными бороздками. Лоб явственно поперечно вдавлен. Головотрубка слабо поперечная, в 1.16 раза шире длины. Спинка головотрубки с отчетливым срединным килем, слегка или отчетливо продольно выпуклая, заметно уже лба.

Рукоять почти прямая, постепенно расширяется от основания к вершине. 1-й членик жгутика усиков в 2.32 раза длиннее ширины, 2-й членик в 1.3 раза длиннее 1-го, остальные членики круглые. Булава широковеретеновидная, заостренная на вершине, наиболее широкая посередине, ее 1-й членик заметно короче остальных члеников, вместе взятых.

Переднеспинка бочонковидная, слегка поперечная, наиболее широкая посередине. Диск переднеспинки густо пунктирован, без зернышек, в центральной части с коротким срединным мозолевидным килем. Processus prosternalis с маленьким шаровидным утолщением между тазиками. Надкрылья узкояйцевидные, на вершинном скате слабо наклонные, в 1.49 раза длиннее своей ширины и в 1.37 раза шире переднеспинки. Бороздки надкрылий примерно одинаковой ширины с промежутками или слегка уже, состоят из почти таких же точек, как на переднеспинке. Промежутки надкрылий в очень сильно сглаженных зернышках.

Передние бедра с крупным треугольным зубцом, мелко зазубренным по дистальному краю и шиповидно оттянутым на вершине. Средние бедра с отчетливым шиповидным зубчиком, более крупным, чем на задних бедрах. Передние голени прямые, на вершине почти прямо обрезаны, наружный вершинный угол не расширен. Внутренний край передних

голеней в вершинной трети с 2–3 отчетливыми скошенными шипиками. 2-й членик передних лапок треугольный, одинаковой длины и ширины, 3-й членик широко двухлопастной, в 1.71 раза шире 2-го. Часть коготкового членика, выступающая за вершину 3-го членика, слегка короче последнего. 2-й членик задних лапок едва удлинненный.

Тело в волосках без чешуек, с одним рядом полуприжатых волосков на промежутках надкрылий.

Penis плавно слабо дуговидно изогнут, в основной половине почти параллельносторонний, в 1.41 раза короче апофиз. Ламелла эдеагуса треугольная, на вершине узко закруглена. Вооружение эндофаллуса из многочисленных мелких зернышковидных склеритов.

Длина тела 4.4–5.1 мм, ширина 2–2.2 мм, у голотипа 4.7 и 2.1 мм.

Самка. 1-й и 2-й вентриты в центральной части плоские или едва выпуклые, 5-й вентрит плоский, на вершине закруглен. Ламелла spiculum ventrale субквадратная, по вершинному краю слегка вырезана, манубриум почти целиком прямой, одинаковой толщины по всей длине. Кокситы не телескопические, с отчетливыми почти круглыми субапикальными стилусами. Сперматека с серповидным согну, ramus слегка выпуклый, collum сильно подогнут.

Длина тела 5.1–6.2 мм, ширина 2.4–2.75 мм.

**Сравнительный диагноз.** От большинства видов подрода отличается пунктированным диском переднеспинки без ясных зернышек. Наиболее близок к *O. abagoensis*, от которого хорошо отличается следующими признаками: промежутки надкрылий с полуприжатыми волосками, ламелла эдеагуса треугольная, узко закруглена на вершине, сперматека без обособленного ramus. *Otiorhynchus dolmenicus* Davidian et Savitsky, 2006 отличается от нового вида многочисленными зернышками на диске переднеспинки, а также 2–3 спутанными рядами коротких полуприжатых волосков на промежутках надкрылий.

**Этимология.** Вид назван именем покойного Владимира Николаевича Прасолова (Санкт-Петербург, Россия), впервые его собравшего.

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## New records of pyralid moths (Lepidoptera: Pyraloidea) in the Altai Republic, Russia

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**Abstract.** First faunistic records of 11 species of phycitine moths (Pyralidae) and one species of grass pyralid moth (Crambidae) in the Altai Republic of Russia are presented. *Christophia granulella* (Zerny, 1914) and *Yelenka calciferella uyghurica* Trofimova et Shovkoon, 2020 are recorded for Russia for the first time, and *Cadra furcatella* (Herrich-Schäffer, 1849) is recorded for the Asian part of Russia for the first time.

**Key words:** Pyralidae, Crambidae, fauna, new records, Altai Mountains, Siberia.

### Новые находки огневков (Lepidoptera: Pyraloidea) в Республике Алтай, Россия

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**Резюме.** Приведены данные о первых находках 11 видов узкокрылых огневков (Pyralidae) и 1 вида травяной огневки (Crambidae) в Республике Алтай (Россия). *Christophia granulella* (Zerny, 1914) и *Yelenka calciferella uyghurica* Трофимова et Shovkoon, 2020 впервые указаны для фауны России, *Cadra furcatella* (Herrich-Schäffer, 1849) – для азиатской части России.

**Ключевые слова:** Pyralidae, Crambidae, фауна, новые указания, Алтайские горы, Сибирь.

The knowledge of the pyraloid moth fauna in Altai is incomplete. Currently, there is no overview of the species composition of pyralids in Altai with specific locality records. The most comprehensive faunistic list for the Russian Altai is published in the Catalogue of the Lepidoptera of Russia, where 39 species of Pyralidae [Sinev et al., 2019] and 70 species of Crambidae [Sinev, Streltsov, 2019] are reported. For comparison, in Omsk Region of Russia, where targeted studies on the diversity of Lepidoptera including pyraloid moths have been conducted, 77 species of Pyralidae and 102 species of Crambidae have been recorded [Knyazev, Sinev, 2023]. The study of the biodiversity of Lepidoptera in the Russian Altai is of great interest due to the cross-border location of the Altai mountain region at the intersection of Central Asian, Western and Eastern Palaearctic faunas (Fig. 1).

During the study of entomological material at the Zoological Institute of the Russian Academy of Sciences (ZISP, St Petersburg, Russia), as well as the private collections of P.Ya. Ustjuzhanin (Novosibirsk, Russia) and the first author (NABC, Barnaul, Russia), 11 species were discovered that had not previously been recorded for the Altai Republic of Russia, including one species and one subspecies previously unknown to the fauna of Russia.

*Pempeliella ornatella* ([Denis et Schiffermüller], 1775)  
(Figs 2, 19–21)

**Material.** 1♂ (ZISP, genitalia preparation NA117), Ulagan Distr., Chibit vill., 1200 m, 16.06.1999 (V.A. Lukhtanov).

**Distribution.** Russia: the species is distributed in the European part of Russia (except for the northern regions),

in the south of Western Siberia and Krasnoyarsk Region, Cisbaikalia and Transbaikalia, and in southern Yakutia [Sinev et al., 2019]. Northwest Africa, Europe (excluding northern parts and Norway), Turkey, Transcaucasia, Iran, Central Asia, Himalaya [Slamka, 2019].

*Psorosa nucleolella* (Möschler, 1866)  
(Figs 3, 41)

**Material.** 1♀ (ZISP, genitalia preparation NA77), Ulagan Distr., 12 km SSE Koo vill., 50°58'N / 87°56'E, 550 m, 6–8.07.2013 (S.Yu. Sinev).

**Distribution.** Russia: the species is widespread in the south of the European part of Russia, in the south of Western Siberia and Krasnoyarsk Region, in Tuva Republic, as well as in Cisbaikalia and Transbaikalia [Sinev et al., 2019]. Southeast Europe, Turkey, Lebanon, Palestine, Egypt, Syria, Iraq, Kazakhstan [Slamka, 2019].

*Christophia granulella* (Zerny, 1914)  
(Figs 4, 22–24)

**Material.** 1♂ (ZISP, genitalia preparation NA100), Kosh-Agach Distr., Kurman Mt., 1900 m, 20.06.1999 (V.A. Lukhtanov).

**Distribution.** China: Xinjiang Uygur Autonomous Region, Lop Nor Desert (Lob Noor) [Roesler, 1993; Liu, Li, 2013]. The species is recorded for the fauna of Russia for the first time.

*Yelenka calciferella uyghurica* Trofimova et Shovkoon, 2020  
(Figs 5, 25, 26)

**Material.** 1♂ (ZISP, genitalia preparation NA65), Kosh-Agach Distr., 5 km N Chagan-Uzun vill., 50°07'N / 88°24'E, 2100 m, 11–13.07.2013 (S.Yu. Sinev).

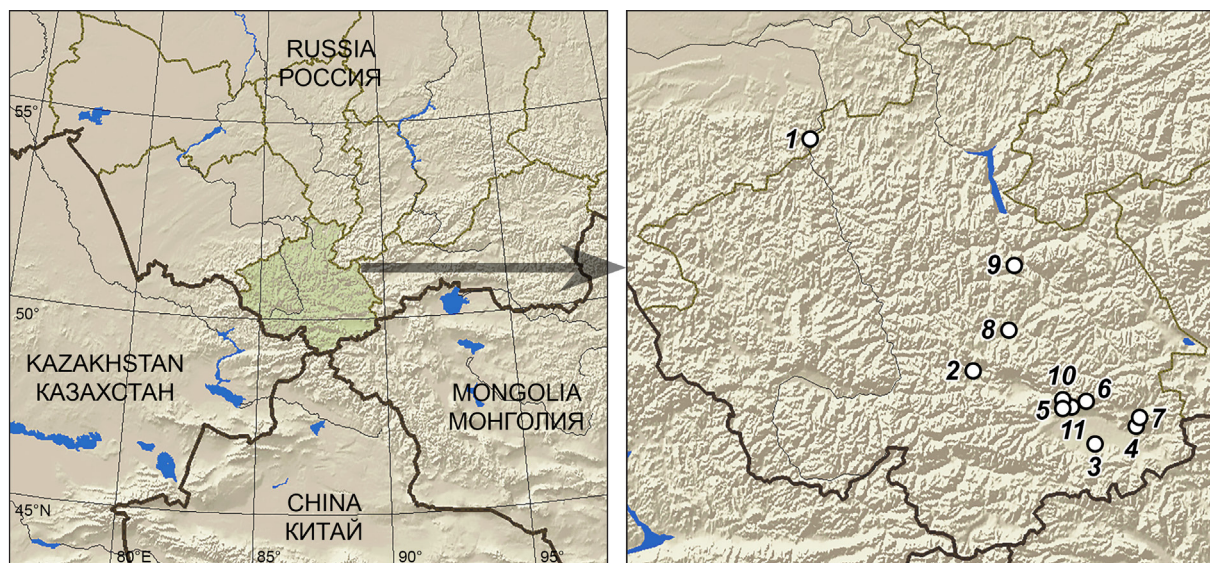


Fig. 1. Collecting sites in the Altai Republic: 1 – Mayma District, Manzherok village, near the Katun River; 2 – Ulagan District, Chibit village; 3 – Kosh-Agach District, Kurman Mount; 4 – Kosh-Agach District, Talduair Mount; 5 – Kosh-Agach District, near Chagan-Uzun village; 6 – Kosh-Agach District, Kuray Ridge, 18 km N of Kosh-Agach village; 7 – Kosh-Agach District, 17 km NE of Kokorya village; 8 – Ulagan District, 10 km SW of Ulagan village; 9 – Ulagan District, 12 km SSE of Koo village; 10 – Kosh-Agach District, 5 km N of Chagan-Uzun village; 11 – Kosh-Agach District, 5 km SE of Chagan-Uzun village.

Рис. 1. Точки сбора в Республике Алтай: 1 – Майминский район, с. Манжерок, рядом с рекой Катунь; 2 – Улаганский район, с. Чибит; 3 – Кош-Агачский район, гора Курман; 4 – Кош-Агачский район, гора Талдуай; 5 – Кош-Агачский район, рядом с с. Чаган-Узун; 6 – Кош-Агачский район, Курайский хребет, 18 км севернее с. Кош-Агача; 7 – Кош-Агачский район, 17 км северо-восточнее с. Кокоря; 8 – Улаганский район, 10 км юго-западнее с. Улаган; 9 – Улаганский район, 12 км юго-юго-восточнее с. Коо; 10 – Кош-Агачский район, 5 км севернее с. Чаган-Узун; 11 – Кош-Агачский район, 5 км юго-восточнее с. Чаган-Узун.

**Distribution.** The subspecies is found in Eastern Kazakhstan (Tarbagatai) and Western Mongolia (Mongolian Altai). The nominotypical subspecies occurs in Voronezh and Saratov regions (European Russia), and Kharkov Region (Eastern Ukraine) [Trofimova et al., 2020]. *Yelenka calciferella uyghurica* is recorded for the fauna of Russia for the first time.

*Euzophera formosella* (Rebel, 1910)  
(Figs 6, 27, 28)

**Material.** 1♂ (collection of A.N. Streltsov, St Petersburg, Russia), Kosh-Agach Distr., 18 km N Kosh-Agach vill., Kuray Ridge, 2200 m, 27.07.2001 (P.Ya. Ustjuzhanin); 1♂ (NABC, genitalia preparation No. 661), Kosh-Agach Distr., 5 km SE Chagan-Uzun vill., 1815 m, 50°04'33.9"N / 88°25'03.0"E, 6–7.07.2024 (A.E. Naydenov, K.E. Naydenova).

**Distribution.** Russia: the species is found in the south of the European part of Russia and in Southern Ural [Sinev et al., 2019]; the first record for Southern Siberia. Syria, Iraq, Iran, Central Asia, Afghanistan, Mongolia [Roesler, 1973].

*Ancylosis (Ancylosis) cinnamomella* (Duponchel, 1836)  
(Figs 7, 8, 29–31, 42)

**Material.** 4♂ (ZISP, genitalia preparations NA103, NA109, NA125, NA127), Kosh-Agach Distr., Kurman Mt., 1900 m, 20.06.1999 (V.A. Lukhtanov); 4♂, 1♀ (ZISP, genitalia preparations NA102, NA120, NA121, NA124), Kosh-Agach Distr., near Chagan-Uzun vill., 1700 m, 6.07.1999 (V.A. Lukhtanov); 2♂ (ZISP, genitalia preparation NA78), Ulagan Distr., 12 km SSE Koo vill., 50°58'N / 87°56'E, 550 m, 6–8.07.2013 (S.Yu. Sinev).

**Distribution.** Russia: the species is found in the south of the European part of Russia, in the south of Western Siberia and Krasnoyarsk Region, in the Tuva Republic,

as well as in the Cisbaikal and Transbaikal regions [Sinev et al., 2019]. North Africa, Europe, Turkey, Central Asia [Roesler, 1973].

*Ancylosis (Ancylosis) maculifera* Staudinger, 1870  
(Figs 9, 10, 43)

**Material.** 2♀ (ZISP, genitalia preparation NA108), Kosh-Agach Distr., Talduair Mt., 2250 m, 22.06.1999 (V.A. Lukhtanov).

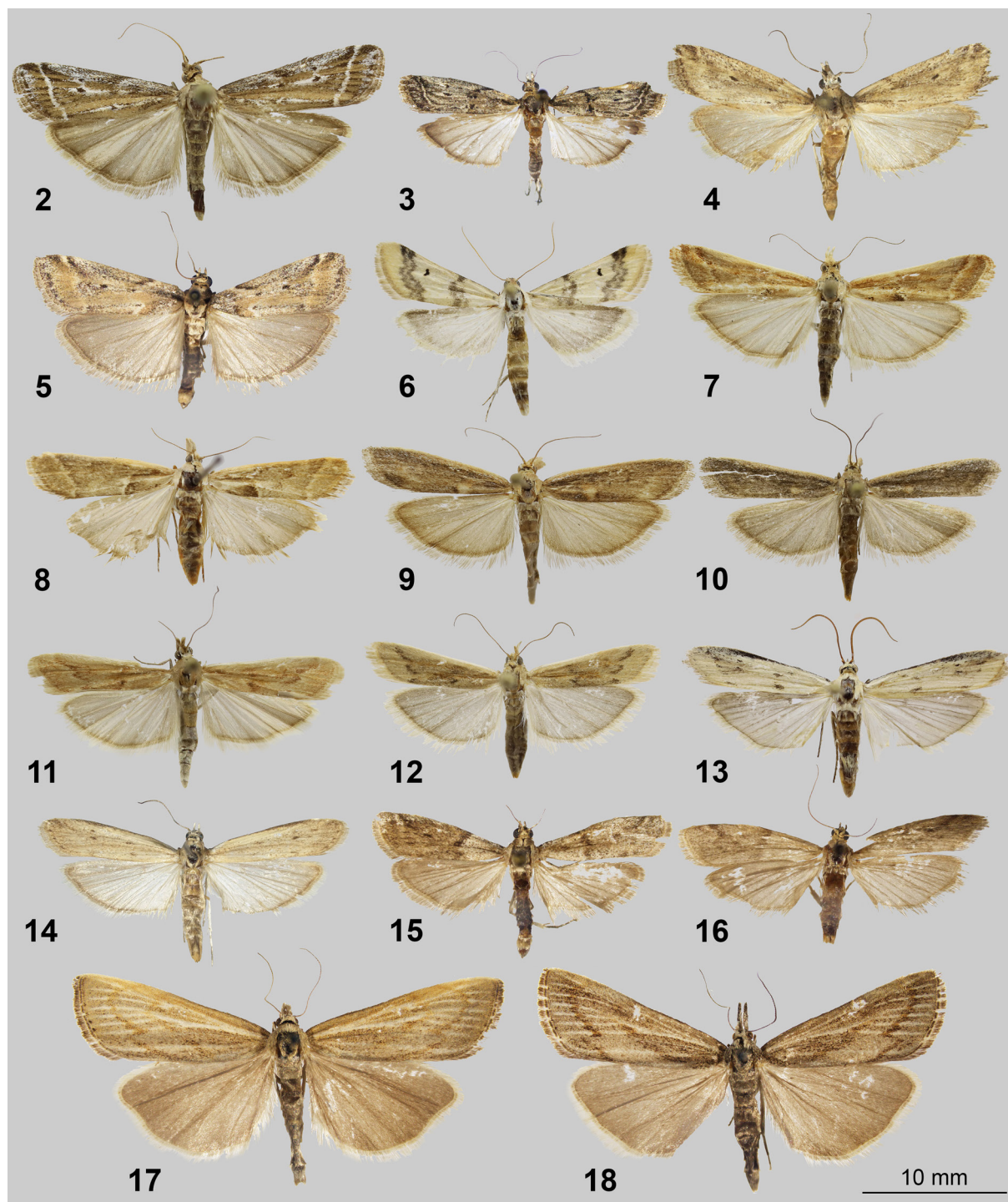
**Distribution.** Russia: the species is locally distributed in the south of the European part and in Asian part of Russia (including the south of Krasnoyarsk Region, Tuva Republic, Cisbaikal region, Amur Region, Lower Amur (Jewish Autonomous and Khabarovsk regions), Southern Kuril islands and Primorskiy Region) [Sinev et al., 2019]. North Africa, Southeast Europe, Transcaucasia, Turkey, Lebanon, Israel, Iraq, Iran, Afghanistan, Central Asia, China, Mongolia [Roesler, 1973].

*Ancylosis (Staudingeria) morbosella* (Staudinger, 1879)  
(Figs 11, 12, 32, 33, 44)

**Material.** 1♂ (ZISP, genitalia preparation NA126), Kosh-Agach Distr., Kurman, 1900 m, 20.06.1999 (V.A. Lukhtanov); 6♂, 1♀ (ZISP, genitalia preparations NA105, NA122, NA123), Kosh-Agach Distr., near Chagan-Uzun vill., 1700 m, 6.07.1999 (V.A. Lukhtanov); 3♂, 2♀ (NABC, genitalia preparation No. 669), Kosh-Agach Distr., 5 km SE Chagan-Uzun vill., 1815 m, 50°04'33.9"N / 88°25'03.0"E, 6–7.07.2024 (A.E. Naydenov, K.E. Naydenova).

**Distribution.** Russia: The species is found in the south of the European part of Russia and in Southern Ural [Sinev et al., 2019]; the first record for Southern Siberia. North Africa, Turkey, Transcaucasia, Central Asia, Afghanistan [Roesler, 1973].



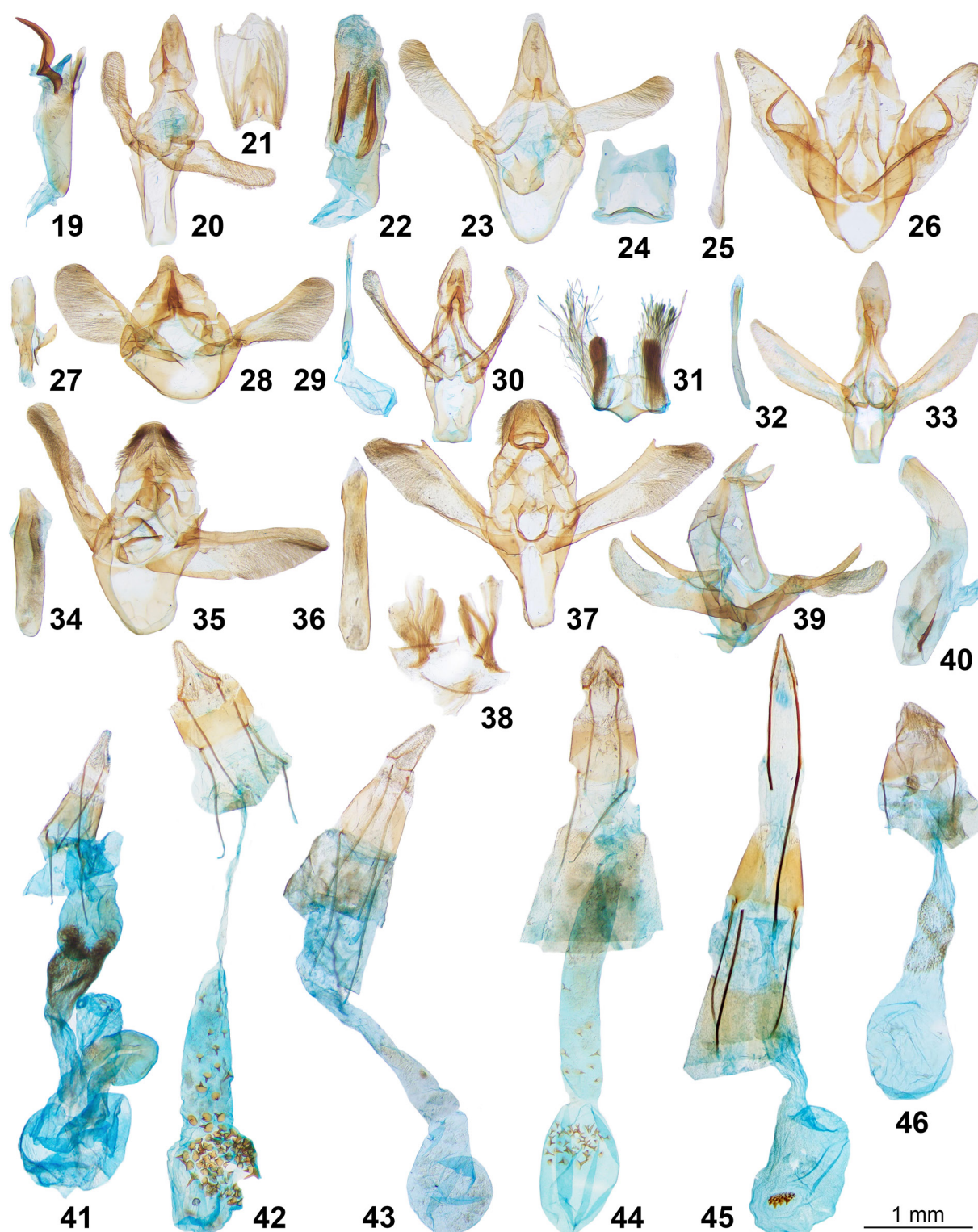


Figs 2–18. Pyralid moths first recorded for the Altai Republic fauna, imagoes.

2 – *Pempeliella ornatella*, male; 3 – *Psorosa nucleolella*, female; 4 – *Christophia granulella*, male; 5 – *Yelenka calciferella uyghurica*, male; 6 – *Euzophera formosella*, male; 7 – *Ancylosis (Ancylosis) cinnamomella*, male; 8 – *Ancylosis (Ancylosis) cinnamomella*, female; 9–10 – *Ancylosis (Ancylosis) maculifera*, female; 11 – *Ancylosis (Staudingeria) morbosella*, male; 12 – *Ancylosis (Staudingeria) morbosella*, female; 13 – *Homoeosoma inustella*, male; 14 – *Homoeosoma nebulella*, female; 15 – *Cadra furcatella*, male; 16 – *Cadra furcatella*, female; 17–18 – *Pediasia jucundella*, male.

Рис. 2–18. Огневки, впервые указанные для фауны Республики Алтай, имаго.

2 – *Pempeliella ornatella*, самец; 3 – *Psorosa nucleolella*, самка; 4 – *Christophia granulella*, самец; 5 – *Yelenka calciferella uyghurica*, самец; 6 – *Euzophera formosella*, самец; 7 – *Ancylosis (Ancylosis) cinnamomella*, самец; 8 – *Ancylosis (Ancylosis) cinnamomella*, самка; 9–10 – *Ancylosis (Ancylosis) maculifera*, самка; 11 – *Ancylosis (Staudingeria) morbosella*, самец; 12 – *Ancylosis (Staudingeria) morbosella*, самка; 13 – *Homoeosoma inustella*, самец; 14 – *Homoeosoma nebulella*, самка; 15 – *Cadra furcatella*, самец; 16 – *Cadra furcatella*, самка; 17–18 – *Pediasia jucundella*, самец.



Figs 19–40. Pyralid moths first recorded for the Altai Republic fauna, male and female genitalia.

19–21 – *Pempeliella ornatella*; 22–24 – *Christophia granulella*; 25–26 – *Yelenka calciferella uyghurica*; 27–28 – *Euzophera formosella*; 29–31, 42 – *Ancylosis (Ancylosis) cinnamomella*; 32–33, 44 – *Ancylosis (Staudingeria) morbosella*; 34–35 – *Homoeosoma inustella*; 36–38, 46 – *Cadra furcatella*; 39–40 – *Pediasia jucundella*; 41 – *Psorosa nucleolella*; 43 – *Ancylosis (Ancylosis) maculifera*; 45 – *Homoeosoma nebulella*. 19–40 – male genitalia: 19, 22, 25, 27, 29, 32, 34, 36, 40 – phallos; 20, 23, 26, 28, 30, 33, 35, 37, 39 – genital capsule; 21, 24, 31, 38 – culcita; 41–46 – female genitalia.

Рис. 19–40. Огневки, впервые указанные для фауны Республики Алтай, гениталии самцов и самок.

19–21 – *Pempeliella ornatella*; 22–24 – *Christophia granulella*; 25–26 – *Yelenka calciferella uyghurica*; 27–28 – *Euzophera formosella*; 29–31, 42 – *Ancylosis (Ancylosis) cinnamomella*; 32–33, 44 – *Ancylosis (Staudingeria) morbosella*; 34–35 – *Homoeosoma inustella*; 36–38, 46 – *Cadra furcatella*; 39–40 – *Pediasia jucundella*; 41 – *Psorosa nucleolella*; 43 – *Ancylosis (Ancylosis) maculifera*; 45 – *Homoeosoma nebulella*. 19–40 – гениталии самцов: 19, 22, 25, 27, 29, 32, 34, 36, 40 – фаллос; 20, 23, 26, 28, 30, 33, 35, 37, 39 – генитальный сегмент; 21, 24, 31, 38 – кульцита; 41–46 – гениталии самок.



*Homoeosoma inustella* Ragonot, 1884  
(Figs 13, 34, 35)

**Material.** 3♂ (NABC, genitalia preparations No. 662, 663), Kosh-Agachsky Distr., 5 km SE Chagan-Uzun vill., 1815 m, 50°04'33.9"N / 88°25'03.0"E, 6–7.07.2024 (A.E. Naydenov, K.E. Naydenova).

**Distribution.** Russia: the species occurs in the European part of Russia (except for the northern regions) and in Southern Siberia (Tuva Republic, Cisbaikal and Transbaikal regions) [Sinev et al., 2019]. Europe, Turkey, Iran, Afghanistan, Central Asia [Roesler, 1973].

*Homoeosoma nebulella* ([Denis et Schiffermüller], 1775)  
(Figs 14, 45)

**Material.** 1♀ (ZISP, genitalia preparation NA101), Mayma Distr., Manzhherok vill., near the Katun River, 400 m, 9.06.1999 (V.A. Lukhtanov).

**Distribution.** Russia: the species is widespread in the European part of Russia, in south of Siberia, and in the Russian Far East [Sinev et al., 2019]. Europe, Turkey, Central Asia [Roesler, 1973].

*Cadra furcatella* (Herrich-Schäffer, 1849)  
(Figs 15, 16, 36–38, 46)

**Material.** 1♂, 1♀ (ZISP, genitalia preparations NA67, NA68), Ulagan Distr., 12 km SSE Koo vill., 50°58'N / 87°56'E, 550 m, 6–8.07.2013 (S.Yu. Sinev).

**Distribution.** Russia: the species is found in the European part of Russia (except for the northern regions) [Sinev et al., 2019]; the first record for the fauna of the Asian part of Russia. Africa, Europe, Transcaucasia, Turkey, Syria, Iraq, Iran, Afghanistan, Central Asia [Roesler, 1973].

*Pediasia jucundella* (Herrich-Schäffer, 1847)  
(Figs 17, 18, 39, 40)

**Material.** 2♂ (ZISP, genitalia preparations NA63, NA64), Kosh-Agach Distr., 17 km NE Kokorya vill., 50°00'N / 89°12'E, 2100 m, 2–5.07.2013 (S.Yu. Sinev); 1♂ (ZISP, genitalia preparation NA81), Ulagan Distr., 10 km SW Ulagan vill., 50°35'N / 87°52'E, 1295 m, 5–6.07.2013 (S.Yu. Sinev); 1♂ (ZISP, genitalia preparation NA83), Kosh-Agach District, 5 km N Chagan-Uzun vill., 50°07'N / 88°24'E, 2100 m, 11–13.07.2013 (S.Yu. Sinev).

**Distribution.** Russia: the species occurs in the European part of Russia (except for the northern regions) and in the south of Krasnoyarsk Region [Sinev, Streltsov, 2019]. East and Southeast Europe, Transcaucasia, Central Asia, Mongolia [Slamka, 2008].

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## Комплекс криптических видов обыкновенных зеленых златоглазок *Chrysoperla carnea* s. l. (Neuroptera: Chrysopidae) в Беларуси: проблемы видовой диагностики и новые находки

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**Резюме.** В Беларуси род *Chrysoperla* Steinmann, 1964 до недавних пор был представлен единственным видом – *Ch. carnea* (Stephens, 1836). Однако в настоящее время этот таксон рассматривается как комплекс криптических видов, из которых *Ch. lucasina* (Lacroix, 1912) и *Ch. pallida* Henry, Brooks, Duelli et Johnson, 2002 для фауны Беларуси указываются впервые. Составлена определительная таблица для видов рода *Chrysoperla*, обитающих на территории Беларуси. Обсуждаются проблемы видовой идентификации обыкновенных зеленых златоглазок комплекса *Ch. carnea* s. l. Дана краткая информация об их распространении, а также особенностях биологии и экологии.

**Ключевые слова:** златоглазки, *Chrysoperla carnea* s. l., Neuroptera, Chrysopidae, новые находки, фауна, Беларусь.

### The *Chrysoperla carnea* s. l. complex of cryptic species of common green lacewings (Neuroptera: Chrysopidae) in Belarus: problems of species identification and new records

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**Abstract.** In Belarus, the genus *Chrysoperla* Steinmann, 1964 has until recently been represented by one species, *Ch. carnea* (Stephens, 1836). However, at present this taxon is considered as a complex of cryptic species, of which *Ch. lucasina* (Lacroix, 1912) and *Ch. pallida* Henry, Brooks, Duelli et Johnson, 2002 are recorded for the fauna of Belarus for the first time. A key to *Chrysoperla* species of the Belarusian fauna is given. Diagnostic characters of imagoes are described and illustrated in detail. Brief information about species distribution, as well as biological and ecological features are provided. Problems of species identification of the common green lacewing complex *Ch. carnea* s. l. are discussed. New data on distribution of *Ch. carnea* s. str. are given.

**Key words:** lacewings, *Chrysoperla carnea* s. l., Neuroptera, Chrysopidae, new records, fauna, Belarus.

## Введение

Златоглазки (Chrysopidae) – одно из крупнейших семейств отряда Neuroptera. В современной мировой фауне насчитывается приблизительно 2000 видов, около 70 из которых обнаружены на территории Европы и 17 – в Беларуси [Буга, 1989; Czechowska, 1995; Canard, 2004; Трепашко и др., 2014; Бородин, Цинкевич, 2016; Островский, 2016а, б, 2017, 2021; Цинкевич, 2017; Ostrovsky, 2021]. Представители этого семейства населяют самые различные биоценозы, встречаясь как в лесных, так и в открытых степных и луговых биотопах. Многие виды златоглазок являются обычными обитателями культурных и агроландшафтов – парков, садов, сельскохозяйственных угодий и т.д. Личинки, а также имаго большинства видов – активные афидофаги и могут быть использованы в биологической защите растений от вредителей [Трепашко и др., 2014].

Род *Chrysoperla* Steinmann, 1964 включает 36 видов златоглазок, по крайней мере 8 из которых обитают в Европе [Brooks, 1994]. В фауне Беларуси зарегистрирована златоглазка обыкновенная *Ch. carnea* (Stephens, 1836). Однако сейчас этот таксон рассматривается как комплекс криптических видов, идентификация которых в ряде случаев затруднительна в силу вариабель-

ности морфологических признаков и запутанной ситуации с терминологией, используемой различными авторами [Hölzel, 1972; Aspöck et al., 1980a, b; Séméria, Berland, 1988; Brooks, 1994; Thierry et al., 1998]. В настоящее время признается существование нескольких близкородственных европейских видов этого комплекса: *Ch. carnea* (Stephens, 1836) sensu Henry et al. [2002] (= *Ch. koltzoffi* sensu Thierry et al. [1996] (nec Navás [1927])), *Ch. lucasina* (Lacroix, 1912) sensu Henry et al. [1996], *Ch. pallida* Henry, Brooks, Duelli et Johnson, 2002 (= *Ch. carnea* sensu Canard and Thierry [2007] (nec Stephens [1836])), *Ch. mediterranea* (Hölzel, 1972) и *Ch. agilis* Henry, Brooks, Duelli et Johnson, 2003, – и теперь сложно понять, о каком из них говорится в белорусской литературе более ранних лет, что и обусловило необходимость проведения данного исследования.

## Материал и методы

Материалом для изучения послужили сборы автора в период с 2017 по 2024 год на территории Гомельской области Республики Беларусь. Отлов златоглазок проводился вручную и энтомологическим сачком на востоке Полесской ландшафтной провинции. Для работы с насекомыми применялся стереомикроскоп

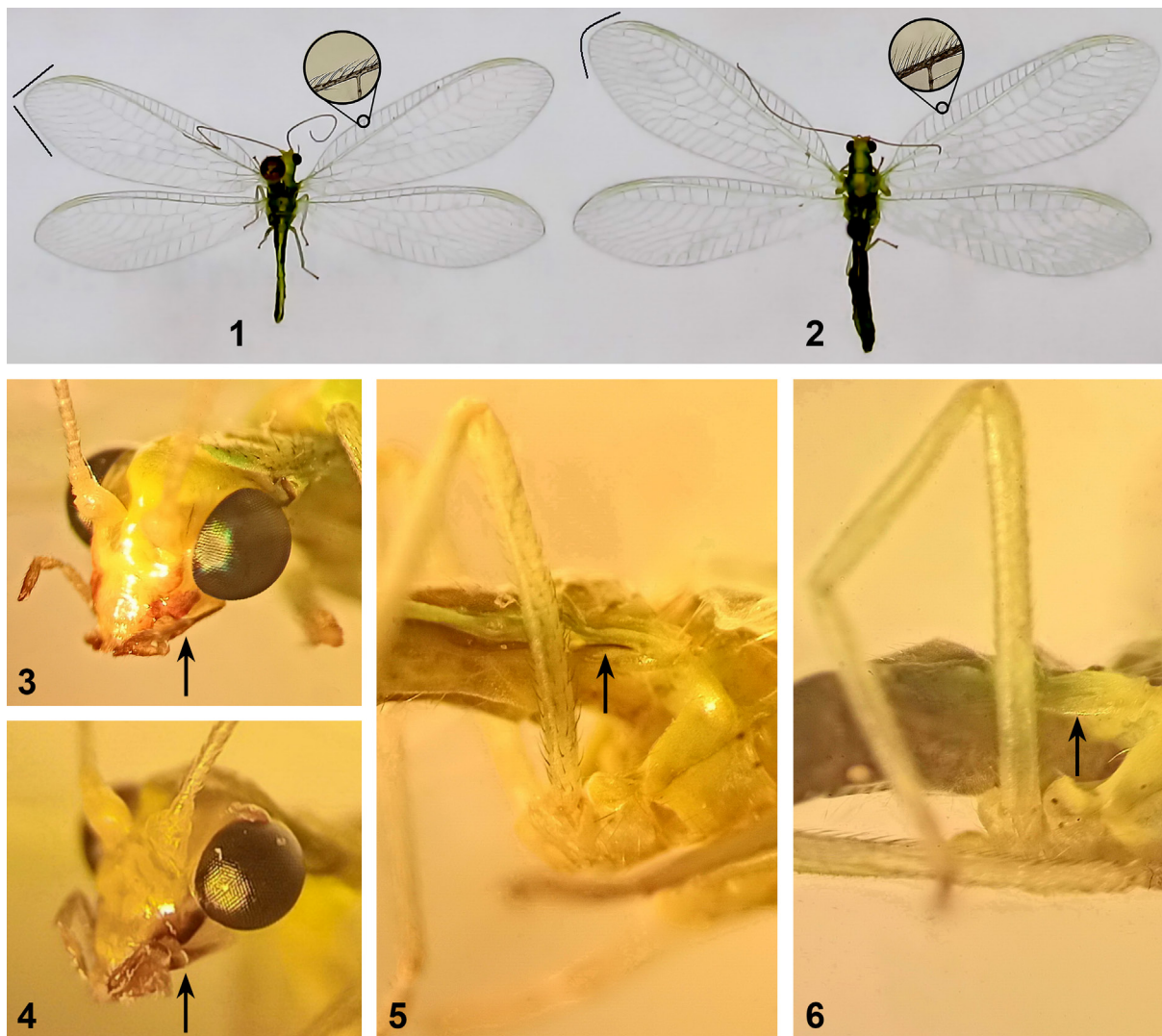


Рис. 1–6. Диагностические признаки видов комплекса *Chrysoperla carnea* s. l.

1, 3, 5 – *Ch. lucasina*; 2, 4, 6 – *Ch. carnea* s. str. 1–2 – общий вид имаго с выделенными фрагментами костального края переднего крыла с щетинками; 3–4 – голова (стрелка указывает на характерные пятна в виде каймы на щеке и наличнике); 5–6 – проксимальный отдел брюшка (стрелкой обозначена плевральная оболочка второго сегмента).

Figs 1–6. Diagnostic characters of species of the *Chrysoperla carnea* s. l. complex.

1, 3, 5 – *Ch. lucasina*; 2, 4, 6 – *Ch. carnea* s. str. 1–2 – general view of the imago with selected fragments of the costal edge of the forewing with bristles; 3–4 – head (the arrow points to the characteristic spots in the form of a border on the gena and clypeus); 5–6 – proximal part of abdomen (the arrow indicates the pleural membrane of the second segment).

МБС-10. Определение сухого и зафиксированного в этаноле коллекционного материала осуществлялось при помощи специализированных ключей [San Martin, 2004; Monserrat, 2016] на основе внешних морфологических признаков (без учета биоакустических данных). Данные по биологии и экологии указываемых видов взяты из работ Середюка с соавторами [Середюк, 2015, 2016; Середюк и др., 2022]. Для фотографирования в лабораторных условиях использовали Canon PowerShot SX130IS и Xiaomi Redmi Note 8 Pro. Исследование терминалий самцов *Ch. pallida* и *Ch. carnea* s. str. базировалось на зафиксированном в этаноле материале. Для вычисления соотношений, описывающих форму половой «губы» и «подбородка», использовались отрезки АВ, ВС, DE, FG (рис. 9, 10). Отношение АВ/ВС отражало ширину «подбородка», в то время как отношение

DE/FG использовалось для описания формы половой «губы». Всего было изучено 558 экземпляров. Собранный материал хранится в коллекции автора.

*Chrysoperla lucasina* (Lacroix, 1912)  
(Рис. 1, 3, 5)

**Материал.** 1♀, Гомельский р-н, 3 окр. рабочего пос. Большевик, 52°33'52"N / 30°51'56"E, 139 м, на соцветиях зонтичных в поле, 7.07.2024; 1♂, Гомель, ул. Портовая, 52°26'20"N / 31°00'45"E, 141 м, на свет окна в подъезде многоэтажного дома, 10.07.2024; 1♀, Ю окр. Гомеля, 52°23'55"N / 31°00'27"E, 117 м, пойменный луг в долине р. Сож, 25.07.2024.

**Замечания.** Европейский лесной вид, заходящий в агро- и урбоценозы. Обитает в травяном ярусе (чаще на Brassicaceae, Graminaceae, Apiaceae и Asteraceae), иногда на кустарниках. Лёт имаго отмечен с мая по ок-



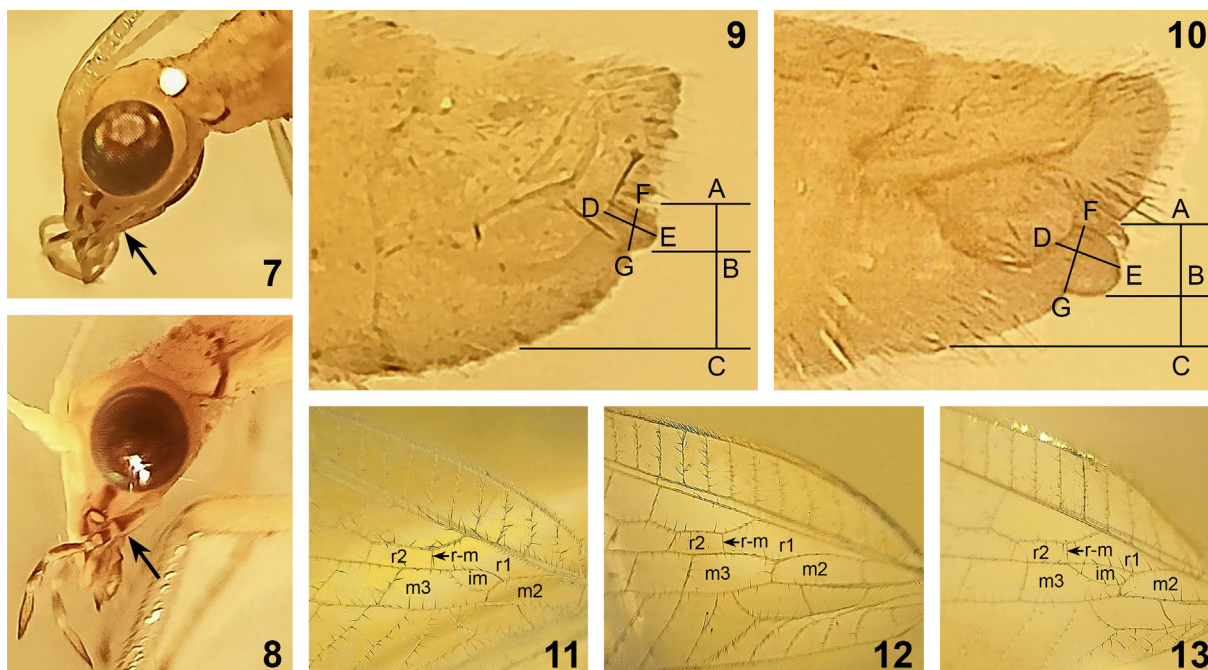


Рис. 7–13. Диагностические признаки видов комплекса *Chrysoperla carnea* s. l.

7, 9 – *Ch. pallida*; 8, 10 – *Ch. carnea* s. str. 7–8 – голова (стрелкой обозначен ствол нижней губы); 9–10 – вершина брюшка самца, иллюстрирующая отрезки АВ, ВС, DE и FG, используемые для вычисления соотношений, описывающих форму половой «губы» и «подбородка»; 11–13 – характер жилкования переднего крыла *Ch. carnea* s. l.: 11 – нормальное жилкование; 12–13 – aberrantное жилкование. im – интрамедиальная ячейка; m2 – 2-я медиальная ячейка; m3 – 3-я медиальная ячейка; r1 – 1-я радиальная ячейка; r2 – 2-я радиальная ячейка; r-m – радиомедиальная жилка.

Figs 7–13. Diagnostic characters of species of the *Chrysoperla carnea* s. l. complex.

7, 9 – *Ch. pallida*; 8, 10 – *Ch. carnea* s. str. 7–8 – head (the arrow indicates the stipes); 9–10 – male abdominal apex, illustrating segments AB, BC, DE, and FG used for calculating the ratios describing the shape of the genital 'lip' and 'chin'; 11–13 – venation pattern of the forewing of *Ch. carnea* s. l.: 11 – normal venation; 12–13 – aberrant venation. im – intramedian cell; m2 – 2<sup>nd</sup> median cell, m3 – 3<sup>rd</sup> median cell, r1 – 1<sup>st</sup> radial cell, r2 – 2<sup>nd</sup> radial cell, r-m – radial-median vein.

тябрь. Зимующие особи не меняют цвет. Яйца в кладке располагаются изолированно друг от друга. В течение года развиваются два, иногда три поколения. Имаго летят ночью на свет. Для фауны Беларуси вид указывается впервые. Ближайшие точки находок *Ch. lucasina* приводятся для Украинских Карпат [Середюк, Щербаченко, 2020].

*Chrysoperla pallida* Henry, Brooks,  
Duelli et Johnson, 2002  
(Рис. 7, 9)

**Материал.** 1♀, Гомель, Центральный парк культуры и отдыха им. А.В. Луначарского, 52°25'17"N / 31°00'57"E, 140 м, на свет фонаря, 18.06.2018; 1♀, Буда-Кошелевский р-н, городской пос. Уваровичи, ул. Колхозная, 52°36'09"N / 30°43'32"E, 134 м, на заброшенном приусадебном участке, 23.05.2019; 1♀, В окр. Гомеля, 52°24'22"N / 31°03'23"E, 122 м, среди зарослей ежевики на берегу пруда, 24.07.2019; 1♂, 2♀, Гомельский р-н, В окр. д. Старые Дятловичи, 52°13'55"N / 30°53'25"E, 113 м, на зимовке в гнезде *Vespa crabro* Linnaeus, 1758 под потолком кирпичной постройки стационарного бонового заграждения на берегу р. Сож, 15.11.2020; 1♀, Гомель, ул. Ауэрбаха, 52°25'49"N / 30°59'12"E, 140 м, на зимовке в коридоре частного дома, 1.04.2021; 1♂, 1♀, Гомельский р-н, СЗ окр. садоводческого товарищества «Берёзки», 52°22'54"N / 31°09'00"E, 130 м, лесополоса на окраине поля, на зимовке в улье на сосе, 18.04.2021.

**Замечания.** Европейский лесной вид. Экологические особенности изучены фрагментарно. Развивается преимущественно в древесном ярусе, реже на кустарниках. Зимующие особи чаще всего меняют окраску тела на желтовато-коричневый цвет. Яйца в кладке рас-

полагаются группами. Для фауны Беларуси вид указывается впервые. Ближайшие точки находок *Ch. pallida* приводятся для Украинских Карпат [Середюк, Щербаченко, 2020].

*Chrysoperla carnea* s. str. (Stephens, 1836)  
(Рис. 2, 4, 6, 8, 10)

**Материал.** 1♂, ЮВ окр. Гомеля, 52°23'23"N / 31°03'42"E, 127 м, редколесье, в подлеске, 9.06.2017; 1♀, Гомельский р-н, 3 окр. пос. Будатин, 52°25'36"N / 31°04'19"E, 145 м, просека в смешанном лесу, на соцветиях золотарника канадского, 3.08.2017; 1♀, ЮЗ окр. Гомеля, 52°24'07"N / 30°53'35"E, 127 м, просека в смешанном лесу, на цветущей травянистой растительности, 27.06.2018; 1♂, Гомель, ул. Ауэрбаха, 52°25'48"N / 30°59'12"E, 141 м, на приусадебном участке, 12.09.2018; 4♂, 11♀, Гомельский р-н, 3 окр. садоводческого товарищества «Глушец», 52°15'25"N / 30°50'25"E, 119 м, смешанный лес, на зимовке под корой усыхающих сосен, 28.10.2018; 5♂, 3♀, там же, 13.04.2021; 2♂, 3♀, Ю окр. Гомеля, 52°20'48"N / 31°01'41"E, 138 м, смешанный лес, на зимовке под корой усыхающей березы, 6.04.2019; 1♂, 1♀, Гомель, пр. Космонавтов, 52°26'57"N / 30°58'00"E, 140 м, на свет фонаря, 6.07.2019; 1♂, В окр. Гомеля, 52°25'30"N / 31°03'10"E, 120 м, пойменный луг в долине р. Ипуть, 21.07.2019; 2♀, Лоевский р-н, 3 окр. д. Абакумы, 51°59'24"N / 30°49'28"E, 125 м, лесосека, на травянистой растительности, 28.07.2019; 1♂, там же, 51°58'56"N / 30°49'08"E, 109 м, дубовая поросль, в кроне дубов, 28.07.2019; 1♀, Брагинский р-н, Ю окр. д. Верхние Жары, 51°19'56"N / 30°35'41"E, 102 м, пойменный луг, 15.08.2019; 1♂, 1♀, Брагинский р-н, СЗ окр. д. Дублин, 51°44'37"N / 30°19'01"E, 113 м, окраина редколесья на границе с кукурузным полем, 20.08.2019; 2♂, 1♀, Гомель, ул. Денисенко, 52°23'49"N / 30°57'58"E, 123 м, под балконом многоэтажного дома, 22.10.2019; 1♂, Гомель, во время лёта в салоне автобуса, 25.12.2019; 1♂, Лоевский р-н, Ю окр. д. Абакумы, 51°58'41"N / 30°50'52"E, 112 м, на пересохшем болоте, 13.06.2020; 1♀,

Брагинский р-н, С окр. пос. Кирово, 51°24'52"N / 30°34'29"E, 116 м, растущая лесосека, 16.07.2020; 2♀, Брагинский р-н, д. Верхние Жары, 51°21'00"N / 30°35'00"E, 105 м, цветущий луг, 21.07.2020; 1♂, 3♀, Буда-Кошелевский р-н, ур. Яслище, 52°33'03"N / 30°24'09"E, 135 м, на зимовке в гнезде *Vespa crabro* в дупле старого клена, 8.11.2020; 257♂, 208♀, Гомельский р-н, В окр. д. Старые Дятловичи, 52°13'55"N / 30°53'25"E, 113 м, на зимовке в гнезде *Vespa crabro* под потолком кирпичной постройки стационарного бонового заграждения на берегу р. Сож, 15.11.2020; 7♂, 12♀, Гомельский р-н, СЗ окр. садоводческого товарищества «Берёзки», 52°22'54"N / 31°09'00"E, 130 м, лесополоса на окраине поля, на зимовке в улье на сосне, 18.04.2021; 1♂, Гомель, ул. Пушкина, 52°25'48"N / 31°00'52"E, 141 м, 3-й этаж многоэтажного здания, на подоконнике, 7.09.2021; 1♂, Гомель, ул. Ланге, 52°25'40"N / 31°00'55"E, 144 м, 6-й этаж многоэтажного здания, на подоконнике, 8.09.2023; 1♀, Гомель, ул. Московская, 52°25'50"N / 30°59'16"E, 140 м, на железобетонном заборе, 31.10.2023; 1♂, Гомель, Центральный парк культуры и отдыха им. А.В. Луначарского, 52°25'12"N / 31°00'59"E, 121 м, набережная р. Сож, во время лёта, 7.04.2024; 1♀, Гомельский р-н, 3 окр. рабочего пос. Большевик, 52°33'52"N / 30°51'56"E, 139 м, на соцветиях зонтичных в поле, 7.07.2024; 1♀, Гомель, 52°25'47"N / 30°59'25"E, 140 м, пешеходный мост у ж/д вокзала «Гомель», на свет фонаря, 16.07.2024; 1♀, там же, 22.07.2024; 1♂, там же, 10.10.2024; 1♀, Ю окр. Гомеля, 52°24'03"N / 31°00'25"E, 118 м, пойменный луг в долине р. Сож, 25.07.2024.

**Замечания.** Европейско-азиатский массовый эвритопный вид. Обитает в различных биотопах, в том числе в агроценозах, в садах, в широколиственных лесах, на перелесках, на пойменных лугах, в парках и т.д. Встречается как на лиственных и хвойных деревьях, так и на траве и кустарниках. Личинки питаются мелкими насекомыми, в то время как имаго – палинофаги, а также могут питаться сладкими выделениями тлей. Лёт имаго наблюдается в течение всего вегетационного периода. С похолоданием взрослые особи мигрируют с открытых пространств в близлежащие леса и здания и прячутся в дуплах и под корой деревьев, в заброшенных гнездах, в ульях, под подоконниками в квартирах, в оконных щелях, на чердаках, на балконах, образуя, как правило, большие скопления. Это объясняет появление имаго на балконах и в помещениях после оттаивания оконных стекол весной, а также после включения отопления осенью, когда вид готовится к зимовке. При этом *Ch. carnea* s. str. в поиске мест для зимовки способен преодолевать значительные расстояния. Зимующие особи чаще всего меняют окраску тела на красновато-бурый («мясной») цвет. Яйца в кладке располагаются изолированно друг от друга. Дает от двух до пяти генераций в год. Имаго летят ночью на свет.



Рис. 14. Взрослые особи *Chrysoperla carnea* s. l. в зимней спячке.  
Fig 14. Hibernated adults of *Chrysoperla carnea* s. l.

#### Определительная таблица видов рода *Chrysoperla* Беларуси

- 1(2). Передние крылья со слегка заостренной вершиной и короткими (<0.1 мм) щетинками на костальном крае (рис. 1). Пятна на щеках и наличнике в виде темной каймы с красноватым оттенком (рис. 3). Плевральная оболочка второго брюшного сегмента с узкой темной косой полосой под тергитом (рис. 5). Зимующие особи не меняют цвет. Яйца в кладке располагаются изолированно друг от друга ..... *Ch. lucasina*
- 2(1). Передние крылья с закругленной вершиной и длинными (>0.1 мм) щетинками на костальном крае (рис. 2). Пятна на щеках и наличнике в виде коричнево-черной каймы (рис. 4). Плевральная оболочка второго брюшного сегмента без узкой темной косой полосы под тергитом (рис. 6). Зимующие особи меняют окраску тела. Яйца в кладке располагаются группами или изолированно друг от друга.
- 3(4). Стволик нижней губы (stipes) без пятен, с небольшим пятном или с очень короткой линией, охватывающей менее половины его длины (рис. 7). Последние стерниты брюшка с короткими и светлыми волосками. Вершина брюшка самца с короткой и узкой «губой» и широким «подбородком» (рис. 9: DE > FG и AB < BC). Зимующие особи меняют окраску тела преимущественно на желтовато-коричневый цвет. Яйца в кладке располагаются группами ..... *Ch. pallida*
- 4(3). Стволик нижней губы (stipes) с черноватой линией, покрывающей обычно более половины его длины (рис. 8). На последних стернитах брюшка большинство волосков длинные и черные. Вершина брюшка самца с широкой и удлиненной «губой» и узким «подбородком» (рис. 10: DE ≤ FG и AB > BC). Зимующие особи меняют окраску тела преимущественно на красновато-бурый («мясной») цвет. Яйца в кладке располагаются изолированно друг от друга ..... *Ch. carnea* s. str.

**Проблемы видовой идентификации обыкновенных зеленых златоглазок комплекса *Chrysoperla carnea* s. l.** Характерными диагностическими признаками обыкновенных зеленых златоглазок комплекса *Ch. carnea* s. l. являются расширенные, с выемкой, коготки, а также поперечная жила r-m, впадающая в ячейку m3, на передних крыльях (рис. 11). Идентификация видов усложняется существованием aberrантных особей и переходных форм. Так, например, у одной из изученных особей *Ch. carnea* s. str. на одном из передних крыльев отсутствовала ячейка im (рис. 12), а у других aberrантных экземпляров поперечная жила r-m впадала в край im (рис. 13). Поэтому в подобных ситуациях в совокупности с другими диагностическими признаками имеет смысл проверить жилкование на обоих крыльях. Генри с соавторами [Henry et al., 1996, 2002, 2003] отмечает, что существующие морфологические различия между тремя наиболее близкими видами (*Ch. carnea* s. str., *Ch. pallida* и *Ch. agilis*) в той или иной



степени перекрываются или образуют плавные переходы (*Ch. lucasina* в этом плане отличается гораздо лучше). К примеру, сравнение зимующих особей из гнезда шершней в окрестностях д. Старые Дятловичи Гомельского района показало, что у некоторых экземпляров имелись промежуточные признаки, характерные как для *Ch. carnea* s. str., так и для *Ch. pallida* (стипесы были без пятен, с небольшим пятном или с очень короткой линией в сочетании с длинными черными волосками на брюшке), а окраска тела варьировала от зеленой до красновато-бурой (рис. 14). Изменчивость окраски у златоглазок комплекса *Ch. carnea* s. l. в свое время отмечал еще Стефенс [Stephens, 1836]. Позже было доказано, что этот признак зависит от таких факторов, как интенсивность диапаузы [Honěk, 1973], характер среды обитания, время сбора после завершения зимовки и даже пол [Thierry et al., 1994]. Кроме того, внутри комплекса *Ch. carnea* s. l. описаны случаи успешного скрещивания с получением жизнеспособных гибридов [Naka et al., 2005, 2006; Henry et al., 2013]. Таким образом, для надежного определения подобных экземпляров (в особенности самок) требуется живой материал и применение специальных биоакустических методов.

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# Annotated checklist of thrips (Thysanoptera) of Armenia

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**Abstract.** The faunistic list of Thysanoptera is presented based on literature data and the author's research in ten of the eleven regions of Armenia during 2022–2024. In total, 25 species of thrips species are known from Armenia, with seven species recorded in the country for the first time: *Aeolothrips fasciatus* (Linnaeus, 1758), *Odontothrips karnyi* Priesner, 1924, *Thrips atratus* Haliday, 1836, *T. minutissimus* Linnaeus, 1758, *T. pillichii* Priesner, 1924, *T. trehernei* Priesner, 1927, *T. vulgatissimus* Haliday, 1836. New host plants have been identified for four species.

**Key words:** thrips, Thysanoptera, new records, host plants, Armenia, Transcaucasia.

## Аннотированный чек-лист трипсов (Thysanoptera) Армении

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**Резюме.** Представлен фаунистический список трипсов (Thysanoptera) Армении, основанный на литературных данных и исследованиях автора в 10 из 11 регионов страны в течении 2022–2024 годов. Всего в Армении известно 25 видов трипсов, семь из которых приведены для страны впервые: *Aeolothrips fasciatus* (Linnaeus, 1758), *Odontothrips karnyi* Priesner, 1924, *Thrips atratus* Haliday, 1836, *T. minutissimus* Linnaeus, 1758, *T. pillichii* Priesner, 1924, *T. trehernei* Priesner, 1927, *T. vulgatissimus* Haliday, 1836. Для 4 видов отмечены новые кормовые растения.

**Ключевые слова:** трипсы, Thysanoptera, новые находки, кормовые растения, Армения, Закавказье.

## Introduction

Thrips, the members of the order Thysanoptera, are a diverse group of insects found worldwide with 6042 described species listed [Classification..., 2018]. These insects play a significant role in various ecosystems, often serving as pollinators, herbivores, and potential vectors of plant diseases. Armenia hosts a wide variety of cultivated and wild plant life, suggesting the existence of a wide range of entomofauna, including thrips. However, thrips have been insufficiently studied in Armenia, and the current knowledge of the diversity is likely incomplete, with only 16 species representing the families Aeolothripidae, Thripidae, and Phlaeothripidae are mentioned in the available literature [Ananian, 1976]. In neighboring countries, more extensive research has been conducted, with over 270 [Mirab-balou, 2018] and 193 species of thrips [Tunç, Hastenpflug-Vesmanis, 2016] recorded from Iran and Turkey respectively. In this article, available information on the thrips fauna of Armenia is reviewed.

## Material and methods

The field surveys were conducted by the author in 10 out of 11 Armenian regions (based on the administrative division). Thrips were collected from various habitats, including agricultural fields, natural vegetation, and urban areas. Several greenhouses were surveyed as well. We used standard methods, such as flower and leaf shaking, brushing [Silva et al., 2021] and crop washing in the mixture

of liquid detergent, sodium hypochlorite and water [Burris et al., 1990]. Specimens preserved in 70% ethanol and later mounted on microscope slides for identification [Bisevac, 1997].

Morphological identification of thrips species was performed using taxonomic keys and published literature [Zur Strassen, 2003]. The specimens were prepared using a modified version of the Bisevac [1997] procedure, which included: clearing in 10% KOH solution, dehydration in a graded ethanol series, and mounting in Foral-Berleze balsam.

The material studied is deposited in the collections of the Scientific Center of Zoology and Hydroecology of the National Academy of Sciences of the Republic of Armenia (Yerevan).

The list below includes all available literature as well as our own data. Species newly recorded from Armenia are marked with an asterisk.

### Family Aeolothripidae

\**Aeolothrips fasciatus* (Linnaeus, 1758)

**Material.** 4♀, Yerevan, Nor Nork, 1302 m, on *Trifolium pratense* L. and *Medicago sativasiativa* L. (Fabaceae), 23.06.2022.

**Distribution.** Widespread around the globe [Mound et al., 2025].

### Family Melanthripidae

*Melanthrips fuscus* (Sulzer, 1776)

**Material.** 3♀, Tavush Region, Zikatar, 1265 m, on *Ranunculus* sp. (Ranunculaceae), 24.05.2023.

**Distribution.** Reported from Europe, Asia, Northern Africa [Mound et al., 2017]. This species was recorded from Ghukasyan District (currently Shirak Region, surroundings of Ashotsk) of Armenia on *Onobrychis* sp. (Fabaceae) [Ananian, 1976]; listed for Tavush Region for the first time.

#### Family Thripidae

*Drepanothrips reuteri* Uzel, 1895

**Distribution.** Reported from Europe [Zur Strassen, 2003], North America [Mound et al., 2017], Crimea, the Caucasus [Ananian, 1976]. It is known in Ararat Valley of Armenia as a pest of grape [Ananian, 1976].

*Frankliniella intonsa* (Trybom, 1895)

**Material.** 2♀, Yerevan, Arabkir, 1138 m, on *Tragopogon* sp. (Asteraceae), 27.06.2022; 3♀, Lori Region, Odzun, 1356 m, on *Senecio* sp. (Asteraceae), 6.07.2023; 2♀, Kotayk Region, Nor Geghi, 1384 m, on greenhouse *Fragaria* × *ananassa* D. (Rosaceae), 9.11.2023.

**Distribution.** Widespread across the Old World, from western Europe to Vietnam, Japan and Taiwan, and feeds on very wide range of unrelated plant species [Mound et al., 2025]. This species is listed from Armenia as a pest of cereals, carrot, and potatoes [Ananian, 1976].

*Frankliniella occidentalis* Pergande, 1895

**Material.** Ararat Region: 2♀, Hayanist, 840 m, Khachpar, 841 m, 17.11.2023. Armavir Region: 3♀, Hovtashat, 836 m, 17.11.2023; 5♀, Zvartnots, 876 m, on greenhouse *Fragaria* × *ananassa* D. (Rosaceae), 17.11.2023. Kotayk Region: 2♀, Kamaris, 1473 m, on greenhouse *Fragaria* × *ananassa* D. (Rosaceae), 21.01.2022; 5♀, Nor Geghi, 1365 m, 10.09.2023; 4♀, Nor Geghi, 1387 m, 9.11.2023; 2♀, Proshyan, 1329 m, on *Rosa* × *damascena* M. (Rosaceae), 2.12.2023. Syunik Region: 1♀, Shikahogh, 971 m, on *Prunella vulgaris* L. (Lamiaceae), 29.06.2023.

**Notes.** The species was recorded from Armavir Region of Armenia, in greenhouses on pepper [Ghazaryan, 2021]. In my research, *F. occidentalis* was found on *Fragaria ananassa* and *Rosa damascena* in greenhouse conditions as a pest. Feeding on strawberry thrips caused ugly fruit formation, and on roses flower petals deformation and discolouration. This information was provided by agronomists of the greenhouses. In the open field *F. occidentalis* was found on *Prunella vulgaris*. In Ararat, Kotayk and Syunik regions, *F. occidentalis* is recorded on above mentioned crops for the first time.

**Distribution.** Widespread across Europe, America, Asia, also present in several countries of Africa and Oceania [Thysanoptera, 2019]. Among countries neighboring Armenia the species is recorded from Turkey, Azerbaijan, and Iran [Thysanoptera, 2019; Thysanoptera..., 2025].

*Frankliniella tenuicornis* (Uzel, 1895)

**Distribution.** Recorded from the Holarctic, Palaearctic and Nearctic [Mound et al., 2025]. Europe, the Caucasus, Siberia, Middle Asia, Northern America [Ananian, 1976]. In Armenia, the species is recorded from Yerevan, on cereals and “wild flowers” [Ananian, 1976].

*Kakothrips pisivorus* Westwood, 1880

**Distribution.** Recorded from Transcaspiian Region, Syria [Zur Strassen, 2003], Europe, the Caucasus, Siberia [Ananian, 1976]. In Armenia, the species was recorded from Yerevan as *K. robustus* (Uzel, 1895) [Ananian, 1976].

*Limothrips angulicornis* Jablonowski, 1884.

**Distribution.** Recorded from the Western Palaearctic [Zur Strassen, 2003], Europe, Georgia, Northern America [Ananian, 1976]. From Armenia the species was recorded on *Triticum* sp. (Poaceae) without clear distribution data [Ananian, 1976].

\**Odontothrips karnyi* Priesner, 1924

**Material.** 3♀, Yerevan, Nor Nork, 1302 m, on *Medicago sativa* ssp. *sativa* L. (Fabaceae), 23.06.2022.

**Distribution.** Recorded from Turano-European-Mediterranean region, also from Cabo Verde, Yemen, Mongolia, on plants of Fabaceae [Zur Strassen, 2003].

*Odontothrips loti* (Haliday, 1852)

**Material.** 2♀, Yerevan, Nor Nork, 1302 m, on *Lotus caucasicus* K. (Fabaceae), 23.06.2022; 3♀, Tavush Region, Koghb env., “Zikatar” State Sanctuary, 1271 m, on *Lapsana grandiflora* B. (Asteraceae), 6.07.2023; 2♀, Vayots dzor Region, Herher, 1886 m, on *Cichorium intybus* L. (Asteraceae), 14.07.2023.

**Distribution.** Widespread in Europe, in the USA. Among countries neighboring Armenia the species is recorded from Georgia and Azerbaijan. In Armenia, the species was recorded from Yerevan [Ananian, 1976]. Feeds on flowers of various Fabaceae, including *Lotus*, *Genista*, *Lupinus*, *Trifolium*. From Tavush and Vayots dzor regions as well as on Asteraceae flowers *O. loti* is reported for the first time.

*Taeniothrips inconsequens* (Uzel, 1895)

**Distribution.** Distributed in the Palaearctic Region [Zur Strassen, 2003]. In Armenia, the species was recorded from Yerevan on plum tree, but not as a pest [Ananian, 1976].

*Tenothrips frici* (Uzel, 1895)

**Distribution.** Widespread around the globe [Mound et al., 2017]. In Armenia, the species was recorded from Yerevan on flowers of *Centaurea* sp. (Asteraceae) [Ananian, 1976].

\**Thrips atratus* Haliday, 1836

**Material.** 2♀, Tavush Region, Zikatar, 1265 m, on *Salvia* sp. (Lamiaceae), 25.05.2023; 2♀, Lori Region, Margahovit, 1786 m, on *Hyoscyamus niger* L. (Solanaceae), 29.06.2023; 2♀, Gegarkunik Region, Sevan, 1944 m, on *Rosa* sp. (Rosaceae), 17.07.2023.

**Distribution.** Widespread both in Europe and North America [Zur Strassen, 2003].

\**Thrips minutissimus* Linnaeus, 1758

**Material.** 5♀, Lori Region, Margahovit, 1786 m, on *Filipendula hexapetala* M. (Rosaceae), 29.06.2023.

**Distribution.** Species occurs throughout northern Europe [Mound et al., 2025], also reported from Iran [Mirab-balou, 2018].

*Thrips physopus* Linnaeus, 1758

**Distribution.** Widespread in Europe, Siberia, Mongolia [Zur Strassen, 2003], the Caucasus, Africa, North America [Ananian, 1976]. In Armenia, the species was recorded as a pest of flowers of *Rosa* sp. (Rosaceae) [Ananian, 1976].

\**Thrips pillichii* Priesner, 1924

**Material.** 5♀, Gegharkunik Region, Sevan Botanical Garden, 1944 m, on *Lapsana grandiflora* B. (Asteraceae), 17.07.2023.

**Distribution.** Widespread in Europe, Iran [Mirab-balou, 2018]. The species was found on flowers of Asteraceae [Zur Strassen, 2003].

*Thrips tabaci* Lindeman, 1889

**Material.** 1♀, Aragatsotn Region, Aparan, 1879 m, on *Rumex crispus* L. (Polygonaceae), 24.06.2023.

**Distribution.** Widespread across the globe [Mound et al., 2025]. In Armenia, the species was recorded from all regions on more than hundred species of wild and cultivated plants, from which it prefers to feed on representatives of Solanaceae and Apiaceae families [Ananian, 1976].

\**Thrips trehernei* Priesner, 1927

**Material.** 3♂, Yerevan, Nor Nork, 1294 m, on *Tragopogon* sp. (Asteraceae) and *Convolvulus arvensis* L. (Convolvulaceae), 23.06.2022; 7♂, Tavush Region, Zikatar, 1265 m, on *Carduus pycnocephalus* L. (Asteraceae) and *Achillea biebersteinii* Af. (Asteraceae), 24.05.2023; 4♂, Aragatsotn Region, Aparan, 1886 m, on *Taraxacum officinale* W. (Asteraceae), 7.07.2023; 3♂, Vayots dzor Region, Herher, 1886 m, *Tragopogon* sp. (Asteraceae), 14.07.2023.

**Distribution.** Widespread across Europe and in North America, southeastern Australia [Mound et al., 2025].

*Thrips validus* Uzel, 1895

**Distribution.** Known from Western Europe, Sibiria [Zur Strassen, 2003], Transcaucasia [Ananian, 1976]. In Armenia, the species was recorded from Yerevan as *T. validus longicollis* Uzel, 1895 [Ananian, 1976].

\**Thrips vulgatissimus* Haliday, 1836

**Material.** 7♀, Gegharkunik Region, Semyonovka env., 2070 m, on *Rumex alpinus* L. (Polygonaceae), 25.06.2023.

**Distribution.** Widespread across Europe, also northern and western areas of North America [Mound et al., 2025].

#### Family Phlaeothripidae

*Haplothrips aculeatus* (Fabricius, 1803)

**Distribution.** Widespread in Europe [Mound et al., 2025], the Caucasus, Middle Asia, Siberia, Far East [Ananian, 1976]. Reported from Armenia as widely distributed [Ananian, 1976].

*Haplothrips angusticornis* Priesner, 1921

**Distribution.** Reported from Europe, Middle East [Haplothrips..., 2024]. In Armenia, the species was recorded from Yerevan [Ananian, 1976].

*Haplothrips leucanthemi* (Schrank, 1781)

**Material.** 2♀, Yerevan, Nor Nork, 1302 m, on *Trifolium pratense* L. (Fabaceae), 23.06.2022; 3♀, Lori Region, Fioletovo env., 1649 m, 25.06.2023; Lori Region, Margahovit, 1782 m, on *Anthemis* sp. (Asteraceae), 25.06.2023; 2♀, Tavush Region, Koghb env., “Zikatar” Environmental Center, 1271 m, on *Anthemis* sp. (Asteraceae), 6.07.2023; 2♀, Aragatsotn Region, near Aparan water body, 1886 m, on *Tripleurospermum* sp. (Asteraceae), 7.07.2023; 2♀, Vayots dzor Region, Herher, 1886 m, on *Centaurea solstitialis* L. (Asteraceae), 14.07.2023; 2♀, Kotayk Region, Akunk env., 1510 m, on *Xeranthemum squarrosum* B. (Asteraceae), 15.07.2023; 2♀, Gegharkunik Region, Sevan Botanical Garden, 1950 m, on *Tripleurospermum* sp. (Asteraceae), 17.07.2023.

**Distribution.** Known from Europe (England and Scotland) [Mound et al., 2025], and also from Iran [Mirab-Balou, 2018].

**Remarks.** This species was reported as *H. niger* Osborn, 1883 from Armenia (Yerevan) on *Trifolium* sp., *Plantago* sp., *Taraxacum* sp., and *Crataegus* sp. [Ananian, 1976]. For above listed regions and associated plants *H. leucanthemi* is recorded for the first time.

*Haplothrips reuteri* (Karny, 1907)

**Distribution.** Reported from Russia, Turkey [Tunç, Hastenpflug-Vesmanis, 2016], Iran [Mirad-balou, 2018]. In Armenia, the species was recorded from Yerevan as a pest of *Trifolium* sp. and *Medicago* sp. (Fabaceae) [Ananian, 1976].

*Haplothrips tritici* (Kurdjumov, 1912)

**Distribution.** Reported from Europe including the European part of Russia, the Caucasus, Western Siberia, West and Middle Asia, Kazakhstan, North America [Ananian, 1976]. In Armenia, the species was recorded from cereal cultivating regions and is known as a pest of wheat [Ananian, 1976].

The presented research provides data on the occurrence of 25 species of thrips in Armenia, of which seven are recorded from the country for the first time and four are new both for associated plant and for the country's regions.

Comparison of existing data on Armenian fauna with data for neighboring Iran and Turkey is an evidence of insufficient level of study of the thrips of Armenia. Different climatic zones of Armenia and diverse habitats suggest that the Thysanoptera fauna is likely far from fully documented. The records presented in this annotated checklist mark a significant step forward in the documentation of Thysanoptera in Armenia. One noteworthy aspect of this study is the revelation of previously unreported species in Armenia, underscoring the need for continued exploration of the region's diversity of thrips.



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# An unexpected discovery of the drosophilid fly *Gitona distigma* Meigen, 1830 (Diptera: Drosophilidae) in the nests of the sand martin *Riparia riparia* (Linnaeus, 1758), with notes on morphology and distribution

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**Abstract.** During excavations of the nests of the sand martin *Riparia riparia* (Linnaeus, 1758), large numbers of adults of the drosophilid fly *Gitona distigma* Meigen, 1830 (Diptera: Drosophilidae) were found. Flies of this genus are widespread in Africa and are found in Australia and India. Of the six Palaearctic species, only *G. distigma* was recorded in temperate latitudes. The adults of this species feed on fermenting substrates, and the larvae develop in the inflorescences of Asteraceae. Obviously, adults of *G. distigma* entered the nests of sand martins for overwintering.

**Key words:** Diptera, Drosophilidae, *Gitona distigma*, nest, *Riparia riparia*, Russia, Saratov Region.

**Неожиданная находка мухи-дрозофилиды *Gitona distigma* Meigen, 1830 (Diptera: Drosophilidae)  
в гнездах береговой ласточки *Riparia riparia* (Linnaeus, 1758),  
с заметками по морфологии и распространению**

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**Резюме.** При раскопках гнезд береговой ласточки *Riparia riparia* (Linnaeus, 1758) были в большом количестве обнаружены имаго мух-дрозофилид *Gitona distigma* Meigen, 1830 (Diptera: Drosophilidae). Мухи этого рода широко распространены в Африке, встречаются в Австралии и Индии. Из шести палеарктических видов в умеренных широтах отмечен только *G. distigma*. Имаго этого вида питаются на бродящих субстратах, а личинки развиваются в соцветиях сложноцветных Asteraceae. Вероятно, имаго *G. distigma* проникли в гнезда береговой ласточки для зимовки.

**Ключевые слова:** Diptera, Drosophilidae, *Gitona distigma*, гнездо, *Riparia riparia*, Россия, Саратовская область.

## Introduction

The genus *Gitona* Meigen, 1830 includes 14 species in the world fauna [Brake, Bachli, 2008; Evenhuis, Pape, 2025], a significant part of which is confined to regions with a warm climate.

Seven species are recorded in the Afrotropical region. *Gitona darwendalei* Duda, 1935 and *G. magnipalpis* Duda, 1936 are described from Zimbabwe, *G. inornata* Seguy, 1933 and *G. gossypii* Seguy, 1933 – from Mozambique, *G. ethiopica* Tsacas et Teshome, 1981 – from Ethiopia, *G. pauliani* Seguy, 1951 was described from Madagascar and is also distributed in Ethiopia. The species *G. stuckenbergi* Tsacas, 1990 is described from South Africa.

One species, *G. incohata* Bock, 1982, is known in Australia.

Six species are recorded in the Palaearctic. *Gitona microchaeta* Seguy, 1941 is described from Morocco, *G. distans* Bezzi, 1924 is known from Cyprus and Pakistan, *G. beckeri* Duda, 1924 – in Uzbekistan and China, *G. valentinae* Maca, 1988 (V.S. Sidorenko supposed that this species is a synonym of *G. distigma* Meigen, 1830) –

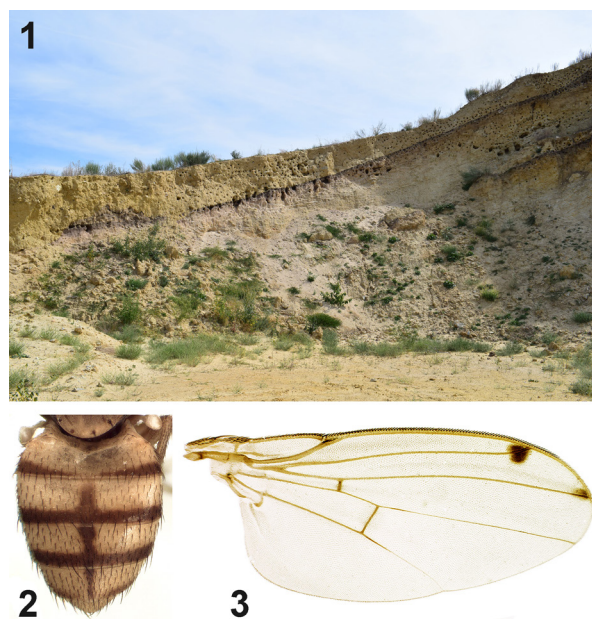
in Uzbekistan. The species *G. canariensis* Duda, 1934 is recorded on the Canary Islands, and *G. distigma* is widespread throughout the Palaearctic region. It is believed that *G. distigma* is the only species distributed in Russia [Sidorenko, 2008].

The genus *Gitona* is quite easily differentiated from closely related genera of the subfamily Steganinae by a micropubescent arista, costal vein C, reaching along the wing margin only to R4+5, fused wing cells bm and dm, a developed facial carina and a smaller number of rows of acrostichal ac setae (up to 8).

Among the three species distributed in Europe, *G. canariensis*, which does not have dark spots on the wings, is very different in appearance [Bachli et al., 2004]. The other two European species (*G. distans* and *G. distigma*) have two dark spots on the apex of R2+3 and R4+5 [Bachli et al., 2004].

## Material and methods

Adult flies in large numbers were found during the excavation of burrows with nests of sand martins in a



Figs 1–3. Habitat and details of male structure of *Gitona distigma*.  
1 – sandy quarry with sand martin nests in the vicinity of Demkino village, Saratov Region; 2 – abdomen, dorsal view; 3 – wing, dorsal view.

Рис. 1–3. Местообитание и детали строения самца *Gitona distigma*.

1 – песчаный карьер с гнездами береговой ласточки в окрестностях д. Демкино, Саратовская область; 2 – брюшко, сверху; 3 – крыло, сверху.

sand quarry. The burrows are located in the sandy cliff of the quarry at a height of 2–3 m. The length of the colony was up to 7 m. The entrance holes of the burrows were extended in a chain of 2–6 tiers in the upper third of the cliff (Fig. 1).

The flies were placed in 70% ethanol, in which they were stored until identification.

The terminology used in this article is based on the work of Sidorenko [2008].

#### *Gitona distigma* Meigen, 1830 (Figs 2, 3)

**Material.** 52♂, 48♀ (collection numbers N 46, N 47, N 48, Institute of Ecology and Evolution of the Russian Academy of Sciences, Moscow, Russia), Russia, Saratov Region, Khvalynsk District, Demkino vill. env., sandy quarry, 52.267003°N / 47.796580°E, from the nests of the sand martin *Riparia riparia* (Linnaeus, 1758), 4.11.2021 (E.N. Kondratiev).

**Diagnosis.** Relatively large, body length 4 mm, yellowish-brown flies. The face is yellowish, with gray pollination, the width of the face is greater than the height, the facial keel is high and wide, the genae are yellow, the height of the gena is slightly more than 0.25 of the largest diameter of the eye, the vertex is framed with white. Antennae yellow-brown, flagellomere 1 oval, almost 1.5 times longer than pedicel. Palpi yellowish. The pleurae are brownish-yellow with diffuse blackish areas. The halteres are brownish-yellow. Legs are single-coloured, brownish-yellow. The abdomen is shiny, yellow, with dark bands along the posterior margin and dark median stripes, clearly expressed on tergites III–V; tergite VI with an indistinct band and a small dark median spot.

The species *G. distigma* differs from the closely related species *G. distans* primarily in the structure of the wing: the distal-medial cross-vein dm-cu of *G. distans* is significantly removed from the radial-medial vein r-m [Bachli et al., 2004: 60, figs 127–128]. In addition, in *G. distigma* the dark spot on the apex of R2+3 is rounded, the spot on the apex of R4+5 is well developed (Fig. 3), and the median expansion of the dark stripes on the abdomen reaches the anterior margin on tergites III–V (Fig. 2).

In *G. distans* the dark spot on the apex of R2+3 is longitudinally oblong, the spot on the apex of R4+5 is less developed [Bezzi, 1924: 255, figs A, B], the median expansion of dark stripes on the abdomen does not reach the anterior margin on tergites III–V.

**Biology.** Adults of *Gitona*, like many other drosophilids, most likely feed on liquefied fermenting substrates of plant origin, including tree sap. Thus, adults of *G. distigma* were caught in beer traps [Gornostaev et al., 2023]. The larvae of *G. distigma* develop in the inflorescences of different species of sow thistles (*Sonchus arvensis* L., *S. oleraceus* L.), prickly tartar (*Onopordon acanthum* L.) [Ashburner, 1981] and other Asteraceae [Ferrar, 1987], damage fruits of *Moringa oleifera* Lam. (Moringaceae) [Chellamuthu et al., 2017]. Little is known about the biology of other species of the genus, except for the species *G. distans*, which was bred from figs [Bezzi, 1924]. Adults of *Gitona* spp. are sometimes found indoors on windows [Sidorenko, 2008].

**Distribution.** Europe and Asia: Spain, France, Germany, Austria, Slovenia, Croatia, Serbia, Macedonia, Switzerland, Czech Republic, Italy, Hungary, Slovakia, Poland, Romania, Belarus, Ukraine, Kazakhstan, Uzbekistan, Tajikistan, India, China, Mongolia [Sidorenko, 2008; Chellamuthu et al., 2017]. Russia: Lipetsk Region, Voronezh Region, Rostov Region, Adygea, Dagestan, Mordovia, Saratov Region, Samara Region, Novosibirsk Region, Altai, Irkutsk Region, Yakutia, Khabarovsk Region, Primorskiy Region [Sidorenko, 2008; Gornostaev, Luypina, 2023; Gornostaev et al., 2023].

## Discussion

We found adult flies in fairly large numbers when excavating sand martin nests in the autumn (November). By this time, the swallows leave the nests, and they remain empty.

Many species of Diptera typically overwinter at the adult stage. At the same time, their numbers may increase by the end of summer. Such cases are widely known, for example, for *Thaumatomyia notata* (Meigen, 1830) (Chloropidae) [Nartshuk, 2009], when clouds of these small flies penetrate into rooms, accumulate on windows and penetrate into all cracks.

Larvae of *D. distigma* are phytophagous. The fertility of adults is quite high: the female lays 200–230 eggs, the full development cycle of one generation does not exceed 36 days [Chellamuthu et al., 2017]. Like *Thaumatomyia notata*, cases of accumulations on indoor windows are known for *G. distigma* [Sidorenko, 2008]. All this gives us reason to assume that in our case, the adults of *G. distigma* entered the nests of the sand martin for overwintering.



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## *Tetragnatha reimoseri* (Roşca, 1939) (Aranei: Tetragnathidae) in the Ural and some territories of North Eurasia

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**Abstract.** *Tetragnatha reimoseri* (Roşca, 1939) is recorded for the Ural and some territories of North Eurasia for the first time, instead of erroneous indications as *T. isidis* (Simon, 1880). Detailed redescription of *T. reimoseri* is given. Four species of *Tetragnatha* Latreille, 1804 (*T. isidis*, *T. reimoseri*, *T. conica* (Grube, 1861) and *T. caudicula* (Karsch, 1879)) with a specific tail-shaped apex of abdomen are known from North Eurasia. Due to a structure of male palps and chelicerae and female sexual organs, *T. reimoseri* is closer to *T. caudicula* than to *T. isidis*. An identification key to four mentioned species is provided.

**Key words:** spiders, Tetragnathidae, *Tetragnatha*, taxonomy, identification key, Ural, North Eurasia.

### *Tetragnatha reimoseri* (Roşca, 1939) (Aranei: Tetragnathidae) на Урале и некоторых территориях Северной Евразии

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**Резюме.** Впервые для Урала и некоторых территорий Северной Евразии отмечен *Tetragnatha reimoseri* (Roşca, 1939) – вид пауков-тетрагнатид, который ошибочно указывался как *T. isidis* (Simon, 1880). Дано подробное иллюстрированное переписание *T. reimoseri*. Из Северной Евразии известно четыре вида пауков-тетрагнат (*T. isidis*, *T. reimoseri*, *T. conica* (Grube, 1861), *T. caudicula* (Karsch, 1879)) со специфическим хвостовидным концом брюшка, вытянутым за паутинными бородавками. Строением пальп самцов, хелицер обоих полов и половых органов самок *T. reimoseri* ближе к *T. caudicula*, чем к *T. isidis*. Для рассматриваемых видов представлена определительная таблица.

**Ключевые слова:** пауки, Tetragnathidae, *Tetragnatha*, таксономия, определительная таблица, Урал, Северная Евразия.

## Introduction

*Tetragnatha* Latreille, 1804 is the largest genus of the family Tetragnathidae, currently comprising 318 species and subspecies in the world fauna [World Spider Catalog, 2025]. Among North Eurasian spiders of this genus, only representatives of four species have tail-like elongated opisthosoma, reaching beyond spinnerets – *T. conica* (Grube, 1861), *T. caudicula* (Karsch, 1879), *T. isidis* (Simon, 1880) and *T. reimoseri* (Roşca, 1939).

First records of tetragnathids with tail-like elongated opisthosoma from the Southern Trans-Ural were made by Azheganova [1951, 1968] under the name *Eucta lutescens* Lendl, 1886. Then *T. isidis* was listed in subsequent publications on the Southern Trans-Ural [Esyunin, Pakhorukov, 1992; Esyunin, Efimik, 1996] and the Southern Ural [Esyunin, 2010; Sokolova et al., 2023]. A thorough revision of specimens has shown that records from the Southern Ural and Southern Trans-Ural as well as from the Caucasus and Eastern Kazakhstan belong to *T. reimoseri*.

Both *T. reimoseri* and *T. isidis* were reported from different regions of Russia and adjacent territories, but unfortunately it is currently not possible to verify these records and materials. The aim of the present work is to correct erroneous information about the distribution of *T. isidis* and *T. reimoseri* in the Ural and some territories of North Eurasia, based on the available materials.

## Material and methods

All specimens are fixed in 70% ethanol and deposited in the collection of Department of Invertebrate Zoology and Aquatic Ecology of the Perm State University (PSU, Perm, Russia, curator S.L. Esyunin). The measurements are given in millimeters. Lengths of leg segments are measured from their dorsal side. Leg measurements are given in the following order: total length (femur, patella + tibia, metatarsus, tarsus).

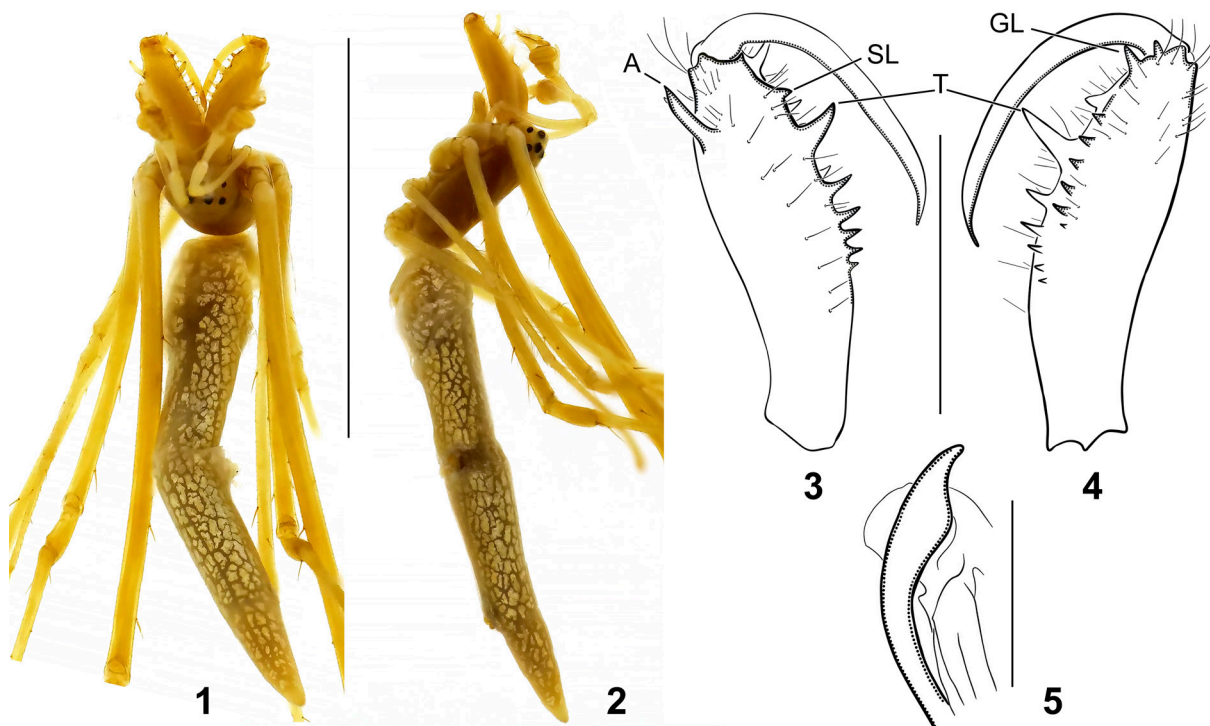
Abbreviations used in the text and figures:

Eyes: ALE – anterior lateral eye; AME – anterior median eye; PLE – posterior lateral eye; PME – posterior median eye; AER – anterior eye row; PER – posterior eye row; AME–ALE – distance between AME and ALE; AME–AME – distance between AME; PME–PLE – distance between PME and PLE; PME–PME – distance between PME; MO – median ocular quadrangle.

Palps and epigyne: C – conductor; E – embolus; P – paracymbium; AS – anterior spermathecae; PS – posterior spermathecae; CD – copulatory duct; ST – spermatheca.

Chelicera: AXU – auxiliary guide tooth of the upper row of chelicera, above GU; AXL – auxiliary guide tooth of the lower row of chelicera; A – male dorsal apophysis, used to lock females fang during copulation; GU – guide tooth of the upper row of chelicera; GL – guide tooth of the lower row of chelicera; RSU – the upper row of small





Figs 1–5. *Tetragnatha reimoseri*, male.

1–2 – habitus: 1 – dorsal view, 2 – lateral view; 3–4 – chelicera: 3 – dorsal view, 4 – ventral view; 5 – tip of embolus. A – dorsal apophysis; SL – a tooth which usually slopes towards the base of the segment; T – elongated tooth in the upper row of chelicera; GL – guide tooth of the lower row of chelicera. Scale bars: 1–2 – 5 mm, 3–4 – 1 mm, 5 – 0.1 mm.

Рис. 1–5. *Tetragnatha reimoseri*, самец.

1–2 – габитус: 1 – вид сверху, 2 – вид сбоку; 3–4 – хелицера: 3 – вид сверху, 4 – вид снизу; 5 – вершина эмболюса. А – спинной отросток хелицеры; SL – зуб, который обычно наклонен к основанию хелицеры; Т – удлиненный зуб в верхнем ряду хелицеры; GL – направляющий зуб нижнего ряда хелицер. Масштабные линейки: 1–2 – 5 мм, 3–4 – 1 мм, 5 – 0.1 мм.

teeth; RSL – the lower row of small teeth; SL – a tooth which usually slopes towards the base of the segment in the male of some species; T – elongated tooth in the upper row of male chelicera; t – a tooth or prominence, isolated from the dentition; U2 – a tooth on the upper row of chelicera after GU; L2 – a tooth on the lower row of chelicera after GL. This terminology follows Wiehle [1939], Locket and Millidge [1953], and Okuma [1987].

Digital photographs are taken with Panasonic GH5 digital camera with a Panasonic Lumix H-H025 25 mm f/1.7 lens. Stacks of colour images were processed using CombineZM software. Images of genitalia were taken from Zeiss Imager.A2 microscope. SEM micrographs were made by means of Hitachi TM3000 SEM microscope in BSE (back-scattered electrons) mode at the Perm State University.

*Tetragnatha reimoseri* (Roşca, 1939)  
(Figs 1–18)

*Eucta lutescens*: Azheganova, 1968: 91, figs 203a–6, 204, 215, 216a–6, 217a–b (♂♀).

*Eucta isidis*: Mkhedze, 1997: 286, figs 654–658.

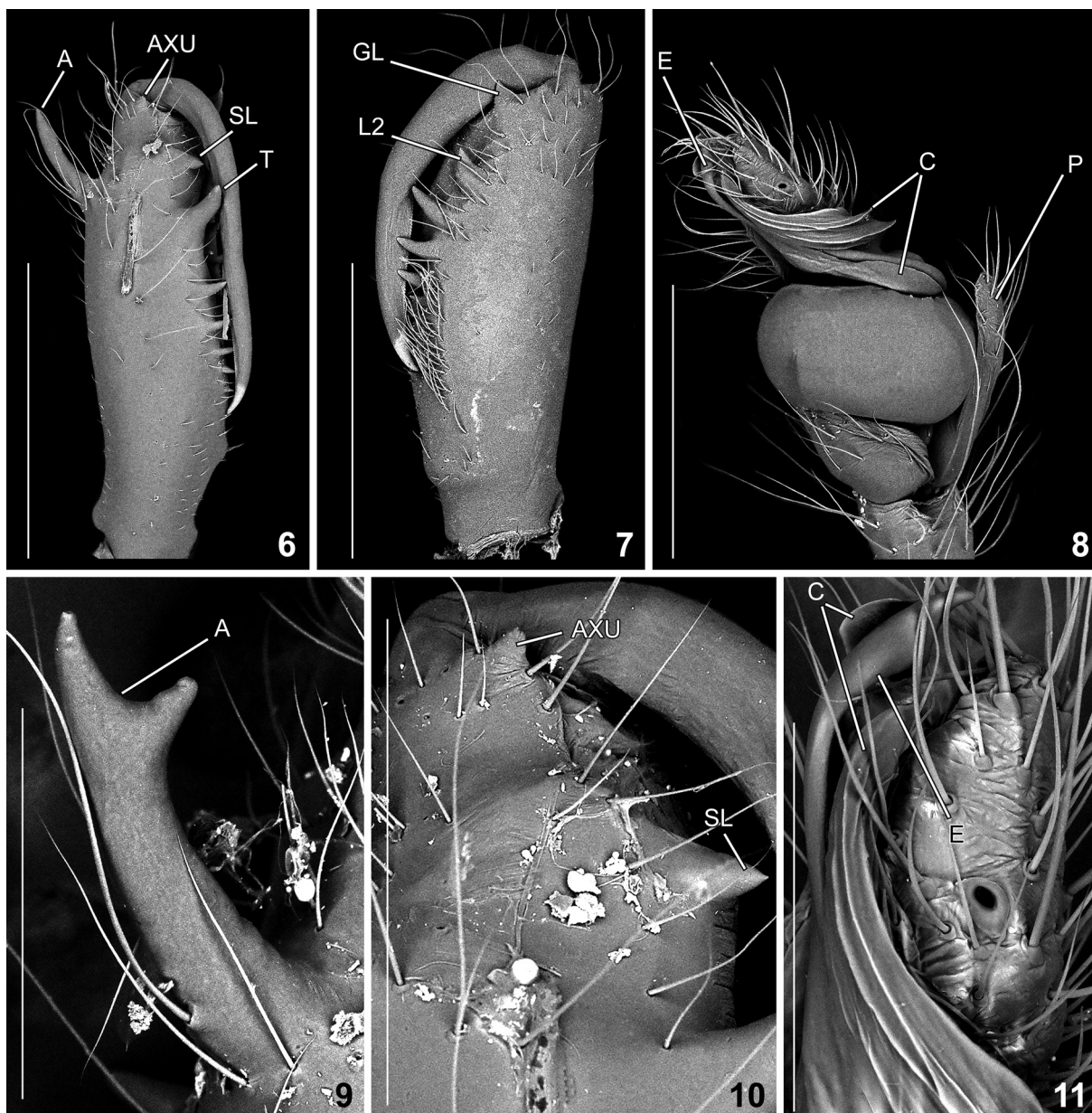
**Material.** Russia. 1♀ (PSU-900), Chelyabinsk Region, Troitsk District, Shartash Lake, from coastal vegetation, 29.06.1969 (unknown collector); 1♀ (PSU-900), the same locality, 27.06.1995 (V.E. Efimik); 1♀ (PSU-1198) the same locality, steppe, 07.2000 (S.L. Eshunin); 1♂ (PSU-1198) the same locality, from coastal vegetation, 17.07.2008 (A.A. Parkhomenko); 1♂ (PSU-5950), Chelyabinsk Region, Ilmensky Reserve, river bank, 28.06.2009 (A.A. Parkhomenko).

Kazakhstan. 1♀ (PSU-2395), East Kazakhstan Region, Kaldzhar River, near Burana vill., from coastal vegetation, 18.07.1936 (D.E. Kharitonov); 2♀ (PSU-2395), the same locality, meadow, 18.07.1936 (A.G. Ovsyannikov).

Georgia. 1♂ (PSU-80), Poti, 19.08.1939 (T.S. Mkhedze); 1♀, 1♀ immature (PSU-80), the same locality, 1940 (T.S. Mkhedze).

**Redescription.** Male (Figs 1–6, 8–11). Total length 11.27–12.01. Carapace 3.35–4.22 long, 1.57–1.64 wide, pale yellow. Eye sizes and interdistance: AME 0.12, ALE 0.1, PME 0.13, PLE 0.13; AME–AME 0.09, AME–ALE 0.14, PME–PME 0.18, PME–PLE 0.09. MO anterior width 0.07, posterior width 0.19, length 0.11. Clypeus 0.29–0.39 high. Labium pale yellow. Sternum from pale yellow to light brown. Legs pale yellow. Leg measurements: I, 27.29–34.46 (7.36–9.57, 9.29–11.64, 8.71–11.21, 1.93–2.04); II, 16.86–20.78 (5.57–6.56, 5.07–7.07, 4.93–5.79, 1.29–1.36); III, 6.72–8.72 (2.43–3.29, 1.85–2.57, 1.71–2.29); IV 16.64–21.13 (5.64–7.43, 5.64–6.63, 4.35–6.21, 1.01–0.86). Chelicera: dorsal apophysis (A) elongated, forked at the end; AXU present, GU absent; upper row with 7 teeth: SL with a beveled tip pointing towards T; T largest; other teeth decreasing in size gradually. AXL present; lower row with 7 teeth: GL largest, other teeth small. Abdomen 7.79–7.92 long, 0.93–1.36 wide, shiny silvery dorsal and gray ventral. Palp (Figs 5, 8, 11). Paracymbium with blunt tip. Tegulum oval, ~2 times wider than long. Conductor with 2 sharply protruding folds. Embolus completely enveloped by conductor, distal portion is curved with sharply narrowed (claw-shaped) tip.

Female (Figs 7, 12–18). Total length 16.42–26.28. Carapace 3.43–4.14 long, 2.07–2.71 wide, pale yellow. Eye sizes and interdistance: AME 1.43, ALE 1.01, PME 1.57, PLE 1.29; AME–AME 1.43, AME–ALE 3.14, PME–PME 1.71, PME–PLE 2.01. MO anterior width 0.21, posterior width 0.29, length 0.21. Clypeus 0.14–0.23 high. Labium pale yellow. Sternum from pale yellow



Figs 6–11. Scanning electron micrographs of *Tetragnatha reimoseri*.

6 – male chelicera, dorsally; 7 – female chelicera, ventrally; 8 – male palp; 9 – dorsal apophysis of male chelicera (A); 10 – distal part of male chelicera, dorsally; 11 – tip of palp. A – male dorsal apophysis; AXU – auxiliary guide tooth of the upper row of chelicera; C – conductor; E – embolus; P – paracymbium; SL – a tooth tilted towards the base of the segment; T – elongated tooth in the upper row of male chelicera; GL – guide tooth of the lower row of chelicera; L2 – a tooth on the lower row of chelicera after GL. Scale bars: 6–7 – 1 mm, 8, 10 – 0.5 mm, 9 – 0.3 mm, 11 – 0.2 mm.

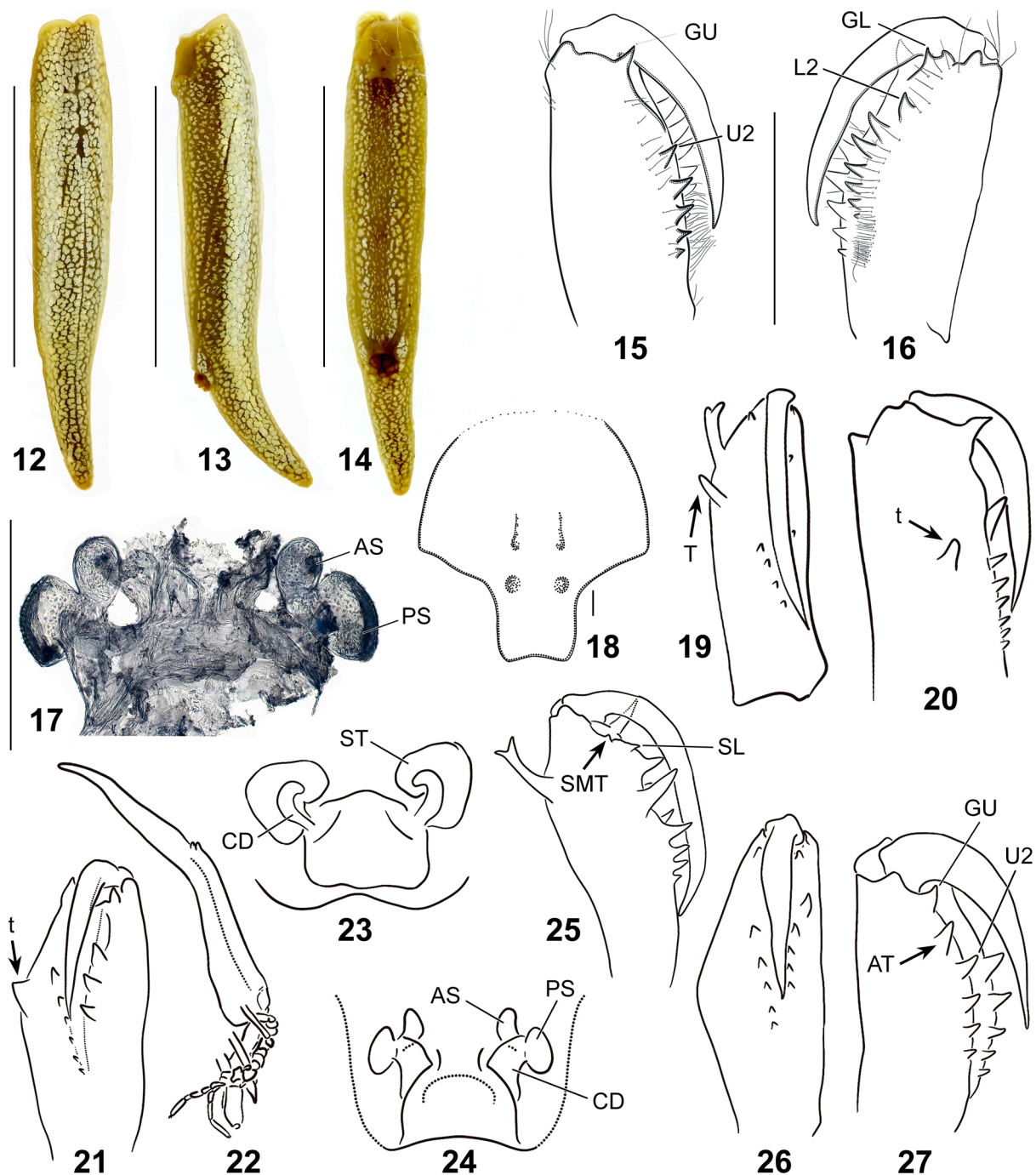
Рис. 6–11. Сканирующие электронные фотографии *Tetragnatha reimoseri* (Rosca, 1939).

6 – хелицера самца, сверху; 7 – хелицера самки, снизу; 8 – пальпа самца; 9 – дорсальный отросток хелицеры самца (A); 10 – кончик хелицеры самца, сверху; 11 – верхушка пальпы. A – дорсальный отросток хелицеры самца; AXU – вспомогательный направляющий зуб верхнего ряда хелицер; C – кондуктор; E – эмболюс; P – парацимбиум; SL – зуб, наклоненный к основанию хелицеры; T – удлиненный зуб в верхнем ряду зубов хелицеры самца; GL – направляющий зуб нижнего ряда хелицеры; L2 – зуб в нижнем ряду хелицеры, следующий за GL. Масштабные линейки: 6–7 – 1 мм, 8, 10 – 0.5 мм, 9 – 0.3 мм, 11 – 0.2 мм.

to light brown, sometimes with medium longitudinal pale yellow spot. Legs pale yellow. Leg measurements: I, 22.28–30.29 (6.43–8.86, 7.28–10.29, 7.14–9.28, 1.43–1.86); II, 13.86–17.85 (4.57–5.86, 4.05–5.86, 4.29–4.85, 1.01–1.28); III, 6.78–8.85 (2.43–3.29, 1.85–2.57, 1.71–2.29); IV, 13.43–18.29 (4.71–6.85, 3.98–5.71, 3.86–5.28, 0.86–1.14). Chelicera: AXU absent; upper row with 7 teeth: GU small; U2 smaller than U3 and U4; other teeth decreasing in size gradually. AXL absent; lower row with

6 teeth: GL largest, L2 smaller than L3; other teeth decreasing in size gradually. Abdomen 11.86–22.14 long, 2.02–2.71 wide, shiny silvery dorsal and gray with rare shiny spots ventral. Epigyne (Figs 17, 18). The genital lobe is approximately as long as wide. Vulva composed of 2 pairs of spermathecae, diameter of posterior pair ~1.5 times of anterior pair, anterior pair spaced by 3.5 diameter of anterior spermatheca, posterior pair spaced by 4 diameters of posterior spermatheca. Central membranous sac absent.





Figs 12–27. *Tetragnatha reimoseri*, female, and diagnostic characters of some North Eurasian *Tetragnatha* species.

12–18 – *T. reimoseri*; 19–23 – *T. isidis*; 24–26 – *T. caudicula*; 27 – *T. conica*. 12–14 – abdomen: 12 – dorsal view, 13 – lateral view, 14 – ventral view; 15–16 – chelicera: 15 – dorsal view, 16 – ventral view; 17–18 – epigyne: 17 – dorsal view, 18 – ventral view; 19, 25 – male chelicera; 20–21, 26–27 – female chelicera; 22 – female body; 23–24 – vulva. 19–20 – by Lessert [1915]; 21–23 – by Morano [2020]; 24, 26 – by Zhu, Zhang [2011]; 25 – by Tanikawa [2009]; 27 – by Wesołowska [1988]. AS – anterior spermatheca; PS – posterior spermatheca; ST – spermatheca; CD – copulatory duct; GU – guide tooth of the upper row of chelicera; U2 – a tooth on the upper row of chelicera after GU; GL – guide tooth of the lower row of chelicera; L2 – a tooth on the lower row of chelicera after GU; T – elongated tooth in the upper row of male chelicera; t – a tooth or prominence, isolated from the dentition; SL – a tooth tilted towards the base of the segment; SMT – a small tooth near SL; AT – an additional tooth between GU and U2. Scale bars: 12–14 – 5 mm, 15–16 – 1 mm, 17 – 0.5 mm, 18 – 0.2 mm.

Рис. 12–27. *Tetragnatha reimoseri*, самка, и диагностические признаки некоторых видов рода *Tetragnatha* из Северной Евразии.

12–18 – *T. reimoseri*; 19–23 – *T. isidis*; 24–26 – *T. caudicula*; 27 – *T. conica*. 12–14 – брюшко: 12 – вид сверху, 13 – вид сбоку, 14 – вид снизу; 15–16 – хелицера: 15 – вид сверху, 16 – вид снизу; 17–18 – эпигина: 17 – вид сверху, 18 – вид снизу; 19, 25 – хелицера самца; 20–21, 26–27 – хелицера самки; 22 – общий вид самки; 23–24 – эндогина. 19–20 – по [Lessert, 1915]; 21–23 – по [Morano, 2020]; 24, 26 – по [Zhu, Zhang, 2011]; 25 – по [Tanikawa, 2009]; 27 – по [Wesołowska, 1988]. AS – передняя сперматека; PS – задняя сперматека; ST – сперматека; CD – копулятивный канал; GU – направляющий зуб верхнего ряда хелицеры; U2 – зуб в верхнем ряду хелицеры, следующий за GU; GL – направляющий зуб нижнего ряда хелицеры; L2 – зуб в нижнем ряду хелицеры, следующий за GL; T – удлиненный зуб в верхнем ряду зубов хелицер самца; t – зуб или выступ, изолированный от зубного ряда; SL – зуб, наклоненный к основанию хелицеры; SMT – маленький зуб рядом с SL; AT – дополнительный зуб между GU и U2. Масштабные линейки: 12–14 – 5 мм, 15–16 – 1 мм, 17 – 0.5 мм, 18 – 0.2 мм.



**Diagnosis.** *Tetragnatha reimoseri* is close to *T. caudicula*, *T. conica* and *T. isidis*. All four species are found in North Eurasia and have an elongated opisthosoma, prominent beyond spinnerets. Unlike the first three species, *T. isidis* is distinguished by a longer posterior part of the abdomen after spinnerets [IJland, Helsdingen, 2011; Morano, 2020: fig. 70]. In the diagnosis below, we focused to the details in the structure of the chelicera and the copulatory organs.

Males of these species (the male of *T. conica* is unknown) are similar in having a bifurcated dorsal spur on the chelicera, but can be distinguished by the following characters: *T. reimoseri* differs from *T. isidis* by sharper conductor folds, by the absence SL and a different arrangement of the elongated tooth (T). The elongated tooth (T) is located in a row with other teeth in *T. reimoseri*, whereas it stands aside in *T. isidis* [Lessert, 1915: fig. 20]. *Tetragnatha reimoseri* differs from *T. caudicula* by the absence of a small tooth on the dorsal side of chelicerae, whereas *T. caudicula* has a small tooth near SL [Okuma, 1988: fig. 1A; Tanikawa, 2009: fig. 58].

Females of three species (*T. reimoseri*, *T. isidis*, *T. caudicula*) are similar in the shape of the epigynal fold and the absence of a central membranous sac in the vulva, but can be distinguished by the following characters: *T. reimoseri* differs from *T. isidis* by the absence of a tooth (t) isolated from the dentition on the dorsal side of the chelicerae [Lessert, 1915: fig. 21; Morano, 2020: fig. 72], by the presence of two pairs of spermathecae, whereas *T. isidis* possess only one pair [Morano, 2020: fig. 74]. *Tetragnatha reimoseri* differs from *T. caudicula* by the length of the copulatory ducts. In *T. reimoseri* copulatory ducts are equal to or shorter than the posterior spermatheca length (Fig. 17), whereas in *T. caudicula* copulatory ducts are at least 1.5 times longer than the posterior spermatheca length [Zhu, Zhang, 2011: fig. 118G]. Females of *T. reimoseri* differ from *T. conica* by the absence of a tooth between GU and U2 on the chelicera dorsally [Wesołowska, 1988: fig. 21].

**Misidentifications.** *Eucta lutescens* [Azheganova, 1951]; *Tetragnatha isidis* [Esyunin, Pakhorukov, 1992; Esyunin, Efimik, 1996; Esyunin, 2010; Sokolova et al., 2023].

**Notes.** We noticed that in the review of Tetragnathidae of the southern Far East [Kurenshchikov, 1994], the figure of the male chelicera of *T. isidis* does not correspond to this species. At the same time, the shape and the number of teeth on the chelicerae [Kurenshchikov, 1994: fig. 62] correspond to those in *Enoplognatha margarita* Yaginuma, 1964 from the family Theridiidae [Yaginuma, Zhu, 1992: fig. 15]. The latter species is widespread in the Russian Far East [Mikhailov, 2013; World Spider Catalog, 2025].

**Distribution.** France, Belgium, Netherlands, Germany, Poland, Italy, Austria, Hungary, Romania, Bulgaria, Georgia [Nentwig et al., 2025] including the Black Sea coast of the country, Russia (Southern Ural), eastern Kazakhstan.

Below we compiled an identification key to the North Eurasian *Tetragnatha* species having tail-like elongated abdomen, reaching beyond spinnerets.

### Key to North Asian species of *Tetragnatha* with elongated abdomen

(*T. conica* males are unknown to science)

1. Chelicerae of males (Fig. 19) and females (Figs 20, 21) with one isolated tooth on the dorsal side; vulva composed of one pair of spermathecae (Fig. 23); the posterior part of the abdomen after spinnerets is about the same length as the anterior part (Fig. 22) ..... *T. isidis*
- Chelicerae of males and females without an isolated tooth on the dorsal side (Figs 3, 15); vulva composed of two pairs of spermathecae or its structure is unknown (Figs 17, 24); the posterior part of the abdomen after spinnerets is much shorter than the front (Figs 12–14) ..... 2
2. Male ..... 3
- Female ..... 4
3. A small tooth near SL is presented (Fig. 25) ... *T. caudicula*
- A small tooth near SL is absent (Fig. 3) ..... *T. reimoseri*
4. A tooth between GU and U2 on the chelicera dorsally is presented (Fig. 27). Vulva unknown ..... *T. conica*
- A tooth between GU and U2 is absent (Figs 15, 26) ..... 5
5. The copulatory ducts of the vulva are equal to or shorter than the posterior spermatheca length (Fig. 17) ..... *T. reimoseri*
- The copulatory ducts are at least 1.5 times longer than the posterior spermatheca length (Fig. 24) ..... *T. caudicula*

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# The first records of two cryptic species of the genus *Cardiocondyla* Emery, 1869 (Hymenoptera: Formicidae) in Russia

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**Abstract.** Two ants, *Cardiocondyla brachycephs* Seifert, 2003 and *C. persiana* Seifert, 2003, are recorded from Russia for the first time. These species were found in Krasnodar Region, in Novorossiysk and Sochi, respectively. The closest known locality for both species is western Georgia. The localities in Krasnodar Region are the westernmost for these species known so far. Both species are similar to other representatives of the *C. elegans* group and can be confidently identified using both the microsculpture of the head surface and morphometric characteristics.

**Key words:** cryptic species, ants, *Cardiocondyla*, morphometry, new records.

## Первые находки двух криптических видов рода *Cardiocondyla* Emery, 1869 (Hymenoptera: Formicidae) в России

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**Резюме.** Представлены сведения о первых находках в России муравьев *Cardiocondyla brachycephs* Seifert, 2003 и *C. persiana* Seifert, 2003. Виды найдены на территории Краснодарского края, в Новороссийске и Сочи соответственно. Ближайшим известным местонахождением обоих видов является Западная Грузия. Местобитания в Краснодарском крае – самые западные из известных для этих видов на данный момент. Оба вида сходны с другими представителями группы видов *C. elegans* и могут быть надежно идентифицированы только по морфометрическим характеристикам в совокупности с микроскульптурой поверхности головы.

**Ключевые слова:** криптические виды, муравьи, *Cardiocondyla*, морфометрия, новые указания.

## Introduction

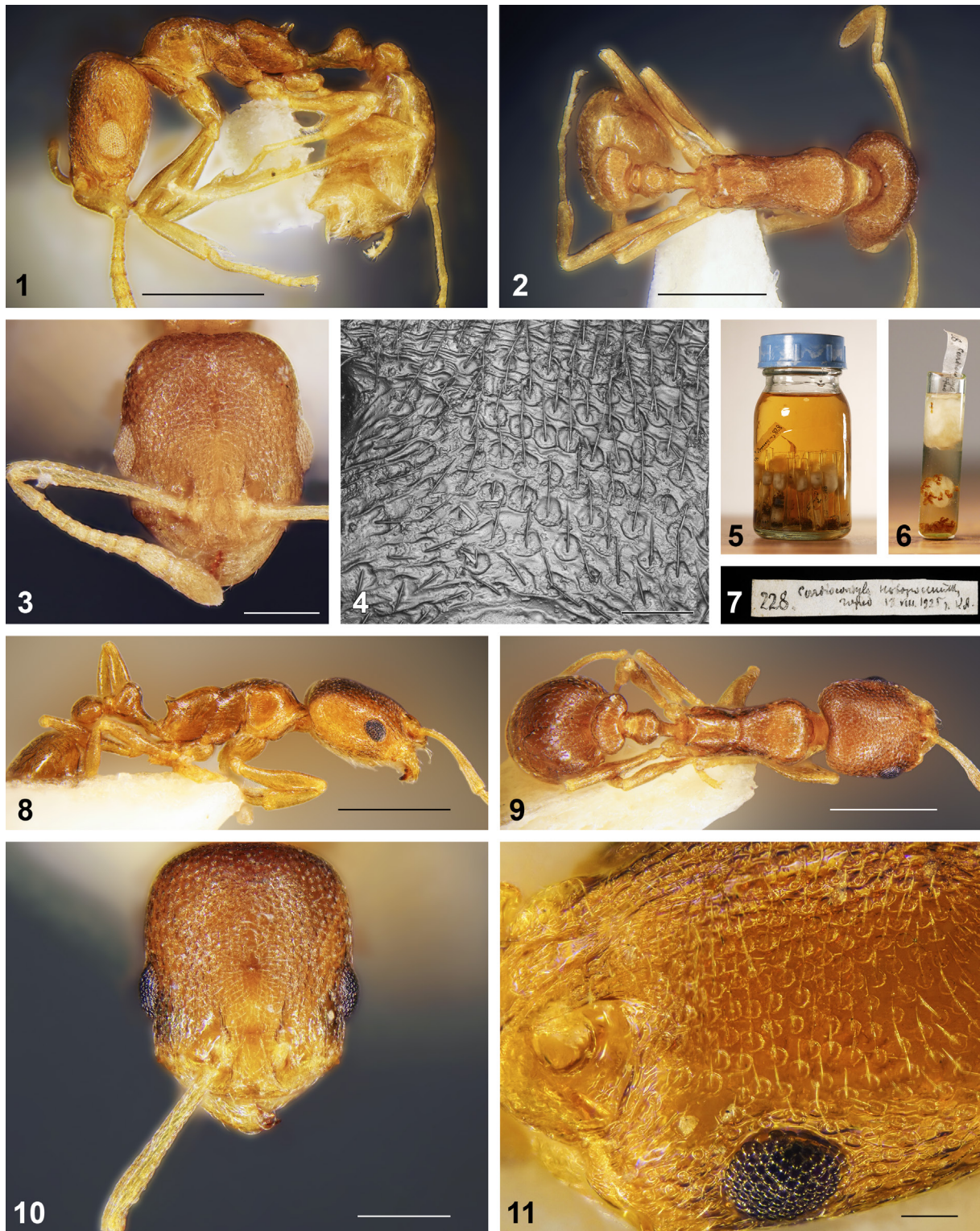
The genus *Cardiocondyla* Emery, 1869 is one of the poorly studied ant genera in Eastern Europe. The paper of Arnoldi [1926] on *Cardiocondyla stambuloffii* Forel, 1892 represented for a long time the only research referring to this genus in Russia. Some information about the fauna of the genus was provided by Radchenko [1996]. The last revision of the Palaearctic species of the genus was conducted by Seifert [2023a]. Applying the synonymies given by Seifert to the checklist provided by Dubovikoff and Yusupov [2017] and using the data provided by Seifert [2023a], only four autochthonous species are known to occur on the territory of the Russian Federation: *C. ulianini* Emery 1889, *C. sahlbergi* Forel 1913, *C. stambuloffii* and *C. koshewnikovi* Ruzsky 1902. A lot of *Cardiocondyla* samples collected by K.V. Arnoldi have been preserved

until today in the collections of the Zoological Institute of the Russian Academy of Sciences (ZISP, St Petersburg, Russia) and the Zoological Museum of Moscow State University (ZMMU, Moscow, Russia). But a large part of the material was not identified even by the collector himself. A detailed analysis of the material revealed new records of two species of the genus for the fauna of Russia, *C. brachycephs* Seifert, 2003 and *C. persiana* Seifert, 2003, is given below.

## Material and methods

Most of the investigated specimens are deposited in the collection of the Zoological Institute of the Russian Academy of Sciences. Many test tubes with labels were stored in a common glass jar filled with ethanol (Figs 5, 6). About half of the test tubes were marked





Figs 1–11. *Cardiocondyla* samples and label.

1–4 – *C. brachyceps*: 1 – lateral view, 2 – dorsal view, 3 – head, frontal view, 4 – microsculpture of the head surface between the inner eye margin and the paramedian vertex; 5–7 – *Cardiocondyla* samples, collected by K.V. Arnoldi (ZISP): 5 – a glass jar with the test tubes filled with ethanol, 6 – test tube with the *Cardiocondyla* specimens, 7 – label of the *C. brachyceps* sample; 8–11 – *C. persiana*: 8 – lateral view, 9 – dorsal view, 10 – head, frontal view, 11 – microsculpture of the head surface between the inner eye margin and the paramedian vertex. Scale bars: 1–2, 8–9 – 0.5 mm, 3, 10 – 0.2 mm, 4, 11 – 0.05 mm.

Рис. 1–11. Образцы *Cardiocondyla* и этикетка.

1–4 – *C. brachyceps*: 1 – латерально, 2 – дорсально, 3 – голова, фронтально, 4 – микроскульптура поверхности головы между усиковой ямкой и верхним краем глаза; 5–7 – образцы *Cardiocondyla*, собранные К.В. Арнольди (ЗИСП): 5 – стеклянная банка с пробирками, заполненными этанолом, 6 – пробирка с экземплярами *Cardiocondyla*, 7 – этикетка пробы с *C. brachyceps*; 8–11 – *C. persiana*: 8 – латерально, 9 – дорсально, 10 – голова, фронтально, 11 – микроскульптура поверхности головы между усиковой ямкой и верхним краем глаза. Масштабные линейки: 1–2, 8–9 – 0.5 мм, 3, 10 – 0.2 мм, 4, 11 – 0.05 мм.

with only four-digit numbers, which made their location impossible to determine as they are undocumented in any way. Fortunately, the sample which turned out to be *C. brachyceps* has a geographic label (Fig. 7). The single specimen of *C. persiana* was found in the collection of the Zoological Museum of Moscow State University. Material on these two species from other regions and comparative material was previously examined and published by Seifert [2023a].

The photos were taken via a Motic BA210 microscope in reflected light using a Panasonic Lumix G7 digital camera and via a laser microscope Keyence VK-9700. The final images were processed with Adobe Photoshop CS5. Morphological terms and morphometric analysis were carried out according to Seifert [2023b]. The morphometric measurements of four *C. brachyceps* workers were taken by B. Seifert using a Leica M165C high-performance stereomicroscope equipped with a 2.0× planapochromatic objective (resolution 1050 lines/mm). The single specimen of *C. persiana* from Sochi was measured by D.M. Shevchenko using a Motic BA210 microscope with 10× plan semi-apochromatic objective. These data are less accurate due to lower resolution and magnification of the microscope.

Definition of numeric characters:

CL – maximum cephalic length in median line; the head must be carefully tilted to the position yielding the true maximum; excavations of hind vertex and/or clypeus reduce CL.

CW – maximum cephalic width; the maximum is usually found across and including the eyes, exceptionally posterior of the eyes.

CS – cephalic size; the arithmetic mean of CL and CW, used as a less variable indicator of body size.

dFOV – mean inner diameter of foveolae or of meshes of a reticulum on vertex at about half way between the median line of head and the inner eye margin. These structures usually have the base of a pubescence hairs in their center. At least seven measurements at magnifications of 360× are averaged.

EYE – eye-size: the arithmetic mean of the large (EL) and small diameter (EW).

FRS – distance of the frontal carinae immediately caudal of the posterior intersection points between frontal carinae and the lamellae dorsal of the torulus. If these dorsal lamellae do not laterally surpass the frontal carinae, the deepest point of scape corner pits may be taken as reference line. These pits take up the inner corner of scape

Table 1. Morphometric data of *Cardiocondyla* spp. workers in the sequence arithmetic mean  $\pm$  standard deviation (minimum, maximum)]according to the data given by Seifert [2023a] and supplemented by the two samples provided in this paper.

Таблица 1. Морфометрические данные рабочих особей *Cardiocondyla* spp. в последовательности среднее арифметическое  $\pm$  стандартное отклонение (минимум, максимум) в соответствии с данными, приведенными Зайфертом [Seifert, 2023a] и дополненными двумя выборками, представленными в этой статье.

	<i>C. sahlbergi</i> (n = 76)	<i>C. persiana</i> Sochi / Сочи (n = 1)	<i>C. persiana</i> (n = 26)	<i>C. brachyceps</i> (n = 20)	<i>C. brachyceps</i> Novorossiysk / Новороссийск (n = 4)
CS, $\mu$ m	522 $\pm$ 20 (468, 564)	553	536 $\pm$ 20 (495, 566)	561 $\pm$ 22 (498, 587)	570 $\pm$ 15 (552, 587)
CL/CW	1.176 $\pm$ 0.019 (1.11, 1.254)	1.15	1.165 $\pm$ 0.026 (1.123, 1.216)	1.129 $\pm$ 0.019 (1.093, 1.164)	1.113 $\pm$ 0.014 (1.1, 1.125)
SL/CS	0.8 $\pm$ 0.013 (0.764, 0.829)	0.792	0.794 $\pm$ 0.017 (0.764, 0.827)	0.842 $\pm$ 0.022 (0.812, 0.877)	0.859 $\pm$ 0.008 (0.854, 0.871)
PoOc/CL	0.438 $\pm$ 0.008 (0.414, 0.453)	0.47	0.441 $\pm$ 0.008 (0.429, 0.458)	0.379 $\pm$ 0.008 (0.367, 0.396)	0.378 $\pm$ 0.004 (0.374, 0.383)
EYE	0.231 $\pm$ 0.007 (0.215, 0.244)	0.21	0.233 $\pm$ 0.007 (0.224, 0.246)	0.252 $\pm$ 0.006 (0.244, 0.268)	0.26 $\pm$ 0.006 (0.253, 0.268)
dFOV	17.4 $\pm$ 0.82 (15, 19)	18.6	19.4 $\pm$ 0.96 (17.8, 21)	19.4 $\pm$ 0.85 (18.0, 21)	19.5 $\pm$ 0.45 (18.9, 19)
FRS/CS	0.256 $\pm$ 0.009 (0.236, 0.275)	0.261	0.254 $\pm$ 0.009 (0.235, 0.268)	0.258 $\pm$ 0.011 (0.235, 0.273)	0.255 $\pm$ 0.011 (0.239, 0.264)
MGr/CS, %	3.73 $\pm$ 0.64 (2.3, 6.6)	4.87	4.4 $\pm$ 0.99 (2.4, 6.6)	4.4 $\pm$ 0.99 (2.4, 6.6)	4.58 $\pm$ 0.64 (4, 5.4)
SPBA/CS	0.278 $\pm$ 0.013 (0.253, 0.322)	0.25	0.27 $\pm$ 0.015 (0.24, 0.294)	0.236 $\pm$ 0.016 (0.214, 0.282)	0.243 $\pm$ 0.012 (0.23, 0.254)
PEW/CS	0.33 $\pm$ 0.021 (0.292, 0.401)	0.332	0.316 $\pm$ 0.025 (0.278, 0.355)	0.302 $\pm$ 0.015 (0.265, 0.347)	0.315 $\pm$ 0.022 (0.299, 0.347)
PPW/CS	0.565 $\pm$ 0.024 (0.509, 0.654)	0.554	0.543 $\pm$ 0.033 (0.478, 0.593)	0.532 $\pm$ 0.028 (0.448, 0.573)	0.548 $\pm$ 0.02 (0.528, 0.573)
PEH/CS	0.351 $\pm$ 0.013 (0.323, 0.388)	0.36	0.347 $\pm$ 0.019 (0.316, 0.382)	0.301 $\pm$ 0.014 (0.269, 0.327)	0.303 $\pm$ 0.015 (0.285, 0.32)
PPH/CS	0.305 $\pm$ 0.011 (0.281, 0.331)	0.297	0.297 $\pm$ 0.014 (0.278, 0.323)	0.263 $\pm$ 0.015 (0.232, 0.291)	0.264 $\pm$ 0.012 (0.255, 0.281)
PLG/CS, %	6.47 $\pm$ 0.54 (5.18, 8.06)	6.52	6.77 $\pm$ 0.39 (5.61, 7.38)	8.15 $\pm$ 0.68 (6.88, 9.08)	8.81 $\pm$ 0.37 (8.29, 9.08)



base when the scape is fully switched caudad and produce a dark triangular shadow in the lateral frontal lobes immediately posterior of the dorsal lamellae of scape joint capsule.

MGr – depth of metanotal groove or depression, measured from the tangent connecting the dorsalmost points of promesonotum and propodeum.

ML – mesosoma length in the alates; measured in lateral view from the caudalmost portion of propodeum to the frontalmost point of the anterior pronotal slope (i.e. not to the frontalmost point of the whole pronotum that is usually concealed by the occiput).

PeW – maximum width of petiole.

PeH – maximum height of petiole.

PLG – mean length of pubescence hairs on dorsum of first gaster tergite as arithmetic mean of at least seven measurements taken at magnifications of 360×.

PpH – maximum postpetiole height; the lateral suture of dorsal and ventral sclerites is the reference line perpendicular to which the maximum height of postpetiole is measured.

PpW – maximum width of postpetiole.

PoOc – postocular distance. Use a cross-scaled ocular micrometer and adjust the head to the measuring position of CL. Caudal measuring point: median occipital margin; frontal measuring point: median head at level of posterior eye margin. Note that many heads are asymmetric; therefore, average the left and right postocular distance.

SL – maximum straight line length of scape excluding the articular condyle given as the arithmetic mean of both scapes.

SP – maximum length of propodeal spines; measured in dorsofrontal view along the long axis of the spine, from spine tip to a line, orthogonal to the long axis that touches the bottom of the interspinal meniscus.

SPBA – the smallest distance of the lateral margins of the spines at their base. This should be measured in dorsofrontal view, since the wider parts of the ventral propodeum do not disturb the measurement in this position. If the lateral margins of spines diverge continuously from the tip to the base, the smallest distance at base is not defined. In this case SPBA is measured at the level of the bottom of the interspinal meniscus.

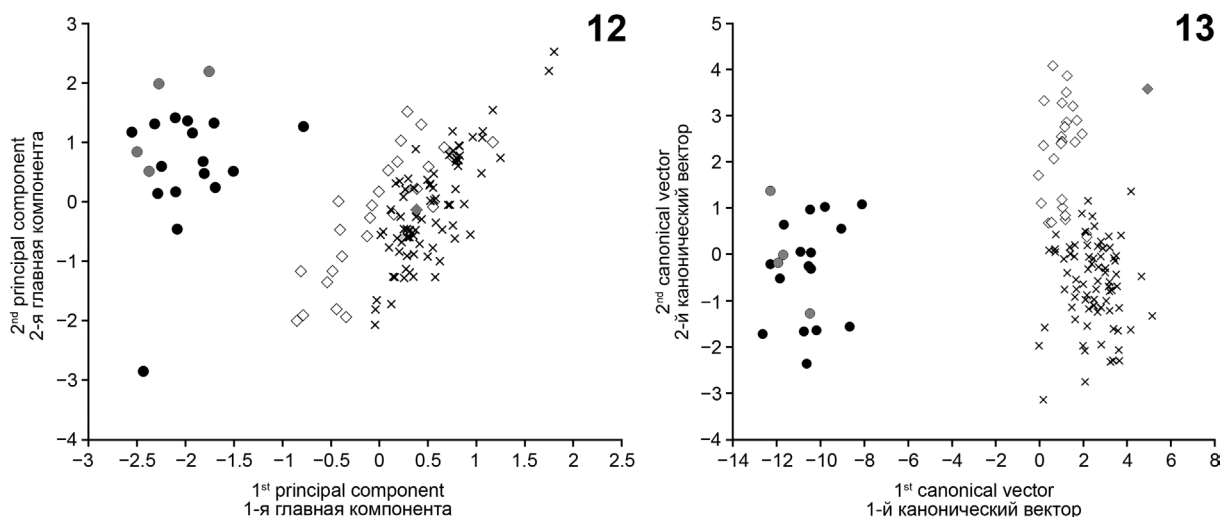
### *Cardiocondyla brachyiceps* Seifert, 2003

(Figs 1–4)

**Material.** 35 workers (ZISP), “228. *Cardiocondyla* Новороссийск, города 12 VIII.1925 г., КА.” (Russia, Krasnodar Region, Novorossiysk, city, K.V. Arnoldi).

**Notes.** Among the species groups defined by Seifert [2023b], *C. brachyiceps* is a member of the *C. elegans* species group and is well separable from the two *C. ulianini* species group members known for the fauna of Russia (*C. sahlbergi* and *C. ulianini*) by a much smaller postocular index PoOc/CL and a larger eye size index EYE/CS (Table 1). Furthermore, *C. brachyiceps* differs from the former two species by the microsculpture of the head surface between the inner eye margin and the paramedian vertex, which is rougher, with coarse wrinkles (Fig. 4). A principal component analysis of 14 characters given in Table 1 allocated the four measured specimens from Novorossiysk clearly to *C. brachyiceps* (Fig. 12).

**Distribution.** The range of the species covers the territory from Eastern Afghanistan (69.5°E) westwards over Iran to southern Georgia and northeast Turkey (41.7°E) [Seifert, 2023a] (Fig. 14). The southern and northern boundaries of the range are unclear. At present, the city of Novorossiysk is the westernmost locality of this species. The closest locality to Novorossiysk is Adjara (41°48'17.4"N /



Figs 12–13. Principal component analysis of 14 morphometric characters given in Table 1 (12) and linear discriminant analysis using the indexes CS, PoOc/CL, PeH/CS, PLG/CS, MpGr/CS and dFov (13). Black circles – *C. brachyiceps*, material is given in Seifert [2023a]; gray circles – *C. brachyiceps* (Novorossiysk); white rhombs – *C. persiana*, material is given in Seifert [2023a]; black crosses – *C. sahlbergi*, material is given in Seifert [2023a]; gray rhomb – *C. persiana* (Sochi).

Рис. 12–13. Анализ главных компонент 14 морфометрических характеристик, приведенных в таблице 1 (12), и линейный дискриминантный анализ, использующий индексы CS, PoOc/CL, PeH/CS, PLG/CS, MpGr/CS и dFov (13). Черные круги – *C. brachyiceps*, материал приведен в работе Зайферта [Seifert, 2023a]; серые круги – *C. brachyiceps* (Новороссийск); белые ромбы – *C. persiana*, материал приведен в работе Зайферта [Seifert, 2023a]; черные крестики – *C. sahlbergi*, материал приведен в работе Зайферта [Seifert, 2023a]; серый ромб – *C. persiana* (Сочи).



41°47'03.1"E), where nests of the species were found on the sandy bank of the Kinkishi River, in a community of thorny shrubs.

*Cardiocondyla persiana* Seifert, 2003  
(Figs 8–11)

**Material.** 1 worker (ZMMU), "5240 Sotschi 4.8.31 V. Lutschnik" (Russia, Krasnodar Region, Sochi, 4.08.1931).

**Notes.** The PCA could not decide if the specimen from Sochi belonged to *C. sahlbergi* or *C. persiana*. A sufficiently clear determination of this problematic specimen was possible by a wild-card run in a character-reduced linear discriminant analysis using the characters CS, PoOc/CL, PeH/CS, PLG/CS, MpGr/CS and dFov with  $p = 0.9666$  (Fig. 13). The classification as *C. persiana* along the 2<sup>nd</sup> canonical vector is clear. The detached placement along the 1<sup>st</sup> canonical vector is most likely due to the low measuring accuracy. The determination of the Sochi specimen as *C. persiana* is also supported by the microsculpture of the vertex which is much coarser than in *C. sahlbergi* (Fig. 11).

**Distribution.** The range of the species covers the territory from Central Iran (54.0°E) westwards to Western Georgia (41.8°E) [Seifert, 2023a] (Fig. 14). The most southern and northern sites are in Iran at 29.2°N and in Georgia at 41.8°N. Sochi is the most western locality known for the species so far – it is situated 255 km northwest of Adjara in Georgia where the species inhabits the same locality as the previous one.

The bionomics of both species are still poorly known. There is no doubt that both species are native to Krasnodar Region, as they are widely distributed along the southeastern coast of the Black Sea.

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The work was performed using equipment at the shared resource centre of Federal Research Centre

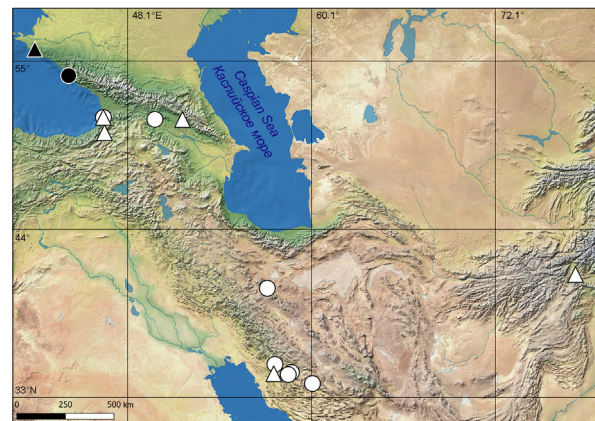


Fig. 14. A distribution map of two *Cardiocondyla* species. White triangles indicate *C. brachycephala* localities, white circles – *C. persiana* localities, black triangle and circle – new locality of species respectively.

Рис. 14. Карта распространения двух видов *Cardiocondyla*. Белые треугольники обозначают местонахождения *C. brachycephala*, белые круги – местонахождения *C. persiana*, черные треугольник и круг – новые местонахождения упомянутых видов соответственно.

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## The first record of *Ficocyba ficaria* (Horváth, 1897) (Hemiptera: Cicadellidae) in Russia

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**Abstract.** *Ficocyba ficaria* (Horváth, 1897) (Hemiptera: Cicadellidae) is recorded for Russia for the first time. The material was collected in 2023–2024 on the Southern Coast of Crimea. This species has Mediterranean origin and is currently widespread in the south of Western Europe. *Ficocyba ficaria* exhibits a trophic association with honeysuckles (*Lonicera* spp.) and fig tree *Ficus carica* with obligatorily change of food plants throughout the year. The current distribution of the species and its harmfulness are discussed.

**Key words:** Hemiptera, Cicadellidae, *Ficocyba ficaria*, first record, *Lonicera*, *Ficus*, Crimea, Russia.

### Первая находка цикадки *Ficocyba ficaria* (Horváth, 1897) (Hemiptera: Cicadellidae) в России

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**Резюме.** Приведены сведения о первой находке в России вида цикадок *Ficocyba ficaria* (Horváth, 1897) (Hemiptera: Cicadellidae). Материал собран в 2023 и 2024 годах на Южном берегу Крыма. Вид имеет средиземноморское происхождение и в настоящее время широко распространен на юге Западной Европы. Трофически *F. ficaria* связан с жимолостями (*Lonicera* spp.) и инжиром *Ficus carica*, при этом для вида характерна обязательная смена кормовых растений в течение года. Обсуждается современный ареал цикадки и степень ее вредоносности.

**Ключевые слова:** Hemiptera, Cicadellidae, *Ficocyba ficaria*, первая находка, *Lonicera*, *Ficus*, Крым, Россия.

*Ficocyba ficaria* (Horváth, 1897) (Hemiptera: Cicadellidae: Typhlocybinae) is a Mediterranean leafhopper species, a representative of the monotypic genus *Ficocyba* Vidano, 1960. The species is trophically associated with honeysuckles (*Lonicera* spp. (Caprifoliaceae)) and fig tree *Ficus carica* (Moraceae) [Vidano, 1960; Quartau et al., 1995]. In 2023, *F. ficaria* was found on the Southern Coast of Crimea, which is the first record in Russia.

Leafhoppers were collected manually and preserved in 96% ethanol. Photographs *in situ* were taken using a Nikon D7200 camera equipped with a Nikon 105mm f/2.8G IF-ED AF-S VR Micro-Nikkor lens and a Raynox DCR-250 converter. Photographs of preserved specimens were taken using an AxioCam ERc5s camera mounted on a Carl Zeiss Stemi 2000-C stereomicroscope, while images of genital structures were taken using a Canon PowerShot A640 camera mounted on a Carl Zeiss Primo Star microscope. Image stacking and post-processing were performed using ZEN 2012 (Blue Edition), Adobe Photoshop CS5, and Adobe Photoshop Lightroom Classic 2020 (v9.2.1.10). Species identification was based on an examination of the male genital structures and a comparison with morphological description provided by Ribaut [1936]. The studied specimens are deposited in the authors' collection.

**Family Cicadellidae Latreille, 1802**  
**Subfamily Typhlocybinae Kirschbaum, 1868**  
**Genus *Ficocyba* Vidano, 1960**  
*Ficocyba ficaria* (Horváth, 1897)  
(Figs 1–11)

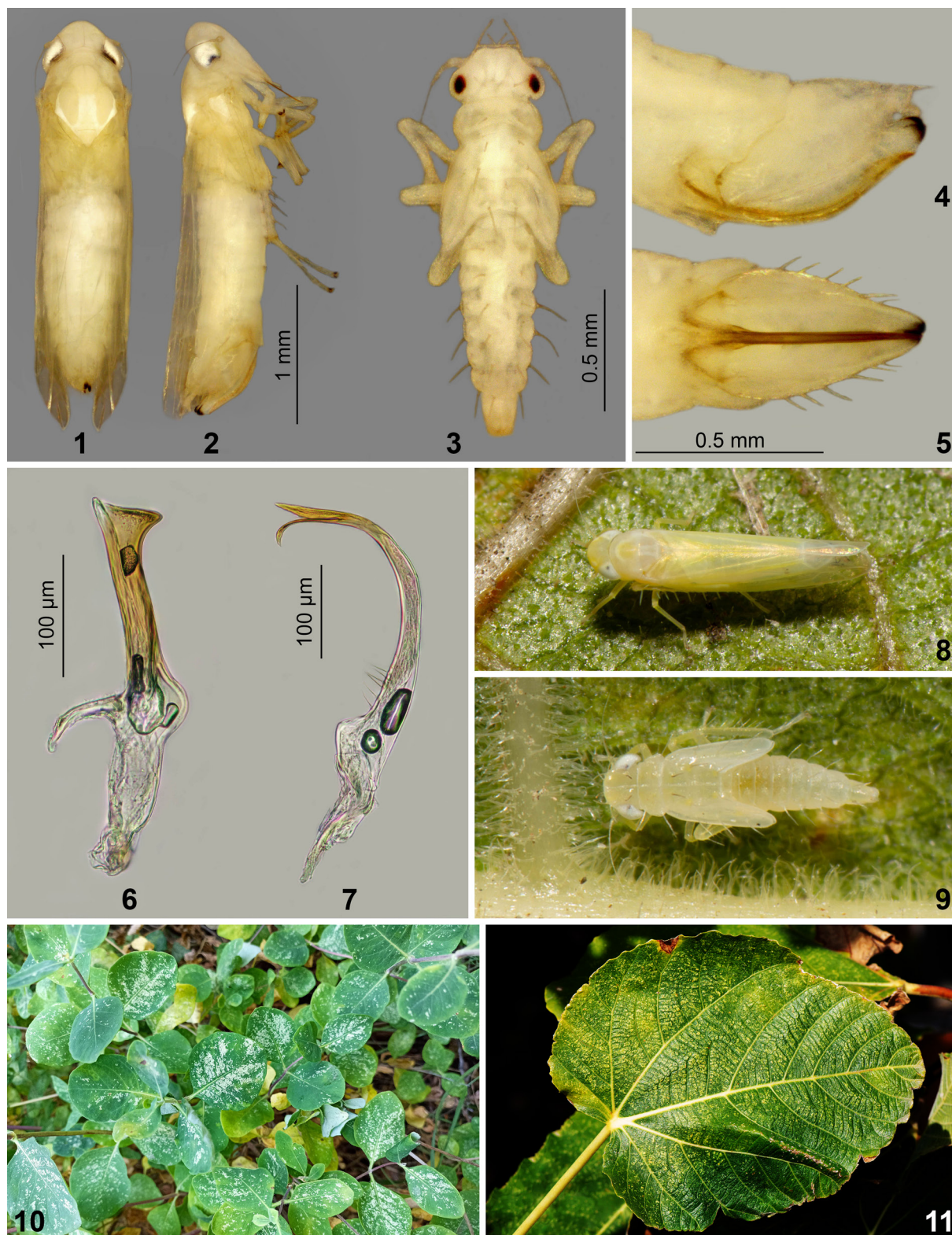
**Material.** Russia, Republic of Crimea: Feodosia urban district: 1♂, 4♀, 1 nymph, Kurortnoe, 44°54'45"N / 35°12'04"E, on leaves of *Lonicera*

*japonica* Thunb., 7.06.2023 (T.V. Nikulina, V.V. Martynov); 20♂, 16♀, 3 nymphs, same place, on leaves of *Lonicera caprifolium* L., 23.05.2024 (T.V. Nikulina, V.V. Martynov); 1♂, 1♀, Koktebel, 44°57'36"N / 35°14'54"E, on leaves of *Ficus carica* L., 3.06.2024 (T.V. Nikulina, V.V. Martynov); Yalta urban district: 5♂, 3♀, Nikita Botanical Garden, 44°50'57"N / 34°23'73"E, on leaves of *Ficus carica* L., 20.10.2024 (A.I. Gubin, T.V. Nikulina).

**Biology.** *Ficocyba ficaria* is a phytophagous and phyllophagous species, exhibiting an obligatory seasonal shift between host plants throughout the year [Vidano, 1960; Quartau et al., 1995]. The spring generation develops on honeysuckles (*Lonicera* spp.), with recorded feeding on the European species *L. caprifolium* (Fig. 10) and *L. implexa*, as well as on the introduced East Asian species *L. japonica* [Vidano, 1960; Moro Arzone et al., 2008]. In late spring to early summer, adult specimens migrate to fig trees *Ficus carica* (Fig. 11), where two generations develop during the summer and autumn. The imagoes of the last generation returns to honeysuckles, where they overwinter in both the egg and adult stages. In Crimea, adult specimens of the spring generation migrate to fig trees in June, with their return to honeysuckles in November. It should be noted that during the autumn migration, adults can also be observed on other plants (*Crataegus*, *Prunus*, *Rubus*, *Quercus*, *Populus*, and *Ulmus*). These plants likely serve as overwintering shelters and may also provide supplementary food sources [Abdul-Nour, 2005; Mazzoni, 2005].

**Notes.** According to our observations, other widespread fig leaf-eating insects also live in Crimea together with *F. ficaria*: *Homotoma ficus* (Linnaeus, 1758) (Hemiptera: Homotomidae) and *Choreutis nemorana* (Hübner, [1799]) (Lepidoptera: Choreutidae). The feeding of *F. ficaria* leads to the formation of light spots on the leaves, imparting a marbled colour (Figs 10, 11). During the spring feeding period on honeysuckles, the intensity of damage





Figs 1–11. *Ficosyba ficaria* and leaf damage.

1–2 – female, habitus: 1 – dorsal view, 2 – lateral view; 3 – nymph, habitus, dorsal view; 4–5 – female genital block: 4 – lateral view, 5 – ventral view; 6 – aedeagus, lateral view; 7 – style, lateral view; 8 – male on the leaf of *Ficus carica*; 9 – nymph on the leaf of *F. carica*; 10 – damage on leaves of *Lonicera caprifolium*; 11 – damage on the leaf of *F. carica*.

Рис. 1–11. *Ficosyba ficaria* и повреждения листьев.

1–2 – самка, внешний вид: 1 – сверху, 2 – сбоку; 3 – нимфа, внешний вид, сверху; 4–5 – генитальный блок самки: 4 – вид сбоку, 5 – вид снизу; 6 – эдеагус, вид сбоку; 7 – стилус, вид сбоку; 8 – самец на листе *Ficus carica*; 9 – нимфа на листе *F. carica*; 10 – повреждения на листьях *Lonicera caprifolium*; 11 – повреждения на листе *F. carica*.

can be substantial, resulting in a significant reduction in the ornamental value of the host plants. To reduce the species harmfulness, the application of systemic insecticides by spraying is recommended, with treatments administered in spring (after leaf emergence) and late autumn. On fig tree the harmfulness of the species is generally less severe and typically does not necessitate pest control measures.

**Distribution.** Mediterranean species, expanding its range in Europe following the spread of its host plants. It has been recorded in Morocco, Portugal, Spain, France, Belgium, Italy, Malta, Switzerland, Germany, Slovenia, Croatia, Hungary, Montenegro, Serbia, Greece, Bulgaria, Israel and Lebanon [Ribaut, 1936, 1952; Vidano, 1960; Linnavuori, 1962; Metcalf, 1968; Günthart, 1971; Nast, 1972, 1987; Dworakowska, 1982; Drosopoulos et al., 1983; della Giustina, 1989; Quartau et al., 1995; Holzinger, Seljak, 2001; Abdul-Nour, 2005; Mazzoni, 2005; Moro Arzone et al., 2008; Mifsud et al., 2012; Vujić, Vesović, 2022; Nickel, 2022; Vanreusel et al., 2025]. In Russia, *F. ficaria* is currently recorded only from the Southern Coast of Crimea.

The data on the current distribution of *F. ficaria* remains incomplete and requires updates. It has been suggested that the natural range of the species coincides with the natural range of fig tree [della Giustina, 1989]. However, *F. ficaria* has not yet been recorded in Asia Minor, which is considered the center of origin of the fig tree. The absence of records from much of the Middle East and the Maghreb is likely attributable to the limited faunistic research conducted in these regions. In Western Europe, *F. ficaria* is known primarily from the Mediterranean, but in recent decades, the species has exhibited a northward expansion, as evidenced by its recent records in Germany (2020) [Nickel, 2022] and Belgium (2024) [Vanreusel et al., 2025]. This expansion is directly related to the increasing use of fig trees and honeysuckles in ornamental landscaping across Western Europe. In addition, the northern boundary of fig tree cultivation is shifting due to global climate change. For example, in Germany, in the northern part of the Upper Rhine Lowland, fig trees have become a common ornamental species in urban and garden landscapes [Nickel, 2022]. Establishing the exact time of *F. ficaria* penetration into Crimea remains challenging. On the territory of the peninsula the fig tree is an archaeophyte, presumed to have been introduced in antiquity. At present, fig tree and honeysuckles are widespread in southern Crimea, occurring both as cultivated plants and as naturalized wild populations. Given these factors, there is a high probability that *F. ficaria* may also be present in Ciscaucasia and along the Black Sea coast of the Caucasus.

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***Teredus opacus* Habelmann, 1854 из Большого Сочи –  
первая находка в России и на Кавказе,  
с заметками о некоторых других представителях  
семейства жуков-тередид (Coleoptera: Terebidae)**

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**Резюме.** На Черноморском побережье Краснодарского края впервые в России обнаружен представитель семейства жуков-тередид (Terebidae) *Teredus opacus* Habelmann, 1854, ранее считавшийся эндемичным для Центральной и Южной Европы и принадлежащий к числу самых редких видов жесткокрылых европейской фауны. Приведена очень старая находка *Teredus cylindricus* (A.G. Olivier, 1790) в Орловской области (Россия), не учтенная в последующих трудах. Рассмотрены экологические особенности этих видов наряду с другими таксонами семейства Terebidae. Даны сведения о еще одном европейском виде семейства – *Oxylaemus cylindricus* (Creutzer in Panzer, 1796), известном по отдельным находкам на Северо-Западном Кавказе. Приведена таблица для определения видов трибы Terebini фауны России.

**Ключевые слова:** Terebidae, *Teredus opacus*, новая находка, экология, Кавказ, Краснодарский край, Россия.

***Teredus opacus* Habelmann, 1854 from Sochi region –  
the first record in Russia and the Caucasus,  
with notes on some other representatives of terebids (Coleoptera: Terebidae)**

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**Abstract.** A representative of the family Terebidae, *Teredus opacus* Habelmann, 1854, has been discovered for the first time in Russia on the Black Sea coast in Krasnodar Region. It was previously considered endemic to Central and Southern Europe and is one of the rarest beetle species in the European fauna. A very old record of *Teredus cylindricus* (A.G. Olivier, 1790) in Oryol Region, Russia, unaccounted for in the subsequent works, is indicated. The ecological features of these species are considered along with other taxa of the Terebidae. Another European species of the family is presented – *Oxylaemus cylindricus* (Creutzer in Panzer, 1796), known from individual records in the North-West Caucasus. A key to species of the tribe Terebini of the fauna of Russia is given.

**Key words:** Terebidae, *Teredus opacus*, new record, ecology, Caucasus, Krasnodar Region, Russia.

## Введение

Немногочисленное по составу семейство Terebidae Seidlitz, 1888 (Coleoptera: Coccinelloidea) в этом ранге было установлено сравнительно недавно [Robertson et al., 2015]. Ранее его представители рассматривались большинством авторов в составе семейства Colydiidae Billberg, 1820 (ныне подсемейство в Zopheridae sensu Ślipiński and Lawrence [1999]) [Erichson, 1845; Lacordaire, 1854; LeConte, 1861; Gemminger, Harold, 1868; Horn, 1878; Reitter, 1882, 1911; LeConte, Horn, 1883; Sharp, 1885, 1894, 1895; Seidlitz, 1887–1891; Ganglbauer, 1899; Grouvelle, 1908, 1910; Hetschko, 1930; Heinze, 1943; Pope, 1961; Horion, 1961; Крыжановский, 1965; Dajoz, 1977, 1980; Ślipiński, 1982; Ślipiński, Pal, 1985], а затем в семействе Bothrididae Erichson, 1845 [Lawrence, 1985, 1991; Pal, Lawrence, 1986; Stephan, 1989; Ślipiński, Pakaluk, 1991; Lawrence, Newton, 1995; Philips, Ivie, 2002; Ślipiński, 2007; Robertson et al., 2008; Ślipiński et al., 2010; Bouchard et al., 2011; Lawrence et al., 2011; Lord, McHugh, 2013; Alekseev, 2015].

Семейство Terebidae включает три подсемейства: Terebinae Seidlitz, 1888, Anommatae Ganglbauer, 1899 и Xylariophilinae Pal et Lawrence, 1986 [Robertson et al., 2015; Alekseev et al., 2021]. Подсемейство Terebinae делится на три трибы: Sysolini Ślipiński et Pal, 1985 (с единственным родом *Sysolus* Grouvelle, 1908), Sositylopsini Dajoz, 1980 (с одним родом *Sositylopsis* Grouvelle, 1910) и Terebini Seidlitz, 1888 (с пятью родами – *Teredus* Dejean, 1835, *Oxylaemus* Erichson, 1835, *Teredolaemus* Sharp, 1885, *Teredomorphus* Heinze, 1943 и *Rustleria* Stephan, 1989) [Ślipiński et al., 2010; Alekseev et al., 2021]. Кроме того, в трибе Terebini был описан ископаемый род *Delteredolaemus* Li et Cai in Li, Huang et Cai, 2022 с одним видом из мелового бирманского янтаря [Li et al., 2022].

Ареал представителей Terebinae охватывает все континенты, за исключением Антарктиды и Южной Америки [Ślipiński et al. 2010; Alekseev et al., 2021]. В Палеарктике известно три рода – *Teredus*, *Oxylaemus* и *Teredolaemus* [Ślipiński, 2007]. *Oxylaemus* населяет также Неарктику, а наиболее богатый видами (в пределах

подсемейства) *Teredolaetus* широко распространен в тропиках и субтропиках Старого Света и проникает в Восточную Австралию, на юге достигая Тасмании [Pope, 1961; Lawrence, 1985; Zhou et al., 2017; Alekseev et al., 2021].

## Материал и методы

Приведенный материал хранится в коллекциях Зоологического института РАН (ЗИН, Санкт-Петербург, Россия), Научно-исследовательского Зоологического музея Московского государственного университета им. М.В. Ломоносова (ЗММУ, Москва, Россия), Московского педагогического государственного университета (МПГУ, Москва, Россия) и в коллекции автора (АМ). В работе также использованы высококачественные фотографии трех экземпляров *Teredus cylindricus*, хранящихся в Музее естественной истории в Лондоне (NHM, Natural History Museum, Великобритания).

Для сбора материала использовались оконные ловушки. Каждая из них (рис. 7–9) представляла собой прочную деревянную конструкцию, на боковых кронштейнах которой вертикально крепился стеклянный прозрачный экран (примерно 80 × 40 × 0.4 см) с горизонтальным широким навесом над ним, а под экраном в коробе размещалась пластиковая емкость прямоугольной формы (примерным объемом 10–11 л), наполняемая 9%-м водным раствором уксусной кислоты с добавлением поваренной соли для фиксации и сохранения попавших в ловушку жуков и других беспозвоночных. Выборка накопившегося в ловушках материала осуществлялась с помощью мелкого сита и ткани, через которые тщательно процеживалось содержимое ловушек.

## Результаты и обсуждение

Род *Teredus* до недавнего времени включал только два европейских вида – *T. cylindricus* (A.G. Olivier, 1790) и *T. opacus* Habelmann, 1854, – первый из которых отмечен также в Северной Африке [Ślipiński, 2007; Ślipiński et al., 2010]. Несколько лет назад был описан вид из Китая (Шэньси) [Liu et al., 2021].

Распространение обоих европейских видов *Teredus* до сих пор изучено далеко не достаточно. В некоторых регионах они обнаружены лишь в первом десятилетии этого века, например в Венгрии [Merkel, Németh, 2008], или даже совсем недавно – на Украине (Ужгород) [Мателешко, 2018]. До настоящего времени последнее местонахождение *T. cylindricus* и *T. opacus* и отдельные места находок второго вида в румынских Карпатах [Pawłowski, 2003] считались одними из самых восточных в Европе, а Восточные Карпаты указывались как восточная и юго-восточная граница ареала рода *Teredus* в западной части Палеарктики. На северо-востоке область распространения рода *Teredus* в Европе простирается до Литвы, откуда известны находки *T. cylindricus* [Tamutis et al., 2011].

В 2022–2023 годах *Teredus opacus* был обнаружен нами в окрестностях села Мамедова Щель Лазарев-

ского района города-курорта Сочи. Таким образом, *Teredus opacus* впервые указывается для фауны России и Кавказа.

Кроме того, совсем недавно выяснилось, что *Teredus cylindricus* уже более 100 лет назад был обнаружен в России на территории Орловской области [Беляев, 1923], но эти данные не были учтены в последующих специальных публикациях по роду *Teredus* и в других литературных источниках.

Наша находка *Teredus opacus* в Краснодарском крае и старая находка *Teredus cylindricus* в Орловской области существенно расширяют ареал рода *Teredus* в Западной Палеарктике.

В настоящее время можно констатировать, что род *Teredus* имеет амфипалеарктический ареал, который характеризуется сильной дизъюнкцией, а на Кавказе, скорее всего, – изолированный фрагмент ареала.

*Teredus opacus* Habelmann, 1854

(Рис. 1–6, 10–14, 16, 17)

Habelmann, 1854: 29 (типовое местонахождение: «Pommerschen Badeort Misdroy auf der Insel Wollin», ныне Мендзыздрое (Międzyzdroje), Польша).

**Материал.** Россия. 1♀ (АМ) (рис. 13, 14, 16, 17), Краснодарский кр., Сочи, Лазаревское, окр. с. Мамедова Щель, Ю склон долины р. Куапсе, 43°57'38.8"N / 39°18'52.2"E, 147 м, широколиственный лес, оконная ловушка, 28.07–3.08.2022; 1♀ (МПГУ) (рис. 11, 12), там же, 17.06–30.07.2023; 1♀ (МПГУ), 1♀ (АМ), там же, 30.07–2.09.2023; 4♀ (АМ), 2♀ (ЗИН), 2♀ (ЗММУ), там же, 43°57'39.5"N / 39°18'54.5"E, 149 м, 17.06–30.07.2023; 1♂ (АМ) (рис. 1–6), там же, 43°57'38.3"N / 39°18'54.4"E, 138 м, 30.07–2.09.2023. Все 13 экземпляров – А.И. Мирошников, Т.П. Мирошникова.

Венгрия. 1 экз. (фотография) (рис. 10), Hungary, Pest county, Valkó, Szent-Pál-hegy, at night from dead oak, 9.05.2014 (A. Kotán, T. Németh, V. Szénási).

**Экология.** По данным некоторых исследователей [Franc, 2005; Potocký, 2015], является одним из самых редких видов жесткокрылых Европы. *Teredus opacus* повсеместно обнаруживается, как правило, лишь в единичных экземплярах ([Burakowski et al., 1986; Merkel, Németh, 2008; Majzlan, 2011; Potocký, 2015; Мателешко, 2018; Kavka, Veverka, 2018]; Тамаш Немет (Tamás Németh), личное сообщение).

Жуки наблюдаются на стволах отмерших деревьев, преимущественно дубов, в основном в ночное время с начала мая по август включительно ([Merkel, Németh, 2008; Kavka, Veverka, 2018]; Тамаш Немет (Tamás Németh), личное сообщение). Имаго обнаруживаются в ходах короедов (Curculionidae: Scolytinae) *Xyleborus monographus* (Fabricius, 1792) [Burakowski et al., 1986], *Dryocoetes villosus* (Fabricius, 1792), *Xyleborus dryographus* (Ratzeburg, 1837) [Möller, 2009] и точильщиков (Ptinidae) [Мателешко, 2018], а также в отмершей древесине, заселенной муравьями *Lasius brunneus* (Latreille, 1798) (Formicidae) [Möller, 2009]. Кроме различных видов дуба, *T. opacus* встречается также на буке [Burakowski et al., 1986].

Нами обнаружен в дубово-грабовом лесу на территории Лазаревского участкового лесничества (квартал 40, выдел 34) Сочинского национального парка. По материалам лесоустройства (2016 года), насаждение характеризуется следующими показателями (формула состава древостоя, древесные породы и возраст):



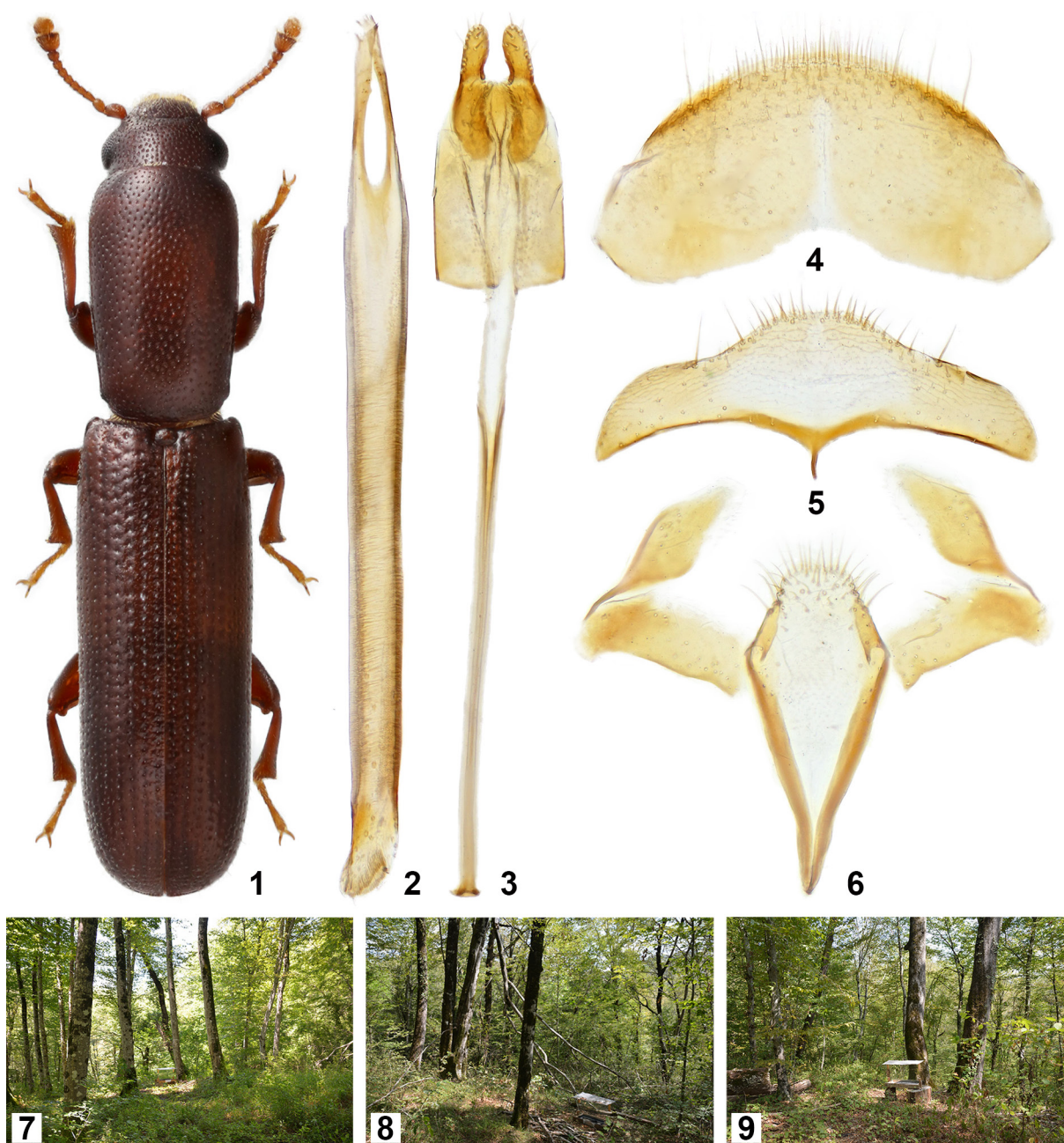


Рис. 1–9. *Teredus opacus*, самец, и местообитания популяции в окрестностях села Мамедова Шель, Краснодарский край, Россия.  
1 – имаго; 2 – пенис, вид сверху; 3 – тегмен, вид сверху; 4 – 8-й тергит, вид сверху; 5 – 8-й стернит, вид сверху; 6 – 9-й сегмент, вид сверху; 7–8 – участки леса из граба обыкновенного *Carpinus betulus* и оконные ловушки; 9 – участок леса с сильным преобладанием дуба иберийского *Quercus iberica* и оконная ловушка.

Figs 1–9. *Teredus opacus*, male, and habitats of the population in the vicinity of the Mamedova Shchel' village, Krasnodar Region, Russia.

1 – imago; 2 – penis, dorsal view; 3 – tegmen, dorsal view; 4 – tergite 8, dorsal view; 5 – sternite 8, dorsal view; 6 – segment 9, dorsal view; 7–8 – forest areas of *Carpinus betulus* and window traps; 9 – a forest area with a strong predominance of *Quercus iberica* and a window trap.

7ГЗДИП + ЯО; Г – граб обыкновенный *Carpinus betulus*, 70 лет, ДИП – дуб иберийский *Quercus iberica* порослевой, 150 лет, ЯО – ясень обыкновенный *Fraxinus excelsior*, 130 лет; в подлеске в основном лещина обыкновенная *Corylus avellana* и кизил обыкновенный *Cornus mas*. Оконные ловушки, с помощью которых собраны жуки, были размещены на трех достаточно удаленных друг от друга участках леса: по одной ловушке в двух куртинах с наличием только деревьев

граба (рис. 7, 8) и одна ловушка в куртине с сильным преобладанием дуба (рис. 9). Жуки наблюдались во всех трех ловушках в период с 17 июня по 2 сентября, хотя в 2023 году ловушки были установлены 18 апреля и до 17 июня материал извлекался из них дважды.

Вместе с *Teredus opacus* в оконных ловушках были обнаружены следующие виды ксилофильные жесткокрылых: *Trigonurus asiaticus* Reiche, 1866 (Staphylinidae), *Ptinus* spp. (2 вида) (Ptinidae), *Lymexylon*





Рис. 10. *Teredus opacus* на стволе отмершего дуба (окрестности Будапешта, Венгрия). Фотография Т. Немета.

Fig. 10. *Teredus opacus* on the trunk of a dead oak (Budapest environs, Hungary). Photograph by T. Németh.

*navale* (Linnaeus, 1758) (Lymexylidae), *Nemozoma elongatum* (Linnaeus, 1761), *Thymalus aubei* Léveillé, 1877 (Trogossitidae), *Pediacus dermestoides* (Fabricius, 1792) (Cucujidae), *Silvanus bidentatus* (Fabricius, 1792), *Ulleiota planata* (Linnaeus, 1761) (Silvanidae), *Cryptolestes duplicatus* (Waltl, 1839) (Laemophloeidae), *Dacne pontica* (Bedel, 1868), *Pseudotritoma valida* (Reitter, 1884), *Triplax lepida* (Faldermann, 1837), *Tritoma bipustulata* Fabricius, 1775, *Tritoma octonotata* (Bedel, 1874) (Erotylidae), *Sphindus dubius* (Gyllenhal, 1808) (Sphindidae), *Endomychus armeniacus* Motschulsky, 1835, *Mycetina apicalis* (Motschulsky, 1835) (Endomychidae), *Prostomis mandibularis* (Fabricius, 1801) (Prostomidae), *Mycetophagus quadripustulatus* (Linnaeus, 1761) (Mycetophagidae), *Orchesia undulata* Kraatz, 1853 (Melandryidae), *Salpingus caucasicus* Reitter, 1905 (Salpingidae), *Bitoma crenata* (Fabricius, 1775), *Colydium elongatum* (Fabricius, 1787), *Dechomus sulcicollis* (Geramar, 1824) (Zopheridae), *Corticeus unicolor* Piller et Mitterpacher, 1783 (Tenebrionidae), *Anaesthetis testacea rufescens* Baeckmann, 1903, *Drymochares starcki* Ganglbauer, 1888, *Leiopus nebulosus caucasicus* (Ganglbauer, 1887), *Mesosa nebulosa* (Fabricius, 1781), *Parmena pontocircassica* Danilevsky et Miroshnikov, 1985, *Parmenopsis caucasica* (Leder, 1879), *Rutpela maculata* (Poda von Neuhaus, 1761), *Stenostola ferrea maculipennis* Holzschuh, 1982, *Xylotrechus arvicola* (Olivier, 1795) (Cerambycidae), *Dissoleucas niveirostris* (Fabricius, 1798), *Platystomos albinus* (Linnaeus, 1758) (Anthribidae), *Scolytus carpini* (Ratzeburg, 1837), *Xyleborus monographus* (Fabricius, 1792) (Curculionidae, Scolytinae), *Platypus cylindrus* (Fabricius, 1792) (Curculionidae, Platypodinae) и целый ряд других, еще не идентифицированных, видов преимущественно из семейств Cerylonidae, Eucnemidae, Latridiidae, Ptinidae, Throscidae, подсемейства Scolytinae (Curculionidae).

**Морфологические признаки.** Длина собранных нами жуков 3.5–4.3 мм (в литературе указывается до 4 мм). Окраска тела несколько изменчива, от красновато-бурой до темно-бурой с красноватым оттенком; лапки и усики более светлые, чем тело. Крыло и гениталии самца и самки как на рисунках 2–6, 16, 17. Некоторые признаки даны в определительной таблице

ниже. Явные внешние отличия самца и самки нами не замечены, лишь надкрылья самки выглядят едва более узкими по сравнению с самцом.

**Созология.** *Teredus opacus* включен в Красные списки видов как отдельных стран, например Австрии [Geiser, 1994], Италии [Carpaneto et al., 2015], Польши [Pawłowski et al., 2002], Словакии [Holecová, Franc, 2001], Чехии [Vávra, 2017], так и некоторых крупных природных регионов, в частности Карпат [Pawłowski, 2003], а также включен в список «зонтичных» видов («umbrella species») для охраны сохранившихся участков первобытных лесов Центральной Европы [Eckelt et al., 2017].

Принимая во внимание повсеместную редкость *Teredus opacus* и его высокую созологическую значимость, рассмотренные выше, мы предлагаем включить этот вид в очередное (четвертое) издание Красной книги Краснодарского края, определив его охранный статус в процессе дальнейшего изучения в региональных условиях.

**Распространение.** Вид спорадично распространен в Центральной и Южной Европе и до настоящего времени был известен из Португалии, Германии, Чехии, Австрии, Словакии, Италии, Хорватии, Румынии, Греции [Ślipiński, 2007], Польши [Habelmann, 1854 (типичное местонахождение); Burakowski et al., 1986; Pawłowski et al., 2002; Pawłowski, 2003; Masiota-Tomaszewska et al., 2020], Венгрии [Merkl, Németh, 2008], Швейцарии [Sanchez et al., 2016] и с крайнего запада Украины [Мателешко, 2018]. Впервые приводится для фауны России и Кавказа.

#### *Teredus cylindricus* (A.G. Olivier, 1790)

(Рис. 18–20)

Olivier, 1790: «N<sup>o</sup>. 18. *Ips*»: 9 (типичное местонахождение: «environs de Paris», окрестности Парижа, Франция).

**Материал.** Италия. 1 экз. (фотография) (NHM) (рис. 18), «Aritzu, Sardinia, G.C.C.», «G.C. Champion, B.M. 1927–409», «NHMUK014663293».

Великобритания. 1 ♀ (фотография) (NHM) (рис. 19), «Windsor Gt Park, Berks SU974727, D.A. Lott, 27.7.1985», «*Teredus cylindricus* (Olivier) det. D.A. Lott, 1985», «D.A. Lott Bequest BMNH(E) 2011–133», «NHMUK014663294»; 1 ♀ (фотография) (NHM) (рис. 20), «UK: Berks, Silwood Park [SU 9468], 16.V.1997, R.G. Booth», «*Teredus cylindricus* (Oliv.) det. R.G. Booth, 1997», «NHMUK014663295».

**Экология.** По сведениям различных авторов [Welch, 1987; Van Meer, 1999; Brustel et al., 2004; *Teredus...*, 2025], имаго *T. cylindricus*, в отличие от предыдущего вида, иногда встречаются большими группами (колониями) под корой отмерших деревьев и местами довольно обычны. Кроме того, известны случаи сбора большого количества экземпляров как на стволах сухостойных дубов [Holzer, 2004], так и ловушками Барбера, установленными рядом со старыми отмирающими дубами [Burgers, 2021]. Вместе с тем некоторые исследователи указывают на очень редкую встречаемость вида в отдельных странах, например в Германии [Köhler, 1992; Skale, Hofmann, 2005], в Польше [Gawroński, Oleksa, 2007].

Жуки обнаруживаются в ходах точильщиков *Ptilinus pectinicornis* (Linnaeus, 1758), *Xestobium rufovillosum* (DeGeer, 1774), *Anobium punctatum* (DeGeer, 1774) (Ptinidae), короеда *Dryocoetes villosus*

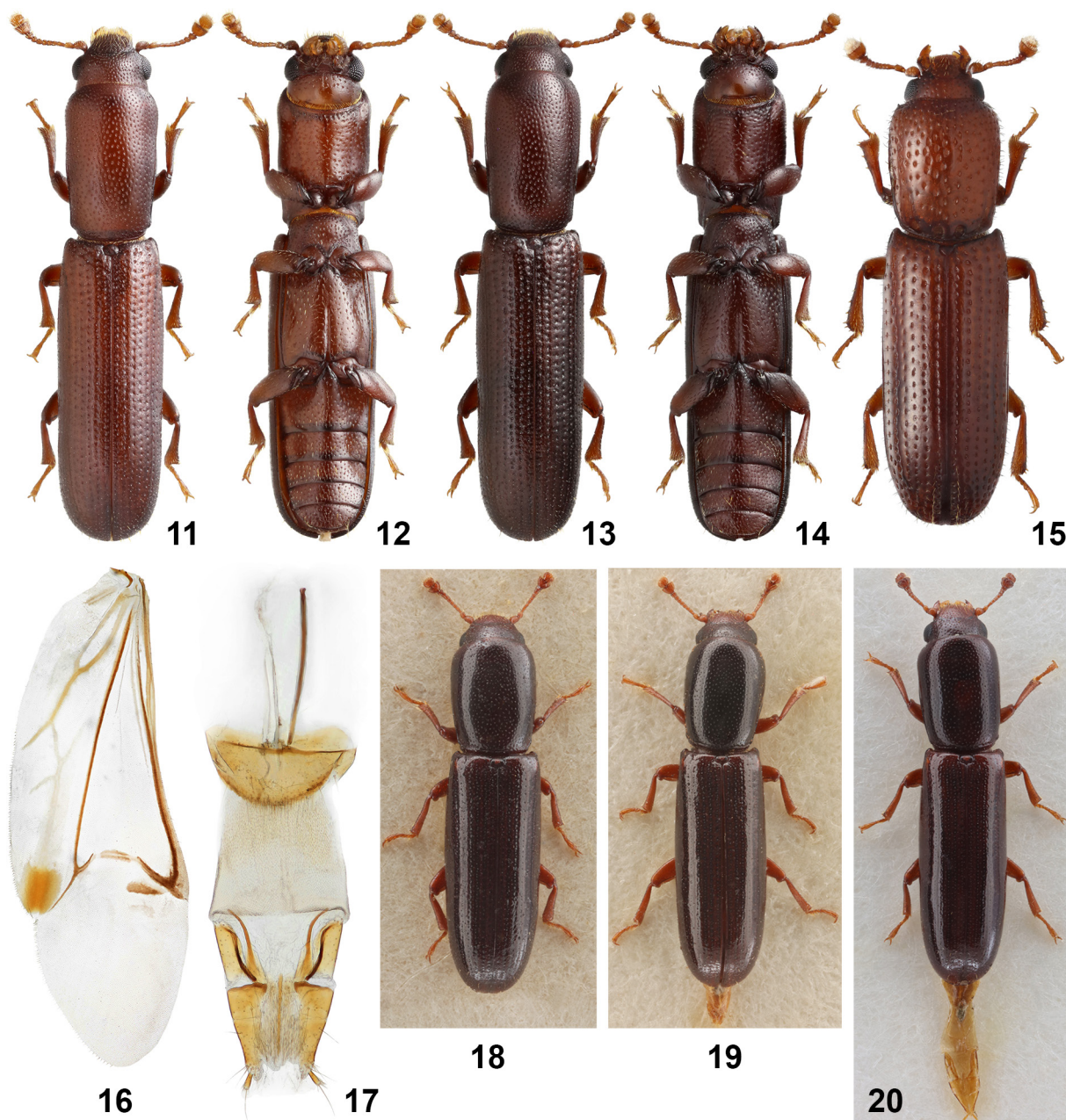


Рис. 11–20. Представители трибы Tereidini, общий вид и детали строения.

11–14, 16–17 – *Tereidus opacus*, самки (окрестности села Мамедова Щель, Краснодарский край, Россия): 11–14 – общий вид сверху и снизу, 16 – крыло сверху, 17 – 8-й сегмент и яйцеклад сверху; 15 – *Oxylaemus cylindricus* (окрестности Горячего Ключа, Краснодарский край, Россия), по [Макаров, 2024]; 18–20 – *Tereidus cylindricus* (фотографии Д. Тельнова и К. Голуб-Янг): 18 – экзemplяр из Италии, 19–20 – самки из Великобритании.

Figs 11–20. Representatives of the tribe Tereidini, habitus and details of struture.

11–14, 16–17 – *Tereidus opacus*, females (vicinity of the Mamedova Shchel' village, Krasnodar Region, Russia): 11–14 – habitus, dorsal and ventral view, 16 – wing, dorsal view, 17 – segment 8 and ovipositor, dorsal view; 15 – *Oxylaemus cylindricus* (Goryachiy Klyuch environs, Krasnodar Region, Russia), after [Makarov, 2024]; 18–20 – *Tereidus cylindricus* (photographs by D. Telnov and K. Holub-Young): 18 – specimen from Italy, 19–20 – females from the United Kingdom.

(Curculionidae: Scolytinae), дровосека *Callidium aeneum* (DeGeer, 1774) (= *Callidium variabile* Fabricius, 1775) (Cerambycidae) в древесине и под корой отмерших деревьев широколиственных пород, в частности дуба, бука и каштана съедобного [Horion, 1961; Dajoz, 1977; Burakowski et al., 1986], наблюдаются в основном в ночное время ([Welch, 1987; Holzer, 2004; Merkl, Németh, 2008; Alexander, 2011]; Тамаш Немет (Tamás

Németh), личное сообщение) и встречаются практически круглый год [Dajoz, 1977; Pendleton, Pendleton, 2024; *Tereidus...*, 2025]. Известны находки имаго на плодовых телах трутовых грибов [Alexander, 2011]. Кроме того, подобно предыдущему виду, жуки отмечены в отмершей древесине, заселенной муравьями *Lasius brunneus* [Welch, 1987; Alexander, 2002; Möller, 2009]. Помимо указанных выше лиственных пород, *T. cylindricus*



встречается также на ясене [Galsworthy, Booth, 2007], клене и ольхе [EUROPARC-España, 2017].

Развитие и образ жизни личинок *T. cylindricus* наряду с другими представителями семейства Teredidae обсуждаются ниже.

**Созология.** *Teredus cylindricus*, как и *T. opacus*, включен в Красные списки видов целого ряда стран, в частности Австрии [Geiser, 1994], Италии [Carpaneto et al., 2015], Польши [Pawłowski et al., 2002], Чехии [Vávra, 2017], отдельных регионов тех или иных государств, например Франции [Dodelin, Calmont, 2021], а также в список «зонтичных» видов («umbrella species») для охраны сохранившихся участков первобытных лесов Центральной Европы [Eckelt et al., 2017]. Кроме того, *T. cylindricus* занесен в Красные книги некоторых стран, например Великобритании [Welch, 1987].

**Замечания.** На сведения вековой давности о находке *Teredus cylindricus* в России [Беляев, 1923] обратил наше внимание А.В. Ковалев (Всероссийский институт защиты растений, Пушкин, Санкт-Петербург, Россия). В упомянутой публикации отмечено, что материал собран в Кромах Орловской губернии в саду (на «липком кольце, 4.IV»). Год сборов не указан в работе, но, судя по некоторым заметкам ее автора, это, скорее всего, 1914–1915 годы. Под садом, очевидно, имелись в виду фруктовые деревья, которые до сих пор не отмечались в литературе в качестве древесных пород, расселяемых рассматриваемым видом.

Обсуждаемая старая находка *T. cylindricus* в России оказалась неучтенной как в отечественной специальной литературе, в том числе в «Определителе жуков» [Якобсон, 1931], охватывающем европейскую часть СССР, в «Определителе насекомых европейской части СССР» [Крыжановский, 1965], так и в зарубежных изданиях, в частности в последнем каталоге жесткокрылых Палеарктики [Ślipiński, 2007].

**Распространение.** Вид весьма широко распространен преимущественно в западной части Европы, проникает в Северную Африку и в настоящее время известен из Великобритании, Португалии, Испании, Франции, Бельгии, Германии, Швейцарии, Чехии, Австрии, Италии, Хорватии, Сербии, Черногории, Алжира, Туниса [Ślipiński, 2007], Венгрии [Merkel, Németh, 2008], Нидерландов [Vorst, 2010; Burgers, 2021], Литвы [Tamutis et al., 2011], Польши [Łomnicki, 1913; Burakowski et al., 1986; Pawłowski et al., 2002; Gawroński, Oleksa, 2007], Словакии [Majzlan, 2011], с крайнего запада Украины [Мателешко, 2018]. Отмечен также в России на территории Орловской области [Беляев, 1923].

С Северо-Западного Кавказа и из горного Крыма известен еще один европейский представитель трибы Teredini – *Oxylaemus cylindricus* (Creutzer in Panzer, 1796), информация о котором приведена ниже.

*Oxylaemus cylindricus* (Creutzer in Panzer, 1796)  
(Рис. 15)

Creutzer in Panzer, 1796: 18 (*Lyctus*) (типичное местонахождение: «Neuwaldegg», Нойвальдегг, ныне один из районов Вены, Австрия).

**Экология.** Повсеместно редок [Крыжановский, 1965; Burakowski et al., 1986; Никитский, Бибин, 2010; Stefanelli et al., 2014; Valladares et al., 2016]. По крайней мере, нам не известны данные о находках многочисленных популяций. Отмечен на отмерших деревьях дуба в ходах короеда *Xyleborus monographus* [Horion, 1961; Dajoz, 1977; Burakowski et al., 1986; Дрогваленко, 2002; Никитский и др., 2008; Никитский, Бибин, 2010]. Как и у видов рода *Teredus*, особенности развития достоверно не известны, несмотря на указания о хищном образе жизни [Dajoz, 1977; Burakowski et al., 1986; Никитский и др., 2008; Никитский, Бибин, 2010; Viñolas et al., 2012; Valladares et al., 2016 и др.]. Наиболее реалистичными представляются сведения о том, что *O. cylindricus* живет как комменсал в поселениях некоторых короедов (Curculionidae: Scolytinae), ходы которых выстланы амброзийными (амброзиальными) грибами [Hůrka, 2005; Stefanelli et al., 2014], а при этом, очевидно, имеет в виду и питание этими грибами. Предположение о развитии за счет амброзийных грибов высказывалось также ранее [Дрогваленко, 2002].

**Созология.** *Oxylaemus cylindricus*, как и представители рода *Teredus*, включен в Красные списки видов целого ряда стран, например Польши [Pawłowski et al., 2002], Чехии [Vávra, 2017], Словакии [Holecová, Franc, 2001], Австрии [Geiser, 1994], Италии [Carpaneto et al., 2015], отдельных регионов тех или иных государств, в частности Франции [Dodelin, Calmont, 2021].

**Распространение.** Вид довольно широко, но спорадично распространен преимущественно в западной части Европы [Ślipiński, 2007], на северо-западе проникая на Британские острова [Alexander, 2011; Telfer, 2011]. В России отмечен на Северо-Западном Кавказе в окрестностях станицы Убинской Северского района и на хребте Пшаф в окрестностях Горячего Ключа в Краснодарском крае [Никитский и др., 2008; Макаров, 2024] и в низкогорьях Республики Адыгея [Никитский, Бибин, 2010], а в Крыму – на горном массиве Агармыш [Дрогваленко, 2002].

Для идентификации видов трибы Teredini, известных из России, предлагается следующая таблица.

#### Таблица для определения видов трибы Teredini фауны России

1. Последний членик усиков отчетливо отделен от предыдущего, так что булава усиков явственно 2-члениковая; наружный край всех голеней лишь со шпорами на самой вершине; верх без явно грубой пунктировки, переднеспинка без ямок и вдавлений в основании; передние тазиковые впадины сзади закрыты ..... 2
- Последние 2 членика усиков тесно соединены, так что булава усиков выглядит 1-члениковой; наружный край передних и средних голеней в вершинной половине с несколькими шипами, наружный край задних голеней перед вершиной по меньшей мере с 2 шипами; верх в грубой и очень грубой пунктировке, переднеспинка в основании с двумя большими ямками в срединной части и продольными



- вдавлениями по сторонам; передние тазиковые впадины сзади открыты ..... *Oxytaemus cylindricus*
2. Переднеспинка в длину примерно вдвое больше, чем в ширину перед основанием; верх тела с более слабым матовым блеском; пунктировка надкрылий отчетливая, грубоватая, но не глубокая, довольно однородная; верх тела темно-бурый с красноватым оттенком или светлее, черным не бывает ..... *Teredus opacus*
- Переднеспинка в длину примерно в 1.5 раза больше, чем в ширину перед основанием; верх тела с более сильным блеском; пунктировка надкрылий мелкая, несколько неоднородная, отчасти неясная; по крайней мере переднеспинка черная или буро-черная, очень часто и надкрылья целиком или почти целиком такой же окраски ..... *Teredus cylindricus*

Данные об образе жизни и развитии личинок *Teredus*, как и в целом представителей семейства Teredidae, крайне скудны и отчасти противоречивы. В отдельных публикациях отмечено, что личинки *Teredus* живут в ходах некоторых жуков-ксилофагов [Lawrence, 1991] или имаго и предполагаемые личинки *Teredus* были собраны в ходах различных жуков-ксилофагов [Ślipiński et al., 2010; Hinson, Buss, 2014], но при этом во всех случаях даны ссылки на работу Хориона [Horion, 1961] как на первоисточник. Однако в указанной публикации нет никаких сведений о личинках (предполагаемых личинках) *Teredus*, а лишь приведена, как отмечено выше, информация о находках имаго *T. cylindricus* в ходах точильщиков *Ptilinus pectinicornis*, *Xestobium rufovillosum* (Ptinidae) и короеда *Dryocoetes villosus* (Curculionidae: Scolytinae) в древесине и под корой отмерших деревьев широколиственных пород, в частности дуба, бука и каштана съедобного. Мы обсудили этот вопрос в личной переписке (от 4.09.2024) с Адамом Шлипинским (Dr S.A. Ślipiński, Australian National Insect Collection, Канберра, Австралия), который отметил, что, по-видимому, личинки *Teredus* впервые упоминаются Бураковским с соавторами [Burakowski et al., 1986]. В этой публикации указано, что личинки *T. cylindricus* ведут хищный образ жизни в ходах точильщиков *Ptilinus pectinicornis*, *Anobium punctatum*, *Xestobium rufovillosum* и, кроме того, в ходах личинок короеда *Dryocoetes villosus*, а *T. opacus* встречается под корой деревьев дуба и бука, заселенных личинками короеда *Xyleborus monographus* [Burakowski et al., 1986: «Larwy [*T. cylindricus*] prowadzą drapieżny sposób życia w chodnikach kołatków: ...poza tym w chodnikach larw kornika», «[*T. opacus*] znajdowany pod korą dębów i buków w chodnikach larw rozwiertka większego»]. *Teredus cylindricus* и (или) *T. opacus* в качестве хищников или вероятных хищников (без упоминания стадий развития) отмечены в целом ряде других работ [Dajoz, 1977; Koch, 1989; Alexander, 2002, 2011; Brustel et al., 2004; Brustel, 2005; Horák, Nakládal, 2009; Majzlan, 2011; Carpaneto et al., 2015]. В отдельных трудах (в частности, [Мателешко, 2018]), напротив, указано, что личинки *Teredus* питаются мицелием грибов, обитая в ходах жуков-ксилофагов (Ptinidae, Cerambycidae, Curculionidae) под корой от-

мерших лиственных деревьев. Однако ни в одной из упомянутых работ нет прямых доказательств того или иного образа жизни личинок, а конкретные находки самих личинок *Teredus* до сих пор не известны.

В некоторых современных публикациях, специально посвященных представителям семейств Teredidae и Bothrididae и отчасти упомянутых выше, предполагается [Ślipiński et al., 2010; Liu et al., 2021] или утверждается [Lord, McHugh, 2013; Zhou et al., 2017; Alekseev et al., 2021], что личинки Teredinae в целом являются микофагами-комменсалами. Они обитают в ходах жуков-ксилофагов из семейств Curculionidae (Platypodinae и Scolytinae), Ptinidae и Cerambycidae и не устраивают коконы при окукливании [Ślipiński et al., 2010; Alekseev et al., 2021]. Личинки Xylariophilinae также характеризуются как свободноживущие микофаги [Ślipiński et al., 2010; Lord, McHugh, 2013]. Все эти данные фактически основаны на результатах довольно давних исследований Лоуренса [Lawrence, 1985] и Пала и Лоуренса [Pal, Lawrence, 1986] с учетом известных сведений о находках имаго тех или иных представителей рассматриваемой группы в ходах различных жуков-ксилофагов. Лоуренс [Lawrence, 1985] изучил несколько личинок, куколку и серию имаго австралийского *Teredolaemus leai* (Grouvelle, 1908), обнаруженных их сборщиком (Н. Elliot) в отрубках (срезах) миртового бука (тасманийского мирта) *Nothofagus cunninghamii*, заселенных *Platypus subgranosus* Schedl, 1936 (Platypodidae) и взятых в долине Арве в Тасмании. Этот автор [Lawrence, 1985], делая свои (приведенные ниже) выводы, использовал данные Хинтона [Hinton, 1941], который описал по большой серии имаго новый вид рода *Teredolaemus* из Новой Британии (ныне часть Папуа – Новой Гвинеи) – *T. pilosus*, выведенный из ствола дерева какао *Theobroma cacao* вместе с жуками семейства короедов (Scolytidae). При этом Хинтон [Hinton, 1941] исследовал содержимое кишечника двух жуков *T. pilosus* и обнаружил только частицы грибов, а именно фрагменты гиф и большое количество спор. Учитывая эти данные, Лоуренс [Lawrence, 1985] заключил, что личинки видов *Teredolaemus*, вероятно, питаются амброзийными (амброзиевыми) грибами, выстилающими ходы Platypodidae и некоторых Scolytidae, хотя у изученных им личинок *T. leai* в кишечнике не было обнаружено никакого содержимого, в том числе указывающего на грибы. Вместе с тем Пал и Лоуренс [Pal, Lawrence, 1986], описывая новое подсемейство Xylariophilinae, новый род *Xylariophilus* и три новых вида этого рода (два из Австралии и один из Индии), представили наблюдения (судя по всему, Лоуренса) за поведением жуков и предполагаемой личинки одного из видов, а именно австралийского *X. honoratus* Pal et Lawrence, 1986. Имаго этого вида обнаружены ночью питающимися на поверхности сумчатых грибов *Huroxylon cyclopicum*, *H. jecorinum*, *Kretzschmaria cetrarioides*, *Xylaria anisopleura* (Ascomycetes, Xylariaceae), а его предполагаемая личинка была замечена во время питания на *Huroxylon cyclopicum*. Упомянутые авторы [Pal, Lawrence, 1986], глубоко анализируя и наглядно демонстрируя личиночные признаки *Teredolaemus* и *Xylariophilus* (наряду с другими родственными груп-

пами), показали явное сходство личинок (как и имаго) этих родов и их существенное отличие от известных эктопаразитических личинок представителей подсемейства Bothriderinae (ныне Bothrideridae). При этом следует заметить, что описанный Хинтоном [Hinton, 1941] *Teredolaemus pilosus*, данные о котором учитывались Лоуренсом [Lawrence, 1985] в его выводах о вероятном питании личинок *Teredolaemus* амброзийскими грибами, сравнительно недавно был перенесен в род *Xylariophilus* [Zhou et al., 2017]. По сути, оказалось, что достоверные факты питания имаго и личинок грибами известны в настоящее время только для представителей рода *Xylariophilus*. Однако морфологическое сходство прежде всего личинок *Teredolaemus* и *Xylariophilus*, представленное в работе Пала и Лоуренса [Pal, Lawrence, 1986] и в последующих трудах [Ślipiński et al., 2010; Robertson, 2010; Robertson et al., 2015], дает основание полагать, что личинки *Teredolaemus* могут питаться грибами. По мнению некоторых авторов [Lawrence, 1991; Robertson, 2010], описание личинки *Oxylaemus* sp. [Klausnitzer, 1975] сомнительно и не соответствует другим известным личинкам Tereidae.

Учитывая вышеизложенное, мы разделяем по крайней мере предположение, если не утверждение, о том, что представители Tereidae (включая *Teredus*) и Xylariophilinae являются микофагами. Имаго Anommatinae встречаются в лесной подстилке, компосте, скошенной траве и верхнем слое почвы, богатой органикой, а личинки известны для некоторых видов рода *Anommatus* Wesm., 1835, но их развитие не изучено [Ślipiński et al., 2010], хотя, весьма вероятно, оно также происходит за счет питания грибами.

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# Classification and taxonomy of the nitidulid-group of families (Coleoptera: Cucujoidea): comments on morphology, bionomics, phylogeny and methodology, with a key to species of the subgenus *Myothorax* Murray, 1864 of the genus *Carpophilus* Stephens, 1830 (Nitidulidae: Carpophilinae)

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**Abstract.** The paper provides an overview of the author's methodological opinion, which became the basis for developing the system and phylogeny of the nitidulid-group of families. The proposals for changing the system and phylogeny of these families are discussed, including the justification for using the taxon Nitiduloidea. The most reliable evidence of ancient divergences of these families can be the structure of the genitalia of both sexes, and therefore, in a number of cases, fossils without exposed genitalia can be arranged to a certain supraspecies group only tentatively. According to the structure of the genitalia of both sexes, two subgroups of families are distinguished: kateretid-subgroup (Apophisandridae, Boganiidae, Kateretidae, Parandrexidae, and Smicripidae) and nitidulid-subgroup (Helotidae, Monotomidae, and Nitidulidae), which reveal significant antiquity and many parallelisms in structure and bionomy and seem to have diverged earlier than the Middle Jurassic. The family Nitidulidae is also clearly divided into two phyletic lineages based on the structure of the male genitalia: nitiduline-lineage (Cillaeinae, Cryptarchinae, Cybocephalinae, Maynipeplinae, and Nitidulinae) and carpophiline-lineage (Amphicrossinae, Calonecrinae, Carpophilinae, and Epuraeinae). Recent proposals for changing the system and phylogeny are discussed. These do not take into account the fundamental features discussed in this paper. They were obtained after preliminary comparisons of some sequencing that require careful additional checks and clarifications. There are also discussed the independent appearance of trophic interactions with the plant generative organs in representatives of many groups of the considered families; misinterpretations of these interactions have often led to hasty and insufficiently substantiated conclusions, including serious errors in constructing classifications and phylogenetic proposals. The latter methodological defects require verification, which can be achieved by the principle (method) of multiple parallelisms. This principle harmoniously complements the concept of integrated taxonomy and phylogenomics, providing the latter with an objective basis and a method of verification. The possible role of participation of representatives of the considered families in pollination of gymnosperms and angiosperms in the past, starting from the Middle Jurassic and up to the present day, are discussed. Using the method of multiple parallelisms, it has been shown that if the nitidulid-group of families has a common origin, then the kateretid-subgroup should be considered as mainly Mesozoic with some genera represented in the modern biota, then the nitidulid-subgroup should be considered, despite the antiquity of its origin, as prosperous in the Cenozoic, having given rise to a large number of modern forms with imaginal or complete anthophagy. At the same time, modern nitidulids, which usually live on dioecious palms, exhibit greatest convergent similarity of many structures with those of Mesozoic apophisandrids.

An overview of the *dimidiatus*-group of species of the subgenus *Myothorax* Murray, 1864 of the genus *Carpophilus* Stephens, 1830 is presented. This group includes widespread food pests that cause significant economic damages. Identification of these species has so far been an almost insoluble problem for pest control specialists. A key to these pests facilitating their identification is developed. New taxa are proposed: subfamily Vetunitidulinae **subfam. n.** (Apophisandridae, type genus *Vetunitidula* Zhao, Engel, Huang et Cai, 2025), tribe Plesiogethini **trib. n.** (Cybocephalinae, type genus *Plesiogethes* Zaitsev, Vasilenko et Perkovsky, 2025) and the genus *Mesohelotopsis* **gen. n.** (Helotidae, type species *Metahelotella monochromata* Liu, Ślipiński, Ren et Pang, 2019), as a result a new combination is established: *Mesohelotopsis monochromata* (Liu, Ślipiński, Ren et Pang, 2019), **comb. n.** The following new species are described: *Carpophilus* (*Myothorax*) *assignatus* **sp. n.** (Malaysia: Kalimantan, Sabah; Indonesia: Sulawesi), *C. (M.) fumatoides* **sp. n.** (India: Karnataka; Laos), *C. (M.) generosus* **sp. n.** (Indonesia: Java, Bali), and *C. (M.) languescens* **sp. n.** (Cambodia). In addition, new synonymy is introduced for the following species: Epuraeinae: *Epuraea* (*Epuraea*) *excisicollis* Reitter, 1872 = *E. (E.) dolosa* Kirejtshuk, 1995, **syn. n.**; Carpophilinae: *Carpophilus* (*Ecnomorphus*) *plagiatiipennis* (Motschulsky, 1858) = *C. (Ecnomorphus) jahari* Dasgupta et Pal, 2019, **syn. n.**, *Carpophilus* (*Myothorax*) *contegens* (Walker, 1858) = *C. (M.) maculatus* Murray, 1864, **syn. n.** = *C. (M.) vittiger* var. *nigritus* Murray, 1864, **syn. n.** = *C. (M.) vittiger* var. *testaceus* Murray, 1864, **syn. n.** = *C. (M.) vittiger* var. *dilutus* Murray, 1864, **syn. n.**, non *Colastus dilutus* Motschulsky, 1858, *Carpophilus* (*Myothorax*) *fusciceps* Grouvelle, 1913 = *C. (M.) scotti* Grouvelle, 1913, **syn. n.**, *Carpophilus* (*Myothorax*) *lewisi* Reitter, 1884 = *C. (M.) signatus* Grouvelle, 1908, **syn. n.** = *C. (M.) signatus* var. *ornatus* Grouvelle, 1908, **syn. n.** = *C. (M.) subcalvus* Kirejtshuk, 1984, **syn. n.**, *Carpophilus* (*Myothorax*) *schioedtei* Murray, 1864 = *C. (M.) pallescens* Murray, 1864, **syn. n.** = *C. (M.) vittiger* var. *limbalis* Murray, 1864, **syn. n.**, *Carpophilus* (*Myothorax*) *pilipennis* Macleay, 1873 = *C. (M.) davidsoni* Dobson, 1952, **syn. n.**; Nitidulinae: *Aethina* (*Aethina*) *aeneipennis* Reitter, 1873 = *A. (A.) zhizhuaca* Chen et Huang, 2024, **syn. n.**, *Atarphia quadripunctata* Reitter, 1884 = *A. cincta* Jelinek et Hájek, 2012, **syn. n.**, *Physoronia wajdelota* (Wankowicz, 1869) = *P. japonica* Reitter, 1873, **syn. n.**, *Pocadius nobilis* Reitter, 1873 = *P. fasciatus* Cline, 2008, **syn. n.** = *P. okinawaensis* Cline, 2008, **syn. n.** = *P. tenebrosus* Chen et Huang, 2020, **syn. n.** = *P. zhangjiajieensis* Chen et Huang, 2020, **syn. n.**; Cryptarchinae: *Glischrochilus* (*Glischrochilus*) *quadripunctatus* (Linnaeus, 1758) = *G. (G.) tremulae* Clayhills, Audisio et Cline, 2016, **syn. n.**; Cybocephalinae: *Cybocephalus bicinctus* Kirejtshuk, 1988 = *C. chlorocapitis* Hisamatsu, 2013, **syn. n.** Besides, lectotypes are designated for *Aethina suturalis* Reitter, 1884, *Carpophilus lewisi* Reitter, 1884, *C. ochropterus* Boheman, 1851, *C. pilosellus* Motschulsky, 1858, *C. (Ecnomorphus) nigricans* Grouvelle, 1897, *C. (Eidocolastus) bosschae* Grouvelle, 1892, *C. (Myothorax) vittiger* var. *limbalis* Murray, 1864,

*C. (M.) luridus* Murray, 1864, *C. (M.) maculatus* Murray, 1864, *C. (M.) vittiger* var. *nigritus* Murray, 1864, *C. (M.) nepos* Murray, 1864, *C. (M.) notatus* Murray, 1864, *C. (M.) pallescens* Murray, 1864, *C. (M.) vittiger* var. *robustus* Murray, 1864, *C. (M.) schioedtei* Murray, 1864, *C. (M.) vittiger* var. *testaceus* Murray, 1864, *C. (M.) vittiger* Murray, 1864, *Colastus dilutus* Motschulsky, 1858, non *Carpophilus (Myothorax) vittiger* var. *dilutus* Murray, 1864, *Colastus plagiaticipennis* Motschulsky, 1858, *Nitidula contegens* Walker, 1858, *Nitidula hemiptera* Fabricius, 1792, non *Dermestes hemipterus* Linnaeus, 1758. The name *Carpophilus (Myothorax) robustus* Murray, 1864, **stat. n.** should be used as valid for a separate species, which was originally proposed to designate a variety of *C. (M.) vittiger*, however, according to the studied lectotypes, the latter should be recognized as a junior synonym of *C. (M.) contegens*.

**Key words:** method of multiple parallelisms, structure of aedeagus, synonymy, individual development, pollinophagy, pollination.

**Классификация и таксономия группы семейств, близких к Nitidulidae (Coleoptera: Cucujoidea):  
замечания по морфологии, биологии, филогении и методологии  
с определительной таблицей для видов подрода *Myothorax* Murray, 1864  
рода *Carpophilus* Stephens, 1830 (Nitidulidae: Carpophilinae)**

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**Резюме.** Сделан обзор методологических взглядов автора, ставших основой для разработки системы и филогении группы семейств, близких к Nitidulidae. Обсуждаются предложения по изменению системы и филогении этих семейств, в том числе и оправданность использования таксона Nitiduloidea. Наиболее надежным свидетельством древних дивергенций этих семейств может быть строение гениталий обоих полов, и поэтому в ряде случаев ископаемые жуки, у которых не сохранились гениталии, могут соотноситься с определенной надвидовой группой только предположительно. По строению гениталий обоих полов выделены две подгруппы семейств: близкая к Kateretidae (Apophisandridae, Boganidae, Kateretidae, Parandrexidae и Smicripidae) и близкая к Nitidulidae (Helotidae, Monotomidae и Nitidulidae), – обнаруживающие значительную древность и многие исторические параллелизмы в строении и биологии и, по-видимому, имеющие общие корни ранее середины юры. Семейство Nitidulidae также отчетливо разделяется по строению гениталий самцов на две филогенетические линии: нитидулинную (Cillaeinae, Cryptarchinae, Cybocephalinae, Maupireplinae и Nitidulinae) и карпофилинную (Amphicrossinae, Calonecrinae, Carpophilinae и Epruraeinae). Обсуждены предложения последних лет по изменению системы и филогении, в которых не учитываются рассмотренные в этой статье фундаментальные особенности, а также которые получены из дендрограмм предварительных сравнений некоторых секвенированных, нуждающихся в тщательных дополнительных проверках и уточнениях. Обсуждается независимое появление трофической приуроченности к генеративным органам растений у представителей многих групп рассмотренных семейств, неправильная интерпретация трофики которых нередко приводит к неверным выводам, в том числе к серьезным ошибкам в построении классификаций и филогенетических реконструкций. Последние методологические дефекты требуют проверки, которую можно осуществить методом множественных параллелизмов. Этот принцип гармонично дополняет концепцию интегративных таксономии и филогеномики, обеспечивая последнюю объективной основой и методом проверки. Обсуждены возможности участия представителей рассмотренных семейств в опылении голосеменных и покрытосеменных в прошлом, начиная со средней юры, и в настоящее время. Благодаря методу множественных параллелизмов показано, что если группа семейств, близких к семейству Nitidulidae, имеет общее происхождение, то подгруппу семейств, близких к семейству Kateretidae, следует рассматривать как преимущественно мезозойскую с некоторыми родами, представленными в современном биоте, а подгруппа семейств, близких к Nitidulidae, должна рассматриваться, несмотря на древность ее происхождения, как процветающая в кайнозое, давшая большое число современных как имагинальных, так и полных антофагов. При этом современные нитидулиды, обычно обитающие на двудомных пальмах, обнаруживают наибольшее конвергентное сходство многих структур с таковыми у мезозойских апофизандрид.

Представлен обзор группы видов *dimidiatus* подрода *Myothorax* Murray, 1864 рода *Carpophilus* Stephens, 1830, в составе которой известны вредители продовольственных запасов, получившие широкое распространение и наносящие значительный экономический ущерб. Определение этих видов до сих пор представляло почти неразрешимую проблему для специалистов по борьбе с этими вредителями. Разработана определительная таблица, призванная облегчить их определение. Предложены новые таксоны: подсемейство Vetunitidulinae **subfam. n.** (Apophisandridae, типовой род *Vetunitidula* Zhao, Engel, Huang et Cai, 2025), триба Plesiogethini **trib. n.** (Cybocephalinae, типовой род *Plesiogethes* Zaitsev, Vasilenko et Perkovsky, 2025) и род *Mesohelotopsis* **gen. n.** (Helotidae, типовой вид *Metahelotella monochromata* Liu, Ślipiński, Ren et Pang, 2019), в результате, установлено новое сочетание: *Mesohelotopsis monochromata* (Liu, Ślipiński, Ren et Pang, 2019), **comb. n.** Описаны следующие новые виды: *Carpophilus (Myothorax) assignatus* **sp. n.** (Малайзия: Калимантан, Сабах; Индонезия: Сулавеси), *C. (M.) fumatoides* **sp. n.** (Индия: Карнатака, Лаос), *C. (M.) generosus* **sp. n.** (Индонезия: Ява, Бали) и *C. (M.) languescens* **sp. n.** (Камбоджа). Кроме того, установлена новая синонимия для следующих видов: Epruraeinae: *Epruraea (Epruraea) excisicollis* Reitter, 1872 = *E. (E.) dolosa* Kirejtshuk, 1995, **syn. n.**; Carpophilinae: *Carpophilus (Ecnomorphus) plagiaticipennis* (Motschulsky, 1858) = *C. (Ecnomorphus) jahari* Dasgupta et Pal, 2019, **syn. n.**; *Carpophilus (Myothorax) contegens* (Walker, 1858) = *C. (M.) maculatus* Murray, 1864, **syn. n.** = *C. (M.) vittiger* var. *nigritus* Murray, 1864, **syn. n.** = *C. (M.) vittiger* var. *testaceus* Murray, 1864, **syn. n.** = *C. (M.) vittiger* var. *dilutus* Murray, 1864, **syn. n.**, non *Colastus dilutus* Motschulsky, 1858, *Carpophilus (Myothorax) fusciceps* Grouvelle, 1913 = *C. (M.) scotti* Grouvelle, 1913, **syn. n.**; *Carpophilus (Myothorax) lewisi* Reitter, 1884 = *C. (M.) signatus* Grouvelle, 1908, **syn. n.** = *C. (M.) signatus* var. *ornatus* Grouvelle, 1908, **syn. n.** = *C. (M.) subcalvus* Kirejtshuk, 1984, **syn. n.**, *Carpophilus (Myothorax) schioedtei* Murray, 1864 = *C. (M.) pallescens* Murray, 1864, **syn. n.** = *C. (M.) vittiger* var. *limbalis* Murray, 1864, **syn. n.**, *Carpophilus*



(*M.*) *pilipennis* Macleay, 1873 = *C. (M.) davidsoni* Dobson, 1952, **syn. n.**; Nitidulinae: *Aethina (Aethina) aeneipennis* Reitter, 1873 = *A. (A.) zhizhuaca* Chen et Huang, 2024, **syn. n.**, *Atarphia quadripunctata* Reitter, 1884 = *A. cincta* Jelínek et Hájek, 2012, **syn. n.**, *Physoronia wajdelota* (Wankowicz, 1869) = *P. japonica* Reitter, 1873, **syn. n.**, *Pocadius nobilis* Reitter, 1873 = *P. fasciatus* Cline, 2008, **syn. n.** = *P. okinawaensis* Cline, 2008, **syn. n.** = *P. tenebrosus* Chen et Huang, 2020, **syn. n.** = *P. zhangjiajieensis* Chen et Huang, 2020, **syn. n.**; Cryptarchinae: *Glischrochilus (Glischrochilus) quadripunctatus* (Linnaeus, 1758) = *G. (G.) tremulae* Clayhills, Audisio et Cline, 2016, **syn. n.**; Cybocephalinae: *Cybocephalus bicinctus* Kirejtshuk, 1988 = *C. chlorocapitis* Hisamatsu, 2013, **syn. n.** Кроме того, обозначены лектотипы для *Aethina suturalis* Reitter, 1884, *Carpophilus lewisi* Reitter, 1884, *C. ochropterus* Boheman, 1851, *C. pilosellus* Motschulsky, 1858, *C. (Ecnomorphus) nigricans* Grouvelle, 1897, *C. (Eidocolastus) bosschae* Grouvelle, 1892, *C. (Myothorax) vittiger* var. *limbalis* Murray, 1864, *C. (M.) luridus* Murray, 1864, *C. (M.) maculatus* Murray, 1864, *C. (M.) vittiger* var. *nigritus* Murray, 1864, *C. (M.) nepos* Murray, 1864, *C. (M.) notatus* Murray, 1864, *C. (M.) pallescens* Murray, 1864, *C. (M.) vittiger* var. *robustus* Murray, 1864, *C. (M.) schioedtei* Murray, 1864, *C. (M.) vittiger* var. *testaceus* Murray, 1864, *C. (M.) vittiger* Murray, 1864, *Colastus dilutus* Motschulsky, 1858, non *Carpophilus (Myothorax) vittiger* var. *dilutus* Murray, 1864, *Colastus plagiatipennis* Motschulsky, 1858, *Nitidula contegens* Walker, 1858, *Nitidula hemiptera* Fabricius, 1792, non *Dermestes hemipterus* Linnaeus, 1758. Название *Carpophilus (Myothorax) robustus* Murray, 1864, **stat. n.**, которое первоначально было предложено для обозначения разновидности *C. (M.) vittiger*, целесообразно использовать как валидное для отдельного вида, а последнее, согласно изученным лектотипам, следует признавать младшим синонимом *C. (M.) contegens*.

**Ключевые слова:** метод множественных параллелизмов, строение эдеагуса, синонимия, индивидуальное развитие, палинофагия, опыление.

## Introduction

The necessity for this paper appeared in connection with the preparation of chapters for the catalogue of beetles of the Russian Far East (families Kateretidae Kirby, 1837 and Nitidulidae Latreille, 1802 (Kirejtshuk, in prep.)), in particular the definition of the composition of species included in these families and the adopted system for the supraspecific taxa. The last analogous catalogue devoted to the modern Palaearctic fauna of Coleoptera was published in 2007 and repeated in 2013 [Jelínek, 2007; Jelínek, Audisio, 2007]. Within nearly twenty years some additional important publications appeared. Besides, some misprints, missing taxa or some errors in the interpretation and other errors found in these published catalogues require corrections and explanations. Due to favorable circumstances in the last decades of the last century I managed to study representatives of almost all generic taxa of the kateretids and nitidulids, as well as type series of most species deposited in main world collections. This allowed me to find features for dividing these families and to propose a number of changes in their systems, a precis of which with some comments was published in 2008 [Kirejtshuk, 2008]. Some wrong subfamily and generic attributions published in the mentioned catalogues were already corrected [Kirejtshuk, 2008]. Incorrect type designations and erroneous synonymy of the cillaeine taxa were recently corrected by Kirejtshuk and Kovalev [2022]. Initially, this paper was intended only as an explanation of the catalogues being prepared, including additions and corrections related to the coleopterofauna of the Russian Far East, including explanations of the inaccuracies and deficiencies of the 2007's catalogues. In recent years, colleagues from Asian countries (X. Chen, Y. Chen, N. Hayashi, S. Hisamatsu, S.-T. Hisamatsu, M. Liu, T. Nakane and others) have contributed a lot to study the fauna of the cucujoid beetles in the area along the Pacific coast, including the Russian Far East. However, within many important recent contributions not all new systematic and taxonomic proposals have been successful enough, and therefore they are a subject of consideration in this paper.

Significant proposals have also been published to change the present system and hypotheses of phylogenetic relationship of the nitidulid-group of families [Audisio et al., 2009; Cline et al., 2014; Lee et al., 2020; Powell et al., 2020; Peris et al., 2024a, b and some others], which in one way or another concern the classification adopted in the submitted Russian Far East catalogue of the Coleoptera. These new concepts were put forward without taking into account some general proposals for the system of the nitidulid-group of families and their generic composition, developed on the basis of studying extant and extinct representatives performed over the past decades [Kirejtshuk, 1982, 1986a, 2008; Kirejtshuk et al., 2023, etc.]. The main feature of all these changes was the rather limited information on taxonomy and phylogeny used by their authors, who apparently considered many areas of knowledge to be redundant for "phylogenetic" reconstructions. Meanwhile, in all cases, the "redundant" areas included the most fundamental data necessary for combining genera into suprageneric groups, including families. This feature is most clearly formulated in the chapter of one handbook by Jelínek et al. [2010], although the theoretical basis for such an approach to taxonomy and phylogenetics of the group under consideration and the most vivid expression can be read in the Leschen's revision [Leschen, 1999]. In this connection it was once again necessary to define the general basic principles of the accepted system and hypothesis of phylogenetic relationships in this group of families in order to compare them with those proposed recently and to analyze their differences from the previous ones. Studies on the nitidulid-group of families has intensified in the last years and resulted in numerous valuable achievements, but some researches have been conducted using new methods that are not yet sufficiently developed in their proper use. Particularly it concerns the molecular researches of DNA sequences, which sometimes use for wide extrapolation even in the past of modern and fossil groups. Herein the main differences associated with certain taxonomic interpretations and classifications are analyzed, including the ground for different approaches in studies of the nitidulid-group of families.

The brief analysis of the methodological peculiarities of different approaches is given. The recently introduced proposals for the structure of suprageneric taxa are criticized. The situation in the generic taxonomy of the subfamily Meligethinae is considered (reflected in the greatest fullness in the paper by Audisio et al. [2009], as well as other publications by P. Audisio with co-authors). Because of many misidentifications of species of the subgenus *Myothorax* Murray, 1864 of the genus *Carpophilus* Stephens, 1830 published in the applied works devoted to pests of stored products, a key to species of the *dimidiatus*-group of the subgenus *Myothorax*, cosmopolitan and mostly known from the Palearctic and Indo-Malayan regions, from where many species can be expected in the Russian Far East, is elaborated and illustrated with the description of some new species. The present paper also touches upon the issues of the development of feeding and life on male gymnosperm strobiles and angiosperm flowers in the families of the nitidulid-group and especially upon the problem of pollination of plants by ancient representatives of these families. This aspect of interactions between insects and plants is of considerable significance for systematics of these families and their phylogenetic reconstructions.

## Structure of the paper

Taking into account the large volume of the paper, we consider it necessary to provide its structure to facilitate orientation in the text:

### Historical and methodological comments

#### Depositories

#### Classification and supraspecific taxa

The nitidulid-group of families or the superfamily Nitiduloidea Latreille, 1802?

Position of the family Apophisandridae Molino-Olmedo, 2017

Position of the genera *Baltoraea* Kurochkin et Kirejtshuk, 2010, *Cornuturates* Peris, Jelínek et Audisio, 2024, *Cretabaltoraea* Peris, Jelínek et Audisio, 2024, *Diopsiretes* Peris, Jelínek et Audisio, 2024, *Protokateretes* Zhao, Huang and Cai, 2023 and *Vetunitidula* Zhao, Engel, Huang et Cai, 2025 (Apophisandridae)

Subfamily Vetunitidulinae Kirejtshuk, subfam. n. (Apophisandridae)

Notes on *Boreades* Parsons, 1943 (Kateretidae)

Genus *Mesohelotopsis* Kirejtshuk, gen. n. (Helotidae)

On the family Cybocephalidae sensu Cline et al. [2014] and subfamily Prometopiinae sensu [Cline et al., 2014]

Notes on "reclassification" of the subfamily Carpophilinae by Powell et al. [2020]

Notes on "re-examination" of the subfamily Meligethinae by Audisio et al. [2009]

Tribe Plesiogethini Kirejtshuk et Kurochkin, trib. n. (Cybocephalinae)

Draft of a possible phylogenetic hypothesis for the nitidulid-group of families

#### Review of species of the *dimidiatus*-group of the subgenus *Myothorax* (Nitidulidae, Carpophilinae: *Carpophilus*) mainly from the Palearctic and Indo-Malayan regions

Definition of the *dimidiatus*-group of the subgenus *Myothorax*

Key to males of the *dimidiatus*-group of species of the subgenus *Myothorax* mainly from the Palearctic and Indo-Malayan regions

*Carpophilus* (*Myothorax*) *assignatus* Kirejtshuk, sp. n.

*Carpophilus* (*Myothorax*) *brunneus* Chen, Hui et Nuang, 2020

*Carpophilus* (*Myothorax*) *contegens* (Walker, 1858)

*Carpophilus* (*Myothorax*) *dimidiatus* (Fabricius, 1792)

*Carpophilus* (*Myothorax*) *fumatooides* Kirejtshuk, sp. n.

*Carpophilus* (*Myothorax*) *fumatus* Boheman, 1851

*Carpophilus* (*Myothorax*) *generosus* Kirejtshuk, sp. n.

*Carpophilus* (*Myothorax*) *languescens* Kirejtshuk, sp. n.

*Carpophilus* (*Myothorax*) *mutilatus* Erichson, 1843

*Carpophilus* (*Myothorax*) *nepos* Murray, 1864

*Carpophilus* (*Myothorax*) *notatus* Murray, 1864

*Carpophilus* (*Myothorax*) *pilipennis* Macleay, 1873

*Carpophilus* (*Myothorax*) *pilosellus* Motschulsky, 1858

*Carpophilus* (*Myothorax*) *robustus* Murray, 1864, stat. n.

*Carpophilus* (*Myothorax*) *schioedtei* Murray, 1864

*Carpophilus* (*Myothorax*) *timorensis* Dobson, 1993

*Carpophilus* (*Myothorax*) *truncatus* Murray, 1864

*Carpophilus* (*Myothorax*) *zeaphilus* Dobson, 1969

#### Species synonymy, notes on species taxonomy and distribution

Synonymy of *Eपुरaea* (*Eपुरaea*) *biguttata* (Thunberg, 1784)

Notes on *Eपुरaea* (*Eपुरaea*) *longipennis* Sjöberg, 1939 and synonymy of *E. (E.) excisicollis* Reitter, 1872

Notes on *Eपुरaea* (*Eपुरaea*) *hilleri* Duftschmid, 1825

Distribution of *Eपुरaea* (*Micruria*) *auripubens* Reitter, 1901

Synonymy of *Carpophilus* (*Ecnomorphus*) *plagiaticollis* (Motschulsky, 1858)

Synonymy of *Carpophilus* (*Myothorax*) *lewisi* Reitter, 1884

Corrections in the list of *Carpophilus* species recorded in China published by Hui and Huang [2019]

Synonymy of *Aethina* (*Aethina*) *aeneipennis* Reitter, 1873

On the designation of the lectotype of *Aethina* (*Circopes*) *suturalis* Reitter, 1884 and notes on *A. (C.) miniata* Hisamatsu, 2014

Synonymy of *Atarphia quadripunctata* Reitter, 1884

Synonymy of *Nitidula carnaria* (Schaller, 1783)

Synonymy of *Physoronia* (*Pocadioides*) *wajdelota* (Wankowicz, 1869)

Synonymy of *Pocadius nobilis* Reitter, 1873

Synonymy of *Meligethes* (*Clypeogethes*) *tenebrosus* Förster, 1849

The subgenus *Glischrochilus* Reitter, 1873 sensu stricto in the Palearctic Region

Synonymy of *Cybocephalus bicinctus* Kirejtshuk, 1988

#### Probability of pollinophagy and pollination by Apophisandridae and other groups of the nitidulid-group of families

## Historical and methodological comments

The phylogenetic reconstructions in the nitidulid-group of families appeared when the attention of the world biological community was focused on the W. Hennig's contribution to the methods of these reconstructions [Mayr, 1974; Platnick, 1979; Hoffmann, Rief, 1988; Crowson, 1991a, etc.]. Taxonomists were actively involved in debating the problems of cladogenetic and anagenetic events, ways of estimation of homoplastic evolutionary processes, significance of numerical phenetics and so on, i.e. it was before the appearance of "hand" cladism and farther uprise of modern cladism and formal methods of computer determination for probable expectations of phylogenetic events, interpreted as true phenomena that do not need proof. It was then revealed that the genital structures and particularly the aedeagus have most strong and very stable differences, which made it possible to regard these three large groups among the considered beetle families and subfamilies (I – Kateretidae with closely related groups,

Ila and Ilb – Nitidulidae with closely related groups) clearly divided into two distinct subgroups: nitiduline-lineage of the Nitidulidae and other families and carpophiline-lineage of Nitidulidae [Kirejtshuk, 1982, 1986a, b, 2000, etc.]. It was done in accordance with the Hennig's methodology [Hennig, 1950].

Later the most attention was given to the multiple structural parallelisms in different nitidulid groups concerning peculiar and partly parallel structural specializations of some organs, regularities and particular differences in the lifestyles of active stages (adults and larvae), to clarify coincidences in genital features with other peculiarities [Kirejtshuk, 1989a, 1991, 1994a, etc.]. It turned out that all these peculiarities are scarcely possible to put (at least at that time) in a matrix and find any software for its adequate processing. Nevertheless, different combining of structural transformations and different trends in evolutionary changes in life strategy in larval and imaginal stages of ontogenetic development allowed to define and formalize some evolutionary regularities (see above lastly cited).

Taxonomic interpretation of the Nitidulidae used by Grouvelle [1913] was regarded as the generally accepted during the end of the 19<sup>th</sup> and more than three-fourths of 20<sup>th</sup> century. However, the new studies on morphological structures, peculiarities of bionomics and trophic characteristics of larvae and adults clarified that each of the Grouvelle's subfamilies, Meligethinae Thomson, 1859, Carpophilinae Erichson, 1842 and Nitidulinae, are polyphyletic and should be greatly re-arranged according to current achievements [Kirejtshuk, 2008]. During these studies, independent origins of different anthophagous nitidulid groups, which were put together before, was first proved [Kirejtshuk, 1989a, 1991, 1994a; Kirejtshuk et al., 2023, etc.]. It appears important that the above-mentioned three Grouvelle's subfamilies included specialized anthophagous genera, which, after the conducted researches, were arranged in a new composition in the subfamilies Epuraeinae, Carpophilinae, Cillaeinae Kirejtshuk et Audisio in Kirejtshuk, 1986, in the tribe Mystropini Murray, 1864 (Nitidulinae) sensu Kirejtshuk [2008], according to evident diagnostic differences in male genitalia but also other body structures. The paradox of the situation in the morphological study and determination of antho- or strobilophagous beetles by external structure is that the adults associated with strobiles and flowers often have not pronounced structural adaptations, but the antho- or strobilophagous larvae usually bear pronounced characters in the integument, reduction of processes on various sclerites of the body, and sometimes in the mouth parts. It is strange that Peris et al. [2024a], who declared the considerable archaism (plesiotypy) of the anthophagous nitidulids, did not even mention this fundamental feature.

Other interpretations of the nitidulid-group of families assume a consideration of mosaic of unsorted facts for combining on base separate trace of relationship or for drawing up a matrix, which can, after some computer processing, give a probable order in simulation of phylogenetic process and classification without a long lasting search of ground for each of the considered groups. Such points of view are clearly demonstrated in few recent proposals of "phylogenetic" hypotheses

by some researchers for the nitidulid-group of families produced by computer sorting of characters instead a very thorough analysis of all the facts, taking into account principal patterns from different aspects of consideration with seeking of pattern similarities in each of these aspects [Leschen, 1999; Cline et al., 2014; Powell et al., 2020]. Some enthusiasts of nucleotide sequence studies use the results of comparisons of a few representatives from rather disparate groups for the computer reconstruction or creation of phylogeny thanks to the special software, which could provide, in their opinion, with a probability of reliable reflection of phylogeny going during millions years, the key to understanding the evolutionary processes in all their manifestations.

The chapter by Jelínek et al. [2010] on Nitidulidae in the Handbook of Zoology included many very important and interesting facts but without a certain order in their significance and clear interdependance, even subfamilies and tribes are listed as proposed without a morphological ground and phylogenetic relationships, including in the subsection "Phylogeny and Classification". The first sentence of the latter division is: "Nitidulidae remains one of the most taxonomically intractable families of cucujoids insofar as internal taxonomy is concerned" [Jelínek et al., 2010: 401]. A look at this chapter shows that for its authors this was really undoubtedly the case, although the first author had spent many years very successfully studying various groups of this family and had published several rather important contributions. Unfortunately, despite the significant and successful experience of research of the family, J. Jelínek preferred contrary to the real situation to support the ideas of mosaic and absence of order and knowledge in the structures of adults and the evolution of the family Nitidulidae as a whole. The morphological part of this chapter appears as description of mixture of structural characters, also it was mentioned about two types of nitidulid aedeagus, corresponding ones called here as the TYPE 2a and TYPE 2b (see below). Despite of many correct morphological details in this part Jelínek et al. [2010: 398] wrote a principal mistake that the nitidulid "tegmen" involves both "phallobase + parameres", however nitidulid aedeagus as apparently other families of the nitidulid-subgroup never has trace of articulated paramera, i.e. the dorsal flat unilobed sclerite of aedeagus should be more correctly named as dorsal part of phallobase or tegmen of the ring-like cucujid aedeagus without paramera, and therefore the further examples of aedeagi in this chapter represent mixtures of aedeagi of the TYPE 2a and TYPE 2b. It is important to note that the cucujoid ring-like aedeagus despite of its frequent some similarity in various families needs a very serious revision to understand and explain this similarity in each concrete group. Nevertheless, the authors of this chapter declared that the previous morphological studies including those by A.G. Kirejtshuk as well as their logic interpretation in terms of phylogeny (in W. Hennig's sense) should be considered as "narrative and quantitative analyses" [Jelínek et al., 2010: 403] and they stated that "subfamily relationships were offered by A.G. Kirejtshuk (1982, 1995), and are represented by hand-drawn diagrams based on relatively few characters and his intuition about the distribution of these characters for



a few exemplar taxa within some but not all subfamilies” [Jelínek et al., 2010: 403]. As in other analogous cases, these authors gave no example for their statement neither in the mentioned publication nor later. Indeed, the situation with declarations of these conclusions not supported by facts is completely opposite and many conclusions by these co-authors are lacking real factual ground (not only in the considered chapter but also in some other publications, discussed herein). It should probably be recalled that our division into subfamilies and other supraspecific taxa was made on the basis of studying the male and female genitalia of all available representatives, which was invariably confirmed by all subsequent studies in which the morphological interpretations were made correctly. On the contrary, studying the structure of the genitalia of both sexes helped to solve the problems of the systematic position of some supraspecific taxa for which many structural parallelisms are manifested in the structure of other organs. For example, the taxon *Trimenus* Murray, 1864 was considered as a subgenus of the genus *Tetrisus* Murray, 1864, including in the catalogue of Palaearctic Coleoptera [Jelínek, Audisio, 2007], since only the female of the latter were available for the original description of their species. Further studies of males helped to establish that these supraspecific taxa should not only be considered as separate genera, but should be attributed to different subfamilies (Epurinae vs Nitidulinae) [Kirejtshuk, 2008].

In the chapter under consideration there is no information on the known fossil nitidulids at all. Consideration on probable relations between the published paleontological data and the proposed classification about the structural fundamental differences between the groups of the Recent fauna, are also missing. The preimaginal stages in their chapter are also formally characterised without attention to their features for systematics and phylogeny of nitidulids. However, trophics and mode of life are usually markedly better expressed in differences of larval than imaginal structures. As a result, the chapter of Jelínek et al. [2010] contains many questionable conclusions and ignores of morphological base in the nitidulid system, including genital structures. Thus, this chapter clearly shows the problem with producing of “phylogeny” using a computer software with mathematic estimations of abstract expectations rather than the traditional logic (“hand-drawn”) analysis of available real facts and further their proof. These misinterpretations of Jelínek et al. [2010] gave the readers the impression that before their work no attempt had been made to put the family Nitidulidae in order in terms of morphology, systematics and to provide hypotheses on the phylogeny of the group as a whole. In this considered publication Jelínek et al. [2010] limited themselves to few promising examples of published cladograms for very small taxa [Endrödy-Younga, 1978; Audisio, Jelínek, 1993; Leschen, 1999], which are related to the analysis of very few structural characters of a restricted number of representatives of the Recent fauna having no inner principal differences in structures and having only a very unclear relation to the phylogeny of the family Nitidulidae as a whole. Neither of these publications even covers a single suprageneric taxon of the Recent fauna with large number of representatives (maybe except Leschen

[1999]) and therefore the extrapolations proposed by these authors are hardly appropriate. It seems impossible to compare the mentioned attempts to establish phylogenetic relations of the family with a phylogenetic concept based on examination of about two thousand species a balanced family system [Kirejtshuk, 2008]. The authors of this chapter manifested: “The most comprehensive published cladistics revision of any nitidulid lineage was on Cyllodini (Leschen 1999)” [Jelínek et al., 2010: 404]. It is very easy to estimate the level of this comprehensiveness in the title, content, conclusions and particularly the chosen characters for phylogenetic reconstructions (nitidulid “phylogenetic relationships, convexity, and the origin of phallolophagy” among nitidulids (see below). Examples of this kind fill most of the paragraphs of the chapter under consideration. This feature of it as a whole makes one doubt how familiar the co-authors are with the literature on the subject they were describing. Nevertheless some readers could regard that the researchers who wrote this chapter are enough competent in the knowledge of this subject. These readers took this chapter as a base for their research efforts and therefore applied to use the methods of quick sorting of morphological characters and statistic estimation of probability of an order after comparison of few facts from the nature, instead to apply to other accessible publications of previous researchers, and proposed some taxonomic changes [Cline et al., 2014; Powell et al., 2020, etc.]. These contradict the already known and accessible factual data and above defined principles elaborated after many years of extensive research. This also concerns chaotic presentation of ecological and bionomical features of nitidulid groups in the publication [Jelínek et al., 2010] which indeed are, appositely, in more or less accordance with the systematic position of each groups. These important circumstances forced the preparation of this review of some recent systematic and phylogenetic proposals after appearance of the above-mentioned chapter [Jelínek et al., 2010] and further continuation of systematic and phylogenetic misinterpretations. Thus, this here considered chapter with doubtful and ungrounded statements became essentially a strong call for crucial reform of the system and phylogenetic reconstructions of the family, to which some taxonomists responded without paying any attention to what had been done before publication of this chapter.

To understand the significance of the chapter of Jelínek et al. [2010] and criticism addressed here, it is very important to consider the paper by Leschen [1999], especially strongly recommended in this chapter published by J. Jelínek etc., co-authored by R.A.B. Leschen, as the most “comprehensive” contribution to the future systematics and phylogenetics of the family Nitidulidae. This publication is especially important for understanding the source of the negative attitude towards prior knowledge and the saturation with ideas about its mosaic distribution, which permeate the above analysed chapter [Jelínek et al., 2010]. The title and text of R.A.B. Leschen’s paper express strong claims as being the first comprehensive contribution in this matter. This kind of phylogenetic and systematic challenge became later rather popular among some researchers. The lastly mentioned author wanted to strongly revise the tribe Cyllodini in context of the family phylogeny and,

probably, in accordance with the achievements of modern methodology. It is very important in order to understand all further less complete attempts (recommended as example to follow by Jelínek et al. [2010] and some others up to “re-examination” by Audisio et al. [2009] with refusing of characters for taxonomic discrimination). This paper by R.A.B. Leschen covers a relatively complete number of genera of the tribe Cyllodini Everts, 1898 (with some notes like “unpublished generic catalogue by A.G. Kirejtshuk” or “listed in A.G. Kirejtshuk’s unpublished catalogue”, etc.) and in this respect is somehow unique among the examples of “successful” cladograms given in the chapter under above consideration [Jelínek et al., 2010]. Instead of a comparative morphological analysis for phylogenetic reconstruction, individual and not connected characters were taken as more preferable than organs or blocks of structures united by function, including the structure of the genitalia of both sexes. This author did not use in his paper the majority of suprageneric nitidulid taxa and principal characters for their discrimination, which were elaborated particularly as base of these taxa [Kirejtshuk, 1982, 1986a, b, etc.]. He particularly ignored significance of interdependent characters of the structures of male and female genitalia and others (almost missing even in his list of coded characters for computer creation of “phylogeny”). R.A.B. Leschen prepared a key to the cyllodin genera with some restriction in use because he applied only to one or few members from large genera (as a result, the diagnostic characters of these genera indeed sometimes represent the diagnostic characters rather for the species examined by him for creation of the key, but not for genera as taxa separated from all other generic taxa, i.e. without care on available variability in the genera with many species). Besides, R.A.B. Leschen took some cyllodin generic and only eight not-cyllodin taxa and proceeded a dendrogram. All selected genera (cyllodin and non-cyllodin ones) according to the coded characters allocated for cyllodins were applied for preparation of his matrix. It is precisely in the definition of characters and the correctness of their coding and, to a lesser extent, in the defects of computer software that the main strange peculiarities of the obtained cladograms of this Leschen’s paper consist. Only some of which are shown below. Hardly anyone could doubt that with such a choice the cladogram could show non-“monophyly” of cyllodins, but the relationships of non-cyllodin genera in this cladogram can scarcely coincide with the family system by Kirejtshuk [2008], which is also not surprising given the mentioned specified feature of character selection. It can be supposed that Leschen regarded that it has no sense to conduct a long comparative morphological analysis to find reasons for taxonomic structure of the family. He decided that this aim can be done much faster and better by a computer with the appropriate software, giving an expected equally reliable results.

The considered cladistic analysis is quite impressive to find its shortcomings, showing all irresistible peculiarities of the methodology restricting its application to reconstruct phylogeny as it was understood previously. Some defects can be mentioned after comparison of differences of phylogenetic hypotheses proposed by Kirejtshuk [1982, 1986a, etc.] and Leschen [1999]. In the former works,

the results of a complete analysis of main structural, developmental, ecological, and bionomical regularities are presented, separating them according to their systematic and phylogenetic importance with taking into account the principal significance of genital structures of both sexes in almost all taxa of the considered groups (much more than 2000 species from more than 200 genera). In the latter work there was used only a very small species diversity (separate representatives of 26 genera) for analysis without comparison of most diagnostic suprageneric peculiarities, including principal differences in genital structures. At least R.A.B. Leschen did not show that he knew the peculiar characters in the male and female genitalia of Cyllodini under his revision, which are useful for comparison with those in other nitidulid tribes, or he did not regard these differences as important for phylogeny in proper sense.

R.A.B. Leschen preferred the matrix method considering all characters in the arbitrary list (mosaic) but not in blocks of interdependent structures. This peculiarity determines principal difference between family systems proposed by me and him. It also explains why mosaic viewpoint dominated in the chapter by Jelínek et al. [2010], prepared together with R.A.B. Leschen. In the list of coded characters proposed by R.A.B. Leschen, the followings are prevalent: “anterior margin of labrum” “frontoclypeal suture”, “number of mandibular incisor lobes of right mandible”, “antennal grooves”, “antennal carinae”, ciliation of the sides of the pronotum and elytra, etc., i.e. the characters with very small or unclear phylogenetic significance because the coded conditions of these characters occur in many other coleopterous groups as adaptive homoplasy. He applied to technical methods when creating the cladogram and the “characters were optimised onto weighted trees, unless otherwise specified, using standard ACCTRAN and DELTRAN optimisations” [Leschen, 1999: 852]. Therefore, my and Leschen’s dendrograms could not be similar because in model proposed by me [Kirejtshuk, 1982, 1986a, etc.] the characters with unclear or doubtful phylogenetic meaning were mostly not considered. It has no sense to mention here all mistakes and contradictions included by Leschen [1999] in his revision, particularly in coding of characters and the matrix of them prepared for the cladogram. Some corrections of his proposals were already published before [Kirejtshuk, 2008].

R.A.B. Leschen also got used to mix morphological reasons and consequences with ecological or bionimical ones. In one of his with co-authors paper [Lee et al., 2020] he also published as a conclusion, the hypothesis of a polyphyletic origin of nitidulids in general and their separate groups partly based on the comparison of differences in their diet. It is very significant that for a group, many of whose representatives are somehow related to flowers (imaginal or complete anthophagy), this diet is not even indicated in the text of his paper of 1999, although later R.A.B. Leschen participated in a publication devoted to the origin of anthophagy in nitidulids [Lee et al., 2020]. He noted that the species of the genus *Camptodes* Erichson, 1843 are “phytophagous”: “larvae are known to develop in rotting cacti while adults occur on flowers” [Leschen, 1999: 872]. Adults of introduced species of *Camptodes* introduced to Australia are very common on flowers while the larvae feed

on succulent stems of *Opuntia* cacti (Cactaceae) [Pimienta-Barrios, del Castillo, 2002; Lawrence, Kirejtshuk, 2019, etc.], although larvae were collected in rotten flowers as well (see also below on saprocantharophy). It should be noted that feeding on decaying cacti should rather be called mycetophagy, not phytophagy (as R.A.B. Leschen did).

The Leschen's nomenclature of trophic regimes has some original ideas but seems to be scarcely useful because of many contradictions in different parts of his paper. He did not pay attention on quite regular differences in diets of larvae and adults of many beetles and most holometabolans. With this, he proposed nomenclature based mostly on external circumstances but not on essential ones connected with particular digestion. Particularly his term "polymorphic" diet for two types of feedings, larval mycetophagy and imaginal anthophagy, when wanted coding *Cychramus* Kugelann, 1794 (Cychramini Gistel, 1848), while his intention in coding the similar types of feeding in *Camptodes* (Cylodini), is unclear. Despite of particular consideration of diets of *Cychramus* and *Camptodes* these are coded in this paper, in the matrix, "sap flows" (character 62) without explanation. Besides, this author used for coding mycetophagous forms only as "sap flows" and "mycetophagous" (included their coded associations only with "epigeal fungi", "hypogean fungi", "Phallales", "Gasteromycetes" and "subcortical fungi"). This researcher did not consider and even mention many other mycetophagous nitidulid groups associated with different kinds of organic matter decomposing with the participation of bacteria and fungi. It is difficult to expect that arbitrary coding of ecological and bionomic features could improve or correct the already arbitrary coding of morphological features. These methodological defects are making it scarcely realistic to achieve anything like phylogenetic reconstruction in proper sense at all.

R.A.B. Leschen put in his matrix some characters of genital structures (58–61), but all of them have not principal differences in the types of structures (described by Kirejtshuk [1982] and many times later). The character 58 is rather unclear: "Cross section of gonocoxites. (0) round (Fig. 21); (1) flat (Figs 23–27). The gonocoxites of nitidulids may either be rounded or flat in cross section" [Leschen, 1999: 881]. This researcher even did not show what means "round" cross section in this case because the figure 21 demonstrates gonocoxites of "*Camptodes* sp." of the usual nitidulid shape with membranous window at the ovipositor apex, usually bearing a stylus. If we have a look at this character in the matrix, we found that the "*Cybocephalus*" has the condition "1" according the Leschen's explanation "flat" condition of the gonocoxites. Many females of this genus were dissected by me during last forty years from all zoogeographical regions and all of them had normal ovipositor (i.e., as that in *Camptodes* in the Leschen's figure). In case that this researcher could not explain what he meant when he proposed different conditions of the ovipositor apex, according to the allocation of the 58<sup>th</sup> character in his matrix it seems that this structure scarcely has an essential phylogenetic significance. As to other genital characters (59–61), their significance for supraspecific taxa and creation of cladograms seems to be rather restricted. Indeed many nitidulid tribes have some

diagnostic specificity, which would be reasonable for the tribal systematics to include it at least in the diagnosis of the tribe. The above notes show that the "phylogenetic" analysis proposed by Leschen [1999] is not such and should be considered a special sorting of random characters. As a result, for example, in the Leschen's cladograms the genus *Epuraea* Erichson, 1843 of the carpophilin-lineage has a position between certainly not closely related genera of the nitidulin-lineage (*Cychramus* (Cychramini), on the one hand, and, on the other, *Thalycra* Erichson, 1843 and *Pocadius* Erichson, 1843 (Nitidulini)). Among other things, it is also the important that, for example, the genital differences and similarities in the nitidulid-group of families are related as with their origin as well as with their functionality. According to usual cladistic processing the independent consideration of interdependable characters produces a rather high weighting and unwanted noise in cladograms. It should be noted that other attempts to change the system after Leschen [1999] turned out to be even further from the data that can be obtained from studying nature. The proposals of Audisio et al. [2009] of change taxonomy of the subfamily Meligethinae have a very peculiar place, as the latter authors demonstrate their preference of branches in cladograms with generic names instead of diagnosis in proper sense or keys. However, in order to introduce such a procedure into research practice, it would be necessary to indicate the names of the used programmes and apparently include their developers as co-authors of the proposed taxa. In cases of using new software it is necessary to change all authorship (to replace the names of colleagues who prepared old software with the creators of the new software) because branches of new cladograms could become different. Unfortunately, P. Audisio et al. did not include in their paper of 2009 either the designations of the software for identification of their taxa, the characters included in their matrices, or the names of the people responsible for developing these software to identify taxa.

R.A.B. Leschen was a pioneer and founder of the fashion to unconventionally change the systematics and create new "phylogenetic" models. The some researchers after his proposal made some more radical innovations apparently considering these new proposals as a further development of the Leschen's concept clearly formulated in his next publication together with Jelínek and other co-authors [Jelínek et al., 2010]. Therefore, this publication aims to reply on these challenges from the traditional viewpoint taking into account that previous achievements of the studies of the groups here considered in the nitidulid-group of families still has a rather great matter.

Cline et al. [2014] made a first attempt to get few DNA sequences of some nitidulids and some beetles of other families and also obtained new data probably useful in future research for understanding of phylogeny of this group, although their conclusions are certainly too premature and need a further critical analysis taking into account different aspects of evolutionary process of this group. The paper by Cline et al. [2014] following the research recommendations by Jelínek et al. [2010] systematics and phylogenetics has no trace of the co-authors' attention to publications of the previous researchers. In the Abstract



of this paper the authors clearly wrote that: “We present a molecular phylogeny of Nitidulidae based on thirty ingroup taxa representing eight of the ten currently recognised subfamilies. Approximately 10K base pairs from seven loci (12S, 16S, 18S, 28S, COI, COII and H3) were used for the phylogenetic reconstruction”. These sentences really present a key to the whole paper and, probably, show the peculiar co-authors scientific opinion. They treated structural and diagnostic features as a kind of tradition that is permissible in cases where apparently no sequencing is given. That is, in their own sequencing and their own use of a computer with some software, they believe that they reach the truth, even without admitting that others may do sequencing of another set of genes, use another computer with other software and get a different result.

A.R. Cline et al. decided that the dendrogram after DNA comparison completely reflects the real phylogeny and can give a reliable ground for many changes in systematic position of nitidulid groups (in the title of their paper: “assessment of subfamilial and tribal classification”). As a result, the nitidulid Cybocephalinae was transferred as a separate family to the “Cerylonid-series”, because they fall in a branch of the mentioned dendrogram together with Endomychidae and Coccinellidae. Cline et al. [2014] also published the morphological diagnoses not only for Cybocephalidae sensu Cline et al., but also for Prometopiinae sensu Cline et al. These diagnoses are very useful to understand what these authors considered in both cases. Almost all diagnostic characters of Cybocephalidae sensu Cline et al. fit with the corresponding nitidulid characters? It is also impossible to distinguish at all the Prometopiinae sensu Cline et al. from the tribe Nitidulini sensu stricto [Kirejtshuk, Mantič, 2015]. Besides, Cline et al. [2014] changed the ranks of some other suprageneric taxa, in particular, they joined the tribes Nitidulini and Cychramini in accordance with branches of their dendrogram, and listed many changes without sufficient explanation and discussion (except their reference to “our results”). However, it can be supposed that the software currently used for creation of a “new” classification of the family is not enough perfect. Another possible thing, which could happen, is occasional appearance of an error in the primary data, which could completely change dendrogram based on small number of data and also conclusions based on it. The research progress of studies on structure of DNA, interdependence and interactions between different molecular blocks during ontogenesis are going so quickly that every year brings new unexpected achievements. The same concerns computer technologies and mathematical statistics.

Therefore, it is impossible to be sure that the results of Cline et al. [2014] will be regarded as adequate to the level of scientific development in a short future, quite the contrary. If we prefer the results of DNA comparison of data under consideration, expressed in terms of probability as absolutely true, and admit that morphological structures bear obviously less reliable evidence for phylogeny, then we are forced to recognise as questionable the position of any modern taxon for which sequencing of DNA has not yet been obtained. With this, all fossil taxa should be recognised incertae sedis with a very small probability to

be reliably determined in future. At the same time, having obtained by traditional methods rather reliable data not on few species (as in the case of molecular research) but on more than 3000 species from the nitidulid-group of families divided in accordance with many features, studied for about 300 years. Thus, if a serious conflict between the system based mainly on structures with many hundreds or thousands of examined species and that based on DNA sequences with few examined species appears, the best way is to estimate a probable reason of this conflict in detail, but not to automatically choose every conclusion after few examination of nucleotides. The extremely paradoxal case of usage of the DNA data for testing of phylogenetic relationship is known for coleopterous suborder Archostemata represented only by about 30 modern species, while some hundred fossil species have already been described. The problem is that only one modern species of *Micromalthus* LeConte, 1878 with abnormal DNA sequences is known in the Recent fauna and it completely ruins all other probable phylogenetic models, and some entomologists still now prefer to believe in the obtained results of comparison of DNA sequences of one modern species rather than a rational argumentation received from the fossil record [Kirejtshuk, 2021].

Having followed the research programme by Jelínek et al. [2010] the co-authors of the paper of Cline et al. [2014] used the supraspecific taxa without proper diagnosis, i.e. unexplained and ungrounded by the authors of both teams. The “Cybocephalidae sensu Cline et al.” and “Prometopiinae sensu Cline et al.” were, for example, used at least in some papers or supplementary files to them [Jelínek, Hájek, 2020; Smith, Szawaryn, 2024; Peris et al., 2024a] and so on. True, one co-author of the paper of Cline et al. [2014] who transferred Cybocephalinae as a separate family to the “cerylonid series”, maybe T.R. Smith, after the critics by Kirejtshuk and Mantič [2015] who suggested that this nitidulid group cannot be regarded in composition of “Coccinelloidea”, published a clear reply where the differences between families Cybocephalidae and Nitidulidae were defined as: “Cybocephalidae possesses five functional abdominal spiracles, and all tarsi have four tarsomeres, while in Nitidulidae, there are six spiracles and five tarsomeres on each leg” [Smith, Szawaryn, 2024: 448]. The use of reductions in traditional systematic research was not considered as a sufficiently significant argument for separation such groups as families (including the opinion of Hennig [1950]). The situation with tarsomeres of cybocephalines will be considered and discussed in a separate paper, which is now in preparation by A.S. Kurochkin and A.G. Kirejtshuk. Therefore the proposed diagnostic characters seems to be very strange for a group which is regarded as a member of another “superfamily”. The variability in the number of abdominal spiracles among cybocephalines needs to be studied. Even if these characters of structural reduction were to be true, can they be used as a sufficient hiatus to separate families at all? The assumption about the age of cybocephalins seems even more unfounded, since it is based solely on indirect assumptions: “Cybocephalids most likely evolved earlier along with their sternorrhynchan prey... Whiteflies (Aleyrodidae) evolved in the Jurassic... and scale insects

(Coccidae) in Early Cretaceous... Molecular dating based on 95 nuclear protein-coding sequences places the origin of the family Cybocephalidae in the Early Cretaceous around 112–128 Ma” [Smith, Szawaryn, 2024: 448–449]. In other words there is no evidence of existence of cybocephalines before the Cenozoic in the mentioned facts, although it can be expected a finding of evidence of their existence in the Mesozoic. In addition to the above mentioned support to a probability of the pre-Cenozoic origin of cybocephalins, serious argument seems to be a wide current range of the genus *Cybocephalus* Erichson, 1844 spreading through almost all zoogeographic regions, excepting the Antarctic one [Smith, 2021].

It seems that a very effective way of checking all innovations and concepts can be the methodology of multiple parallelisms, which I always used. I will discuss it below. This principle harmoniously complements the concept of integrated taxonomy and phylogenomics, providing the latter with an objective basis and a method of verification. It is difficult to imagine another way of reliable verification at present and in the past (as in Darwin’s time) [Kirejtshuk, 2021], which means that it is necessary to find a possibility to solve many problems of phylogenetic interrelations due to reconstructions based on coincidence of patterns of changes (series of interconnected facts) traced in different aspects of evolutionary processes. This principle (method) originates in the ideas of J. Agassiz and E. Haeckel, defined by the former of the two as the principle of triple parallelism, which was successfully developed by Severtsov [1912, 1914, etc.] and his followers. This principle can be extrapolated to the multiple (multidimensional) parallelism (including molecular, geographic (space) and ecological aspects). The range of applicability of this method can be essentially expanded. In accordance with the integrity of all biological systems, other aspects of their evolution can be added to the morphology, embryology, and paleontology initially included in this method. The reconstruction of relationships can be considered as “proven” (meaning most probable under the current knowledge) in case of finding in them independent congruence between morphological analysis, results of comparison of nucleotide sequences and in the fossil record. Each aspect of the phylogenetic process has its own specific limitations for interpretation and extrapolation. However, if only some concrete facts are used for calibration of any tree based on facts and regularities of another aspect (series of facts), there is a considerable risk to make a very probably mistakable result. It is precise that comparison of independent analyses of different aspects of phylogeny that, when they become in coincidence, can be regarded as some supported evidence the plausibility of phylogenetic constructions (main feature of this principle). There are many mistakes connected with usage of the method of calibrations and statistic establishment of phylogenetic branches [Toussaint et al., 2017; Cai et al., 2022, etc.] and, therefore, significance of calibration should be regarded as more or less restricted. Unfortunately, the principle of multiple (multidimensional) parallelism cannot be used to the full extent of its power, but it is necessary to choose the paleontological method of phylogenetic reconstruction as an important source of information for groups that are well-documented through

very diverse fossils, and as for which only few of its relict remnants reached the modern epoch. It can even be argued that this principle cannot be completely implemented, because there is no objective chances for a complete reconstruction of the paleontological record. However, on the other hand, the more complete the filling of all possible aspects of the consideration of phylogenesis with facts and the fewer contradictions there are between them (i.e. all conflicts between facts of different aspects that arose in the process of studies will be resolved), the more substantiated the hypothesis of genuine phylogenesis can be developed (“proven”). Thus, despite all the difficulties in using this methodology, it seems to be the only available way to get a chance to reach a more or less correct interpretation of phylogenetic relations. It seems that maximum attention should be paid to each of the available aspects during the construction of phylogenetic hypothesis. Preference for one of the aspects inevitably leads to errors in interpretation, even if calibrations are used. If the separate results based on different aspects in consideration coincide to each other, the phylogenetic reconstruction can be accepted as probable. When some results demonstrate discrepancies, it is necessary to analyze contradictions seeking ways to solve them.

By now, quite a lot of data on DNA sequencing of various groups of the considered families has been accumulated, however, the contradictions that have arisen between the hypothetical molecular “phylogenies” published in recent decades with phylogenetic data from other fields of knowledge are still only increasing. They can be resolved using the method of multiple parallelisms. Until this is done, it is better to limit comparative and evolutionary molecular studies of DNA to careful preliminary hypotheses on “molecular systematics” and “molecular phylogenetics”, as was done in correct molecular studies on the genus *Carpophilus* and other nitidulids [Brown, 2009; Brown et al., 2012, etc.], *Xenostromylus variegatus* Fairmaire, 1891 [Zhan et al., 2021] and on others without radical changes in the system and supraspecific taxonomy making other phylogenetic data phylogenetic supposedly useless and unnecessary. The latter papers on data with DNA sequences are very different not only in their conclusions, but also in their content from those proposed in the publications by Audisio with co-authors [Audisio et al., 1999, 2009; Trizzino et al., 2009, etc.], Cline et al. [2014], Lee et al. [2020], Powell et al. [2020], here analysed in detail and many others, depriving other phylogenetic data of the possibility of explaining and understanding the history of the biota by few data on random DNA sequences. The results of “molecular phylogenetics” can be recognised as really phylogenetical when they obtain some parallel concordances with other aspects of evolutionary process (but not only with correction by random calibrations).

With that the data obtained by Cline et al. [2014] should deserve a considerable attention of other researchers to estimate their due importance. It can be expected that a future comparison of this dendrogram with other computer “trees” will give more reasonable results for some concepts when new data will be filled by data from other genes, new samples of DNA from other genera, and when available software will be better

elaborated our knowledge on interactions between genes in an organism and in many successive generations will become clearer. Nevertheless, one preliminary hypothesis can be cautiously proposed based also on the published dendrogram and taking into consideration other above-mentioned aspects. According to the traditional viewpoint the nitidulid dorsal part of phallobase (“tegmen”) without deep median excision represents the remains of enlarged phallobase, but the segmented paramera irrevocably disappeared in common ancestor before divergences of the helotids, monotomids and nitidulids and apparently never appeared again. It possible to trace gradual reduction of the paramera in the modern members of the Boganiidae Sen Gupta et Crowson, 1966 [Sen Gupta, Crowson, 1966; Crowson, 1990; Kirejtshuk, 2000; Escalona et al., 2015, etc.]. The probable divergence of the family group into the families with articulated paramera (kateretid-subgroup: Apophisandridae Molino-Olmedo, 2017, Kateretidae, Smicripidae Horn, 1880, ? Parandrexidae Kirejtshuk, 1994 (this family at present is only confirmed by structure of ovipositor similar to that in apophisandrids and kateretids, but not the aedeagus), and probably Boganiidae) and the families with the dorsal part of phallobase (“tegmen”), i.e. without traces of paramera (nitidulid-subgroup: Helotidae Chapuis, 1876, Monotomidae Laporte, 1840, and Nitidulidae) is partly confirmed by the molecular data [Cline et al., 2014; Cai et al., 2022, etc.]. The next important block of very useful data suggests that the carpophiline-lineage is apparently markedly younger not only than a common ancestor of the helotid-monotomid-nitidulid block, but even probably younger than the diversification of the most of modern suprageneric groups of the nitiduline-lineage. Another valuable fact was found by Lee et al. [2020] who made the DNA sequencing for the genus *Calonecrus* Thomson, 1857, which could be not an archaic member of this nitidulid lineage, but rather a derivative one. One of the co-authors of this paper is R.A.B. Leschen who, following the peculiar research program already discussed above and published before 2020 [Leschen, 1999; Jelínek et al., 2010, etc.], kept the peculiar perception of the own targets and research results without relying on or comparing them with the results of other researchers. Although sometimes Lee et al. [2020] refer to previous publications and include them in the list of references, but do not always even check their content. For example, the authors write in their paper [Lee et al., 2020: 919] that “recently (Kirejtshuk, 2008) considered calonecrines, as well as Maynipeplinae, as separate families from Nitidulidae” although in this paper by Kirejtshuk only the possibility of isolating these groups from the nitidulids is considered (“these small groups are so distinct that they could be excluded from this family as two taxa with the family rank” [Kirejtshuk, 2008: 109]). On the base of few abstract and frequently not quite correct statements (mostly not original) Lee et al. [2020] published the divisions “Evolution of food preference”, “Evolution of diet”, “Paraphyly of Nitidulinae” and other subjects with many extraordinary but not grounded conclusions which scarcely have chances to be grounded by facts and processes in the nature and mostly followed from the conviction that the comparative conclusions obtained by Cline and his co-authors [2014] with the assistance

of computer software already available now are, in the opinion of these co-authors, absolutely reliable and true as well as these co-authors, according to their viewpoint, were used the best and most reliable DNA sequences, while everything else hardly deserves serious attention.

However, it is reasonable to assume that it will be able to make correct phylogenetic judgments based on DNA comparison dendrograms only when a set of markers will be selected in a truly intelligent way (rather than largely randomly, as is often done now). The cases discussed below show that molecular studies of nitidulids are currently far from providing a sound selection of markers (although it is possible that till now a true sound selection can only be made experimentally). It can be expected that further development of molecular research and accumulation of more reliable data will provide this selection less occasional. Each aspect of consideration of the phylogenetic process (morphological, molecular, palaeontological, ontogenetic, and others) has its own specific limitations for interpretation and extrapolation, and therefore each separate aspect scarcely can reflect phylogeny in sufficient completeness. Specific peculiarity of molecular aspect apparently mostly consists in its possibility to track sequence of divergences in the considered group. However despite difficulties, the method of multiple parallelism was used to elaborate and test the system, and further to propose the phylogenetic scenario for the nitidulid-group of families and probably will be efficient in future on systematic and phylogenetic research.

## Depositories

The used material is stored in the following depositories:

AMNY – American Museum of Natural History (New York, USA);

AMS – Australian Museum (Sydney, Australia);

ANIC – Australian National Insect Collection, CSIRO (Canberra, Australia);

CMN – Canadian Museum of Nature (Ottawa, Canada);

FMNH – Field Museum of Natural History (Chicago, USA);

MCNG – Museo Civico di Storia Naturale Giacomo Doria (Genova, Italy);

MNHN – Muséum National d'Histoire Naturelle (Paris, France);

MRAC – Musée royal de l'Afrique centrale (Tervuren, Belgium);

NHML – Natural History Museum (London, UK);

NMB – Naturhistorisches Museum (Basel, Switzerland);

NME – Naturkundemuseum (Erfurt, Germany);

NMP – Národní Museum v Praze (Prague, Czech Republic);

NRS – Naturhistoriska Riksmuseet (Stockholm, Sweden);

RNHL – Rijksmuseum van Natuurlijke Historia (Leiden, Netherlands);

QMB – Queensland Museum (Brisbane, Australia);

SAM – South Australian Museum (Adelaide, Australia);



SMNS – Staatliches Museum für Naturkunde (Stuttgart, Germany);

TMB – Magyar Természettudományi Múzeum (Budapest, Hungary);

ZIN – Zoological Institute of the Russian Academy of Sciences (St Petersburg, Russia);

ZMB – Museum für Naturkunde an der Humboldt-Universität zu Berlin (Berlin, Germany);

ZMKU – Zoological Museum of Kiel University (Germany);

ZMUC – Zoologisk Museum (Copenhagen, Denmark);

ZML – Zoologiska Museet, Lunds Universitet (Lund, Sweden);

ZMMU – Zoological Museum of Moscow State University (Moscow, Russia);

ZSI – Zoological Survey of India (Calcutta);

ZSM – Zoologische Staatssammlung (Munich, Germany).

## Classification and supraspecific taxa

### The nitidulid-group of families or the superfamily Nitiduloidea Latreille, 1802?

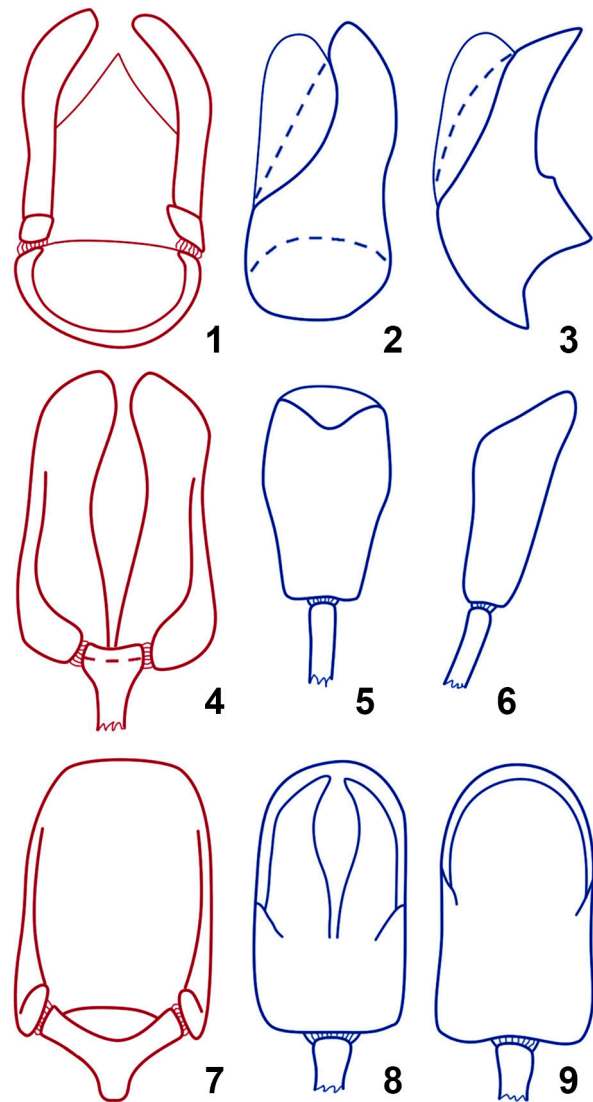
The genera currently treated as a separate family Kateretidae were traditionally long interpreted as a nitidulid subfamily (although Kirby [1837] used the incorrect taxon spelling as family “Catheretidae” (stem Kater-) and Lacordaire [1854] proposed the junior synonym “Brachyptérides”, further used by Murray [1864] and few others as Brachypteridae). Kirejtshuk [1986a] showed that these genera have the genitalia of both sexes with structure completely different from those in other nitidulids, particularly their aedeagus has somewhat expressed asymmetry (Figs 1–3) and consists of (1) phallobase with dorsally articulated paramera and ventral part of phallobase (or fork-sclerite), and also (2) penis trunk looking like a sclerotised tube (TYPE 1), while the true nitidulid aedeagus (Figs 1–9) consists of the united dorsal part of phallobase (“tegmen”) with the fork-sclerite and usually dorsoventally compressed penis trunk. The nitidulids are split into two large groups: (1) the nitiduline-lineage (Figs 7–9) with the plate-like dorsal part of phallobase (“tegmen”) not incised or somewhat incised apically and more or less sclerotised penis trunk (TYPE 2a), and also (2) the carpophiline-lineage (Figs 4–6) with the dorsal part of phallobase (“tegmen”) with a deep or frequently complete median incision (only somewhat similar to the dorsal part of phallobase with paramera in the kateretids) and more or less membranous penis trunk (TYPE 2b). In this publication [Kirejtshuk, 1986a] it was also indicated that the Kateretidae could be related more closely to Boganiidae than to the nitidulid subfamilies, as it is impossible to find a reasonable argumentation of structural transition between kateretid and nitidulid aedeagi, but some similarity of the kateretid aedeagus and that of the nitidulid carpophiline-lineage can be explained as a subsequence of similar functionality of aedeagal sclerites easier than by closer relationship. In contrast to that in the bilobed aedeagus of the nitiduline-lineage, the penis trunk in the kateretid-subgroup of families and nitidulid carpophiline-lineage exduces out of abdomen with passing between the

paramera in the first case and between separate lateral lobes of phallobase (“tegmen”) in the second one (Figs 10, 11). The nitiduline-lineage aedeagus opens by moving apart the apical parts of the two plates (dorsal part of phallobase and subflattened penis trunk), which allows the internal sac of the penis to evert into the female’s ovipositor (Figs 12, 13).

There are some interpretations on the structure of the coleopterous aedeagus and its evolutionary transformations, although two viewpoints on origin of the cucujoid ring-like aedeagus are more or less widely recognised. Crowson [1955, 1981] and later Lawrence et al. [2011] wrote that phallobase (“basal piece”) initially was only beneath the penis trunk and the dorsal tegmen with articulated paramera appeared subsequently. With this the widely spread opinion is that the tegmen consists of the phallobase with paramera or without them, and also that the paramera can disappear and appear again. This opinion is wrong at least for the families of the nitidulid-group because all families of the kateretid-subgroup almost always (except many boganiids) have paramera laterally articulated with a weakly sclerotised median tegminal lobe, while the families of the nitidulid-subgroup never have articulated paramera or lateral lobes similar to them at sides of median tegminal lobe [Kirejtshuk, 1986a], because “lateral lobes” in the latter subgroup looking like the deeply medially incised median tegminal lobe. Structure of modern boganiid aedeagus shows a trend to reduction, but scarcely restoration, while both modern and fossil members of other families of the kateretid-subgroup with known aedeagus apparently maintain an archaic tegmen or phallobase with articulated paramera. Crowson [1967] synonymised “parameron” and tegminal “lateral lobe” and this interpretation became rather popular (see above on opinion of Jelínek et al. [2010] and including in many publications devoted to the nitidulid-group of families (already here cited Audisio et al. [2008, 2014a, etc.], Peris et al. [2024a] and so on)). Even more, Crowson [1967: 16] published that the “inverted” type of the “histeroid” aedeagus with the dorsal plate without articulated appendages but with deep a median excision and processes on either side of it called him “parameres” (figure 11) that is somewhat similar to the aedeagus of the carpophiline-lineage and dorsal view of the “cucujoid” aedeagus with articulated appendages (“parameres”) [Crowson, 1967: 17, fig. 13a] that, on the other hand, is rather different from that in the kateretid-subgroup of families. Both the mentioned illustrations could be an additional reason of the further confusion in homologisation of the true paramera and the lateral lobes of dorsal part of phallobase (tegmen). There is a rather serious discrepancy consisting in the fact that all representatives on the nitidulid-group of families with the studied structure of the male genitalia, in contrast to Crowson’s indication of the probable inversion of the histeroid aedeagus, have a non-inverted aedeagus, and therefore this morphological contradiction requires a special comparative studies of genitalia in different coleopterous groups. Another hypothesis on phallobase as derivatives of abdominal segment X presents in Crowson [1981] who wrote on sternal origin of the “tegminal apodeme” (= “tegminal strut” by Sharp and Muir [1912] = “fork-sclerite” by Kirejtshuk [1998a]) which can be

the ventral part of the “phallobase” and homologised with derivatives of the sternite of the abdominal segment X, while the dorsal part of the phallobase (“tegmen”) – tergite of the abdominal segment X. However, it is difficult to be sure that this scheme of structure and transformation for the ring-like aedeagus of the nitidulid-group of families can be extrapolated on most other cucujoids or even on other coleopterous groups. As a result, there are two distinct groups of families which could be preliminarily recognised as related, although this relation remains unproved.

Despite this, Audisio [1993] proposed to unite these families back into a separate superfamily Nitiduloidea including the families Cybocephalidae, Kateretidae, Nitidulidae, and Smicripidae (mentioned in the original superfamily “diagnosis”), with incomplete and vague comparison of it with other cucujoid families (even with Boganiidae and Rhizophagidae). This author did not explain a syndrome of this taxon (complex of synapomorphies) making it possible to distinguish this taxon members of this superfamily from other cucujoid groups did not show how his proposal can correspond with rules of creation of hierarchic system at all. R.A. Crowson together with the author of this paper were going to find any argumentation for this “superfamily” in the structures of larvae and adults, but they could not do it. Till now the situation with this taxon remains almost without principal changes. Later Kirejtshuk [2000] again demonstrated that the family Kateretidae more similar to Boganiidae and Smicripidae by their genitalia, and Nitidulidae – to Helotidae and Monotomidae. As a result, the phyletic roots of these two groups of families even still now cannot be regarded as well definite. Nevertheless, parallelisms in structural transformations of pollinophagous groups closely related to Kateretidae and those closely related to Nitidulidae can be also considered as those appeared in consequence of homoplasy originated in more related groups [Kirejtshuk, 2021]. Both these groups of families are frequently united into one group of related families (superfamily Nitiduloidea), although such a combination can be recognised still as preliminary because of the above reasons and also necessity of elaboration of a true diagnostic “syndrome” to discriminate them from other cucujoids sensu lato. The list of some characters of separate groups in the paper of Cai et al. [2022] is called by these authors as the “Diagnosis” for the Nitiduloidea but it can scarcely be recognised and used as such. With this, the latter co-authors put in the superfamily Nitiduloidea also the families Protocucujidae Crowson, 1954 and Sphindidae Jacquelin du Val, 1860, but they treated as the separate superfamily Eroteyoidea with two families Boganiidae and Erotylidae Latreille, 1802, while the first seems to be closely related to nitidulid-group of families rather than any other cucujoids sensu lato. Both subgroups of families here united should be regarded as preliminary, because, despite many similarities between these subgroups, their common origin cannot yet be considered as proven and requires further careful research into many other groups of cucujoid groups (not only Protocucujidae and Sphindidae). Other models of phylogenetic relationships in the superfamily Cucujoidea sensu lato are mostly being developed through extensive comparison and analysis of DNA sequences [Robertson et al., 2015; McKenna et al., 2019; Liu et al., 2023, etc.].



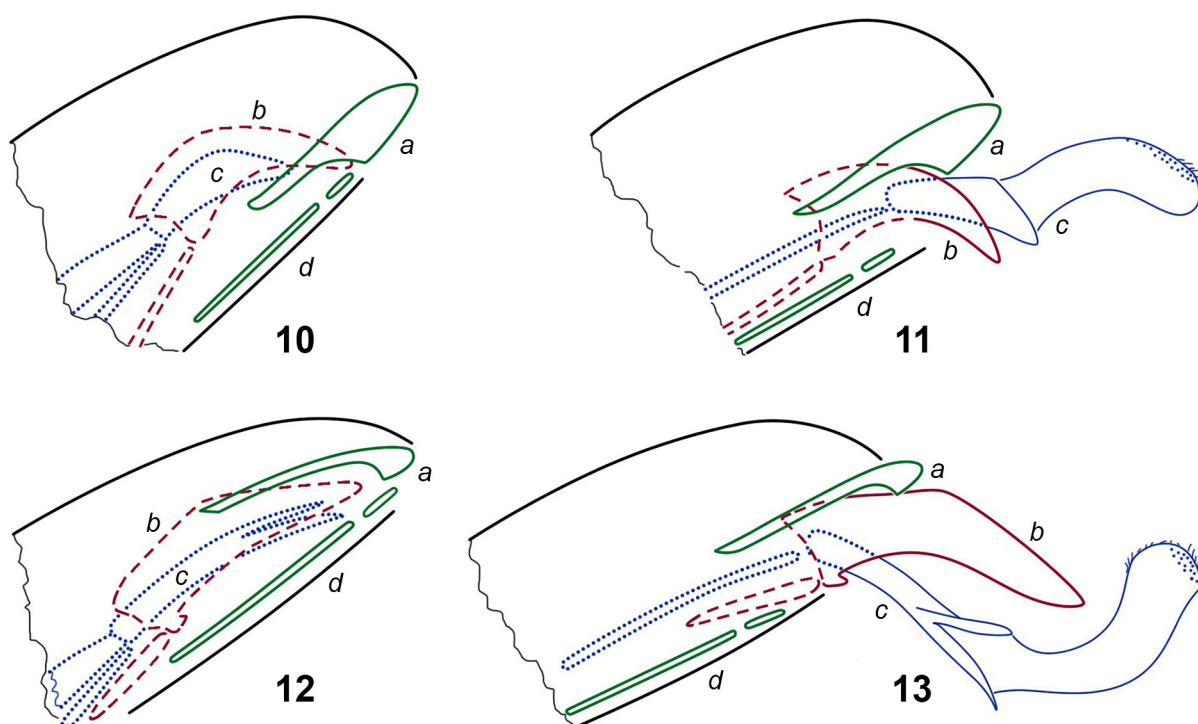
Figs 1–9. Types of aedeagal structure in nitidulid-group of families (after Kirejtshuk [1986a], with changes).

1–3 – TYPE 1: Kateretidae (and also Apophisandridae и Smicripidae); 4–6 – TYPE 2b: Nitidulidae, carpophilinae-lineage: Calonecrinae, Epuraeinae, Carpophilinae, Amphicrossinae; 7–9 – TYPE 2a: Nitidulidae, nitidulinae-lineage: Cillaeinae, Cryptarchinae, Cybocephalinae, Meligethinae, Maynipeplinae, Nitidulinae (and also Helotidae, Monotomidae). 1 – dorsal part of phallobase and paramera, ventral view; 2, 5, 8–9 – penis trunk, dorsal view; 3, 6 – same, lateral view; 4, 7 – dorsal part of phallobase (“tegmen”), ventral view.

Рис. 1–9. Типы строения эдеагуса в группе семейств, близких к Nitidulidae (по [Kirejtshuk, 1986a], с изменениями).

1–3 – ТИП 1: Kateretidae (а также Apophisandridae и Smicripidae); 4–6 – ТИП 2b: Nitidulidae, карпофилиновая линия – Calonecrinae, Epuraeinae, Carpophilinae, Amphicrossinae; 7–9 – ТИП 2a: Nitidulidae, нитидулиновая линия – Cillaeinae, Cryptarchinae, Cybocephalinae, Meligethinae, Maynipeplinae, Nitidulinae (а также Helotidae, Monotomidae). 1 – дорсальная часть фаллобазы и параметры, снизу; 2, 5, 8–9 – ствол пениса, сверху; 3, 6 – то же, сбоку; 4, 7 – дорсальная часть фаллобазы («тегмен»), снизу.

So far, they have little correspondence in position of families under present consideration with the concepts developed here and require a further thorough study of the contradictions of both considered approaches and the search for ways to resolve them. At the same time, the models proposed to date based on molecular differences also do



Figs 10–13. Sagittal section of abdominal apex: mechanism of work of aedeagus in the nitidulid-group of families (after Kirejtshuk [1986a], with changes).

10–11 – TYPE 2: Nitidulidae, carpophilinae-lineage – Amphicrossinae, Calonecrinae, Carpophilinae, Epuraeinae (similar mechanism in the kateretid-subgroup of families: Apophisandridae, Kateretidae and Smicripidae); 12–13 – Nitidulidae, nitidulinae-lineage – Cillaeinae, Cryptarchinae, Cybocephalinae, Meligethinae, Maynipeplinae and Nitidulinae (and also other families of the nitidulid-subgroup close to Nitidulidae: Helotidae и Monotomidae). 10, 12 – aedeagus retracted into the abdomen; 11, 13 – protruding aedeagus with inner sac of penis turned out. Designations: *a* – male anal sclerite (green); *b* – dorsal part of phallobase (“tegmen”) (red); *c* – penis trunk and its inner sac (blue); *d* – ventral plate and spiculum gastrale (green).

Рис. 10–13. Сагитальный разрез вершины брюшка самца: механизм работы эдеагуса в группе семейств, близких к Nitidulidae (по [Kirejtshuk, 1986a], с изменениями).

10–11 – ТИП 2а: Nitidulidae, карпофилиновая линия – Amphicrossinae, Calonecrinae, Carpophilinae, Epuraeinae (а также сходный механизм в подгруппе семейств, близких к Kateretidae: Apophisandridae, Kateretidae и Smicripidae); 12–13 – Nitidulidae, нитидулиновая линия – Cillaeinae, Cryptarchinae, Cybocephalinae, Meligethinae, Maynipeplinae и Nitidulinae (а также другие семейства подгруппы, близкие к семейству Nitidulidae: Helotidae и Monotomidae). 10, 12 – втянутый в брюшко эдеагус; 11, 13 – выдвинутый наружу эдеагус с вывернутым внутренним мешком пениса. Обозначения: *a* – анальный склерит самца (зеленый); *b* – дорсальная часть фаллобазы («тегмен») (красный); *c* – ствол пениса и внутренний мешок пениса (синий); *d* – вентральная пластинка и гастральная спикула (зеленый).

not appear to be entirely consistent with each other and should therefore be considered preliminary until they are reliably tested, including by comparison with other aspects of evolutionary process in accordance with the principle of multiple parallelisms. Another important thing is to find a reasonable place for this “superfamily” (Nitiduloidea) in the infraorder Cucujiformia obtained balanced relations with other superfamilies included in this infraorder (Clerioidea, Cucujoidea *sensu stricto*, Tenebrionidea etc.) by a logic way thanks to searching of enough actual diagnoses expressed in natural characters for discrimination of taxa, but not by any sort of splitting of branches of dendrograms with nodes of probabilistic branchings obtained thank to computer software.

#### Position of the family Apophisandridae Molino-Olmedo, 2017

During about ten years it was not clear what a position should have some genera from the Cretaceous Burmese amber with some similarity with both kateretids and nitidulids. When Poinar and Brown [2018] decided

to describe one of these genera they applied to me for an advice. I informed them that it is more likely a kateretid because a parameron was observable from under abdominal apex of the specimen examined (this is mentioned in the Acknowledgement of the Poinar and Brown's paper). After this description with the attribution of this fossil to Kateretidae many researchers described some related genera also as kateretids [Peris, Jelínek, 2019, 2020; Tihelka et al., 2021; Zhao et al., 2023a, b, etc.]. However, Molino-Olmedo [2017] decided to put one of the considered related genera in the cerambycids and proposed for it a suprageneric name of tribal rank (Apophisandrini) of the subfamily Parandrinae Blanchard, 1845. The original description is not perfect and with the only picture of not good quality. Vitali [2019], specialist on cerambycids, established some reasons to bring this tribe together with Parandrexidae. Recently the ovipositors of the Parandrexidae (*Cretoparacucujus* Cai, Escalona, Li, Huang et Engel, 2018 [Cai et al., 2018]) and genus closely related to *Apophisandra* Molino-Olmedo, 2017 [Molino-Olmedo, 2017] (*Protonitidula* Zhao, Huang and Cai, 2022 [Zhao et al., 2022]) and the “puzzle” of characters in the



genital structures was at last collected and made it possible to erect a separate family Apophisandridae as distinct from both Kateretidae and Nitidulidae but with more similarities shared with the former than the latter [Kirejtshuk et al., 2023].

Recently, Peris et al. [2024a] published one more time a support of a strong similarity of the apophisandrid and kateretid aedeagi, but, unfortunately, with some serious misinterpretations and errors in the text of this paper. It concerns a reconstruction of the dorsoventrally posthumously compressed phallobase with clearly articulated paramera and tube-shaped penis trunk with strongly oblique basal orifice [Peris et al., 2024a: figs 2E, F]. With that these co-authors did not discuss this matter in the main text of their paper, but they wrote in the supplementary file ("Table 2") that the "parameres with articulated mobile and rather weak distal portion; median lobe of the aedeagus much wider proximad". This sentence explains the certainly wrong interpretation of these authors. They regarded that the paramera like those of kateretids (= "mobile and rather weak distal portion") are homologous to lateral lobes of the nitidulid phallobase ("tegmen") because of their some similarities. Perhaps, Peris et al. [2024a] named the dorsal part of phallobase by "parameres". The penis trunk in this paper is called as "median lobe" (the term from the nomenclature by Sharp and Muir [1912]). It is a mixture of incorrect usage of morphological terms making impossible to fulfil any correct comparison by definition but gives a key to understand the entire paper under consideration and its inadequate conclusions. The title of this "Table 2" declares: "Synoptic table of the main diagnostic morphological characters and character states for purported members of the superfamily Nitiduloidea. Refer to Audisio (1993), Audisio et al. (2015) and to Figs 1–24 in Audisio et al. (2017) for complete drawings of anatomical parts and/or morphological explanations". By the way, these authors selected strange characters to distinguish the Nitiduloidea groups (without mention of important characters of thorax, abdomen, and legs), which make them difficult to identify considered taxa, and also they included "Cybocephalidae/Cybocephalinae" in this superfamily, which one of the co-authors (P. Audisio) had previously already transferred to the "cerylonid series" [Cline et al., 2014]. It can be thought that the diagnostic characters were taken by the co-authors mostly from meligethines and some other modern Palaearctic groups known to them. As it was mentioned by Kirejtshuk and Mantič [2015], this group (Cybocephalinae) has not enough serious structural characters to approach it not only to so called the superfamily Coccinelloidea, but also to regard it separately from the family Nitidulidae. Though it would be quite reasonable to take the diagnostic characters from the detailed comparison in the paper Kirejtshuk et al. [2023] with many new characters for discrimination of all families of the nitidulid-group in connection of the proposal of the family Apophisandridae. In this case, it would be possible to discuss every of the characters but not as Peris et al. [2024a] did, discussing the characters that they did not look at the original paper, and the characters that belong to other groups. With this, Kirejtshuk et al. [2023: 20] wrote: "The strict indication on the distinctness of both groups

represents the genitalia of their both sexes: paramera apparently articulated with phallobase in apophisandrids ([26]: Figure 4A) and tegmen in nitidulids; and almost evenly membranous ovipositor without clearly separated inner and outer lobes of gonocoxites in apophisandrids ([35]: Figure 1), while the nitidulid ovipositor usually has the traced sclerotized elements and separated inner and outer lobes of the gonocoxites". So one of the main discoveries of Peris et al. [2024a] was described in detail in the original paper with proposal of the family state (Apophisandridae) and they did not notice it but wrote inappropriate criticism of the latter. These two families (Apophisandridae and Nitidulidae) in most cases are rather different in the thoracic sclerites, structure of legs and abdomen from those in meligethines, but after examination of about 2500 nitidulid species and about 100 apophisandrid ones, it was found that in some cases, exceptions were present that did not allow these structural features to definitely include in the diagnosis (as, apparently, in the case of *Baltoraea* Kurochkin et Kirejtshuk, 2010).

Nevertheless, the principal differences in the genitalia in both sexes of the considered families demonstrate the clearer evidence of a rather ancient divergence, which could happened during the Jurassic. The family Apophisandridae in terms of the level of variability of many structures, is somewhat similar to Nitidulidae, which is, however, known to have much greater number of members and wider variability in many structures in representatives of both recent and fossil faunas. Thus, the present paper is a second attempt to show that apparent evidence often turns out to be false and needs to be verified in accordance with the principle of multiple parallelisms to find independent true evidence. Thus, it became clear, why Peris et al. [2024a: 598], summarizing their conclusions, declared: "We justify that this group of fossils [Apophisandridae] species should be better placed within an extinct basal subfamily of Nitidulidae, with some plesiomorphic character states shared either with Kateretidae and with some basal Nitidulidae lineages (Epuraeinae, Calonecrinae and Mayniplinae)" (note that the indicated groups have three types of aedeagal structure and are probably not closely related). This circumstance was the reason why I spent about 10 years collecting material for more reliable judgments. Only when it became clear that enthusiasts of quick descriptions and conclusions had described several species of this group in three families (kateretids and nitidulids from the nitidulid-group and also cerambycids from the superfamily Chrysomeloidea, and also in manuscripts there were ideas to classify them even as predators) had to look for ways to counteract development of this misunderstanding. It should be noticed that most enthusiasts of hasty publications followed the advice [Poinar, Brown, 2018] to classify apophisandrids as members of the Kateretidae (it was close to a correct attributions) with doubtful attributing pollination to them, but when there was a desire of others to classify them as other families, it was necessary to write down the considerations that had developed during many years [Kirejtshuk et al., 2023].

It is important to mention once again that possible transformation of the cucujoid ring-type aedeagus of the TYPE 1 in the kateretid-subgroup of families into TYPE 2

in the nitidulid-subgroup, is apparently going only in one direction, as it can be traced among modern boganiids [Sen Gupta, Crowson, 1966; Crowson, 1990; Kirejtshuk, 2000; Escalona et al., 2015, etc.] till the enlarged dorsal part of phallobase (“tegmen”) with very small remnants of paramera before complete reduction of the latter and no case of an appearance of paramera after their previous complete disappearing is known. Thus, how is it possible to explain the presence of the aedeagus of the TYPE 1 only in the kateretid-subgroup of families and the aedeagus of the TYPE 2 only in the nitidulid-subgroup of families, except phylogenetic divergence of these subgroups? It is necessary to take into account also that the structure of ovipositor of Kateretidae and Apophisandridae is different from that in Nitidulidae, which was included in “Table 2” in the paper of Peris et al. [2024a]. Probably, in this case it would be reasonable to join with Nitidulidae not only Apophisandridae, also Kateretidae with the same aedeagus, and so on. But Peris et al. [2024a] ignored these principal important aedeagal and also ovipositor similarities.

Suchwide, the kateretids as well as apophisandrids have clearly primary paramera and each parameron articulated to lateral sclerotised part of the phallobase, while its median part extended far from places of parameran articulations (Figs 1–3). The nitidulid phallobasa = “tegmen” has no trace of primary articulated paramera, its median plate is frequently excised at apex and this excision can reach phallobasal (“tegmenal”) base forming so called “tegmenal” = phallobasal lateral lobes (not lateral lobes of the aedeagus in the sense of Sharp and Muir [1912]) in the carpophiline lineage (Figs 4–9), but sometimes the phallobasa = “tegmenal” sides bear small processes. Nevertheless, the nitidulid lateral lobes and lateral processes of phallobase are certainly secondary (not homologous) in relation to primary paramera and their similarity with true paramera show no transitions in structures and it is impossible to interpret them as homology. The origin of their structural similarity is conditioned with similar functionality (Figs 10–13). According to the last studies the apophisandrid aedeagus completely fits the kateretid one (more correct reconstruction of this aedeagus and that of another apophisandrid genus will be published soon (Kirejtshuk et al., in prep.), although a preliminarily reconstruction of the later is accessible in the slide 15 of the presentation [Kirejtshuk, 2024: [https://www.zin.ru/animalia/coleoptera/rus/KIR\\_2024\\_PPT.HTM](https://www.zin.ru/animalia/coleoptera/rus/KIR_2024_PPT.HTM)]. This principal aspect of considerations is one of the main ones for systematics and phylogenetics of the nitidulid-group of families and the papers of devoted to this matter [Kirejtshuk, 1982, 1986a, b; Kirejtshuk et al., 2023, etc.] are frequently cited but without enough attention to the contents. As the above argumentation shows that the structure of male genitalia made it possible to separate not only families close to Kateretidae (including also Apophisandridae, Boganiidae and Parandrexidae), and also subfamilies of the nitidulid carpophiline-lineage (Amphicrossinae Kirejtshuk, 1986, Calonecrinae Kirejtshuk, 1982, Carpophilinae and Epuraeinae Kirejtshuk, 1986) as well as nitiduline-lineage (Cillaeinae, Cryptarchinae Thomson, 1959, Cybocephalinae, Meligethinae, Nitidulinae (including tribe

Mystropini Murray, 1864) and Maynipeplinae Kirejtshuk, 1998). It can be regarded that the genital structures are an “Ariadne’s thread” to follow traces of the phylogeny of not only three distinct clades in the nitidulid-group of families having joined to the mentioned families also the Helotidae and Monotomidae with the bilobed aedeagus (Figs 4–6), although it is possible to make the same phylogenetic reconstructions even without this “thread” thanks to a correct analysis of other morphological characters and application to the method of multiple parallelisms to explain independent evidence of phylogenetic changes.

It may be important to note that the problem of appearance of considerable similarity within not quite closely related groups in similar conditions draw due attention of many researchers (for example, as adaptive homoplasy), but not, unfortunately, attention of Peris et al. [2024a] and some other researchers. Precisely external structural similarities of anthophagous kateretids and some nitidulids (Epuraeinae and Carpophilinae (carpophiline-lineage), Mystropini and Meligethinae (nitiduline-lineage)) with very different genital structures gave reasons for Peris et al. [2024a] to unite them into one nitidulid group or closely related groups. Besides, study of changes of throphic regime in related groups gives evidence to suppose an independent origin of anthophagy, carpophagy and phyllophagy from initial mycetophagy [Kirejtshuk, 1989a, 1997a; Kirejtshuk et al., 2023, etc.], but apparently never in into opposite direction (and this regularity seems to be characteristic of beetles, and probably of many other insects). Peris et al. [2024a: 594] in the Abstract of their paper wrote: “We attempt to demonstrate their placement in an extinct basal subfamily in Nitidulidae (Apophisandrinae stat. nov.), with some partially shared plesiomorphic characters of both Kateretidae and Nitidulidae: Epuraeinae, and with a series of convergent morphological characters also shared with other extant anthophagous nitidulids including Nitidulinae: Mystropini and Meligethinae”. After excluding Kateretidae as separate family, there is no nitidulid known with the aedeagus of the TYPE 1 (Figs 1–3) and, therefore, such a proposal of Peris et al. [2024a] needs serious explanations. In the text of the lastly cited paper the authors many times repeated that the mentioned groups and also Mystropini (Nitidulinae) have plesiomorphic or symplesiomorphic characters without mention of other anthophagous groups from Carpophilinae, Nitidulini, Cychramini, Cylodini etc. and never indicating what characters can be treated as plesiomorphic. However, if these authors put the subfamilies Carpophilinae and Cillaeinae back into one subfamily (having specialised anthophagous groups with similar structures), and taking into account of close relations between apophisandrids and kateretids, their taxonomic interpretation of the groups under consideration became surprisingly reminiscent of that is presented in the Junk’s catalogue on the Nitidulidae [Grouvelle, 1913] and other publications appeared before studies on genitalia and other organs of the latter, i.e. the system of the nitidulids was somehow returned to the state that it had about 100 years ago, where many anthophagous groups were joined into three taxonomic units (Kateretinae, Carpophaginae and Meligethinae).

The causes and regularities of structural transformations during (antho-)phyllophagization of nitidulids and other beetles were discussed in detail by Kirejtshuk and co-authors [Kirejtshuk, 1989a, 1997a; Kirejtshuk et al., 2023, etc.]. All the above-mentioned subfamilies belong to different lineages, on the one hand, and have principal differences in their aedeagus, which is an evident trace of their phylogenetic divergence. Their similarities seemed to appear partly as similar adaptations or partly as consequence of shortening of ontogenetic development in such ephemeral substrate as flowers with restricted by flowering period. Therefore, some similarities, regarded as “plesiomorphic” by Peris et al. [2024a], indeed should be interpreted as secondary features as result of short larval development. The latter can be supposed because many structural similarities showing different epuraeines, carpophilines, cillaeines and some tribes nitidulines (but not mystropins), some of which are mycetophagous in larval and imaginal stages, i.e. living and developing in ephemeral substrate, like fermented tree sap and different decaying matter of plant origin. This is another principal aspect, which is very important for understanding of probable phylogeny and structural parallelisms in beetles of the nitidulid-group of families and which was ignored by Peris et al. [2024a]. Besides, it is important to note that the family Parandrexidae, closely related to apophisandrids, kateretids and probably boganiids, is known from the Middle Jurassic [Kirejtshuk, 1994b; Lu et al., 2015, etc.] and Crowson [1981] put forward a very productive hypothesis on relations between Boganiidae, Nitidulidae and Parandriidae recently obtained a new support [Kirejtshuk et al., 2023], but this hypothesis even is not mentioned at all by Peris et al. [2024a, b]. Thus these two publications express the research program defined by Jelínek et al. [2010] with ignoring of the principal significance of genital structures of both sexes in the considered group of families, and also with ignoring of similar structural and bionomical regularities in parallel changes in phylogeny of related groups.

Thus, as the research program for studies declared by Jelínek et al. [2010] found a complete expression in the publication of Peris et al. [2024a], it is quite clear why the Apophisandridae found a position as a subfamily among nitidulids. Nevertheless, the argumentation of it should be regarded as mostly erroneous, because based on misinterpretation of some principal characters, wrong homologisation and misinterpretation of some important things from morphology, paleontology and phylogenetic methodology.

#### Position of the genera

***Baltoraea* Kurochkin et Kirejtshuk, 2010,  
*Cornuturetes* Peris, Jelínek et Audisio, 2024,  
*Cretabaltoraea* Peris, Jelínek et Audisio, 2024,  
*Diopsiretes* Peris, Jelínek et Audisio, 2024,  
*Protokateretes* Zhao, Huang and Cai, 2023,  
 and *Vetunitidula* Zhao, Engel, Huang et Cai, 2025  
 (Apophisandridae)**

These genera were initially proposed in the composition of different families: *Baltoraea*, *Cornuturetes*, *Cretabaltoraea* and *Diopsiretes* as members of Nitidulidae,

while *Protokateretes* as a member of Kateretidae. The tomographic scanning and reconstruction of the external surface of *Baltoraea simillima* Kurochkin et Kirejtshuk, 2010 [Peris et al., 2024b] made it possible to observe its underside with clearly visible outline of thoracic sclerites (particularly posterior edge of metaventricle deeply excised as characteristic of apophisandrids but rare among nitidulids, which was not visible before during preparation of its original description), also the recent re-examination its previous imagines [Kirejtshuk, 2015: [https://www.zin.ru/animalia/coleoptera/rus/baltor\\_g.htm](https://www.zin.ru/animalia/coleoptera/rus/baltor_g.htm)] allow to conclude that its tarsomere 4 looks like scarcely cylindrical. Besides, the structure of anterior part of the front and mandibles are more or less different from those characteristic of nitidulids and somewhat similar to those in some apophisandrids. The same can be supposed about strong thorns, characteristic of apophisandrids, but not most known anthophagous nitidulids. Oppositely, the absence of visible crenellation along the posterior edge of pygidium and hypopygidium of *Baltoraea* species is characteristic of nitidulids rather than apophisandrids. Nevertheless, the opinion of D. Peris et al. in approaching *Baltoraea* looks like admissible because there is no (pollino-)anthophagous member among nitidulids having seriate elytral punctation. At the same time, such an attribution is still questional and needs further support (tomography of the genitalia would be best). Although the increasing similarity of species of this genus (the youngest of the known apophisandrids) with some nitidulid groups and not with other members of the apophisandrids, it can be assumed that it is connected with the peculiarity of the expression of the tendency in structural transformation simplifying some structures in groups with short larval development and/or special host plant.

As to other above-mentioned genera, all they are very clearly apophisandrids in many characters mentioned by Kirejtshuk et al. [2023] in legs, head and its appendages, thoracic sclerites, abdomen and legs, which are quite discriminative in cases when they were illustrated in the pictures published in these papers. Peris et al. [2024a, b] put them to Kateretidae or Nitidulidae apparently without attentive application to the original family diagnosis of the apophisandrids and detailed comparison of them with other nitidulid-group families and important diagnostic characters are missing in the text of original descriptions of the type species of the above-mentioned genera. As for the Peris' et al. remarks that the species of the genus *Protokateretes* have cylindrical tarsomere 4 like that in the kateretids, it can be recommended that they look closely at the photographs of the species described by them and other photographs of this genus, especially the legs of its type species [Zhao et al., 2023a, b, 2024; Peris et al., 2024a, b], and compare their remarks with the re-description of this taxon (Apophisandridae) in paper of Kirejtshuk et al. [2023]. Of course, determining whether the ends of a very small cylinder or cone are cut off (crosswise or beveled), and also presence of small setae on its lower surface in a small beetle in amber are a rather delicate problem and should be supplemented by other more reliable accompanying characters.



**Subfamily Vetunitidulinae Kirejtshuk, subfam. n.  
(Apophisandridae)**

Type genus *Vetunitidula* Zhao, Engel, Huang et Cai, 2025.

**Diagnosis.** The new subfamily is rather distinct from another subfamily (Apophisandrinae sensu stricto) in the shape and structure of the abdominal apex in male: last abdominal segment much longer than wide, and subrectilinearly narrowing apically, pygidial apex rather narrow, subtruncate and without trace of serration, hypopygidium with clear laterosternites.

**Notes.** The type species of this genus has an extraordinary structure of its rather narrow abdominal apex, unique among more than a hundred of fossils having studied by the author of this paper and clearly visible in the original description [Zhao et al., 2025], which is considered as a good reason to propose a new subfamily. Representatives of the nominative subfamily have the last abdominal segment wider than long, with moderately narrow to rather wide apex, which is usually distinctly serrate apice of pygidium and/or hypopygidium along their posterior edge.

**Notes on *Boreades* Parsons, 1943**

This generic name was proposed for one Nearctic species originally described as *Cercus abdominalis* Erichson, 1843, synonymised by Audisio [1993] with *Heterhelus* Jacquelin du Val, 1858, but Hisamatsu and Lee [2007] decided that it is possible to regard together in a separate "subgenus" *Boreades* with two species: *Heterhelus* (*Boreades*) *abdominalis* and *H. (B.) solani* (Heer, 1841). Indeed, the determination of two most common Palaeartic species (*H. scutellaris* (Heer, 1841) and *H. solani*) sometimes is very complicated because of their great variability in many external characters. On the other hand, the distinctness of the body of *Boreades abdominalis* from all true Palaeartic and Nearctic members of the *Heterhelus* sensu stricto and *Taiwanoheterhelus* Hisamatsu et Lee, 2007 in the peculiarities of body colouration and the sculpture of integument, and also some characters of the underside demonstrate that *Boreades abdominalis* is very distinct from all members of *Heterhelus*. The proper taxonomic rank of *Boreades* and its relations within kateretids require a further revision.

**Genus *Mesohelotopsis* Kirejtshuk, gen. n. (Helotidae)**

Type species *Metahelotella monochromata* Liu, Ślipiński, Ren et Pang, 2019.

**Notes.** One helotid species from the Cretaceous Burmese amber described by Liu et al. [2019] as a member of the genus *Metahelotella* Kirejtshuk, 2000 is really somewhat similar to modern species of this genus, but rather distinct from them in the shape of pronotum and structure of its basal border, elytral basal border, and also very peculiar elytral sculpture, and, therefore, it needs to be considered as a new genus. Characters of the underside of the Mesozoic "congener" are not clearly visible. Other fossil helotids were described in publications [Liu et al., 2019; Tihelka et al., 2020; Li et al., 2023].

**Diagnosis.** Body elongate elliptical, moderately convex both dorsally and ventrally; head slightly longer than wide; long pronotum with archuate anterior edge strongly projecting anteriorly and with scarcely expressed anterior angles, posterior edge thickly bordered and distinctly bisinuate, posterior angles very sharply acute; elytra widest at anterior fourth, with base strongly thickly bordered and looking like sharply convex transverse stripe laterally, projecting as acute process; elytral integument basally and along suture alutaceous and covered with very shallow, coarse and greatly interspaced punctures showing slight trace of longitudinal rows and interspace between them with diffuse and very fine punctures; oppositely, lateral part of elytral integument in distal four-fifths smooth and covered only with coarse deep and greatly interspaced punctures arranged in regular rows; legs rather long and narrow.

**Comparison.** In contrast to all recent helotids, *Mesohelotopsis monochromata* **comb. n.** has (1) the rather convex and very long pronotum with archuate anterior edge strongly projecting anteriorly and with scarcely expressed anterior angles, but posterior angles very sharply acute; (2) elytral base strongly thickly bordered and looking like a sharply convex stripe laterally projecting as acute process; (3) elytral integument basally and along suture alutaceous and covered with very shallow, coarse and greatly interspaced punctures with slight trace of longitudinal rows and interspace between them with diffuse and very fine punctures, oppositely, the lateral part of elytral integument in the distal four-fifths smooth and covered only with coarse deep and greatly interspaced punctures arranged in regular rows.

All known fossil members of the family are characterised of the rather long pronotum. Representatives of *Mesohelotopsis* **gen. n.** have the somewhat wider body, very strongly vaulted borders along pronotal and elytral base distinctly separated from the remaining integuments of the pronotum and elytra, extremely characteristic sculpture and punctuation of its integument, in particular on elytra, very distinct from those of other fossil genera, although character of elytral punctuation is somewhat similar to that in *Burmahelota* Liu, Ślipiński, Ren et Pang, 2019. Besides, the new genus differs from:

– *Burmahelota* in the distinctly and deeply bi-sinuate pronotal base with median process only slightly projecting posteriorly, pronotum as arcuately narrowing to apex as to base (not widest at anterior edge);

– *Lobatihelota* Li, Liu et Cai, 2023 in the much larger and not strongly projecting laterally eyes, pronotum gently arcuate at sides (not subquadrate) and absence of elytral costae;

– *Palaeohelota* Liu, Ślipiński, Ren et Pang, 2019 in the markedly shorter head (particularly frons), distinctly and deeply bi-sinuate pronotal base with median process slightly projecting posteriorly (not gradually convex), pronotum distinctly convex and more arcuate at sides, absence of elytral costae;

– *Trihelota* Tihelka, Huang et Cai, 2020 in the pronotum gently arcuate at sides (not subquadrate), elytra without spots with completely smooth and coloured integument.

**Etymology.** “*Meso-*” from Mesozoic, “*heloto-*” from *Helota* and “*-opsis*” (“οψις”) meaning “resembling a (specified) thing”. Gender feminine.

The corrected combination of the type species should be *Mesohelotopsis monochromata* (Liu, Ślipiński, Ren et Pang, 2019), **comb. n.**

**On the family Cybocephalidae sensu Cline et al. [2014] and subfamily Prometopiinae sensu Cline et al. [2014]**

Cline et al. [2014] proposed the transfer of one nitidulid group of genera usually regarded as the subfamily Cybocephalinae into another place corresponding that in their cladogram, i.e. within “Cerylonid series”, erected a subfamily rank among nitidulids for many members of the *Megauchenia*-complex of the genera (Prometopiinae Böving et Craighead, 1931: *Axyra* Erichson, 1843, *Megauchenia* Macleay, 1825, *Megaucheniodes* Audisio et Jelínek, 1993, *Palaeometopia* Kirejtshuk, 2007, *Prometopia* Erichson, 1843 (including the subgenus *Parametopia* Reitter, 1884), *Pseudoplatychora* Grouvelle, 1890, and *Taraphia* Audisio et Jelínek, 1993), and also proposed some strange grouping of other nitidulids, based only on comparison of sequences of some nucleotids. Many these innovations strongly contradict the previous taxonomic classification of the family [Kirejtshuk, 2008] and have no real support beyond the dendrogram, created by a computer after comparison of DNA sequences. The authors of this publication regarded that the systematic position of taxa can be defined only its placement in their dendrogram created by computer software. Kirejtshuk and Mantič [2015] demonstrated that the diagnoses of Cybocephalidae sensu Cline et al. [2014] and the subfamily Prometopiinae sensu Cline et al. [2014] are not applicable. The Cybocephalinae were returned to the nitidulids, while the Prometopiinae without any character for discrimination of the above-mentioned genera from the remaining genera of the tribe Nitidulini sensu stricto was returned to the nominotypical tribe. Some corrections in the dendrogram of Cline et al. [2014] were made also by Lee et al. [2020] after involving in this dendrogram new DNA sequences, but the lastly mentioned coleopterists tried to find a base of their “phylogenetic” constructions exceptionally on comparison of molecular data and without any other support, particularly with ignoring data on real phylogeny in past. Therefore the conclusions of both these papers need a serious critical revision with use of the method of multiple parallelisms.

**Notes on “reclassification” of the subfamily Carpophilinae by Powell et al. [2020]**

Some interesting ideas were included in the paper by Powell et al. [2020] devoted to generalizations after very few sequencing of some carpophilines. However, these authors not always strictly adhered to the International Code of Zoological Nomenclature [1999] and, therefore, their conclusions need to be revised and supported by facts used in any logic classification. It is necessary to explain why the “new” proposed “reclassification” is preferable to place the previous one, developed by many scientists beginning

from C. Linnaeus. In the Abstract of this “reclassification” is declared: “The most complete molecular phylogeny of Carpophilinae to date, based on 37 ingroup taxa, covering four of the six recognised genera, is presented... These data were generated using a novel method discussed here” [Powell et al., 2020: 1359]. The authors of this publication as well as before Cline et al. [2014] regarded that the systematic position of taxa can be defined only its placement in their dendrogram created by computer software. In contrast to other above considered [Leschen, 1999; Cline et al., 2014], these authors informed about number of species taken by them for their “comprehensive” contribution in the systematics and the present discussion with them can be much simpler than with two other groups of co-authors. In the section “Systematics”, Powell et al. [2020] cited many papers but no publication concerned the matter of their “reclassification”, except Cline et al. [2014], i.e. one of the co-authors of the paper under consideration considered in detail above, although some brief information was included in the text of their paper as “Taxon sampling”. Thus, this “reclassification” strictly follows recommendations by Jelínek et al. [2010] and founder of this fashion of the systematic research of nitidulids [Leschen, 1999] in regarding the efforts of previous researchers mostly as the “narrative and quantitative analyses” which can be generally neglected and take only the things necessary for the concept of these authors themselves. As it can be understood the “novel method” by Powell et al. [2020] consist in their usage the standard tools and methods of molecular studies, quite fashionable fragments of DNA mostly borrowed from GenBank and apparently commonly used software. As their sampling, these authors took mostly representatives of the Nearctic fauna without clarification subgeneric position of them and use arbitrary attribution for some of them and other without. Because their new concept is out the logical construction summarized in the classification published by Kirejtshuk [2008] and also without any other one, the proposed new hypothesis can not be discussed. In these notes it seems to be enough to mention only the main short shortcomings showing that this concept and “reclassification” are rather premature to consider it for replacement of the classification elaborated by previous researchers nearly during two hundred years. They concern many contradictions to the knowledge on the subfamily Carpophilinae, main of which can be formulated in the following:

A. The genus *Carpophilus* Stephens, 1830 is divided into nine subgenera [Kirejtshuk, 2008]. It means that every species should have a place in one of these nine subgenera. The “reclassification” by Powell et al. proposes a dendrogram obtained after comparison of DNA sequences and includes as well the species with subgeneric attribution as those without it. These authors in their dendrogram joined, for example, in one branch “*Carpophilus tempestivus*” (belonging to the subgenus *Ecnomorphus* Motschulsky, 1858), “*Carpophilus nepos*” (belonging to the subgenus *Myothorax*), “*Ctilodes clinei*” and “*Carpophilus fumatus*” (belonging to the subgenus *Myothorax*) and, as a result, showing a paraphily of the *Myothorax*, and, even more, this branch with four species from different genera and subgenera has a position aside from other members of

the subgenera *Ecnomorphus* and *Myothorax*. At the same time, Powell et al. [2020] put all species of one branch into one genus *Caplothorax* sensu Powell et al., although indeed they belong to the following subgenera of the genus *Carpophilus*:

1) *Caplothorax* Kirejtshuk, 1997: *C. (C.) melanopterus* Erichson, 1843 and *C. (C.) rufus* Murray, 1864;

2) *Megacarpolus* Reitter, 1919: *C. (M.) brevipennis* (Blanchard, 1842) represented by one specimen (female) in very bad condition and should be interpreted as *incertae sedis*, *C. (M.) californicus* (Schaeffer, 1911), *C. (M.) funebris* Sharp, 1889, *C. (M.) lugubris* Murray, 1864, *C. (M.) sayi* Parsons, 1843 (= *niger* Say, 1823, non Seidlitz, 1888), *C. (M.) similis* Sharp, 1889, *C. (M.) viduatus* Sharp, 1889;

3) *Plapennipolus* Kirejtshuk, 1997: *C. (P.) rufiventris* Schaeffer, 1911 and *C. (P.) yuccae* (Crotch, 1874).

It is important to note also that the type series of both *Carpophilus melanopterus* and *C. rufus* are each represented only by one female, which seem to be conspecific (according to the A.G. Kirejtshuk's preliminary examination, yet not published). However, in the dendrogram these two probably conspecific species were put in the different branches of the proposed "phylogenetic" tree.

B. The taxon *Megacarpolus* Reitter, 1919 was initially proposed for the alone Asian species (by monotypy) [Kirejtshuk, 2019] and the subsequent proposal to transfer its New World relatives to another taxon of the genus group (*Caplothorax* sensu Powell et al. [2020]) contradicts the nomenclatural procedure to not divide members of the same taxon only because of geographical isolation. Such a practice in systematic research completely contradicts all the rules of constructing hierarchical systems in principle. Besides, not only the above-mentioned species belong to this subgenus, but also the following American members: *C. (Megacarpolus) deflexus* Sharp, 1889, *C. (M.) rufitarsis* Murray, 1864, *C. (M.) transitans* Sharp, 1889, and *C. (M.) tristis* Erichson, 1843. Kirejtshuk [1997a] introduced *Caplothorax* and *Plapennipolus* only with lists of distinguishing characters for them (as differentiated diagnoses) and the formal requirements of the code are met, although a detailed revision of both subgenera and their proper diagnoses remained still needed. Powell et al. [2020] probably wanted to eliminate this gap but not successfully, because these researchers used for this purpose DNA sequences instead examination of morphological structures of each members under their consideration (their "Diagnosis" proposed by G.S. Power et al. has almost no characters which make it possible to distinguish these subgenera).

C. Only five species of *Megacarpolus* are known from the Eastern Hemisphere [Kirejtshuk, 2019]: *C. (M.) annae* Kirejtshuk, 2019, *C. (M.) funereus* Murray, 1864, *C. (M.) grandis* Motschulsky, 1860, *C. (M.) triton* Murray, 1864 (= *titanus* Reitter, 1884), and *C. (M.) variolosus* Murray, 1864, while Powell et al. [2020: 1365] believed that "many Old World taxa remain in subgenus *Megacarpolus*."

In the considered publication, the co-authors, without mentioning that the connections of the nitidulids with the generative organs of plants are known and have been studied for at least 200 years, conducted an analysis of some data and obtained that "the parsimony-based

ancestral state reconstruction recovered three independent origins of anthophily within *Carpophilinae*" [Powell et al., 2020: 1366]. These origins are, in the co-authors' opinion, happened in the genera *Caplothorax*, *Carpophilus* and *Nitops* Murray, 1864. Peculiar co-authors' interpretations of the carpophiline genera are shown in the previous paragraphs and it is not mentioned what they meant under the origin in, for example, *Carpophilus*, in which adults of many unrelated congeners certainly independently became anthophilous and anthophagous (even specialised with imaginal or complete anthophagy). At the same year another opinion with attempt to decide "evolution of feeding habits of sap beetles" by applying to comparison of DNA sequences [Lee et al., 2020] appeared which produced an opposite result. Unfortunately, the co-authors of both these papers did not indicate how one could check the conformity of their conclusions with the facts in nature and, accordingly, their applicability in biology. Therefore, as in the previous case, the conclusions of Powell et al. [2020] and Lee et al. [2020] need a serious critical revision with use of the method of multiple parallelisms.

#### Notes on "re-examination" of the subfamily Meligethinae by Audisio et al. [2009]

This subfamily was partly revised during the 20<sup>th</sup> century by Easton [1956, 1957a, b, 1959, 1960, 1964, 1968, etc.], Endrödy-Younga [1978], Jelínek [1975, 2000a, b, etc.] and Kirejtshuk [1979, 1981, 1989b, 1992, etc.] and other colleagues following to the traditional classification procedure and most its genera and subgenera were described in accordance with traditional diagnostic characters mostly in the structure of antennae, ultimate abdominal segment, meso- and metatibiae. However, the publication of Audisio et al. [2009] completely stopped these studies because these co-authors introduced in this large paper 22 new genera in addition to formerly recognized ones, and all of them were treated without proper diagnoses or comparison with other supraspecific taxa, but only with division "Generic description and diagnosis" for every of both new or former "genus". Thus, a very strange situation appeared in the group including about 400 species and after this proposal divided into more than 40 genera, which are impossible to identify without checking every description of all "generic" taxa included in the "re-examination". Almost the only available way to establish the genus membership is to consult P. Audisio, since he was the only one of the co-authors who had experience of studying this group before the publication of this "revision" and is probably responsible for the separation of all the species included. The paragraph 13 of the currently valid version of International Code of Zoological Nomenclature [1999] allows to accept a taxon as valid if its description includes the characters distinguished it from other taxa of this higher taxon. Audisio et al. [2009: 347] explained their approach by the following phrases: "Short differential diagnoses were not included herein for each described genus, because most treated genera are only characterised by peculiar combinations of several different morphological characters (listed in descriptions/redescriptions), and only rarely by single autoapomorphic traits". It is not clear how such



explanations can be acceptable for systematic research as taxonomic argumentation. In the end of the publication [Audisio et al., 2009: 490] these authors wrote only one paragraph with a dendrogram having the caption: “Fig. 43. Cladogram of hypothetical phylogenetic relationships between the 43 recognised genera of Meligethinae, as inferred from an exploratory and preliminary cladistic analysis based on 72 morphological characters”. With this, P. Audisio et al. did not publish any list of these 72 characters, which could illustrate probable relations of these “genera”. However, it is important for the continued possibility of using the proposed taxa in research practice to ensure their recognition through the formulation of a distinct syndrome for each of them. These authors also presented the main movements of the continents (albeit its simplified and outdated interpretation) starting from the Jurassic, as if this explains the “scenario” of the differentiation of modern meligethine “genera” accepted in this “re-examination” (in their opinion this “scenario” fits well with available data about the origin, phylogenetic position, dispersion and present-day distributions” [Audisio et al., 2009: 491]). Thus, as a result, one of most important nitidulid subfamily became without a possibility to use its generic structure and find either generic or species attribution because its previous system greatly conflicts with new one which remain ungrounded. This is a rather paradoxical situation never happened before. Biologists and scientific community till now can not determinate any of genera sensu Audisio et al. as these taxa remain without proper generic diagnoses, key to genera, matrix of the characters necessary for generic discrimination and even without name of the software which can be used for the find place in the cladogram published by Audisio et al. [2009] without explanation. Considering papers of Cline et al. [2014] and Powell et al. [2020] readers can get some impression of the authors’ viewpoint and some discussion can be possible. Even proposal of the superfamily Nitiduloidea can be discussed. But the paper by Audisio et al. [2009] is unique because in many cases it gives no chance for it. For example, the probably most archaic genus of the subfamily, *Pria* Stephens, 1830 with the most number of plesiomorphies is placed not at base in the cladogram of this paper and this is not explained in the text, although the most important diagnostic character is mentioned in its “Generic redescription and diagnosis”. This question involuntarily arises in any reader of this paper who knows this subfamily at least a little and such disappointment appears in many places of it. In the references for the “re-examination” Audisio et al. [2009] included also “Audisio P. et al. in press: Preliminary cladistic analysis of pollen-beetles of the subfamily Meligethinae (Coleoptera, Nitidulidae). *Fragmenta Entomologica*” where the list of the characters for discrimination of the “genera” accepted in this re-examination could be expected. However this cited paper, unfortunately, remains still in press. Another important peculiarity of the situation with this generic classification of the subfamily Meligethinae should be noted for readers who wants to understand its hopeless dramatic. In the text of the published paper under this consideration, Audisio and co-authors [2009] make several references to another paper on the molecular

systematics of the subfamily Meligethinae [Trizzino et al., 2009], arguing for its proposed group division. However, in the paper by Trizzino et al., the following is literally written in the Conclusions: “several slippage-derived motifs in the expansion segments provided preliminary genetic support for newly proposed taxonomic arrangements of several genera and subgenera of Meligethinae, which is in direct support of morphological and ecological data”. Thus, one paper relies on another, and the other on the first, but it is not explained to readers how to get out of this circle. In addition, Audisio and co-authors [2009] substantiate many times their classification conclusions with their own unpublished materials and the content of still unpublished data from student works (F. Lomanna and S. Strika).

For further development and discussion of the subfamily system, it was expected that the co-authors would present at least the list of characters used to create the already published cladogram, so that it would be possible to discuss the phylogeny within the framework of logical deductive methods based on established patterns, rather than statistical-probabilistic expectations based on facts formalized in matrices, which in turn still remain unknown. Some times it was published that both true diagnosis and comparison are missing in the paper of Audisio et al. [2009] and, therefore, it is no possibility to discriminate all taxa and particularly new taxa proposed in it [Kirejtshuk 2011a, b; A. Kirejtshuk, P. Kirejtshuk, 2012; Kirejtshuk, Mantič, 2015, etc.]. Nevertheless, during over 15 years passed after appearance of the paper of Audisio et al. [2009], no paper has appeared with diagnoses or comparison of the “genera” recognised by P. Audisio or his co-authors. It was not made even for “genus” *Meligethes* sensu Audisio et al. [2009] revised by Audisio et al. [2014a] without any diagnosis, comparison and key to species. As a result, it is not clear how it is possible to distinguish it from *Odontogethes* Reitter, 1871, proposed as a subgenus to separate some species from the nominotypical taxon by dentate tarsal claws. Indeed, it was later discovered that sometimes closely related species can have dentate or not dentate claws or even specimens of the same species have this character so variable that some individuals can have distinctly dentate but other simple claws. The latter two names were synonymised by Kirejtshuk [1988], but P. Audisio in some his publications recognised this synonymization and not in others (always without explanations), as well as he sometimes used the writing of *Odontogethes* (as proposed Reitter [1871] but usually “*Odonthogethes*” (probably corrected or with a misprint). In the revision of *Meligethes* Audisio et al. [2014a: 28] it is written that “available molecular and morphological datasets provide strong and concordant evidence of the robustness of a relatively large clade that includes *Meligethes*, *Brassicogethes*, *Meligethinus* Grouvelle, 1906, and likely also *Micropria* Grouvelle, 1899 (Strika 2004; Trizzino et al. 2009; Audisio et al. 2008, 2009, 2014, and unpublished data)”. However, all cited papers, which were published, have not data mentioned by Audisio et al. It can be thought that these data remain in the still unpublished “thesis” of S. Strika (2004) many times cited in publications of Audisio et al. or in other “unpublished data”. This paper has no diagnosis for the “genus” *Meligethes* sensu Audisio et al. [2014a] but has four

characters for discrimination of its subgenera sensu Audisio et al. [2014a: 29] and "*Odonthogethes*" sensu Audisio et al. [2014a: 72]: (1) "always simple (never markedly toothed or at least obtusely toothed) tarsal claws" in "*Meligethes*" and "always toothed (sharply toothed or at least obtusely toothed) tarsal claws" in "*Odonthogethes*"; (2) "microsetae of middle portion of the posterior edge of pronotum... more distinctly visible" in "*Meligethes*" and "microsetae of middle portion of the posterior edge of pronotum (in front of scutellum) less distinctly visible" in "*Odonthogethes*"; (3) "temples behind eyes (postero-lateral view) on each side always with a deep subcircular pit placed at the end of antennal grooves" in "*Meligethes*" and "postocular subcircular pit placed immediately under the posterior ventrolateral edge of each eye" in "*Odonthogethes*" (indeed this pit sometimes distinctly expressed, sometimes very slightly expressed and in other cases not expressed at all); (4) "tegmen frequently with more or less distinct projections along the distal inner edge of the paramera" in "*Meligethes*" and "tegmen always without projections along the distal inner edge of the paramera" in "*Odonthogethes*". Thus, the above-mentioned characters clearly show that a hiatus between these "taxa" was also not defined at all. Among other things, it should be noted that here the apical parts of the tegmen, separated by the apical medial excision, are called there by the co-authors as "paramera" (see also above for the understanding of consequence of the erroneous use of these morphological terms).

Finally, everybody who has looked through some representatives of the above-mentioned "genera" sensu Audisio et al. [2009] (for example, "*Meligethes*", "*Brassicogethes*", "*Meligethinus*" Grouvelle, 1906, and likely also "*Micropria*" – see above the phrase from Audisio et al. [2014a: 28]), he will be very surprised that their relations can be represented as a phylogenetic unity. Another thing is a proposal such "genus" as "*Afrogethes*" Audisio et Cline in Audisio et al. [2009] including many so different species that it is impossible to understand what reason was used to unite them. Audisio et al. [2014b] published also some remarks with information on the DNA samples of meligethines available in GenBank and proposed an interpretation of these and other data obtained from the Bayesian analysis in phylogenetic terms and expressed in a dendrogram ("phylogram"). However, the matching of dendrogram "based on molecular data" with a certain classification can have a sense and be only possible if the species involved in it are included in the groups (taxa) defined by proper diagnoses. Besides, in this case the methodology of multiple parallelism for proving of a hypothesis proposed for so integrated objects as living organisms having a common phylogenetic background can also be applied as desirable and optimal thanks to independence of supporting evidence.

Similar situations occur in species taxonomy. For example, Audisio and Spornraft [1990] described "*Meligethes matronalis*", which was subsequently synonymised with "*Meligethes subaeneus*" Sturm, 1845 [Kirejtshuk, 1997b]. After that, two more papers were published by Audisio et al. [2001, 2002] on the morphometry of the three sympatric species (two above-mentioned ones and "*Meligethes coracinus*" Sturm, 1845), their differences in

allozymes, as well as an indication that these species differ in mitochondrial DNA sequencing (as far as known last remains not published). These papers, however, showed not so much the distinctness of the three "species" as the variability of a single species with three species synonyms, i.e. cast doubt on the distinctness of the three "species". In some cases, when P. Audisio proposed new species based on DNA sequencing [Audisio et al., 1999; Trizzino et al., 2009, etc.], accompanied by a morphological diagnosis, subsequent comparison of the type specimens of these "species" showed that these studied type specimens were in their morphological structures hardly different from those of previously described species. A fairly simple way to check whether the three groups of specimens examined are one or three species would be to rear the larvae to get adults and offer them flowers of different plant species for feeding (similar to the laboratory experiments that allowed to prove the synonymy of "*Epuraea biguttata*"). This is the most reliable way to prove species separation and it is much simpler than P. Audisio used. Meligethine specimens are easy to breed because this breeding do not need any complex equipment in addition to flowering plants. By the by, these experiments can also show the true food plants of the meligethine species but not only list of plant species where the adults of beetles were collected. On the other hand, studies of larval structures will certainly give reliable data not only on real trophic interconnections between beetles and flowers but they also could bring very important facts for discrimination as of species as of groups of meligethines.

Recently some young coleopterists published dendrograms for few "genera" sensu Audisio et al. [Liu et al., 2017, 2018, 2020a, b, etc.]. These recent publications contain the all necessary data for the taxa considered in the lastly mentioned papers, including diagnostic characters, dendrograms created after studies morphological characters and comparison of DNA sequences only few "genera" and conclusions on these with initial incorrect interpretation originated from publication by Audisio et al. [2009] and also probably under the personal supervising by P. Audisio. Thus, the new coleopterists were forced to use as a base for their research only the "re-examination" by Audisio and his co-authors with correspondent unwanted defects in their conclusions. The corrections in this "re-examination" can be done only by somebody who can test the subfamily in a wide score of the whole world fauna (not local one) to estimate the "conclusions" by Audisio et al. [2009] taking into consideration the comments stated in the above. This circumstance is a serious as at the moment the conclusions of Audisio et al. [2009] and their followers have rather restricted scientific significance because of their essential taxonomic defects. Is it possible to obtain plausible results from vague premises? Such a revision is urgent in order to start an adequate research of the subfamily Meligethinae. The subfamily is extremely complicated group for systematics because of many similar structural adaptations and parallelisms, known in members of this group, even in the genital structures. Finally, it would be desirable to carry on studies of development and larval structures which will bring also new important data not only for determination of reliable food preference and species

isolation but also even for systematics and phylogeny. Probably it is reasonable to use a way of arrangement of supraspecific taxa, which was applied by Murray [1864] and Kirejtshuk [1997a, b, 1998b, etc.] in the subfamilies Epuraeinae and Carpophilinae, i.e. splitting large genera into many subgenera rather than into many genera with very weak to vanishing hiati. This re-arrangement with grounding by proper diagnostic characters will give a good base for true progress in study of this subfamily.

The above argumentation makes it impossible to use taxonomic composition of the subfamily Meligethinae proposed by Audisio et al. [2009] not only for the catalogue of insects of the Far East, but also in the taxonomy of this subfamily because many “genera” in it still remain mysterious. The only case of wrong use of species name was needed obvious correction by the correct senior synonym in the catalogue of the insects of the Russian Far East (Kirejtshuk, in prep.). The use of the Audisio’s interpretation of meligethine system apparently has led and will lead to permanent misunderstandings, uncertainties and false conclusions. The system of this subfamily preliminarily here regarded as currently admissible as a beginning to further research and improvement with addition of other taxa defined by clear diagnoses was published by Kirejtshuk [2008]. P. Audisio could at least publish the list of characters and the matrix compiled by him and his co-authors, which he used to create the “cladogram of hypothetical phylogenetic relationships” and prepare the publication of 16 years ago [Audisio et al., 2009]. If it becomes known how this cladogram was created and what computer programs were used, this will greatly facilitate the corrections and improvements of the taxonomy of the subfamily Meligethinae because this will make it possible to discuss taxonomic problems. The publication of the matrix for this cladogram will make it possible to check contradictions in coding, independence of chosen characters and probably understand why the cladogram has so peculiar branching. It can be expected that in this case some new characters will provide this matrix with very important information and current new software can produce different cladograms. These corrections could help to overcome the deep crisis in which the systematics of this important subfamily found itself 16 years ago and essentially stopped the development of taxonomy of it, becoming one of the reasons for further publications with similar shortcomings.

#### **Tribe Plesiogethini Kirejtshuk et Kurochkin, trib. n. (Cybocephalinae)**

Type genus *Plesiogethes* Zaitsev, Vasilenko et Perkovsky, 2025 (Eocene Rovno amber).

**Notes and comparison.** The larva obtained the name *Plesiogethes mali* Zaitsev, Vasilenko et Perkovsky, 2025 is characterised with some very unusual features: heavily sclerotised body integument, very long thoracic segments and elongate head with anterior part of epicranium rather projecting anteriorly and bisinuate anterior edge of labrum, very long ultimate maxillary and labial palpomeres and long lateral processes on abdominal segments I–VIII. However other its characters completely fit nitidulid ones: including characteristic body shape, head and its visible

parts of mouthparts (except ultimate palpomeres), types of setae in characteristic localization on body sclerites and pretarsus bearing a single simple microseta as well as single long capitate adhesive seta. All these features are more or less similar to those in nitidulid larvae of different groups, having free-living mode of life, and completely fit those in cybocephalines. Therefore its assignment to the subfamily Cybocephalinae, as preliminarily supposed in Zaitsev et al. [2025], is quite reasonable. Besides, it looks like reasonable to extrapolate on its lifestyle also the cybocephaline predaceous one, although the fossil larva seemed to feed different prey than those in modern cybocephaline members because rather long head, thoracic segments and legs are somehow reminiscent those in some carabids and indicate that this larva moved rather quickly and feeding on rather mobile prey. However, the lateral processes on abdominal segments could be different from the “spiracular tubes” homologous with those in other nitidulid larvae, as the very similar processes on last abdominal segments of larvae in modern cybocephalines bear apical pore (not spiracle) producing silk thread during making by prepupal larva a pupal cradle (chamber).

**Diagnosis.** Body with heavily sclerotised body integument, comparatively long thoracic segments (about as twice long as abdominal segments) and elongate head with anterior part of epicranium rather projecting anteriorly and bisinuate anterior edge of labrum, very long ultimate maxillary and labial palpomeres, long lateral processes on abdominal segments I–VIII and comparatively long legs.

#### **Draft of a possible phylogenetic hypothesis for the nitidulid-group of families**

All of the above in this section, as well as the provisions of previous publications [Kirejtshuk, 1982, 1986a, b, 1998a, 2000; Kirejtshuk et al., 2023, etc.] and discussed also above, can be presented as a preliminary draft of the hypothesis of phylogenetic relationship and is expressed in the following form for two subgroups that are apparently closely related, characterised by fundamental differences in the structure of the genitalia in both sexes and are partly commented on below as a key to the groups according to some pronounced features that require further study and verification:

1. Kateretid-subgroup of families: Boganiidae + ((Smicripinae + Kateretidae) + (Apophisandridae + Parandrexidae)).

2. Nitidulid-subgroup of families: (Helotidae + Monotomidae) + (Cybocephalinae + (Cryptarchinae + (Nitidulinae + Cillaeinae + Meligethinae)) + (Calonecrinae + (Amphicrossinae + (Epuraeinae + Carpophilinae))).

Comments to the preliminary hypothesis of phylogenetic relationships in the nitidulid-group of families:

1) Boganiidae and other families of the kateretid-subgroup: aedeagus including phallobase with dorsally articulated paramera and penis trunk looking like a sclerotised tube with two basal struts in Boganiidae and with one basal strut in Apophisandridae – Kateretidae – Smicripidae; ovipositor without differentiation of gonocoxites into inner and outer lobes.

2) Pair of Smicripidae and Kateretidae: posterior edge of metaventrite between widely separated metacoxal



cavities subrectilinear; tarsomeres 1–3 deeply bilobed and small tarsomere 4 subcylindrical.

3) Pair of Apophisandridae and Parandrexidae: posterior edge of metaventrite between narrowly separated metacoxal cavities more or less angularly excised; tarsomeres 1–4 oblique and usually unilobed or frequently slightly unilobed and small tarsomere 4 more or less lobed.

4) Pair of Helotidae and Monotomidae with many characters similar to those in Nitidulidae, including structure of genitalia of both sexes very similar to those in nitidulids could become isolated from the latter, could be separately and could be before the main divergences of nitidulids.

5) Divergences of the carpophiline-lineage (Amphicrossinae, Calonecrinae, Carpophilinae, Epuraeinae) and nitiduline-lineage (Cillaeinae, Cryptarchinae, Cybocephalinae, Maynipeplinae, Meligethinae, Nitidulinae) were considered by Kirejtshuk [1982, 1986a, b, 1998a].

### **Review of species of the *dimidiatus*-group of the subgenus *Myothorax* (Nitidulidae: Carpophilinae: *Carpophilus*) mainly from the Palaearctic and Indo-Malayan regions**

#### **Definition of the *dimidiatus*-group of the subgenus *Myothorax***

Murray [1864: 372] proposed this subgenus and defined it as: “Body subcylindrically convex, oblong. Thorax subquadrate”. This diagnosis was rather good at that time, but the increased variability of it with increasing number of included species and particularly of more variable subgenera *Ecnomorphus* with five synonyms, and later proposed *Caplothorax* and *Plapennipolus* made it insufficient. It is important addition to the original diagnosis that the subquadrate pronotum has rounded and not projecting both anterior and posterior angles, and also more or less subquadrate elytra. True, some Australian, Central and South American species of *Ecnomorphus* have similar shape of the pronotum and elytra, but the body of the latter species are not so convex as in members of *Myothorax*. Nevertheless, the subgenera need a further comprehensive revision to elaborate more adequate diagnoses for all subgenera.

The subgenus *Myothorax* is composed of many rather distinct species, while few consubgenera are characterised by very great variability of features usually considered in other species as diagnostic and, therefore, the species diagnostics in some cases is almost impossible by testing of individual specimen (particularly if only females accessible). Two groups of this subgenus are represented by closely related species distributed mostly in the Indo-Malayan members, one of these group (*dimidiatus*-group) includes also many species with the (sub)cosmopolitan ranges thanks to their inhabitation in stored products over the world. Taking into consideration the importance of the latter group for human economic activity, a key to its species, descriptions of new species and also general information of type series and synonymy of the members of this group are given below. Most characters of this group are rather variable and need

a great attention for reliable determination, although the complex of external characters combined with structural features of the male genitalia can provide an exact species identification (structure of female ultimate abdominal segment and ovipositor can be sometimes rather distinct, although they are frequently more or less similar in more than one species).

The *dimidiatus*-group is composed of species with the more subparallel-sided and more convex body, less distinct and denser punctation as well as usually with the more contrasting sculpture of integument, more developed pubescence, simple female pygidium and, as a rule, not arrow like lateral lobes of the dorsal part of phallobase (“tegmen”): *C. (M.) assignatus* sp. n., *C. (M.) brunneus* Chen, Hui et Nuang, 2020, *C. (M.) contegens* (Walker, 1958), *C. (M.) dimidiatus* (Fabricius, 1792), *C. (M.) fumatoides* sp. n., *C. (M.) fumatus* (Boheman, 1851), *C. (M.) generosus* sp. n., *C. (M.) languescens* sp. n., *C. (M.) mutilatus* Erichson, 1843, *C. (M.) nepos* Murray, 1864, *C. (M.) notatus* Murray, 1864, *C. (M.) pilipennis* Macleay, 1873, *C. (M.) pilosellus* Motschulsky, 1858, *C. (M.) robustus* Murray, 1864, stat. n., *C. (M.) schioedtei* Murray, 1864, *C. (M.) timorensis* Dobson, 1993, *C. (M.) truncatus* Murray, 1864, ? *C. (M.) xanthopterus* Murray, 1864, and *C. (M.) zeaphilus* Dobson, 1969. The holotype of *C. (M.) xanthopterus* (female, NHML, labelled with “*xanthopterus*”) described from Indonesia (Sumatra) was re-examined. However, it has only the characters allowing to attribute it with a comparable probability to a pair of *C. (M.) dimidiatus* and *C. (M.) pilosellus* because of absence of features secondary sexual dimorphism. In the Southern Hemisphere many populations were found including specimens similar to those of *C. (M.) pilosellus* which can be regarded as separate species, *C. (M.) imitatus* Semeraro, Blanck, Rako et Cunningham, 2023 and *C. (M.) truncatus*, whose discrimination, however, is so complicated that even species isolation of them remains questionable (see below).

Another *lewisi*-group of *Myothorax* units the species with the more robust, elongate oval and moderately convex body, very distinct and sparser punctation as well as with the more smoothed sculpture of integument, less conspicuous pubescence, modified female pygidium and usually with more or less arrow-like lateral lobes of phallobase (“tegmen”): *C. (M.) araucariae* Dobson, 1993, *C. (M.) lewisi* Reitter, 1884 and *C. (M.) pygidialis* Grouvelle, 1897.

The species of the *lewisi*-group are somewhat similar to *C. (M.) joliveti* Kirejtshuk, 2001 and *C. (M.) mimicus* Kirejtshuk, 2001 from the Equatorial Africa in the comparatively wide and less pubescent body with less convex dorsum, although other characters (including in structure of genitalia of both sexes) seem to give evidence that close relations between African and mentioned Asian species are scarcely probable. *Carpophilus (Myothorax) gaveni* Dobson, 1964 and *C. (M.) kusheli* Dobson, 1993 from Australia, Norfolk and New Zealand should be also regarded as members of this subgenus. Besides the last mentioned species, this subgenus includes also *C. (M.) angustatus* Murray, 1864 and *C. (M.) piceus* Grouvelle, 1906 from Madagascar; *C. (M.) australis* Murray,

1864 from Australia; *C. (M.) constrictus* Grouvelle, 1908 from Kenya; *C. (M.) fusciceps* Grouvelle, 1913 (= *C. scotti* Grouvelle, 1913, **syn. n.**, proposed on base of re-examination of the holotypes of both deposited in NHML (holotype of *C. (M.) fusciceps*, female – “Sithouette, 9 (or G)”, “Seychelle Islands, Percy Sladen, Trust Expedition”, “*Carpophilus fusciceps* Grouv.” (written by A. Grouvelle), formerly designated in the collection as lectotype by S. Endrödy-Younga in 1968; holotype of *C. (M.) scotti*, female – “Sithouette, 9 (or G)”, “Seychelle Islands, Percy Sladen, Trust Expedition”, “*Carpophilus scotti* Grouv.” (written by A. Grouvelle), formerly designated in the collection as lectotype by S. Endrödy-Younga in 1968, from Seychelles)); *C. (M.) kollerii* Grouvelle, 1912 from Democratic Republic of the Congo (Zaire); *C. (M.) mutabilis* Fairmaire, 1849 from Polynesia and New Caledonia; *C. (M.) mycetophagus* Lesne, 1938 from Equatorial and East Africa; *C. (M.) oculatus* Murray, 1864 (including *C. (M.) oculatus gilloglyi* Dobson, 1993 and *C. (M.) oculatus cheesmani* Dobson, 1993) from Polynesia; *C. (M.) piceus* Grouvelle, 1906 and *C. (M.) truncatus* from Madagascar and the latter is known also from Seychelles and some areas of Africa. One female of *C. (M.) australis* received from NHML (“Type”, “Melbourne”, “*australis*”) with length 4.5 and breadth 1.7 mm has pressed and destroyed head, pronotum, one elytron and abdominal apex and therefore its characters are not easy to interpret. This specimen is authentic and could potentially be designated as a lectotype if another authentic one with better preserved condition is not found. The original description of the last species definitely says about the peculiar shape of the pronotum and the safe elytron somewhat shorter than usually in other species of *Myothorax*.

Many references on (sub)cosmopolitan species of *Myothorax* associated with stored products were included in the very useful publication of Williams et al. [1983] and later publications on these species are too numerous and not reliable in species determination, and they can be taken from Internet and reference publications, although it is necessary to take into account that determinations of them frequently can be not enough precious. Most records of the *Myothorax* species from stored products in the catalogue of the Palearctic Coleoptera should be treated with some caution, although many of them are rather probable for appearance in Eurasia due to their importation. At the same time there are many publications on these topic which can be scarcely used because their authors do not mention or show the characters important for species identification.

**Key to males of the *dimidiatus*-group of species  
of the subgenus *Myothorax*  
mainly from the Palearctic and Indo-Malayan regions**

Females have the same external characters, differing from males mostly in the narrower protrarsi, lack of exposed anal sclerite and outlines of posterior edges of the sclerites of ultimate abdominal segment, which are usually rounded to subtruncate or subangular, rarely additionally transversely subcarinate along subcarinate posterior edge (*C. (M.) timorensis*) or excised to emarginate

(*C. (M.) robustus* **stat. n.**, *C. (M.) schioedtei*). Almost each species in the below key are provided also with a drawing of ovipositor.

- 1a. Inner edge of metatibia (usually both meso- and metatibiae) more or less distinctly convex to almost angularly widened in distal half (if convex outline of unner edge nor clear, antennomere 3 markedly longer than antennomere 2); dorsal pubescence rather dense, very conspicuous and subrecumbent ..... 2
- 1b. Inner edge of meso- and metatibiae nearly straight or very slightly curved at the middle; dorsal pubescence variable, but usually sparser, less conspicuous and recumbent (only very rarely in *C. (M.) pilipennis* inner edge of meso- and metatibiae somewhat convex) ..... 3
- 2(1)a. Submesocoxal line less curving at anterior angle of metaventrete; antennomere 3 markedly longer than antennomere 2; last labial palpomere about 1.5 times as long as wide; metafemur with moderately convex posterior edge; metatibia less widened along inner edge; prohypomera with deeper punctures clearly margined posteriorly; body subparallel-sided, usually brownish to dark brown or blackish with lighter elytra, part of underside and appendages. 1.9–3.3 mm. Figs 38–45, 155, see below also *C. (M.) dimidiatus* and Figs 46, 47. Subosmopolitous, in stored products and under natural conditions subpantropical (more common in Africa, Madagascar and Australia) ..... *C. (M.) dimidiatus*
- 2(1)b. Submesocoxal line more curving at anterior angle of metaventrete; last labial palpomere about twice as long as wide; antennomeres 2 and 3 subequal in length; metafemur with emarginate, straight or only slightly convex posterior edge; metatibia more widened along inner edge; prohypomera with shallower punctures less distinctly margined posteriorly; body somewhat more oval, with similar colouration, although in the territory under consideration often comparatively lighter. 1.5–2.9 mm. Figs 49, 50, 122–126, 156. Subcosmopolitan, in stored products and in natural localities subpantropical (more characteristic of the Indo-Malayan Region) ..... *C. (M.) pilosellus*
- 3(2)a. Body dark brownish with one bright yellowish elongate stripe or elongate oval spot on elytral disk along the middle of suture, although rarely body (sub) unicolourous ..... 4
- 3(2)b. Body subunicolourous with unicolourous elytra (yellowish to dark brown) (only some *C. (M.) robustus* **stat. n.** and *C. (M.) schioedtei* with dark elytra or lightened their base and subsutural stripes) ..... 6
- 4(3)a. Disk of each elytron in the middle or in distal two-thirds with yellowish or reddish elongate oval spot indistinctly outlined; body nearly unicolourous chestnut brown to blackish, but ventral surface of head and appendages reddish, sometimes also edges of dorsal sclerites and abdomen somewhat lighter; prosternal process with a well raised median carina reaching its apex; interspaces between punctures on elytra about as great as puncture diameter; mesoventrite with rather coarse sculpture; lateral

- lobes of phallobase ("tegmen") very long and narrow, with dense brush of hairs at midlength. 2.3–4.7 mm. Figs 114–117. Madagascar ..... *C. (M.) notatus*
- 4(3)b. Each elytron with more or less distinctly outlined yellowish elongate stripe along suture and usually along base; prosternal process with weak median carina becoming obsolete at apex; interspaces between punctures on elytra markedly broader than puncture diameter; lateral lobes of phallobase ("tegmen") moderately long and moderately narrow, only with subapical sparse hairs ..... 5
- 5(4)a. Dorsum with very contrasting microreticulation; dorsal punctation finer and denser; distance between punctures on pronotum at most one puncture diameter; mesoventrite with more or less distinct punctures; prosternal process not smoothed and with subtruncate posterior edge; submesocoxal line more curved at anterior angle of metaventrite; pubescence on dorsum rather suberect than subrecumbent; posterior ends of antennal grooves joined through more or less clear transverse concavity. Female unknown. 3.6–4.2 mm. Figs 64–73. Indonesia, Bali ..... *C. (M.) generosus* **sp. n.**
- 5(4)b. Dorsum with somewhat smoothed microreticulation, sometimes almost alutaceous; dorsal punctation coarser and sparser; distance between punctures on pronotum 2–4 puncture diameters; mesoventrite with very coarse sculpture and indistinct punctures; prosternal process smoothed and with arcuate posterior edge; submesocoxal line less curved at anterior angle of metaventrite; pubescence on dorsum rather subrecumbent than suberect; surface behind mentum and between posterior ends of antennal grooves slightly and evenly excavate. 2.3–3.9 mm. Figs 27–37. Subcosmopolitan in stored products; in natural localities in Nepal, India (Andaman Islands), Myanmar, Malaysia ("P. Tioman, Tekek"), Kalimantan, Singapore, Sri Lanka, Indonesia (Java, Sumatra, Moluccas), Philippines (Leyte, Mindanao), Papua New Guinea, Japan, Mexico; Afro-Madagascan, Australian and Polynesian regions ..... *C. (M.) contegens*
- 6(3)a. Lateral lobes of phallobase ("tegmen") very narrow and long, at least 4 times as long as width of base of each lobe ..... 7
- 6(3)b. Lateral lobes of phallobase ("tegmen") not more than 3.5 times as long as width of base of each lobe, usually wider and shorter ..... 8
- 7(6)a. Prosternum with obsolete punctation at anterior edge; metafemur never with tubercle at base of posterior edge; body very dark brown to black with somewhat lighter elytra, ventral surface of head, prohypomera, legs and antennal flagella; pronotum subunicolourous. 2.6–4.8 mm. Figs 51–57. India (Karnataka), Laos ..... *C. (M.) fumatoides* **sp. n.**
- 7(6)b. Prosternum with distinct punctation at anterior edge, reduced only at the middle; metafemur frequently with a tubercle at base of posterior edge; body usually reddish to brown (rarely dark brown to blackish) with much lighter elytra, antennal flagella, legs and usually most underside; pronotum often blackish in the middle and light along periphery. 2.1–4.6 mm. Figs 58–63. Probably subcosmopolitan under artificial conditions and with initial range in natural localities in Africa ..... *C. (M.) fumatus*
- 8(6)a. Lateral lobes of phallobase ("tegmen") flattened and disposed almost in one plane; antennomeres 2 and 3 subequal in length; last labial palpomere clearly widened apically, nearly as long as wide or only 1.5 times as long as wide at apex; body with more or less uniform colouration, with reddish to brownish dorsum; body comparatively small, wide and subparallel-sided ..... 9
- 8(6)b. Lateral lobes of phallobase ("tegmen") moderately or strongly curved posteriorly and laterally; combination of other characters different ..... 10
- 9(8)a. Body almost inconspicuous pubescent and more robust; last labial palpomere only slightly longer than wide at apex; elytra shorter than their width combined and with more arcuate sides; meso- and metatibiae widest as apical fifth; metafemur less than 2.5 times as long as wide; lateral lobes of phallobase ("tegmen") heavily sclerotised, with lateral lobes shorter and rounded at apex. 2.4 mm. Figs 86–94. Cambodia ..... *C. (M.) languescens* **sp. n.**
- 9(8)b. Body clearly pubescent and usually more slender; last labial palpomere about 1.5 times as long as wide at apex; elytra subequal to or somewhat longer than their width combined and with less arcuate sides; meso- and metatibiae widest just at apex; metafemur about or more than 2.5 times as long as wide; lateral lobes of phallobase ("tegmen") slightly sclerotised, with lateral lobes longer and obliquely truncate at apex. 1.7–3.2 mm. Figs 106–113. Subcosmopolitan in stored products and subpantropical in natural localities ..... *C. (M.) nepos*
- 10(8)a. Lateral lobes of phallobase ("tegmen") almost angularly inclined ventrally; anterior part of prosternum and apex of its process with obsolete punctation; posterior edge of prosternal process subtruncate rather than arcuate; body comparatively large: 3.1–5.6 mm; unicolourous straw yellow to brownish or blackish, with lighter basal and subsutural parts of elytra as well as underside, legs and antennal flagella. Figs 127–132. Indonesia (Maluku), Papua New Guinea ..... *C. (M.) robustus* **stat. n.**
- 10(8)b. Lateral lobes of phallobase ("tegmen") gently and arcuately inclined ventrally; combination of other characters usually different ..... 11
- 11(10)a. Lateral lobes of phallobase ("tegmen") with very long and dense hairs or hyaline process at the middle of sides, widened at the middle and rather narrowed apically; last labial palpomere not longer or slightly longer than its width at apex; body usually darker (brownish to dark brown with lighter elytra and appendages) and in general smaller: 2–3.1 mm ..... 12
- 11(10)b. Lateral lobes of phallobase ("tegmen") only with some short subapical hairs, gently narrowed to obliquely truncate or blunt apices, if hyaline process developed, it located at base of lateral lobes of phallobase ("tegmen"); last labial palpomere at least 1.5 times longer than its width at apex; body usually lighter and in general larger: 2–4.8 mm ..... 13



- 12(10)a. Antennomere 3 markedly longer than antennomere 2 and more than twice as long as its width at apex; lateral lobes of phallobase ("tegmen") strongly haired at the middle and without hyaline process, their apices not sharply pointed and gently curved dorsoventrally; last labial palpomere clearly widened to oblique apex; anterior part of prosternum with quite distinct punctation; prosternal process with apex rather widely rounded to subtruncate; body somewhat lighter and, as a rule, larger: 2.2–3.1 mm. Figs 148–154. Subcosmopolitan in stored products and, perhaps, with initial range in Africa ..... *C. (M.) zeaphilus*
- 12(10)b. Antennomere 3 usually not longer than antennomere 2 and much less than twice as long as its width at apex; lateral lobes of phallobase ("tegmen") without distinct hair at the middle, but with a long hyaline process, their apices sharply pointed and strongly curved dorsoventrally; last labial palpomere rather subquadrate; anterior part of prosternum with very reduced punctation or impunctate; prosternal process with apex rounded to subangular; body somewhat darker and, as a rule, smaller: 2–2.6 mm. Figs 74–85. Probably potentially subcosmopolitan in stored products; in natural conditions in China (Shaanxi, Yunnan), India (Kerala), Thailand, Togo, Gambia, Equatorial Guinea ..... *C. (M.) brunneus*
- 13(12)a. Prosternum with distinct punctation and very smoothed sculpture at anterior edge, apex of its process subsemicircular; metafemur considerably more than 2.5 times as long as wide; antennomeres 2 and 3 comparable in length; body in general comparatively more slender and often with darkened pronotum (disk to entire sclerite), elytral apices, metaventrite and sometimes abdomen. 2–4.1 mm. Figs 95–105. Subcosmopolitan in stored products and in natural localities subpantropical; probably with its initial range in the Eastern Hemisphere (most likely in the Indo-Malayan Region) ..... *C. (M.) mutilatus*
- 13(12)b. Prosternum with obsolete punctation and sculpture at anterior edge; metafemur usually not more than 2.5 times as long as wide (in *C. (M.) schioedtei* metafemur sometimes longer); body in general larger: 2.4–4.8 mm; usually colouration different ..... 14
- 14(13)a. Antennomere 3 slightly longer than wide at apex and distinctly shorter than antennomere 2; pronotum somewhat wider at anterior edge than at posterior edge and with slightly arcuate sides; pronotum and elytra with sparse and coarse punctures, interspaces between them about two puncture diameters or broader; tibiae somewhat narrower than antennal club and mesotibia with prominent two teeth in distal fourth; body unicolourous straw reddish, comparatively more slender and smaller: 2.4–2.6 mm. Figs 140–147. Timor ..... *C. (M.) timorensis*
- 14(13)b. Antennomere 3 markedly more than twice (2.5–3.5 times) as long as wide at apex and at least about as long or longer than antennomere 2; medioanterior part of prosternum rectilinear from side; body in general larger: 2.4–4.8 mm; combination of other characters different ..... 15
- 15(14)a. Body more convex, with lateral edges of pronotum invisible or nearly invisible from above; pronotum with subrectilinear sides at basal two-thirds and narrowed markedly more strongly anteriorly than posteriorly; prosternal process distinctly truncate at apex; body variable in colouration: usually unicolourous reddish to dark brown, sometimes with darkened elytra or with lighter part of underside and appendages; elytra comparatively shorter (about 5/6 as long as wide combined); lateral lobes of phallobase ("tegmen") with wider apices. 2.4–4.6 mm. Figs 118–121. Australia (Queensland, New South Wales, Australian Capital Territory, South Australia), New Zealand ..... *C. (M.) pilipennis*
- 15(14)b. Body less convex with lateral edges of pronotum clearly visible from above; pronotum with not vertically sloping and subrectilinear sides, comparably narrowed as anteriorly as posteriorly; prosternal process subsemicircular at apex; elytra comparatively longer ..... 16
- 16(15)a. Antennomeres 2 and 3 comparable in length; body chestnut brown to blackish pronotal disk, but elytra, ventral surface of head, prohypomera, ventrite 1 and appendages considerably lighter or sometimes unicolourous bright reddish with somewhat darkened pronotal disk; lateral lobes of phallobase ("tegmen" longer) less dorsoventrally curved and with wider apices. 2.7–3.3 mm. Figs 14–26. Malaysia (Kalimantan, Sabah), Indonesia (Sulawesi) ..... *C. (M.) assignatus* **sp. n.**
- 16(15)b. Antennomere 3 markedly longer than antennomere 2; colouration different: usually body unicolourous light reddish or with straw yellowish elytra, although sometimes to unicolourous brown (very rarely with infusate pronotal disk and elytral apices); lateral lobes of phallobase ("tegmen") comparatively short, strongly dorsoventrally curved and with narrower apices. 2.4–4.8 mm. Figs 133–139. Vietnam, Laos, Thailand, India (Andaman and Nicobar Islands), Malaysia (Kalimantan), Indonesia (Sumatra, Lombok, Irian Jaya, "Nancorvi", "Sumbawa"), Philippines (Leyte, Luzon, Mindanao), USA (Hawaii) ..... *C. (M.) schioedtei*

*Carpophilus (Myothorax) assignatus* Kirejtshuk, **sp. n.**  
(Figs 14–26)

**Type material.** Holotype, ♂ (SMNS): Malaysia, "Borneo: Sabah, Crocker Range N.P., NW Keningau, 900–1200 m, 16–20.XI.1996, W. Schawaller". Paratypes: 1♂, 2♀ (SMNS, ZIN), Malaysia, "Borneo: Sabah, Crocker Range N.P., NW Keningau, 900–1200 m, 17.XI.1996, W. Schawaller".

**Additional material.** 1♀ (NHML), Indonesia, "Sulawesi Utara, Danau Moot, 1 200 m, nr. Kotamobagu, Aug. 1985", "tray 2", "Fog 18, 1 100 m, coffee, I.viii.85", "R. Ent. Soc Lond., Project Wallace, B.M. 1985–10".

**Description.** Male (holotype). Length 3, breadth 1.2, height 0.7 mm. Body rather convex dorsally and ventrally; chestnut-brown, with darkened disk of pronotum and lighter (reddish) elytra, ventral surface of head, legs, prohypomera and appendages, but slightly darker prosternal disk; dorsum with oily lustre and underside moderately shining; dorsum with recumbent, weakly conspicuous yellowish hairs, somewhat longer than distance between their insertions; underside with shorter and less conspicuous pubescence.

Head surface with not quite distinct punctures, about 1.5 times greater than eye facets in diameter, interspaces between them about half of puncture diameter, with dense and fine, well conspicuous cellular microreticulation. Pronotal surface about as that on head, but punctures at least twice as coarse as eye facets and interspaces between them slightly less than puncture diameter. Elytra with punctures similar to those on pronotum, but finer and with interspaces between them slightly broader than puncture diameter. Uncovered tergites almost as punctured and sculptured as elytral apices, although with sparser punctures. Surface of prosternum with obsolete punctation and rather smooth, but before prosternal process appearing indistinct punctures and smoothed microreticulation. Mesoventrite with very coarse sculpture, submicrogranular. Metaventrte nearly as punctured as elytra, but interspaces between punctures somewhat broader and with smoothed microreticulation. Ventrites with very shallower and finer punctures in comparison with those on the rest surface, interspaces between them with dense and fine cellular microreticulation.

Head about three-fourths as long as distance between eyes, moderately convex and with moderately raised temples. Mandibles moderately strongly developed. Antennae about two-thirds as long as width of head, their club elongate oval (about 1.5 times as long as wide) and comprising about two-sevenths of total antennal length, antennomere 2 about as long as antennomere 3. Antennal grooves deepened at mentum and distinctly outlined, with a rather deep depression between their posterior ends. Mentum about 3 times as wide as long. Last labial palpomere somewhat widened to truncate apex, about 1.5 times as long as wide.

Pronotum rather convex, with subtruncate anterior edge and shallowly emarginate base, sides very slightly arcuate, anterior and posterior angles widely rounded. Elytra about nine-tenth as long as wide combined, sides steeply sloping to lateral edges. Pygidium with nearly transverse apex.

Distance between mesocoxae about one and half and that between metacoxae – one and third as that between procoxae. Prosternal process slightly curved along coxae and moderately widened before arcuately convex apex, which is somewhat narrower than antennal club. Metaventrte slightly convex, with somewhat deepened median suture. Submesocoxal line slightly deviating from posterior edge of coxal cavities at anterior angle of metaventrte and reaching metepisternum at anterior fourth of inner edge. Ventrte 1 as long as hypopygidium and little longer than ventrite 4. Epipleura at base somewhat narrower than antennal club.

Protibia somewhat wider, but meso- and metatibia more or less narrower than antennal club, with nearly straight inner edge, outer edge of meso- and metatibiae with sparse rows of short and stout spines. Profemur about one and third, mesofemur – one and two-thirds, metafemur slightly more than twice as wide as corresponding tibiae. Protarsus about two-thirds as wide as protibia, claws long and narrow, somewhat toothed at base.

Lateral lobes of phallobase (“tegmen”) heavily sclerotised.

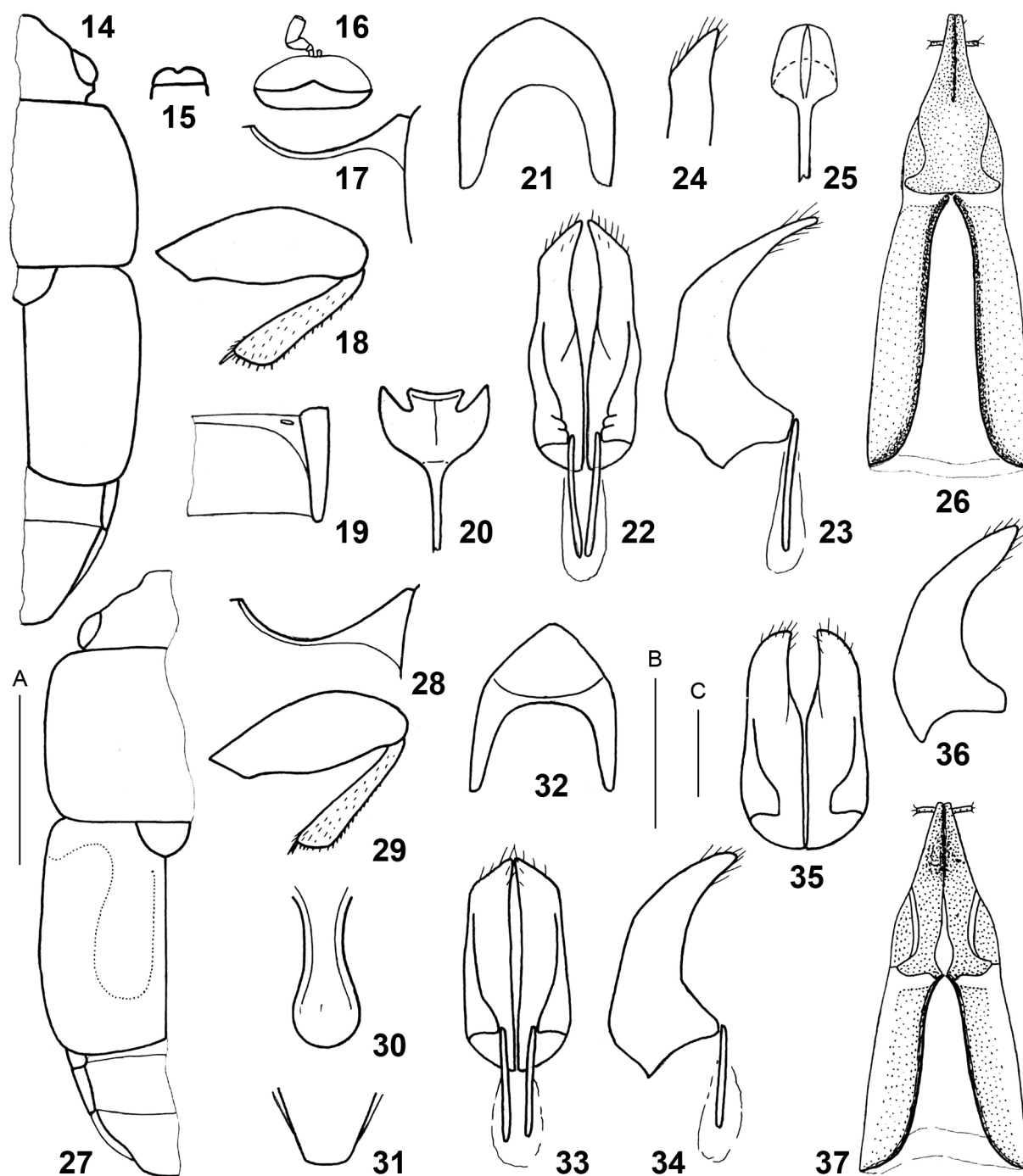
Female. Differs from male in narrower protarsus (about half as wide as protibia) and longer last abdominal segment with pygidium markedly longer than metafemur and widely rounded at apex. Ovipositor well sclerotised.

Variability. Length 2.7–3.3, breadth 1.1–1.3 mm; additional female: length 3.5, breadth 1.7, height 0.9 mm. Largest specimen in the type series (female) with pronotum slightly narrowed anteriorly from base. Punctuation of some paratypes somewhat coarser and microreticulation (particularly on pronotum) more contrasting. The additional specimen (female), in contrast to the holotype and paratypes, has much more robust and subunicolourous bright reddish body with slightly darkened pronotal disk, less conspicuous pubescence, much denser punctures on head and pronotum (interspaces between punctures on pronotum fourth to third of puncture diameter), shallower and indistinct punctures on

elytra, rather coarse punctures on prosternum behind smoothed medioanterior part without visible punctation, apex of prosternal process markedly wider than antennal club, submesocoxal line less deviating from posterior edge of cavity, somewhat wider apices of sclerites of last abdominal segment and somewhat narrower ovipositor.

**Diagnosis.** This new species has an appearance rather similar to that in *C. (M.) mutilatus* and *C. (M.) pilipennis* (*dimidiatus*-group), although its shape of lateral lobes of phallobase (“tegmen”) resembles *C. (M.) lewisi* (*lewisi*-group) rather than any other members of the subgenus. The differences of the new species from both representatives of the *dimidiatus*-group are given in the key above, however, the darkened pronotal disk and lighter elytra of *C. (M.) assignatus* **sp. n.** make it more similar to *C. (M.) mutilatus*. In addition to the mentioned characters, the new species differs from both species of the *dimidiatus*-group in the deeper antennal grooves and more or less distinct depression between their posterior ends as well as in the structure of apex of its ovipositor and from *C. (M.) mutilatus* also in less distinct punctation of dorsum, outline of submesocoxal line, more deepened median line of metaventrte and wider metatibia with peculiar outline, and from *C. (M.) pilipennis* in narrower tibiae, less distinct punctation and more raised sculpture of dorsum.

*Carpophilus (Myothorax) assignatus* **sp. n.** has a characteristic shape of lateral lobes of phallobase (“tegmen”) which allows easily to recognise it among other related consubgenera from the Palaearctic and Indo-Malayan regions. The body size and other external characters of this new species can be compared in the first turn with *C. (M.) fumatus* and *C. (M.) fumatoides* **sp. n.** It differs from both of them in the mainly lighter colouration, less distinct punctation of dorsum (particularly on head), subequal length of antennomeres 2 and 3, less distinct punctation and coarser sculpture of mesoventrite, much shorter lateral lobes of phallobase (“tegmen”) and different shape of ovipositor apex. This new species differs from the African *C. (M.) congoensis* Kirejtshuk, 2001 from Equatorial Africa (probably related to both lastly mentioned species) in lighter colouration, less distinct punctation of dorsum (particularly on head), less distinct punctation and more coarse sculpture of mesoventrite, much shorter lateral lobes of phallobase (“tegmen”), but also in the more conspicuous pubescence and light elytra without any spot or patch along suture. The new species under consideration has also some resemblance to the Indo-Malayan *C. (M.) contegens*, *C. (M.) robustus* **stat. n.** and *C. (M.) schioedtei*, but differs from all of them in its not so wide and not strongly dorsoventrally curved lateral lobes of phallobase (“tegmen”), less distinct punctation of dorsum (particularly on head), rather smoothed surface of anterior part of prosternum, narrower and more convex apex of prosternal process, peculiar outline of submesocoxal line, characteristic structure of ovipositor; and also differs from the first in its more subcylindrical body with more subquadrangular pronotum, lighter elytra and appendages, usual shape of male metafemur; from the second in its light colouration with nearly unicolourous elytra, less conspicuous pubescence; from both the first and third of lastly mentioned species in its usually finer body size, subequal length of antennomeres 2 and 3, shorter and



Figs 14–37. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

14–26 – *C. (M.) assignatus* sp. n.; 27–37 – *C. (M.) contegens*. 14 – female body, dorsal view; 15 – anterior part of frons and labrum, dorsal view; 16 – mentum and labial palpus, ventral view; 17, 28 – submesocoxal line of metaventre, ventral view; 18, 29 – male metafemur and tibia, ventral view; 19 – right half of abdominal segment 6 with spiracle, dorsal view; 20 – male ventral plate and spiculum gastrale; 21, 32 – male anal sclerite, ventral view; 22–23, 33–34 – lateral lobes of phallobase (“tegmen”): 22, 33 – ventral view, 23, 34 – lateral view; 24 – apex of lateral lobe of phallobase (“tegmen”), dorsocaudal view; 25 – penis trunk, dorsal view; 26, 37 – ovipositor, ventral view; 27 – male body with dotted outline of lighter part of elytron, dorsal view; 30 – prosternal process, ventral view; 31 – apex of female pygidium, dorsal; 35–36 – (?) extreme in variability of lateral lobes of phallobase (“tegmen”): 35 – ventral view, 36 – lateral view. Scale bars: A – 1 mm (to Figs 14, 27), B – 0.5 mm (to Figs 15–19, 21, 27–32), C – 0.25 mm (to Figs 10, 22, 23–26, 33–37).

Рис. 14–37. Виды подрода *Myothorax* рода *Carpophilus*.

14–26 – *C. (M.) assignatus* sp. n.; 27–37 – *C. (M.) contegens*. 14 – тело самки, сверху; 15 – передний край лба и лабрум, сверху; 16 – ментум и лабиальный щупик, снизу; 17, 28 – заатриковая линия метавентрита, снизу; 18, 29 – задние бедро и голень самца, снизу; 19 – правая половина брюшного сегмента 6 с духальцем, сверху; 20 – вентральная пластинка самца и гастральная спикула; 21, 32 – анальный склерит самца, снизу; 22–23, 33–34 – латеральные доли фаллобазы («тегмен»): 22, 33 – снизу, 23, 34 – сбоку; 24 – вершина латеральной лопасти фаллобазы («тегмена»), дорсокаудально; 25 – ствол пениса, сверху; 26, 37 – яйцеклад, снизу; 27 – тело самца с пунктированным очертанием осветленной части надкрылья, сверху; 30 – отросток переднегруди, снизу; 31 – вершина пигидия самки, сверху; 35–36 – (?) латеральные доли фаллобазы («тегмен») в наиболее изменчивой степени: 35 – снизу, 36 – сбоку. Масштабные линейки: А – 1 мм (к рисункам 14, 27), В – 0.5 мм (к рисункам 15–19, 21, 27–32), С – 0.25 мм (к рисункам 10, 22, 23–26, 33–37).



wider mentum, shorter last labial palpomere. Besides, from *C. (M.) oculatus* from Polynesia this new species differs in the character of its body colouration, subequal length of antennomeres 2 and 3, more dense and more distinct punctation of both dorsum and underside, more contrasting sculpture of integument, narrowly rounded apex of female pygidium, structure genitalia of both sexes. This new species is easily diagnosed from the species of the *lewisi*-group due to its subparallel-sided body, subquadrangular pronotum, dense and not quite clear punctation and rather contrasting sculpture.

**Etymology.** The epithet of this new species means “assigned”, “appointed”, “determined”.

*Carpophilus (Myothorax) brunneus*  
Chen, Hui et Nuang 2020  
(Figs 74–85)

*Carpophilus (Myothorax) brunneus* Chen, Hui et Huang, 2020: 435 (China: Shaanxi, Yunnan; holotype and paratypes).

**Material.** India. 4 ex. (NMB, ZIN), “Kerala, 1350 m, 15 km SW Munnar, 1–9.V.1997, 10.02N 76.58E, Kabar Valley, Demlický & Pachlátka”. Thailand. 1 ex. (NMB), “9–14.V.1991, Chiang DAO, 350 m, 19°22'N 98°57'E, Vit Kubán”, “Thanon Thong Chai, D. Král & V. Kubán”.

Gambia. 5 ex. (ZIN, ZML), “6 km N Kartung in cropped *Borassus* fruit, 20.XI.1977, UTM 28 PCK 851, Loc. 41”, “Cederholm-Danielsson-Hammerstedt-Hedqvist-Samuelsson”.

Guinea-Bissau. 1 ex. (ZIN), “Portug. Guinea, Bissau, 9.III.97, E. Hintz”. Togo. 1 ex. (ZMB), “Bismarckburg, 17.XI.1892, Conradt”.

**Diagnosis.** This species is very similar to *C. (M.) zeaphilus*, differing from it only in the characters listed in the above key to species. The most peculiar differences of this species from *C. (M.) zeaphilus* consists in the shape of lateral lobes of phallobase (“tegmen”) with a hyaline process on the lateral side of each, subtruncate apex of prosternal process and subtruncate apex of female pygidium. Almost all studied specimens of this species are certainly darker and with sparser punctation than all specimens of *C. (M.) zeaphilus* collected in different part of Africa and examined during this study.

Both mentioned species have a clear feature very distinct among the members of the subgenus: developed hairs or an hyaline process at the middle of each lateral lobe of phallobase (“tegmen”), which have a little reminiscence only of that in *C. (M.) mimicus* from the Equatorial Africa, and *C. (M.) notatus* from Madagascar, although both last-mentioned species are much larger and dorsally somewhat subflattened and with much larger, wider and well sclerotised gonocoxites of ovipositor than those in *C. (M.) brunneus* and *C. (M.) zeaphilus*; besides, the first has the sparser and finer punctation of both dorsum and underside, smoothed integument, slightly conspicuous pubescence, strongly widened and flattened apex of prosternal process, antennomere 3 much longer than antennomere 2, lateral lobes with quite different outline and also with shorter and not so dense hairs, while the second is different in its darker colouration with a light spot on each elytron, much denser and coarser punctation, more raised microreticulation of integument, carinate prosternal process and very long lateral lobes of phallobase (“tegmen”). Among other members of the subgenus, the considered pair of species significantly resemble *C. (M.) nepos*, differing from it not only in the structure of genitalia of

both sexes, but also in the comparatively denser and more conspicuous pubescence, narrower femora and tibiae. It is important to notice that *C. (M.) nepos* not infrequently has nearly unicolourous body and always with punctation on anterior part of prosternum.

This species and *C. (M.) zeaphilus* are more or less similar to some small species or species with very variable body size of the *dimidiatus*-group, namely *C. (M.) contegens*, *C. (M.) dimidiatus*, *C. (M.) languescens* **sp. n.**, *C. (M.) mutilatus*, *C. (M.) pilosellus*, *C. (M.) timorensis* and *C. (M.) truncatus*, but, except differences in the structure of genitalia and much coarser and sparser punctation as well as the differences, which are diagnosed both from one another, these species differs:

– from *C. (M.) contegens* in their pattern of body colouration, usually more arcuate pronotal sides, shorter last labial palpomere, outline of submesocoxal line, narrower tibiae;

– from *C. (M.) dimidiatus* and probably *C. (M.) truncatus* in their usually slightly lighter body, less raised and not so conspicuous pubescence, more arcuate pronotal sides, nearly straight inner edge of meso- and metatibiae, subtruncate apex of female pygidium;

– from *C. (M.) languescens* **sp. n.** in their darker and more subparallel-sided body, last labial palpomere not widened apically, much narrower tibiae, different shape of mesotibia, longer metafemur;

– from *C. (M.) mutilatus* in their darker body with unicolourous pronotum, usually more arcuate pronotal sides, narrower tibiae, subtruncate apex of female pygidium;

– from *C. (M.) pilosellus* in their markedly less pubescent dorsum, outline of submesocoxal line, usually more contrasting sculpture of integument, nearly straight inner edge of meso- and metatibiae;

– from *C. (M.) timorensis* in their more developed pubescence, antennomere 3 not shorter than antennomere 2, more distinct dorsal punctation, medioanterior part of prosternum rectilinear viewing from side, submesocoxal line more deviating from anterior angles of metaventre and simple apex of female pygidium.

*Carpophilus (Myothorax) contegens* (Walker, 1858)  
(Figs 27–37)

*Nitidula contegens* Walker, 1858: 206 (Sri Lanka, syntypes) = *Carpophilus contegens* Olliff, 1885: 69; *Carpophilus (Myothorax) maculatus* Murray, 1864: 372 (Oahu; syntypes), **syn. n.** = *C. (M.) vittiger* Murray, 1864: 373 (“in India orientali et insulis Waigiou, Aru, Morty, Dorey & c.”; syntypes) = *C. (M.) vittiger* var. *nigritus* Murray, 1864: 373 (Waigiou; syntypes), **syn. n.** = *C. (M.) vittiger* var. *testaceus* Murray, 1864: 273 (Waigiou; syntypes), **syn. n.** = *C. (M.) vittiger* var. *dilutus* Murray, 1864: 373 (Macassar; syntypes), **syn. n.**, non *Colastus dilutus* Motschulsky, 1858.

In total, more than 500 specimens, including type specimens.

**Type material.** Sri Lanka. 1♂, lectotype of *C. (M.) contegens* (NHML), here designated, “Type”, “Ceylon”, “*contegens*”, “*contigens* Walker (type)”.

Indonesia. 1♂, lectotype of *C. (M.) vittiger* var. *testaceus* (NHML), here designated, and 2♂, 1♀, paralectotypes of *C. (M.) vittiger* var. *testaceus* (NHML), “N. Guin., Wagiu”, “Wag.”, “Wallace”, “ex Mus. Murray”, “Fry Coll. 1905-100”; 1♀, (?) paralectotype of *C. (M.) vittiger* var. *testaceus* (NHML), “Molucas, Morty”, “Wallace”, “M.”, “Ex Mus. Murray”, “*C. vittiger* var. *testaceus* Murr.”; 1♂, lectotype of *C. (M.) vittiger* var. *nigritus* (NHML), here designated, “Wag”, “*vittiger* var.”, “*vittiger* var. *nigritus* Waigou”,

"68.106", "*Carpophilus maculatus nigritus* R.M. Dobson Det., Sept. 1984"; 1♂, (?) paralectotype of *C. (M.) vittiger* var. *nigritus* (NHML), "Moluccas", "Type", "Ex Mus. Murray", "*vittiger* var.", "Fry Coll., 1905-100", "*Carpophilus maculatus nigritus* R.M. Dobson Det., Sept. 1984"; 1♀, (?) syntype of *C. (M.) vittiger dilutus* (NHML), "Moluccas, Jilolo", "Wallace", "Fry Coll., 1905-100"; 1♀, (?) syntype of *C. (M.) vittiger* var. *dilutus* (NHML), "ex Mus. Murray", "N. Guin. Wagiu", "*vittiger* var.", "Wallace", "Fry Coll., 1905-100", "*Carpophilus maculatus dilutus* R.M. Dobson Det., lectotype"; 1♀, lectotype of *C. (M.) vittiger* (NHML), here designated, (?) Indonesia, "Type", "Murr.", "2.64.9", "68.106", "*vittiger*".

USA, Hawaii: 1♂, lectotype of *C. (M.) maculatus* (NHML), here designated (marked as lectotype in the collection by S. Endrödy-Younga in 1964), "68.106", "Type", "*maculatus*"; 1♂, 1♀, paralectotypes of *C. (M.) maculatus* (NHML), "Pacific, Sandw. I.", "ex Mus. Murray", and one of them also "51853", "Type", "Oahu", "*maculatus*, Brit. Mus. Oahu".

**Additional material** (some selected specimens). Liberia. 1 ex. (ZMB), "Monrovia, ?".

Cameroon. 1 ex. (ZMB), "von Coffea liberica, Botaa, 23.3.1938, Buhr".

Democratic Republic of Congo (Zaire). 1 ex. (MRAC), "Basoko, 18.I.1921, L. Ghesquière".

Tanzania. 1 ex. (ZMB), "zwischen Massa und Tanga, über Magila und Pangan", "14.7-6.8.1891, Conradt".

Seychelles. 15 ex. (ZIN, ZMB), "Mahé, Schultess-Merian"; 1 ex. (ZIN), Poire, 6-8.08.84, Seichel. Soviet Exped. (in Russian ).

India. 5 ex. (NMB, ZIN), "Andaman Is., Havelock I., env. of village, N 7, 11°59'N 92°58'E, 22-IV-14.V.1998, Karel & Simon Majer".

Nepal. 1 ex. (SMNS), "Gorkha Distr., Darondi, Khola zw. Motar u. Naya Sangu, 700-1100, Kulturland, 14 Aug. 83, Martens & Schawaller".

Myanmar. 1 ex. (NRS), "Kokee, Kava, Feb. 1919", "J.A. Kusche"; 1 ex. (NRS), "S. SHAN States, 1500 m, Taunggyi, I.VIII-22.IX.34, Malaise"; 1 ex. (NMB), "N. Shan S., 10-15 km N Usipaw, 600-700 m, 22.02.1996, S. Kazantzev".

Singapore. 1 ex. (MSNG), "Singapore, 1894, Modigliani".

Malaysia. 1 ex. (ZMB), "N. Borneo, Kina-Balu"; 2 ex. (ZIN), "Malaysia, Tioman, Tekek, 22.3.1987, T.-E. Leiler".

Indonesia. 1 ex. (TMB), "Sumatra"; 3 ex. (TMB), "Java, Xántus"; 1 ex. (RNHL), "Kerckhoven, Breanger, W. Java"; 1 ex. (RNHL), "Dr. R. Hagen, Tandjong, Morawa, Serdang (N.O. Sumatra)"; 1 ex. (SAM), "Aru Is., H. Elgner"; 1 ex. (ZMB), "N.O. Sumatra, Prov. Langkat, 1906, E. Heinze"; 1 ex. (ZMB), "W. Sumatra, Padang, 23.XII.08, Schoede S.G."; 1 ex. (NRS), "Medan, Mjób"; 2 ex. (RNHL), "Java, Seneng M., (Sem.) Sds, 797, 10-2-32, L.G.E. Kalshoven"; 1 ex. (RNHL), "Getasan, 1100 m, Java, Dec. 33, v. Doesburg"; "van Doesburg"; 2 ex. (AMNY), "Marotai, Moluccas, March, 1945, Gilbert Banner".

Malaysia or Indonesia. 2 ex. (ZMB), "S.O. Borneo, Grabowsky"; 6 ex. (ZMB), "Borneo, Dr. Scheidt".

Japan. 5 ex. (ZMB), "Japan, 1905, E. Kaiser".

Philippines. 1 ex. (SMNS), "Mindanao, 1-3 May 1996, Misamis occ. 1700 m, Don Victoriana, Bolm"; 1 ex. (SMNS), "Mindanao, 30 km E of Malaybalay, Busoi, 5-9 May 1996, Bolm, 1000 m"; 4 ex. (SMNS), "Mindanao, 30 km NW of Maramag, 13-17 May 1996, Bagomingsilang, 1700 m, Bolm"; 1 ex. (SMNS), "Leyte, Lake Danao, forest edge, 500 m, 19.2-8.3.1991, Schawaller & al.".

Papua New Guinea. 3 ex. (TMB), "N. Guinea, Biry, 96", "Friderich-Wilh-hafen" (named by O. Sjöberg as "*mutilatus* Er."); 1 ex. (TMB), "Stephansort, Astrolabe Bai", "N. Guinea, Biry, 1898"; 1 ex. (TMB), "N. Guinea, Biró, 1901", "Friderich-Wilh-hafen" (named by O. Sjöberg as "*mutilatus* Er.").

Polynesia. About 30 ex. (ZIN, ZMUC), "Cook Is., "Friderich-Wilh-hafen" (named by O. Sjöberg as "*mutilatus* Er."); 2 ex. (ZIN, ZMUC), "Tahiti, paa en raad, Appelsin, Galatea"; 1 ex. (ZMUC), "C. fairmarei Deyr., Tahiti"; 2 ex. (ZIN, ZMUC), "Society Is., Huahine, Fare, XI.1985, N.L.H. Krauss".

USA. 33 ex. (ZIN, ZMUC), Hawaii, "Oahu (paa Nordsiden), *Pandanus frugter*, Galatea".

Mexico. 1 ex. (ZIN), "Saltillo Coahuila, Bajío UAAAN, 25°25'23" N 101°00'19" E, 1592 m; collected in dried fruits (orange, apple and lemon), may 15.V.2016 and 01-05.VI.2016, H. Hernandez"; 2 ex. (ZIN), "Chiapas, Angel Albino Corzo, 15° 52' N y 92° 43' E. 640 m, collected in dried fruits (orange, apple and banana), 24.XII.2016, H. Hernandez".

**Diagnosis.** This species is a member of the *dimidiatus*-group and easily diagnosed due to its characteristic colouration, shape of apex of female pygidium, and genitalia. Among the considered species it has some similarity in colouration to *C. (M.) generosus* **sp. n.**, *C. (M.) notatus*, *C. (M.) robustus* **stat. n.** and *C. (M.) schioedtei*, although the intensity and pattern of its colouration usually are comparatively more stable than

in the mentioned relatives. The genitalia of both sexes are quite distinct, although aedeagus of it is somewhat similar to that in *C. (M.) schioedtei*. Despite the certain variability in external characters, *C. (M.) contegens* differs:

– from *C. (M.) generosus* **sp. n.** in its lightened base of elytra, markedly less developed temples, subequal length of antennomeres 2 and 3, sparser and coarser punctures on most sclerites, more contrasting sculpture on all sclerites (particularly on mesoventrite), shape of prosternal process, outline of submesocoxal lines;

– from *C. (M.) notatus* in its usually larger body, lighter general body colouration, lightened base of elytra, never subcarinate prosternal process, markedly finer punctuation of mesoventrite, female pygidium widely rounded at not explanate apex;

– from *C. (M.) robustus* **stat. n.** and *C. (M.) schioedtei* in its usually smaller and more slender body, comparatively smaller head with, as a rule, moderately raised temples, subequal length of antennomeres 2 and 3, more distinct punctuation on uncovered tergites, usually contrastingly punctured and sculptured prosternum, not emarginate apex of female pygidium.

Light and small specimens of the species under consideration is rather similar and reminiscent of those of *C. (M.) robustus* **stat. n.** and *C. (M.) schioedtei*, although they are clearly distinguished only by structure of their ovipositor apex and, as a rule, proportions in length of antennomeres 2 and 3. The typical specimens of *C. (M.) contegens* differ from those of *C. (M.) schioedtei* in the pattern of body colouration, shape of pronotum, outline of posterior edge of male metafemur and female pygidium, curvature of inner edge of lateral lobes of phallobase ("tegmen"), shape of ovipositor apex, but smallest specimens of both rather similar and only structure of ovipositor remains quite distinct. Finally, some specimens of the considered species are also rather similar to the Polynesian specimens of *C. (M.) oculatus*, but differ from the latter mostly in the character of body colouration, distinct punctuation of prosternum and structure of genitalia of both sexes, although some differences are traced in shape of pronotum and width of basal antennomeres. *Carpophilus (Myothorax) contegens* can be compared also with some species of the *dimidiatus*-group with medium body sizes than with smaller members of the group. Nevertheless, the species under consideration is different from them not only in its peculiar colouration, shape of female pygidium and genitalia of both sexes, but also:

– from *C. (M.) assignatus* **sp. n.** in its usually sparser punctuation of dorsum, markedly different punctuation and sculpture of prosternum, meso- and metaventrite, shorter male metafemur;

– from *C. (M.) fumatoides* **sp. n.** and *C. (M.) fumatus* in its usually finer and sparser punctuation as well as in the less contrasting sculpture of integument, more conspicuous pubescence, never raised tubercle at base of posterior edge of metafemur;

– from *C. (M.) mutilatus* in the outline of its submesocoxal lines, clearer punctuation on uncovered tergites, sparser and finer punctuation and distinct cellular microreticulation on prosternum, meso- and metaventrite, somewhat wider metatibia;

– from *C. (M.) pilipennis* in more subquadrangular shape of its pronotum, usually sparser and finer punctation of integument (but more distinct punctation on prosternum), less contrasting cellular microreticulation on dorsum, less medially curved prosternal process with rather subarcuate apex, slightly deepened median part of male metaventrite and longer male metafemur.

**Notes.** Walker [1858: 206] in his description of *Nitidula contegens* gave quite reliable diagnosis of this species: “nigra, elytris basi (margine excepto) et apud suturum (triente apicali excepta) testaceus”. Nevertheless, Murray [1864] missed this indication, described *C. (M.) maculatus* and *C. (M.) vittiger* having provided it with rather similar diagnoses. Later, Gemminger and de Harold [1868] erroneously synonymised *Ecnomorphus biguttatus* Motschulsky, 1858 (which is regarded in the subfamily Cryptarchinae) and *C. (M.) vittiger* with the varieties proposed to the latter by A. Murray and, finally, Grouvelle [1908] first synonymized *C. (M.) contegens* and *C. (M.) vittiger* as the same variety of *C. (M.) dimidiatus*. The last synonymy supplemented by the Murray’s varieties entered into the Junk’s catalogue [Grouvelle, 1913] and succeeding publications [Blackwelder, 1957; Plaza, 1977, etc.]. Indeed, the type specimens of the varieties proposed by A. Murray for *C. (M.) vittiger* belong to three different species: *C. (M.) contegens*, *C. (M.) robustus* **stat. n.** and *C. (M.) schioedtei*. Unfortunately, Murray [1864] did not write in the original description an exact designation of the specimens examined, their origin and their depositories, particularly for the varieties proposed by him. It seems that the identificational labels were written by him or somebody else later the preparation of the manuscript of his monograph and without proper accuracy. All the specimens from the type series of *C. (M.) vittiger* deposited in NHML were examined, and some disagreement between the text of the Murray’s monograph and labels was made out. This circumstance does not allow to be sure in attribution of part of specimens to the concrete variety, although all of them can be interpreted as the syntypes of *C. (M.) vittiger* in general.

The type specimens of *Nitidula contegens*, *Carpophilus (Myothorax) maculatus*, *C. (M.) vittiger*, and *C. (M.) vittiger* var. *nigritus* used for fixation of these names correspond with the text of the original description and represent the mature specimens of the same species. The lectotype and paralectotypes of *C. (M.) vittiger* var. *testaceus* are immature, but without doubts conspecific with the specimens mentioned above. The labels of the specimens indicated as *C. (M.) vittiger* var. *dilutus* are different from that which can be interpreted as suited to the text of the description and, therefore, these specimens are designated here as questional syntypes. One of specimen from the type series of *C. (M.) vittiger* var. *testaceus* is conspecific with the specimens of *C. (M.) vittiger* var. *robustus* (see below). The synonymy of *C. (M.) maculatus* and *C. (M.) vittiger* was established by Hinton [1945], probably after his re-examination of the types listed above.

*Carpophilus (Myothorax) dimidiatus* (Fabricius, 1792)  
(Figs 38–45, 153)

*Nitidula dimidiata* Fabricius, 1792: 261 (“Indie Occidentali”; syntypes), non *Cateretes dimidiatus* Heer, 1841 = *Carpophilus pusillus* Stephens, 1830: 51 (East Indies; syntypes) = *C. auropilosus* Wollaston, 1854: 117 (Madeira; ? holotype).

In total, some hundred specimens from different zoogeographical regions (mostly from the Afro-Madagascan Region) represented in almost each collection, type specimens of *Nitidula dimidiata* and others from many of all zoogeographic regions, except Antarctic one.

**Type material.** 1♀, lectotype of *N. dimidiata* (ZMUC), designated by Dobson [1956], “*Carpophilus dimidiatus* (F.), Lectotype, R.M. Dobson Det., January 1956”; 1♂, paralectotype of *N. dimidiata* (ZMUC), “ex Am. mer. – Schmidt”, “AlloTYPE des. Dobson 1956”; 11 ex., (?) paralectotypes of *N. dimidiata* (ZMB), “8378”, “*dimidiata* Fab., Ld., Am. Ins., Lund” (with additional labels under different specimens: 1 ex. – “Demerary”, 1 ex. – “Cuba, Otto”, 1 ex. – “Latjunjoa”, 1 ex. – “Am. spt., Dej”, 1 ex. – “Carot. m., Zimm.” – the specimens with these labels could apparently be added to *N. dimidiata* after description by J.C. Fabricius or somebody else).

**Additional material** (some selected specimens). India. 1 ex. (ZSI), “Ja. 2, Tommu, 25.5.72, on Mango leaf, T. Sengupta”.

Nepal. 1 ex. (NMW), “E-Nepal, Arun Valley, Sultibari, 500 m, 11–14.6.1988, Probst”.

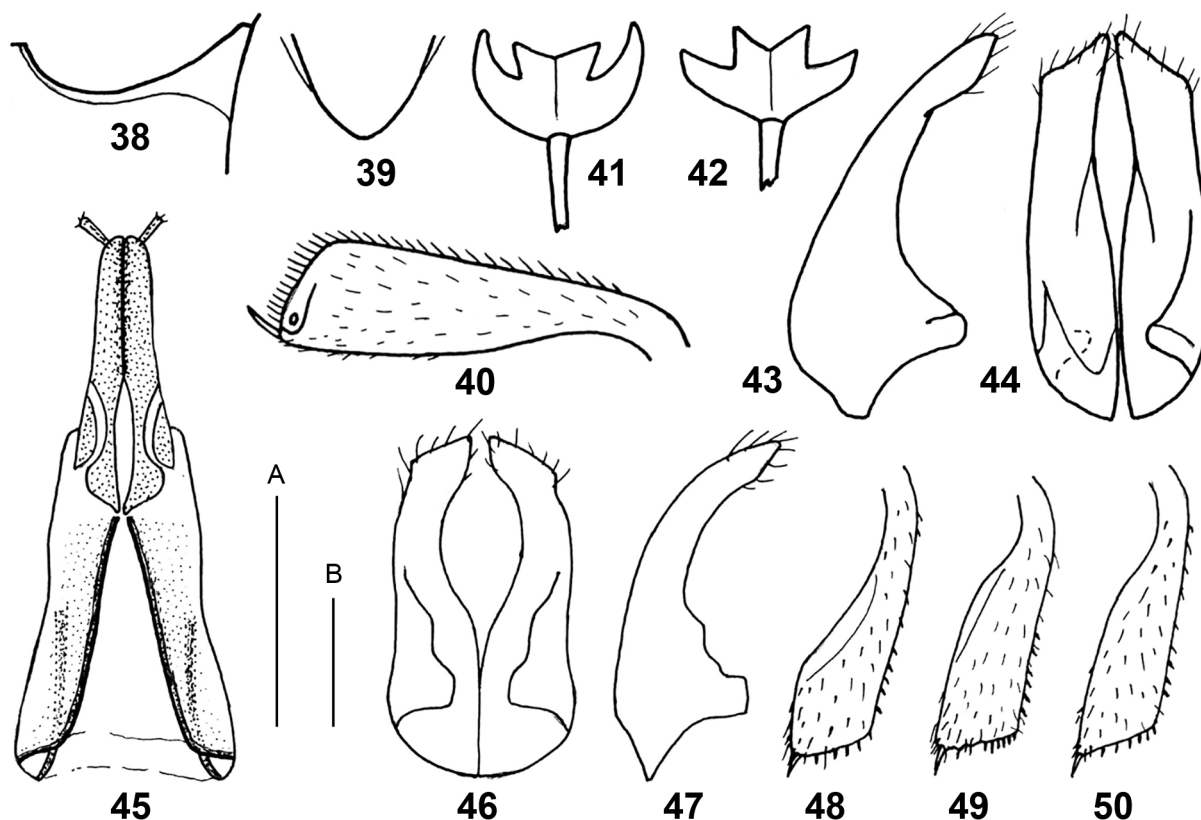
Indonesia. 16 ex. (RNHL, ZIN), “In old fruits of native castanea on the ground”, “Buitenzorg, 10-II-1924, Dr. Kalshoven L. – 19”; 2 ex. (RNHL), “Java, Seneng M., (Sem.) Sds, 797, 10-2-32, L.G.E. Kalshoven”; 1 ex. (RNHL), “Getasan, 1100 m, Java, Dec. 33, v. Doesburg”; some hundred specimens (ZIN, ZMB), mostly from Afro-Madagascan Region, North Africa, Madeira, Europe, Ukraine (Kharkov), Russia (Leningrad Region, St Petersburg, Krasnodar Region), etc.

**Diagnosis.** This species is characterised by comparatively small and usually dark body, comparatively short elytra, comparatively narrow protibia and rather short lateral lobes of phallobase (“tegmen”), although identification of this species in some cases is very difficult because of a great scope of variability of some characters. Among small members of the *dimidiatus*-group with subparallel-sided and convex body (*C. (M.) brunneus*, *C. (M.) languescens* **sp. n.**, *C. (M.) nepos*, *C. (M.) pilosellus*, *C. (M.) timorensis*, *C. (M.) truncatus*, *C. (M.) zeaphilus*) it can be diagnosed due to not only its peculiar structure of lateral lobes of phallobase (“tegmen”), but also due to the following characters:

– from *C. (M.) languescens* **sp. n.** and *C. (M.) nepos* due to its more slender, usually darker and not unicolourous body, denser and more conspicuous pubescence, usually more subquadrangular pronotum, much denser and usually significantly finer punctation of dorsum, not quite subovoid antennal club, different length of antennomeres 2 and 3, more distinct punctation and sculpture of anterior part of prosternum, outline of submesocoxal line and more curved inner edge of metatibia, different structure of ovipositor; and from *C. (M.) languescens* **sp. n.** also due to its wider prosternal process, narrower legs with oblique apex of meso- and metatibiae;

– from *C. (M.) brunneus* and *C. (M.) zeaphilus* due to its more slender and usually darker body, denser and more conspicuous pubescence, more subquadrangular pronotum, denser and coarser punctation on dorsum, longer last labial palpomere, outline of submesocoxal line and more curved inner edge of metatibia; and from the first of them also due to its different length of antennomeres 2 and 3;





Figs 38–50. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

38–45 – *C. (M.) dimidiatus*; 46–48 – *C. (M.) truncatus*; 49–50 – *C. (M.) pilosellus*. 38 – submesocoxal line of metaventre, ventral view; 39 – apex of female pygidium, dorsal view; 40 – male metatibia, dorsal view; 41 – characteristic ventral plate and spiculum gastrale; 42 – aberrant ventral plate and spiculum gastrale of specimen from the West Caucasus; 43–44 – lateral lobes of phallobase (“tegmen”) of usual structure: 43 – lateral view, 44 – ventral view; 45 – ovipositor, ventral view; 46–47 – lateral lobes of phallobase (“tegmen”) of paralectotype (NHML): 46 – ventral view, 47 – lateral view; 48–50 – male metatibia, dorsal view: 48 – specimen from Seychelles (ZIN), 49 – lectotype (ZMMU), 50 – specimen from Japan (ZIN). Scale bars: A – 0.5 mm (to Figs 38–40, 48–50), B – 0.25 mm (to Figs 41–47).

Рис. 38–50. Виды подрода *Myothorax* рода *Carpophilus*.

38–45 – *C. (M.) dimidiatus*; 46–48 – *C. (M.) truncatus*; 49–50 – *C. (M.) pilosellus*. 38 – затазиковая линия метавентрита, снизу; 39 – вершина пигидия самки, сверху; 40 – задняя голень самца, сверху; 41 – вентральная пластинка и гастральная спикула самца характерного строения, снизу; 42 – вентральная пластинка и гастральная спикула самца aberrантного строения с Западного Кавказа, снизу; 43–44 – латеральные доли фаллобазы («тегмен») обычного строения: 43 – сбоку, 44 – снизу; 45 – яйцеклад, снизу; 46–47 – латеральные доли фаллобазы («тегмен») паралектотипа (NHML): 46 – снизу, 47 – сбоку; 48–50 – задняя голень самца, сверху: 48 – экземпляр с Сейшельских островов (ZIN), 49 – лектотип (ZMMU), 50 – экземпляр из Японии (ZIN). Масштабные линейки: A – 0.5 мм (к рисункам 38–40, 48–50), B – 0.25 мм (к рисункам 41–47).

– from *C. (M.) pilosellus* due to the peculiarities listed in the above key;

– from *C. (M.) timorensis* due to the antennomere 2 distinctly longer than antennomere 3, usually darker colouration, distinct and denser punctures on prosternum, more distinct dorsal punctation, medioanterior part of prosternum rectilinear from side, outline of submesocoxal line, wider metatibia with convex inner edge, simple apex of female pygidium;

– from *C. (M.) truncatus* mostly due to the different shape of metatibiae and somewhat shorter antennomere 3.

The species under consideration is also similar to *C. (M.) mutilatus*, which has an intermediate position between larger and smaller members of the *dimidiatus*-group, however, *C. (M.) dimidiatus* differs from it not only due to its somewhat smaller, convex and more slender body, but also due to its peculiar character of body colouration, unicolourous pronotum, more raised and more conspicuous pubescence on dorsum, difference in the

length of antennomeres 2 and 3, outline of submesocoxal line, somewhat wider meso- and metatibiae, which are more curved along inner edge, longer lateral lobes of phallobase (“tegmen”) and peculiar ovipositor.

**Notes.** R.M. Dobson examined the type series of *Nitidula dimidiata* in 1956 and designated two specimens as mentioned above in the “Type material”. Two other paralectotypes, deposited in ZMUC were identified by him as “*Carpophilus languidus* Er.” (although they cannot be regarded as the latter as well). The designated lectotype of *Nitidula dimidiata* has 2.8 mm in length, dark brown body with lightened elytra and distinctly convex outer edge of metatibia. The type series of *Carpophilus (Myothorax) pusillus* and *C. (M.) auropillosus* should be deposited in NHML.

Sometimes specimens, which are rather similar to one another, can be attributed to one of the related species, usually interpreted as *C. (M.) dimidiatus* and *C. (M.) pilosellus*. In some rare cases it is quite problematical

to find a correct decision to identify specimens with partly intermediate state of characters (including characters in shape of lateral lobes of phallobase ("tegmen")). The species distinctness of these consubgenera needs a further study. Most African specimens (particularly from South Africa) are dark to completely blackish with the coarser and somewhat sparser punctation (with very distinct punctures on pygidium, nearly as large as those on other sclerites of dorsum), while most Indo-Malayan, Palearctic and Nearctic specimens examined are comparatively lighter or with darkened pronotum and thoracic underside, although the Australian, Central and South American specimens are not infrequently completely black. Besides, the African representatives (particularly from South Africa) are usually rather shining from below (with smoothed interspaces on thoracic underside), while specimens from other areas have more or less clearly microsculptured interspaces on thoracic underside. This difficulties in distinction of these species become even more than shown above, if representatives from Madagascar and Seychelles (as well as from some African areas) are included into consideration, where there is another form traditionally as *C. truncatus*, namely *C. (M.) imitatus*, described from Australia. The latter is very similar to dark variety of *C. (M.) dimidiatus*, but with the male metatibia rather like that in *C. (M.) pilosellus* than that in *C. (M.) dimidiatus*. Alone external difference of *C. (M.) truncatus* from other mentioned species is a stripe along inner edge of metatibia, which is widened in the anterior half of tibia, although among the representatives of *C. (M.) pilosellus* from the Indo-Malayan Region some have metatibia rather similar to that in typical *C. (M.) truncatus*. Finally, the lateral lobes of phallobase ("tegmen") in *C. (M.) dimidiatus* usually are markedly shorter and wider than in most specimens of *C. (M.) pilosellus*, but these lateral lobes in *C. (M.) truncatus* and *C. (M.) imitatus* are somehow characterised by the intermediate length and width of the lateral lobes and sometimes *C. (M.) pilosellus* also has the shorter lateral lobes than those in characteristic specimens.

In connection with the fact that representatives of the subgenus *Myothorax* have been very frequently named as "*dimidiatus*", there are a lot of misusage of this name in literature. At least over than 200 years this species was increasing its range to subcosmopolitan one. At present it is difficult to be sure in opinion on an initial range of this species before it was distributed by human activity, however, it could be supposed an initial palaeotropical distribution of it. It seems to be rather common in natural localities in the Afro-Madagascan and Australian regions, in particular, in South Africa, as well as Central and South America than in other regions of the globe. The type locality of *Nitidula dimidiata* is Central America, that of *Carpophilus pusillus* – the East Indies and that of *C. auropillosus* – Madeira.

*Carpophilus (Myothorax) fumatoides* Kirejtshuk, **sp. n.**  
(Figs 51–57)

**Material.** Holotype, ♂ (NMP): Laos, "6–11.5.1997, 20 km NW Louang, Namtha, 21°09'N 101°18'E, 800–1000 m, Jendek & Šuaša". Paratypes: 1♂ (ZIN), Laos, "6–11.5.1997, 20 km NW Louang, Namtha, N 21°09.2, E 101°18.7 al., 800–1000 m, J. Jendek & O. Šuaša"; 9 ex. (♂♂, ♀♀) (TMB, ZIN), India, "Karnataka, Shimoga, Jog Falls, 500 m, leg. Gy. Topál", "singled near river Sharavati, 2.III.1980".

**Description.** Male (holotype). Length 4.7, breadth 1.7, height 0.8 mm. Body rather convex dorsally and moderately ventrally; blackish to black with brown reddish base and anterior part of head, edges of pronotum, proximal four-fifths of elytra, apical ventrites, antennal flagella and legs; dorsum with an oily lustre and underside moderately shining, dorsum with moderately dense and long, recumbent, rather conspicuous yellowish hairs, about 2.5 times as long as distance between their insertions.

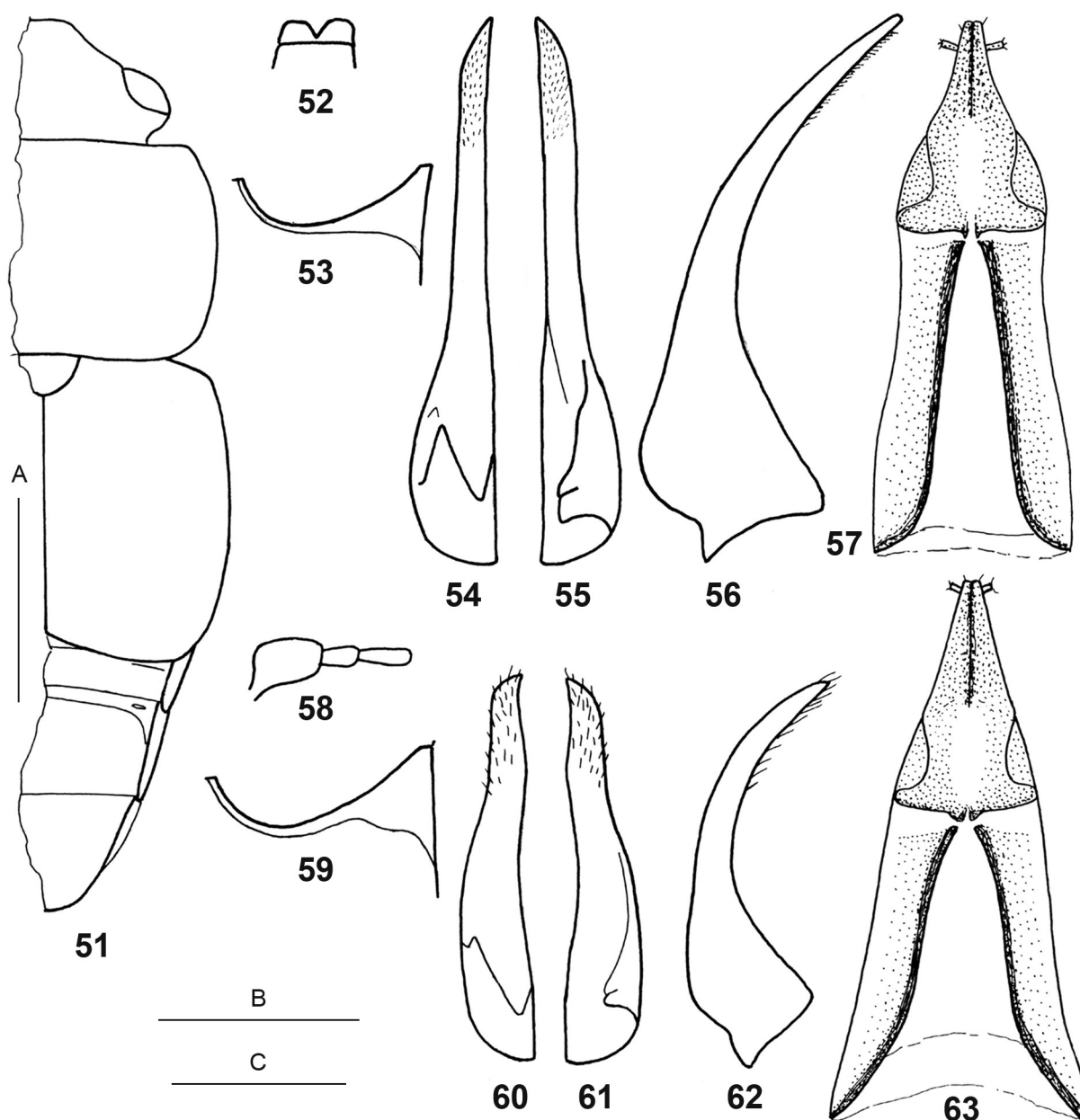
Head surface with distinct deep (sometimes contiguous) punctures, 2–2.5 times as coarse as eye facets in diameter, interspaces between them at most fourth of puncture diameter, with dense cellular microreticulation. Pronotum with similar punctation and microreticulation, but punctures somewhat coarser and sparser, with interspaces fourth to third of puncture diameter, although at sides punctures rather dense and mostly contiguous. Elytra with similar, but somewhat elongate and markedly shallower punctures than those on head and pronotum and interspaces between them about third of puncture diameter and very contrastingly cellularly microreticulated, at apices punctures becoming finer. Uncovered tergites with deep and somewhat elongate punctures with cross-section about twice as coarse as those of eye facets, interspaces between them about half puncture cross-section and with very contrasting microreticulation. Apical ventrites with fine punctures, as coarse as eye facets, interspaces between them about one puncture diameter and with contrasting microreticulation. Prosternum with obsolete punctation and rather smoothed at anterior edge, but with distinct and shallow punctures at coxae and on intercoxal process (about 1.5 times larger than facets), interspaces between them about third of puncture diameter and narrower, with dense cellular microreticulation. Mesoventrite with quite distinct irregular punctures (as coarse as on head and pronotum) and very coarse sculpture. Metaventrite with regular punctures, somewhat finer than on those on head and pronotum, interspaces between them about as great as one puncture diameter and with somewhat smoothed microreticulation. Ventrite 1 with fine and sparse punctures, interspaces between them smoothly microreticulated.

Head slightly shorter than distance between eyes, weakly convex and with well developed temples. Antennae about three-fourths as long as width of head, their club suboval (about one and third as long as wide and with widest antennomere 10) and comprising about two-sevenths of total antennal length, antennomere 3 slightly longer than antennomere 2. Pronotum subquadrangular, moderately convex and only at sides rather steeply convex, its anterior and posterior angles widely rounded. Elytra about five-sixths as long as combined width, at sides steeply sloping to lateral edges. Pygidium rather subtruncate than subarcuate at apex, about two-thirds as long as metatibia.

Antennal grooves moderately deepened at mentum, their posterior ends joined by transverse shallow depression. Mentum about 3 times as wide as long. Last labial palpomere nearly subcylindrical to scarcely widened to truncate apex, about twice as long as wide at apex.

Distance between mesocoxae as great as that between metacoxae, almost 1.5 times as great as that between procoxae. Prosternal process very slightly curved along coxae and rather widened before subtruncate apex, its sides rounded, where it is somewhat wider than antennal club. Metaventrite subflattened, with slightly deepened median suture. Submesocoxal line slightly arcuately deviating from the posterior edge of coxal cavities at outer angle of metaventrite and reaching metepisternum at anterior fourth of its inner edge. Ventrite 1 about as long as hypopygidium and somewhat longer than ventrite 4. Hypopygidium about two-thirds as long as metatibia. Epipleura at base about as wide as antennal club.

Tibiae comparatively short, protibia markedly wider, meso- and metatibiae subequal to width to antennal club, with nearly straight inner edge (or slightly concave in metatibia), outer edge of meso- and metatibiae with sparse rows of short and rather stout



Figs 51–63. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

51–57 – *C. (M.) fumatoides* sp. n.; 58–63 – *C. (M.) fumatus*. 51 – male body with spiracles of abdominal segments 5 and 6, dorsal view; 52 – anterior part of frons and labrum, dorsal view; 53, 59 – submesocoxal line of metaventrite, ventral view; 54–56, 60–62 – lateral lobes of phallobase (“tegmen”): 54, 60 – dorsal view, 55, 61 – ventral view, 56, 62 – lateral view; 57, 63 – ovipositor, ventral view; 58 – antennomeres 1–3. Scale bars: A – 1 mm (to Fig. 51), B – 0.5 mm (to Figs 52–53, 58, 59), C – 0.25 mm (to Figs 54–57, 60–63).

Рис. 51–63. Виды подрода *Myothorax* рода *Carpophilus*.

51–57 – *C. (M.) fumatoides* sp. n.; 58–63 – *C. (M.) fumatus*. 51 – тело самца с дыхальцами на брюшных сегментах 5 и 6, сверху; 52 – передняя часть лба и лабрум, сверху; 53, 59 – субмезококсовая линия метавентрита, снизу; 54–56, 60–62 – латеральные доли фаллобазы («тегмен»): 54, 60 – сверху, 55, 61 – снизу, 56, 62 – сбоку; 57, 63 – яйцеклад, снизу. 58 – антенномеры 1–3. Масштабные линейки: А – 1 мм (к рисунку 51), В – 0.5 мм (к рисункам 52–53, 58, 59), С – 0.25 мм (к рисункам 54–57, 60–63).

spines. Pro- and mesofemora about 1.7 and metafemur 2.5 times as wide as corresponding tibiae, metafemur 2.5 times as long as wide and slightly convex at posterior edge. Protarsus about half as wide as protibia, claws long and narrow, somewhat toothed at base.

Lateral lobes of phallobase (“tegmen”) heavily sclerotised.

Female. Differs from male in subflattened metaventrite along midline, narrower protarsus (two-fifths as wide as protibia), longer last abdominal segment with subrounded-subangular and slightly subexplanate apex of pygidium (both pygidium and hypopygidium slightly longer than metatibia). Ovipositor well sclerotised.

Variability. Length 2.6–4.8, breadth 1.1–1.7, height 0.6–0.8 mm. The paratypes from India are smaller and with more subquadrate pronotum. The males from this series have protarsus about two-thirds as wide as protibia. This species is extremely variable in body size and colouration, but in general the body of the studied specimens is rather dark to nearly unicolourous dark brown (including appendages).

**Diagnosis.** This new species is similar to *C. (M.) fumatus*, although differs from it in the more widely reduced punctation at the middle of anterior part



of prosternum, more or less clear transverse depression between the posterior ends of antennal grooves, metafemur never with tubercle at base of its posterior edge, also in general darker body and shape of the ovipositor apex. The lateral lobes of phallobase ("tegmen") of both these species has a rather similar structure, but somewhat differs in length and thickness of lateral lobes. Also, lateral lobes of phallobase ("tegmen") of the new species in contrast to that of *C. (M.) fumatus* is rather heavily sclerotised.

From other species of the *dimidiatus*-group this new species is clearly distinguished in its long lateral lobes of phallobase ("tegmen"). The body size and colouration of this new species are similar to those in *C. (M.) assignatus* sp. n., *C. (M.) generosus* sp. n., *C. (M.) mutilatus*, *C. (M.) schioedtei*, *C. (M.) pilipennis* and in particular to the darkest specimens of *C. (M.) robustus* stat. n. The characters of punctuation and sculpture of sclerites on underside as well as the structure of ovipositor and many other external structural peculiarities of this new species in general resemble those of *C. (M.) assignatus* sp. n. rather than other above listed species. Identification of their representatives in some cases presents a certain difficulty because of variability of characters of these species. Nevertheless, in addition to the peculiar feature in structure of lateral lobes of phallobase ("tegmen"), *C. (M.) fumatoides* sp. n. differs:

- from *C. (M.) assignatus* sp. n. in its antennal club markedly darker than flagellum, difference in length of antennomeres 2 and 3; from *C. (M.) contegens* in its somewhat larger body, pattern of body colouration, shape of gonocoxites;
- from *C. (M.) generosus* sp. n. in its less contrasting sculpture of dorsum, lack of clear antennal grooves behind the middle of mentum, not truncate or subtruncate apex of prosternal process and different outline of submesocoxal line;
- from *C. (M.) mutilatus* in the smoothed anterior part of prosternum, difference in length of antennomeres 2 and 3, darkened antennal club, disposition of styli on ovipositor;
- from *C. (M.) robustus* stat. n. and *C. (M.) schioedtei* in its not so great difference in length of antennomeres 2 and 3, and shape of gonocoxites;
- from *C. (M.) pilipennis* in its more slender and much less convex body (particularly pronotum), usually much darker body, antennal club darker than flagellum, not so deepened midline of metaventricle and shape of gonocoxites.

The new species under consideration has a certain similarity to *C. (M.) congoensis* from Equatorial Africa, but it is clearly distinct from it in the peculiarities of body colouration, denser punctuation and not very smooth integument, antennomere 3 longer than antennomere 2, shape of gonocoxites.

**Etymology.** The name of this species is formed from the name of the related species "*fumatus*" (blacken, smocked) and "*ideus*" (from Greek "*eidos*" – idea, species, kind).

*Carpophilus (Myothorax) fumatus* Boheman, 1851  
(Figs 58–63)

*Carpophilus fumatus* Boheman, 1851: 564 ("Caffraria"; syntypes) = *C. ochropterus* Klug, 1862: 209 (Mozambique; syntypes).

In total, about a thousand specimens from Africa and Madagascar, deposited in many collections, including type specimens below and others mostly in the Afro-Madagascan Region (MRAC, NRS, ZMB, ZIN, ZMB, ZML, etc.).

**Type material.** South Africa. 1 ex., lectotype of *C. (M.) fumatus* (NRS), designated by Kirejtshuk [1996], "Caffraria J. Wahlb."; 1 ex., paralectotype of *C. (M.) fumatus* (NRS), "Cap. B. Spei., J. Wahlb."

Mozambique. 1 ex., lectotype, here designated, and 1 ex., paralectotype of *C. (M.) ochropterus* (ZMB) (marked as lectotype in the collection by S. Endrödy-Younga), "Mosambik, Peters", "*ochropterus* Kl., Madag., Goud."; 9 ex., at least partly probably paralectotype(s) of *C. (M.) ochropterus* (ZMB), "cotypes" *ochropterus* – "53763", "*fumatus* Boh., Gerst.", Ugono v.d. mont. Deck" (under one of specimens also "Mosambik, Peters").

**Additional material** (some selected specimens). Portugal. 5 ex. (ZML), Madeira.

Algeria. 4 ex. (FMNH).

Tunisia. 5 ex. (ZML).

USA. 2 ex. (ZML), "USA, Hawaii: W. Waihee".

**Notes.** This species is very similar to the previous one (see above and data in Kirejtshuk [1996]).

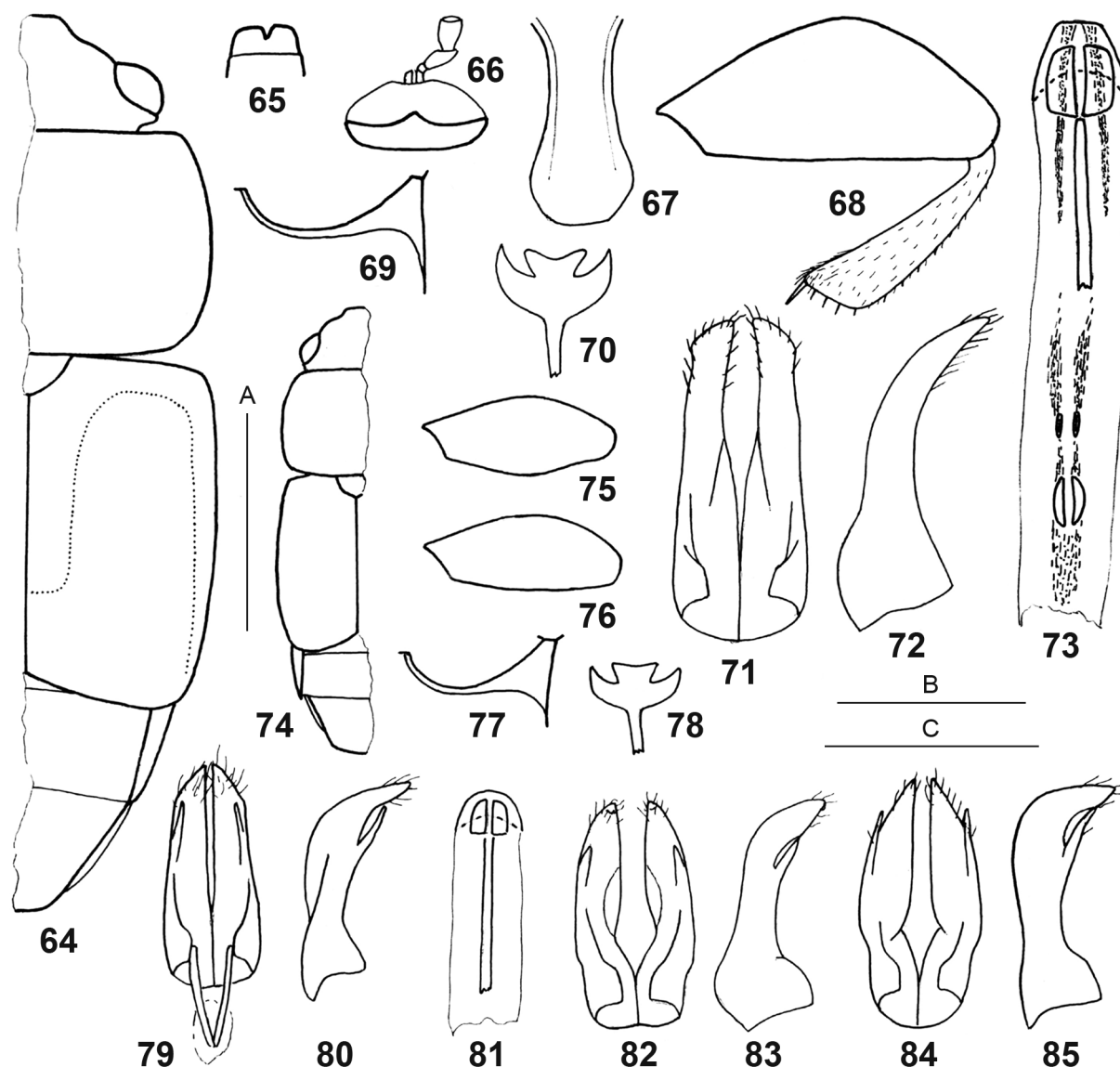
*Carpophilus (Myothorax) generosus* Kirejtshuk, sp. n.  
(Figs 64–73)

**Material.** Holotype, ♂ (SMNS): Indonesia, "Bali, Danau Buyan, 1300 m, 19–21.2.1994, Bolm". Paratype: 1♂ (RNHL), Indonesia, "Getasan, 1100 m, Java, Dec. 33, v. Doesburg".

**Description.** Male (holotype). Length 4.2, breadth 1.3, height 0.8 mm. Body rather convex ventrally and dorsally; black with bright brown reddish base and anterior part of head, base and subsutural places of elytra, abdominal apex, prohypomera, mouthparts, antennal flagella and legs; dorsum almost dull and underside with a faint oily lustre; dorsum with moderately dense and long, subrecumbent (forming clear arc to plane of integument), rather conspicuous yellowish hairs, about twice and more longer than distance between their insertions.

Head surface with quite distinct, very dense (subcontiguous) and deep regular punctures, about twice as coarse as eye facets in diameter, interspaces between them with dense and extremely contrasting cellular microreticulation. Pronotum with similar punctuation, but punctures somewhat coarser and much sparser, interspaces between them about two-thirds of puncture diameter, with somewhat smoothed, dense cellular microreticulation, but at sides punctures subcontiguous. Elytra with punctures markedly finer and rather shallower than those on head and pronotum (slightly coarser than eye facets) and with interspaces between them markedly broader than one puncture diameter and rather contrastingly microreticulated, at apices punctures becoming finer. Uncovered tergites and ventrites with punctures very similar to those on elytra, but interspaces between them about one puncture diameter or smaller and with very contrasting microsculpture. Prosternum with distinct punctures only at coxae and at sides (about as those on uncovered tergites and apical ventrites), narrow interspaces between them and space at sides of anterior part with more or less distinct cellular microreticulation, space at the middle of anterior edge completely smooth. Mesoventricle as coarsely punctured as head and sides of pronotum, but finer and slightly shallower punctures, very narrow interspaces between them contrastingly microreticulated. Metaventricle with very dense and distinct punctures, as coarse as those on head and pronotum, but clearly shallower, interspaces between them about third of puncture diameter and with dense and very contrasting microreticulation.

Head about four-fifths as long as distance between eyes, weakly convex and with well developed temples. Mandibles rather well developed. Antennae about three-fourths as long as width of head, their club rather subovoid (about 1.5 times as long as wide and with antennomere 10 widest) and comprising almost fourth of total antennal length, antennomere 3 slightly longer than antennomere 2. Pronotum with somewhat arcuate sides,



Figs 64–85. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

64–73 – *C. (M.) generosus* sp. n., male, holotype; 74–85 – *C. (M.) brunneus*. 64 – body with dotted outline of lighter part of elytron, dorsal view; 65 – anterior part of frons and labrum, dorsal view; 66 – mentum and labial palpus, ventral view; 67 – prosternal process, ventral view; 68 – metafemur and tibia, ventral view; 69 – submesocoxal line of metaventrite, ventral view; 70 – ventral plate and spiculum gastrale; 71–72 – lateral lobes of phallobase ("tegmen"): 71 – ventral view, 72 – lateral view; 73 – penis trunk with armature of inner sac, dorsal; 74 – body of male from India (Kerala) (ZIN), dorsal view; 75 – mesofemur of the same male, ventral view; 76 – metafemur of male from Thailand (NMB), ventral view; 77 – submesocoxal line of metaventrite of specimen from India (Kerala) (ZIN), ventral view; 78 – ventral plate and spiculum gastrale of the same male; 79–80 – lateral lobes of phallobase ("tegmen") of the same specimen: 79 – ventral view, 80 – lateral view; 81 – penis trunk of the same specimen, dorsal view; 82–83 – lateral lobes of phallobase ("tegmen") of specimen from Thailand (NMB): 82 – ventral view, 83 – lateral view; 84–85 – lateral lobes of phallobase ("tegmen") of specimen from the Gambia (ZIN): 84 – ventral view, 85 – lateral view. Scale bars: A – 1 mm (to Figs 64, 74), B – 0.5 mm (to Figs 65–69, 75–77), C – 0.25 mm (to Figs 70–73, 78–85).

Рис. 64–85. Виды подрода *Myothorax* рода *Carpophilus*.

64–73 – *C. (M.) generosus* sp. n., самец, голотип; 74–85 – *C. (M.) brunneus*. 64 – тело с пунктированным очертанием осветленной части надкрылья, сверху; 65 – передняя часть лба и лабрум, сверху; 66 – ментум и лабиальный щупик, снизу; 67 – отросток переднегруди, снизу; 68 – задние бедро и голень, снизу; 69 – субмезококсовая линия метавентрита, снизу; 70 – вентральная пластинка и гастральная спикула; 71–72 – латеральные доли фаллобазы («тегмен»): 71 – снизу, 72 – сбоку; 73 – ствол пениса и вооружение его внутреннего мешка, сверху; 74 – тело самца из Индии (Керала) (ZIN), сверху; 75 – среднее бедро этого же самца, снизу; 76 – заднее бедро самца из Таиланда (NMB), снизу; 77 – субмезококсовая линия метавентрита экземпляра из Индии (Керала) (ZIN), снизу; 78 – вентральная пластинка и гастральная спикула этого же самца; 79–80 – латеральные доли фаллобазы («тегмен») этого же экземпляра: 79 – снизу, 80 – сбоку; 81 – ствол пениса этого же экземпляра, сверху; 82–83 – латеральные доли фаллобазы («тегмен») экземпляра из Таиланда (NMB): 82 – снизу, 83 – сбоку; 84–85 – латеральные доли фаллобазы («тегмен») экземпляра из Гамбии (ZIN): 84 – снизу, 85 – сбоку. Машштабные линейки: A – 1 мм (к рисункам 64, 74), B – 0.5 мм (к рисункам 65–69, 75–77), C – 0.25 мм (к рисункам 70–73, 78–85).

moderately convex and only at sides rather steeply convex, its anterior angles subangular and posterior angles widely rounded. Elytra slightly longer than wide combined, subflattened on disk and at sides steeply sloping to lateral edges. Pygidium about two-thirds as long as metafemur and widely rounded at apex. Antennal grooves rather deep, distinctly outlined in both inner and outer edges, strongly and subrectilinearly convergent, their posterior ends joined through more or less clear transverse concavity. Mentum about 2.5 times as wide as long. Last labial palpomere nearly slightly widened to truncate apex, about 1.5 times as long as wide.

Distance between mesocoxae and that between metacoxae about 1.5 times as great as that between procoxae. Prosternal process scarcely curved along coxae and slightly widened before subtruncate apex, subangular at sides, where somewhat wider than antennal club. Submesocoxal line slightly arcuately deviating from posterior edge of coxal cavities at outer angle of metaventrite and reaching metepisternum at anterior fifth of inner edge. Ventrite 1 much shorter than hypopygidium and somewhat longer than ventrite 4. Hypopygidium about two-thirds as long as metafemur. Epipleura at base somewhat wider than antennal club.

Tibiae comparatively short and subequal in width, but markedly wider than antennal club, with nearly straight inner edge, outer edge of meso- and metatibiae with rather dense rows of short and moderately stout spines. Pro- and mesofemora about 1.5 times, metafemur twice as wide as corresponding tibiae, metafemur about 2.5 times as long as wide and of usual outline. Protarsus about three-fourths as wide as protibia, claws long and narrow.

Lateral lobes of phallobase ("tegmen") well sclerotised.

Variability. The paratype is smaller (3.6 mm), lighter (basal two-thirds of elytra and last abdominal segments brownish, subsutural elongate stripes, prohypomera and legs bright reddish) and with more subrecumbent dorsal pubescence (but not recumbent).

**Diagnosis.** This new species is more similar to the species of the *dimidiatus*-group with the medium body size listed as probable relatives to *C. (M.) assignatus* sp. n. (see above), although well characterised by very dense punctation of both dorsum and underside, very contrasting microreticulation of integument, comparatively small and narrow antennal club, rather conspicuous and subrecumbent (not completely recumbent) dorsal pubescence, outline of submesocoxal line. Besides, *C. (M.) generosus* sp. n. has quite distinct in the structure of the lateral lobes of phallobase ("tegmen").

**Etymology.** The name of this species means "pedigree", "thoroughbred".

*Carpophilus (Myothorax) languescens* Kirejtshuk, sp. n.  
(Figs 86–94)

**Material.** Holotype, ♂ (NMB): Cambodia, "4.1.1998, Siem Reap, town area".

**Description.** Male (holotype). Length 2.4, breadth 1.1, height 0.6 mm. Body rather convex ventrally and dorsally; almost unicolourous reddish with somewhat darkened metaventrite and abdominal apex; dorsum and underside with a faint oily lustre; dorsum with moderately dense and rather short, recumbent, scarcely conspicuous yellowish hairs, shorter or about as long as distance between their insertions; underside with slightly more conspicuously pubescent.

Head surface with quite distinct and deep regular punctures, about 1.5 times as coarse as eye facets in diameter, interspaces between them somewhat narrower than a puncture diameter, with dense and moderately contrasting cellular microreticulation. Pronotum with punctures markedly coarser and much

sparser than those on head, interspaces between them slightly narrower than a puncture diameter, with somewhat smoothed, dense cellular microreticulation, but punctures becoming coarser and denser at sides, and sculpture more contrasting. Elytra at basal half with very similar punctation and sculpture to those on disk of pronotum, but interspaces between punctures broader than one puncture diameter, at apices punctures becoming finer. Uncovered tergites with very shallow, not quite distinct and sometimes elongate punctures, about as coarse as those on rest of dorsal sclerites, but interspaces between them about half puncture diameter or narrower and with very contrasting microsculpture. Ventrites with very small, shallow but mostly well outlined punctures, about as coarse as eye facets, but interspaces between them about a puncture diameter or narrower and with partly smoothed microsculpture (on hypopygidium punctures denser and interspaces with more contrasting sculpture). Prosternum with quite distinct and deep punctures on most part (about as coarse as those on dorsal sclerites), very narrow interspaces between them with rather smoothed microreticulation, space along anterior edge not punctured and completely smooth. Mesoventrite with very coarse and rather shallow punctures, interspaces between them contrastingly microreticulated. Metaventrite with very dense and distinct punctures, as coarse as those on dorsal sclerites and prosternum, interspaces between them third to half of puncture diameter and with dense and slightly smoothed microreticulation.

Head about fourth-fifths as long as distance between eyes, weakly convex and with well developed temples. Mandibles moderately developed. Antennae about six-sevenths as long as width of head, their club rather subovoid (about one and thirds as long as wide and with antennomere 10 widest) and comprising almost two-sevenths of total antennal length, antennomeres 2 and 3 subequal in length. Pronotum with somewhat arcuate sides, moderately convex and only at sides rather steeply convex, its anterior and posterior angles widely rounded. Elytra about 1.1 times as long as wide combined, at sides steeply sloping to lateral edges. Pygidium about three-fourths as long as metafemur and widely rounded at apex. Antennal grooves rather deepened, without clear transverse depression between posterior ends of antennal grooves. Mentum about 2.5 times as wide as long. Last labial palpomere nearly slightly widened to truncate apex, about 1.5 times as long as wide.

Distance between mesocoxae and that between metacoxae about 1.5 times as great as that between procoxae. Prosternal process scarcely curved along coxae and slightly widened before subtruncate apex, subangular at sides, where it somewhat wider than antennal club. Submesocoxal line slightly arcuately deviating from posterior edge of coxal cavities at outer angle of metaventrite and reaching metepisternum at anterior fourth of its inner edge. Ventrite 1 scarcely shorter than hypopygidium and somewhat longer than ventrite 4. Hypopygidium about three-fourths as long as metafemur. Epipleura at base somewhat wider than antennal club.

Tibiae subequal in width, slightly narrower than antennal club, with almost straight inner edge, outer edge of mesotibia with rather dense rows of short and stout spines. Pro- and mesofemora about one and two-thirds, metafemur 2.5 times as wide as corresponding tibiae, metafemur much less than 2.5 times as long as wide and of usual outline. Protarsus about four-fifths as wide as protibia, claws narrow.

Lateral lobes of phallobase ("tegmen") heavily sclerotised.

**Diagnosis.** This new species is very similar to *C. (M.) nepos*, externally differing from it only in subunicolourous body, almost inconspicuous pubescence, shape of meso- and metatibiae as well as in the shape of heavily sclerotised phallobase ("tegmen") (*C. (M.) nepos* has a characteristic weakly sclerotised lateral lobes of phallobase ("tegmen") with much longer lateral lobes and with different apices of them). Besides these characters



and others mentioned in the above key, the anterior part of prosternum of *C. (M.) languescens* **sp. n.** is markedly smoother than that of *C. (M.) nepos*. This new species and *C. (M.) nepos* have a comparatively small body, comparable with that of *C. (M.) dimidiatus*, *C. (M.) brunneus*, *C. (M.) pilosellus*, *C. (M.) timorensis* and *C. (M.) zeaphilus*, however, the lateral lobes of phallobase ("tegmen") of the first two species are different from that of all the species compared with them. The shape of meso- and metatibiae of the new species under consideration are quite distinct from those of all species lastly mentioned. Except peculiar structure of the lateral lobes of phallobase ("tegmen"), *C. (M.) languescens* **sp. n.** and *C. (M.) nepos* are also characterised by their rather robust body with arcuate pronotal and elytral sides, comparatively sparse and distinct punctation of dorsum, usually somewhat smoothed integument and very weak pubescence, characteristic outline of submesocoxal line. They differ from *C. (M.) dimidiatus*, *C. (M.) pilosellus* and *C. (M.) truncatus* in their more robust and lighter body, much less developed pubescence, character of punctation and sculpture (including those on prosternum), nearly straight inner edge of meso- and metatibiae; and also from *C. (M.) dimidiatus* in their subequal length of antennomeres 2 and 3; and also from *C. (M.) pilosellus* in their shorter last labial palpomere. *Carpophilus (Myothorax) languescens* **sp. n.** and *C. (M.) nepos* differ from *C. (M.) brunneus* and *C. (M.) zeaphilus* in their much less developed pubescence, character of punctation and sculpture (including those on prosternum), shape of prosternal process. Finally, *C. (M.) languescens* **sp. n.** and *C. (M.) nepos* differ from *C. (M.) timorensis* in their more robust body, antennomere 3 not shorter than antennomere 2, more distinct dorsal punctation, medioanterior part of prosternum rectilinear from side, submesocoxal line more deviating from anterior angles of metaventricle wider meso- and metatibiae.

**Etymology.** The name of this species means "weakened", "relaxed".

*Carpophilus (Myothorax) mutilatus* Erichson, 1843  
(Figs 95–105)

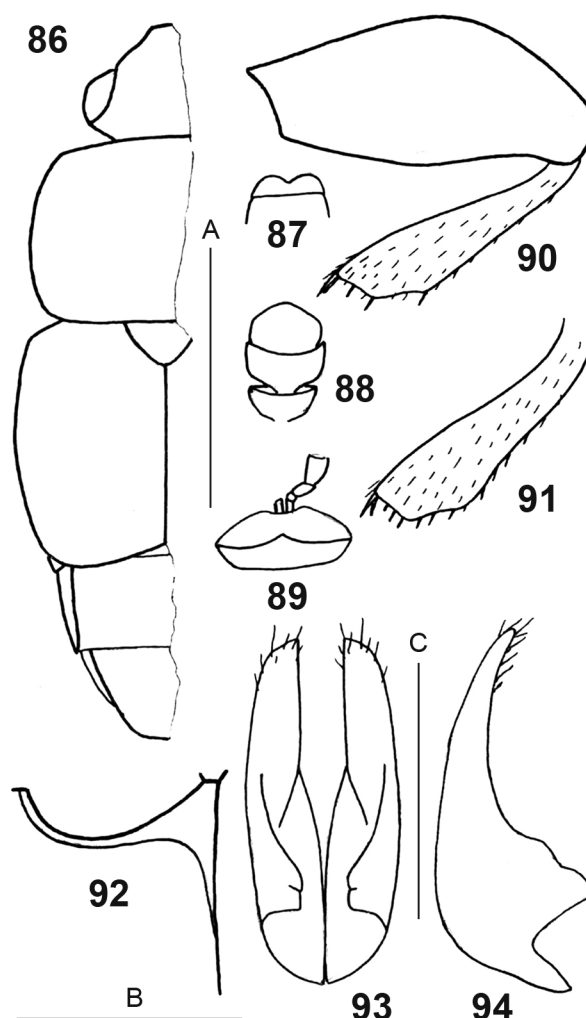
*Nitidula hemiptera* Fabricius, 1792: 261 (America; syntypes), non *Dermestes hemipterus* Linnaeus, 1758 = *Carpophilus mutilatus* Erichson, 1843: 258 (Sicilia; syntypes) = ? *Carpophilus tempestivus* Jacquelin du Val, 1856: 42 (? Cuba), non *C. tempestivus* Erichson, 1843 = ? *Ips bimaculatus* Montrouzier, 1860: 262 (New Caledonia), non *Silpha bimaculata* Marsham, 1802 = ? *Ips puberulus* Montrouzier, 1860: 263 (New Caledonia, Lifu) = *Carpophilus (Myothorax) luridus* Murray, 1864: 377 ("Europa, America boreali, America meridionali, India orientali & c.", syntypes).

In total, over than one thousand specimens were examined, including type specimens below and others, deposited in different collections from all zoogeographical regions, except Antarctic one.

**Type material.** Italy. 1♂, lectotype of *C. mutilatus* (ZMB), designated by Dobson [1960], and 4 paralectotypes (ZMB), "8376", "*mutilata* N., Lusit., Sicil."

Sri Lanka. 1♂, lectotype of *C. (M.) luridus* (NHML), here designated, "Ceylon", "ex Mus. Murray", "Fry Coll. 1905-100", "*luridus* (Dej.), Murr. D.M. Cat., Ceylon".

America. 1♀, paralectotype of *C. (M.) luridus* (NHML), "TYPE", "ex Mus. Murray", "Am. Bor.", "*luridus*, n. Am.", "68.106"; 1♂, lectotype of *Nitidula hemiptera* Fabricius, non Linnaeus (ZMKU), here designated, and



Figs 86–94. *Carpophilus (Myothorax) languescens* **sp. n.**, male, holotype.

86 – body, dorsal view; 87 – anterior part of frons and labrum, dorsal view; 88 – antennal club; 89 – mentum and labial palpus, ventral view; 90 – metafemur and tibia, ventral view; 91 – mesotibia, ventral view; 92 – submesocoxal line of metaventricle, ventral view; 93–94 – lateral lobes of phallobase ("tegmen"): 93 – ventral view, 94 – lateral view. Scale bars: A – 1 mm (to Fig. 86), B – 0.5 mm (to Figs 87–92), C – 0.25 mm (to Figs 93–94).

Рис. 86–94. *Carpophilus (Myothorax) languescens* **sp. n.**, самец, голотип.

86 – тело, сверху; 87 – передний край лба и лабрум, сверху; 88 – булава усиков; 89 – ментум и лабиальный щупик, снизу; 90 – задние бедро и голень, снизу; 91 – средняя голень, снизу; 92 – субмезококкальная линия метавентрита, снизу; 93–94 – латеральные доли фаллобазы («тегмен»): 93 – снизу, 94 – сбоку. Машштабные линейки: А – 1 мм (к рисунку 86), В – 0.5 мм (к рисункам 87–92), С – 0.25 мм (к рисункам 93–94).

1 ex., paralectotype of *N. hemiptera* Fabricius, non Linnaeus (ZMKU) – two specimens (including one labelled by Kirejtshuk as the lectotype) in a separate tray "353 – 30", "TYPE"; 11 ex., (?) paralectotypes of *N. hemiptera* Fabricius, non Linnaeus (ZMB), "8375", "*hemiptera* Fab., Lund, Am. Ins., Lund" (with additional labels under different specimens: 1 ex. – "Cuba, Otto", 1 ex. – "St. Thom., Moritz", 1 ex. – "Brasil. Sell." – the specimens with these labels apparently added to *N. dimidiata* after description by J.C. Fabricius or somebody else).

**Additional material** (some selected specimens). Russia. About 100 ex. (ZIN), St Petersburg, Leningrad Region, Krasnodar Region, Primorskiy Region.

Afghanistan. 2 ex. (ZIN), Nuristan, Kamdeš, 1300 m, 11.9.1971, O. Kabakov (in Russian).

India. 2 ex. (NHML), "Mothronwala, Dehra Dun, H.G.C.", "flowers of *Hedydium*", "H.G. Champion Coll."; 1 ex. (NHML), "Lachiwala, Dehra Dun, H.G.C.", "H.G. Champion Coll."; 1 ex. (NHML), "Haldwani Distr., Kumaon, H.G.C.", "H.G. Champion Coll."; 1 ex. (NHML), "Kheri Forest, U.P., Jan' 16, H.G.C.", "H.G. Champion Coll."; 9 ex. (NHML, ZIN), "Dehra Dun, H.G.C.", "14.12.25", "H.G. Champion. Coll."; 17 ex. (NHML), "Fraserpet, Coorg., F.R.I. Sandal Insect Survey"; 2 ex. (NHML), "Jalgaon, Maharashtra", "banana florets"; 15 ex. (TMB, ZIN), "W Bengal, Darjeeling, North Point, 1000-1300 m, Gy. Topál"; 5 ex. (TMB, ZIN), "Karnataka, Shimoga Distr., Jog Falls, 500 m, near river Sharawati, 1.III.1980, Gy. Topál"; 1 ex. (TMB), "Aligarh, Bot Gard of Guslim Univ., swept in grass and bushes", "12.I.1982, J. Papp"; 2 ex. (SMNS), "Rajasthan: Bharatpur, 12.8.1989, A. Riedel"; 5 ex. (ZIN), "Rajasthan, Cazri Farm, 9.X.1989, fruit trap, A. Kompantzev"; 4 ex. (NMB, ZIN), "Andaman Is., Havelok I., env. of village N7, 11°59'N, 92°58'E, 22.IV-14.V.1998, Karel & Simon Majer".

Nepal. 1 ex. (TMB), "Piple, IX-X.1969, Woyanovich".

Sri Lanka. 1 ex. (AMNY), "Western Prov., Nugegoda, May 3-10, 1969, P.B. Karunaratne (from rotten fruits)"; 1 ex. (AMNY), "Central Prov., Katugastota, 1600 ft, May 26, 1969, P.B. Karunaratne".

China. 1 ex. (ZMB), "Taiwan, Formosa, H. Sauter".

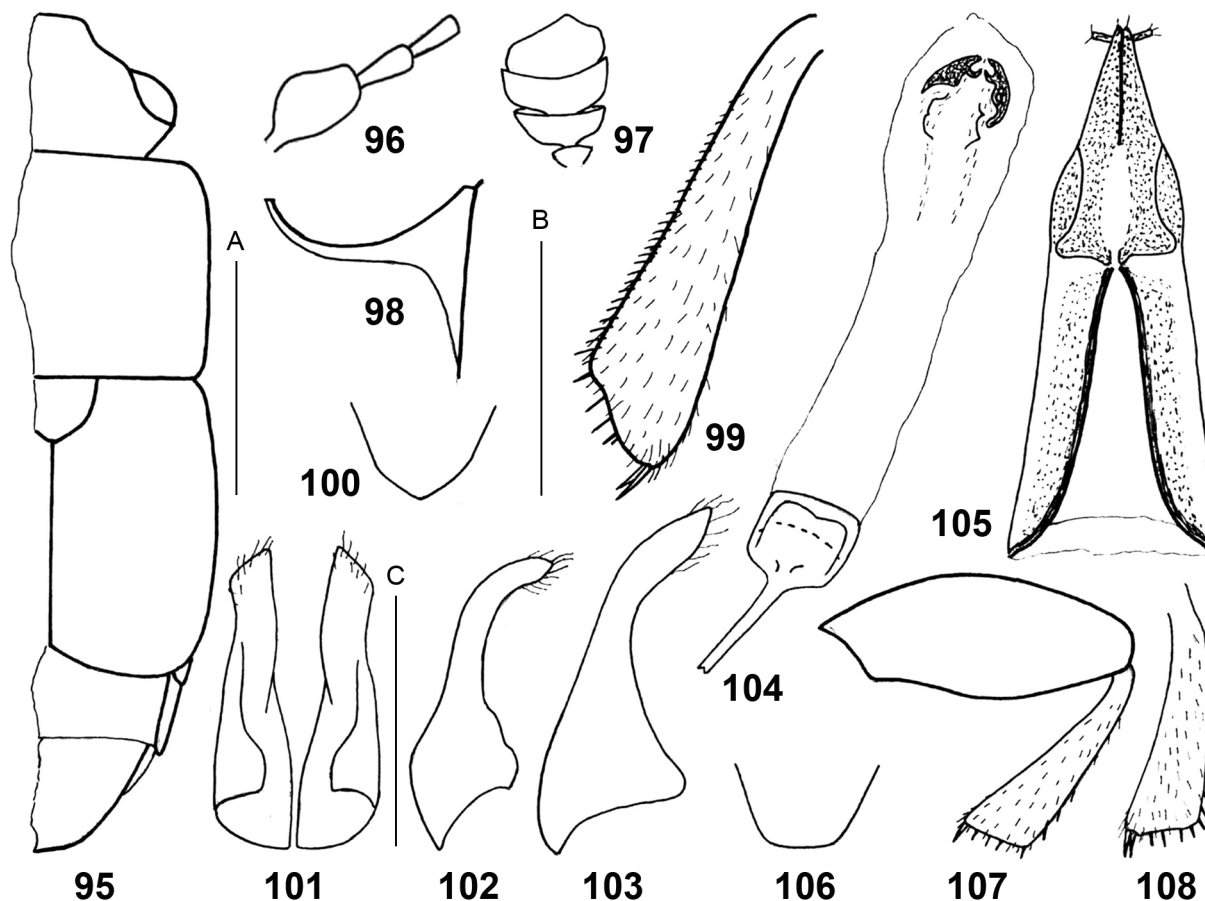
Thailand. 1 ex. (TMB), "Khon Kaen, Im Zoo, ad lucen", "26.I.1978, Sunanta, Aumphantiri"; 4 ex. (ZML), "...Pattaya, 1979, T. Palm"; 2 ex. (ZIN,

ZMUC), "Chieng Mai Province, 300 m, 30.ix.1981, Zool. Mus. Copenhagen"; 1 ex. (MNG), "NE Bangkok, Khao Yai Nat. Park, 750-850 m, 26.XI-3.XII.85, Burckhart-Löbl".

Vietnam. 2 ex. (TMB), "Yen so, SE of Hanoi, 19-23.IV.1966, Gy. Topál, beaten from trees"; 5 ex. (TMB, ZIN), "Xuan dinh, NW of Hanoi, 26-29.IV.1966, Gy. Topál", "netted in grasses"; 3 ex. (TMB, ZIN), "Hanoi, Hotel Kim lien, 1-2.V.1966, Gy. Topál", "from decaying banana tree"; 3 ex. (NMP, ZIN), "Hoa Binh, 4-7.6.1986, Ha Son Binh prov., Jan Horák".

Malaysia. 87 ex. (MMUE, ZIN), "Penang, Universiti Sains, 1.6.76, Mangka trap, R.A. Beaver" (and "...3.6.76, Banana trap..."); 4 ex. (SMNS, ZIN), "Pahang, 30 km S Pekan, 20.2.1994, Grimm & Rachinsky"; 1 ex. (SMNS), "Borneo: Sabah, Kinabalu N.P.: Headquarters, 1500-1600 m, 11-15.XI.1996, W. Schawaller"; 29 ex. (SMNS, ZIN), "Borneo: Sabah, Crocker Range N.P., NW Keningau, 900-1200 m, at light, 18.XI.1996, D. Grimm"; 1 ex. (SMNS), "Borneo: Sabah, Gaya Island, 22-23.XI.1996, W. Schawaller".

Indonesia. 1 ex. (RNHL), "Sumatra, Manna, M. Knappert", "*Carpophilus vittiger* det. Murr."; 2 ex. (RNHL), "P.H. v. Doesburg, Java, Samarang"; 3 ex. (NRS), "Sumatra, Medan, Mjöb"; 5 ex. (RNHL, ZIN), "L.G.E. Kalshoven, Java, 250 m, Buitenzorg, 11-I-1926" (and "X-1919", "3-5-1927"); 5 ex. (RNHL, ZIN), "Dr. J. v.d. Vecht, Tjiomas, Buitenzorg, 1 Oct. 1936"; 1 ex. (NHML), "Sulawesi Utara, Dumoga-Bone N.P., May 1985", "trap Flight intercept", "Plot A, ca. 200 m, Lowland forest", "R. Ent. Soc Lond., Project Wallace, B.M. 1985-10".



Figs 95-108. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

95-105 - *C. (M.) mutilatus*; 106-108 - *C. (M.) nepos*. 95 - male body, dorsal view; 96 - antennomeres 1-3; 97 - antennal club; 98 - submesocoxal line of metaventrite, ventral view; 99 - male metatibia, ventral view; 100 - apex of female pygidium, dorsal view; 101-102 - lateral lobes of phallobase ("tegmen"): 101 - ventral view, 102 - lateral view; 103 - aberrant lateral lobes of phallobase ("tegmen") of specimen from Vietnam (Hoa binh) (ZIN), lateral view; 104 - penis trunk with extracted inner sac, dorsal view; 105 - ovipositor, ventral view; 106 - apex of female pygidium, dorsal view; 107 - male metafemur and tibia, ventral view; 108 - male mesotibia, ventral view. Scale bars: A - 1 mm (to Fig. 95), B - 0.5 mm (to Figs 96-100, 106-108), C - 0.25 mm (to Figs 101-105).

Рис. 95-108. Виды подрода *Myothorax* рода *Carpophilus*.

95-105 - *C. (M.) mutilatus*; 106-108 - *C. (M.) nepos*. 95 - тело самца, сверху; 96 - антенномеры 1-3; 97 - булава усиков; 98 - субмезококсальная линия метавентрита, снизу; 99 - задняя голень самца, снизу; 100 - вершина пигидия самки, сверху; 101-102 - латеральные доли фаллобазы («тегмен»): 101 - снизу, 102 - сбоку; 103 - aberrantные латеральные доли фаллобазы («тегмен») экземпляра из Вьетнама (Хоабинь) (ZIN), сбоку; 104 - ствол пениса с вывернутым внутренним мешком, сверху; 105 - яйцеклад, снизу; 106 - вершина пигидия самки, сверху; 107 - заднее бедро и голень самца, снизу; 108 - задняя голень самца, снизу. Масштабные линейки: A - 0.5 мм (к рисунку 95), B - 0.5 мм (к рисункам 96-100, 106-108), C - 0.25 мм (к рисункам 101-105).

Philippines. 1 ex. (ZMB), "Insel Negros, Dumaguete, leg. Böttcher, 29.2.1914"; 9 ex. (ZIN, ZMB), "Ilaga, 3 Februar 1915, Böttcher"; 1 ex. (SMNS), "Leyte Visca, N Baybay, cultiv. land, 1991, Schawaller et al."; 1 ex. (NMB), "15.VII.1995, Philipp., Palawan, Prov. Narra: Tigman", "Wolfgang Ulrich".

Mexico. 3 ex. (ZIN), "Saltillo Coahuila, Bajío UAAAN, 25°25'23" N 101°00'19" E, 1592 m; collected in dried fruits (orange, apple and lemon), may 15.V.2016 and 01–05.VI.2016, H. Hernandez"; 7 ex. (ZIN), "Chiapas, Angel Albino Corzo, 15° 52' N y 92° 43' E. 640 m, collected in dried fruits (orange, apple and banana), 24.XII.2016, H. Hernandez".

**Diagnosis.** This species seems to be the most variable among members of the *dimidiatus*-group and due to its comparatively slender body and nearly straight inner edge of meso- and metatibiae it is more similar to *C. (M.) assignatus* **sp. n.**, *C. (M.) contengens*, *C. (M.) fumatoides* **sp. n.**, *C. (M.) fumatus*, *C. (M.) generosus* **sp. n.**, *C. (M.) notatus*, *C. (M.) pilipennis*, *C. (M.) robustus* **stat. n.**, *C. (M.) schioedtei* and *C. (M.) timorensis*. The species under consideration has a peculiar dorsoventral curvature of lateral lobes of phallobase ("tegmen") and peculiar female gonocoxites with characteristic disposition of styli at simple apex as well as characteristic submesocoxal line. Besides, it differs:

- from *C. (M.) assignatus* **sp. n.** and *C. (M.) pilipennis* also in the characters listed in the above key: distinct punctuation on entire surface and very smoothed sculpture at anterior edge of prosternum, subsemicircular apex of its process; metafemur considerably more than 2.5 times as long as wide; in general smaller body (although the scopes of body size are considerably overlapping), comparatively more slender and often with darkened pronotum;

- from *C. (M.) contengens* also in its pattern of body colouration, usually less raised pubescence, frequently less distinct punctuation on uncovered tergites, denser and coarser punctuation and somewhat smoothed cellular microreticulation on prosternum, meso- and metaventrete, somewhat narrower metatibia and not truncate apex of female pygidium;

- from *C. (M.) fumatoides* **sp. n.** and *C. (M.) fumatus* also in its usually smaller and much lighter body, distinctly punctured and microreticulated anterior part of prosternum, subequal length of antennomeres 2 and 3, light antennal club;

- from *C. (M.) generosus* **sp. n.** also in its lighter body with different pattern of infuscation; much less dense punctuation and less contrasting sculpture of integument (but with raised punctures and usually microreticulation on anterior part of prosternum), clearly recumbent dorsal pubescence, light antennal club, flattened surface behind mentum between posterior ends of antennal grooves;

- from *C. (M.) notatus* also in its much lighter body, distinct punctuation on anterior part of prosternum, but not so coarse punctuation and somewhat smoothed microreticulation on mesoventrite, comparatively narrower metafemur and tibiae;

- from *C. (M.) robustus* **stat. n.**, *C. (M.) schioedtei* as well as Polynesian *C. (M.) mutabilis* and *C. (M.) oculatus* also in its more developed punctuation of underside (rather dense on prosternum and metaventrete), prosternal process with apex somewhat curved along coxae and subtruncate at posterior edge, usually more distinctly microreticulate prosternal and mesoventral surface, comparatively smaller antennal club, somewhat narrower tibiae and simple apex of female pygidium;

- from *C. (M.) timorensis* also in its generally larger body, antennomere 3 not shorter than antennomere 2, more distinct punctuation, including that on medioanterior part of pronotum, medioanterior part of prosternum rectilinear from side, submesocoxal line more deviating from anterior angles of metaventrete and simple apex of female pygidium.

Finally, it differs from the species with more or less convex outer edge of metatibiae (*C. (M.) dimidiatus*, *C. (M.) pilosellus* and *C. (M.) truncatus*) in not only the peculiar structures of genitalia of both sexes, but also in its usually larger body, more distinct punctuation of integument, less developed and less conspicuous dorsal pubescence, peculiar outline of the submesocoxal line.

**Notes.** The references to this species in the Western Hemisphere should be corroborated by a further study. Dobson [1960] supported that the holotype of *C. (M.) luridus* (type series deposited in NHML) is conspecific with the lectotype of *C. (M.) mutilatus*. Some of references to *C. (M.) dimidiatus* seem to concern the species under consideration as well as *C. (M.) nepos* or *C. (M.) pilosellus*. In the collection of ZMB the specimens of this species are labelled as the following: 1♂ – "Thio", "76995", "*biguttatus* Motsch."; 1♀ – "Kanala", "76995", "*biguttatus* Motsch.". Probably this misidentification referred to the species described by Motschulsky [1858], which indeed belongs to the subfamily Cryptarchinae. This situation apparently is connected with the error in the catalogue by Gemminger and de Harold [1868: 810]. The depositories of the series of *C. (M.) bimaculatus* Montrouzier (not Marsham) and *C. (M.) puberulus* remain unknown, although that of *C. (M.) tempestivus* Jacquelin du Val (non Erichson) should be deposited in MNHN.

This species was first described from Central America (type locality of *Nitidula hemiptera* Fabricius (non Linnaeus)) and later from Europe (*Carpophilus mutilatus* – Sicily). Murray [1864] thought that this species was originated from the West Indies and added to it the cosmopolitan variety "*luridus*", however, Reitter [1919: 55] pointed out that it spreads in "Europa und über den ganzen südöstlichen Teil der Erde". After study of collections of many museums it became possible to suppose that this species is cosmopolitan, but more common in the Indo-Malayan Region.

*Carpophilus (Myothorax) nepos* Murray, 1864  
(Figs 106–113)

*Carpophilus (Myothorax) nepos* Murray, 1864: 381 (Brazil; syntypes) = *Carpophilus freemani* Dobson, 1956: 37 (USA: Iowa; Brazil: Manaus; (?) Bolivia).

In total, more than a hundred specimens were examined, including the types as well as others mostly from the Indo-Malayan Region, and also from the other areas of Eurasia, Africa and both North and South America (AMNY, MSNG, NHML, NMB, NMP, SMNS, ZIN, ZMB, ZSI).

**Type material.** Brazil. 1♂, lectotype of *C. (M.) nepos* (NRS), here designated, "Rio Jan", "F. Sahlb."; 1♂, paralectotype (NRS), "Rio Jan", "Fry"; 6 paratypes of *C. freemani* (NHML), "Brazil nuts at Hull, Dec. 1954", "Brit. Mus. 1956-26".

**Additional material** (some selected specimens). Tanzania. 1 ex. (ZMB), "D.O. Afrika, Daressalam, Methner"; 1 ex. (ZMB), "D.O. Afrika, Dereina, 19.XI.1905, Schröder".



India. 1 ex. (ZMB), "India or., Nagpore", "Coll. G. Hauser"; 1 ex. (NHML), "W. Almora, Kumaon, India, H.G.C."; 1 ex. (NHML), "Sarda, Bengal, P.W.C."; 1 ex. (ZSI), "Ja 2, Tammu, 25.5.72, on Mango leaf, T. Sengupta"; 1 ex. (ZIN), "Grarakhpur Peach, 10.6.73, T. Sengupta"; 1 ex. (ZSI), "Calcutta, Lichu, 10.5.76, T. Sengupta"; 2 ex. (TMB, ZIN), "W Bengal, Nagarkanda, sifted gargage-heap", "3-14.I.1980, leg. Gy. Topál"; 2 ex. (ZIN), "Rajasthan, Jodhpur, 10-12.IX.1989, A. Kompantzev".

Sri Lanka. 10 ex. (AMNY, ZIN), "Western Prov., Nugegoda, May 3-10, 1969, P.B. Karunaratne (from rotten fruits)"; 2 ex. (TMB, ZIN), "SW, Dodanduwa, 15 km NW of Galle, 3-20.3.1988, T. Munk".

Thailand. 1 ex. (NMB), "...23-25.II.1993, Ranong prov., 9°56' 98'40", Ranong Hot Spring, K. Majer"; 4 ex. (ZIN, ZML), "Pattaya, 1979, T. Palm"; 1 ex. (ZMUC), "Chieng Mai Province, 325 m, 15-30.x.1984, Karsholt, Lomholdt & Nielsen"; 4 ex. (MSNG, ZIN), "Mae Hong Son, Tom Lok, 8 km N Mae Lang, 700 m, 11, 13.XI.1985, Burckhardt-Löbl"; 2 ex. (SMNS), "Changwat Chiang Mai, Chiang Mai, Dez. 1988, leg. Trautner & Geigenmüller"; 14 ex. (NMB, ZIN), "1-21.iii.1996, Chumphon prov., Pha To env., 9°48' 98'47", K. Majer".

Vietnam. 1 ex. (TMB), "Prov. Ha-Tinh, forêtière Hũong-sôn, 150 m, forêt trop. pluv.", "à la lumière, 19.VIII.1963, T. Pócs"; 1 ex. (TMB), "Hanoi, Hotel Kim-lien, 1-2.V.1966, Gy. Topál, from decaying banana tree"; 2 ex. (NMB, ZIN), "21.35N 106.30E, 52 km SW of Lang Son, 27.iv-6.v.1996, 370 m, Pacholátko & Demlický".

Malaysia. 1 ex. (ZIN), "Johor, Lombong, 15 km N Kota Tinggi, 27-30.7.1992, R. Schuh".

Philippines. 2 ex. (ZMB), "Mindanao, Kalambugan b. Lanao, Böttcher"; 3 ex. (ZMB, ZIN), "Luzon, Manila, 27.10.1914, leg. Böttcher".

Mexico. 5 ex. (ZIN), "Saltillo Coahuila, Bajío UAAAN, 25°25'23" N 101°00'19" E, 1592 m; collected in dried fruits (orange, apple and lemon), may 15.V.2016 and 01-05.VI.2016, H. Hernandez"; 3 ex. (ZIN), "Chiapas, Angel Albino Corzo, 15° 52' N y 92° 43' E. 640 m, collected in dried fruits (orange, apple and banana), 24.XII.2016, H. Hernandez".

**Addition to description.** This species is very similar to *C. (M.) languescens* **sp. n.** (see description of the latter). Length 1.7-3.2, breadth 0.8-1.2, height 0.5-0.7 mm. Rather convex ventrally and dorsally; general colouration of dorsal surface of head, pronotum, abdominal tergites, metaventrite and often elytral apices usually about brownish to dark brown, but the remainder markedly lighter (elytra especially lighter); dorsum and underside with faint oily lustre; dorsum with moderately dense and short, subrecumbent, moderately conspicuous yellowish hairs, 1.5-2 times as long as distance between their insertions; underside with less conspicuously pubescence. Lateral lobes of phallobase ("tegmen") and ovipositor weakly sclerotised.

**Diagnosis.** This species differs from *C. (M.) languescens* **sp. n.** only in the almost always lighter elytra, more conspicuous pubescence, shape of meso- and metatibiae as well as in the shape of weakly sclerotised lateral lobes of phallobase ("tegmen") with much longer and different apices of lateral lobes (see above the key to species). Besides the considered characters, this species in contrast to *C. (M.) languescens* **sp. n.** has shorter elytra, which are 6/7-7/8 as long as wide combined.

**Notes.** The type specimens of *C. (M.) freemani* are deposited in the collection of NHML. Some of references to *C. (M.) dimidiatus* seem to concern the species under consideration as well as *C. (M.) mutilatus* or *C. (M.) pilosellus*. The author of this paper published the synonymy of *C. (M.) nepos* and *C. (M.) freemani* without explanation [Kirejtshuk, 1996], although his opinion was grounded on study of the type series of the first. Both synonyms of this species were proposed for the specimens originated from Brazil (type locality) or the type locality of *C. (M.) freemani* can be in Bolivia (its holotype taken from Brazil nuts originated from Brazil or Bolivia), although this species has the world-wide range under artificial conditions and is known from natural localities of many areas with a warm climate.

### *Carpophilus (Myothorax) notatus* Murray, 1864 (Figs 114-117)

*Carpophilus (Myothorax) notatus* Murray, 1864: 380 (Madagascar; syntypes).

In total, some dozens of specimens were examined, including types below and others from Madagascar (MRAC, NHML, NMNH, ZIN).

**Type material.** Madagascar. 1♂, lectotype of *C. (M.) notatus* (ZMB), here designated, and 2 ex., paralectotypes (ZMB), with the same labels: "binotatus Kl., Madag., Goud.", "8364"; 4 ex., paralectotypes of *C. (M.) notatus* (ZMB) (marked as lectotype in the collection by S. Endrödy-Younga in 1964), "Madagascar, Goud.", "8364".

**Additional material** (some selected specimens). Madagascar. 1 ex. (NMHN), "Region de l'Androy, Ambovombe, Dr J. Decorse, 1901"; 2 ex. (ZIN), "Maroansetra, VII-XI.1946"; 6 ex. (MRAC, ZIN), "Madagascar Est: Ambodivoangy, VI.1960, J. Vadon"; 1 ex. (ZMB), "Antanarivivo, Ambodrona, 3-5.1.1995, J. Janák".

**Notes.** This species is included in this review because it is useful to be compared with its relatives from the Indo-Malayan Region. It is quite distinct from all the species of the *dimidiatus*-group of species thanks to the very characteristic body colouration with bright yellow oval spot on each elytron, and particularly long and narrow lateral lobes of its phallobase ("tegmen").

### *Carpophilus (Myothorax) pilipennis* Macleay, 1873 (Figs 118-121)

*Carpophilus pilipennis* Macleay, 1873: 160 (Australia: Gayndah; type (? types)) = *C. davidsoni* Dobson, 1952: 256 (Australia, New Zealand), **syn. n.**

In total, several hundred of specimens were examined, including types below as well as specimens from Australia and other territories (AMS, ANIC, MVM, QMB, ZIN).

**Type material.** Australia. 1♀, syntype of *C. (M.) pilipennis* (AMS), "K 26 893", "*Carpophilus pilipennis*, Gayndah"; 1 ex., paratype of *C. (M.) davidsoni* (NHML), "Dubba, New South Wales, 22/12/48"; 2 ex., paratypes of *C. (M.) davidsoni* (AMS), "Leeton, NSW, 1/2/49, E.L. Jones".

**Additional material** (some selected specimens). Australia. 13 ex., (QMB, ZIN), Queensland; 2 ex. (NHML), "N.S.W. Nowra, 30-iii-1934, F.A. Rodway"; 1 ex. (NHML), "Pozières R., 15-I-1970, J. Heaton".

New Zealand. 16 ex. (NHM, ZIN), "AK: Auckland, Mt. Eden, garden, 80 m, I.1984", "P.M. Hammond".

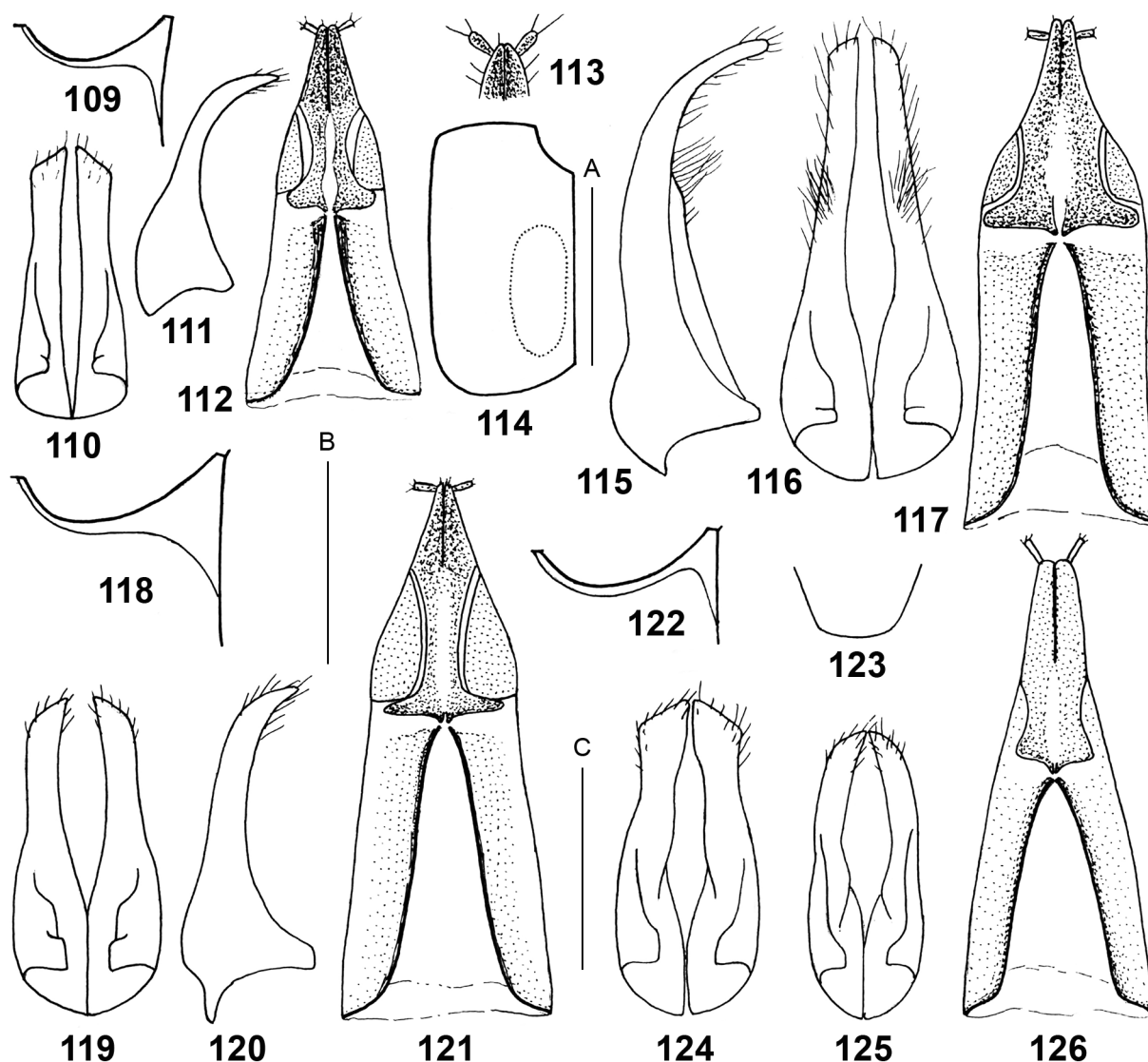
Polynesia. About 200 ex. (FMNH), Marianas (Guam, Saipan etc.).

**Notes.** The re-examination of one syntype of *C. (M.) pilipennis* showed that this female seems to be conspecific with two paratypes of *C. (M.) davidsoni*, other studied specimens from different parts of East Australia as well as they fit the illustrations by Dobson [1952]. The records of this species from Polynesia [Gillooly, 1962] and Philippines [Gillooly, 1969] should be reverified, although some Polynesian specimens examined in the collection of FMHN are really conspecific with *C. (M.) pilipennis*.

### *Carpophilus (Myothorax) pilosellus* Motschulsky, 1858 (Figs 122-126, 156)

*Carpophilus pilosellus* Motschulsky, 1858: 41 (East Indies; syntypes) = *C. floridanus* Fall, 1910: 122 (USA; syntypes) = *C. halli* Dobson, 1954: 299 (Nigeria, Sierra Leone, Honduras).

In total, more than 250 specimens were examined, including type specimens below and others mostly from the Himalayas, Indochina and adjacent territories, but also from different territories of the globe (NMB, NME, NMP, TMB, ZIN, ZMB).



Figs 109–126. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

109–113 – *C. (M.) nepos*; 114–117 – *C. (M.) notatus*; 118–121 – *C. (M.) pilipennis*; 122–126 – *C. (M.) pilosellus*. 109, 118, 122 – submesocoxal line of metaventrite, ventral view; 110–111, 115–116, 119–120 – lateral lobes of phallobase ("tegmen"): 110, 115, 119 – ventral view, 111, 116, 120 – lateral view; 112, 117, 121, 126 – ovipositor, ventral view; 113 – apex of ovipositor, ventral view; 114 – elytron with dotted outline of light spot, dorsal view; 123 – apex of female pygidium, dorsal view; 124 – lateral lobes of phallobase ("tegmen") of the lectotype of *C. (M.) pilosellus*, ventral view; 125 – lateral lobes of phallobase ("tegmen") of specimen from Japan, ventral view. Scale bars: A – 1 mm (to Fig. 114), B – 0.5 mm (to Figs 109, 118, 122–123), C – 0.5 mm (to Figs 110–113, 115–117, 119–121, 124–126).

Рис. 109–126. Виды подрода *Myothorax* рода *Carpophilus*.

109–113 – *C. (M.) nepos*; 114–117 – *C. (M.) notatus*; 118–121 – *C. (M.) pilipennis*; 122–126 – *C. (M.) pilosellus*. 109, 118, 122 – субмезококсовая линия метавентрита, снизу; 110–111, 115–116, 119–120 – латеральные доли фаллобазы («тегмен»): 110, 115, 119 – снизу, 111, 116, 120 – сбоку; 112, 117, 121, 126 – яйцеклад, снизу; 113 – вершина яйцеклада, снизу; 114 – надкрылье с пунктированным очертанием осветленного пятна, сверху; 123 – вершина пигидия самки, сверху; 124 – латеральные доли фаллобазы («тегмен») лектотипа *C. (M.) pilosellus*, снизу; 125 – латеральные доли фаллобазы («тегмен») экземпляра из Японии, снизу. Масштабные линейки: A – 1 мм (к рисунку 114), B – 0.5 мм (к рисункам 109, 118, 122–123), C – 0.5 мм (к рисункам 110–113, 115–117, 119–121, 124–126).

**Type material.** (?) India. 1♂, lectotype of *C. pilosellus* (ZMMU), here designated, and 7 ex., paralectotypes (ZMMU), "Ind. or."

**Additional material** (some selected specimens). Russia. About 50 ex. (ZIN), St Petersburg, Leningrad Region, Samara Region, Primorskiy Region, etc.

Jordanian. 1 ex. (TMB), "N Jordan, J. Klapperich", "Irbid, 600 m, 28.10.0957".

China (including Taiwan). 1 ex. (TMB), "Formosa, Sauter"; 1 ex. (NHML), "Charbin, 20.vi.1952"; 2 ex. (NME, ZIN), "Shaanxi, Qin Ling Shan, 109.16E, 34.20N, Li Shan Mt., nr. Lintong, 31 km E Xian, 1000–1200 m, Div. Meadows & Forest, 26–27.08.1995, A. Pütz".

Cambodia. 1 ex. (NMP), "centr., Phnom ??, 5.XII.84, Frühbauer".

Vietnam. 1 ex. (ZIN), mountains SW Shon Zyong, 20.3.1962, Kabakov (in Russian); 1 ex. (ZIN), mountains SW Shon Zyong, 23.3.1962, Kabakov (in Russian) [Kum-Ranh].

Thailand. 1 ex. (ZML), "Pattaya, 1979, T. Palm"; 5 ex. (NMB, ZIN), "9–14.V.1991, Thiang Dao, 350 m, 19°22'N 98°57'E, Vít Kubán".

Indonesia. 11 ex. (ZIN, ZMB), "S.O. Borneo, Grabowsky".

Philippines. 1 ex. (ZMB), "Calapan, Böttcher, 3.2.1916".

Papua New Guinea. 22 ex. (TMB), "N. Guinea, Biry, 1896" (and 1897, 1898, 1900, 1901); 1 ex. (TMB), "Brit. N. Guinea, Mazalón".

Polynesia. About 100 ex. (FMNH), Marianas (Guam, Saipan etc.).

**Diagnosis.** This species due to its small dark body and convex inner edge of metatibia (especially convex in male) is very similar to *C. (M.) dimidiatus* and its most closely related consubgenera (*C. (M.) imitatus* and *C. (M.) truncatus* – see below), differing from them in the characters mentioned in the above key to species and below. The lateral lobes of phallobase (“tegmen”) in most cases are much longer and narrower than in *C. (M.) dimidiatus* and different from those of all three mentioned relatives.

**Notes.** Except the duplicates of the type series of *C. (M.) pilosellus* re-examined by the author, there are some other type specimens deposited in NHML [Gilligly, 1962]. The type series of *C. (M.) floridanus* is deposited in the collection of the Museum of Comparative Zoology at Harvard College in Cambridge (Massachusetts, USA) and that of *C. (M.) halli* – in NHML. The writer used the synonymy proposed for these names by Gilligly [1962] and Connell [1963]. Some of references to *C. (M.) dimidiatus* seem to concern the species under consideration as well as *C. (M.) mutilatus* or *C. (M.) truncatus*. This species together with *C. (M.) dimidiatus* and *C. (M.) truncatus* form a group of very similar and apparently closely related species (see above the “Notes” of *C. (M.) dimidiatus*). Kirejtshuk [1996] pointed out that *C. (M.) truncatus* was mixed with more common *C. (M.) pilosellus* and he also indicated the some diagnostic characters to separate these species. After study of many additional specimens from different collections, it became clear that the distinctness of these forms and their relations with *C. (M.) dimidiatus* need a further more detailed revision. This species seems to have subcosmopolitan range, although it was first described from the East Indies (*C. (M.) pilosellus*), then from Florida (*C. (M.) floridanus*), and last from stored products transported from Nigeria, Sierra Leone, Honduras (*C. (M.) halli* with type series remaining not defined because R.M. Dobson in its description did not mention the origin of the holotype). At present, it seems problematic to conclude on the initial range of this species, but it seems be very likely in the Indo-Malayan Region.

*Carpophilus (Myothorax) robustus* Murray, 1864, **stat. n.**  
(Figs 127–132)

*Carpophilus (Myothorax) vittiger* var. *robustus* Murray, 1864: 373 (Waigiu; syntypes).

In total, about 50 specimens were examined, including types below and 32 ex. (SMNS, TMB, ZIN).

**Type material.** Indonesia. 1♂, lectotype of *C. (M.) vittiger* var. *robustus* (NHML), here designated, “Wagiou”, “N. Guin., Waigiu” (Waigeo), “Wallace”, “ex Mus. Murray”, “Fry Coll. 1905-100”, “*Carpophilus maculatus robustus* Murr., R.M. Dobson Det.”; 1♂, paralectotype of *C. (M.) vittiger* var. *robustus* (NHML), “Wagou” (Waigeo), “*vittiger* var.”, “68.106”, “*vittiger* var. *robustus*, Dorey”, with the same Dobson’s label; 1♂, paralectotype of *C. (M.) vittiger* var. *testaceus* (NHML), “Wagiou” (Waigeo), “*vittiger* var.”, “68.106”, “B.M., Type”, “*vittiger* var. *testaceus*”, with the same Dobson’s label.

**Additional material** (some selected specimens). Indonesia. 1 ex. (SMNS), “Maluku, Is. Halmahera, Tobelo, Mamuya, 12.XI.1999, 20–500 m, A. Riedel”.

Papua New Guinea. 31 ex. (TMB, ZIN), “N Guinea, Biry, 1898”, “Simbang Huon Golf”; 1 ex. (TMB), “N Guinea, Biry, 1900”, “Friedrich-Wilh.-hafen”.

**Diagnosis.** This species is very similar and, probably, closely related to *C. (M.) schioedtei* as well as to the Polynesian *C. (M.) mutabilis* and *C. (M.) oculatus* (see

below the diagnosis of the *C. (M.) schioedtei* and the above key to species), however, it differs from the first in the denser punctuation and raised microreticulation of the integument on pronotum, difference in length of antennomeres 2 and 3 as well as in its more expressed punctuation and sculpture on prosternum, and in comparison with the second the species under consideration also has the more robust body, usually with very convex and subquadrangular pronotum, never with traces of explanate pronotal sides, subtruncate apex of prosternal process and very distinct shape of the lateral lobes of phallobase (“tegmen”). Besides, this species is very distinct from both *C. (M.) mutabilis* and *C. (M.) oculatus* in the pattern of the body colouration.

**Notes.** Three type specimens from two “varieties” of *C. (M.) vittiger* belong to the species quite distinct in the structure of the male genitalia. The labels of the one of these specimens corresponds the Murray’s text devoted to *C. (M.) vittiger* var. *robustus* and it was designated as a lectotype of it. The second specimen of *C. (M.) vittiger* var. *robustus* has some inconsistency in the labels (“Wagou” and “*vittiger* var. *robustus*, Dorey”) and it is reasonable to regard it only as a paralectotype, despite that it is more mature, larger and darker. Finally, one of the specimens of *C. (M.) vittiger* var. *testaceus* belongs to this species, but the name *testaceus* in accordance with the lectotype designation should be treated as a synonym of *C. (M.) contegens* (see above). The type locality of *C. (M.) vittiger* var. *robustus* is Waigeo (“Waigiu” – an island in the Raja Ampat Archipelago offshore the Indonesian part of New Guinea). Besides, it is so far known only from the Papuan Province from Simbang Huon Golf (Papua New Guinea) and from a close insular system – Maluku (Halmahera Island: Tobelo, Mamuya).

*Carpophilus (Myothorax) schioedtei* Murray, 1864  
(Figs 133–139)

*Carpophilus (Myothorax) schioedtei* Murray, 1864: 381 (“Pulo Milu”; syntypes) = *C. (M.) pallescens* Murray, 1864: 380 (“Waigiu”; syntypes), **syn. n.** = *C. (M.) vittiger* var. *limbalis* Murray, 1864: 373 (“Dorey”; syntypes), **syn. n.**

In total, more than 160 specimens were examined, including the types as well as others from different collections (ANIC, NHML, NMB, NMP, RNHL, SMNS, ZIN, ZMB, ZMO, ZMUC).

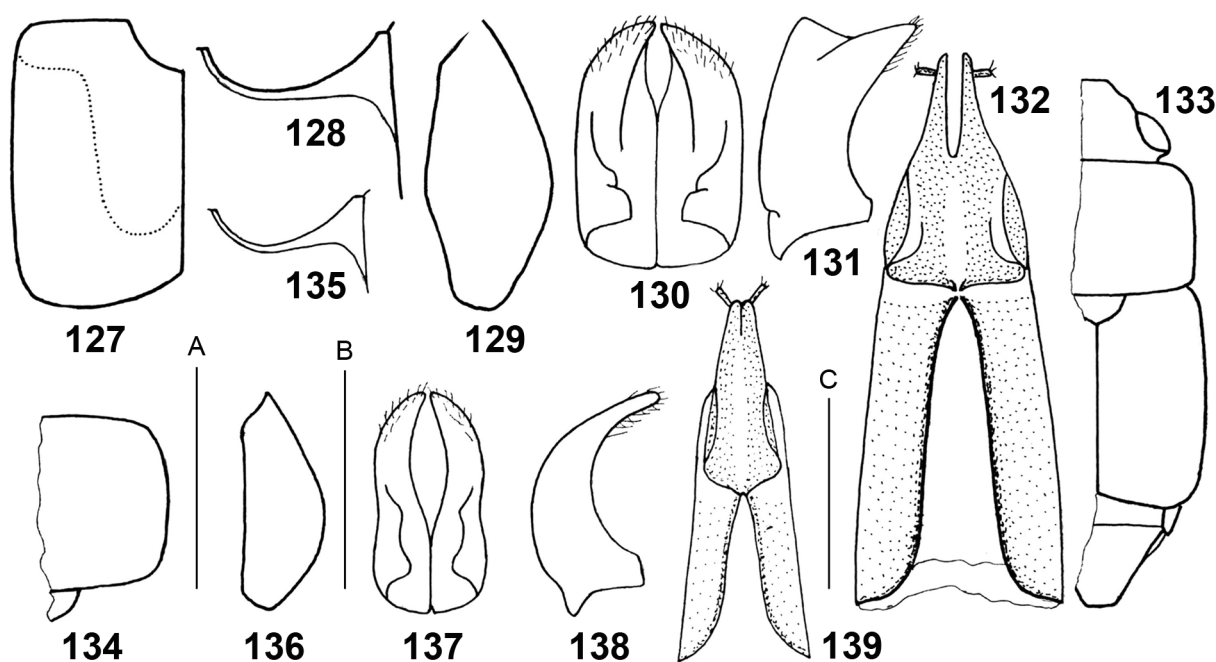
**Type material.** India. 1♂, lectotype of *C. (M.) schioedtei* (ZMUC), here designated, “Pulo Milu, Galatea”, “*schiodtei* Murr.”, “holotypus Jelínek 1984”.

Indonesia. 1♀, lectotype of *C. pallescens* (NHML), here designated, and 1♀, paralectotype of *C. (M.) pallescens* (NHML), “Waigiu”, “68.106”; 1♀, lectotype of *C. (M.) vittiger* var. *limbalis* (NHML), here designated, “Wallace”, “ex Mus. Murray”, “Moluccas, Dorey”, “Dor”, “Fry Coll. 1905-100”, “*limbalis*”; 1♀, (?) paralectotype of *C. (M.) vittiger* var. *limbalis* (NHML), “Celebes, Macass”, “ex Mus. Murray”, “Type”, “*vittiger* var.”, “Fry Coll. 1905-100”, “*Carpophilus maculatus limbalis* Murr., R.M. Dobson Det., Lectotype”.

**Additional material** (some selected specimens). India. 15 ex. (ZIN, ZMUC), “Pulo Milu, Galatea”; 2 ex. (ZMUC), “Nancovri, Galatea”; 1 ex. (NMB), “Andaman Is., Havelok I., env. of village N7, 11°59’N, 92°58’E, 22.IV–14.V.1998, Karel & Simon Majer”.

China. 1 ex. (ZMB), “Tainan, Formosa, 1911, H. Sauter”, “22.VII”, “*Carpophilus dimidiatus* F.”, “det. Grouvelle”; 5 ex. (NHML, ZIN), “Hong Kong, Sai Kung Farm (case 432)”, “in rotten flowers of orange, 16.IV.81, R. Winney, 83/8A”; 2 ex. (NHML, ZIN), “Hong Kong, Tai Po Kau, 7.X.92”, “inside fallen fruit of *Citrus reticulata*”.





Figs 127–139. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

127–132 – *C. (M.) robustus* stat. n.; 133–139 – *C. (M.) schioedtei*. 127 – elytron with dotted outline of lightened part, dorsal view; 128 – submesocoxal line of metaventrite, ventral view; 129 – male metafemur, ventral view; 130–131, 137–138 – lateral lobes of phallobase ("tegmen"); 130, 137 – ventral view, 131, 138 – lateral view; 132, 139 – ovipositor, ventral view; 133 – female body, the holotype, dorsal view; 134 – pronotum of specimen from Vietnam, dorsal view; 135 – submesocoxal line of metaventrite, ventral view; 136 – female metafemur (holotype), ventral view. Scale bars: A – 1 mm (to Figs 127, 133–134), B – 0.5 mm (to Figs 128–129, 135–136), C – 0.5 mm (to Figs 130–132, 137–139).

Рис. 127–139. Виды подрода *Myothorax* рода *Carpophilus*.

127–132 – *C. (M.) robustus* stat. n.; 133–139 – *C. (M.) schioedtei*. 127 – надкрылье с пунктированным очертанием осветленной части, сверху; 128 – субмезококсовая линия метавентрита, снизу; 129 – заднее бедро самца, снизу; 130–131, 137–138 – латеральные доли фаллобазы («тегмен»); 130, 137 – снизу, 131, 138 – сбоку; 132, 139 – яйцеклада, снизу; 133 – тело самки, голотип, сверху; 134 – переднеспинка экземпляра из Вьетнама, сверху; 135 – субмезококсовая линия метавентрита, снизу; 136 – заднее бедро самки (голотип), снизу. Масштабные линейки: А – 1 мм (к рисункам 127, 133–134), В – 0.5 мм (к рисункам 128–129, 135–136), С – 0.5 мм (к рисункам 130–132, 137–139).

Thailand. 5 ex. (NMB, ZIN), "23–25.II.1993, Ranong prov., 9°56' 98'40", Ranong Hot Spring, K. Majer"; 24 ex. (NMB, ZIN), "1–21.iii.1996, Chumphon prov., Pha To env., 9°48' 98'47", K. Majer"; 1 ex. (SMNS), "29.VIII.1996, Nong Khai, 17°52'N 102°44'E, M. Hauser".

Laos. 14 ex. (NMP, ZIN), "5–11.5.1997, 20 km NW Louang Namtha, N 21°09.2 E 101°18.7, Alt. 900 ± 100 m, E. Jendek & O. Šauša".

Vietnam. 11 ex. (ANIC, SMNS, ZIN), 400 m, Son Đòong, Range Tam Đảo, O. Kabakov, 20.02.1962 (in Russian), fruits of *Dillenia*, 24.02.1962 (in Russian); 3 ex. (ZIN), mountains SO Chảo quý, 300 m, 6.02.1963, O. Kabakov (in Russian); 5 ex. (NMP, ZIN), "Hoa Binh, 4–7.6.1986, Jan Horák"; 1 ex. (NMB), "2–12.V, Cuc Phuong N.P., 100 km S Hanoi, J. Jendek, 1991".

Malaysia. 2 ex. (SMNS), "Borneo: Sabah, Crocker Range N.P., NW Keningau, 900–1200 m, at light, 18.XI.1996, D. Grimm".

Malaysia or Indonesia. 1 ex. (ZMB), "N. Borneo, H. v. Tertyen".

Indonesia. 1 ex. (RNHL), "Dr B.H. Hagen, Tandjong, Morawa, Serdang (N.O. Sumatra)"; 1 ex. (RNHL), "Amboina, Ned. India, L. de Vos"; 1 ex. (NHML), "Ternate, 92–20"; 9 ex. (SMNS, ZIN), "Irian Jaya: Jayapura, Sentani, Cyclop-Mts., 5–10.1991, 300 m, A. Riedel"; 1 ex. (SMNS), "NE Sumbawa, 4 km NW of Dompou, 13.II.1994, Bolm"; 2 ex. (SMNS), "Lombock, Crocker Range N.P., NW Keningau, 900–1200 m, at light, 18.XI.1996, Bolm".

Philippines. 6 ex. (ZIN, ZMB), "Insel Leyte, Burauen bei Leyte, Böttcher, 7.5.1915"; 1 ex. (ZMB), "Luzon, Böttcher, II.1918"; 1 ex. (ZMUC), "Palawan, Mantilingajan, Pinigisan, 600 meter, 23 Sept. 1963, Noona Dan Exp. 61–62"; 2 ex. (NMB), "1600 m, Mindanao, 30 km W of Maramag, 28–30 Dec. 1990, Bolm"; 17 ex. (SMNS, ZIN, ZMO), "Mindanao, 30 km E of Malaybalay, Busdi, 5–9 May 1996, Bolm, 1000 m"; 1 ex. (SMNS), "Mindanao, 30 km NW Maramag, 13–17 May 1996, Bagingsilang, 1700 m, Bolm"; 1 ex. (SMNS), "Mindanao, Davao Prov., 29 km NW of New Bataan, 20–22 May 1996, Bolm, 1200 m".

Papua New Guinea. 2 ex. (NHML), "N. Guinea, Kapakapa, Mag-Guigno 1891, L. Loria".

Oceania. 13 ex. (NHML), Solomon I., New Hebrides, Malekula.

USA. 4 ex. (ZIN, ZMUC), Hawaii, "Oahu, Galatea".

**Diagnosis.** This species is very similar and, probably, closely related to *C. (M.) robustus* stat. n. differing from it mostly in the structure of lateral lobes of phallobase ("tegmen") and the characters listed in the above key to species. It is more or less characteristic that the posterior edge of the prosternal process in this species is more arcuate to subsemicircular, while that in *C. (M.) robustus* stat. n. is subtruncate. The shape of the pronotum in this species often is quite characteristic, but that in smaller specimens is without clear lateral explanations and almost as outlined as that in smallest specimens of *C. (M.) robustus* stat. n. In contrast to *C. (M.) robustus* stat. n., the male pygidium in this species is subtruncate rather than arcuate or angular, antennal grooves are frequently joined behind the mentum by a more or less clear transverse depression. *Carpophilus (Myothorax) schioedtei* is also very similar to the Polynesian *C. (M.) mutabilis* but differs from it in the colouration of its body, outline of pronotum and elytra, denser punctuation and more developed sculpture of integument, more conspicuous pubescence and narrower lateral lobes of its phallobase ("tegmen").

This species has an appearance quite characteristic of many species of the *dimidiatus*-group, however, the structure of the male genitalia allows to suppose a closer relationship between this species and *C. (M.) contegens*. Nevertheless, except peculiar structure of genitalia of both sexes, *C. (M.) schioedtei* differs from the latter in

the usually lighter and larger body, less distinct, denser and finer punctation of its integument, more smoothed surface of the prosternum, greater difference in the length of antennomeres 2 and 3, nearly subtruncate apex of the prosternal process, longer last labial palpomere, somewhat shorter metafemur, rounded to subangular apex of the male pygidium and emarginate apex of the female pygidium.

*Carpophilus (Myothorax) schioedtei*, except the peculiar genitalia, pronotum and shape of apex of the female pygidium, differs also:

- from *C. (M.) assignatus* **sp. n.** in its comparatively larger and rather subquadrate antennal club, different length of the antennomeres 2 and 3, prosternal process usually less curved along coxae and with more subflattened apex, submesocoxal line more deviating from the edge of coxal cavities;

- from *C. (M.) fumatoides* **sp. n.**, *C. (M.) fumatus* and *C. (M.) generosus* **sp. n.** in its lighter body colouration, a greater difference in length of the antennomeres 2 and 3, prosternal process with more flattened apex, more smoothed prosternal and mesoventral surface, comparatively larger antennal club; and from the latter also in the sparser punctation and less contrasting sculpture of integument, not subtruncate apex of the prosternal process and different outline of the submesocoxal line;

- from *C. (M.) mutilatus* in its less developed punctation of underside (much sparser or reduced on prosternum and metaventrite), prosternal process with more flattened apex and subtruncate posterior edge, more smoothed prosternal and mesoventral surface, comparatively larger antennal club and somewhat wider tibiae;

- from *C. (M.) notatus* in its lighter body with less contrasting spots on elytra, less coarse and not so dense punctation of integument (especially reduced or smoothed punctation and sculpture on prosternum and mesoventrite), subquadrate antennal club, prosternal process less curved along coxae and with subflattened apex;

- from *C. (M.) pilipennis* in its more slender body with not so raised sculpture on dorsum, different length of the antennomeres 2 and 3, prosternal process less curved along coxae and with subflattened apex, somewhat more smoothed surface of mesoventrite, less deepened median line of the metaventrite, submesocoxal line less strongly deviating from the posterior edge of cavities.

Finally, the species under consideration differs from the Polynesian *C. (M.) oculatus* mostly in the pattern of body colouration, characters of punctation and sculpture of integument as well as in the genital structure of both sexes; and also from *C. (M.) timorensis* in its generally larger body, antennomere 3 not shorter than antennomere 2, more distinct punctation, including that on medioanterior part of prosternum, medioanterior part of prosternum rectilinear from side, submesocoxal line more deviating from anterior angles of metaventrite and simple apex of the female pygidium.

**Notes.** Among the specimens collected during voyage of the Galathea on the island Pulo Milu (Nicobar Islands) one female was studied by A. Murray and for

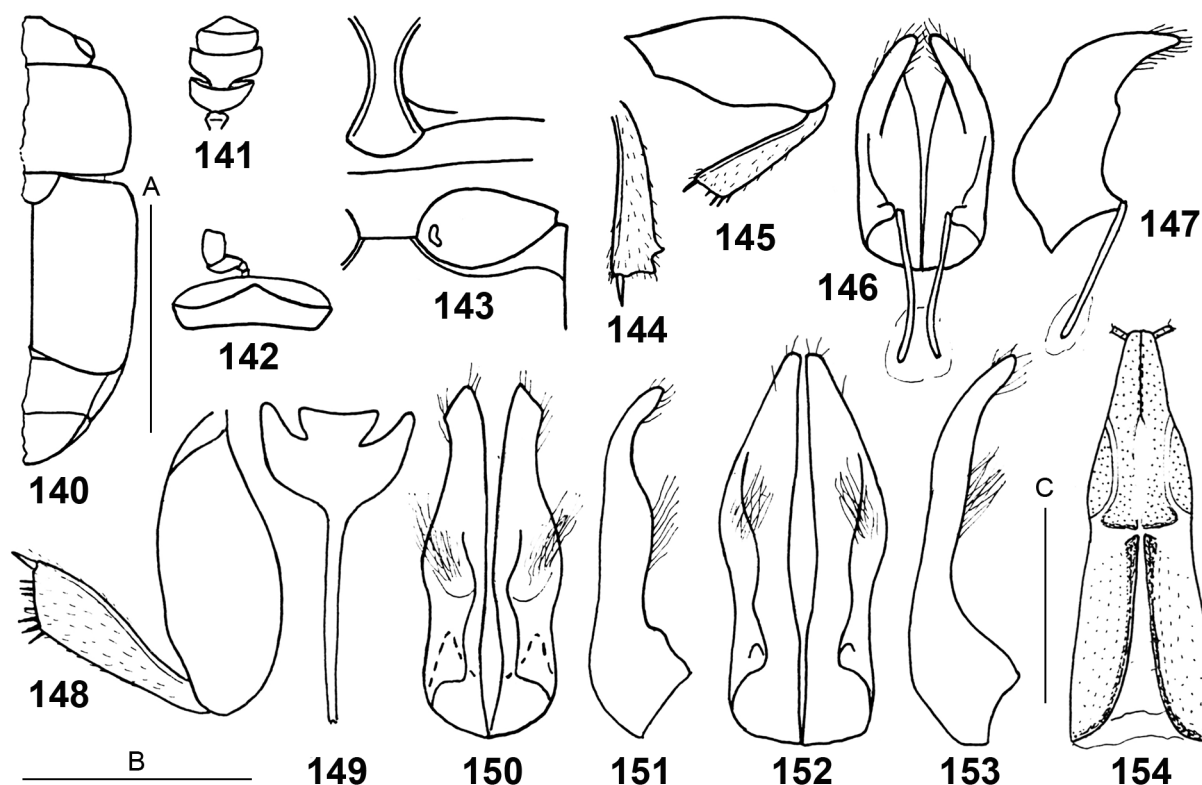
this specimen (small – with body length 2.4 mm – and brownish female with lighter elytra) he proposed the name *C. (M.) schioedtei*. Although the characters of this light and small specimen are not easy to interpret, other specimens originated from the same series are quite mature and include both sexes. It is necessary to note that lateral lobes of phallobase (“tegmen”) of the most males from this series are rather narrow at base. Besides, specimens from the type locality are characterised by darker head, pronotum and uncovered tergites. On the other hand, the studied specimens from Thailand show a great variability in width of the lateral lobes of phallobase (“tegmen”) at base; pattern of the body infuscation as that in *C. (M.) mutilatus* (with blackish pronotal disk) and female pygidium in many cases convex or even subangular. The both type specimens of *C. (M.) pallescens*, lectotype and paralectotype, are small females, which are difficult for a reliable identification, and, therefore, the name *pallescens* is preferable regarded as the second synonym, although it was published above the page with the description of *schioedtei*. The form *C. (M.) vittiger* var. *limbalis* is represented in the collection of NHML by two females. One of the latter, chosen for the lectotype designation, has two geographical labels consistent to the text of the original description (“Dorey”). This specimen is rather small (2.1 mm in length), pale and with slightly darkened elytra apices. Another female of this series is larger (3.6 mm), brownish with slightly darker elytral apices. This specimen has indication on another locality (“Celebes, Macass.”), and therefore, it is designated as questionable paralectotype of this variety (see above the “Notes” to *C. (M.) contegens*), but not as the lectotype, as proposed on label by R.M. Dobson. Moreover, because of similarity in the female genitalia, the small specimens of both *C. (M.) robustus* **stat. n.** and the species under consideration are rather problematical for a reliable separation, the name *limbalis* would be reasonable to regard as not a senior synonym for one of these forms. However, the two females of *C. (M.) limbatus* examined with a more probability are rather conspecific with the specimens of the species under consideration than with those here regarded as *C. (M.) robustus* **stat. n.** Taking into account these circumstances, the author proposes to treat the name *limbalis* as a junior synonym of *schioedtei*, despite the fact that the description of *limbalis* is located in the text of the Murray’s monograph some pages above the latter name.

*Carpophilus (Myothorax) timorensis* Dobson, 1993  
(Figs 140–147)

*Carpophilus timorensis* Dobson, 1993: 7 (Timor; holotype and paratypes).

**Type material.** Timor. 1♂, 1♀, paratypes of *C. (M.) timorensis* (BMNL), “Dilli, Timor, 20–22 Jan, Dr. M. Cameron, B.M. 1936–555”, “not maculatus Murr. or freemani Dobs.”, “*Carpophilus timorensis* Dobson, R.M. Dobson det.”

**Notes.** This species is included in this review because it is useful to be compared with its other relatives from the Indo-Malayan Region. It can be identified after the above key to species and also “Diagnosis” for *C. (M.) brunneus*, *C. (M.) dimidiatus*, *C. (M.) languescens* **sp. n.**, *C. (M.) mutilatus*, and *C. (M.) schioedtei*.



Figs 140–154. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

140–147 – *C. (M.) timorensis*; 148–154 – *C. (M.) zeaphilus*. 140 – male body, dorsal view; 141 – antennal club; 142 – mentum and labial palpus, ventral view; 143 – prosternal process, mesoventrite, mesocoxal cavity and submesocoxal line of metaventricle, ventral view; 144 – male mesotibia, ventral view; 145, 148 – male metafemur and tibia, ventral view; 146–147 – lateral lobes of phallobase (“tegmen”): 146 – ventral view, 147 – lateral view; 149 – male ventral plate and spiculum gastrale; 150–151, 152–153 – lateral lobes of phallobase (“tegmen”) of specimen from the Afrotropical Region: 150, 152 – ventral view, 151, 153 – lateral view; 154 – ovipositor, ventral view. Scale bars: A – 1 mm (to Fig. 140), B – 0.5 mm (to Figs 142–145, 148), C – 0.5 mm (to Figs 146–147, 149–154).

Рис. 140–154. Виды подрода *Myothorax* рода *Carpophilus*.

140–147 – *C. (M.) timorensis*; 148–154 – *C. (M.) zeaphilus*. 140 – тело самца, сверху; 141 – булава усиков; 142 – ментум и лабиальный щупик, снизу; 143 – отросток переднегруди, мезовентрит, мезококсовая впадина, субмезококсовая линия метавентрита, снизу; 144 – средняя голень самца, снизу; 145, 148 – заднее бедро и голень самца, снизу; 146–147 – латеральные доли фаллобазы («тегмен»): 146 – снизу, 147 – сбоку; 149 – вентральная пластинка и гастральная спикула самца; 150–151, 152–153 – латеральные доли фаллобазы («тегмен») экземпляра из Афротропической области: 150, 152 – снизу, 151, 153 – сбоку; 154 – яйцеклад, снизу. Масштабные линейки: А – 1 мм (к рисунку 140), В – 0.5 мм (к рисункам 142–145, 148), С – 0.25 мм (к рисункам 146–147, 149–154).

*Carpophilus (Myothorax) truncatus* Murray, 1864  
(Figs 46–48)

*Carpophilus (Myothorax) truncatus* Murray, 1864: 381 (Madagascar; syntypes) = *Carpophilus jarijari* Powell et Hamilton, 2019: 193 (Australia: Victoria; holotype and paratypes) = ? *C. floridanus* Fall, 1910 = ? *C. halli* Dobson, 1964.

In total, more than 60 specimens examined, including type specimens.

**Type material.** Madagascar. 4 ex., syntypes of *C. (M.) truncatus* (ZMB) (marked in the collection by S. Endrödy-Younga in 1964), “Madagascar, Goudot”, “8371”; 2 ex., syntypes of *C. (M.) truncatus* (NHML), “Madagascar”, “ex Mus. Murray”, “Fry Coll. 1905–100”.

**Additional material** (some selected specimens). Morocco. 1 ex. (ZSM), “Marrokko, Agadir, Flugh/faule, Orange, 1.4.85, leg. Spornraft”.

South Africa. 2 ex. (ZSM), “Natal, Durban, 27 August 1980, leg. Spornraft”.

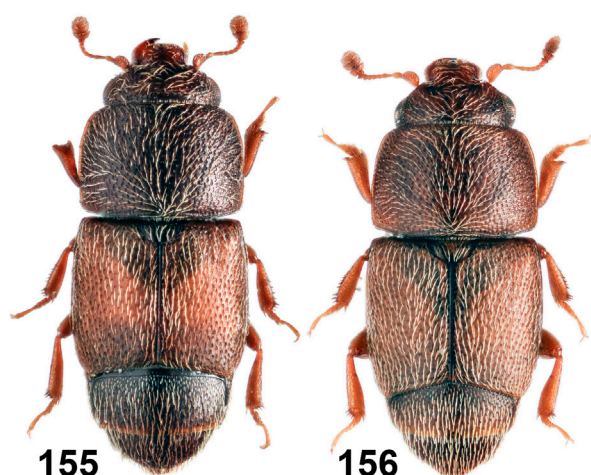
Madagascar. 3 ex. (ZIN), “Annanarivo: Sikoro, C. schaufus”; 5 ex. (ZIN, ZMB), “Madagascar Centre, Antananarivo, 3–5.1.1995, J. Jana’k”, “1250–1350 m, jardins tamisages”.

Seychelles. 2 ex. (ZIN), “S. Seychelles, Farquinar Atoll, 16–19.VIII.1984, USSR Zool. Exp.”.

Mauritius. 4 ex. (NHML).

**Notes.** It can be identified after the above key to species and also “Diagnosis” in *C. (M.) dimidiatus*. Semeraro et al. [2023] redescribed this species in detail and described *C. (M.) imitatus* Semeraro, Blacket, Rako et Cunningham, 2023 after study of some series from local populations from Australia (Victoria, New South Wales, South Australia), however the complete examination of large series of these two “species” and also *C. (M.) dimidiatus* and *C. (M.) pilosellus* from different geographical places of the Southern Hemisphere remains rather necessary to define their diagnostic characters and true distribution. Probably, synonymization of the names of the members of *Carpophilus* by Gillogly [1962] and Connell [1963] was quite correct when they put both *Carpophilus floridanus* from Florida and *C. halli* from stored products transported from Nigeria, Sierra Leone, Honduras to junior synonyms of *C. (M.) pilosellus*. However Jelínek and Audisio [2007] transferred both these names to synonyms of *C. (M.) truncatus*. Therefore, it would be reasonable once again to have a look at the antennomeres 2





Figs 155–156. Species of the subgenus *Myothorax* of the genus *Carpophilus*.

155 – *C. (M.) dimidiatus*, beetle length 2.6 mm; 156 – *C. (M.) pilosellus*, beetle length 2.5 mm.

Рис. 155–156. Виды подрода *Myothorax* рода *Carpophilus*.

155 – *C. (M.) dimidiatus*, длина жука 2.6 мм; 156 – *C. (M.) pilosellus*, длина жука 2.5 мм.

and 3 in the type specimens of *C. floridanus* and *C. halli*. At least *C. (M.) pilosellus* seems to be rather usual in stored products of Europe and Palearctic as a whole, while *C. (M.) truncatus* has also lot of chances to come there from areas of the Southern Hemisphere thanks to transportation by men.

*Carpophilus (Myothorax) zeaphilus* Dobson, 1969  
(Figs 148–154)

*Carpophilus zeaphilus* Dobson, 1969: 99 (Kenya; holotype and paratypes).

Many specimens from Africa and Madagascar were examined, partly listed by Kirejtshuk [1996] and compared with the type specimens in NHML.

**Notes.** This species is rather similar to *C. (M.) brunneus* and its diagnosis is discussed above in the “Diagnosis” of it. It can be identified after the above key to species and also “Diagnosis” in *C. (M.) dimidiatus* and *C. (M.) languescens* **sp. n.** This species was recorded from other continents, although it seems to be more common in Africa. The type locality of this species is Kiganjo (Kenya) and it is thought that Africa was the continent of its initial range before it started to distribute by men.

### Species synonymy, notes on species taxonomy and distribution

**Synonymy of *Epuraea (Epuraea) biguttata*  
(Thunberg, 1784)**

The problem of determination of specimens which could be named *Epuraea (Epuraea) biguttata* and *E. (E.) unicolor* (Olivier, 1790) is known to everybody who tried to do it. After examination of some thousand museum specimens, Kurochkin and Kirejtshuk [2006] fulfilled the following some testing experiments in Samara Region

of Russia, which included larvae taken in six localities (different administrative districts) from different ecotopes (fruiting bodies of *Fomes fomentarius* (Fr.) Gill. on *Quercus robur* L. and *Betula pendula* Roth, spore powder, under bark of *Quercus robur*, *Acer platanoides* L. and *Betula pendula* on fermented sap) and bred adults on different substrates (sometimes with change on another and different from that where the larvae were taken, and also on yeast/banana/sugar/water mixture). These experiments showed that there are no reliable diagnostic characters to consider *E. (E.) biguttata* and *E. (E.) unicolor* as separate species and the characters of “*E. (E.) biguttata*” and “*E. (E.) unicolor*” are mostly dependable on the substrate of habit and feeding. Hisamatsu [2016] after a rather wide comparison materials from different places of the Palearctic Region found that the structures (including the armature of the inner sac of penis) formerly treated for separation of these “species” should be recognised as intraspecific variability. Nevertheless, Jelínek and Audisio [2007] in their catalogue mentioned *E. (E.) biguttata* and *E. (E.) unicolor* separately. Later, Booth [2020] regarded that the mentioned names can be used for two separate species, he examined some localities in the United Kingdom and found two forms which could be regarded as two species. However, two types of the armature of inner sac of penis drawn by R. Booth as belong two considered “species” have not been found among examined specimens from different localities of both European and Asian parts of Russia, but the continental specimens showed a great variability of the armature of inner sac of penis. Thus, the opinion of P. Audisio, R. Booth and J. Jelínek on a possibility to divide *E. (E.) biguttata* into two species (“*E. (E.) biguttata*” and “*E. (E.) unicolor*”) should be recognized as unproven.

### Notes on *Epuraea (Epuraea) longipennis* Sjöberg, 1939 and synonymy of *E. (E.) excisicollis* Reitter, 1872

The holotype of *Epuraea longipennis* was studied by A.G. Kirejtshuk in the 90s of the last century and after that it was loaned by P. Audisio (Roma University), who was keeping it about at least 20 years. The latter researcher published the synonymy of the name of “*longipennis*” with name *Epuraea (Epuraea) dolosa* Kirejtshuk, 1995 [Audisio et al., 2006] and was asked to send the specimen to the Hungarian Natural History Museum or its pictures to St Petersburg for a next examination. However, he did not find a possibility to return this Sjöberg’s type back to the museum up to 2021 (until the death of O. Merkl, curator of collection of the Hungarian Natural History Museum). According to the first examination, the Sjöberg’s type does not fit the type specimens of *E. (E.) dolosa*. It remains unclear what was the reason for the synonymization of names with completely dissimilar types (*longipennis* and *dolosa*). Therefore, this synonymy is not included in the catalogue of the Far East insects (Kirejtshuk, in prep.). In the same paper, Audisio et al. [2006] designated as a neotype of *E. (E.) excisicollis* Reitter, 1872 the specimen which seems to be a variety of *E. (E.) dolosa* with markedly wider body with comparatively shorter elytra, having also pronotal and elytral sides more widely explanated. Large series of *Epuraea* Erichson, 1843 specimens from West

Siberia (partly published by Kerchev et al. [2022]) showed a great variability of *E. (E.) excisicollis*. The taxonomic situation can be change if the true type specimen is found during further research.

In accordance with the latter designation for this Reitter's name as the senior synonym of this species, the synonymy of it at the moment is following: *Epuraea excisicollis* Reitter, 1872: 18 (Germany) = *E. danica* Sjöberg, 1939: 115 (Denmark) = *E. (Epuraea) dolosa* Kirejtshuk, 1995: 279, **syn. n.** (northern part of the Eastern Europe).

#### Notes on *Epuraea (Epuraea) hilleri* Duftschmid, 1825

After synonymization of *Epuraea hilleri*, *E. (Epuraea) concurens* Sjöberg, 1939 and *E. (E.) fageticola* Audisio, 1991 (= *Nitidula castanea* Duftschmid, 1825, not C.R. Sahlberg, 1820 et non Melsheimer, 1846) by Kirejtshuk [1997b] establishing that this species has two forms without "subspecific status", Audisio et al. [2006] put forward a hypothesis on splitting of one species into two subspecies (the eastern *E. (E.) hilleri hilleri* and the western *E. (E.) hilleri fageticola*) with difference in body size, which appeared a sequence of the Pliocene/Pleistocene ice-cycle. Additional specimens confirmed the Kirejtshuk's opinion on the irregular distribution of populations of this species with predominance of populations with smaller specimens in eastern, northern and mountainous areas, while the populations in the western and southern areas of the species range include mainly larger specimens, although some specimens in the last-mentioned part of the species range are as small as those in northern or eastern ones. It seems that such a distribution could be resulted by phenological circumstance or having temperature dependence rather than historical which could have a phylogenetic explanation.

#### Distribution of *Epuraea (Micruria) auripubens* Reitter, 1901

This species was described from Mongolia ("Changai-Gebirge" [Reitter, 1901]). It can be easily distinguished even after its original description, particularly thanks to "tibiis extus apice subdentate-productis" and it is included into the key to *Epuraea* species of the Russian Far East [Kirejtshuk, 1992]. Recently it was found also in China, Altai Mountains, Kuril Islands. As it is common among epuraeines, this species demonstrates a significant level of variability in the width of pronotal explanation and sharpness of penis apex.

**Material.** 1 ex. (ZIN), Da-Tzin'-Lu, 23.06.1893, Potanin (in Russian); 1 ex. (ZIN), between Tzun' Gor and Tao (ch)guan', 8.08.1893, Potanin (in Russian); 1 ex. (ZIN), Lan'-Chzhou-Fu, 1–8.08.1908, Kozlov (in Russian); 2 ex. (ZIN), Kosh-Agach, Altay, Narchuk, 16.06.1964 (in Russian); 1 ex. (ZIN), Mongolia, Khuvsgul Aimag, Uliy Daba Pass, M. Kozlov, 16–17.07.975 (in Russian); 1 ex. (ZIN), Kuril Islands, Kharimkotan Isl., 8.08.1996, V. Tislenko (in Russian); 3 ex. (ZIN), KH-96-ASI-969, Kharimkotan, A. Lelej, 8.08.98 (in Russian); 2 ex. (ZIN) Racshua Isl., 4.08.1999, A. Lelej, S. Storozhenko (in Russian).

#### Synonymy of *Carpophilus (Ecnomorphus) plagiatiipennis* (Motschulsky, 1858)

This species is one of the most common and widely distributed consubgener, demonstrating a wide level of

variability in many characters studied in many specimens from the Indo-Malayan Region, including the characters used by Dasgupta and Pal [2019] for distinguishing of *Carpophilus (Ecnomorphus) jahari* Dasgupta et Pal, 2019 and the type specimens of "species" proposed earlier.

Thus, the corrected synonymy of this species is following: *Colastus plagiatiipennis* Motschulsky, 1858: 39 (? syntypes, India orientalis ("des montagnes de Nura-Ellia" (= Nuwara Eliya, Sri Lanka))) = *C. dilutus* Motschulsky, 1858, non *Carpophilus (Myothorax) vittiger* var. *dilutus* Murray, 1864: 373 = *C. (Eidocolastus) bosschae* Grouvelle, 1892: 43 (syntypes, Borneo occidentalis) = *C. (E.) nigricans* Grouvelle, 1897: 356 (syntypes, Sumatra) = *C. (Ecnomorphus) jahari* Dasgupta et Pal, 2019: 24, **syn. n.** (holotype and paratype, India, Arunachal Pradesh).

In total, more than 300 specimens were examined, including type specimens below and others (NHML, NMB, NMP, NMW, NRS, RMNH, SMNS, TMB, ZIN, ZMB, ZMUC).

**Type material.** Sri Lanka. 1♂, lectotype of *Colastus plagiatiipennis* (ZMMU), here designated (marked as lectotype in the collection by J. Jelinek), and 6 ex., paralectotypes of *C. plagiatiipennis* (ZMMU, ZIN), "Ind. or."; 1♂, lectotype of *C. dilutus* (ZMMU), here designated, and 3 ex., paralectotypes of *C. dilutus* (ZMMU), "Ind. or."; 1 ex., paralectotype of *C. plagiatiipennis* (NRS), "Ceylon", "Motsch."

Malaysia. 1♀, lectotype of *Carpophilus boschai* (RMNH), here designated, "Borneo occ., Sambus, Dr J. Bosscha".

Indonesia. 1♂, lectotype of *Carpophilus (Eidocolastus) nigricans* (MSNG), here designated, "SUMATRA, SI-RAMBÉ, XII.90–III.91, E. Modigliani", "*Carpophilus nigricans* Grouv." (written by A. Grouvelle).

**Additional material** (some selected specimens). India. 2 ex. (TMB, ZIN), "Karnataka, Shimoga Distr., Jog Falls, 500 m, Gy. Topál", "from decaying jack-fruit and carcasses, 9.III.1980, Gy. Topál"; 1 ex. (NMW), "Kerala, Alleppey, 8–9.10.1991, R. Schuh".

Nepal. 1 ex. (SMNS), "311 Ilam Distr., Modia Khola Valley, N Siwalik Mts., Berlese sample, Shorea mixed forest, 320 m, 6 April 1988, J. Martens & W. Schawaller".

Sri Lanka. 1 ex. (NHML), "Colombo"; 1 ex. (NHML), "Mt. Lavinia, Ceylon, R.N. Parker".

Thailand. 3 ex. (ZIN, ZMUC), "Chiang Mai Province, Doi Inthanon N.P.: Mae Klang, 3–400 m, X.1981, Zool. Museum Copenhagen leg."; 1 ex. (ZMUC), "Chiang Mai Province, Doi Inthanon N.P.: Vajirataru, 750 m, 10.X.1981, Zool. Museum Copenhagen leg."; 2 ex. (NMB, ZIN), "25.V.1991, Fang, 300 m, 19°55'N 99°12'E, Vit Kubán"; 1 ex. (ZMUC), "Satun province, Thale Ban National Park, 6°42'N 100°10'E, 14–16.x.1991, O. Martin"; 31 ex. (ZIN, ZMUC), "Yala province, Bang Lang National Park, 6°04'N 101°11'E, Dead tree, 18–20.x.1991, O. Martin"; 1 ex. (ZMUC), "Trang province, Hat Chao Mai National Park, 7°19'N 99°27'E, 25–27.x.1991, O. Martin"; 1 ex. (NMP), "S. Thailand, 25.4.1992, Betong, S. Bilý"; 1 ex. (NMP), "NW Thailand, 1–7.V.1992, Mae Hong Son, Ben Si Lang, 1000 m, S. Bilý"; 1 ex. (ZIN), "Soppong, 1500 m, 19.27N, 98.20E, V. Kubán, 28–31.5.95"; 1 ex. (NMP), "Mae Hong Son prov., 19°27'N 98°20'E, 1500 m, Soppong, 7–12.V, Vit Kubán".

Laos. 1 ex. (TMB), "Bolikhamsay Prov., Nam Leuk village, 300 m", "from cut logs, N 52, 13.IV.1998, O. Merkl and C. Sorba".

Vietnam. 1 ex. (ZIN), ridge, Tam Dao, Shon-Zuong, lowland valley, 20.2.1962, O. Kabakov (in Russian); 4 ex. (ZIN), mountains, S O Son-Duong, 300 m, 24.2.1962, Kabakov (in Russian); 1 ex. (ZIN), mountains, 40–50 km NO Thai Nguyen, 5.2.1963, O. Kabakov (in Russian); 1 ex. (NMB), "14,10N 108,30E, 40 km NW of An Khe, Buon Luoi, 28–30.V.1966, Pacholátko & Demlický"; 3 ex. (NMB, ZIN), "(Tonkin), pr. Hoang Liin Son, Sapa, 11–15.V.1990, Vit Kubán"; 3 ex. (ZIN), "Mai hou, prov. Ha Son Binh, 31.10–4.11.1990, Belokobylskij".

Malaysia. 16 ex. (NRS, ZIN), "Mt. Tibang, 1,700 m", "O. Borneo, Mjöberg"; 4 ex. (NHML), "Penang, G.F. Bryant. XI.13" (and "X.13"); 1 ex. (NHML), "Mt. Matang, W. Sarawak, G.E. Bryant, XII.1913"; 10 ex. (NHML), "Sabah, Tawai Plat, 1300 ft, 8 m S. Telupid, 8.ix.1977"; 1 ex. (ZIN), "Sarawak, Kapit Distr., Sebung, Baleh riv., 6–21.3.1994, Horák".

Indonesia. 2 ex. (RMNH, ZIN), "Matthes, Palunberg, Sumatra", "Coll. Veth"; 3 ex. (TMB), "Engano, Bua-Bua, V–VI.1891, Modigliani", det. (?) Grouvelle as *Eidocolastus dilutus*; 6 ex. (ZIN, ZMUC), "Mentawai, Sipora, Sereinu, V–VI.94, Modigliani"; 1 ex. (NHML), "ex koffubessen, Avros Medan, 29-I-35" (determined by P. Audisio as "*C. bifenestratus*");

1 ex. (NHML), "Sulawesi Utara, Dumoga-Bone N.P., January 1985", "underground funnel trap with carrion", "lowland forest, ca 200 m", "R. Ent. Soc Lond., Project Wallace, B.M. 1985-10"; 1 ex. (NHML), "Sulawesi Utara, Dumoga-Bone N.P., March 1985", "At light", "Clarke' Camp, Lower montane forest, 1140 m", "R. Ent. Soc Lond., Project Wallace, B.M. 1985-10"; 3 ex. (NHML), "Sulawesi Utara, Dumoga-Bone N.P., 9-16 May 1985", "Malaise trap", "lowland forest, ca 200 m", "R. Ent. Soc Lond., Project Wallace, B.M. 1985-10"; 1 ex. (ZIN), "Sulawesi Utara", "G. Mogogonipa, summit, 1008 m, 25.xi.1985", "R. Ent. Soc Lond., Project Wallace, B.M. 1985-10" (named by J. Jelinek as *C. sinuatus*); 2 ex. (NMB, ZIN), "Sumatra (N), Brastagi, G. Sibayak, 1450-1900 m, 19-23.II.1991, Bocák & Bocáková"; 2 ex. (SMNS, ZMB), "E-Jawa, Ijen. pl. Nat. P., 1800 m, Sodong, 26-27.II.1994, Bolm".

Philippines. 140 ex. (STM, ZIN), "Pt Banao, Mindanao"; 32 ex. (ZIN, ZMB), "Port Bangabei Capis, Insel Panay, Böttcher, 9.I.1915".

### Synonymy of *Carpophilus (Myothorax) lewisi* Reitter, 1884

This species is one of commonest and widely distributed consubgenera, demonstrating a wide level of variability in many characters, established after examination of many specimens from the Palaearctic and Indo-Malayan regions, including some type series.

The corrected synonymy of this species is following:  
*Carpophilus lewisi* Reitter, 1884 = *C. signatus* Grouvelle, 1908, **syn. n.** = *C. signatus* var. *ornatus* Grouvelle, 1908, **syn. n.** = *C. subcalvus* Kirejtshuk, 1984, **syn. n.**

In total, about 200 specimens were examined, including type specimens below and other specimens from the Indo-Malayan Region (NHML, NMB, NMW, RMNH, SMNS, TMB, ZIN).

**Type material.** Russia. 1 ex., holotype, and 2 ex., paratypes of *C. (M.) subcalvus* (ZIN), Vladivostok, Prim. Region, Berger, 13-26.viii.911 (in Russian).

Japan. 1 ♂, lectotype of *C. lewisi* (NHML), here designated, "Jokohama", "Japan, G. Lewis, 1910-320", "*C. lewisi* m. n. sp., Japan".

India. 2 ♀, syntypes of *C. signatus* (MNHN), "Kurseong, P. Braet", "*C. signatus* ty. Grouv." (written by A. Grouvelle); 1 ♀, holotype of *C. ornatus* (MNHN), "Sikkim, Resenzeit, H. Fruhstorfer", "*Carpophilus ornatus* ty. Grouv." (written by A. Grouvelle).

**Additional material** (some selected specimens). Russia. 4 ex. (ZIN), Primorsky Region, "Ussuriysky District, Gornotaezhnoe, 19.05.989, A. Kirejtshuk" (also "13.05.989" and "11.06.989"); 2 ex. (ZIN), Ussuriysk District, Gornotaezhnoe, 5 km ESE, stream valley, 20.05.1989, A. Kirejtshuk (in Russian); 1 ex. (ZIN), Ussuriysk District, Gornotaezhnoe, stream valley, 3.06.1989, A. Kirejtshuk, flowers of Acer (in Russian); 1 ex. (ZIN), Ussuriysk District, Gornotaezhnoe, felling near village, 7.06.1989, A. Kirejtshuk (in Russian).

China. 1 ex. (ZIN), Yunnan, environs of Biibyan', Daveishan', 1300 m, 23.06.1956, Khuan Ke-Zen etc. (in Russian and Chinese); 1 ex. (ZIN), Salween valley, W Baoshan', 800 m, Yunnan, V.1955, V. Popov (in Russian and Chinese); 31 ex. (NMB, ZIN), "Yunnan, 1500-2500 m, 25.22N 98.49E, 17-24/5.1995, Gaoligong mts., Vít Kubáň".

Pakistan. 3 ex. (NHML), "Punjab, Murree Hills, Camp Thobba", "H. Roberts".

India. 14 ex. (NMB, ZIN), "Darjeeling D., Bhakta B."; 9 ex. (TMB), "Ind. or., Trichinopoly"; 1 ex. (NHML), "Kurseong, Inde, Verschraeghen, 1904"; 1 ex. (NHML), "3079", "Ihoobsering Lebeng, IV.09, H.M.L."; 1 ex. (TMB), "W. Bengal, Darjeeling, below North Point, 650-1300 m, Gy. Topál"; 9 ex. (NMB, ZIN), "Chuba, 11.IV.1979, 670 m", "Darjeeling D., Bhakta B."; 5 ex. (NMB, ZIN), "Ringkabong, 890 m, 16.IV.1979", "Darjeeling D., Bhakta B."; 3 ex. (NMB), "Kalimpang, 1000 m, Upper Bombusti, 5.V.1985", "Darjeeling D., Ch.J. Rai".

Nepal. 1 ex. (SMNS), "185 Ilam Distr., zw. Mai u. Ilam, 1330 m, 1.4.1980, Martens & Ausobsky"; 1 ex. (NHML), "4500', Kathmandu, British Embassy, 20.V-23.VI.1983", "At light", "M.J.D. Brendell"; 1 ex. (ZIN), "303 Kathmandu Distr., Kathmandu Valley, Baneshwar, cultural land, gardens, 30 Mar.-2 Apr. 1988, 1400 m, J. Martens & W. Schawaller"; 4 ex. (SMNS, ZIN), "316 Ilam Distr., Bililate nr. Ilam, 1330 m, remnant trees around spring, moist soil, 1330 m, 8 April 1988, Martens & Schawaller"; 10 ex. (NMB, ZIN), "Kathmandu V., Godavari, 1500 m", "21-27.V.1989, M. Brancucci"; 1 ex. (SMNS), "632, Kathmandu, Baneshwar, 1350 m, 18-24.VI.2000, W. Schawaller".

Thailand. 1 ex. (SMNS), "Amphoe Chiang Dao, Dai Chiang Dao, 9.1.1989, 1500 m, Traitner & Geigenmüller"; 3 ex. (NMB, ZIN), "18-23.IV.1991, Doi Suthep-Pui, 1300-1500 m, P. Pacholátko".

Vietnam. 2 ex. (ZIN), 400 m, Son Duong, range Tam-Dao, onions of Dillenia, O. Kabakov, 24.02.1962 (in Russian); 1 ex. (ZIN), mountains, near Sa-pa, 1600-2000 m, 4.04.1963, O. Kabakov (in Russian); 1 ex. (NMB), "N. Viet Nam (Tonkin, Prov Vinh Phu, 1990, Tam Dao, 17-21.V., Vít Kubáň"; 1 ex. (NMW), "N-Vietnam, 25.V-10.VI, Sapa (Lao Cai), 22°20' S 103°50' E, E. Jendek, 1991"; 1 ex. (NMB), "N. Vietnam, 21.27N 105.39E, 70 km NW Hanoi, Tam Dao, 1-8.VI.1996, 900-1200 m, Pacholátko & Dembicky".

Indonesia. 2 ex. (RMNH), "Dr. Kohlbrugge, Tosari, Java", "*Carpophilus pygidialis* Grouv., var. det. Gr. 1910"; 1 ex. (NMB), "Sumatra (Jambi), Gunung, Kerinki, 1800-2100 m, 6-7.III.1991, Bocák & Bocáková".

### Corrections in the list of *Carpophilus* species recorded in China published by Hui and Huang [2019]

In the mentioned paper a review of the species of the genus *Carpophilus* was compiled with addition specimens newly determined by Z. Hui and M. Huang. Unfortunately, among names of the species, which are rather probable in China, there are also mentioned some more or less doubtful or impossible to expect in natural conditions of China:

– *Carpophilus (Carpophilus) flavipes* Murray, 1864 according to the examined type and other specimens is distributed in India, Nepal, Sri Lanka, Myanmar, Thailand, Vietnam, Malaysia (both peninsular and insular parts), Singapore, Indonesia (Java, Kalimantan, Mentawai, Sulawesi etc.), Philippines (Mindanao, Luzon, Mindoro, Leyte, Panay etc.), (NHML, NMB, NMP, ROM, STMD, ZIN, ZMB, ZMMU, ZMUC, ZSM), but no specimen is known from the Palaearctic Region and China (including Taiwan);

– *Carpophilus (Ecnomorphorus) sexpustulatus* (Fabricius, 1792) spreads in the Mediterranean [Jelinek, Audisio, 2007] and can scarcely be expected in China;

– *Carpophilus (Semocarpulus) succisus* Erichson, 1843 is known from the Neotropical Region and also after a rather doubtful record from Azores [Listagem..., 2010; Jelinek et al., 2016];

– *Carpophilus (Myothorax) truncatus* – this name seems to be erroneously used for *C. (M.) pilosellus* (see above).

### Synonymy of *Aethina (Aethina) aeneipennis* Reitter, 1873

The characters in description of *Aethina (Aethina) zhizhuaca* Chen et Huang, 2024 completely correspond to those in other specimens of *A. (A.) aeneipennis* [Kirejtshuk, 1986c] and therefore the former [Chen et al., 2024] is certainly an additional junior synonym of the latter.

Thus, the emended synonymy of this species is following: *Aethina aeneipennis* Reitter, 1873 = *Meligethopsis singularis* Rebmman, 1944 = *Aethina (Aethina) zhizhuaca* Chen et Huang, 2024, **syn. n.**

### On the designation of the lectotype of *Aethina (Circopes) suturalis* Reitter, 1884 and notes on *A. (C.) miniata* Hisamatsu, 2014

*Aethina (Circopes) suturalis* (Figs 157, 158) is rather common in the eastern part of the Palaearctic Region (Russia: Primorsky and Khabarovsk regions, Kunashir Island; Japan: Honshu, Shikoku, Kyushu; South-Eastern China; South Korea) [Kirejtshuk, 1986c; Hisamatsu, 2014]



and seems to demonstrate a considerable variability in many characters: general body colouration and colouration of separate body segments or only elytra, punctuation and sculpture of integument and particularly in dorsal pubescence. This species, in contrast to consubgenera, usually has longitudinal rows of hairs on elytra bearing hairs subequal in length, although the subsutural lines on its elytra (another subgeneric diagnostic character) always are rather distinct [Reitter, 1884]. Nevertheless, the conspecific individuals of this species could be easily mixed with specimens of other *Circopes* Reitter, 1873 species or even with small and unicoloured light specimens of *A. (Aethina) inconspicua* Nakane, 1967, and because E. Reitter did not mention depository of type and designate a holotype among many studied specimens [Reitter, 1885: 42]: “Fukushima, Suyama, Vada-togé im Juni und Juli 1881”. In order to avoid any taxonomic problem in future the lectotype designation is proposed for one of specimen deposited in NHML labelled with red round “Type, H.T.”, “Japan, C. Lewis, 1910-320”, “Fukushima, 26.VII.–29.VII.81”, handwritten “*Aethina suturalis* m.n.sp.”, “NHMUK 013664051” and another specimen should be considered as an additional because it was labelled with “Suyama, 20.IV.–22.IV.80”, “Japan, G. Lewis, 1910-320” (the date is different from that published). Many specimens named as “*Aethina suturalis* m.n.sp.” with geographic labels different from that published by Reitter [1885] are deposited in different museums.

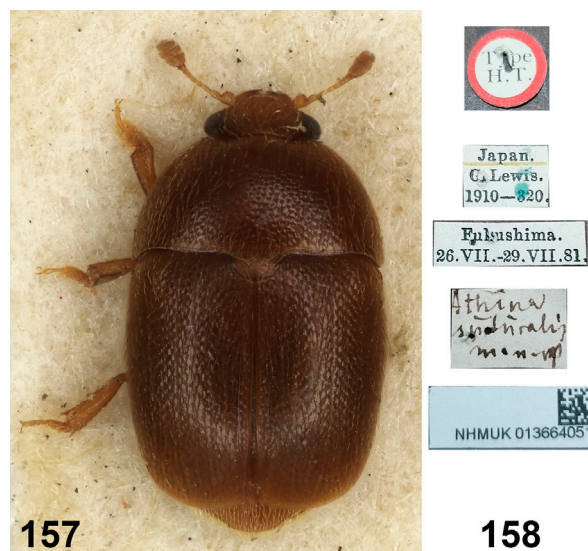
*Aethina (Circopes) miniata* was described as rather distinct from *A. (Circopes) suturalis* in the characters mentioned by Hisamatsu [2014], but it has also a very considerable resemblance in external as in genital characters with those of *A. (C.) subquadrata* (Motschulsky, 1858). Therefore, it seems that the pictures and description of type specimens of *A. (C.) minuata* in Hisamatsu [2014] and examined specimens of *A. (C.) subquadrata* fit to each other as conspecific ones. On the other hand, *A. (C.) subquadrata*, in contrast to many consubgenera, is known widespread species in many areas of the Indo-Malayan Region showing a great variability in many characters. Therefore the true relation between these taxa (*A. (C.) minuata* and *A. (C.) subquadrata*) needs a further serious revision of specimens from many localities.

#### Synonymy of *Atarphia quadripunctata* Reitter, 1884

Jelínek et al. [2012] proposed a new species of the genus *Atarphia* Reitter, 1884 from China (*Atarphia cincta*) based on some differences in the coloured spots on dorsal body surface, “length” of metaventrite and proportions of some other sclerites. All these characters are more or less variable, particularly secondary sexual ones, and cannot be used for discrimination of two “species” even among specimens from the same small locality (see below).

Thus, the current synonymy of this species is as following: *Atarphia quadripunctata* Reitter, 1884 = *A. cincta* Jelínek et Hájek, 2012, **syn. n.**

**Material.** Russia. 10 ex. (ZIN), Primorskiy Region, Preserve Kedrovaya pad', 1.9.85, Kompantzev A.V. (in Russian) (also “№16, 10.9.85”, “№16, 15.9.85”, “№16, 20.9.85”); 2 ex. (ZIN), Primorskiy Region, Ussuriysk District, Gornotaezhnoe, valley forest, 13.06.1989, A. Kirejtschuk (in Russian).



Figs 157–158. *Aethina (Circopes) suturalis*, lectotype.  
157 – lectotype, length of specimen 2.6 mm; 158 – labels pinned under lectotype.

Figs 157–158. *Aethina (Circopes) suturalis*, лектотип.  
157 – лектотип, длина экземпляра 2.6 мм; 158 – этикетки, подколотые под лектотипом.

#### Synonymy of *Nitidula carnaria* (Schaller, 1783)

Lasoń et al. [2021] described a new species of the genus *Nitidula* Fabricius, 1775 from Russia, Kazakhstan, Mongolia and China (*N. obenbergeri* Lasoń, Hájek et Jelínek, 2021) based on the very peculiar structure of the penis trunk and rather small “differences” in some external structures from *N. carnaria* including some morphometric indicators and variation of body colouration. The most distinct of them, which can be used, may be regarded the proportion of antennomeres 4 and 5 ([Lasoń et al. 2021: 510]: *N. obenbergeri*: “Antennae as long as the width of head across eyes, antennomeres IV and V as a rule (safe very small specimens) distinctly longer than wide”; and *N. carnaria*: “Antennae shorter than the width of head across eyes, antennomeres IV and V as long as wide”). Sometimes the similar character is more or less applicable as in *Carpophilus* and other cases, although it can be efficient when difference in proportions of antennomeres is markedly greater (see above), but even in these cases this character is not enough reliable. It is necessary to take into account that length of antennomeres sometimes can be variable because of partial invagination of base of one antennomere in to the (sub)membraneous apex of the preceding one. It can be clearly seen even on the pictures proposed for illustrations in the paper of Lasoń et al. [2021: figs 1, 3]. Other characters proposed by them for discrimination of these two species are formulated in the key to *Nitidula* species. The most problematic matter is the pictures of the penis trunk (figs 1, 3), which look like very different in “*N. carnaria*” and “*N. obenbergeri*”. Dissection of some specimens with smaller body from the same areas (Russia, Kazakhstan, Mongolia and China), in which the co-authors found their “new species”, did not allow to find any specimen with such abnormal structure

of penis trunk. Some level of variability has been found mostly in the outlines of lateral sides of the penis trunk: slightly narrowing in the apical third to subparallel-sided or slightly widening apically, however not to the same extent as shown in figure 6 “*N. obenbergeri*” of Lasoń et al. [2021]. Another very strange thing seen in this figure 6 is that the preapical paramedian processes of penis trunk of *N. obenbergeri* in this picture, and strange overlapping by membranous lobes of apical orifice of the penis trunk. The last mentioned feature of *N. obenbergeri* does not correspond with usual structure of male genitalia in nitidulids. Two more oddities are present in this case: why could an isolated species arise in the center of the range of a transpalaeartic and comparatively numerous species, living together with the “new” one in the same biotopes, and what forms are found to the east and west of the range of *N. obenbergeri*, as well as in other zoogeographic regions (Nearctic, Indo-Malayan and Australian regions). Finally, if there are two sympatric species, then it is necessary to find out to which of them the Schaller’s type belongs in order to solve the taxonomic problem that has arisen: which name can be applicable to which species. It is proposed that until at least some of these problems are resolved, these forms (“*N. carnaria*” and “*N. obenbergeri*” sensu Lasoń et al.) be considered as varieties of the same species.

Thus, the current synonymy of this species is as following: *Silpha carnaria* Schaller, 1783 = *Nitidula quadripustulata* Fabricius, 1792 = *N. guttalis* Herbst, 1793 = *N. flavipennis* Heer, 1841 = *N. variata* Stephens, 1830 = ? *N. obenbergeri* Lasoń, Hájek et Jelínek, 2021.

#### Synonymy of *Physoronia (Pocadioides) wajdelota* (Wankowicz, 1869)

This species was first described as an abnormal member of the genus *Pocadius* from Europe and later three similar “species” were proposed for specimens from Japan. Recently their attribution was some times discussed [Jelínek, 1978, 1999, 2008; Kirejtshuk, 1992, 1997b, 2006, etc.], however this taxonomic problem of their link with genus and subgenus is still under debate because complicated hiatus between generic and subgeneric taxa of the *Pocadius*-complex proposed for the Recent Eurasian fauna [Kirejtshuk, 2008]. The current taxonomic combination and species synonymy of the names previously established for Japanese specimens described as three “species” by Reitter [1873, 1884] was proposed by Kirejtshuk [1997b].

Fresh specimens collected in the West Siberia (Russia: Tyumen Region) (Kirejtshuk et al., in prep.) gave an obvious reason to estimate variability of all morphological characters of these most widely distributed consubgenera and propose the following synonymy: *Pocadius wajdelota* Wankowicz, 1869 = *P. japonica* Reitter, 1873, **syn. n.** = *P. rufimargo* Reitter, 1884 = *P. unicolor* Reitter, 1884.

#### Synonymy of *Pocadius nobilis* Reitter, 1873

The *Pocadius* species are associated with fungi closely related to the genus *Lycoperdon* Pers. (formerly family Lycoperdaceae) characterised of rather wide species ranges

and, as a result, frequently coleopterous species associated with these fungi also have rather great structural variability and wide ecological distribution (in various biotopes). The names here are present such a case concerning a species, whose north populations consist of specimens more or less uniform in structures, while southern ones have specimens with greater variability. Mostly small or very small series of available specimens from the southern parts of the species range represented by not characteristic specimens due to different variable characters were recognised in two papers as members of separate species [Cline, 2008; Chen, Huang, 2020]. This circumstance forces to propose the following synonymy: *Pocadius nobilis* Reitter, 1873 = *P. yunnanensis* Grouvelle, 1910 = *P. fasciatus* Cline, 2008, **syn. n.** = *P. okinawaensis* Cline, 2008, **syn. n.** = *P. tenebrosus* Chen et Huang, 2020, **syn. n.** = *P. zhangjiajieensis* Chen et Huang, 2020, **syn. n.**

In total, about 300 specimens were examined, including type specimens below and 4 ex. (ZIN) from the series used for description of *P. okinawaensis* and others from the Russian Far East, Indo-Malayan Region (NHML, NMB, NMW, RMNH, SMNS, TMB, ZIN, ZMB).

**Type material.** Japan. 2 ex., paralectotypes of *P. nobilis* (NHML), round label “Type/HT”, “232” (handwriting), “Japan, G. Lewis, 1910-320”, “*Pocadius nobilis* m.” (handwriting), “NHML”; 1 ex., paralectotype (RNHL), “Japan, leg. Lewis”, “Coll. Reitter / *nobilis*”, “Holotypus 1873”, “*P. nobilis*; m.” (handwriting); 2 ex., paralectotypes of *P. yunnanensis*, which should be regarded as valid paralectotypes, although designated by A.G. Kirejtshuk as the lectotype and paralectotype in the collection about twenty years before the publication of Cline [2008], “Yunnan Mission”, “Ant. Grouvelle, Yunnan”, “*Pocadius yunnanensis* Grouv.”; 17 ex., including 13 ex. (FMNH, type series of *P. okinawaensis*) and 4 ex. (ZIN), “Ryukyu Is.: OKINAWA; Katsudake, XI:28:1945, E. Ray”.

The genus *Pocadius* was preliminarily revised by Cline [2008] after his study of specimens. He examined many museum collections without sufficient attention in observing the traditions of taxonomic research, including the designation of lectotypes among type specimens, and also freely treating the publications of his predecessors. Thus, a further comprehensive revision of this genus remains necessary. For example, Cline [2008] designated as a lectotype of *P. nobilis* one specimen in the collection of RNHL. At the same time, other specimens from the same series were deposited in NHML where the Lewis’ collection initially should be housed were designated as paralectotype or additional specimens. As a result, instead of selecting one specimen from the Lewis’ collection in NHML to designate as the lectotype, A.R. Cline designated as the lectotype one duplicate deposited in RNHL, and the two specimens on the same pin, that have a label “Type/HT” in NHML, were labelled by him as the “paralectotypes”, and, finally, the remaining specimens of the type series in its original location are named by A.R. Cline as “additional” specimens. On contrary, he published deposition of the lectotype and paralectotype of *P. yunnanensis* in NMHN, where should be deposited only duplicates of this type series. Thus, the potential lectotype and paralectotype of the latter type series accordingly with rather logical tradition were designated by A.G. Kirejtshuk in RNHL before the publication of Cline [2008], where they should be deposited, but after the published other designations by A.R. Cline should be recognised as invalid, i.e. lectotype of *P. yunnanensis* designated by A.G. Kirejtshuk should be considered as paralectotype. Even more, the last mentioned

specimens with the correct designations were not included in the Cline's "revision" with false and unrealistic explanations. Apparently, other cases of this type of the Cline's research can be found in this paper [Cline, 2008] and this should be kept in mind. Cline [2008] also considered *P. nobilis* and *P. yunnanensis* synonymized by Kirejtshuk [1984] as two separate species, referring to the characters in the "description and key", however, in his key only evidently variable characters are given and such a character also could not be possible to find in the Cline's descriptions of both *P. nobilis* and *P. yunnanensis*. Unfortunately, the Cline's key to species is based in many cases on variable characters and scarcely possible for reliable identification. Synonymised here *Pocadius fasciatus*, *P. tenebrosus* and *P. zhangjiajieensis* are known to the author only from their sufficiently informative original descriptions.

#### **Synonymy of *Meligethes (Clypeogethes) tenebrosus* Förster, 1849**

The situation with the two specimens that claimed to be types of "*Meligethes persicus*" (one in ZMMU and the another in MNHN) was assessed in detail in the paper of Kirejtshuk and Kurochkin [2004], which shows that in both cases neither specimen could be used to describe the species in question, because the both were labelled with a wrong generic attribution, different from that in the original description (!) *Nitidula persica*) and their characters are rather different from those published in the original description of *Nitidula persica* Falderman, 1835. If we accept this obvious fact, then the synonymy of this species should be as follows: *Meligethes tenebrosus* Förster, 1849 = *M. sinuans* Rey, 1889 = *M. pedicularius* auctorum, non *Nitidula pedicularia* Gyllenhal, 1808 = *Meligethes persicus* auctorum, non *Nitidula persica* Faldermann, 1835.

#### **The subgenus *Glischrochilus* Reitter, 1873 sensu stricto in the Palaearctic Region**

This subgenus is mostly represented in the modern Western Hemisphere's fauna, while there were only three traditionally recognised species in the Palaearctic Region and regarded to be associated with living under the bark mostly of conifers. They are represented by one mostly and widely spread in the boreal Palaearctic forests, *Glischrochilus (Glischrochilus) quadripunctatus* Linnaeus, 1758, and also by two localized ones, one in the eastern northern part of Asia (Kamchatka), *G. (G.) biguttulus* Motschulsky, 1860, and another in the eastern Asian part with more or less moderate climate (Russian Far East, eastern northern China, Korea, and Japan), *G. (G.) cruciatus* Motschulsky, 1860. The most widely distributed "species" exhibits a clinal variability in body shape and size, while the specimens from northern areas along the eastern range borders are gradually becoming smaller and more slender (somewhat similar to those of *G. (G.) biguttulus*), while those from southern areas are becoming only somewhat smaller (somewhat similar to those of *G. (G.) cruciatus*). Occurrence in the western boundaries of *G. (G.) quadripunctatus* both local "species" specimens with transited pattern of colouration give a reason to suppose that the Palaearctic Region is

inhabited only by one polymorphous species consisted of three subspecies. This idea needs to be properly verified by detailed comparative examination.

Recently, some researchers (T. Clayhills, J. Vilén etc.) found some adults of *Glischrochilus (Glischrochilus)* collected using cross flight interception (window) traps at *Populus tremula* L. in some localities in Finland. They (together with P. Audisio, A.R. Cline etc.) decided that these are representing a new species, but they did not observe these specimens in places where these beetles could live and develop (at living aspen trees), they also did not collect any adult or larva for study and breeding the larvae on different substrate to check if these larvae from these beetles produce the similar specimens in next generation (see more on this method above). These researchers only obtained the DNA sequences of the *Glischrochilus (Glischrochilus)* specimens collected in the flight interception traps nearby aspen trees, compared with the DNA sequences of other *Glischrochilus (Glischrochilus)* specimens which could be associated with conifers and found some differences which, in their opinion, give an enough reason to propose a new species (Clayhills et al. [2016]: *G. (G.) tremulae* Clayhills, Audisio et Cline, 2016). These authors found some slightly expressed morphometric differences between few specimens collected from the flight interception traps nearby aspen and other specimens determined as *G. (G.) quadripunctatus* which are as if noticeable in the outline of the pronotum, the convexity of the upper body surface, expression of the temples, width of the male tarsal plate, small differences in the aedeagal structures. The mentioned co-authors could not find specimens of this "new" species in museum material from Europe, Siberia, Turkey and the Caucasus and this seems to suggest a limited range of "*G. (G.) tremulae*". However, Lasoń [2023] collected some similar specimens under bark and fresh cut trunks of aspen in Poland and decided that this is good support of separation of this "new" species and his observations brought some additional characters, which, in his opinion, are enough for discrimination of two "species". Recent examination of thousands of specimens deposited in the ZIN collection shows that the specimens with complete set of the characters of this "new" species are really mostly rare among mounted museum specimens, although specimens with some structural deviations resembling something intermediate state of each of the characters mentioned by Clayhills et al. [2016], Clayhills [2017] and Lasoń [2023] seem to be more or less frequent at least in the East European localities. A.S. Kurochkin during 2001–2002 got extensive sampling of *G. (G.) quadripunctatus* in Samara Region of the European Russia in different biotopes and under bark of different tree species. It is interesting that adults with an appearance of "*G. (G.) tremulae*" were collected under bark as of *Pinus silvestris* L. as of *Populus tremula* together with typical specimens of *G. (G.) quadripunctatus*. The form "*G. (G.) tremulae*" seems to be becoming less frequent in the Asian part of the Palaearctic Region and eastern from Tyumen Region of Russia remains unrecorded. It is important to note that the observed range of variability of each of all characters (including genital ones) in different populations of *G. (G.) quadripunctatus* is much greater



than that indicated by Clayhills et al. [2016], Clayhills [2017] and Lasoń [2023] as diagnostic one for “two” species. Another important thing is that such two forms of appearance can be traced also in *G. (G.) cruciatus* (one like “typical” *G. (G.) quadripunctatus* and another like “*G. (G.) tremulae*”). This coincidence of two forms can be explained by some similarity of determining ecological circumstances in which their larvae develop rather than inner factors (like molecular differences). As to molecular differences between the typical *G. (G.) quadripunctatus* and “*G. (G.) tremulae*”, it is necessary to continue the studies of DNA sequences and seeking factors determining of them taking into account that the molecular diversity of so variable species as *G. (G.) quadripunctatus* could be even much higher than that in the phyllophagous *Xenostrogylus variegatus* Fairmaire, 1891 having considerably smaller range [Zhan et al., 2021] (see also above). Probably in order to check if *G. (G.) quadripunctatus* can be split into two species it is necessary to test DNA sequences not for specimens from one small local area but from many localities through the whole Eurasia and find any real ground to erect a separate species for a form with something different DNA. It seems to be also scarcely possible to distinguish “species” separated only by few DNA sequences and this proposal can be scarcely possible to regard this taxonomic proposal as reasonable till a wide comparison of some hundred populations and comprehensive analysis of all aspects of their variability.

Thus, the current synonymy of this species is following: *Silpha quadripunctata* Linnaeus, 1758 = *Silpha quadripustulatus* Linnaeus, 1761 = *Ips niger* J.R. Sahlberg, 1889 = *Glischrochilus (Glischrochilus) tremulae* Clayhills, Audisio et Cline, 2016, **syn. n.**

#### **Synonymy of *Cybocephalus bicinctus* Kirejtshuk, 1988**

The synonymy of this species is quite evident because the both description include very distinct the same characters in the shape of protibiae and extremely peculiar body colouration [Kirejtshuk, 1988; Hisamatsu, 2013]. Thus, the current synonymy of this species is following: *Cybocephalus bicinctus* Kirejtshuk, 1988 = *C. chlorocapitis* Hisamatsu, 2013, **syn. n.**

### **Probability of polliphagy and pollination by Apophisandridae and other groups of the nitidulid-group of families**

What attracts pollen-bearing beetles to female cones has not yet been certainly established for any species.  
R.A. Crowson [1991b: 17]

This epigraph very well conveys the impression that many people have when it comes to the participation of beetles visiting the generative organs of plants in pollination. Pollination of dioecious gymnosperms has always been considered a logical obstacle to any theoretical constructions of the origin of angiosperms, and studies of pollination of modern gymnosperms have not provided convincing grounds for entomophily, both

then and now. Therefore, Crowson [1991b: 16] added “some palaeobotanists suspect that the ancestry of true flowering plants (Angiospermae), an “abominable mystery” to C. Darwin, may have lain among the cycadeoids”. Many researchers of past years shared such opinion and now they do not understand how the popularity of attributing ancient pollination to the extinct species that cannot have direct evidence of participation in pollination arose. In fact, some current researchers have solved the problem by simply abandoning it, i.e. recognising the unprovable and discarding all other arguments. But since this problem especially affects the evolution of many families of the nitidulid-group, it makes sense to dwell on it, since it is essential for understanding not only the latest publications on apophisadrids, but also the phylogeny and system not only of Apophisadrid, but all the families discussed here. Unfortunately, some recent systematic and phylogenetic proposals were done without knowledge about this aspect of evolution of the nitidulid-groups of families (see also above).

The discussion of the participation of insects in pollination of dioecious cycads has been the subject of heated debate for many years. There are supporters of different points of view even now. It is probably correct to think that it does not matter who visits to female generative organs, but the result expressed in pollination itself is important. It can be assumed that it is not important for plants what or who was the pollinator in a particular case: wind, vertebrates or insects. In this sense, all three components can be considered as potential pollinators. Therefore modern pollen-feeding beetles are pollinators of gymnosperms to the extent that they visit male cones and end up after visiting them in female ones. Apparently, disputes on this matter in the literature are not very urgent and frequently not enough convincing. However, it is impossible not to take into account the fact that there is a difference in the composition of visitors to male and female cones and it is very likely that this difference somehow affects participation in pollination. Female cones are more often inhabited by curculionoids, chrysomeloids and other groups, but not by representatives of the nitidulid-group of families. There are probably sufficient grounds that similar situations prevailed in Mesozoic biotas. Botanists do not always pay attention to this, but there is also data that in the cones of both sexes, only sometimes both inhabitants of predominantly male cones, in which they undergo larval development, and inhabitants of female cones are found. Apparently the composition of visitors initially was occasional, although it is possible to suppose that in time some advantages for visiting could appear and be increased due to the natural selection. The situation seemed to resemble that known for modern dioecious palms and the beetles visiting to male and female inflorescences. As a result, even rare visits to female inflorescences by inhabitants of male ones from the tribe Mystropini increases fruiting [Kirejtshuk, Couturier, 2010; Kirejtshuk et al., 2023, etc.]. It is also important that everything that is known about as modern gymnosperm cycads and araucarias as modern angiosperm dioecious palms can be used to somewhat understand the circumstances of the Mesozoic biotas. In these cases, all random visitors of female gymnosperm

cones and angiosperm inflorescences, even those who came from male gymnosperm cones and angiosperm flowers of the same species, can hardly be justified in calling them pollinators, although their participation in pollination cannot be denied (similar to the wind). With this always, it is necessary to take in account that rotting gymnosperm strobiles and angiosperm inflorescences of both sexes could and can be visited and used for larval development by the same species associated with decaying substrates of plant origin as in past as present.

It can be assumed that in the initial stages of the development of considered relationships, insects were rather accidental pollinators supplementing wind pollination, and with the further development of interdependent co-adaptations of beetles and plants, the proportions of pollination by beetles increased in the proportion compared with other factors (wind and vertebrates). But the beetles apparently, as a rule, remained pollen eaters (pollinophagous) both in the imaginal and larval stages (as pollinophagous beetles of the nitidulid-group of families in the Recent fauna). And they become pollinators by chance or peculiar circumstances. Thus pollen-eating was in past and currently is a vital thing for them (beetle adults and larvae), and pollination was and is just a passing coincidence. To call all apophisandrids pollinators is an even more incredibly exaggerated definition, because it is impossible to be sure in pollination for all specimens of the species bearing some trace of morphological adaptations to pollinophagy. It is somehow the same as calling all epuraeines anthophagous (as was done by Peris et al. [2024a]) only because very few known species, in which adults have pronounced adaptations to living in flowers (subgenus *Apria* Grouvelle, 1919 of the genus *Epuraea* and subgenus *Mandipetes* Kirejtshuk, 1997 of the genus *Amystrops* Grouvelle, 1906) and some separate species from many different and sometimes rather large groups. It is interesting that a significant part of apophisandrids have an appearance that really resembles epuraeines (the appearance of a universal generalised inhabitant of decaying plant remains and fungal substrates, including decaying cones of modern gymnosperms and flowers of angiosperms). Such similarity can be explained mainly by the circumstances of accelerated larval development in the ephemeral substrates of their habitat, which determined the removal of the final stages of ontogenetic (preimaginal) differentiations, bearing traces of last phylogenetic innovations (including generic and sometimes suprageneric differences). Thus, habitual appearance of adults of apophisandrids, epuraeines and mystropins has not evidence of their ancient relationship (as Peris et al. [2024a] thought) but they are typical examples of convergence caused by the similarity of changes in ontogenesis (i.e. the most common cases in the phylogeny of not only most coleopterous groups but also holometabolans in general).

As has long been known, plant generative organs always were particularly attractive resource for insect feeding, interconnections between these groups of organisms becoming in time more multiple and diverse and were rather essential in evolution of both, although some crises of various scale (sometime rather serious up to (sub)global) happened. As was discussed above,

feeding on pollen of plant male generative organs does not automatically mean pollination (i.e. transfer pollen from male plant organs to female plant organs), and formation of regular pollination was lasting many millions years up to the time when the angiosperms appeared. During this long period many mutual co-adaptations progressively appeared and progressively evolved in both plants and insects. It is very important to take into account that appearance and development of feeding on pollen happened many times, and different insect groups could use different ways to master such feeding habits. Insects with large body could begin to regularly visit gymnosperm male cones to get pollen for eating and this habit could maintain during long period without changes (i.e. without visiting or occasional visits to gymnosperm female cones). These habits of large insects seemed to provide them a peculiar evolutionary trend and phylogeny [Crowson, 1991b; Bernhardt, 2000; Wang et al., 2013, etc.]. Beetles of the nitidulid-group of families with smaller body had other evolutionary perspectives. They can be traced in some analogous interactions between modern beetles of these families and gymnosperms and dioecious angiosperms and extrapolated on probable interactions between the Mesozoic plants and beetles. Crowson [1991b] noted that all beetles of the nitidulid-group of families were found only in male cones of cycads and araucarias (Boganiid paracucujines, *Conotelus* Erichson, 1843 (nitidulid Conotelini Kirejtshuk et Kovalev, 2022) and *Colopterus* Erichson, 1842 (nitidulid Cillaeini), *Epuraea* (nitidulid Epuraeini), *Carpophilus* (nitidulid Carpophilinae), monotomid *Europs* Wollaston, 1854), often in decaying cycad cones. The male cones of modern cycads (particularly decaying ones) are also visited by many representatives of this group of families [Kirejtshuk, 1994a, b; Escalona et al., 2015; Kirejtshuk, Kovalev, 2022, etc.], but regular association of beetles with gymnosperms is known for Boganiidae demonstrating regular interconnections with cycad male cones [Sen Gupta, Crowson, 1966, 1969; Endrödy-Younga, Crowson, 1986; Crowson, 1990; Endrödy-Younga, 1991; Donaldson et al., 1995; Donaldson, 1997; Suinyuy et al., 2009; Escalona et al., 2015, etc.], although unverified references to possibility of polination without supporting facts have also often been published. Another important aspect is the modern association of nitidulids with male inflorescences of the dioecious palms. In Africa the male inflorescences of *Elaeis* palms are inhabited by some specialised nitidulids from the epuraeines (carpophiline-lineage) and meligethines (nitiduline-lineage) with different types of aedeagus [Jelínek, 1992], while some specialised nitiduline American pollinophagous beetles from the endemic Western Hemispheran tribe Mystropini (Nitidulidae of the nitidulin-lineage) are also associated with *Elaeis* palms [Núñez et al., 2005; Kirejtshuk, Couturier, 2010, etc.]. The habitual appearance of all these palm epuraeines, meligethines and nitidulines is extremely similar. If the opinion of Peris et al. [2024a, b] their structural plesiotypy can be considered as correct, their differences in the genitalia and characters of their external structures should be considered apomorphic. So, according to the opinion of Peris et al. [2024a, b], the coleopterists of the 19<sup>th</sup> and early 20<sup>th</sup> century were right in their taxonomic attributions

of nitidulid beetles and all morphological and bionomical studies of the last hundred years were wrong as well as changing of taxonomy and phylogenetic reconstructions after the latter studies. This quite fits in well with the recommendations by Jelínek et al. [2010] and methodology by Leschen [1999] to ignore previous systematic and phylogenetic studies as “narrative and quantitative”, including those of recent decades in new phylogenetic reconstructions.

On the other hand, all the mentioned palm nitidulids live and develop in great number in male palm inflorescences and only single individuals rarely (i.e. probably occasionally) visit to the female palm inflorescences. In general, the male flowers are inhabited and used for larval development by the beetles from the coleopterous groups completely different from those in female flowers. Can these groups be considered pollinators, i.e. carriers of pollen from male flowers to female flowers for pollination of the latter? Besides, many visitors of decaying gymnosperm cones and angiosperm flowers do it because of attraction by fermented substrate but not because of attraction by cones or flowers proper. Finally, the range of diversity of relationships between beetles and angiosperm flowers is apparently much larger than that between beetles and gymnosperm cones. For example, the kateretids of two genera living and developing on *Acorus* spp. (Acoraceae) without close relationship share a trophic base: species of *Platamartus* Reitter, 1892 are more common during male flowering and those of *Sibirhelus* Kirejtshuk, 1989 during seed maturation, and the larvae of the latter seem to be carpophagous rather anthophagous, while adults live throughout the entire period of flowering and fruiting [Sokolov et al., 2024]. Very frequently numerous groups like some epuraeinae genera (carpophilinae-lineage), genera *Carpophilus* (carpophilinae-lineage), *Aethina* Erichson, 1843 (nitidulinae-lineage), *Camptodes* (nitidulinae-lineage) seems to include as completely (larvae and adults) anthophagous as completely (larvae and adults) mycetophagous representatives, and also some representatives of intermediate with anthophagous adults and mycetophagous larvae according to the scheme of ways of changes in trophic associations [Kirejtshuk, 1989a; Kirejtshuk et al., 2023, etc.]. An unusual lifestyle is known with a case of a counter adaptation of plant for regular interaction between *Duguetia cadaverica* Huber (Annonaceae) with foul-smelling flowers to attract a beetle regular pollinator *Pycnocnemus* sp. (Cyllocini) [Teichert et al., 2012], and some mycetophagous *Triacanus* spp. (nitidulinae Cyllocini) associated with fungi of family Fallaceae are recorded as pollinators of *Orchidantha fimbriata* Holttum (Lowiaceae) [Kirejtshuk, 2016] (saprocanthrophily). It is important that appearance of anthophagous adults does not reflect this type of feeding behavior in morphological structures. On contrary, anthophagous larvae always demonstrate more or less expressed structural adaptations to the “open” lifestyle which could be preadaptive for leaf-meaning habit of the larvae of *Xenostromylus* spp. and *Anister* spp. This very important aspect for the phylogenetic interpretation in the nitidulid-group of families is the life habit and structural features of modern anthophagous larvae and this very important aspect is used in phylogenetic and

systematic reconstructions by Kirejtshuk with co-authors [Kirejtshuk, 1989a, 1991, 2000, 2008; Kirejtshuk, Couturier, 2010; Kirejtshuk et al., 2023, etc.], but was ignored by Audisio et al. [2009, etc.] and Peris et al. [2024a, b]. It is easily to trace the main larval features of anthophagous and mycetophagous representatives in the review of Japanese nitidulid larvae of Hayashi [1978] and published separate descriptions [Bondar, 1940; Kurochkin, Kirejtshuk, 2003; Kirejtshuk et al., 2007; Kirejtshuk, Couturier, 2010, etc.]. The mycetophagous larvae have the structures similar to those of other mycetophagous cucujoids from many families, while anthophagous larvae demonstrate quite characteristic features comparable only with larvae associated with more or less open lifestyle and somewhat like those known in phyllophagous nitidulines and parasitoid cybocephalines. This evolutionary trend is displayed in the scheme of changes in trophic associations in Nitidulidae to appearance and development of phyllophagy [Kirejtshuk, 1989a; Kirejtshuk et al., 2023] but can be extrapolated on many groups of cucujiformian families. The appearance of structure of antho- and phyllophagous larvae different from those of mycetophagous ones can be easily understood and explained by comparatively short larval development in ephemeral substrate, while it is scarcely possible to admit that the structure of anthophagous larva could be primary in relation to that of mycetophagous one (this is important to assess the unrealistic plausibility of the hypothesis of Peris et al. [2024a, b]). Another conclusion from the above is that in some fossils it is impossible to know whether the adult beetle is anthophagous or mycetophagous without actualization of data on their modern relatives.

So there is only one way to go – it is to use traditional actualization of the above data from the Recent biota to imagine what could be possible in the Mesozoic. Only five modern anthophagous groups of the subfamily/tribal taxonomic rank from the nitidulid-group of families (epuraeines, kateretines, meligethines, mystropines and paracucujines) having close trophic associations with modern dioecious or “conditionally dioecious” plants (they are from the angiosperm families Acoraceae, Arecaceae, Araceae and gymnosperm Cycadaceae) without obligatory pollination by the beetles under consideration and all of them have a considerable resemblance to fossil apophisandrids. Other anthophagous subfamilies/tribes of this group of families are represented by species less similar or very different from fossil apophisandrids (they are carpophilines, cillaeines, cychramines, cyllocidines and nitidulines) and they have trophic associations mostly with monoecious angiosperm plants, which can be pollinated by the mentioned coleopterous groups. One of interesting peculiarity of the modern mystropin lifestyle is their trophic associations only with dioecious Arecaceae and “conditionally dioecious” Araceae. On the other hand, it is necessary to add the fossil Mesozoic parandrexids also with a great similarity to apophisandrids, which could be associated with gymnosperm male cones and also could be by occasional pollinators [Crowson, 1981, 1991b]. Thus, known available data from representatives of the nitidulid-group of families of the Recent biota demonstrate probably ancient trace of pollinophagy but no trace of certain obligatory pollination. It is important



to mention that the family Parandrexidae, closely related to apophisandrids, kateretids and probably boganiids, is known from the Middle Jurassic [Kirejtshuk, 1994b; Soriano et al., 2006; Lu et al., 2015, etc.]. The hypothesis of Crowson [1981, 1991b] on relations between Boganiidae, Nitidulidae and Jurassic Parandrixidae and that the latter of them could be, in his opinion, pollinophagous and associated with namely gymnosperm male cones, obtained a new strong morphological support [Kirejtshuk et al., 2023], but both this hypothesis and two of the above mentioned coleopterous families also even are not mentioned by Peris et al. [2024a, b].

Audisio et al. [2009], Jelínek et al. [2010] and Peris et al. [2024a, b] regarded mostly only anthophagous meligethines, mistropins, kateretids and “apophisandrids” and “some modern genera of Epuraeinae”. Indeed, the meligethines, mistropins and kateretids are really specialized anthophagous groups (although some kateretids seem to be rather carpophagous than anthophagous), while no epuraeine genus is known as specialised anthophagous (only a couple of small subgenera of two large genera – see above) and fossil apophisandrid includes some genera which apparently could be strobilo- or even anthophagous, but “pollinophagous” habit of others remain hypothetical rather than grounded by real facts. On the other hand, most groups of the nitidulid-group of families have representatives characterised by clear and obligatory association with plant generative organs. Only the family Helotidae and probably Monotomidae, and also nitidulid subfamilies Amphicrossinae, Calonecrinae, Cryptarchinae and Cybocephalinae represent the exception, i.e. they have no clear connection with either gymnosperm male strobiles or angiosperm flowers. Another peculiarity of pollinophagy in the Recent fauna of the nitidulid-groups of families is usual complete or at least imaginal pollinophagy of related representatives in generative organs of plants of rather phylogenetically separated groups. Two closely related Australian members of the subgenus *Circopes* (Nitidulini: *Aethina*) became complete strobilophagous in *Macrozamia riedleri* (Fisch. ex Gaudich.) C.A. Gardner (Zamiaceae) (*A. (C.) unguiculata* Kirejtshuk, 1986) and complete anthophagous in *Cordylina stricta* (Sims) Endl. (Dracenaceae) (*A. (C.) australis* Kirejtshuk, 1986) [Kirejtshuk, 1994a]. Besides, among mostly mycetophagous *Aethina*-complex of genera the complete anthophagy is characteristic of other groups of the subgenera *Circopes*, *Ithyra* Reitter, 1873 (specialised on flowers of Acanthaceae) and *Idaethina* Gemminger et Harold, 1868 (specialised as complete anthophagans in flowers of Malvaceae (mostly from genus *Hibiscus* L.)), and phyllophagy is known for species of the genus *Anister* Grouvelle, 1901 and carpophagy for those of the subgenus *Australaethina* Kirejtshuk et Lawrence, 1999 of the genus *Neopocadius* Grouvelle, 1906 [Kirejtshuk, Lawrence, 1999]. The rather similar situation is found in other nitiduline and cillaeine tribes of the family Nitidulidae (above cited papers by A.G. Kirejtshuk) and in this regard, the question involuntarily arises why Peris et al. [2024a] published as a reliable unproven fact on anthophagy of “some modern genera of Epuraeinae”, but ignored most already long-known facts about other anthophagous (and

also phyllophagous and carpophagous) habits of most nitidulids published in the 20<sup>th</sup> century or even before.

Thus, it appears unlikely that Mesozoic paradrexids, boganiids and apophisandrids, and many other pollinophagous beetles were specialised pollinators of gymnosperms, i.e. they necessarily transferred pollen from male cones to female cones. However, since they were probably specialised pollen consumers, they could therefore more often than other beetles visit female cones of the same cycad species after visiting male cones and thus realize pollination. Most likely, the first users of pollen of gymnosperms cannot be recognised by their appearance not only as pollinators, but also as visitors of the generative organs of plants (like many currently living specialised complete (both larval and imaginal) anthophagous species). The same applies to nitidulids and boganiids associated with modern gymnosperms (see above). However, this does not mean that all nitidulids and boganiids should be called pollinators. The situation is that if some modern species of *Epuraea* turned out to be an anthophagous, this does not mean at all that all other modern species should be anthophagous (with this most of its congeners are mycetophagous or with other trophic diets up to predation (for example, some its congeners prey on nematodes or scolytine larvae)). Particularly it concerns some other groups with a more or less generalized appearance due to comparatively quick larval development in ephemeral substrates, which does not necessarily have to be “archaic”. And one should not build phylogenetic concepts on this external impression until careful research has been carried out. It should be taken into account that such generalized groups are also known among nitidulid taenioncins, carpophilines, nitidulins, cyllodins, cychramins, cillaeins, conotelins including also specialised strobilo- and anthophagous representatives (in addition to completely anthophagous meligethines and mistropins, and also strobilo- and anthophagous and partly carpophagous boganiids and kateretids). The so global generalizations and many misinterpretations on pollinators proposed by Cai et al. [2018] and Peris et al. (see above lastly cited) and some other paleontologists on feeding and habits of fossils after considering only few occasional and restricted groups of modern anthophagous beetles and rather brief studies of scarce material on fossils seem to be too hurried and superfluous with ignoring of many important points of the problem.

Such a viewpoint on the pollination of Mesozoic members of the kateretid-subgroup of the families should be regarded as rather unilateral to be accepted as plausible and grounded because of the conclusions conflicting data from extinct and modern biotas, while concept of Crowson [1981] on pollinophagy of Jurassic representatives of the kateretid-subgroup obtained during further over than 40 years some important additional supports). However, we must also not forget that in most cases it is impossible to recognise anthophagous or mycetophagous habit by the external appearance of a beetle, and that most of the studied fossils will forever remain with unknown food preferences. It is expected this argumentation will be used by further researchers who would be better to revise all already described apiophisandrid genera to divide them

into those which could be probably pollinophagous and other with other diets, and also to take this circumstances in preparation of future publications. It is as important to do this as it is to remove from use supraspecific taxa without real diagnoses that do not allow for all recognised species to find a systematic position.

The above (in particular, evidence from the fossil record) makes it possible to propose the following scenario for describing the development of pollinophagy within representatives of the nitidulid-group of families in the Mesozoic and Cenozoic. By the middle of the Mesozoic, the kateretid-subgroup of families was already widely represented in the Eastern Hemisphere (Asia [Martynov, 1926; Kirejtshuk, 1994b, etc.] and "Pyrenees" (Iberian plate) [Soriano et al., 2006]), in which not only groups with completely mycetophagous members (boganiids) appeared, but also imaginal and complete pollinophagous representatives (boganiids and paradreids), specialised in male cones of gymnosperms, which apparently became relatively numerous and diverse by the end of the Jurassic and in the Lower Cretaceous [Kirejtshuk, 1994b; Soriano et al., 2006; Lu et al., 2015; Kirejtshuk et al., 2023, etc.]. Paradreids reached the boundary between the Lower and Upper Cretaceous, later probably at the Albion/Cenomanian they seemed to have been gradually replaced by a new family (apophisandrids), i.e. the family, in which pollinophagous members constituted a significant part of the diversity and seemed to survive at least until the late Eocene (*Baltoraea* [Kurochkin, Kirejtshuk, 2010]). Another branch of the kateretid-subgroup of families appears in the known fossil record at the boundary of the Jurassic and Cretaceous with the family Kateretidae (*Lebanorettes* Kirejtshuk et al., 2008), which could be also associated with gymnosperm cones, while all other representatives of this family with known bionomy are associated with flowers and fruits (seeds) of angiosperms on the Recent flora of the most floristic regions (except for the Antarctic Region), although *Antirhelus* Kirejtshuk, 2023 from the Eocene could have a diet different from other kateretids [Kupryjanowicz et al., 2019; Kirejtshuk et al., 2023]. The second family of this branch (Smicripidae) was recorded from Albion/Cenomanian Burmese amber as well as Eocene Baltic and Rovno amber [Kirejtshuk, Nel, 2008; Bukejs, Kirejtshuk, 2015; Kirejtshuk, 2017; Kupryjanowicz et al., 2019; Lyubarsky, Perkovsky, 2023], while all modern species of it has largely retained its association with ancient larval mycetophagy to the present day (stage II according to regular changes in trophic associations [Kirejtshuk, 1989a]).

The appearance of the nitidulid-subgroup of families in the published fossil record is also determined by the early Cretaceous, although there are reasons to assume its actual appearance much earlier. Unfortunately, late Cretaceous outcrops are very poor in fossil beetles in general [Zherikhin, 1978]. As a result, the currently available late Cretaceous fossils do not include reliable pollinophagous beetles and can only be reliably indicated for the Paleogene. Nevertheless, it can be tentatively assumed that the change in the representation of gymnosperms and angiosperms in the Cretaceous floras should have been reflected in changes in the composition of pollinophages. This could

be associated with a decrease in the proportion of fossils found from the kateretid line and the appearance of pollinophages of the nitidulid line, but this assumption also requires paleontological confirmation. It can also be assumed that the period of change in the proportion of pollinophagous beetles on gymnosperms to the pollinophagous beetles on angiosperms followed a change in the proportions of these groups of plants in late Mesozoic floras and was quite long. Therefore, the existing gap in the fossil record is quite explainable by these circumstances. Unfortunately, significant amounts of beetles in the examined fossil record reappear starting from the Eocene, and therefore many researchers have the impression that Eocene outcrops indicate a sharp emergence of Cenozoic fauna after the Mesozoic one. Nevertheless one true boganiid with a great similarity to characteristic pollinophagous apophisandrids and nitidulids having very long antennae will be described soon from the late Cretaceous of China (Kirejtshuk, in prep.). Besides, species-rich materials from the middle of the Paleocene show that even at this time beetles retained Mesozoic groups in their composition [Kirejtshuk et al., 2016; Kirejtshuk, Nel, 2018; Nabozhenko, Kirejtshuk, 2017; Nel et al., 2024, etc.]. It is important to note that the conclusions made without taking this feature into account, including ones by Peris et al. [2024a, b], relate not so much to the available material that they write about, but to the publications that they used to prepare the conclusions for their papers.

At present rather few obvious fossil pollinophagous beetles from the nitidulid subgroup of families have been described. There are only two species of meligethine genus *Melipriopsis* Kirejtshuk, 2011 from Eocene Baltic amber [Kirejtshuk, 2011b; Kirejtshuk, Bukejs, 2023]. These data can be considered combining with the relict range of most archaic meligethine genus *Pria* currently spread mostly in the Afro-Madagascan Region, and also in the Palaearctic and Indo-Malayan regions, and one species is known from Australia (*P. pumilla* Cooper, 1982). This combination supports a concept of the most archaic position of this genus within the subfamily Meligethinae. Other groups consisting only of members with complete (imaginal and larval) pollinophagy and widely distributed can be hypothetically regarded as older ones, while the groups which include species with different lifestyle and trophic regime in terms the scheme proposed by Kirejtshuk [1989a] and repeated by Kirejtshuk et al. [2023] younger. Most data on these groups and observed types of their ontogeny and diet were published in the paper listed in the below references (see below papers of A.G. Kirejtshuk) and some additional data mentioned above. As noted above, it seems to be important that the pollinophagous beetles of different phyletic branches of the nitidulid-group of families associated with dioecious gymnosperm and angiosperm plants (apophisandrids, epuraeines, meligethines and mystripins) demonstrate a considerable secondary similarity in their appearance and structural peculiarities of mouthparts and other appendages (antennae and legs), although their principal structures of their thorax and particularly genitalia of both sexes are similar to those as characteristic (diagnostic) of kateretid-group in apophisandrids and nitidulid-subgroup of families in

others, i.e. manifesting evidence of their true phylogenetic roots and thereby proving their convergent origin of the characters in appearance, mouthparts, antennae and legs. Therefore these convergent (homoplastic) features should be definitely interpreted as certainly younger than the diagnostic group characters in thorax and genitalia. The closest relatives of apophisandrids can be expected among boganiids, generalized appearance pollinophagous epuraeines (tribe Epuraeini) could be more or less initial for the nitidulid carpophiline-lineage, while meligethines seem to have close relations with "Palaeogean" members of the nitidulin *Aethina*-complex of genera, but mystropins could have a American phyletic root from another nitidulin complex of genera (probably from relatives of the *Nitidula*-, *Soronia*-complexes or other complexes closest to them [Kirejtshuk, 2008]; they have been found in the Miocene Dominican amber, but waiting for description). Considering the fossil records and different aspects of phylogenetic processes in the nitidulid-group of families it is scarcely possible to imagine and find argumentation for that the above mentioned similarity of polliniphagous kateretid- and nitidulid-subgroups of families could be maintained from the Jurassic as was supposed by Peris et al. [2024a, b]). Another statement of Peris et al. [2024a: 598] that the apophisandrids "should be better placed within an extinct basal subfamily of Nitidulidae, with some plesiomorphic character states shared either with Kateretidae and with some basal Nitidulidae lineages (Epuraeinae, Calonecrinae and Maynipeplinae)" can be scarcely understood because these authors did not indicate what systematic interpretation was recognised by them (indeed in this statement they join together two subgroups of families (kateretid- and nitidulid-subgroups) and two different nitidulid lineages (carpophiline- and nitiduline-ones).

In addition, it can be noted that the meligethines are distinguished from other subfamilies in some peculiarities which are not always easy to observe and compare in many specimens from different groups. One of such peculiarities is a pair of paramedian deep arcuate impressions along the base of pygidium, characteristic of all meligethine taxa. Something like this there are in the members of the *Aethina*-complex of genera, but, in contrast to meligethines, the transverse row of arcuate impressions vary in number and outline (usually eight). This similarity in both these groups can be preliminarily regarded as an evidence of phyletic relation and both groups are characterised a trend to anthophagy: meligethines consist of members with complete anthophagy, while the members of different genera of the *Aethina*-complex show all three stages of changes in trophic associations from complete mycetophagy (stage I) to complete anthophagy, complete carpophagy, imaginal anthophagy + larval carpophagy or phyllophagy. Thus, the bionomical aspect of evolution coincides the structural one and can be used for grounding a phylogenetic hypothesis.

In this section it was shown how the method of multiple parallelisms can be used to substantiate a phylogenetic hypothesis. The material presented in this paper demonstrates the verification of the correspondence between the paleontological, morphological, ontogenetic, ecological and bionomic aspects of evolution, which

provides grounds for recognising the proposed phylogenetic hypothesis of Kirejtshuk [1982] as sufficiently probable. At present, the development of this hypothesis provides grounds for drawing conclusions on the historical development of the group of families under consideration in general. On its basis, the following conclusions are suggested:

1. The nitidulid-group of families could have a common origin during or somewhat earlier than the Middle Jurassic, although this statement needs further support.

2. The kateretid-subgroup should be considered as mainly Mesozoic with probable dominance of members with at least imaginal pollinophagy on male gymnosperm cones, recorded mostly in the late Mesozoic (Middle Jurassic – Albion/Cenomanian) and reaching the Eocene (Baltic amber); only some its genera are represented in the modern biota: Boganiidae (some members with complete mycetophagy and some with complete pollinophagy on gymnosperms), Kateretidae (mostly complete antho- or caprophagy on angiosperms), Smicripidae (mycetophagy and partly with imaginal anthophagy on angiosperms).

3. The nitidulid-subgroup should be considered, despite the antiquity of its origin (at least early Cretaceous), as mostly prosperous in the Cenozoic, having given rise apparently during the late Cretaceous and Cenozoic to a large number of modern forms with imaginal and complete strobilophagy on gymnosperms and anthophagy on angiosperms from most suprageneric taxa of this subgroup of families, and also with further stages of changes in trophic associations: complete carpophagy, imaginal anthophagy + + larval phylophagy, complete phyllophagy, etc. Only one family of this subgroup (Nitidulidae) reveals numerous independent transitions to feeding on the generative organs of some modern gymnosperms and many families of angiosperms. Representatives of various subfamilies of both nitidulid phyletic lineages (epuraeine- and nitiduline-lineages) got obligate connections with plant flowers as specialized pollinophagous forms in the imaginal and larval stages of their individual development, and some have become even carpophagous or phyllophagous ones.

4. The majority of specialized anthophagous nitidulids differ little from their mycetophagous relatives and these groups apparently had comparatively recent origin (possibly more or less recently or at most during the Neogene). Two groups specialised as completely anthophagous are sufficiently isolated from other nitidulids and are considered as separate suprageneric taxa (subfamily Meligethinae and nitiduline tribe Mystropini). These lastly mentioned groups apparently had more ancient origin than other anthophagous groups (possibly appeared during the Paleogene or near the boundary between the late Cretaceous and Paleocene).

5. Some unrelated groups of specialised strobilophagous and anthophagous of both subgroups of families (Apophisandridae, Kateretidae and Parandrexidae from the kateretid-subgroup, as well as some nitidulid subfamilies from the nitidulid-subgroup of families) acquired a considerable similarity as a result of classic convergence, often approximately parallel in time, and sometimes confined to different time eras (Mesozoic and Cenozoic). In these cases, the appearance of a



generalized appearance was mostly due to accelerated larval development in conditions of habitat in ephemeral substrates, which were and are generative organs during the pollination period of many plants. Convergent similarity often misled some researchers, who considered unrelated groups as closely related before in the 18<sup>th</sup>–20<sup>th</sup> centuries and even in this century. For a long time, the groups close related to the genus *Kateretes* Herbst, 1793 were considered as a subfamily within the family Nitidulidae, until it became clear from the study of the structure of the genitalia of both sexes that the similarity of their external appearance is obviously convergent. Recently, initially described as kateretids and other families, Cretaceous genera close to the *Apophisandra* were mistakenly transferred to the family Nitidulidae. In this paper, it was further proven that the latter belong to the kateretid-, but not the nitidulid-group of families, phylogenetically related more to the paradreids than to the kateretids sensu stricto. It was also shown that many Mesozoic apophisandrids, which could be associated to Mesozoic dioecious gymnosperms, exhibit the greatest similarity not only in appearance, but also in many body appendages, with some modern groups of nitidulids (epuraeins, mystropins and meligethines), associated with dioecious palms (i.e. apparently namely dioeciousness of plants can be reflected in the development of peculiar similarity of pollinophagous nitidulids, inhabited on them).

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