

Notes on the *Helophorus guttulus* group (Coleoptera: Helophoridae)

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Abstract

A review of the *Helophorus guttulus* group (Coleoptera: Helophoridae) is presented. *Helophorus costulatus* KUWERT, 1887 is synonymized with *H. guttulus* MOTSCHULSKY, 1860. A lectotype is designated for *H. nivalis* GIRAUD, 1852. Determination of the exact type localities of *H. costulatus*, *H. dormitans* (SHARP, 1916) and *H. guttulus* is discussed. Data on the distributions and a determination key for all five species of the group are presented.

Key words: Coleoptera, Hydrophiloidea, Helophoridae, *Helophorus guttulus* group, taxonomy, new synonymy, lectotype designation, distribution, Europe, Caucasus, Turkey.

Introduction

The *Helophorus guttulus* group was first proposed by ANGUS (1985) for *H. costulatus* KUWERT, 1887, *H. faustianus* (SHARP, 1916), *H. fauveli* GANGLBAUER, 1901, *H. guttulus* MOTSCHULSKY, 1860, and *H. nivalis* GIRAUD, 1852. *Helophorus apfelbecki* KNIŽ, 1910, originally described as a subspecies of *H. nivalis*, and shown by ANGUS (2009) to be a distinct species, was added to this group by ANGUS et al. (2017). These six species were formerly placed in the subgenus *Atractohelophorus* KUWERT, 1886, which is now regarded as a junior synonym of *Rhopalohelophorus* KUWERT, 1886. Members of this group have somewhat varied appearances but all are more robust and frequently highly arched (ANGUS et al. 2017).

When the second author examined some specimens (males and females) from Turkey, he thought that they might represent *H. costulatus*, which was known only from the single female holotype from “Kurasili” (probably in Dagestan). Further morphological study of these specimens including comparison with Caucasian material of *H. guttulus* revealed identical aedeagi and the presence of transitional forms. This led the authors to the conclusion that both these names refer to the same species.

Based on the new synonymy, a redescription of *H. guttulus* is given, along with distribution maps for *H. guttulus* and *H. faustianus*, and a revised key to the species of the *H. guttulus* group.

Material and methods

Abbreviations:

BMNH	Natural History Museum, London, U.K. (M. Barclay)
CGC	Czesław Greń collection, Bytom, Poland
MNHN	Muséum national d’histoire naturelle, Paris, France (N. Berti †)
MNKh	V.N. Karazin National University in Kharkiv, Kharkiv, Ukraine (A.G. Shatrovskiy)
MSPI	Moscow State Pedagogical University, Department of Zoology and Ecology, Moscow, Russia (K.V. Makarov)
NMW	Naturhistorisches Museum Wien, Vienna, Austria (M.A. Jäch)
UCBL	Musée des Confluences, Lyon, France (L. David)
ZIN	Zoological Institute, Russian Academy of Science, St. Petersburg, Russia (B. Korotyaev)
ZMMU	Zoological Museum, Moscow, Russia (A. Gusakov)

The material of *H. guttulus* and other species of this group studied before is deposited in various European museums (see ANGUS 1985, 1987, 1988, 1992, 2009, ANGUS et al. 2017).

The type material of *Helophorus caucasicus* KUWERT, 1885, *H. costulatus*, *H. dormitans* (SHARP, 1916), and *H. fauveli* was studied and described by ANGUS (1985).

When males were prepared for study of the aedeagus, genitalia were mounted in dimethyl hydan-toin formaldehyde (DMHF) on slides for photography.

For definition and for macrophotography (Figs. 2, 4, 6–11, 27–36), an MBS-9 binocular micro-scope was used with illumination in the form of an adjustable ring of light from a lamp illu-minator (6500k 144 LED). The micrographs were taken using a Levenhuk D320L microscope with a M1400 PLUS camera (Figs. 13–16, 18–20, 22–26), followed by overlaying images in Helicon Focus Pro 5.3.11.3 software. The photograph of the lectotype of *H. guttulus* (Fig. 1) was taken by Kirill Makarov (MSPI). The photographs shown in Figs. 3, 5, 21, 37–46 were taken in the Sackler imaging laboratory of the BMNH, using a Leica MZ125 stereomicroscope and a Zeiss Axioskop bright field compound microscope, both equipped with Canon DSLR cameras, and the images were stacked using Helicon Focus 7. The illustration of the holotype of *H. costu-latus* (Fig. 12, 17) was taken with a Cambridge S-410 scanning electron microscope and pub-lished by ANGUS (1985, 1992).

Helophorus guttulus group

Species of the *H. guttulus* group are characterized by the following features: colour black, elytra occasionally mottled with yellow, maxillary palpi sometimes metallic, body less elongate and parallel-sided and more arched than in the *H. glacialis* group.

Helophorus guttulus MOTSCHULSKY, 1860

(Figs. 1–36, 47)

Helophorus guttulus MOTSCHULSKY 1860: 106. – ANGUS 1985: 144; 1992: 58; ANGUS et al. 2017: 250; LOHSE 1971: 119 (misinterpretation, see below).

Helophorus insularis caucasicus KUWERT 1885: 232.

Helophorus costulatus KUWERT 1887: 167; **syn.n.**

Atractohelophorus dormitans SHARP 1916: 196.

TYPE LOCALITY: “Derbent, Daghestan”, Russia (see below for discussion).

TYPE MATERIAL: *Helophorus guttulus*: Lectotype ♂ (ZMMU), designated by ANGUS (1985): “*Helophorus guttulus* Motsch. Daghest. Derbent”, “Derbent Mots.”, “40”, “*H. guttulus* Motsch. Zaitzev det.”. Paralectotype ♂ (ZMMU).

Helophorus insularis caucasicus: Lectotype ♂ (MNHN), designated by ANGUS (1985): “Kaukas, Leder”, “*insularis* var. *caucasicus* mihi”. Paralectotypes (MNHN): 1 ♀, same data as lectotype; 1 ♀: “Caucasus Reitter Leder”; 2 ♂♂: “Caucasus Martkopi [southeastern Georgia]. Leder (Reitter)”.

Helophorus costulatus: Holotype ♀ (MNHN), studied by ANGUS (1985): “Kurasili Faust”, “*Helophorus costulatus* mihi”.

Helophorus dormitans: Lectotype ♀ (BMNH), designated by ANGUS (1985): “*A. dormitans* Type D. S.”, “TransCauc. Faust”. Paralectotype ♀ (BMNH): “*A. dormitans* Ind Typ. D. S.”, “TransCauc.”.

ADDITIONAL MATERIAL EXAMINED:

T U R K E Y: Gümüşhane, between Zigana Pass and Mt. Zigana, 1300–1400 m a.s.l., alpine zone, 10.VI.1998, leg. B. Kataev & A. Solodovnikov, 1 ♂, 2 ♀♀ (MNKh); Trabzon, Soğanlı Pass, 2200 m a.s.l., 11.VII.1995, leg. L. Lehmann, 2 ♂♂, 1 ♀, 16 exs. (NMW); Trabzon, 40 km S Of, S Uzungöl (lake), ca. 2050 m a.s.l., ca. 40°35'57"N 40°16'56"E, 4.VIII.2006, leg. M. Schülke, 1 ♂, 1 ♀, 8 exs. (NMW); Rize, İkizdere, Üçtepe, 25.VI.1973, leg. F. Schubert, 1 ♂, 3 exs. (NMW); Rize, Ovit Dağı Pass, 2600 m a.s.l., 31.V.1989, leg. M.A. Jäch, 1 ♂, 2 ♀♀ (NMW); Erzurum, Dumlulu Dağı, 35–40 km NE Erzurum, 2500–2900 m a.s.l., 15.VI.1998, leg. B. Kataev & A. Solodovnikov, 1 ♂, 4 ♀♀ (MNKh); Artvin, Gaglagon River, 2000–2900 m a.s.l., 25.VI.1998, leg. B. Kataev & A. Solodovnikov, 3 ♂♂, 2 ♀♀ (MNKh); Artvin, Gül Dağı, north slope of river valley, 1800 m a.s.l., 26.VI.1998, leg. B. Kataev & A. Solodovnikov, 1 ♀ (MNKh).

- G E O R G I A: Abkhasia, Uhalt Ridge (part of Bzyb Range), 2100–2200 m a.s.l., near snow, 24.VI.1982, leg. V. Drabkin, 2 ♀♀ (MNKh); Abkhasia, Bagri-Yashta Mountains, Anchkho Pass, 1900–2000 m, 5.VII.2007, leg. N. Yunakov, 6 exs. (ZIN); Abkhasia, Klukhorskiy Pass, 1.VII.1935, collector unknown, coll. P. Zaitzev, 2 ♂♂, 1 ♀ (ZIN); Mtskheta-Mtianeti, Gveleti, Darial Gorge, date and collector unknown, coll. P. Zaitzev, 3 ♀♀ (ZIN); Mtskheta-Mtianeti, Mt. Kazbek, W of Stepantsminda, Ortsveri (also known as Gergeti) Glacier, 2500–3600 m a.s.l., 1.–4.VII.1988, leg. D.W. Wrase [the specimens are erroneously labelled “Ossetia b.” (= North Ossetia)], 2 ♂♂, 3 ♀♀ (BMNH); South Ossetia, Kel’ volcanic plateau, Lake “Shaudzuar” [written in Cyrillic script on label: “Шаудзуар”], date and collector unknown, coll. P. Zaitzev, 1 ♀ (ZIN); Kakheti, Shakriani, 26.–28.VI.1898, leg. Fomin, 1 ♀ (ZIN); Lagodekhi, date and collector unknown, coll. P. Zaitzev, 1 ♀ (ZIN); Lake Tabatskuri, date and collector unknown, coll. P. Zaitzev, 1 ♀ (ZIN).
- R U S S I A: Krasnodar, Tsitsa River, alpine meadows, 8.VI.1903, leg. Y. Philipchenko, 1 ♂, 1 ♀, 1 ex. (ZIN); Krasnodar, near Mt. Pshikhashkha, 28.VI.1903, leg. Y. Philipchenko, 1 ♂ (ZIN); Krasnodar, Krasnaya Polyana, without date, leg. Dr. Lgocky, 1 ♂, 2 ♀♀ (ZIN); Adygea, Mt. Dzhuga [Mt. Dzhuga forms the border between Adygea and Krasnodar – the label data in Cyrillic script refer to “Майк. отд. (= Division of Maikop)”, and therefore the collecting locality probably must be attributed to Adygea], 16.VI.1911, leg. D. Volnukhin, 4 ♂♂ (BMNH), 1 ♂, 25 exs. (ZIN); Karachay-Cherkessia, Mt. Ullu-hatipara, 5 km W Teberda, 3100 m a.s.l., 16.VIII.1988, leg. V. Gratshev, 1 ♂ (MNKh); North Ossetia, Bokovoy Ridge, Tseyskiy Canyon, 4300 m a.s.l., 19.VII.1985, leg. S. Alexeev, 1 ♀ (MNKh); North Ossetia, Tseya Glacier, 3100–3200 m a.s.l., bank of left tributary of the Wilpata-Don Stream, SSW slope, 15.–22.VII.1984, leg. S.K. Alekseev, 1 ♂ (MNKh); North Ossetia, Tseya Glacier, Wilpata-Don Stream, 2900 m a.s.l., 19.VII.1984, leg. S.K. Alekseev, 1 ♂, 3 ♀♀ (MNKh); same locality, but 26.IX.1984, 4 ♂♂, 4 ♀♀ (MNKh); North Ossetia, Kassar Gorge, Zaramag Trough near Zaramag, 3000 m a.s.l., 23.III.1986, leg. S.K. Alekseev, 1 ♂, 1 ♀ (MNKh); Dagestan, Khundzakh, 13.V.1903, leg. M. Poltoratskiy, 2 ♀♀ (ZIN); Dagestan, Mt. Shalbuzdag, 22.VIII.1926, leg. M. Riabov, 1 ♀ (ZIN); Dagestan, Khunzakh, 13.V.1903, leg. M. Poltoratskiy, 2 ♀♀ (ZIN); Dagestan, Mt. Khochaldag, alpine region, 10.VIII.1911, leg. L. Mlokošewicz, 1 ex. (ZIN).

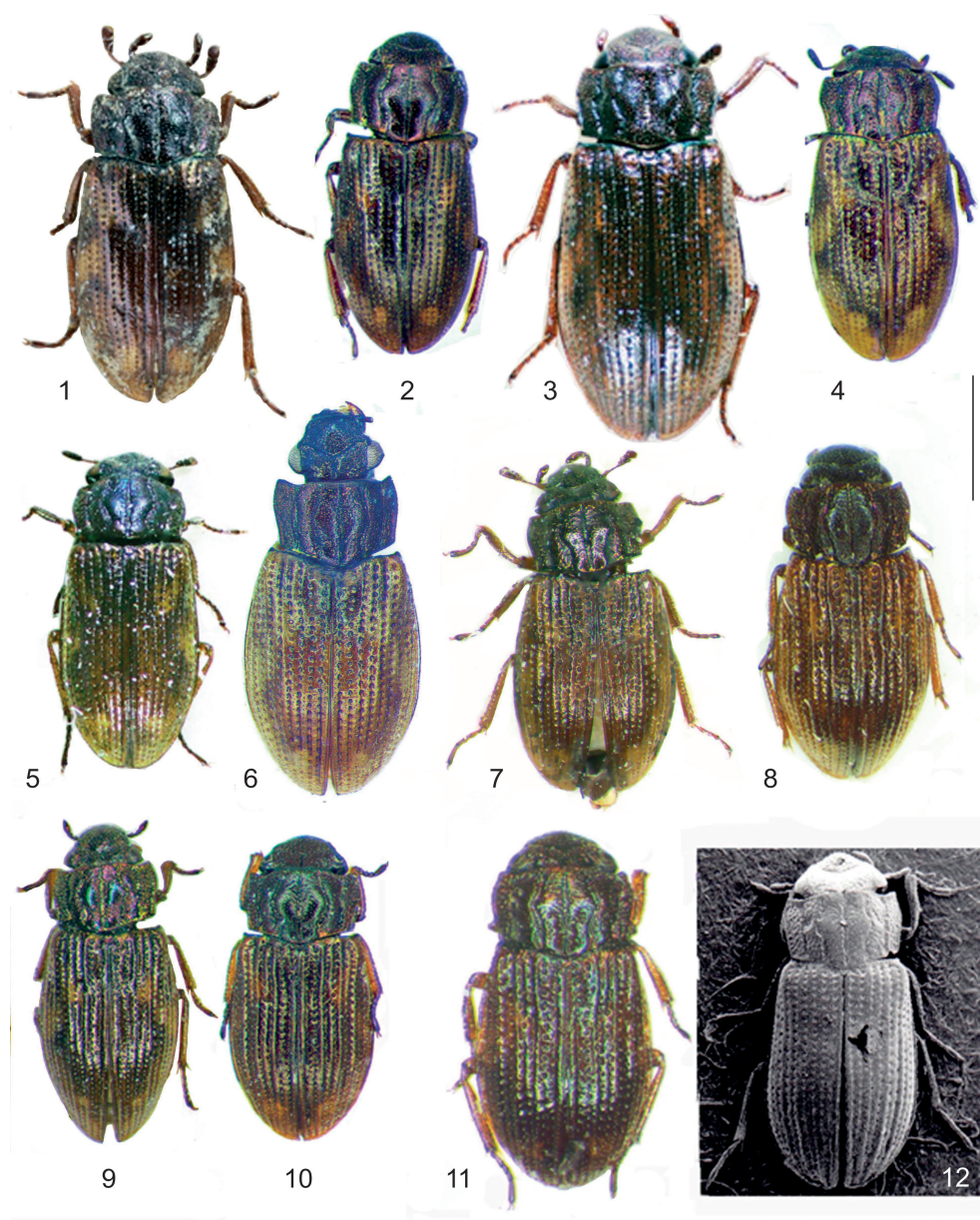
DISCUSSION: *Helophorus guttulus* was wrongly interpreted as *H. montenegrinus* KUWERT, 1885 by ORCHYMONT (1927), who regarded *H. guttulus* as a variety of the widely distributed *H. brevipalpis* BEDEL, 1881. This misinterpretation was also accepted by LOHSE (1971). In fact, these species are not alike, and the status of *H. guttulus* was discussed by ANGUS (1985).

The type locality of *H. guttulus*, Derbent, is situated in southeastern Dagestan, on the coast of the Caspian Sea. This species is known from the Caucasus (both the Greater and the Lesser) and from northeastern Anatolia. All known localities are situated in the subalpine and alpine zones. The nearest mountain ranges are at distances of 50 km (Jufudag Ridge) and 80 km (Samur Ridge). These are the easternmost of the spurs of the Greater Caucasus having snow. So, the city of Derbent is obviously not the true type locality of *H. guttulus*. Probably, the material studied by MOTSCHULSKY (1860) was collected in the mentioned mountains and labelled with the approximate data “Derbent”.

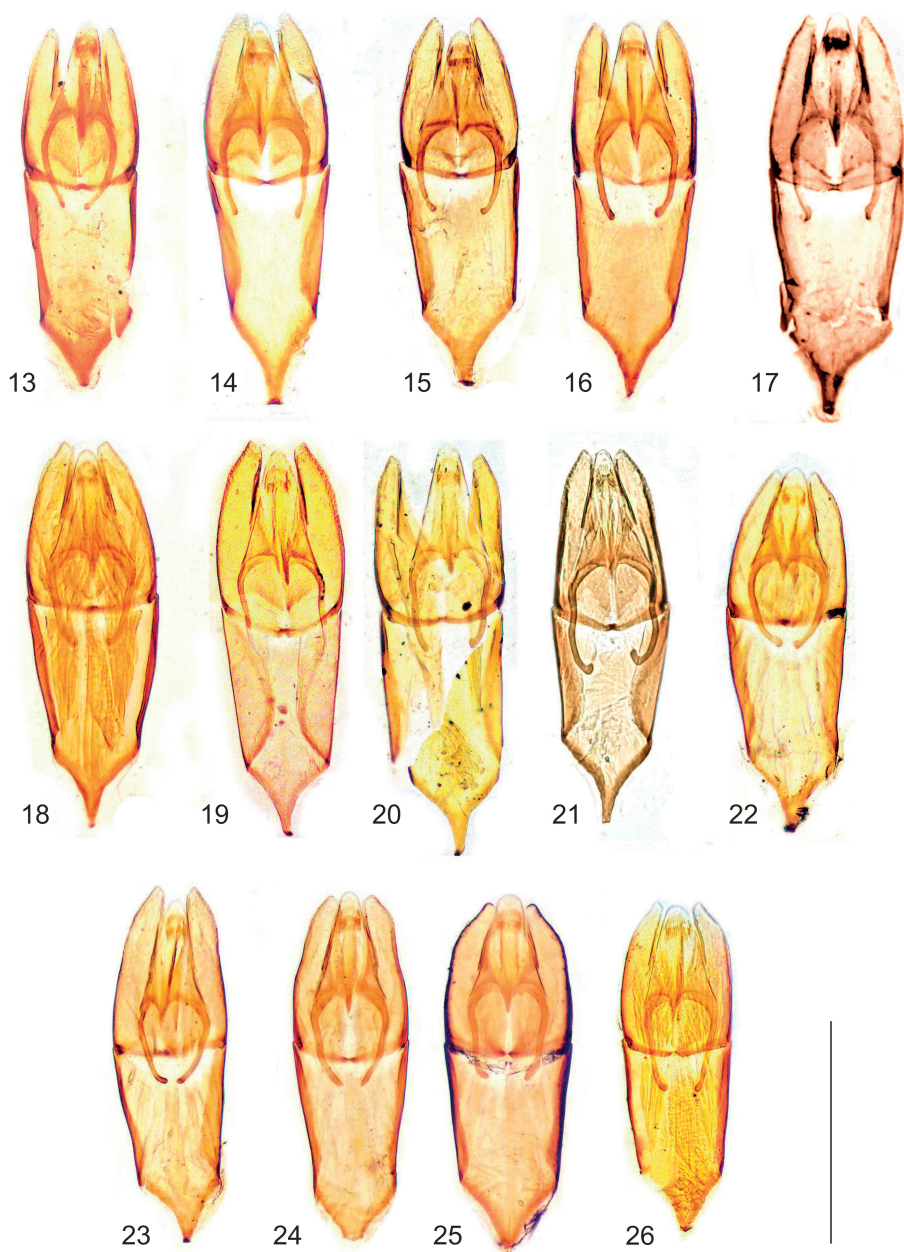
As for the type locality of *H. costulatus*, we were unable to locate “Kurasili”. But it is known that Johannes Faust collected Caucasian material in 1872 in the southern mountains of Dagestan (“... dass er ... im Frühjahr 1872 zugleich mit dem Lepidopterologen Hugo Th. Christoph († 1894) eine mehrmonatliche Sammelreise nach Baku, Derbent und die südlichen Berge Daghestans unternahm.” [“that he travelled with the lepidopterologist Hugo Th. Christoph († 1894) for several months to Baku, Derbent and the southern mountains of Dagestan in the spring of 1872”]) (HELLER 1903: 402). So we suggest that the lectotype was collected in the eastern ranges of the Greater Caucasus.

Furthermore, the type specimens of *H. dormitans* were collected by Johannes Faust in the southern mountains of Dagestan, which means that all the variation in the species is represented by material from this small area of the eastern Caucasus.

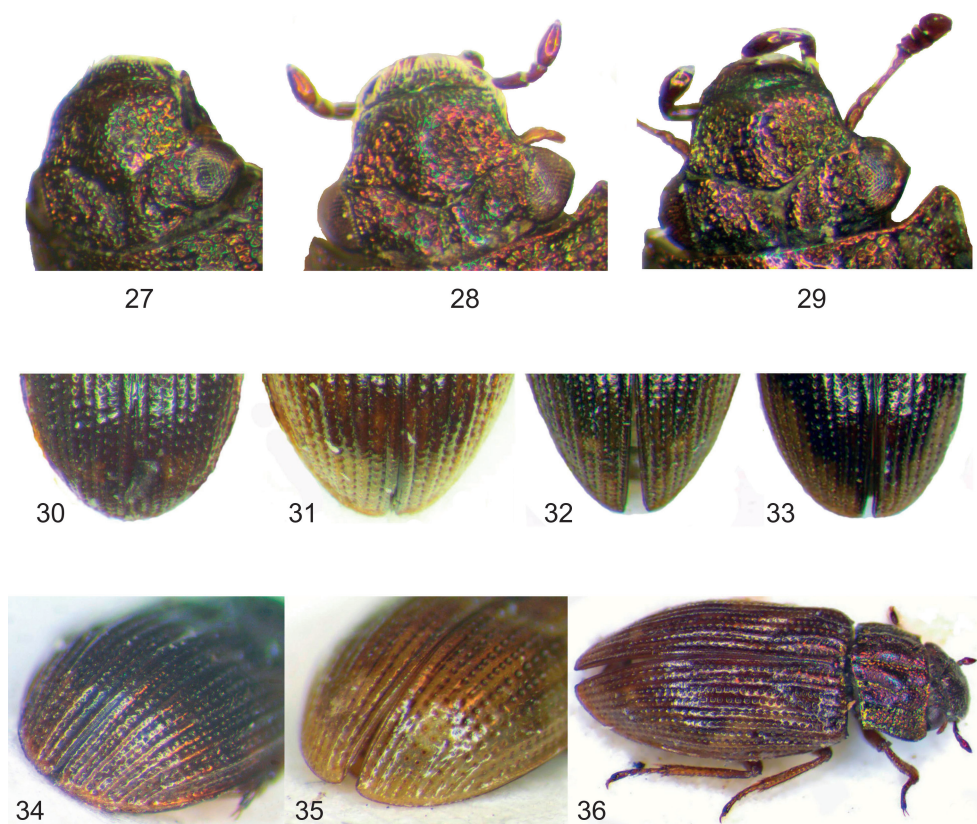
MORPHOLOGICAL CHARACTERISTICS: The holotype of *H. costulatus* has some very distinctive characteristics: strongly developed conical protuberance on the frons, bluntly rounded elytral apex, and strongly ridged elytral interstices in apical third (ANGUS 1985, 1992).



Figs. 1–12: *Helophorus guttulus*, whole beetles, stacked photographs (1–11), SEM (12): 1) Dagestan, “Derbent”, lectotype, ♂; 2) Turkey, Artvin, Gaglagon River, ♂; 3) probably Dagestan, lectotype of *H. dormitans*, ♀; 4) Russia, North Ossetia, Tseya Glacier, Wilpata-Don Stream, ♂; 5) Russia, Adygea, Dzhuga, ♂; 6) Russia, Karachay-Cherkessia, Mt. Ullu-hatipara, 5 km W Teberda, ♂; 7) Russia, Krasnodar, Krasnaya Polyana, ♂; 8) Turkey, Erzurum, Dumlu Dağı, ♀; 9) Turkey, Artvin, Gül Dağı, ♀; 10) Turkey, Gümüşhane, Zigana Range, ♂; 11) Turkey, Erzurum, Dumlu Dağı, ♂; 12) Russia, probably Dagestan, “Kurasili”, holotype of *H. costulatus*, ♀ (from ANGUS 1985). Scale = 1 mm.



Figs. 13–26: *Helophorus guttulus*, aedeagi: 13) Turkey, Erzurum, Dumlu Dağı; 14–15) Turkey, Artvin, Gaglagon River; 16) Turkey, Gümüşhane, Zigana Range; 17) Russia, Dagestan, “Derbent”, lectotype (from ANGUS 1985); 18) Russia, North Ossetia, Kassar Gorge, Zaramag Trough near Zaramag; 19) Russia, Karachay-Cherkessia, Mt. Ullu-hatipara, 5 km W Teberda; 20) Russia, Krasnodar, Krasnaya Polyana; 21–22) Russia, Adygea, Dzhuga; 23–26) Russia, North Ossetia, Tsey Glacier, bank of left tributary of Wilpata-Don Stream. Scale = 0.5 mm.



Figs. 27–29: *Helophorus guttulus*, frons: 27) Turkey, Erzurum, Dumlu Dağı; 28) Turkey, Artvin, Gül Dağı; 29) Russia, Krasnodar, Krasnaya Polyana.

Figs. 30–33: *Helophorus guttulus*, elytral apices: 30–31) Turkey, Erzurum, Dumlu Dağı. (30) ♂, (31) ♀; 32) Turkey, Artvin, Gül Dağı, ♀; 33) Russia, North Ossetia, Tseya Glacier, Wilpata-Don Stream, ♂.

Figs. 34–36: *Helophorus guttulus*, elytral apices (34–35) and habitus at dorso-lateral view (36): 34) Turkey, Erzurum, Dumlu Dağı; 35) Russia, Karachay-Cherkessia, Mt. Ullu-hatipara, 5 km W Teberda; 36) Turkey, Artvin, Gül Dağı.

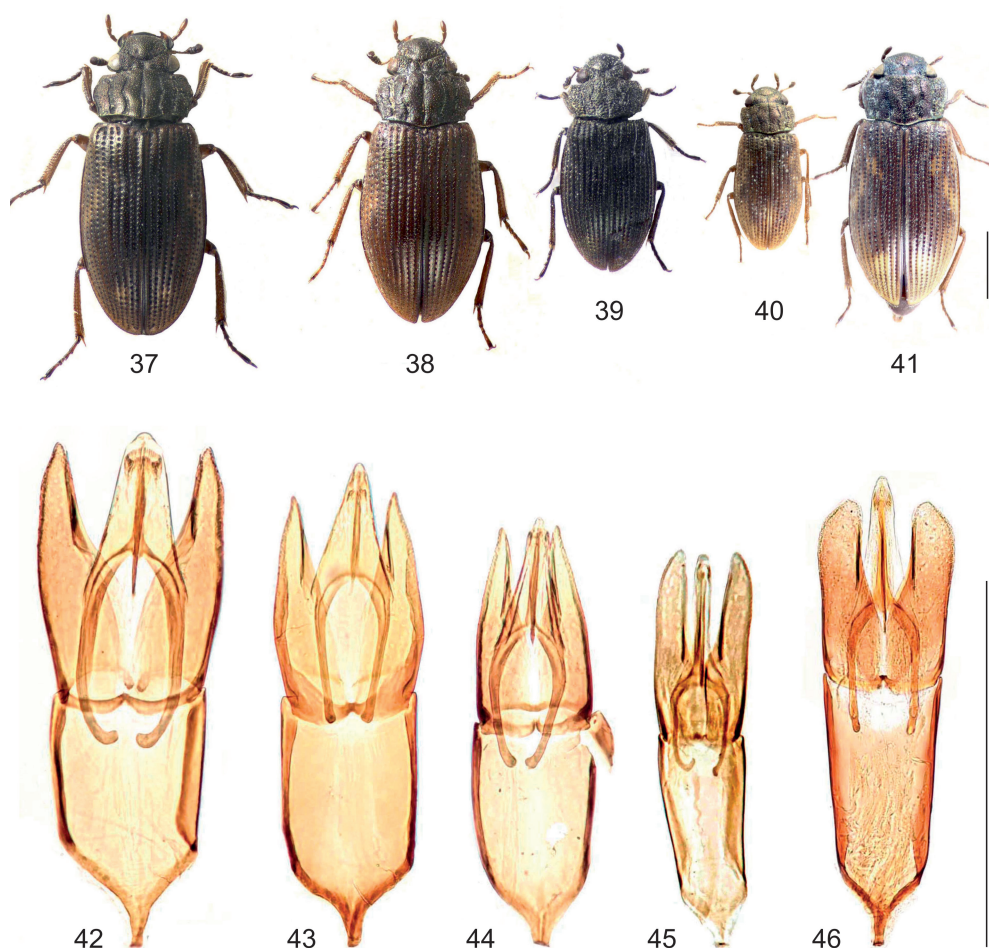
The authors have examined a rather large amount of specimens and concluded that specimens, including males, similar to the holotype of *H. costulatus*, are associated with other transitional characteristics of *H. guttulus* (Figs. 1–12). We could not find any significant differences in the aedeagal structures (Figs. 13–26).

There is a tendency for the parameres to have their outer margins slightly concave subapically, especially in specimens from Russia.

The conical protuberance on the frons may be more or less distinctly developed (Figs. 27–29). Its form is not strictly conical, but more of a longitudinal elevation.

The elytral apex may be more or less rounded or tapered even among specimens collected together (Figs. 30–33).

All the examined specimens have raised intervals on the apical third of the elytra (see below). Sometimes these interstices may be more (Fig. 34) or less (Fig. 35) ridged. Even some odd interstices are completely or partly ridged (Fig. 36).



Figs. 37–41: *Helophorus guttulus* group species, whole beetles, stacked photographs: 37) *H. apfelbecki*, ♂, North Macedonia; 38) *H. nivalis*, ♀, Italy; 39) *H. fauveli*, ♂, Switzerland, Valais; 40) *H. faustianus*, holotype ♂ (probably Dagestan); 41) *H. faustianus*, ♀, Georgia, Tbatani. Scale = 1 mm.

Figs. 42–46: *Helophorus guttulus* group species, aedeagi: 42) *H. apfelbecki*, North Macedonia; 43) *H. nivalis*, Austria; 44) *H. fauveli*, Switzerland, Valais; 45) *H. faustianus*, holotype (probably Dagestan); 46) *H. faustianus*, Georgia, Tbatani. Scale = 0.5 mm.

DIAGNOSIS: Length: ♂♂ 2.3–2.9 mm, ♀♀ 2.6–3.5 mm, Width: ♂♂ 1.1–1.50 mm, ♀♀ 1.2–1.6 mm. Index length/width: ♂♂ 1.87–2.36, ♀♀ 1.79–2.46. We found some specimens both wider and narrower than is indicated by the ratios given above, but these outliers are randomly distributed geographically. Body short, convex. Body shape irregular oval, not parallel-sided. General colour dark brown to black with maroon-bronze, greenish and golden reflection; elytra with more or less visible yellow mottling, mid brown to yellowish (Figs. 1–11).

Head: Surface with well-developed, but flattened granules, reduced to punctuation on the middle part of the clypeus. Middle part in front of the lateral branches of the epicranial suture strongly raised in the form of a longitudinal ridge (Figs. 27–29). Stem of Y-groove narrow linear; antennae 9-segmented; maxillary palpi black-bronze, apical segment symmetrical.

Pronotum: Highly arched, narrowed basally, maximal width in the anterior third, the ratio of width to length: ♂♂ 1.46–1.58, ♀♀ 1.47–1.53; anterior angles rounded, posterior angles obtuse. Intervals with granulation, reduced to punctures in inflated middle part of internal ones and flattened on less inflated middle intervals. Grooves narrow, shallow. Submedian grooves curved outward, not angled, submarginal ones expanded at the middle. Submedian and submarginal grooves with row of punctures; on the median and marginal grooves these rows are interrupted. Ground colour black with maroon-bronze shine, posterior edge and grooves at least in posterior part gold, sometimes grooves wholly gold.

Elytra: Short and broad (index length/width: ♂♂ 1.45–1.50, ♀♀ 1.43–1.52), rounded on the sides, tapered or obtusely, sometimes abruptly rounded on the apex (Figs. 30–33). Interstices 2, 4, 6 and 8 raised along all own length, sometimes strongly raised near the apex, keeled; the rest interstices are more or less partly raised: interstices 3 raised on the base and on apical half, interstices 5 raised on apical half, interstices 7 and 9 raised in the middle of their length (Fig. 36). Colouration often black with yellow spots, but sometimes brown to yellowish, with humeral, subhumeral, subapical and apical spots, sometimes connecting. Subapical spot always present.

Legs: Rather short, yellowish brown.

Aedeagus (Figs. 13–26): 0.37–0.45 mm long, 0.12–0.15 mm wide; length of basal piece about 1.1–1.53 × that of the parameres. Parameres curved medially, often straightened to the apex, more or less concave along the outer margin, apices obliquely truncate. Penis: 0.20–0.24 mm long, 0.08–0.10 mm wide, of conical form, obtusely rounded apically, struts about as long as penis.

DISTRIBUTION (Fig. 47): Greater and Lesser Caucasus of Russia and Georgia; Armenia (Mt. Aragats); northeastern Turkey.

Helophorus faustianus (SHARP, 1916)

(Figs. 40–41, 45–46, 48)

Atrachelophorus faustianus SHARP 1916: 195. – ANGUS 1985: 144; 1988: 235; 1992: 58; ANGUS et al. 2017: 250.

TYPE LOCALITY: “Alp Cauc” (probably Dagestan), shown on the map (Fig. 48) as the same as for the holotype of *H. costulatus* collected by J. Faust.

TYPE MATERIAL: Holotype ♂ (BMNH), studied by ANGUS (1985): “*A. faustianus* Type D. S.”, “Alp Cauc”, “*faustianus* Type”.

ADDITIONAL MATERIAL EXAMINED:

T U R K E Y: Bursa, Uludağ, 1800 m a.s.l., 31.VII.1988, leg. M.A. Jäch, 3 exs. (NMW); Artvin, Borçka, 1500 m a.s.l., 1971–1974, leg. F. Schubert, 5 exs. (NMW).

G E O R G I A: Samegrelo-Upper Svaneti, Hebudi, ca. 1470 m a.s.l., muddy puddle by the road, no plants, 5.VII.2016, leg. C. Greñ, 1 ♂ (CGC); Samegrelo-Upper Svaneti, Ushguli, ca. 2100 m a.s.l., 4.VII.2016, leg. C. Greñ, 1 ♂, 2 ♀♀ (CGC); Mtskheta-Mtianeti, Gudauri, 2370 m a.s.l., pools in river valley, 12.VII.2016, leg. C. Greñ, 1 ♂, 5 ♀♀ (CGC); Samtskhe-Javakheti, Saghamo, ca. 2000 m a.s.l., oxbow lake in meadow, 14.VII.2017, leg. C. Greñ, 1 ♂ (CGC); Samtskhe-Javakheti, Poka, Paravani River Valley, 2080 m a.s.l., pool in meadow, 10.VII.2016, leg. C. Greñ, 1 ex. (CGC); Samtskhe-Javakheti, Bakuriani, 30.VI.1916, collector unknown, coll. P. Zaitzev, 2 ♂♂, 1 ♀ (ZIN); Samtskhe-Javakheti, Bakuriani, 1800–2200 m a.s.l., 4.–7.VII.1986, leg. D. Wrase & M. Schülke, 10 exs. (NMW); Kakheti, Mt. Tbatani, 1879, leg. Leder (coll. Reitter), 3 ♀♀ (ZIN).

MORPHOLOGICAL CHARACTERISTICS: Black, elytra sometimes mottled with yellow. The pronotum is normally flatter over the internal intervals than in *H. guttulus*.

DISTRIBUTION (Fig. 48): Greater and Lesser Caucasus of Russia and Georgia; Turkey (mountains of northern Anatolia, from Bursa Province in the west to Artvin Province in the east). A single female labelled “Araxesthal” (leg. H. Leder, coll. Reitter), deposited in the NMW might

also belong to *H. faustianus*. Specimens from “Araxesthal” [= Aras Valley] most likely were collected near Ordubad, Nakhchivan Autonomous Republic, Azerbaijan].

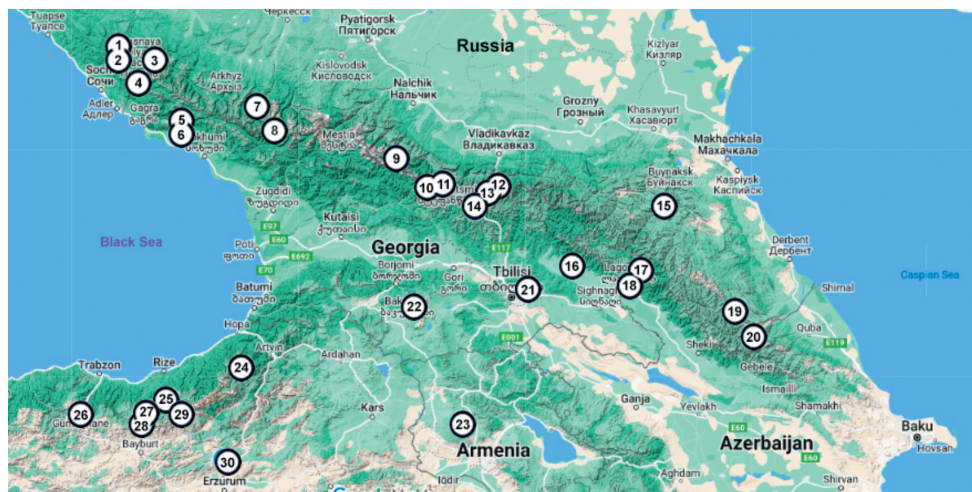


Fig. 47: Distribution of *Helophorus guttulus*: 1) Tsitsa River; 2) Mt. Pshikhashkha; 3) Mt. Dzhuga; 4) Krasnaya Polyana; 5) Bzyb Range; 6) Bagri-Yashta Mts.; 7) Mt. Ullu-hatipara; 8) Klukhorskiy Pass; 9) Bokovoy Ridge; 10) Tsey Glacier; 11) Kassar Gorge; 12) Gveleti; 13) Stepantsminda; 14) Kel' volcanic plateau; 15) Khunzakh; 16) Shakriani; 17) Mt. Khochaldag; 18) Lagodekhi; 19) “Derbent”/“Kurasili” (approximation); 20) Mt. Shalbuzdag; 21) Martqopi; 22) Lake Tabatskuri; 23) Mt. Aragats; 24) Gül Dağı; 25) İkizdere; 26) Zigana Range; 27) Uzungöl; 28) Soğanlı Pass; 29) Ovit Dağı Pass; 30) Dumlu Dağı.

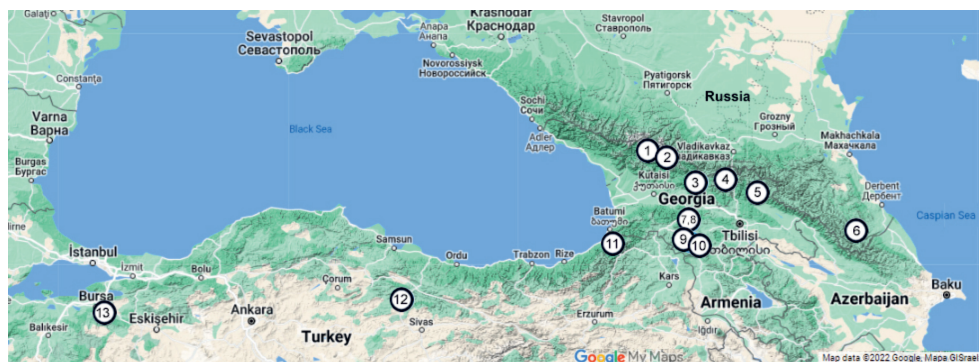


Fig. 48: Distribution of *Helophorus faustianus*: 1) Hebudi; 2) Ushguli; 3) Lake Ertso (ANGUS 1985); 4) Gudauri; 5) Mt. Tbatani; 6) “Derbent”/“Kurasili” (approximation); 7) Dabadzveli (ANGUS 1985); 8) Bakuriani; 9) Poka; 10) Saghamo; 11) Borçka; 12) Tokat (ANGUS 1985, 1988, 1992); 13) Uludağ.

Helophorus apfelbecki KNIŽ, 1910

(Figs. 37, 42)

Helophorus apfelbecki KNIŽ 1910: 51. – ANGUS 1985: 145 (*H. nivalis*); 1992: 58 (*H. nivalis*); 2009: 1; ANGUS et al. 2017: 250.

TYPE LOCALITY: “Eastern Albania, Golešnica Jezero” (in fact, probably North Macedonia; see ANGUS 2009).

TYPE MATERIAL: Not examined.

MATERIAL EXAMINED:

NORTH MACEDONIA: 5 ♂♂ (see ANGUS 2009).

MORPHOLOGICAL CHARACTERISTICS: The general appearance of the beetles is like a large *H. flavipes* FABRICIUS, 1792 or a smallish *H. aquaticus* (LINNAEUS, 1758). Largest species of the group: 3.9–4.4 mm long. The head and pronotum are metallic blackish bronze, the elytra vary from being coloured as the pronotum to very dark brown with traces of even darker mottling, the legs and maxillary palpi are dark brown, and the apical segment of the palpi is small, not quite symmetrical. The stem of the Y-groove on the head expands anteriorly, and the antennae are nine-segmented. The pronotum is flat, like that of *H. glacialis* VILLA & VILLA, 1833, weakly arched, the grooves are narrow, fairly shallow. The internal and middle intervals are punctate, the externals weakly granulate. The sides of the elytra are rounded, and the flanks are broadly visible from below and form a distinct ledge along the sides of the elytra when viewed from above. The elytral striae are strong, and the punctures are connected by narrow grooves in the apical half of the elytra. Interstices 2 and 4 are somewhat raised in the basal third of the elytra, and are about twice the width of the striae. The other interstices are about 1.5 × the width of the striae. The aedeagus (Fig. 42) is broadly similar to that of *H. nivalis*, but a little larger.

DISTRIBUTION: Balkan Peninsula (so far confirmed only from North Macedonia). Two large specimens from Mt. Durmitor (1 ♂, 1 ♀, NMW) in Montenegro might well belong to this species as well.

DISCUSSION: Comprehensive molecular studies will be necessary to reveal, whether *H. apfelbecki* is really a distinct species or just an aberration of *H. nivalis*.

***Helophorus fauveli* GANGLBAUER, 1901**

(Figs. 39, 44)

Helophorus fauveli GANGLBAUER 1901: 314. – ANGUS 1985: 144; 1987: 55; 1992: 59; ANGUS et al. 2017: 250.

Helophorus ganglbaueri KNIŽ 1909: 297.

TYPE LOCALITY: Simplon, Valais, Switzerland.

TYPE MATERIAL: *Helophorus fauveli*: See ANGUS (1985).

Helophorus ganglbaueri: Lectotype ♀ (NMW), designated by ANGUS (1985).

ADDITIONAL MATERIAL EXAMINED:

SWITZERLAND: Valais, VIII.1971, leg. I.M. White, 1 ♂, 1 ♀ (BMNH).

ITALY: Lombardia, Alpi Orobie, Passo di San Marco, ca. 1900 m a.s.l., 17.VIII.1994, leg. V. Assing, 1 ♀ (NMW).

MORPHOLOGICAL CHARACTERISTICS: Black, often with purplish or greenish bronze reflections. Maxillary palpi dark brown, often bronzed. Differing from *H. nivalis* in the flatter, granulate and somewhat narrower pronotum. The pattern of the elytral striae is similar to that of *H. nivalis*, as is the aedeagus.

DISTRIBUTION: Switzerland (Valais), northern Italy (Piemonte, Lombardia, Trentino).

DISCUSSION: Molecular studies will hopefully reveal, whether specimens described as *H. fauveli* (and *H. ganglbaueri*) are really to be regarded as a distinct species or just as aberrant specimens of *H. nivalis*.

***Helophorus nivalis* GIRAUD, 1852**

(Figs. 38, 43)

Helophorus nivalis GIRAUD 1852: 92. – ANGUS 1985: 143; 1987: 56; 1992: 58; ANGUS et al. 2017: 250.

Helophorus semicostatus REY 1885: 375.

TYPE LOCALITY: Not specified in the original description. Ludwig Miller (1820–1897), who collected the lectotype (see below), was born in Ljubljana (Slovenia) and obviously spent most of his life in Vienna (Austria), where he worked as a civil servant in various ministries (finance, agriculture). Most probably, the lectotype was collected in Austria.

TYPE MATERIAL: *Helophorus nivalis*: Lectotype, unsexed (NMW), by present designation: “Collect.[ion] Miller” [printed label probably added by a former curator of the NMW, probably by Ludwig Ganglbauer (1856–1912)], “*Helophorus nivalis* Mill.[er] n.sp.” [handwritten historical label, probably in Miller’s handwriting], “*Helophorus nivalis* GIRAUD det. KODADA 1992”; the specimen is complete and in good condition; it is glued on the tip of a historical triangular mounting card.

Paralectotypes: 26 specimens (NMW) are here regarded as presumptive paralectotypes, although we cannot prove that all these specimens belong to the syntype series.

Joseph Etienne Giraud (1808–1877) collected 38 syntypes of *H. nivalis* (together with five specimens of *H. glacialis*) at an elevation of 6000–7000 feet near Bad Gastein (Salzburg, Austria) (GIRAUD 1852). According to HORN et al. (1990) Giraud’s coleoptera collection should (at least in part) be deposited in the NMW, but no specimens of *H. nivalis* from this collection could be traced in the NMW.

In the original description, GIRAUD (1852) stated also that he had seen specimens of his new species in the collection of Carl (Karl) Ullrich († 1921) under the name “*tristis*” (nomen nudum) and in the collection of Ludwig Miller (1820–1897) under the name “*nivalis*”, which was finally adopted by GIRAUD (1852).

Seven specimens of *H. nivalis* of the Ullrich collection and 20 specimens of the Miller collection are housed in the NMW. Since the specimens are not dated, we are unable to find out which of these specimens can be regarded as syntypes, mainly because some of them may have been collected after *H. nivalis* had been described (1852). Four females of the Ullrich collection have already been studied by ANGUS (1985), who did not designate a lectotype.

According to the kind of labelling and mounting, the lectotype designated here is certainly one of the oldest specimens of the Miller collection. Furthermore, due to its historical determination label (“*Helophorus nivalis* Mill. n.sp.”) it is highly probable, that this specimen belongs to the material GIRAUD (1852) had referred to in the original description.

The remaining 19 (presumptive) syntypes of the Miller collection are partly (9 exs.) mounted on triangular cards of different sizes and materials, or on rectangular (more modern) cards (these specimens probably have been remounted by a former curator of the NMW); the labelling comprises “Mill” [handwritten] or “Collect. Miller” [printed] and, in most cases, handwritten identification labels (“*nivalis*”), possibly written by L. Ganglbauer.

Three of the syntypes of the Ullrich collection are glued on tiny pinned cards (distinctly smaller than the beetles), and labelled: “Ullr.” [printed], and “*nivalis*” [same handwriting as in most of the Miller specimens]; the remaining four syntypes of the Ullrich collection, which have been examined by ANGUS (1985), have been remounted to large rectangular cards and carry a circular “LECTOTYPE” label with a broad blue margin; one of the specimens is labelled: “*tristis* Austr.[ia] Ullr.[ich]” [handwritten historical label, probably in Ullrich’s handwriting].

***Helophorus semicostatus*:** Lectotype ♀ (UCBL), designated by ANGUS (1985): “Autriche, Fairmaire”, “*semicostatus* R.”.

MORPHOLOGICAL CHARACTERISTICS: Head and pronotum black, maxillary palpi dark brown, sometimes bronzed. Elytra dark brown. Recognized by the shape and sculpture of the pronotum, the convex elytral interstices with a tendency for interstices 2, 4 and 6 to be raised above the others, and by the punctures of the elytral striae, which are normally connected by narrow grooves along the striae.

DISTRIBUTION: This species is wide-spread in the Alps. It has also been recorded from Czechia, Poland and Slovakia, and from the Balkan Peninsula; its occurrence is here confirmed for northeastern Bosnia and Herzegovina (Majevica Mountains, 1 ♂, NMW) and southwestern Bulgaria (Rhodope Mountains, Demir Kapu, south of Samokov, 1 ♂, NMW; more detailed locality data are described in APFELBECK 1894).

Key to the species of the *Helophorus guttulus* group

- 1 Pronotum rather flat, granulate over almost all the surface, strongly narrowed basally. Length: 3.0–3.5 mm. Aedeagus (Fig. 44) *fauveli*
- Pronotum less granulate, often less contracted basally 2
- 2 Elytral striae to a large extent set in grooves, joining the punctures. Pronotum strongly widened at base of anterior third, strongly narrowed behind this, the sides distinctly sinuate before the hind angles. Aedeagus (Figs. 42–43) 3
- If elytral striae set in grooves, the pronotum is less strongly widened at base of anterior third, and the basal sinuation is weaker 4
- 3 Rather bulky, head and pronotum dark, elytra mid to dark brown. Length: 2.6–4.0 mm. Aedeagus (Fig. 43) *nivalis*
- Larger and darker. Length: 3.9–4.4 mm. Aedeagus larger (Fig. 42) *apfelbecki*
- 4 Internal intervals of pronotum usually flat. Length: 2.5–3.8 mm. Aedeagus (Figs. 45–46) *faustianus*
- Internal intervals of pronotum usually arched. Length: 2.3–3.5 mm. Aedeagus (Figs. 13–26) .. *guttulus*

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