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HYDROPHILUS ATERRIMUS ESCHSCHOLTZ, 1822 (INSECTA: COLEOPTERA: HYDROPHILIDAE) IN BELARUS

Hydrophilus aterrimus Eschscholtz, 1822 is a rheophilic species. In Belarus it prefers shallow water bodies (old river-beds, fens, ponds, reservoirs, large puddles, often floodplains) with warm water, overgrown with macrophytes, also lives in rivers, lakes and reclamation canals. The species lives throughout Belarus, it is also known from the Berezinsky Biosphere Reserve, the national parks "Braslavskie Ozera", "Belovezhskaya Pushcha" and "Pripyatsky".

Populations of *H. aterrimus* tend to decrease in Europe. At the beginning of the XXIst century a similar trend began to be observed on the territory of Belarus. In this connection, *H. aterrimus* was included as a species that needs attention (least concern (LC)) on the List of Species Requiring Additional Study and Attention for Preventive Protection in the Red Data Book of Belarus. The reasons for reduction in the number of population of *H. aterrimus* are not clear yet. Consequently, this species needs additional study of its biology and ecological preferences in order to more accurately determine its protection category.

In the article diagnostic features of *Hydrophilus aterrimus* and *H. piceus* (Linnaeus, 1758) are recorded. The second species was previously excluded from the composition of the fauna of Belarus. However, the possibility of the appearance of *H. piceus* in the west or south of Belarus cannot be ruled out due to global warming.

Key words: Insecta; Coleoptera; Hydrophilidae; *Hydrophilus*; fauna; Belarus.
Fig. 16. Ref.: 24 titles.

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HYDROPHILUS ATERRIMUS ESCHSCHOLTZ, 1822 (INSECTA: COLEOPTERA: HYDROPHILIDAE) В БЕЛАРУСИ

Hydrophilus aterrimus Eschscholtz, 1822 — реофильный вид, в Беларуси предпочитает мелководные водоемы (старицы, болота, пруды, водохранилища, крупные лужи, чаще пойменные) с теплой водой, заросшие макрофитами, обитает также в реках, озерах и мелиоративных каналах. Вид распространен на всей территории Беларуси, известен из Березинского биосферного заповедника, национальных парков «Браславские озера», «Беловежская пуща», «Припятский».

Популяции *H. aterrimus* в Европе имеют тенденцию к сокращению. В начале XXI века аналогичная ситуация стала наблюдаться и на территории Беларуси. В связи с этим *H. aterrimus* включен как вид, требующий внимания (вызывающий наименьшие опасения (LC)) в список видов, требующих дополнительного изучения и внимания для профилактической охраны Красной книги Республики Беларусь. Причины сокращения численности *H. aterrimus* пока не ясны. В связи с этим данный вид нуждается в дополнительном изучении его биологии и экологических преференций в целях более точного определения его охранной категории.

В статье представлены диагностические признаки *Hydrophilus aterrimus* и *H. piceus* (Linnaeus, 1758). Последний вид ранее был исключен из состава фауны Беларуси. Однако нельзя не учитывать возможность появления *H. piceus* на западе или юге Беларуси в связи с глобальным потеплением.

Ключевые слова: Insecta; Coleoptera; Hydrophilidae; *Hydrophilus*; фауна; Беларусь.
Рис. 16. Библиогр.: 24 назв.

Introduction. The genus *Hydrophilus* O. F. Müller, 1764 includes 48 species in the world fauna [1]. In the Palaearctic region the genus includes 11 species. Three species (*Hydrophilus aterrimus* Eschscholtz, 1822 (Figures 1—3, 7, 9, 11), *H. piceus* (Linnaeus, 1758) (Figures 4—6, 8, 10, 12) and *H. pistaceus* Laporte, 1840) have been recorded in Europe [2—4].

Hydrophilus aterrimus is a widespread species. It lives on the territory from France to Western Siberia (Russia) and from Finland to Italy and Iran [2; 5].

H. aterrimus is one of the large beetles of the Belarusian fauna. It was first reported by N. M. Arnold for territory of modern Belarus (vill. Novoselki) in 1902 [6]. In 1940, this species was listed from several localities in Vitebsk region [7]. It was quite often mentioned in various reports from the territory of Belarus [6; 8—17].

H. aterrimus was considered quite common in our country at the end of the last century. Although it was pointed out that it does not occur often [17]. A decline in numbers of this species in Europe is currently being noted, therefore, in a number of countries it has a conservation status, for example, in Poland it has status "Vulnerable species" (VU) [18].

At the beginning of the XXIst century, a similar trend began to be observed on the territory of Belarus. In this connection, *H. aterrimus* was included in the List of Species Requiring Additional Study and Attention for Preventive Protection in the Red Data Book of Belarus as a species that needs attention (least concern (LC)) [19]. The reasons for reduction in the number of population of *H. aterrimus* are not clear yet. Therefore, the study of this species in Belarus is relevant.

Materials and methods. The material for the article presents research results of the author carried out on the territory of Belarus and other regions in the period from 1981 to 2022. The examined specimens are deposited in the following collections:

CDL D. S. Lundyshev collection, Baranovichi, Belarus;
CSR S. K. Ryndevich collection, Baranovichi, Belarus;
ZISP Zoological Institute, Russian Academy of Sciences, St Petersburg, Russia;
ZMBU Zoological Museum of Belarus State University, Minsk, Belarus.

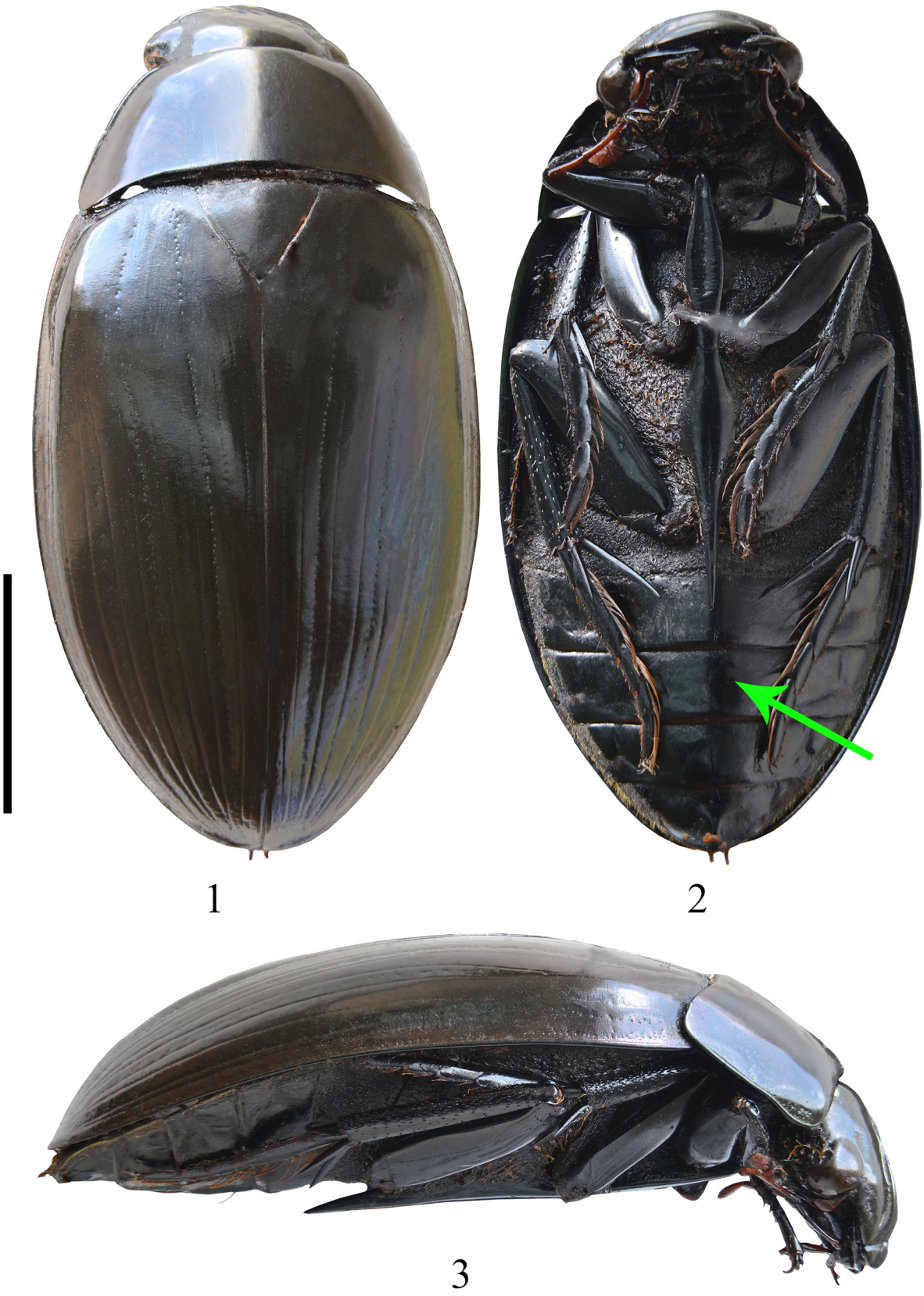
The material was examined with the use of a Nikon SMZ-745T stereomicroscope and MBS-10 stereomicroscope. Habitus photographs were taken with the use of Nikon D5100 with Nikon 60 mm 1:2.8G Macro Lens and Meik Macro Extension Ring Kit. The figures were prepared with the help of Photoshop CS5 program.

Results and discussion. During the study the material from the territory of all six regions of the Republic of Belarus was examined. An annotated sheet of the studied material, diagnostic features of the species, its environmental preferences are listed below.

Hydrophilus aterrimus Eschscholtz, 1822 (Figures 1—3, 7, 9, 11)

***Differential diagnosis*.** Body oval, dorsal side moderately convex, without microsculpture and pubescence. Length 29—43 mm. Total color black, elytra with very slight olive sheen, tarsi blackish brown (Figures 1—3). Last segment of male antennal club without notch. Apical spines at the end of the elytral sutures absent (Figure 7). Spine on metaventrite barely reaching midlength of abdominal ventrite 2 (Figure 2, 3). Last ventral sternite with a longitudinal fold in the middle. Abdomen are arched medially without clear keel (Figure 2). Expansion of the apical segment of male fore tarsi small (Figure 9). Male genitalia have almost parallel apical part of parameres and fairly wide apex of medial lobe (Figure 11).

***Material examined*. Brest reg.:** g. [town] Brest, tsentr [center], v trave [in grass], 7.05.1994, leg. Kitaynik D. A., 1 specimen [in Russian] (CSR); Baranovichi, prud [pond] O 0094, u berega pod plavayushchim brevnjv [near the shore under a floating log], glubina [deep] 0.3 m, 11.09.1994, leg. Lukashenya M., 2 specimens (1 specimen immature) [in Russian] (CSR); same



Figures 1—3. — *Hydrophilus aterrimus* Eschscholtz, habitus: 1 — dorsal view; **2** — ventral view; **3** — lateral view. Scale bar 10 mm

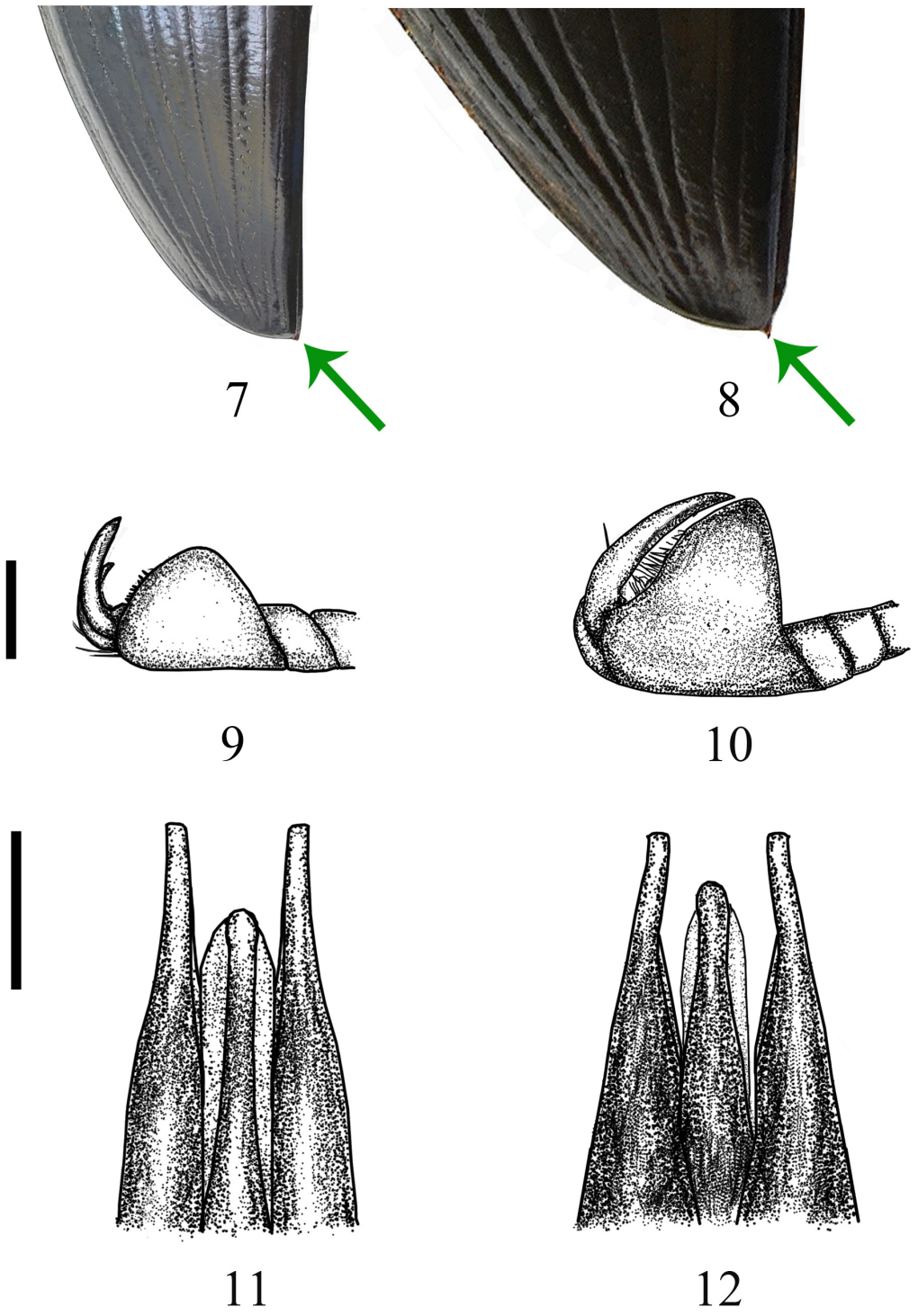
Рисунки 1—3. — *Hydrophilus aterrimus* Eschscholtz, внешний вид: 1 — вид сверху; **2** — вид снизу; **3** — вид сбоку. Длина масштабной линейки 10 мм

4 5

6

Figures 4—6. — *Hydrophilus piceus* (Linnaeus, 1758), habitus: 4 — dorsal view; **5** — ventral view; **6** — lateral view. Scale bar 10 mm

Рисунки 4—6. — *Hydrophilus piceus* (Linnaeus, 1758), внешний вид: 4 — вид сверху; **5** — вид снизу; **6** —вид сбоку. Длина масштабной линейки 10 мм



Figures 7—12. — *Hydrophilus aterrimus* and *H. piceus*: 7 — apex of elytra of *H. aterrimus* (female), dorsal view; **8 —** apex of elytra of apex of elytra of *H. piceus* (female), dorsal view; **9 —** expansion of the apical segment of male fore tarsi of *H. aterrimus*; **10 —** expansion of the apical segment of male fore tarsi of *H. piceus*; **11 —** apex of male genitalia of *H. aterrimus*; **12 —** apex of male genitalia of *H. piceus*. Scale bar 10 mm (**9—12**)

Рисунки 7—12. — *Hydrophilus aterrimus* and *H. piceus*: 7 — вершина надкрылий *H. aterrimus* (самка), вид сверху; **8 —** вершина надкрылий *H. piceus* (самка), вид сверху; **9 —** расширение апикального сегмента передних лапок самца *H. aterrimus*; **10 —** расширение апикального сегмента передних лапок самца *H. piceus*; **11 —** вершина гениталий самца *H. aterrimus*; **12 —** вершина гениталий самца *H. piceus*. Длина масштабной линейки 10 мм (**9—12**)

data but 16.09.1994, leg. Ryndevich S. K., 2 specimens [in Russian] (CSR); Brestskaya obl. [Brest reg.], Gantevichskiy r-n [Hantsavichy district], meliorativnyy kanal [soil-reclamation canal / drainage channel], 26.04.1985, 2 specimens [in Russian] (ZMBU); okr. g. [near town] Malorita, P 0124 [pond], 22.07.1996, leg. Ryndevich S., 1 specimen (larvae) [in Russian] (CSR); Brestskaya obl. [Brest reg.], Baranovichskiy r-n [Baranavichy district], d. [village] Molchad, prud [pond], 17.06.1985, leg. Aleksandrowicz O. R., 1 specimen [in Russian] (ZMBU); Belarus, Baranovichi, in flight, 10.06.2000, leg. Zemoglyadchuk A. V., 1 specimen (CSR); Brestskaya obl. [Brest reg.], Baranovichskiy r-n [Baranavichy district], okr. d. [near village] Gintsevichi, vodokhr. [reservoir] Baranovichskoe, 7.06.2007, leg. Ryndevich S., 1 specimen [in Russian] (CDL); Brest reg, Baranavichy district, near vill. M. Kolpeniytsa, 7.06.2007, 1 specimen (CDL); Brest reg., lake Beloe [Byaroza district], 11.07.2002, leg. Dmitrenok M., 4 specimens (CSR); Brest reg., Bereza distr., vill. Melech, 20.VI.2022, leg. Romanko I. R., 1 specimen.

Gomel reg.: Zhitkov. r-n [Zhitkavichy district], d. [village] Khlupin, 26.04.1987, leg. Aleksandrowicz O. R., 1 specimen [in Russian] (ZMBU); Gomel reg., Zhitkavichy district, national park "Pripyatsky", near v. Khvoensk, old river-bed of r. Pripyat', 17.06.2001, 2 specimens (CSR); same data but old river-beds of r. Pripyat'with *Salvinia natans* (L.) All., 1785, 18.06.2001, 8 specimens; Gomel reg., Zhitkavichy district, near Lyaskovichi, old river-bed of r. Pripyat', 19.06.2013, leg. Ryndevich S. K., 7 specimens.

Grodno reg.: near Grodno, swamp, lining of nest of marsh harrier (*Circus aeruginosus*), 12.04.1989, leg. Vinchevsky A., 4 specimens (2 immature beetles and 2 pupae); Grodnensk. gubern. [Grodno province], Belov. Pushcha [Belovezhskaya Pushcha], leto [summer], [leg.] Mordvilko, 1 specimen [in Russian] (ZISP).

Minsk reg.: Minskaya gubern. [Minsk province], s. [village] Yazyl, Bobruysk. [now Staryya Darogi district], 10.VII.1910, [leg.] Mordvilko, 2 specimens [in Russian] (ZISP); Minsk reg., Nesvizh distr., Gorodeya, in flight, day, 10.06.1974, 1 specimen; Nesvizhskiy r-n [Nesvizh distr.], p. [township] Gorodeya, 9.05.1981, na svet [at light], leg. Ryndevich S., 1 specimen [in Russian] (CSR); same data, but v let, na zerkalo [collected in flight, on mirror], 5.VI.1985, leg. Ryndevich S., 1 specimen [in Russian] (CSR); Minskaya obl. [Minsk reg.], Vileyskiy r-n [Vileyka district], okr. d. [near village] Sosenka, O 0022 [Vileyskoe reservoir], 7.07.1988, leg. Ryndevich S., 1 specimen [in Russian] (CSR); Minskaya obl. [Minsk reg.], Stolbtsovskiy r-n [Stowbtsy district], okr. d. [near village] Nikolaevshchina, K 0099 [soil-reclamation canal / drainage channel], zarosli kubyshki [thickets of egg-pods], gl. [deep] 0.2 m, 23.05.1995, leg. Ryndevich S. K., 2 specimens [in Russian] (CSR); Minskiy r-n [Minsk district], Priluki, 18.05.1985, leg. Aleksandrowicz O. R., 5 specimens [in Russian] (ZMBU); Zelenoe, Minskiy r-n [Minsk district], 30.08.1988, leg. Aleksandrowicz O. R., 1 specimen [in Russian] (ZMBU); d. [village] Novosel'e [Minsk district], 24.06.1974, leg. Aleksandrowicz O. R., 1 specimen [in Russian] (ZMBU); Pukhovichskiy r-n [Pukhavichy district], d. [village] Kopeynoe, 25.06.1991, leg. Aleksandrowicz O. R., 5 specimens [in Russian] (ZMBU); Krupskiy r-n [Krupki district], d. [village] Yazby, 13.06.1980, leg. Aleksandrowicz O. R., 4 specimens [in Russian] (ZMBU); Belarus, near Krupki, r. Bobr, 10.VII.2018, leg. Kostyuchenko A. V., 1 specimen (CSR).

Mogilev reg.: Mogilev, [leg.] Semenov A., 2 specimens [in Russian] (ZISP); Semenov, Mogilevskaya obl. [Mogilev reg.], Osipovichskiy r-n [Osipovichi district], d. [village] Daraganovo, na svet [at light], 20.07.1987, leg. Ryndevich S., 1 specimen [in Russian] (CSR); same data, but prud [pond], 21.07.1987, leg. Ryndevich S., 10 specimens (8 imagoes, 2 larvae) [in Russian] (CSR); Mogilevskaya obl. [Mogilev reg.], Bobruyskiy r-n [Bobruysk district], okr. d. [near village] Domanovo, 25.06.1990, leg. Aleksandrowicz O. R., 1 specimen [in Russian] (ZMBU).

Vitebsk reg.: Vitebskaya obl. [Vitebsk reg.], Lepelskiy r-n [Lepel district], BGBZ [Berezinsky Biosphere Reserve], d. [village] Domzheritsy, P 0028 [pond], 30.05.1994, leg. Ryndevich S., 1 specimen [in Russian] (CSR); Vitebskaya obl. [Vitebsk reg.], Lepelskiy r-n [Lepel district], okr. d. [near village] Kraytsy, 25.07.1998, leg. Ryndevich S. K., 4 specimens [in Russian]

(CSR), Belarus, Berezinsky Reserve, r. Serguch/Buzyanka/, water trap, 26.VI.2015, leg. Ryndevich S. K., 2 specimens (CDL), Belarus, Miory dystr., near Byevshchina, in flight, 25.VII.1993, 1 specimen; Belarus, Vitebskaya obl. [Vitebsk reg.], Orshanskiy r-n [Orsha district], okr. p. [near township] Orekhovsk, oz. [lake] Bolshoe Orekhovskoe, 12.VI.2022, leg. Vakar O., 2 specimens (larvae) [in Russian] (CSR).

Ecology. Rheophilic species, prefers shallow water bodies (old river-beds, fens, ponds, reservoirs, large puddles, often floodplains) with warm water, overgrown with macrophytes, also lives in rivers, lakes and reclamation canals (Figures 13—16).

Figures 13—16. — Habitats of *Hydrophilus aterrimus*: 13 — river Serguch, Vitebsk reg.; **14** — old river-bed of r. Pripyat near Lyaskovichi, Gomel reg.; **15** — river Bobr, Minsk reg.; **16** — reservoir Baranovichskoe, Brest reg.

Рисунки 13—16. — Места обитания *Hydrophilus aterrimus*: 13 — река Сергуч, Витебская обл.; **14 —** старица реки Припять около Ляскович, Гомельская обл.; **15 —** река Бобр, Минская обл.; **16 —** водохранилище Барановичское, Брестская обл.

Beetles fly at light and on mirror.

Imagoes are phytophagous. Feeding imago on filamentous algae has been recorded [5]. Larvae are predators, keeping at a shallow depth (usually no more than 0.5 m) near the coast (up to 4 m) in thickets of macrophytes. In laboratory and in vivo conditions the last instar larvae were recorded feeding on fish fingerlings of cyprinids (Cyprinidae), frog tadpoles, and larvae of various insects among which dragonflies Coenagrionidae, beetles (*Dytiscus* sp., *Acilius sulcatus* (Linnaeus, 1758), *Hydrochara caraboides* (Linnaeus, 1758)) and Diptera (*Eristalis* sp.).

Imagoes are active from the second half of April to September. In September, young beetles appear, which overwinter in the soil or other shelters (nests, etc.).

Hydrophilus aterrimus may use nests of circumaquatic and semiaquatic birds as places for pupation. So in the harrier's nest, undercolored (immature) beetles and pupae were found in nest of *Circus aeruginosus* (Linnaeus, 1758). These specimens were found already dead at the early of April in the lining of an old nest. They probably died in the nest in the fall.

Late instar larvae, pupae and beetles are regularly recorded in the nests of the marsh harrier, which they use as places for pupation (personal communication of A. E. Vinchevsky, 2023).

Distribution. Euro-West Siberian-West Asian temperate species [20]. The species lives throughout Belarus and is recorded from six regions of the Republic [14]. It is also known from the Berezinsky Biosphere Reserve, the national parks "Braslavskie Ozera", "Belovezhskaya Pushcha", and Pripyatsky. It is most common in the south of Belarus (floodplain of the Pripyat River).

Comparison. *Hydrophilus aterrimus* is often confused with *Hydrophilus piceus* (Linnaeus, 1758). The second species has been repeatedly indicated for the fauna of Belarus. *H. piceus* was first reported by N. M. Arnold [21] for the territory of modern Belarus. However, it is not listed in his catalogue and is missing from the collection [22]. The species was mentioned from the Belarusian Poozer'e [7; 23], but the study of the materials deposited in the Vitebsk State University collection did not confirm this fact. All previous records should be referred to *H. aterrimus* [5]. These two species have good diagnostic features [5; 24], but we should once again pay attention to them in order to avoid confusion. In addition, the possibility of the appearance of *H. piceus* in the west or south of Belarus cannot be ruled out due to global warming.

H. piceus has larger sizes (length 30—51 mm). The body is more strongly narrowed behind (Figure 4, 5) than at *H. aterrimus* (Figure 1; 2). Apical spines at the end of the elytral sutures are clear (Figure 8). Abdomen are arched medially with strong keel (Figure 5). Expansion of the apical segment of male fore tarsi very large (Figure 10). Male genitalia have slightly converging inwards and more massive apical part of parameres and more narrowed apex of medial lobe (Figure 12).

Conclusion. At the moment, only one species of the genus *Hydrophilus*, *H. aterrimus*, is known in the fauna of Belarus. Populations of this species tend to decrease in Europe. The reasons for the decline in numbers of *Hydrophilus aterrimus* in Belarus are not clear yet. In this connection, biology and ecological preferences of the species need additional study in order to more accurately determine its protection category.

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