

Taxonomic status of *Enochrus simulans* and *E. umbratus* (Coleoptera: Hydrophilidae)

Таксономический статус *Enochrus simulans* и *E. umbratus* (Coleoptera: Hydrophilidae)

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KEY WORDS: water scavenger beetles, Coleoptera, Hydrophilidae, *Enochrus*, taxonomy, East Asia.

КЛЮЧЕВЫЕ СЛОВА: водолюбы, Coleoptera, Hydrophilidae, *Enochrus*, таксономия, Восточная Азия.

ABSTRACT. *Enochrus umbratus* (Sharp, 1884) **stat. rev.** has been restored in the species status and the lectotype and paralectotypes of *Philydrus umbratus* Sharp, 1884 has been designated. *Enochrus umbratus* is still known only from type specimens, all other published records of this species are belongs to *Enochrus simulans* (Sharp, 1873). Due to the absence of a new findings more than 140 years, it is proposed that *Enochrus umbratus* is very rare species or can be a migrant from other region, occasionally collected in Japan. Redescriptions of *Enochrus simulans* and *E. umbratus* with diagnostic features, illustrated by original photographs and line drawings, are provided.

РЕЗЮМЕ. Для *Enochrus umbratus* (Sharp, 1884) **stat. rev.** восстановлен видовой статус и обозначен лектотип и паралектотипы *Philydrus umbratus* Sharp, 1884. *Enochrus umbratus* известен только по обозначенным здесь типовым экземплярам, все остальные опубликованные находки этого вида относятся к *Enochrus simulans* (Sharp, 1873). В связи с отсутствием новых находок более 140 лет предполагается, что *Enochrus umbratus* очень редок или может быть мигрантом из другого региона. Даны переописания *Enochrus simulans* и *E. umbratus* с диагностическими признаками, проиллюстрированное оригинальными фотографиями и рисунками.

Introduction

In the recent fauna the genus *Enochrus* Thomson, 1859 is represented by 222 described species [Short, Fikáček, 2011] which belong to six subgenera, including *Holcophilydrus* Kniž, 1912 with striate elytra. *Enochrus simulans* was described by D. Sharp from Nagasaki, Ja-

pan [Sharp, 1873] and *E. umbratus* (Sharp, 1884) was described by him from Honshu and Hokkaido (Japan). D. Sharp pointed out its differences from *E. simulans*, by deeper elytral striae. M. Satô [1961] treated *E. umbratus* as a subspecies of *E. simulans*, but some authors treated it as a valid species [Zaitsev, 1908; Kamiya, 1940, Nakane, Matsui, 1986; Shatrovskiy, 1989; Lee *et al.*, 1992, Lee, 1994, Kim *et al.*, 1994, Hansen, 1999, 2004, Kirejtshuk, Shatrovskiy, 2001, Cho, Park, 2010, Ryndevich, 2014]. Species *Enochrus ussuriensis* Kniž, 1911 was described from “Ussurigebiet” (Primorsky Krai, Russia) and *Enochrus kishidai* Kamiya 1935 from Chengde (Hebei, China). Type material of *E. kishidai* is supposed to be lost. All three species that were listed above have been synonymised with *E. simulans* by Jia & Wang [2010]. However, taxonomic status of *E. umbratus* as synonym of *E. simulans* remained unclear because the respective type material was not examined [Fikáček *et al.*, 2015]. S. Shödl reexamined the types of *Philydrus umbratus* and *P. simulans* in the Sharp collection in 1996 and designated the lectotype and paralectotypes of former and the holotype of latter. Unfortunately, his designation was never published, and some of the paralectotypes from the typical series of *P. umbratus* belong to *E. simulans*. The study of the type material of *E. simulans* and *E. umbratus* and additional material of *E. simulans* has made it possible to determine the status of these species.

Material and Methods

Examined specimens are deposited in the following state and private collections: CSR — S.K. Ryndevich collection, Baranovichi, Belarus; IBIW — Papanin Institute for Biology of Inland

Waters, Borok, Yaroslavl Oblast, Russia (A.A. Prokin); MPU — Moscow State Pedagogical University, Moscow, Russia (K.V. Makarov); NHML — the Natural History Museum, London, U.K. (R.B. Angus, M. Barclay); ZISP — Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia (A.G. Kirejtshuk, B.A. Korotyaev); ZMMU — Zoological Museum of Moscow State University, Moscow, Russia (A.A. Gusakov).

Enochrus males were dissected; their genitalia were placed in water-soluble glue on a plastic plate pinned below the respective specimens.

Beetles were examined using a Nikon SMZ-745T and Nikon SMZ-800 stereomicroscopes. Measurements were taken using an ocular micrometer. Total body length is measured between anterior margins of eyes and apices of elytra, width is taken as maximum linear distance between outer margins of elytra. Body length is measured in specimens with deflexed head and not inflexed prothorax (i.e. in the natural position). As additional material, photographs of the habitus of *Enochrus simulans* from Japan, kindly provided by Dr. Yu. Minoshima (Kitakyushu Museum of Natural History and Human History, Kitakyushu, Japan), were studied. Terminology of male genitalia structures was used according to Litovkin *et al.* [2021].

Habitus, dorsal and ventral side photographs were taken with a Canon EOS 40D digital camera with a Canon MP-E 65 mm objective and were combined using Zerene Stacker 1.04 software and Nikon D5100 digital camera with attached Nikon 60 mm 1:2.8G macro lens and Meike Macro Extension Tube Set. Photographs of genitalia were taken with a Nikon Eclipse 50i stereomicroscope with camera from glass slides in glycerol.

The photographs were edited subsequently in Adobe Photoshop CS5®.

Map was created in QGIS 2.18 using the freely available altitude data (GLOBE project: <https://www.ngdc.noaa.gov/mgg/topo/globe.html>) and borderline files (DIVA-GIS: <http://diva-gis.org/>).

Taxonomy

Family Hydrophilidae Latreille, 1802
Subfamily Enochrinae Short et Fikáček, 2013
Enochrus Thomson, 1859

Enochrus Thomson, 1859: 18.

Type species: *Hydrophilus bicolor* sensu Gyllenhal, 1808 (= *Hydrophilus melanocephalus* Olivier, 1793).

Subgenus *Holcophilydrus* Kniž, 1912

Subgenus *Holcophilydrus* Kniž, 1912: (168)

Type species: *Holcophilydrus ussuriensis* Kniž, 1912: (168)

Enochrus (*Holcophilydrus*) *simulans* (Sharp, 1873)
Figs 1–10, 13–14, 19–24, 27–33, 34–41, 45–47, 49–51, 54–56.

Philydrus simulans Sharp, 1873: 59

Philydrus umbratus Sharp, 1884: 454 (partim)

Enochrus ussuriensis Kniž, 1911: 168

Enochrus kishidai Kamiya, 1935: 4

MATERIAL. Type material. Holotype. Male, **Japan**, “Type.” [red bordered round printed label], “Japan, G. Lewis, 1910-320” [printed labels], *Philydrus simulans*, Type D.S.” [Sharp's writing], Holotypus, *Philydrus simulans* Sharp, 1873 ♂, des. Shödl, 1996” [red label Shödl's writing] (NHML).

ADDITIONAL MATERIAL. **China**: San Chekhe [river Sanchahe, Jilin Province], [leg.] Grachevsky, 14.VII. [18]91, 1 specimen (ZISP). **North Korea**. Sariwon, prov. Khoankhado, S. Koreya [North Korea], 2.VII.[1]950, [leg.] Bokhsenius, 1 specimen (ZISP); same data but 19.VII.[1]950, 24 specimens (ZISP); same data but 20.VII.[1]950, 4 specimens (ZISP). **Japan**. “Japan, G. Lewis, 1905-313” [printed labels], “Hakodate” [Sharp's writing], “umbratus” [Sharp's writing], “Paralectotypus, *Philydrus umbratus* Sharp, 1884 ♂, des. Shödl, 1996” [red label Shödl's writing], “*Philydrus umbratus* Sharp, paralectotype, S. Ryndevich & A. Prokin des., 2021 [red printed label]”; female “*Philydrus umbratus*, Niigata, 14.9.81, Lewis” [Sharp's writing on the face of the card], “Japan, G. Lewis” [printed label], “Sharp Coll. 1905-313” [printed label], “Paralectotypus, *Philydrus umbratus* Sharp, 1884 ♀, des. Shödl, 1996” [2 red labels Shödl's writing], “Paralectotype” [blue bordered round printed label]; “*Philydrus umbratus* Sharp, paralectotype, S. Ryndevich & A. Prokin des., 2021 [red printed label] (all in NHML). Tsuruga [Fukui Prefecture], Nippon, Japan, 29.VIII.[1]917, [leg.] Rashkovskiy, 1 specimen (ZISP). **Russia. Primorsky Krai**. Primorsk. kr. [Primorsky Krai], Ussur. r-n [Ussuriysky district], s. [village] Kamenushka, 25.VII.1982; [leg.] N. Nikitsky, 2 specimens (ZMMU); same data but 12.VII.1982, 1 specimen (ZMMU); Primorskiy kray [Primorsky Krai], s. [village] Lazo, 7–8.VIII.2005, na svet [at light], leg. Yu. Sundukov, 1 specimen (CSR); same data but 7–13.VI.2006, 1 specimen (IBIW); Lazovskiy zapov. [Lazovskiy Reserve], uste r. [river mouth] Sokolovka, 28.VII.2005, na svet [at light], leg. Yu. Sundukov, 2 specimens (MPU); s. [village] Lazo, 7–13.VIII.2006, leg. Sundukov, Shokhrin, 2 specimens (CSR, MPU). Lazovskiy zap-k [Lazovskiy Reserve], Sokolovka, 16.VIII.2005, na svet [at light], leg. Sundukov, Shokhrin, 2 specimens (MPU, IBIW); same data but 28.VII.2005, 2 specimens (IBIW); Primorsky Krai, Spassk-Dalny, at light, 10.VII.2016, leg. M.E. Sergeev, 3 specimens (IBIW); [Khankaysky District], [village] Troitskoe, oz. [lake] Khanka, Primor'e [Primorye], 17.VII.[19]09, [leg.] Cherskiy 1 specimen (ZISP); same data but 3.VII.[19]09, 1 specimen (ZISP); same data but 4.VII.[19]09, 2 specimens (ZISP), same data but 5.VII.[19]09, 4 specimens (ZISP); same data but 6.VII.[19]09, 1 specimen (ZISP); same data but 11.VII.[19]09, 1 specimen (ZISP); same data but 13.VII.[19]09, 20 specimens (ZISP); same data but 14.VII.[19]09, 1 specimen (ZISP); same data but 17.VII.[19]09, 5 specimens (ZISP); same data but 26.VII.[19]09, 1 specimen (ZISP); [village] Kamen-Ribolov, oz. [lake] Khanka, Yuzhnouss. [South Ussuri Krai, old name], 7.V.[19]08, [leg.] A. Cherskiy 1 specimen (ZISP); same data but 3.IX.[19]08, 2 specimens (ZISP); Primorsk. obl. [Primorskaya Oblast, old name], oz. [lake] Khanka, [village] Kamen-Ribolov 31.VII.[19]10, [leg.] Tarobarov, 4 specimens (ZISP); same data but 17.VII.[19]10, 1 specimen (ZISP); s. [village] Monastyrishche, Prim. o. [Primorskaya Oblast, old name], 20.VI.[1]907, [leg.] Emel'yanov, 1 specimen (ZISP); Dol. [valley] Lunzy [Lunza River, old name, now Gribnaya River in Chernigovskiy District], Prim. o. [Primorskaya Oblast, old name], VII.[1]915, [leg.] Emel'yanov, 1 specimen (ZISP); St. [station] Devitsa, Yu. oz. [farther south of lake] Khanka, Ussur. kr. [Ussuri Krai, old name], 14.VII.[1]927, Sokolov, 1 specimen (ZISP); [village] Yakovlevka, Spas. u. Ussur. kr. [Spassky uезд, Ussuri Krai, old name, now Spassky District], 30.VI.[1]927, [leg.] Sokolov, 1 specimen (ZISP); same data but 7.VIII.[1]926, [leg.] Dyakonov, Filip'ev, 4 specimens (ZISP); [village] Vinogradovka, Ussur. kr. [Ussuri Krai, old name], 1–2.VIII.[1]929, [leg.] Dyakonov, Filip'ev, 1 specimen (ZISP); same data but 4.VIII.[1]929, 1 specimen (ZISP); same data but 7.VIII.[1]929, 1 specimen (ZISP); Ussuriysk, Primor.



Figs 1–4. *Enochrus simulans*, habitus in dorsal view. 1 — holotype of *Philydrus simulans*; 2 — male, Japan, Fukuoka, Higashikami, 3 — male, Japan, Tochigi-ken, Fujioka-machi, 4 — female, Japan, Shimane-ken, Okinoshima. Scale bar: 1 mm.

Рис. 1–4. *Enochrus simulans*, габитус сверху. 1 — голотип *Philydrus simulans*; 2 — самец, Япония, Фукуока, Хигашиками, 3 — самец, Япония, Тотиги-кен, Фудзиока-мати, 4 — самка, Япония, Симанэ-кен, Окиношима. Масштабная линейка: 1 мм.



Figs 5–8. *Enochrus simulans*, habitus in dorsal view. 5 — male, Russia, Kunashir; 6 — female, Russia, Kunashir, 7 — male, Russia, Primorsky Krai, Lazo, 8 — female, Russia, Primorsky Krai, Troitskoe. Scale bar: 1 mm.

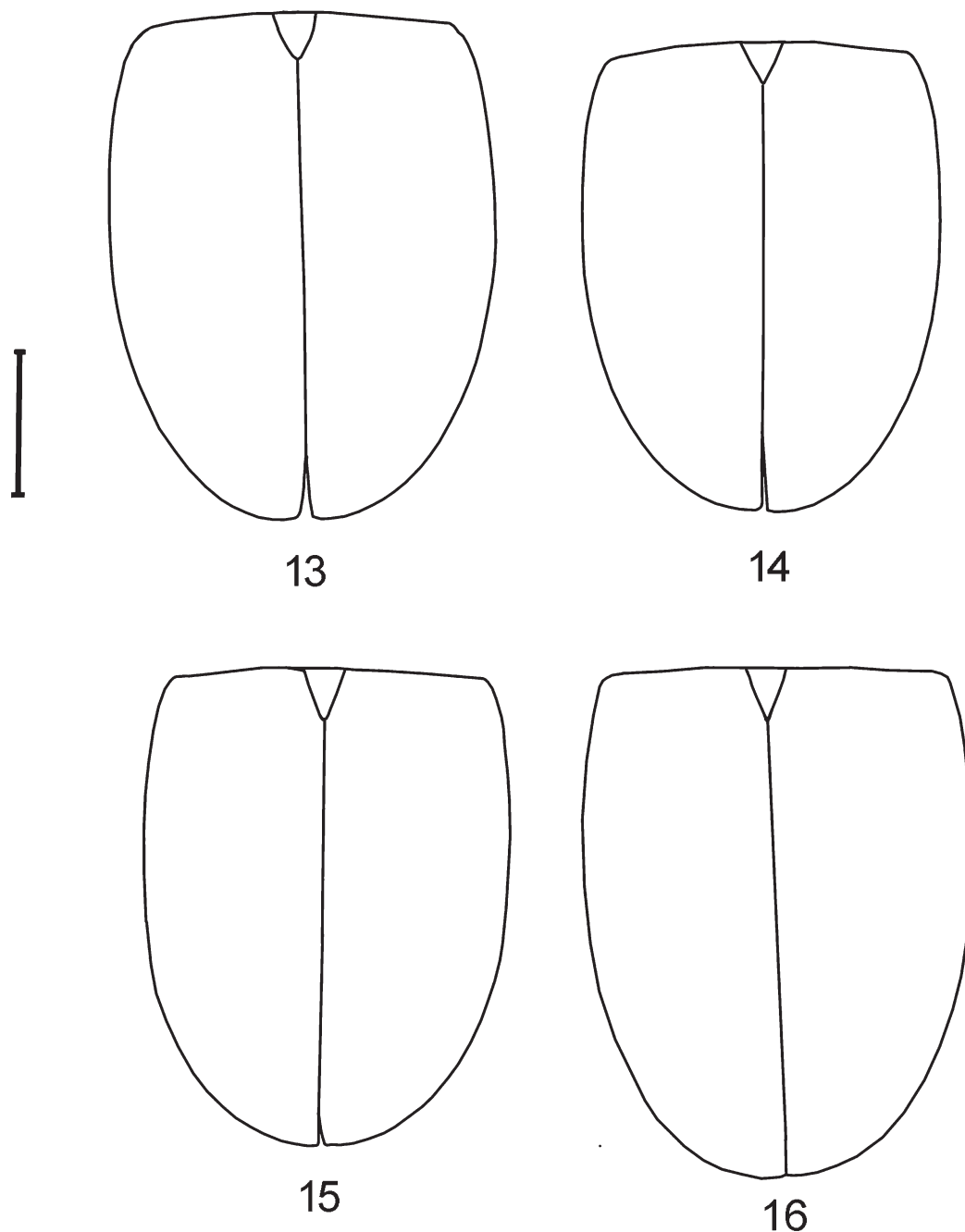
Рис. 5–8. *Enochrus simulans*, габитус сверху. 5 — самец, Россия, Кунашир; 6 — самка, Россия, Кунашир, 7 — самец, Россия, Приморский край, Лазо, 8 — самка, Россия, Приморский край, Троицкое. Масштабная линейка: 1 мм.



Figs 9–12. *Enochrus*, habitus in dorsal view. 9–10 — *Enochrus simulans*, 9 — male, North Korea, 10 — female, North Korea, 11–12 — *E. umbratus* *stat.rev.*, 11 — lectotype of *Philydrus umbratus*, 12 — female, paralectotype of *Philydrus umbratus*, Japan, Chiuzenji. Scale bar: 1 mm.
Рис. 9–12. *Enochrus*, габитус сверху. 9–10 — *Enochrus simulans*, 9 — самец, Северная Корея, 10 — самка, Северная Корея, 11–12 — *E. umbratus* *stat.rev.*, 11 — лектотип *Philydrus umbratus*, 12 — самка, паралектотип *Philydrus umbratus*, Япония, Тюзенджи. Масштабная линейка: 1 мм.

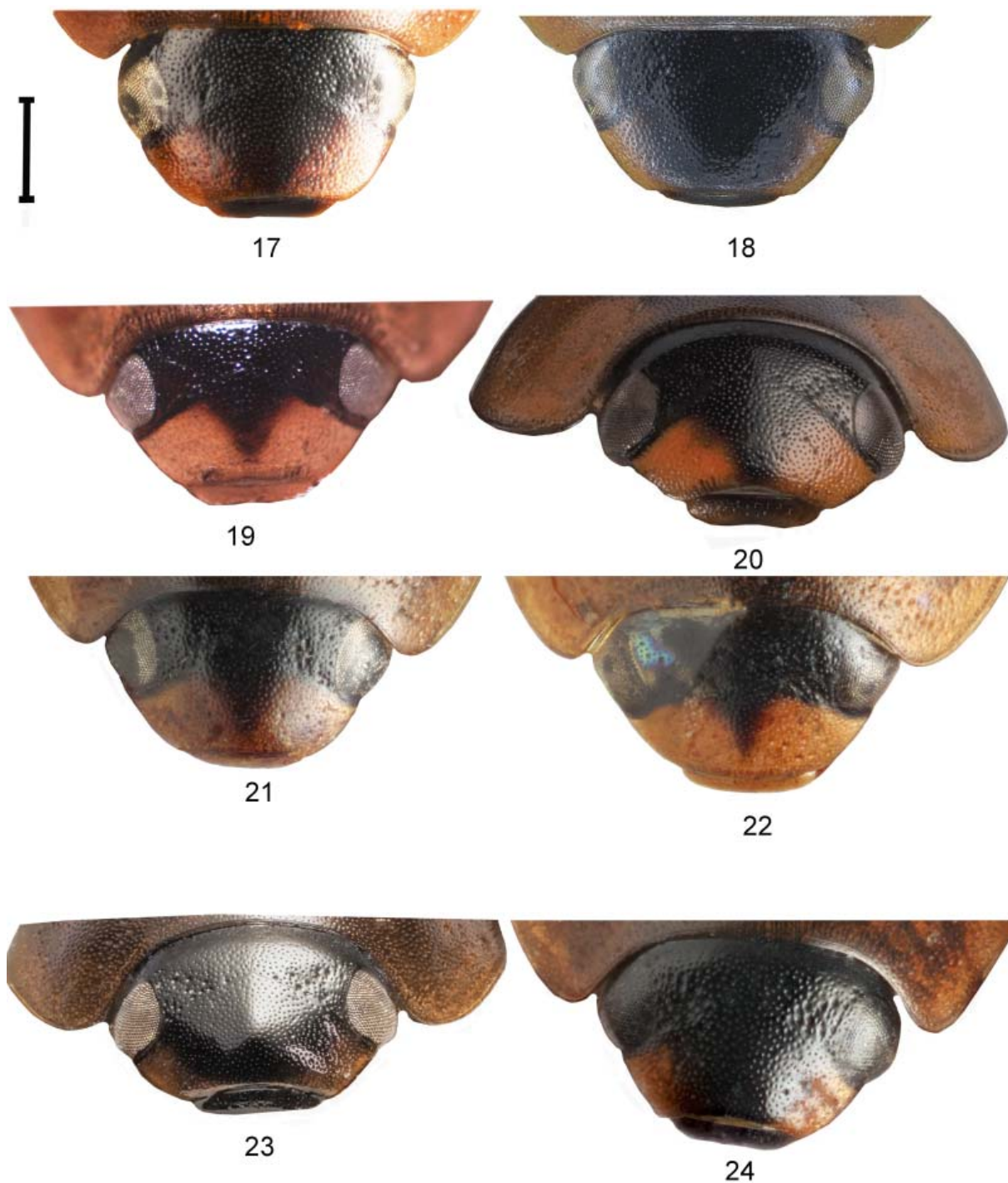
20.VIII.[1]969, [leg.] Kryzhanovskiy, 1 specimen (ZISP); r. Tumen-Ula [old name, now Tumen River], Ross-Kor. granits. [Russia-Korea border], 12.VII.[1]913, [leg.] Cherskiy, 8 specimens (ZISP); same data but 13.VII.[1]913, 13 specimens (ZISP); same data but 14.VII.913 5 specimens (ZISP); Primorsk. obl. [Primorskaya Oblast, old name], Tuman-Ula [old name, now Tumen River], 4.VIII.[19]14, Cherskiy, 1 specimen (ZISP); Yu Primor'ye [South Primorye], Khasanskiy r-n

[Khasansky district]], 8.5 km YuV g. [SE of Khasan urban-type settlement], 42°24'27"N 130°44'59"E, 24.V.2022, leg. K. Makarov, A. Makarov, 1 specimen (MPU); 10.7 km VSV [ENE of Khasan urban-type settlement], m. [cape] Ostrovok Fashivyy, 42°26'54"N 130°46'47"E, 23.V.2022, leg. K. Makarov, 1 specimen (MPU); 5 km Z s. [W of village] Pervomayskoe, bolotse [swamp], h~130, 45°07'57"N 131°46'47"E, 14.V.2024, leg. K. Makarov, 3 specimens (MPU); 3.5 km Yu p. [S of urban-



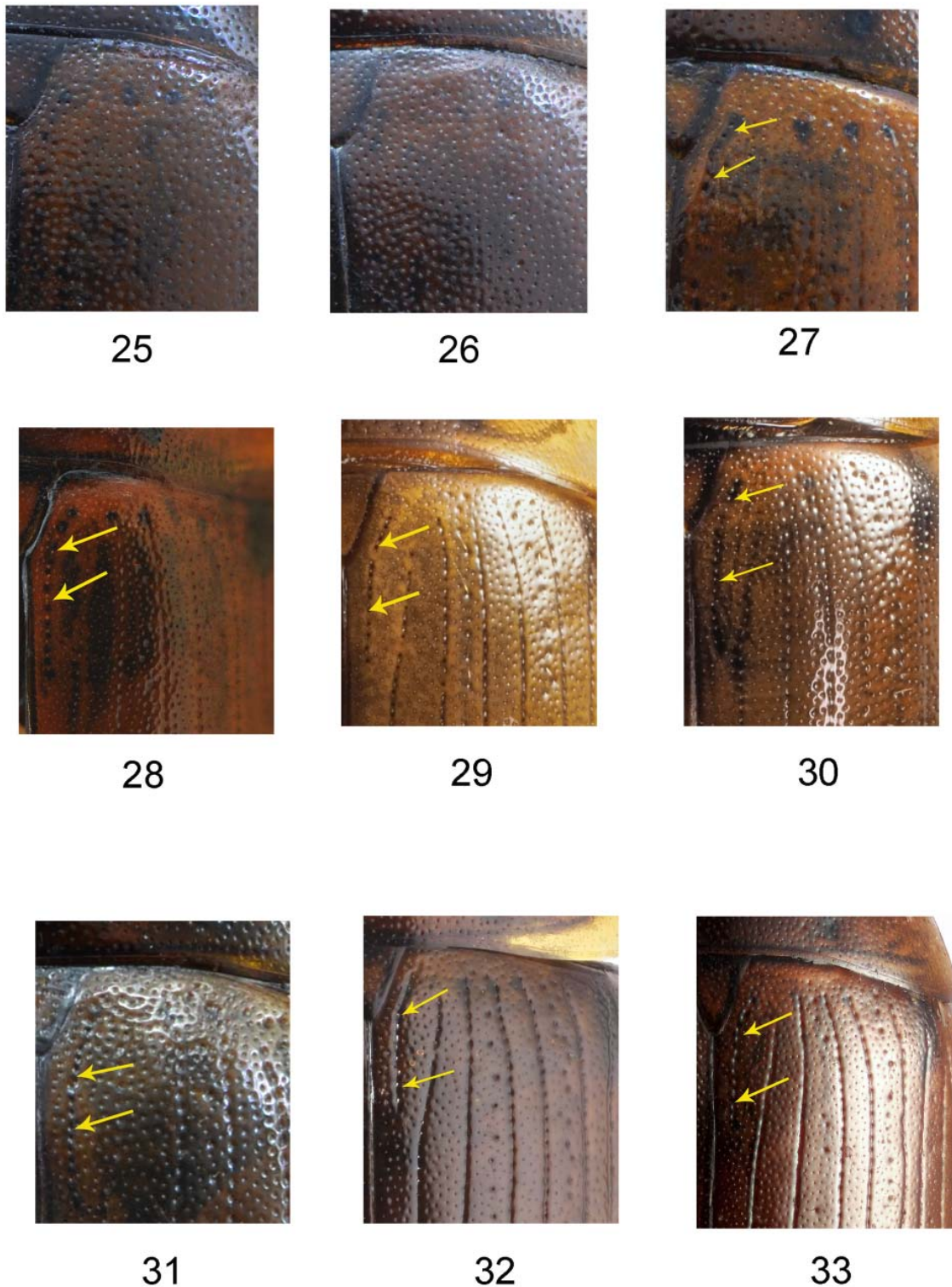
Figs 13–16. *Enochrus* elytral contour, dorsal view. 13–14 — *Enochrus umbratus* **stat. rev.**, 13 — male, 14 — female. 15–16 — *E. simulans*, 15 — male, 16 — female. Scale bar: 1 mm.

Рис. 13–16. Контур надкрылий *Enochrus*, вид сверху. 13–14 — *Enochrus umbratus* **stat. rev.**, 13 — самец, 14 — самка. 15–16 — *E. simulans*, 15 — самец, 16 — самка. Масштабная линейка: 1 мм.



Figs 17–24. *Enochrus*, head, dorsal view. 17–18 — *E. umbratus* **stat. rev.**, 17 — lectotype of *Philydrus umbratus*, 18 — female, paralectotype of *Philydrus umbratus*, Japan, Chiuzenji. 19–24 — *Enochrus simulans*, 19 — holotype of *Philydrus simulans*, 20 — male, Japan, Tochigi-ken, 21 — male, Russia, Primorsky Krai, Lazo, 22 — male, North Korea, Khoankhado, 23 — female, Japan, Shimane-ken, 24 — female, Russia, Primorsky Krai, Troitskoe. Scale bar: 0.5 mm.

Рис. 17–24. *Enochrus*, голова, вид сверху. 17–18 — *E. umbratus* **stat. rev.**, 17 — лектотип *Philydrus umbratus*, 18 — самка, паралектотип *Philydrus umbratus*, Япония, Чиузенджи. 19–24 — *E. simulans*, 19 — голотип *Philydrus simulans*, 20 — самец, Япония, Тотиги-кен, 21 — самец, Россия, Приморский край, Лазо, 22 — самец, Северная Корея, Хоанхаддо, 23 — самка, Япония, Симанэ-кен, 24 — самка, Россия, Приморский край, Троицкое. Масштабная линейка: 0,5 мм.

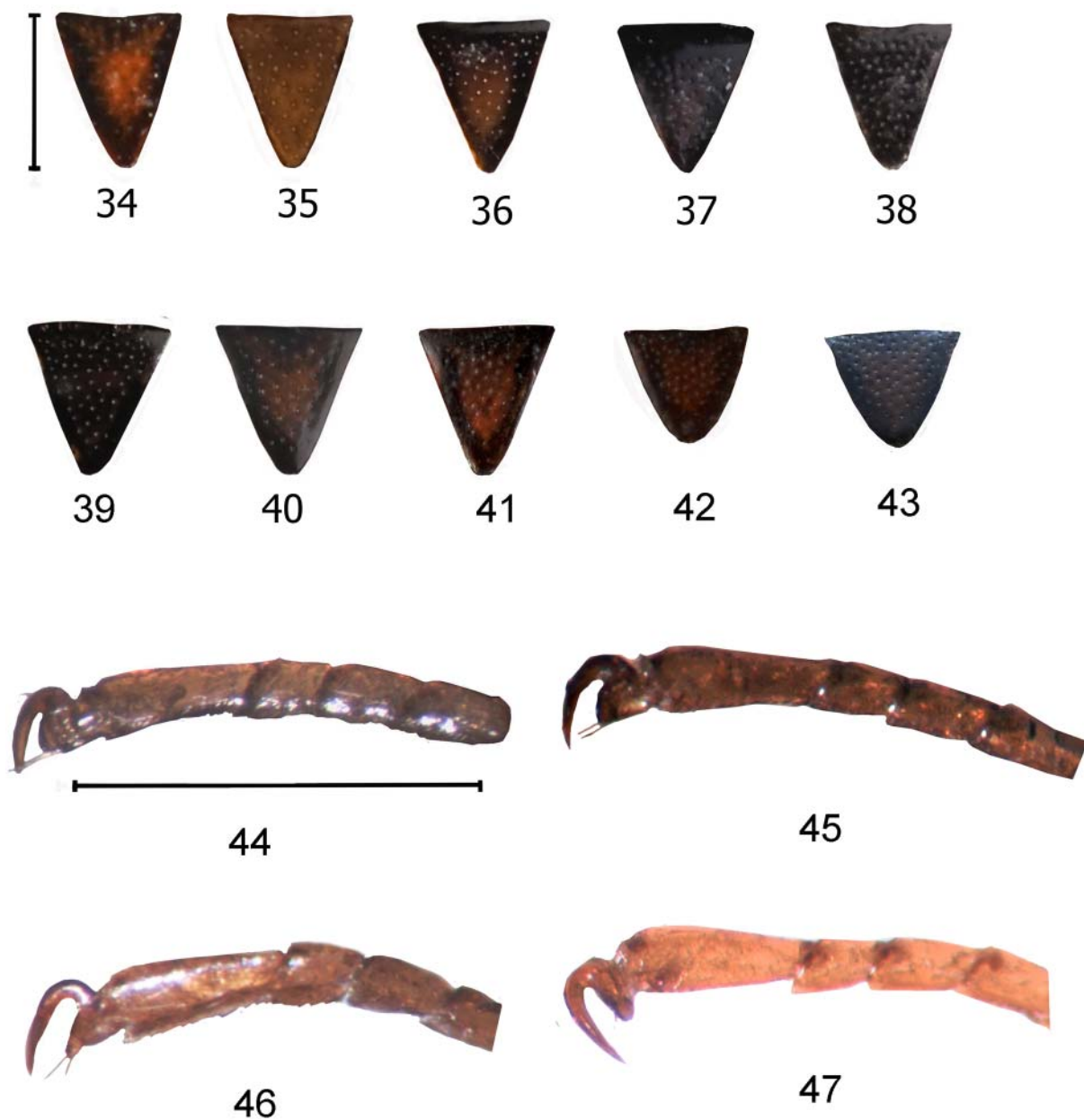


Figs 25–33. *Enochrus*, base of elytra. 25–26 — *E. umbratus* stat.rev., 25 — lectotype of *Philydrus umbratus*, 26 — female, paralectotype of *Philydrus umbratus*, Japan, Chiuzenji. 27–33 — *E. simulans*, 27 — holotype of *Philydrus simulans*, 28 — male, paralectotype of *Philydrus umbratus*, Japan, Hakodate, 29 — male, Japan, Higashikami, 30 — male, Japan, Fujioka-machi, 31 — male, Russia, Kunashir Isl., 32 — male, Russia, Primorsky Krai, Lazo, 33 — female, North Korea, Khoankhado.

Рис. 25–33. *Enochrus*, основание надкрылий. 25–26 — *E. umbratus* stat.rev., 25 — лектотип *Philydrus umbratus*, 26 — самка, паралектотип *Philydrus umbratus*, Япония, Чиузенджи. 27–33 — *E. simulans*, 27 — голотип *Philydrus simulans*, 28 — самец, паралектотип *Philydrus umbratus*, Япония, Хакодате, 29 — самец, Япония, Хигашиками, 30 — самец, Япония, Фудзиока-мачи, 31 — самец, Россия, о-в Кунашир, 32 — самец, Россия, Приморский край, Лазо, 33 — самка, Северная Корея, Хоанхудо.

type settlement] Turiy rog, Vtoraya rechka bereg oz. [shore of lake] Khasan, h~70, 45°11'55"N 131°59'44"E, 13.V.2024, leg. K. Makarov, Yu. Sundukov, 9 specimens (MPU); Yu Primop'e [South Primorye], Chernigovskiy r-n [district], 2.5

km V. s. [W of village] Merkushevka, h~200, 44°22'19"N 132°49'52"E, 17.V.2024, leg. K. Makarov, 1 specimen (MPU); okr. p. [near urban-type settlement] Tikhovodnoe, ber. P. [river bank] Ditrievka, 44°25'59"N 132°34'27"E, h~70, 18.VI.2023,



Figs 34–47. *Enochrus*, scutellum, claw and protarsomeres of male. 34–43 — scutellum. 44–47 — claw and protarsomeres of male. 34–41, 45–47 — *E. simulans*, 42–44 — *E. umbratus* **stat.rev.**, 34, 45 — holotype of *Philydrus simulans*, 35 — male, Japan, Higashikami. 36–38 — males, Japan, Fujioka-machi, 39 — female, Japan, Okinoshima, 40 — male, Russia, Primorsky Krai, Lazo, 41 — female, North Korea, Khoankhado. 42, 44 — lectotype of *Philydrus umbratus*, 43 — female, paralectotype of *Philydrus umbratus*, Japan, Chiuzenji. 46 — male, paralectotype of *Philydrus umbratus*, Japan, Hakodate, 47 — male, *E. simulans*, Russia, Kunashir Isl. Scale bar for figs 34–43: 0.3 mm. Scale bar for figs 44–47: 0.5 mm.

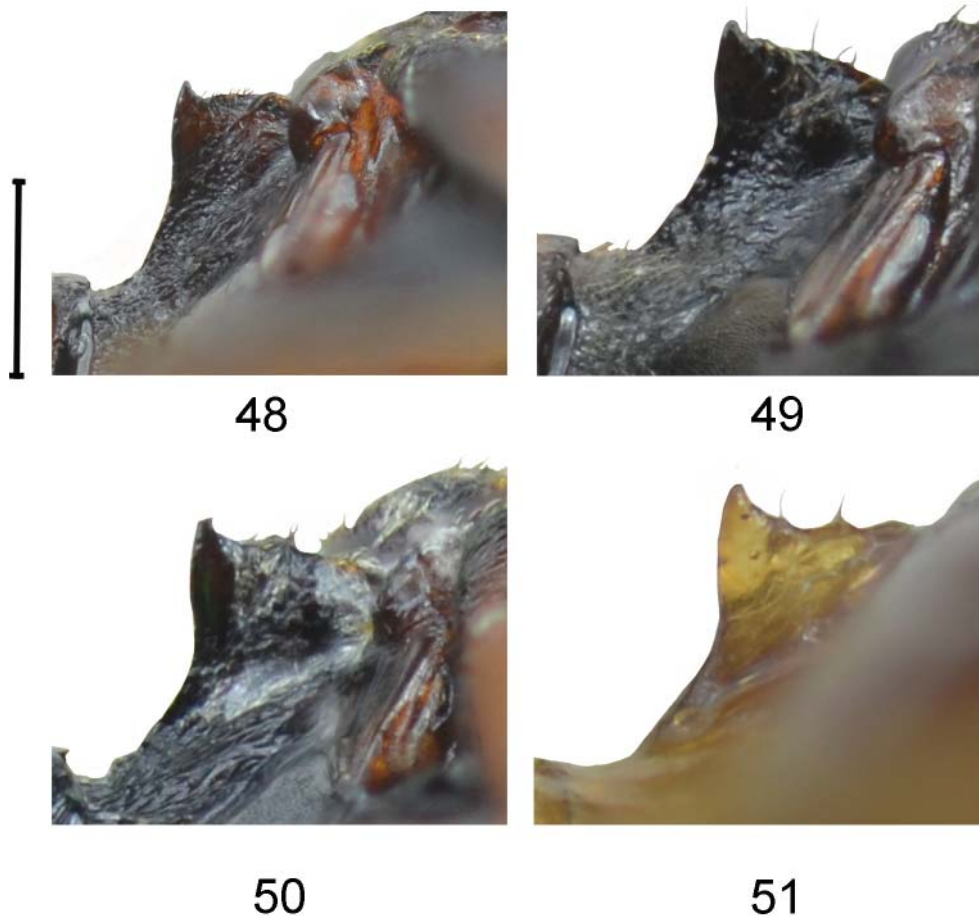
Рис. 34–47. *Enochrus*, щиток, коготок и протарсомеры самца. 34–43 — щиток. 44–47 — коготок и протарсомеры самца. 34–41, 45–47 — *E. simulans*, 42–44 — *E. umbratus* **stat.rev.**, 34, 45 — голотип *Philydrus simulans*, 35 — самец, Япония, Хигашиками. 36–38 — самцы, Япония, Фудзиока-мати, 39 — самка, Япония, Окиносима, 40 — самец, Россия, Приморский край, Лазо, 41 — самка, Северная Корея, Хоанхадэ. 42, 44 — лектотип *Philydrus umbratus*, 43 — самка, паралектотип *Philydrus umbratus*, Япония, Чиузенджи. 46 — самец, паралектотип *Philydrus umbratus*, Япония, Хакодате, 47 — самец, *E. simulans*, Россия, о-в Кунашир. Масштабная линейка для рис. 34–43: 0,3 мм. Масштабная линейка для рис. 44–47: 0,5 мм.

leg. I. Melnik, 1 specimen (MPU). **Sakhalin Oblast.** Kunashir Isl., right slope of Severyanka River valley, 10.VIII.2017, leg. K. Makarov, 1 specimen (MPU); hills south of Stolbchaty cape, 21.VII.2013, leg. Yu. Sundukov, L. Sundukova, 3 specimens (CSR, MPU); thermal spring 1 km south-east of Alekhino outpost, 18.VII.2009, leg. K. Makarov, A. Zaitsev, 1 specimen (CSR); caldera of Golovnin volcano, western shore of Lake Goryacheye, 30.V.2017, leg. Yu. Sundukov, L. Sundukova, 1 specimen (MPU); coastal marshes between Belozerskaya and Rikorda rivers, 19.VIII.2017, leg. K. Makarov, Yu. Sundukov, 4 specimens (MPU); near Dubovoe, shore of Khlebnikova River, 21.VIII.2017, leg. K. Makarov, Yu. Sundukov, 1 specimen (MPU); watershed of Golovnina and Khlebnikova rivers, 20.VIII.2017, leg. K. Makarov, Yu. Sundukov, 1 specimen (MPU); near Golovnino, at light, 20.VIII.2017, leg. K. Makarov, Yu. Sundukov, 1 specimen (IBIW); east of Golovnino, flood-plain, 20.VIII.2017, leg. K. Makarov, Yu. Sundukov, 1 specimen (MPU); mouth of Rikorda River, 22.VIII.2017, leg. K. Makarov, Yu. Sundukov, 1 specimen (MPU).

REDESCRIPTION. *Form and colour.* Body oval, slightly convex (Figs 1–10, 15–16), length 4.8–6.0 mm, width 2.5–3.0 mm. Maximum body width in basal part, in front of middle of elytra. Lateral margin of the elytra is sharply rounded at the

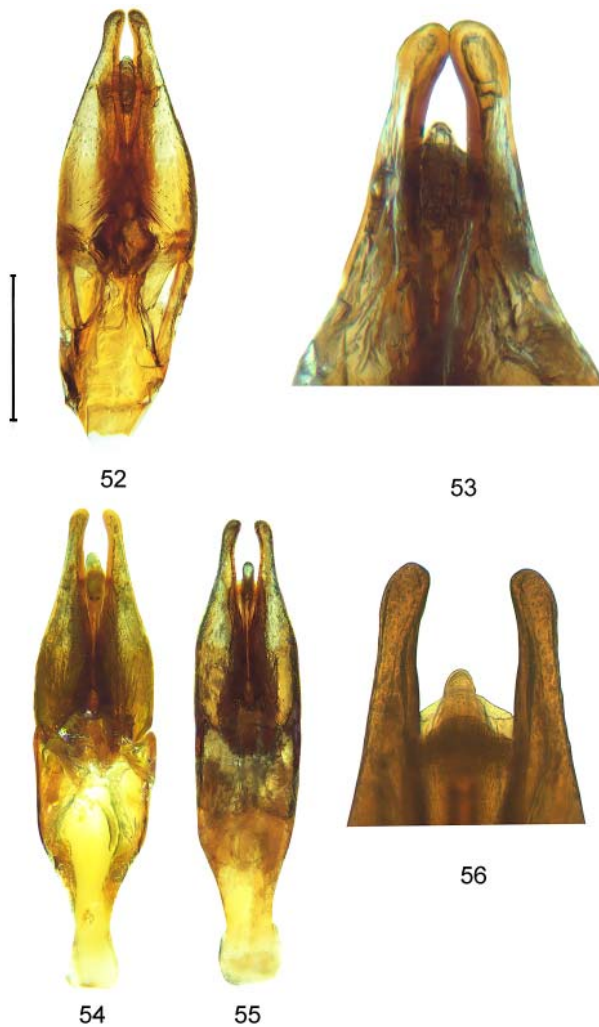
apices (Figs 15–16). Dorsal side yellowish to reddish-yellow and yellowish-brown. Basal part of head and central triangular spot black. Female with large central dark spot, that reaches the labrum and occupies most of the head (Figs 23–24). Labrum of male usually pale (Figs 19, 21–22), less often darkened (Fig. 20). Female labrum dark (Figs 23–24). Pronotum with four small and one large central dark spots (Figs 1–10). Lateral parts of pronotum and elytra paler. Punctate striae may be darkened (Figs 1, 3, 9–10, 28–30). Maxillary palpomeres and antennae yellowish to reddish-yellow or brownish-yellow except for darker club. The last segment is darkened on apex. Ventral surface black to dark brown, posterior margins of abdominal ventrites paler, brown or reddish-brown. Legs reddish-yellow and yellowish-brown, posterior margins of femora darker, tarsi brownish-yellow or reddish-yellow.

Head. Dorsal surface with dense evenly punctation with moderately coarse punctures being of equal size, without microsculpture. Groups of larger and coarser punctures are located around the inner edge of eyes and along anterior margin of head. Clypeus with dense, moderately coarse punctures, interstices without microsculpture. Anterior margin of clypeus with very narrow bead. Eyes big, hardly protruding, emarginated anteriorly, separated by ca. 3.4–3.7× width of one eye



Figs 48–51. *Enochrus*, mesoventral elevation. 48 — *E. umbratus* stat. rev., male, paralectotype of *Philydrus umbratus*. 49–51 — *E. simulans*, 49 — male, Russia, Kunashir Isl., 50 — male, Russia, Primorsky Krai, Lazo, 51 — male (juvenile), Russia, Primorsky Krai, Lazo. Scale bar: 0.5 mm.

Рис. 48–51. *Enochrus*, мезовентральный отросток. 48 — *E. umbratus* stat. rev., самец, паралектотип *Philydrus umbratus*. 49–51 — *E. simulans*, 49 — самец, Россия, о-в Кунашир, 50 — самец, Россия, Приморский край, Лазо, 51 — самец (недоокрашенный), Россия, Приморский край, Лазо. Масштабная линейка: 0,5 мм.



Figs 52–56. *Enochrus*, aedeagus. 52, 53 — *E. umbratus* **stat. rev.**, 53 — paralectotype of *Philydrus umbratus*, 53 — apex of aedeagus, lectotype of *Philydrus umbratus*, 54–56 — *E. simulans*, 54 — holotype of *Philydrus simulans*, 55 — *E. simulans*, aedeagus, Russia, Kunashir Isl. 56 — apex of aedeagus, holotype of *Philydrus simulans*. Scale bar: 0.5 mm.

Рис. 52–56. *Enochrus*, эдеагус. 52, 53 — *E. umbratus* **stat. rev.**, 53 — паралектотип *Philydrus umbratus*, 53 — вершина эдеагуса, лектотип *Philydrus umbratus*, 54–56 — *E. simulans*, 54 — голотип *Philydrus simulans*, 55 — *E. simulans*, эдеагус, Россия, остров Кунашир. 56 — вершина эдеагуса, голотип *Philydrus simulans*. Масштабная линейка: 0,5 мм.

(Figs 19–24). Mentum almost flat with setae in anterior part, about 1.3–1.4 times as wide as long. Antennae with 9 antennomeres, scapus ca. about 1 × as long as antennomeres 2–5 combined, club non compact. Maxillary palpomere 4 symmetrical, ca. 1.5–1.6 × as long as palpomere 3 in length.

Thorax. Elytra and pronotum without microsculpture, have very rare large punctures (with rare trichobothria). Pronotum 3.1–3.4 times as long as elytra. Pronotum ca. 2.2–2.3 × as wide as long, strongly narrowed anteriorly. Pronotal punctation similar to that on head. In lateral part of pronotum large punctures formed oval which interrupted from inside at the

center level of pronotum. Margins of pronotum narrowly rimmed. Prosternum well developed, protruding anteromedially, with a transverse groove, carina, which can only be detectable posteriorly. Mesoventral elevation high acute and dentiform (Figs 49–51). Metaventricle not abruptly raised, with dense punctate pubescence median pentagonal area ca. 0.9–1 × as long as wide, center of pentagonal area glabrous. Scutellum clearly elongated, ca. > 1 × as long as wide (Figs 34–41). Elytra with 9 punctate striae, punctate row at outer edge of elytra and short scutellary stria in base of first elytral interval. Intervals flat; ground punctures on intervals fine. Large punctures (with trichobothria) in elytra situated in the 3rd, 5th, 7th and 9th elytral intervals. Humeral bulge not distinct. Epipleura rather weakly oblique anteriorly, more so posteriorly. Femora with sparse and shallow punctures ventrally, pubescence part of metafemora occupied about 1/7 of femoral length. Tarsi with very short pale setae ventrally. Fifth tarsomere about as long as tarsomeres 3–4 combined. Claw long, quite widely spaced from fifth protarsomere of male (Figs 45–47).

Abdomen. Abdomen with five exposed ventrites, dense uniform pubescence; first ventrite not carinate; ca. as long as second ventrite, fifth ventrite arcuate, not emarginate apically.

Male genitalia (Figs 54–56). Phallobase symmetrical, about 1.3 times as long as paramere. Parameres strong narrow in apical half; rounded at apex, clear spread at apex (Fig. 56). Penis with narrowly spaced apodemes, apical part about 1.4 times as long as apodemes, corona large, situated subapically.

VARIATION. Some males from Japan have dark labrum (Fig. 20). Labrum can be darked completely or only in the center (Fig. 20). Dorsal color is quite variable (Figs 1–10). Specimens from mainland Eurasia have deeper and sharper punctate elytral striae (Figs 7–10, 32–33), specimens from Kuril islands and Japan have shallower elytral striae (Figs 1–6, 27–31).

PUBLISHED RECORDS. Japan [Zaitsev, 1908], Japan [Uéno *et al.*, 1985]; Russia: Primorsky Krai: Ussuriysky Nature Reserve; “Tshernye Gory, Venedivnovo” (=Venevitino=Venevitinovo vill., Nadezhdinsky District), “Baranovskij” (= Baranovskiy vill, Nadezhdinsky District, Sakhalin Oblast: Aniva District, 5 km W Aniva) [Hebauer, 1995]; Primorsky Krai, Japan, [Shatrovskiy 1989]; China (“Manchuria”, Nei Mongol), Taiwan [Gentili *et al.*, 1995]; South Korea, Japan, China (“Manchuria”), Taiwan [Hansen, 1999, 2004]; Korea, Japan, North-East China (including Taiwan), Primorsky Krai [Kirejtshuk, Shatrovskiy 2001]; Russia: Lazovsky Nature Reserve: Lazo, Sokolovka, Chekhunenka, Bolotnikovo [Prokin, 2009]; China (Heilongjiang, Jilin, Inner Mongolia, Hebei, Beijing, Tianjin, Liaoning, Shanxi, Shaanxi, Sichuan, Hubei, Shanghai) [Jia, Wang, 2010], Japan (Honshû: Izumo-shi, Kisu-ki-chô, Nadabunchô, Shakunouchi-kôen Shimane-ken, Sonochô; Kyushu: Nakanosu; Okinoshima) [Minoshima, Hayashi, 2011]; subtaiga zone of Russian Far East and Japan [Ryndevich, 2014]; South Korea (Nohwa and Bogil Islands); South Korea (Chungcheongbuk-do, Chungcheongnam-do, Gyeongsangbuk-do, Gyeonggi-do, Gyeongsangnam-do, Gangwon-do, Jeollabuk-do, Jeollanam-do, Jeju-do); North Korea, China, Japan, Far East Russia [Jung *et al.*, 2020]; Kunashir Isl.: right slope of Severyanka River valley, hills south of Stolbchaty cape, thermal spring 1 km south-east of Alekhino outpost, the caldera of Golovnin volcano, western shore of Lake Goryacheye, coastal marshes between Belozerskaya and Rikorda rivers, near Dubovoe, shore of Khlebnikova River, watershed of Golovnina and Khlebnikova rivers, near Golovnino, flood-plain east of Golovnino, the mouth of Rikorda River [Ryndevich *et al.*, 2021], Spassk-Dalny [Sazhnev *et al.*, 2021].

DISTRIBUTION. China (Heilongjiang, Jilin, Inner Mongolia, Hebei, Beijing, Tianjin, Liaoning, Shanxi, Shaanxi, Sich-

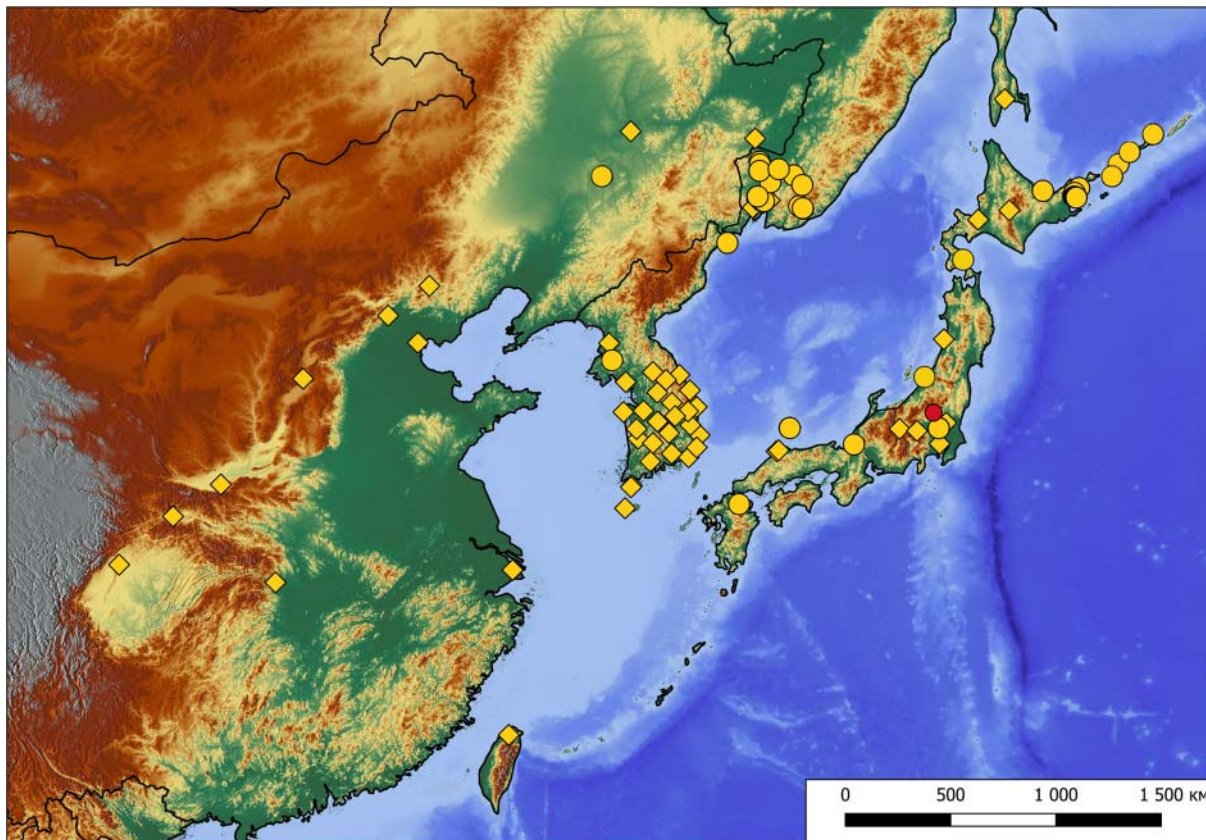


Fig. 57. Known distribution of *Enochrus simulans* and *E. umbratus* **stat.rev.** Red circle — *E. umbratus*, yellow circle — *E. simulans* (examined material), yellow rhombus — *E. simulans* (published records).

Рис. 57. Известное распространение *Enochrus simulans* и *E. umbratus* **stat.rev.** Красный круг — *E. umbratus*, желтый круг — *E. simulans* (исследованный материал), желтый ромб — *E. simulans* (опубликованные данные).

uan, Hubei; Shanghai), North Korea, Japan (Hokkaido, Honshu, Okinoshima), Russia (Far East), South Korea, Taiwan (Fig. 57).

BIONOMICS. Water beetles. Species is found in rivers, lakes, thermal streams, flies at light.

Enochrus (Holcophilydrus) umbratus (Sharp, 1884)
stat.rev.

Figs 11–14, 17–18, 25–26, 42–44, 48, 52, 53.

Philydrus umbratus Sharp, 1884: 454 (partim).

MATERIAL. Type material. Lectotype (present designation). Male, Japan, “*Philydrus umbratus*, Types D.S., [Lake] Chiuzenji [Nikko, Tochigi Prefecture], Japan, 24.8.1881, Lewis” [Sharp’s writing on the face of the card], “Type” [printed label], “Japan, G. Lewis” [printed label], “Sharp Coll. 1905-313” [printed label], “Lectotypus, *Philydrus umbratus* Sharp, 1884 ♂, des. Shödl, 1996” [red label Shödl’s writing], Lectotype” [blue bordered round printed label]; “*Philydrus umbratus* Sharp, lectotype, S. Ryndevich & A. Prokin des., 2021” [white printed label]. Paralectotypes. Japan: 2 females [originally mounted on one card with lectotype], same data as for lectotype, but “Paralectotypus, *Philydrus umbratus* Sharp, 1884 ♀, des. Shödl, 1996” [2 red label Shödl’s writing], “Paralectotype” [blue bordered round printed label]; “*Philydrus umbratus* Sharp, paralectotype, S. Ryndevich & A. Prokin des., 2021 [2 red printed labels]”; male and female [originally mounted

on one card] “*Philydrus umbratus*, Chiuzenji, 24.8.81, Japan, Lewis” [Sharp’s writing], “Japan, G. Lewis” [printed label], “Sharp Coll. 1905-313” [printed label], “Paralectotypus, *Philydrus umbratus* Sharp, 1884 ♂ (& ♀), des. Shödl, 1996” [2 red labels Shödl’s writing], “Paralectotype” [blue bordered round printed label]; “*Philydrus umbratus* Sharp, paralectotype, S. Ryndevich & A. Prokin des., 2021 [2 red printed labels] (all in NHML).

REMARKS. Type material has labels by Stefan Schödl (1957–2005), but the lectotype of the species had never been officially designated until now.

The species was described from Nikko, Niigata, Yokohama and Hakodate, but we haven’t studied the type material from Yokohama. Lectotype is placed on one card (left) with two paralectotypes (females). Male genitalia of males mounted on a plastic plates and placed below the card on a pin.

Paralectotypes of *Philydrus umbratus* from Hakodate and Niigata (Figs 28, 45–46) are belongs to *Enochrus simulans*.

REDESCRIPTION. *Form and colour.* Body oval, slightly convex (Figs 11–14), length 5.4–6.1 mm, width 2.9–3.3 mm. Maximum body width in basal part, in front of middle of elytra. Lateral margins of the elytra is smoothly rounded at the apices (Figs 13–14). Dorsal side reddish-yellow to yellowish-brown. Basal part of the head and central triangular spot are black. Central dark spot reaches the labrum and occupies most part of head. Triangular spot of the female is larger than that of male. Labrum of male and female dark (Figs 17–18). Lateral parts

of labrum of male slightly paler. Pronotum with four small and one large central dark spots (Figs 11–12). Lateral parts of pronotum and elytra paler. Punctate rows not darkened (Figs 11–12). Maxillary palpomeres and antennae yellowish to reddish-yellow or brownish-yellow except for darker club. The last segment is darkened on apex. Ventral surface black to dark brown, posterior margins of abdominal ventrites paler, brown or reddish-brown. Legs reddish-yellow. Posterior margins of femora darker, tarsi brownish-yellow or reddish-yellow.

Head. Dorsal surface with dense evenly punctation with moderately coarse punctures being of equal size, without microsculpture. Groups of larger and coarser punctures are located around the inner edge of eyes and along anterior margin of head. Clypeus with dense, moderately coarse punctures, interstices without microsculpture. Anterior margin of clypeus with very narrow bead. Eyes big, hardly protruding, emarginated anteriorly, separated by ca. 4.2–4.3× width of one eye (Figs 17–18). Mentum almost flat with setae in anterior part, 1.6 times as wide as long. Antennae with 9 antennomeres, scapus about 1× as long as antennomeres 2–5 combined, club non compact. Maxillary palpomere 4 symmetrical with, ca. 1.4× as long as, palpomere 3 in length.

Thorax. Elytra and pronotum without microsculpture, have very rare large punctures (with rare trichobothria). Pronotum 3.2–3.4 times as long as elytra. Pronotum ca. 2.0–2.1× as wide as long, strongly narrowed anteriorly. Pronotal punctation similar to that on head. In lateral part of pronotum large punctures forming oval which interrupted from inside at the center level of pronotum. Margins of pronotum narrowly rimmed. Prosternum well developed, protruding anteromedially, with a transverse groove, carina, which can only be detectable posteriorly. Mesoventral elevation high acute and dentiform (Fig. 48). Metaventricle not abruptly raised, with dense punctate pubescence median pentagonal area ca. 0.9–1× as long as wide, center of pentagonal area glabrous. Scutellum expanded, ca. < 1× as long as wide. Elytra with 9 punctate striae, barely noticeable punctate row at outer edge of elytra. Punctate striae near elytral base smoothed out and poorly distinguishable. Short scutellary stria in base of first elytral interval absent. Large punctures (with trichobothria) in elytra situated in the 3rd, 5th, 7th and 9th

elytral intervals. Humeral bulge not distinct. Epipleura rather weakly oblique anteriorly, more so posteriorly. Femora with sparse and shallow punctures ventrally, pubescence part of metafemora occupied about 1/7 of femoral length. Tarsi with very short pale setae ventrally. Fifth tarsomere about as long as tarsomeres 3–4 combined. Claw not long, not wide spaced from fifth protarsomere of male (Fig. 44).

Abdomen. Abdomen with five exposed ventrites, dense uniform pubescence; first ventrite not carinate; ca. as long as second ventrite, fifth ventrite arcuate, not emarginate apically.

Male genitalia (Figs 52–53). Phallobase symmetrical, about 1.2 times as long as paramere. Parameres strong narrow in apical half; rounded at apex, noticeably joined at apex (Fig. 53). Penis with narrowly spaced apodemes, apical part about 1.4 times as long as apodemes, corona large, situated subapically.

PUBLISHED RECORDS. Japan [Zaitsev, 1908; Hansen, 1999, 2004].

DISTRIBUTION. Japan: Honshu (Fig. 60).

NOTE. All records of *E. umbratus* from mainland Eurasia (Russian Far East, South Korea), the Kuril Islands and most localities from Japanese islands (with the exception of Honshu) refer to *E. simulans* [Kamiya, 1940, Lee *et al.*, 1992, Lee, 1994, Kim *et al.*, 1994, Hansen, 1999, 2004, Kirejtshuk, Shatrovskiy 2001, Cho, Park, 2010, Ryndevich, 2014].

BIONOMICS. Water beetles. Type specimens were collected in lake.

Discussion

Enochrus simulans is very variable species. Some males of *E. simulans* have big head spot which reaches labrum (as females) and dark labrum (Fig. 20).

Specimens of *E. simulans* from mainland Russia, China and Korea have deeper and sharper punctate elytral striae (Figs 7–10, 32–33), unlike the specimens from islands (Japanese and Kurils), which have shallower elytral striae. Therefore, until DNA analysis is carried out, the question on the taxonomic status of specimens

Table 1. Diagnostic features of *Enochrus simulans* and *E. umbratus*.

Таблица 1. Отличительные признаки *Enochrus simulans* и *E. umbratus*.

Diagnostic features	Species	
	<i>E. simulans</i>	<i>E. umbratus</i>
Lateral margins of the elytra	sharply rounded at the apices	smoothly rounded at the apices
Head spot	females always have big spot which reaches labrum; usually males have small spot which not reaches labrum; sometimes males have big spot which reaches labrum	males and females always have big spot which reaches labrum
Labrum color	females always have dark labrum; usually males have pale labrum; sometimes males have full dark labrum or dark median part of labrum	males and females have dark labrum
Scutellum	clearly elongated, ca. > 1× as long as wide	expanded, ca. < 1× as long as wide
Short scutellary stria at the base of first elytral interval	present	absent
Elytral punctate striae	clear and well distinguishable	smoothed out and poorly distinguishable near elytral base
Claw of male	quite widely spaced from fifth protarsomere	not wide spaced from fifth protarsomere
Male genitalia	parameres clear spread at apex	parameres more robust, noticeably joined at apex

from the continental Eurasia (as *E. ussuriensis*) remains open, whether they are just a morph or a subspecies of *E. simulans*.

Enochrus umbratus was considered both as a subspecies and as a synonym of *E. simulans*. They are really very similar. In addition, the type series of *Philydrus umbratus* consisted of both *E. umbratus* and typical *E. simulans* (Figs 28, 45–46). Only part of the typical series of *P. umbratus* can be considered a junior synonym of *E. simulans*. This could have misled researchers about taxonomic status of *E. umbratus*.

In the course of the morphological analysis, it was possible to identify a number of diagnostic features that make it possible to distinguish between these two species (Table 1).

Enochrus umbratus differs well from *E. simulans* in the absence of short scutellary stria in base of first elytral interval, smoothed out and poorly distinguishable punctate striae near elytral base and a wider scutellum. Males of these species differ in protarsal claws. The differences in the structure of the male genitalia of these closely related species are small and strongly depends from the way of their preservation and examination, as it was shown for subgenus *Lumetus* Zaitzev, 1908 [Litovkin *et al.*, 2021].

Possibly, due to the absence of new finding more than 140 years, *Enochrus umbratus* is a migrant from other region, occasionally recorded from Japan or the species is very rare. Except of *E. umbratus*, the rarest Japanese species of the genus is *Enochrus (Methydrus) uniformis* (Sharp, 1884), known after type material also collected by G. Lewis and 5 specimens collected in 1945–1948 years [Minoshima, 2019].

Another, less reliable, version is that *Enochrus umbratus* may be a hybrid of *Enochrus simulans* with other species of *Enochrus*. This assumption can only be verified by molecular methods, the success of which is not guaranteed when working with old museum material.

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