Journal of Asia-Pacific Biodiversity 14 (2021) 461–491

Contents lists available at ScienceDirect

Journal of Asia-Pacific Biodiversity

journal homepage: http://www.elsevier.com/locate/japb

Original Article

The beetles of the families Helophoridae, Georissidae, Hydrophilidae, Hydraenidae, and Elmidae (Insecta: Coleoptera) of Kunashir Island and the Lesser Kurils

S.K. Ryndevich [a], A.A. Prokin [b,c,*], K.V. Makarov [d], Yu.N. Sundukov [e]

[a] Baranovichi State University, Voykova ul. 21, Baranovichi, Brest Oblast, 225404, Belarus
[b] Papanin Institute for Biology of Inland Waters, Russian Academy of Sciences, Borok, Nekouzsky District, 152742 Yaroslavl Oblast, Russia
[c] Cherepovets State University, Lunacharski 5, Cherepovets, 162600, Vologda Oblast, Russia
[d] Zoology & Ecology Department, Moscow Pedagogical State University, Kibalchicha Str. 6, Bld. 5, Moscow 129164, Russia
[e] Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, Vladivostok, 690022, Russia

ARTICLE INFO

Article history:
Received 29 January 2021
Received in revised form
24 May 2021
Accepted 8 June 2021
Available online 29 June 2021

Keywords:
Coleoptera
Fauna
Kunashir
Lesser Kurils
Polyphaga

ABSTRACT

The fauna of Kunashir Island and the islands of the Lesser Kuril Chain contains 47 species from 18 genera of Georissidae, Helophoridae, Hydrophilidae, Hydraenidae, and Elmidae. Two species (*Enochrus vilis* (Sharp, 1884) and *Ochthebius inermis* Sharp, 1884) are recorded for Russia for the first time. Fifteen species are new to the fauna of Kunashir Island and the Lesser Kurils. The article contains an annotated list of species, including the studied material and published records. The article is illustrated by photographs of habitats and species, maps of their distribution in Kunashir. The relationships between the species richness on an island area and the features of the fauna of Kunashir in comparison with Hokkaido are discussed. The species richness of the studied Polyphaga families in Kunashir is almost 2/3 of the fauna of Hokkaido, while the island's area is 55 times smaller. The reason for the absence of large species of the genera *Hydrochara* and *Hydrophilus* in Kunashir is hypothesized to be a restriction of the northern range species boundaries by the July isotherm of +16°C.

Introduction

The history of the study of the Coleoptera fauna of the Kuril Islands dates back 170 years. The first information about the beetles of the archipelago appeared in the second half of the XIX—beginning of the XX centuries (e.g. Bates 1883; Mannerheim 1853; Motschulsky 1850, 1860; Poppius 1906; Sharp 1896). These works contained fragmentary information on the collecting of individual species and descriptions of new taxa. By the end of the XIX century, the Coleoptera fauna of the archipelago was so poorly studied that the famous British navigator and animal trader H.J. Snow, who spent several years sailing around the Kuril Islands between 1873 and 1896, could write only the following about the beetles: "Coleoptera – Small beetles of several species are common on all the islands, but none were noticed of large or even medium size. The greatest variety occurs on the southern islands." (Snow 1897).

Active accumulation of knowledge about the beetle fauna of the Kuril archipelago began in the first half of the ЧЧ century with the works of Japanese entomologists (Miwa 1929, 1934; Ohta 1929, Kobayashi 1931; Kanô 1933; Matsushita 1933; Tamanuki 1933; Kôno 1935a, 1935b, 1935c, 1935d, 1935e, Kô no, 1936a, 1936b, 1936c, 1937a, 1937b; Nakane 1961). The information obtained during this period was summarized in S. Kuwayama's book "Insect fauna of the southern Kuril Islands" (Kuwayama 1967), which reports more than 330 species of beetles.

In the second half of the ЧЧ century, the Soviet Union period of the Entomofauna of the Kuril Islands studies began (Kryvolutskaja 1962, 1965, 1966; Kryvolutskaja and Medvedev 1966; Gurjeva and Kryvolutskaja 1968; Kryzhanovskij et al. 1975, 1995; etc), ending with the release of the first generalizing book on the Kuril archipelago written by G.O. Kryvolutskaja, "Entomofauna of the Kuril Islands" (Kryvolutskaja 1973), which reports 740 species of Coleoptera.

* Corresponding author.
E-mail address: prokina@mail.ru (A.A. Prokin).
Peer review under responsibility of National Science Museum of Korea (NSMK) and Korea National Arboretum (KNA).

https://doi.org/10.1016/j.japb.2021.06.007
pISSN2287-884X eISSN2287-9544/

The next important stage in the study of the Coleoptera fauna of the Kuril archipelago was the publication of the "Keys of the Insects of the Far East of USSR." Three volumes of this series were devoted to beetles (Lehr 1989, 1992, 1996). In total, 1029 species of Coleoptera are listed in these books (Lelej et Storozhenko 2010).

After the release of the "Keys…," information on the different Coleoptera families of the Kuril Islands can be extracted from the following publications: Lafer 1999, 2002; Yoshitomi and Nikitsky 2004; Zerche 2004; Bezborodov 2014; Makarov end Sundukov 2014, 2016; Sundukov 2017, 2019; Sundukov and Makarov 2013, 2014, 2016; Makarov et al. 2019; etc.

The published data on the families Helophoridae, Hydrophilidae, Hydraenidae, and Elmidae of the Kuril fauna are quite limited (Shatrovskiy 1984, 1989a, 1989b, 1992; Nillson et al. 1995; Ryndevich 1995, 1998, 2001, 2003, 2006, 2007, 2008, 2014; Kirejtshuk and Shatrovskiy 2001a, 2001b; Ôhara and Jia 2006; Kamite 2009; Fikáček et al. 2012b; Jäch and Delgado 2014; Jung et al. 2014; Palatov 2014; Prokin et al. 2016; Ryndevich et al. 2017, 2019; Ryndevich and Prokin 2017). Basically, these works, which report 34 species from 12 genera, are devoted to the superfamily Hydrophiloidea of the South Kuril Islands.

The study of Coleoptera of Kuril Islands is important for an inventory of the regional fauna of the Russian Far East and an assessment of the total diversity of archipelago fauna, the species richness of Hydrophiloidea, Hydraenidae, and Elmidae, and for understanding the fauno genesis of island biota as a whole.

Study area

The research was conducted on the southern islands of the Kuril archipelago within the borders of the South Kuril administrative region of the Sakhalin Province (Oblast) of Russia. The South Kuril region includes the Kunashir Island of the Greater Kuril Chain and the islands of the Lesser Kuril Chain (Figure 1). Their total area is about 1860 km^2, or 18% of the total area of the archipelago. All islands are of volcanic origin, located at the junction of the Kuril arc with the geological systems of Hokkaido.

The climate of the islands is characterized as a temperate moist marine, with a strong influence on the waters of the Sea of Okhotsk and the Pacific Ocean.

The islands are characterized by a strict wind regime (with gusts of up to 35–50 m/s), a large amount of precipitation (1200–1500 mm per year), relatively mild winters and cool summers (average temperatures of the coldest month—5.6°C, warm month +15.5°C). The waters of the warm Soya current are reaching the Okhotsk coast of the archipelago, and the cold Kuril-Kamchatka (Oyashio) current is on the Pacific side, which favors the conservation and development of maximum biodiversity on the west coast of Kunashir in comparison with the islands of the Lesser Kuril Chain.

The beetles were collected by the authors on five of the seven islands of the South Kuril region, so the characteristics of these islands are given below. Since the data on the area of the islands in different sources do not coincide, we use the information published by K.S. Gansey and A.N. Ivanov (2012).

Kunashir is the southernmost and one of the largest islands of the Great Kuril Chain. Its area is 1510.2 km^2, the length is 123 km, and the width is from 7 to 30 km. The relief of Kunashir is mainly volcanic. The island consists of three mountain ranges formed by four active volcanoes: the Tyatya Volcano (h=1819 m) and the highest point of the Dokuchaeva Ridge; Ruruy Volkano (h=1485 m) in the north, Mendeleev Volcano (h=888 m) in the central part, and Golovnin Volkano (543 m) in the south. The mountain ranges are divided by two isthmuses (Yuzhnokurilsky and Sernovodsky) composed of Quaternary marine sediments and volcanic-sedimentary folded Neogene rock formations. As well as Iturup, Kunashir is characterized by the highest landscape diversity among the islands of the Kuril archipelago. The island has a dense river network, represented by numerous mountain and lowland rivers and streams, a significant part of which are thermal streams with elevated temperature and mineralization (Figures 2–4). There are two dozens of lagoons, volcanic and karstic lakes, and ponds on Kunashir. The largest freshwater body is the lagoon Lake Peschanoe (an area of 7.14 km^2), and the largest thermal lake—caldera Lake Goryacheye (3.09 km^2). The flora of Kunashir is noticeably more diverse than on other islands of the archipelago. One thousand eighty-seven species of vascular plants grow there (Barkalov 2009). Dark coniferous, coniferous–deciduous, and stony birch forests are widespread on the island. Alder-birch forests and shore thickets of willows are characteristic of river floodplains. In the lower reaches and estuaries, marshy grass-sedge meadows and moss mires are common, and on the coast, there are dry mixed grasses and bamboo meadows on sandy and buffy soils (Fukuda et al. 2015).

Shikotan is the northernmost and largest island of the Lesser Kuril Chain. Its area is 252.8 km^2, length is up to 27 km, and maximum width is 12 km. The relief of the island is represented by a thick pile of steeply sloping hills and low mountain ranges. The highest mountains are the Shikotan (412 m), Ploskaya (363 m), Notori (357 m), and Tomari (356 m). The hydrographic network of the island is quite dense, mainly represented by small mountain rivers and streams. There are no lakes and thermal springs. The island is characterized by the absence of altitudinal zonation. On the island, there are bamboo meadows, small arrays of dark coniferous-birch forests, and shrubby raised bogs. River valleys and floodplains are characterized by alder forests, thickets of coastal willows, and boggy grass-sedge meadows (Barkalov and Eremenko 2003; Sundukov 2014).

Polonsky Island is a small island of the Lesser Kuril Chain, located 25 km south of Shikotan. Its length is about 6 km, the maximum width is up to 3.5 km, and the area is 11.8 km^2. The coastline of the island is slightly indented, and on the northern coast of the island there are two bays—Udobnaya and Chasovaya. The surface of the island is low and flat, with a maximum altitude of 14–16 m above sea level. The coast is occupied by sandy and pebble beaches or eroded peatlands approaching the water. The island is characterized by short streams with narrow wetland shores. There are two fairly large freshwater lakes—in the south and at the base of Yazykovy Cape. Polonsky Island is completely devoid of forest vegetation. Its elevated coastal shafts are covered with dense grassy meadows and rose hips (*Rosa rugosa* Thunberg), and the entire central part and floodplains are covered by sedge, reed, or sedge-moss mires (Barkalov and Eremenko 2003; Gage et al. 2006; Sundukov 2019).

Yuri Island is a small island in the south of the Lesser Kuril Chain. Its length is about 7 km, the maximum width is up to 2 km, and the area is about 10 km^2. The island stretches from the northeast to southwest, with a strongly indented coastline. The landscape is represented by four hilly massifs connected by three low isthmuses. Probably, during periods of even small transgressions of the sea, Yuri Island was divided into four independent islands. The height of the watershed ranges from 20 to 30 m, and the highest point of the island is 44 m above sea level. The isthmuses are occupied by low-laying mires and small lagoon lakes. The coast of the island is mostly rocky. In large bays there are areas of sandy beaches, and the rest of the coast is occupied by pebbles or coarse-clad beaches. There are no rivers on the island; only small streams flow from the hillsides with narrow channels deep in clay soil and wetland shores. Yuri Island is also completely devoid of forest vegetation. Its elevated areas are covered with thick motley grass meadows, and the lowlands are covered by sedge-moss mires (Barkalov and Eremenko 2003; Gage et al. 2006; Sundukov 2017).

Tanfiliev Island is the southernmost island of the Lesser Kuril Chain, located 5 km from the northeast coast of Hokkaido. Its length is 8.3 km, the maximum width is 5.5 km, and the area is 12.4 km^2. The landscape is flat, with a maximum altitude up to 16 m above sea level. The coastline is heavily indented, forming wide bays and prominently protruding capes in the sea. The hydrographic network is represented by small short streams and several lagoon lakes, the largest of which (Bolotnoye and Kamyshovoe) are located on the east coast. The relief and vegetation of the island are similar to Polonsky Island (Barkalov and Eremenko 2003; Gage et al. 2006).

Material and methods

The study is mostly based on the material collected on the Kunashir, Shikotan, Polonsky, Yuri, and The study of Coleoptera (Figure 1).

In 2008, 2009, 2011, 2013, and 2017, within the framework of the project on the study of the Kunashir Coleoptera fauna, K.V. Makarov, I.V. Melnik, A.V. Matalin, A.A. Zaitsev and A.S. Prosvirov examined over 180 sites in various parts of the island and collected 905 specimens related to 37 species from the beetle families reviewed herein.

From May to October 2013–2017, as part of the program for the general inventory of insect (Insecta) and spiders (Aranei) taxonomic composition of the southern Kuril Islands, Yu.N. Sundukov and L.A. Sundukova conducted research in more than 100 localities of Kunashir and collected 411 specimens of 40 species from families reviewed herein. In addition, the same persons collected beetles on the islands of Shikotan (May-October 2012 and August 2016), Polonsky (August–September 2017), Yuri (August–September 2016), and Tanfiliev (June 2017) islands, including 230 specimens of 16 studied species.

Manual collection, collection using an aspirator, screening of the substrate, collecting at lights, window traps, “trampling” of vegetation in mires, splashing of the shores of water bodies were used for material sampling.

In addition to these materials, 143 specimens of 15 species were collected by O.N. Kabakov, I.M. Kerzhner, B.A. Korotyaev, S.A. Kurbatov, N.B. Nikitsky and S.V. Saluk in Kunashir in 1973–2011, as well as small fees of I.M. Kerzhner in 1973 from Shikotan, were studied.

Examined specimens are deposited in the following collections:

CAK	A.G. Koval collection, St. Petersburg, Russia;
CAP	A.A. Prokin collection, Borok, Russia;
CSK	S.A. Kurbatov collection, Moscow, Russia
CSR	S.K. Ryndevich collection, Baranovichi, Belarus;
MPU	Moscow State Pedagogical University, Moscow, Russia (K.V. Makarov);
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).

Type specimens and additional material for all species reported in this paper were studied.

The authors studied the type material of 20 species: *Enochrus* (= *Philhydrus*) *simulans* (Sharp, 1873); *E.* (= *Philhydrus*) *umbratus* (Sharp, 1888); *Cercyon algarum* Sharp, 1873; *C. aptus* Sharp, 1873; *C. dux* Sharp, 1873 (all is deposited in the Natural History

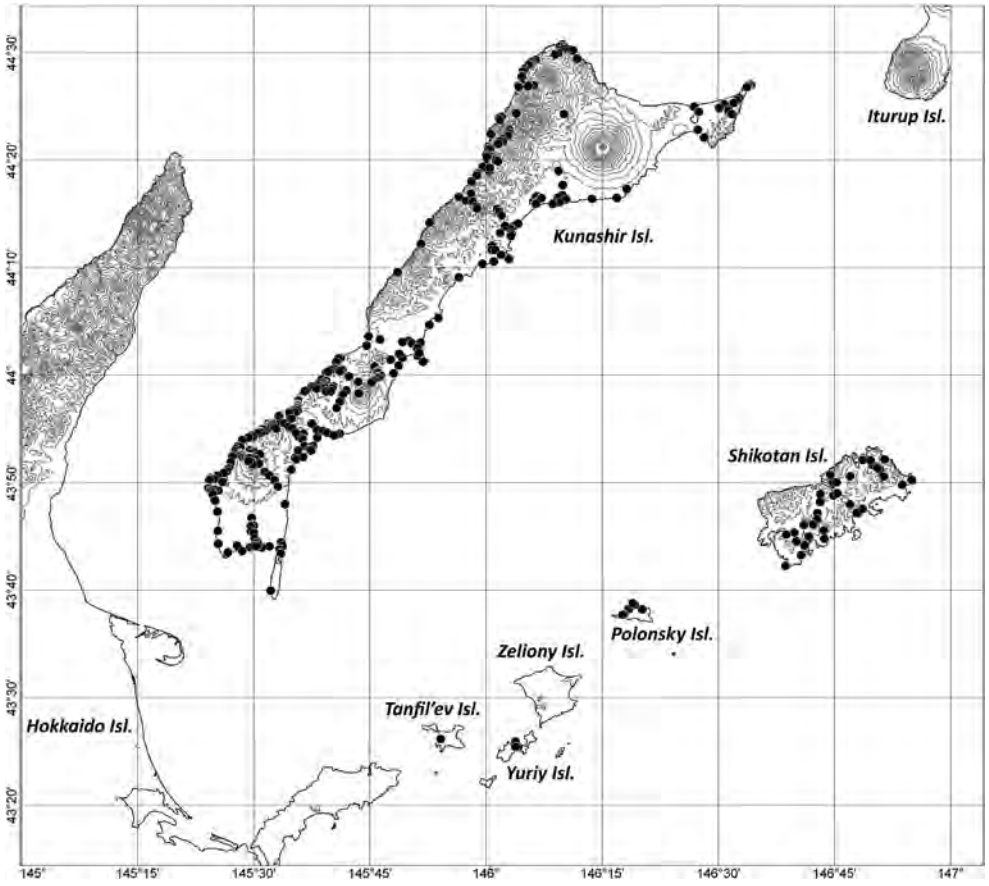

Figure 1. Map of localities on Kunashir Island and the Lesser Kurils in 2008–2017.

Figure 2. Typical habitats of Helophoridae and Hydrophilidae on Kunashir Island: A, the shore of Lake Valentiny (*Helophorus matsumurai*, *Hydrobius fuscipes*, *Coelostoma orbiculare*, *Crenitis apicalis*); B, valley of Tyatina River, 1–2 km upstream of mouth (*Helophorus nigricans*, *Hydrobius fuscipes*); C, lakes in the valley south of Lake Peschanoe (*Enochrus vilis*, *E. affinis*, *Cercyon korbianus*); D, Veslovsky Peninsula 1.5 km north of Cape Veslo (*Hydrobius fuscipes*, *Enochrus testaceus*, *E. affinis*, *Coelostoma orbiculare*); E, mouth of Rikorda River (*Enochrus simulans*); F, cordon Alekhinsky, a small lake (*Enochrus testaceus*). Photo C by Yu.N. Sundukov; F by A.A. Zaitsev, other photographs by K.V. Makarov.

Museum, London, U.K. (NHML)); *C. numerosus* Shatrovskiy, 1989 (ZISP, ZMMU); *C. olibrus* Sharp, 1874 (NHML); *C. retius* Ryndevich & Prokin, 2017 (ZISP, ZMMU, MPU, CSR); *C. rotundulus* Sharp, 1884 (NHML); *C. saluki* Ryndevich, 1998 (ZISP, CSR); *C. sundukovi* Ryndevich, Hoshina & Prokin, 2019 (ZISP, CSR); *C. symbion* Shatrovskiy, 1989 (ZISP, ZMMU); *C. unipustulatus* Nakane, 1982 (Hokkaido University, Sapporo, Japan); *C. ustus* Sharp, 1874 (NHML); *C. vagus* Sharp, 1884 (NHML); *C. verus* Shatrovskiy, 1989 (ZISP); *Laccobius kunashiricus* Shatrovskiy, 1984 (ZISP); *Megasternum japonicum* Shatrovskiy, 1989 (ZISP); *Pachysternum haemorrhoum* Motschulsky, 1866 (ZMMU); *Pacrillum lucidum* (Shatrovskiy, 1989) (= *Agnaeformia lucida*) (ZISP). Their label data are published below if required clarification. Otherwise, if type material was recorded in other papers of the authors or colleagues, it is mentioned in the "Published records" to avoid increasing the volume of the paper.

Labels data of specimens deposited in collections of ZISP, MPU, ZMMU, and CSR written originally in Russian using Cyrillic script were translated into English. The brackets […] are used for our comments. The exact coordinates of the collection localities are given in Appendix A, Table 1.

Parts of the specimens were dissected and the genitalia were placed in water-soluble dimethyl hydantoin resin with transparent plastic labels pinned below the respective specimens.

The ecological preferences of the species, discussed in the "Collecting notes" section, apply only to specimens collected on Kunashir Island and the Lesser Kurils.

The materials were examined using a Nikon SMZ-745T stereomicroscope. The photographs of habitus were taken with the Canon EOS 5D Mark III camera and Canon MP-E 65 mm objective (MPU) using the extended focus technology.

Maps were prepared using the program BmpGen2 (Makarov 2019). The coordinates of the collection locations are stored in a database created in Visual FoxPro 9.0.

Data on collected material from the southern Kuril Islands are available in GBIF, URL https://www.gbif.org/dataset/a8207151-95ff-457a-ada6-03438de183b6

Results

In total, the paper presents data on 47 species from 18 genera belonging to 5 families of mainly aquatic Polyphaga. Two species

Figure 3. Typical habitats of Hydraenidae, Elmidae, Georissidae and Hydrophilidae on Kunashir Island: A, creek mouth near Moristy Island (*Laccobius oscillans*); B, the mouth of Vodopadny Stream south of Cape Ivanovsky (*Hydraena riparia, Heterlimnius hasegawai, Georissus canalifer*); C, south face of Cape Prasolova (*Laccobius oscillans, Ochthebius yoshitomii*); D, the mouth of Ozernaya River, cliff (*Georissus canalifer*); E, acid lake south of Lake Vodopadnoe (*Heterlimnius hasegawai*); F, creek Stolbovskoy near hot springs "Stolbovskie" S Cape Stolbchaty (*Zaitzeviaria gotoi*). Photo F by A.V. Matalin, other photographs by K.V. Makarov.

(marked **) are recorded for the Russian fauna for the first time, and fifteen species (marked *) are new to Kunashir Island and the Lesser Kurils. The check-list of species found in the studying area is presented below.

Check-list of species of Kunashir Island and the Lesser Kurils

Family *Helophoridae Leach, 1815*

1. *Helophorus* (*Rhopalohelophorus*) *matsumurai* Nakane, 1963 (Figures 5A–F, 19A)

Material examined. Kunashir Isl.: 1 ex., stream mouth ~1 km east of Dokuchaevo, 30 vii.2013 (K Makarov, Yu Sundukov), coll. CAP; 3 exs., the mouth of Severyanka River, 12 viii 2017 (K Makarov), coll. MPU; 1 ex., east shore of Lake Valentiny, 27 vi 2008 (K Makarov), coll. CAP; 9 exs., south shore of Lake Valentiny, 15 viii 2017 (Yu Sundukov, L Sundukova, K Makarov), coll. MPU; 5 exs., the mouth of the Medny Stream, 15 viii 2017 (Yu Sundukov), coll. MPU; 1 ex., shore of Lake Mikhaylovskoye, 14 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 1 ex., eastern shore of Lake Glukhoe, 9 vii 2008 (I Melnik), coll. CAP; 1 ex., lower reaches of Sernovodka River, mire, 10 viii 2014 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., Ozernaya River valley, 27 vii 2011 (A Zaitsev), coll, CAP; 2 exs., near Dubovoe, 25–26 vii 2017 (Yu Sundukov, L Sundukova), coll. MPU; 32 exs., near Dubovoe, shore of Khlebnikova River, 21 viii 2017 (K Makarov, Yu Sundukov), coll. MPU. Shikotan Isl.: 1 ex., Tserkovnaya Bay, 24 v-10 vi 2012 (Yu Sundukov), coll. CAP; 1 ex., Tserkovnaya Bay, 12–15 viii 2016 (Yu Sundukov, L. Sundukova), coll. CAP.

Published records. Kunashir Isl. (Palatov 2014). Zeliony Isl. (Nillson et al. 1995).

Collecting notes. Silty margins of small lakes and rivers (Figure 2A).

Note. Specimens of *Helophorus matsumurai* have some variability in the sculpture of the pronotum and the male genitalia (Figure 5A–F)

* **2. *Helophorus* (*Rhopalohelophorus*) *nigricans*** Poppius, 1907 (Figures 5G–H, 19B)

Material examined. Kunashir Isl.: 4 exs., valley of Tyatina River, 1–2 km upstream of mouth, 7–10 vi 2016 (Yu Sundukov), coll. MPU.

Collecting notes. Only in the northeast of the island, in sediments on the bank of the Tyatina River (Figure 2B).

Family Georissidae Thomson, 1859

Figure 4. Typical habitats of Hydrophilidae on Kunashir Island: A, a sea coast near Moristy Island (*Cercyon numerosus*, *C. dux*); B, northern coast of Cape Chetverikova (*Cercyon algarum*, *C. aptus*); C, valley of Valentiny Stream (*Cercyon olibrus*, *C. saluki*, *C. retius*, *Pachysternum haemorrhoum*); D, valley of Andreyeva River, ~1.5 km upstream of mouth, window traps (*Cercyon olibrus, C. saluki, Pachysternum haemorrhoum*); E, beached fish, the mouth of Bystry Stream (*Cercyon olibrus*, *C. laminatus*, *Pachysternum haemorrhoum*); F, leaves of *Lysichiton camtschatcensis* left after bear feeding, hills south of Lake Peschanoe (*Cercyon retius*, *C. verus*, *C. vagus*).

* **3. *Georissus* (*Georissus*) *canalifer*** Sharp, 1888
(Figures 5I–J, 19C)

Material examined. Kunashir Isl.: 5 exs., the mouth of Ozernaya River, cliff, 11 viii 2009 (K Makarov), coll. CAP, MPU; 1 ex., the mouth of Vodopadny Stream south of Ivanovsky Cape, 10 viii 2008 (I Melnik), coll. MPU. Shikotan Isl.: 1 ex., the hill on the creek valley Vesoliy, 26 vi 2011 (I Melnik), coll. MPU.

Collecting notes. On bare ground of cliffs at the mouths of small streams and rivers (Figure 3B–C) flowing into the Kunashir Strait. No data about species habitat in Shikotan.

Family Hydrophilidae Latreille, 1802
Subfamily Hydrophilinae Latreille, 1802
Tribe Laccobiini Houlbert, 1922

* **4. *Laccobius* (*Laccobius*) *bedeli*** Sharp, 1884
(Figures 6A, 19D)

Material examined. Kunashir Isl.: 1 ex., Ivanovsky Cape, Grozovoe, 16–17 vii 2013 (Yu Sundukov, L Sundukova), coll. CSR; 2 exs., Ivanovsky Cape, 2 km south of Grozovoe, small stream, 2 vi 2015 (Yu Sundukov), coll. CSR, MPU.

Collecting notes. Shores of small streams flowing in the plain part of the Kunashir Isl.

5. *Laccobius* (*Laccobius*) *kunashiricus* Shatrovskiy, 1984
(Figure 6B, 19E)

Material examined. Kunashir Isl.: 1 ex., Ivanovsky Cape, Grozovoe, 16–17 vii 2013 (Yu Sundukov) coll. CSR.

Published records. Kunashir Isl. (Shatrovskiy 1984, 1989b; Kirejtshuk and Shatrovskiy 2001b).

Collecting notes. Same as previous species.

* **6. Laccobius (Microlaccobius) oscillans** Sharp, 1884
(Figures 6C, 19F)

Material examined. Kunashir Isl.: 1 ex., stream mouth near Moristy Island, 17 viii 2013 (K Makarov, Yu Sundukov) coll. CAP; 11 exs., the south face of Prasolova Cape, in the cervices of the rocks, 11 viii 2017 (K Makarov, Yu Sundukov), coll. MPU, CAP; 2 exs., hills south of Stolbchaty Cape, 21 vii 2013 (Yu Sundukov, L Sundukova), coll. CSR, MPU; 8 exs., 17 km south-west Yuzhno-Kurilsk, thermal spring, 16 vi 1990 (I Melnik), coll. MPU; 10 exs., near Tretiyakovo, valley of Valentiny Stream, 2 viii 2008 (K

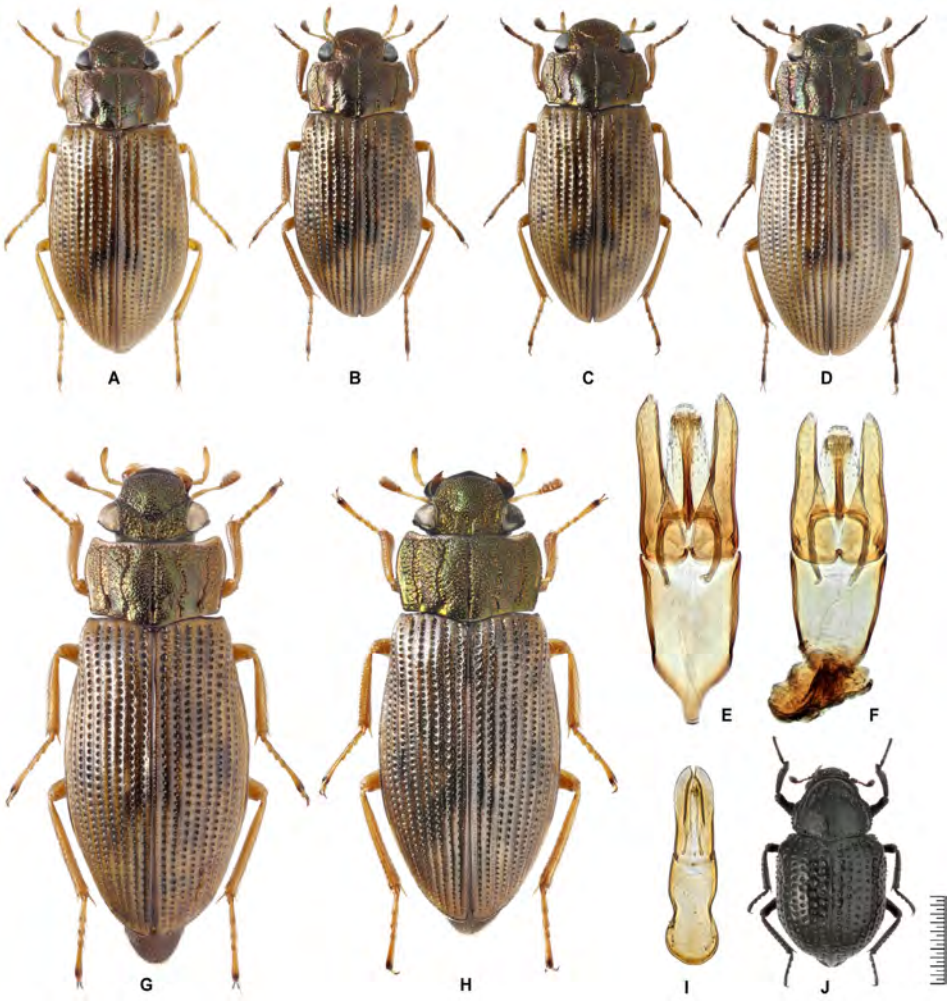

Figure 5. Helophoridae and Georissidae of South Kurils and adjacent regions: A–F—*Helophorus matsumurai* (A, Kunashir Isl., lower reaches of Sernovodka River; B–F, Sakhalin Isl., Yuzhno-Sakhalinsk: E–F, aedeagus variability); G–H, *H. nigricans*; I–J, *Georissus canalifer*: I, aedeagus, J, habitus. <scale bar: 1.0 mm (A–D, G–H, J) >

Makarov), coll. MPU, CAP; 6 exs., Tretiyakovo env., Valentiny Stream, h = 26 m, 13 vi 2011 (A Matalin), coll. CAP; 1 ex., cordon Alekhinsky, lake, 29 vii–6 viii 2008 (I Melnik), coll. MPU; 14 exs., Alekhino Outpost, stream, 1 vi 2011 (A Matalin, I Melnik), coll. MPU, CAP; 1 ex., stream 3 km from the outpost in Alekhina Bay, 43°54'17"N, 145°29'21"E, 30 vii 2013 (D Palatov), coll. CAP; 1 ex., Ivanovsky Cape, 2 km south of Grozovoe, small stream, 2 vi 2015 (Yu Sundukov), coll. CSR; 3 exs., 3 km south-east of Ivanovsky Cape, 15 vi 2011 (A Matalin), coll. CAP.

Collecting notes. Widely distributed on Kunashir Isl., usually inhabits shallow water of small streams (Figure 3A), also found on rocky cliffs at the sea coast and in the groundwater outlet zone (Figure 3C). Common in thermal streams (Stolbovskoy and Valentiny, streams in the vicinity of the Alekhino Outpost).

Note. The record of *Laccobius* (*Microlaccobius*) *formosus* Gentili, 1976 from Kunashir (Palatov 2014) refers to *L. oscillans*. Species *L. formosus* distributed in China, Taiwan, Northern Vietnam, and Thailand, and once was recorded from Primorsky Krai, Russia (Gentili 1995). It was never recorded from Japan and the Kuril Islands (Fikáček et al. 2015).

Tribe Hydrobiusini Mulsant, 1844

7. *Hydrobius fuscipes* (Linnaeus, 1758)
(Figures 6D, 19G)

Material examined. Kunashir Isl.: 2 exs., valley of Tyatina River, 1–2 km upstream of mouth, 10 vi 2016 (Yu Sundukov), coll. CAP; 1 ex., the mouth of the right tributary of the Zolotaya River, 19 viii 2013 (K Makarov, Yu Sundukov), coll. CAP; 5 exs., lower reaches of Zolotaya River, 12 viii 2017 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., right slope of Severyanka River valley, 23 vii 2013 (K Makarov), coll. CAP; 2 exs., right slope of Severyanka River valley, 10 viii 2017 (K Makarov), coll. CAP; 1 ex., eastern shore of Lake Valentiny, 27. vi 2008 (K Makarov), coll. CAP; 1 ex., south shore of Lake Valentiny, 15 viii 2017 (K Makarov), coll. CAP; 5 exs., south coast of Vodopadny Cape, mire, 22 viii 2011 (K Makarov), coll. CAP; 1 ex., cordon Alekhinsky, 28–30 ix 2014 (Yu Sundukov), coll. CSR; 2 exs., western shore of Lake Peschanoe, 5 vi 2011 (A Matalin), coll. CAP; 2 exs., western shore of Lake Peschanoe, 3–5 vii 2015 (Yu Sundukov, L Sundukova), coll. MPU, CSR; 8 exs., cordon Alekhinsky, the nortwest shore of Lake Peschanoye, 7 viii 2011 (K. Makarov), coll. CAP; 1 ex., Ivanovsky Cape, 18–21 ix 2014 (Yu Sundukov), coll. CSR; 2 exs., Ivanovsky Cape, 11–16 vi 2013 (Yu Sundukov, L Sundukova), coll. MPU, CSR; 8 exs., watershed of Rikorda and Belozerskaya rivers, 25–31 v 2016 (Yu Sundukov), coll. CAP; 6 exs., coastal marshes between Belozerskaya and Rikorda rivers, 19 viii 2017 (K Makarov, Yu Sundukov), coll. CAP; 2 exs., Veslovsky Peninsula 1.5 km north of Veslo Cape, 21 vii 2008 (K Makarov), coll. CAP. Shikotan Isl.: 4 exs., Tserkovnaya Bay, 24 v–10 vi 2012 (Yu Sundukov, L Sundukova), coll.

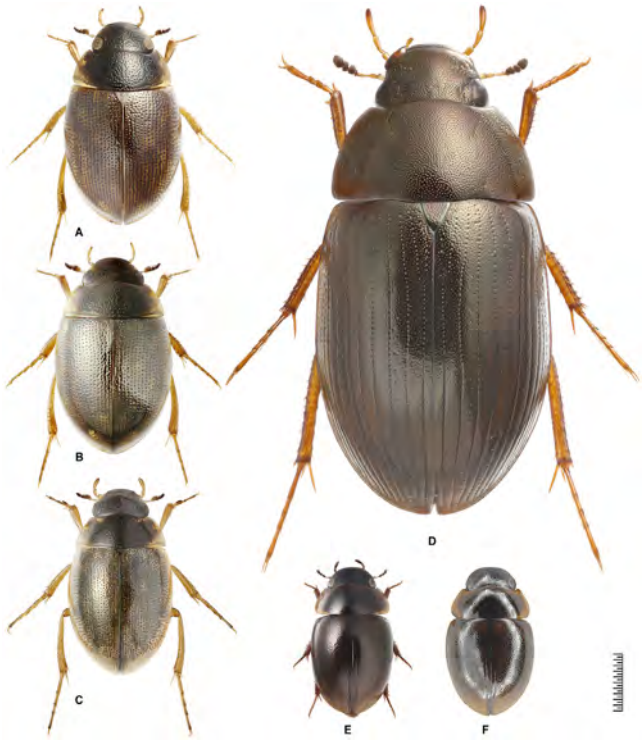

Figure 6. Hydrophilidae of South Kurils: A, *Laccobius bedeli*, female; B, *L. kunashiricus*, female; C, *L. oscillans*, male; D, *Hydrobius fuscipes*; E, *Anacaena asahinai* (Kunashir Isl.); F, same, specimen from Shikotan Isl. <scale bar: 1.0 mm (A–F)>.

CAP. Polonsky Isl.: 1 ex., southwestern cape, 5 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU.

Published records. Kunashir Isl. (Ryndevich and Angus 2020).

Collecting notes. Shallow shore zone of plain parts of lakes (Figure 2A), rivers (Figure 2B), and wetlands, including coastal marshes (Figure 2D), in wet soil, and in decomposing water plants on the shores.

Subfamily Chaetarthriinae Bedel, 1881
Tribe Anacaenini M. Hansen, 1991

* **8. *Anacaena asahinai*** Satô, 1982
(Figures 6E–F, 19H)

Material examined. Kunashir Isl.: 1 ex., Ivanovsky Cape, 18–21 ix 2014 (Yu Sundukov), coll. MPU; 4 exs., Ivanovsky Cape, Grozovoe, 2–4 vi 2013 (Yu Sundukov, L Sundukova), coll. CSR, MPU; 1 ex., west of Bystry Stream, 27–28 v 2013 (Yu Sundukov, L Sundukova), coll. CSR. Shikotan Isl.: 1 ex., Tserkovnaya Bay, 23 ix–3 x 2012 (Yu Sundukov), coll. MPU; 2 exs., Tserkovnaya Bay, 24 v–10 vi 2012 (Yu Sundukov), coll. MPU, CSR. Yuri Isl.: 1 ex., east coast of middle cape, 26 viii–4 ix 2016 (Yu Sundukov, L Sundukova), coll. CSR.

Published records. Southern Kuril Islands (Kirejtshuk and Shatrovskiy 2001b).

Collecting notes. Shallow shore zone of small streams, in the mouth part.

Note. Specimens from Yuri and Shikotan islands have very small brownish spots near the eyes and a slightly convex dorsal side of the body (as *A. lutescens* species group) (Figure 6F). Male genitalia, habitus characteristics, and total color of these specimens are typical for *A. asahinai*.

* **9. *Crenitis* (*Crenitis*) *apicalis*** Reitter, 1896
(Figures 7, 8, 19I)

Material examined. Kunashir Isl.: 4 exs., eastern shore of Lake Valentiny, 27 vi 2008 (K Makarov), coll. CAP; 1 ex., south shore of Lake Valentiny, 15 viii 2017 (K Makarov), coll. MPU; 6 exs., lower reaches of Saratovskaya River, 10–14 vi 2014 (Yu Sundukov), coll. MPU, CSR; 8 exs., same label, 12–18 vii 2014 (Yu Sundukov), coll. MPU, CAP; 3 exs., lower reaches of Filatova River, 29–31 vii 2014 (Yu Sundukov, L Sundukova), coll. MPU, CSR; 1 ex., near Nazarovo Outpost, 5 vii 2008 (K Makarov), coll. CAP; 1 ex., Yuzhnokurilsky Cape, 20–22 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., hills S of Stolbchaty Cape, h ~ 18, 21 vii 2013 (K Makarov, Yu Sundukov, L Sundukova), coll. CAP; 3 exs., cordon Alekhinsky, 28–30 ix 2014 (Yu Sundukov), coll. MPU; 13 exs., Alekhino Outpost, stream, 1 vi 2011 (A Matalin, I Melnik), coll. CAP. Shikotan Isl.: 12 exs., Tserkovnaya Bay, 24 v–10 vi 2012 (Yu Sundukov), coll. CAP; 4 exs., Tserkovnaya Bay, 24–25 vi 2012 (Yu Sundukov), coll. CAP; 1 ex., Tserkovnaya Bay, 23 ix–3 x 2012 (Yu Sundukov), coll. CAP.

Collecting notes. Shingle shores of lakes (Figure 2A), shallow of small rivers and streams, both at the estuarine part and away from the coast.

Note. The group of species, including *Crenitis apicalis* Reitter, 1896, *C. japonica* (Nakane, 1963), and *C. hokkaidensis* (Nakane, 1966), which differs from other species of the genus in 9-segmented antennae, elevation on the mesothorax and parameres with denticles along the inner dorsal margin (Figure 7D1), is indistinguishable using characters, indicated by Nakane (1966) and Hebauer (1994). This species group shows significant intrapopulation variability. The specimens from Kunashir and Shikotan (Figures 7D–F, 8H–L) do not differ at the species level from studied specimens from Mongolia, Russian Primorye, and Sakhalin Island (Figure 8A–G), so we report them as *Crenitis apicalis*. The Japanese species require study and are possibly synonyms of

Figure 7. *Crenitis apicalis* from Kunashir Island, males: A, D, Kunashir Isl., the mouth of the Medny Stream; B–C, E–F, Kunashir Isl., near Alekhino Outpost; A–C, habitus, D–F, aedeagus variability, D1—inner dorsal margin of paramera. <scale bar: 1.0 mm (A–D)>

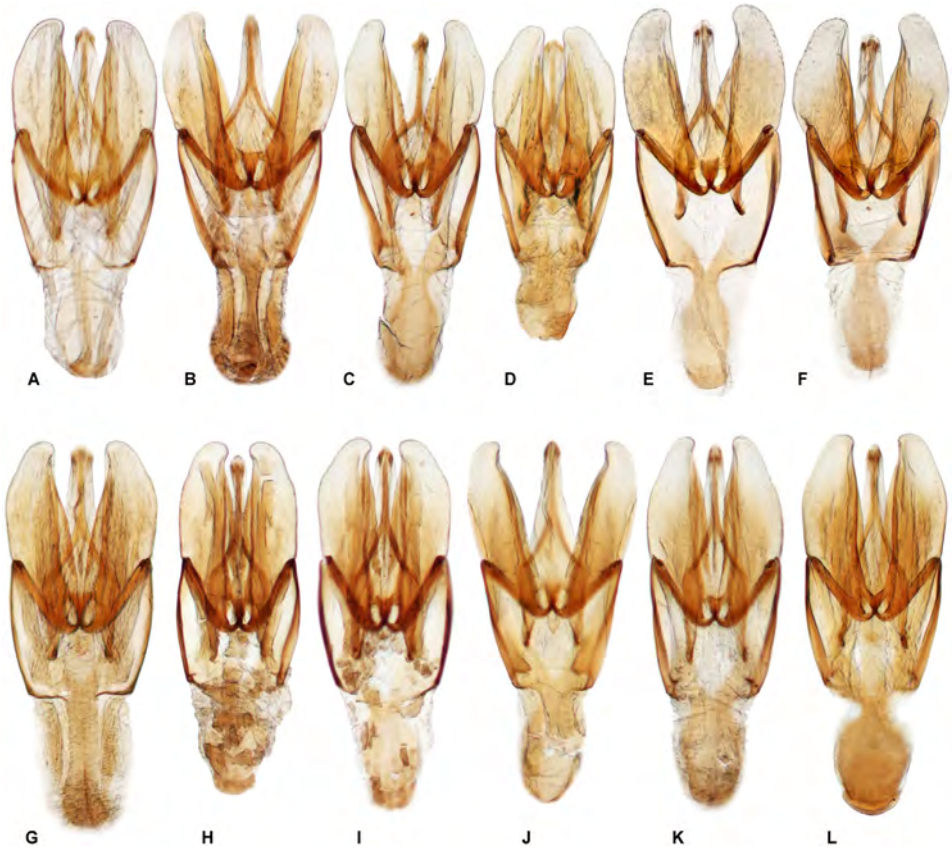

Figure 8. *Crenitis apicalis*, aedeagus variability: A–B, Mongolia, Selenge Province, Tsagaannuur District; C–F, Primorsky Krai (C, env. Terney; D, Lazovsky Reserve; E–F, Borisovskoe Plateau, Listvennichnaya River); G, Sakhalin Isl., env. Nogliki, Tym' River; H–I, Shikotan Isl., Tserkovnaya Bay; J–L, Kunashir Isl. (J, Lake Valentiny, K–L, near Alekhino Outpost).

C. apicalis. In the future, it is necessary to revise this "apicalis" species group with the involvement of molecular genetic methods.

Subfamily Enochrinae Short & Fikáček, 2013

* **10. *Enochrus* (*Holcophilydrus*) *simulans*** (Sharp, 1873)
(Figures 9A, 10A, 20A)

Material examined. Kunashir Isl.: 1 ex., right slope of Severyanka River valley, 10 viii 2017 (K Makarov), coll. MPU; 3 exs., hills south of Stolbchaty Cape, 21 vii 2013 (Yu Sundukov, L Sundukova), coll. CSR, MPU; 1 ex., thermal spring 1 km south-east of Alekhino Outpost, 18 vii 2009 (K Makarov, A Zaitsev), coll. CSR; 1 ex., the caldera of Golovnin Volcano, western shore of Lake Goryacheye, 30 v 2017 (Yu Sundukov, L Sundukova), coll. MPU; 4 exs., coastal marshes between Belozerskaya and Rikorda rivers, 19 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 1 ex., near Dubovoe, shore of Khlebnikova River, 21 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 1 ex., watershed of Golovnina and Khlebnikova rivers, 20 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 1 ex., near Golovnino, at light, 20 viii 2017 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., east of Golovnino, flood-plain, 20 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 1 ex., the mouth of Rikorda River, 22 viii 2017 (K Makarov, Yu Sundukov), coll. MPU.

Published records. Southern Kuril Islands (as *E. umbratus* Sharp, 1888) (Kirejtshuk and Shatrovskiy 2001b).

Collecting notes. Wetlands in river valleys and along the coast (Figure 2E). Occasionally found in thermal streams and on the shores of thermal lakes.

* **11. *Enochrus* (*Lumetus*) *testaceus*** (Fabricius, 1801)
(Figures 9B, 10B, 20B)

Material examined. Kunashir Isl.: 3 exs., cordon Alekhinsky, a small lake, 7 viii 2011 (K Makarov),. coll. MPU; 2 exs., coastal marshes between Belozerskaya and Rikorda rivers, 19 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 3 exs., Veslovsky Peninsula 1.5 km north of Veslo Cape, the shore of mire, 21 vii 2008 (K Makarov), coll. CSR, MPU.

Collecting notes. Shallow margins of small lakes (Figure 2F) and rivers, wetlands at river mouths among macrophytes (Figure 2D).

* **12. *Enochrus* (*Methydrus*) *affinis*** (Thunberg, 1794)
(Figures 9D, 10D, 20D)

Material examined. Kunashir Isl.: 1 ex., watershed of Saratovskaya and Tyatina rivers, 21–25 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR; 1 ex., lakes in the valley south of the western shore of Lake Peschanoe, 8 viii 2011 (K Makarov), coll. MPU; 1 ex., the caldera of Golovnin Volcano, the western shore of Lake Goryacheye, 30 v 2017 (Yu Sundukov, L Sundukova), coll. CAP; 15 exs., south coast of Vodopadny Cape, freshwater mire, 22 viii 2011 (K Makarov), coll. MPU, CSR; 8 exs., near Golovnino, at light, 20 viii 2017 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., Veslovsky Peninsula 1.5 km north of Veslo Cape, 21 vii 2008 (K Makarov), coll. CAP.

Collecting notes. Wet soil and shallow waters near lake shores, including thermal and wetlands at river mouths.

Note. The record of *Enochrus uniformis* (Sharp, 1884) from Kunashir Isl. by D. Palatov (2014) refers to *E. affinis*.

** **13. *Enochrus* (*Methydrus*) *vilis*** (Sharp, 1884)
(Figures 9C, 10C, 20C)

Material examined. Kunashir Isl.: 1 ex., lower reaches of Filatova River, 29–31 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR; 9 exs.,

Figure 9. Hydrophilidae of South Kurils: A, *Enochrus simulans*; B, *E. testaceus*; C, *E. vilis*; D, *E. affinis*. <scale bar: 1.0 mm (A–D)>.

near Yuzhno-Kurilsk, marsh between sea shore and Serebryanka River, 6 vii 2008 (K Makarov), coll. MPU, CSR; 1 ex., near Tretiyakovo, valley of Valentiny Stream, 10 viii 2011 (K Makarov), coll. MPU; 18 exs., cordon Alekhinsky, a small lake, 7 viii 2011 (K Makarov), coll. MPU, CSR, CAP; 2 exs., lakes in the valley south of the western shore of Lake Peschanoe, 9 viii 2011 (K Makarov), coll. MPU; 5 exs., south coast of Vodopadny Cape, 22 viii 2011 (K Makarov), coll. MPU; 1 ex., cordon Andreyevsky, 22–25 viii 2014 (Yu Sundukov), coll. CSR; 4 exs., Ivanovsky Cape, Grozovoe, 16–17 vii 2013 (Yu Sundukov, L Sundukova), coll. MPU, CSR; 1 ex., near Dubovoe, shore of Khlebnikova River, 21 viii 2017 (K Makarov, Yu Sundukov), coll. CAP.

Collecting notes. Wet soil and shallow waters near banks of small freshwater streams and rivers, wetlands at river mouths.

Subfamily Sphaeridiinae Latreille, 1802
Tribe Coelostomatini Heyden, 1891

* **14. *Coelostoma orbiculare*** Fabricius, 1775
(Figures 11A, 20E)

Material examined. Kunashir Isl.: 2 exs., right slope of Severyanka River valley, 10 viii 2017 (K Makarov), coll. MPU; 1 ex., south shore of Valentiny Lake, 16 viii 2017 (Yu Sundukov), coll. MPU; 13 exs., Veslovsky Peninsula 1.5 km north of Veslo Cape, the shore of marsh, 21 vii 2008 (K Makarov), coll. CAP.

Collecting notes. Mires in river valleys and marshes on the sea coasts (Figure 2D).

Tribe Megasternini Mulsant, 1844

15. *Cercyon* (*Cercyon*) *algarum* Sharp, 1873
(Figure 11B, 20F)

Material examined. Kunashir Isl.: 1 ex., bay east of Shpil Rock, 2 viii 2013 (K Makarov), coll. CAP; 5 exs., south coast of Dokuchaeva Bay, 30 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., hills

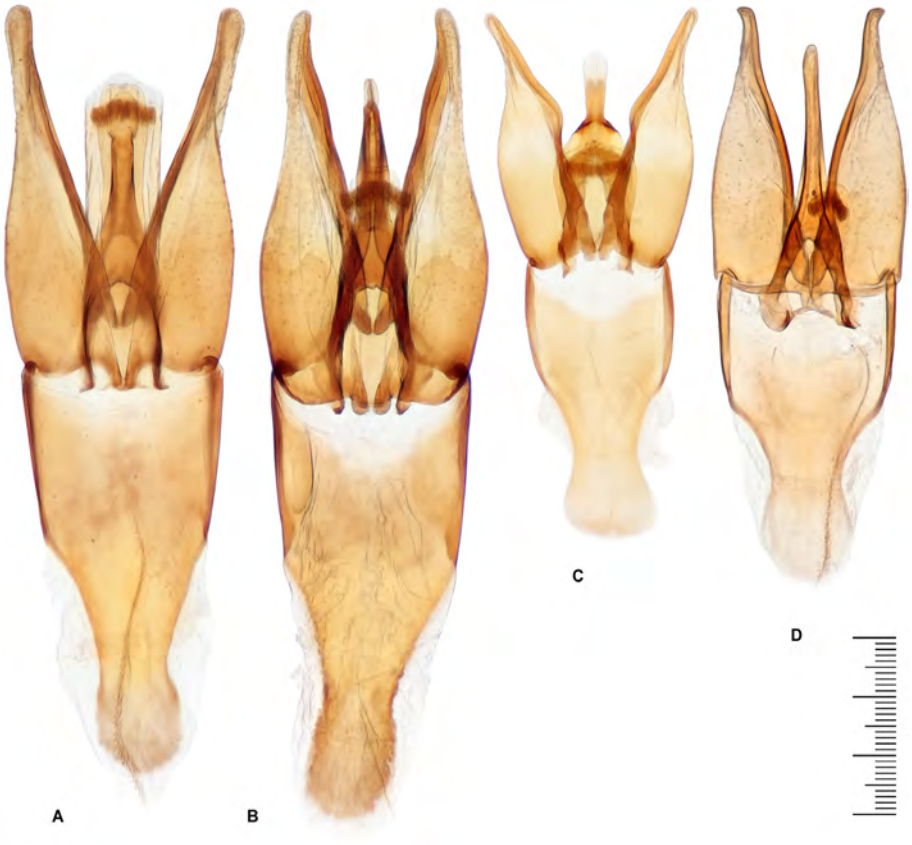

Figure 10. Aedeagus of *Enochrus* spp. from Kunashir Island: A, *E. simulans*; B, *E. testaceus*; C, *E. vilis*; D, *E. affinis*. <scale bar: 0.3 mm (A–D)>.

Figure 11. Hydrophilidae of South Kurils: A, *Coelostoma orbiculare*; B, *Cercyon algarum*; C, *C. aptus*; D, *C. dux*; E, *C. numerosus*; F, *C. korbianus*; G, *C. olibrus*; H, *C. marinus*. <scale bar: 1.0 mm (A–H)>.

between Severyanka and Zolotaya rivers, 1 vii 2008 (K Makarov), coll. CAP; 6 exs., sandy terraces near Lake Valentiny, 16 viii 2017 (K Makarov), coll. MPU; 3 exs., Yuzhnokurilsky Cape, 20–22 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., hills south of Stolbchaty Cape, h ~ 18, 21 vii 2013 (K Makarov, Yu Sundukov, L Sundukova), coll. CAP; 20 exs., bay south-west of Odinoky Stream, 3 viii 2011 (K Makarov), coll. CAP; 1 ex., northern coast of Chetverikova Cape, 23 viii 2011 (K Makarov), coll. MPU; 3 exs., the sea coast near Okhotskoe Natural Boundary, 23 vii 2011 (K Makarov), coll. CAP; 1 ex., 0.3 km south-west from the mouth of Ozernaya River, h ~ 125, 27 vii 2011 (K Makarov), coll. CAP; 4 exs., 1.5 km south-west mouth of Ozernaya River, the sea coast, 26 vii 2011 (K Makarov), coll. CAP; 3 exs., Veslovsky Peninsula 1.5 km north of Veslo Cape, at low tide, 20 vii 2008 (K Makarov), coll. MPU.

Published records. Southern Kuril Islands (Shatrovskiy 1989b); Kunashir Isl. (Shatrovskiy 1992); Southern Kuril Islands (Kirejtshuk and Shatrovskiy 2001b), Kuril Islands (Ryndevich 2003); Kunashir Isl. (Ôhara and Jia 2006).

Collecting notes. Sea coasts, often sandy, in decomposing seaweed (Figure 4B).

16. *Cercyon* (*Cercyon*) *aptus* Sharp, 1873
(Figure 11C, 20G)

Material examined. Kunashir Isl.: 21 exs., lower reaches of Saratovskaya River, 10–16 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR, MPU; 3 exs., lower reaches of Saratovskaya River, 14–15 vii 2014 (Yu Sundukov, L Sundukova), coll. MPU; 15 exs., Mendeleevo, at light, 2 vi 1985 (SV Saluk), coll. CSR; 1 ex., cordon Alekhinsky, 7 viii 2011 (K Makarov, A Zaitsev), coll. CAP; 1 ex., coast of Okhotsk Sea, south of Znamenka Cape, 30 v 2011 (A Matalin), coll. CAP; 2 exs., near Sernovodsk, in decomposing seaweed, 27 vi 1985 (SV Saluk), coll. MPU, CSR; 1 ex., near cordon Andreyevsky, ocean coast, 7 vii 2008 (K Makarov), coll. CAP; 6 exs., the mouth of Belkina River, ocean coast, under log and drift-wood, 20 v 2011 (A Matalin), coll. CAP; 2 exs., northern coast of Chetverikova Cape, 23 viii 2011 (K. Makarov), coll. MPU; 2 exs., the northern coast of Puzanova Cape, 21 viii 2011 (K Makarov), coll. CAP; 4 exs., near Alekhino Outpost, 1 vi 2011 (A Matalin, I Melnik), coll. CAP; 1 ex., near cordon Ivanovsky, 11 vi 2011 (A Matalin), coll. CAP; 3 exs., Veslovsky Peninsula 1.5 km north of Veslo Cape, at low tide, 20 vii 2008 (K Makarov), coll. CAP. Shikotan Isl.: 18 exs., Tserkovnaya Bay, 24 v–10 vi 2012 (Yu Sundukov), coll. MPU. Polonsky Isl.: 1 ex., southwestern cape, 5 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU.

Published records. Southern Kuril Islands (Shatrovskiy 1989b); Southern Kuril Islands: Iturup Isl., Urup Isl., Kunashir Isl. (Shatrovskiy 1992); Southern Kuril Islands (Kirejtshuk and Shatrovskiy 2001b), Kuril Islands (Ryndevich 2003); Kuril Islands: Kunashir Isl., Iturup Isl.: Lesozavodsky; Dobroye Nachalo Bay; Urup Isl.: Otkrytyi Bay; near Shabalina River; Natalie Bay; near Veselaya River; Barkhatny Bay; near Lopukhovaya River; Chirpoi [Chirpoy] Isl.: Peschanaya Bay (Ôhara and Jia 2006).

Collecting notes. Sea coasts, less often river mouths, in decomposing seaweed on the sand.

17. *Cercyon* (*Cercyon*) *dux* Sharp, 1873
(Figure 11D, 20H)

Material examined. Kunashir Isl.: 6 exs., bay east of Shpil Rock, 2 viii 2013 (K Makarov), coll. CAP; 2 exs., stream mouth ~1 km east of Dokuchaevo, 4 viii 2013 (L Sundukova), coll. CAP; 11 exs., south coast of Dokuchaeva Bay, 30 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., stream mouth near Moristy Island, 17 viii 2013 (K Makarov, Yu Sundukov), coll. CAP; 3 exs., hills between Severyanka and Zolotaya rivers, 1 vii 2008 (K Makarov), coll. CAP; 1 ex., the mouth of Severyanka River, 1 vii 2008 (K Makarov), coll. MPU; 9 exs., near Lake Il'inskoye, 17 viii 2017 (K Makarov), coll. MPU; 1 ex., Yuzhnokurilsky Cape, 20–22 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 5 exs., the sea coast near Okhotskoe Natural Boundary, 23 vii 2011 (K Makarov), coll. CAP; 1 ex., south coast of Alekhina Cape, 31 vii 2011 (K Makarov), coll. CAP; 18 exs., bay south-west of Odinoky Stream, 3 viii 2011 (K Makarov), coll. CAP; 1 ex., the northern coast of Puzanova Cape, 21 viii 2011 (K Makarov), coll. CAP; 1 ex., 1.5 km south-west mouth of Ozernaya River, the sea coast, 26 vii 2011 (K Makarov), coll. CAP; 2 exs., near cordon Ivanovsky, 11 vi 2011 (A Matalin), coll. CAP; 2 exs., Ivanovsky Cape, Grozovoe, 23–26 v 2013 (Yu Sundukov, L Sundukova), coll. CSR.

Published records. Kunashir Isl.: Sernovodsk (Ryndevich 1995, 2001); Southern Kuril Islands (Kirejtshuk and Shatrovskiy 2001b).

Collecting notes. Decomposing seaweed on the coasts, including mouths of rivers and streams.

* **18. *Cercyon* (*Cercyon*) *korbianus*** Kni & zcaron, 1912 (Figure 11F, 20I)

Material examined. Kunashir Isl.: 1 ex., near Tretiyakovo, the valley of Valentiny Stream, 10 viii 2011 (K Makarov), coll. MPU; 2 exs., south coast of Vodopadny Cape, freshwater mire, 22 viii 2011 (K Makarov), coll. MPU; 17 exs., cordon Alekhinsky, a small lake, 7 viii 2011 (K Makarov), coll. MPU; 1 ex., cordon Alekhinsky, the south-west shore of Lake Peschanoe, 7 viii 2011 (A Zaitsev), coll. MPU; 7 exs., cordon Alekhinsky, north-west shore of Lake Peschanoe, 7 viii 2011 (K Makarov), coll. MPU; 1 ex., lakes in the valley south of the western shore of Lake Peschanoe, 8 viii 2011 (K Makarov), coll. MPU; 3 exs., flood-plain of the Alekhina River near the mouth, 5 viii 2011 (K Makarov), coll. MPU; 3 exs., 1 km south-west of Alekhino, coastal stones, 3 viii 2011 (K Makarov, A Zaitsev), coll. MPU; 2 exs., watershed of Rikorda and Belozerskaya rivers, 25–31 v 2016 (Yu Sundukov), coll. MPU; 4 exs., the mouth of Sennaya River, 2.5 km east of Paltusovo, 17 vi 2011 (A Matalin), coll. MPU; 2 exs., Veslovsky Peninsula 1.5 km north of Veslo Cape, the shore of mire, 21 vii 2008 (K Makarov), coll. MPU. Shikotan Isl.: 1 ex., Tserkovnaya Bay, 26–31 vii 2012 (Yu Sundukov, L Sundukova), coll. MPU.

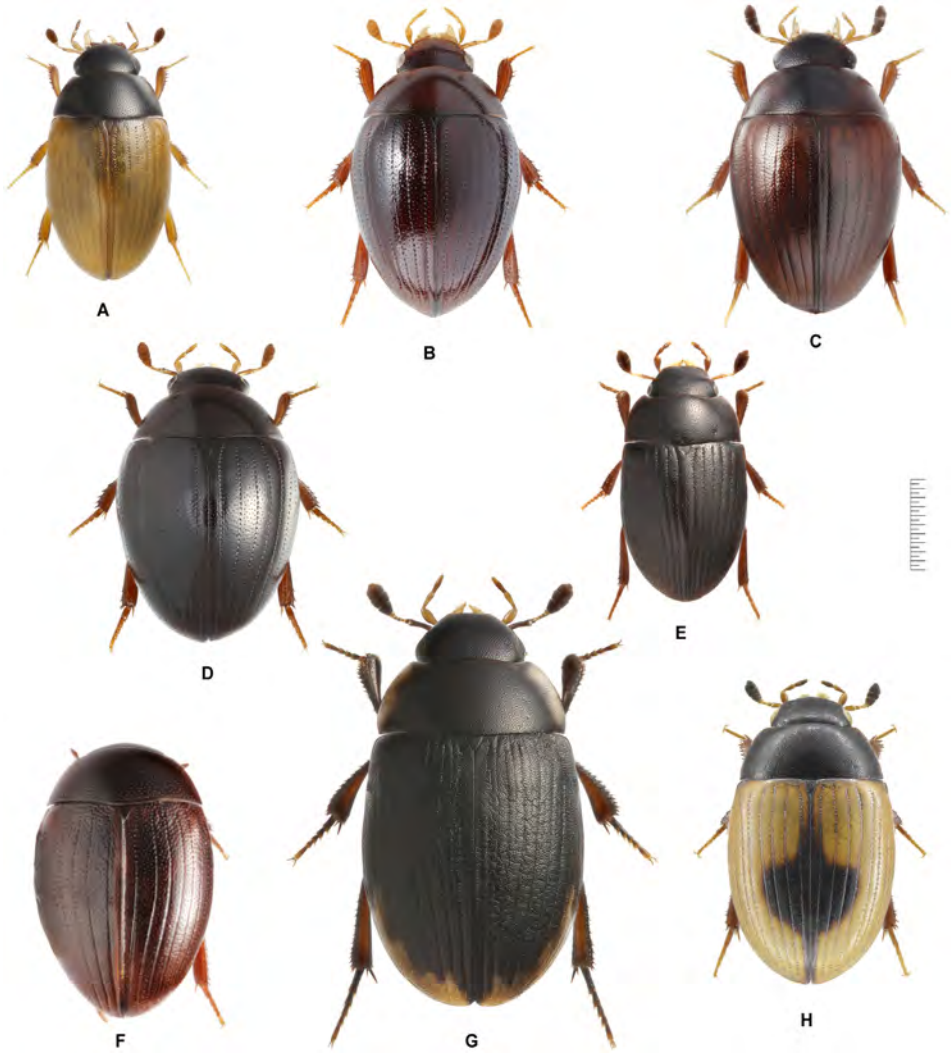

Figure 12. Hydrophilidae of South Kurils: A, *Cercyon quisquilius*; B, *C. rotundulus*; C, *C. retius*; D, *C. saluki*; E, *C. setulosus*; F, *C. sundukovi*; G, *C. symbion*; H, *C. unipunctatus*. <scale bar: 1.0 mm (A–H)>.

Collecting notes. Silty and peaty shores of small lakes, wetland areas at the coast, more often in river mouths.

* **19. *Cercyon* (*Cercyon*)** *marinus* Thomson, 1853
(Figure 11H, 21A)

Material examined. Kunashir Isl.: 5 exs., south shore of Lake Valentiny, 15 viii 2017 (K Makarov), coll. MPU; 2 exs., cordon Alekhinsky, the nort-west shore of Lake Peschanoe, 7 viii 2011 (K Makarov), coll. CAP; 1 ex., 2 km south-east of Ivanovsky Cape, 16 viii 2011 (A Zaitsev), coll. CAP; 1 ex., near Golovnino, at light, 20 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 35 exs., Veslovsky Peninsula 1.5 km north of Veslo Cape, the shore of mire, 21 vii 2008 (K Makarov), coll. CAP. Polonsky Isl.: 2 exs., southwestern cape, 5 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU.

Collecting notes. Wetland lake's shores, marshes near the sea coasts (Figure 2C).

20. *Cercyon* (*Cercyon*) *numerosus* Shatrovskiy, 1989
(Figure 11E, 21B)

Material examined. *Type material*: Paratypes: Kunashir Isl.: 2 exs., Sernovodsk, 28 vi 1985, (NB Nikitskiy), coll. ZMMU; 2 exs., bl. [near] Mendeleevo, 15-y rm [15th km], sern. istoch. [sulfur spring], 29 vi 1985 (NB Nikitskiy), coll. ZMMU; 1 ex., Alekhino, Kunashir, 30 vii [1] 973 (IM Kerzhner), coll. ZISP; 1 ex., o. [isl.] Urup Isl.: v rayone r. [in vicinities of river] Bezymyannaya, na YuZ [SW] p. [settlement] Podgorny, v vybrosakh vodorosley [in algae on the coast], 7 viii [19] 67 (Kudrilov), coll. ZISP.

Note. A.G. Shatrovskiy (1992) recorded only the total number of paratypes (231) and did not indicate the full list of paratypes labels for *Cercyon numerosus*. Therefore, most parts of the paratype localities (include ones from Kuril Islands) have not yet been published. Some of them were listed by S.K. Ryndevich (2001).

Other material examined. Kunashir Isl.: 4 exs., stream mouth ~1 km east of Dokuchaevo, 4 viii 2013 (L Sundukova), coll. CAP; 1 ex., Lovzova Peninsula, source of Maly Stream, 20 viii 2015 (Yu Sundukov, L Sundukova), coll. MPU; 2 exs., stream mouth near Moristy Island, 17 viii 2013 (K Makarov, Yu Sundukov), coll. CAP; 7 exs., sandy terraces near Lake Valentiny, 16 viii 2017 (K Makarov), coll. MPU; 14 exs., lower reaches of Saratovskaya River, 10–16 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR; 2 exs., near Lake Il'inskoye, 17 viii 2017 (K Makarov), coll. MPU; 5 exs., the mouth of Stolbovskoy Stream, 9 vi 2011 (A Matalin), coll. CAP; 6 exs., cordon Alekhinsky, 1 viii 2011 (SA Kurbatov), coll. CSR; 10 exs., near Sernovodsk, in decomposing seaweed, 28 vi 1985 (SV Saluk), coll. CSR; 1 ex., lower reaches of Andreyeva River, 15–18 viii 2014 (Yu Sundukov, L Sundukova), coll. CSR; 1 ex., near cordon Andreyevsky, ocean coast, 7 vii 2008 (K Makarov), coll. CAP; 1 ex., the mouth of Belkina River, ocean coast, under log and drift-wood, 20 v 2011 (A Matalin), coll. CAP; 1 ex., south coast of the Alekhina Cape, 31 vii 2011 (K Makarov), coll. CAP; 1 ex., Alekhino Outpost, 5 viii 2011 (K Makarov), coll. CAP; 7 exs., bay south-west of Odinoky Stream, 3 viii 2011 (K Makarov), coll. CAP; 4 exs., 1.5 km south-west mouth of Ozernaya River, the sea coast, 26 vii 2011 (K Makarov), coll. CAP; 1 ex., the mouth of stream, 1 km north of Blizhny Island, 26 vii 2011 (K Makarov), coll. CAP; 2 exs., Ivanovsky Cape, 2 km south of Grozovoe, small stream, 2 vi 2015 (Yu Sundukov), coll. CSR; 1 ex., near cordon Ivanovsky, 11 vi 2011 (A Matalin), coll. CAP; 1 ex., 2.5 km south of Ivanovsky Cape, 11 vi 2011 (A Matalin), coll. CAP; 1 ex., west of Bystry Stream, the sea coast, 27–28 v 2013 (Yu Sundukov, L Sundukova), coll. CSR. Shikotan Isl.: 8 exs., Tserkovnaya Bay, 24 v–10 vi 2012 (Yu Sundukov), coll. CAP. Yuri Isl.: 2 exs., east coast of middle cape, 26 viii– 4 ix 2016 (Yu Sundukov, L Sundukova), coll. CAP. Tanfiliev Isl.: 1 ex., Zorkaya Bay, 7 vi 2017 (Yu Sundukov), coll. MPU. Polonsky Isl.: 7 exs., Moryakov Bay, 2 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., Udobnaya Bay, 6 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU.

Published records. Southern Kuril Islands (Shatrovskiy 1989b), Kunashir Isl.: Mendeleevo (Shatrovskiy 1992); Southern Kuril

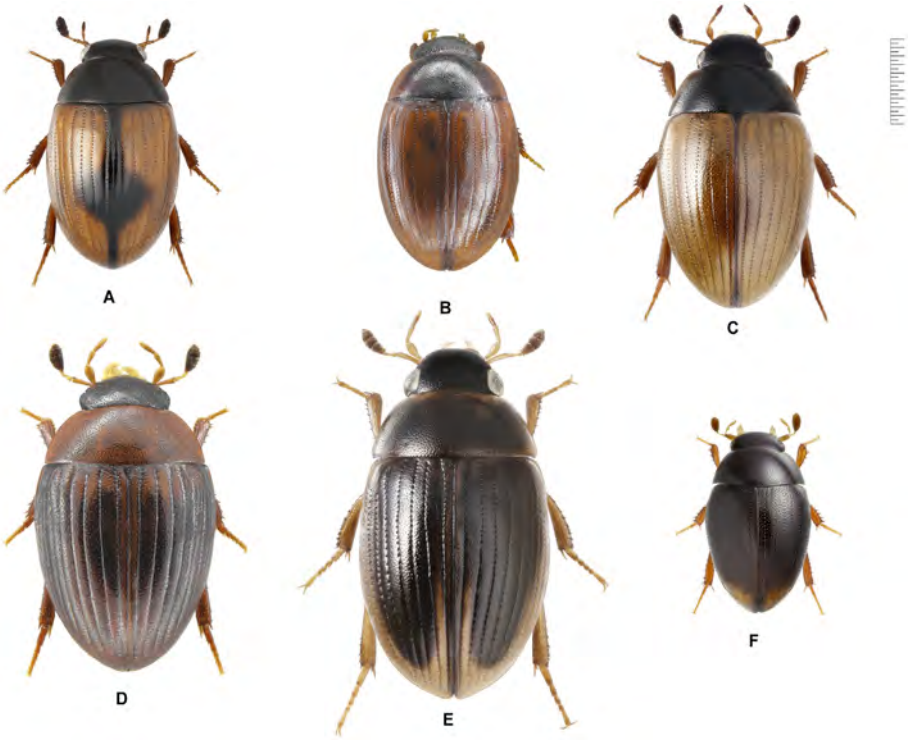

Figure 13. Hydrophilidae of South Kurils: A, *Cercyon unipustulatus*; B, *C. ustus*; C, *C. verus*; D, *C. vagus*; E, *C. laminatus*; F, *C. analis*. <scale bar: 1.0 mm (A–F)>.

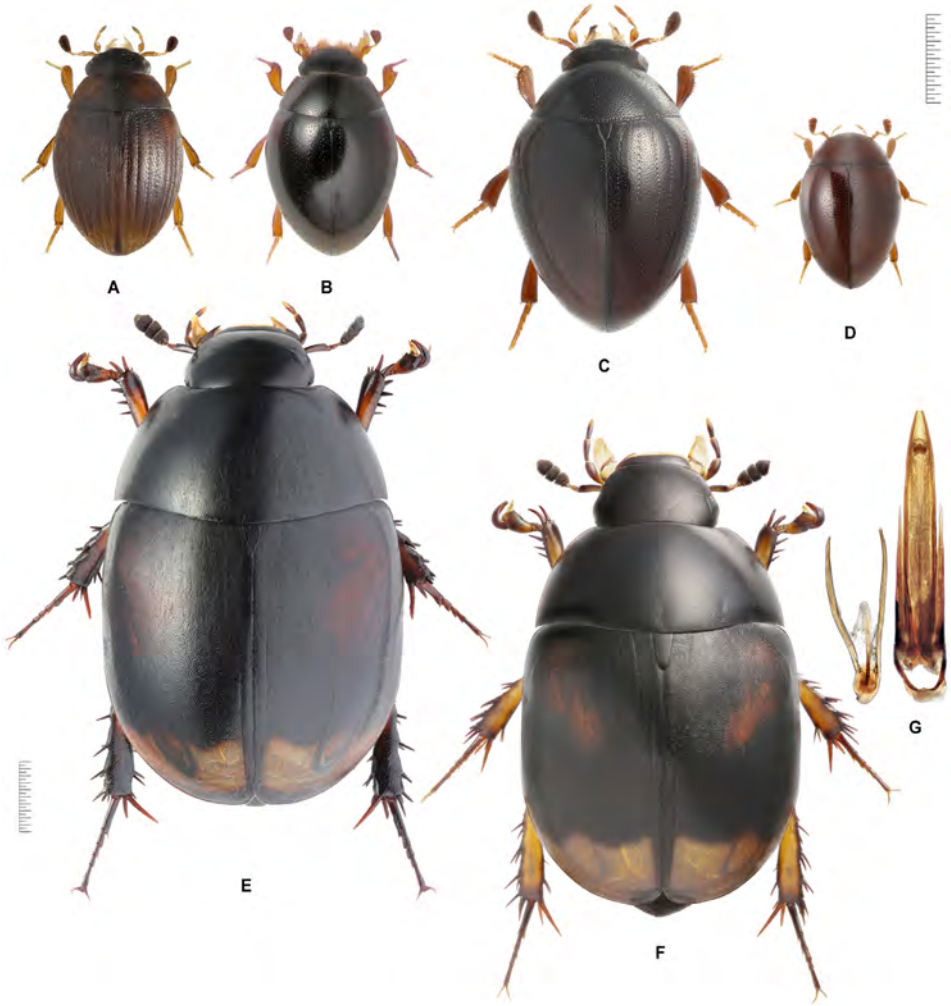

Figure 14. Hydrophilidae of South Kurils: A, *Cryptopleurum subtile*; B, *Megasternum japonicum*; C, *Pachysternum haemorrhoum*; D, *Pacrillum lucidum*; E, *Sphaeridium lunatum*; F–G, *S. scarabaeoides*: F, habitus, G, male genitalia. <scale bar: 1.0 mm (A–F)>.

Islands (Kirejtshuk and Shatrovskiy 2001b), Kunashir Isl.: Sernovodsk (Ryndevich 2001); Kuril Islands: Urup Isl.: Otkrytyi Bay; near Shabalina River; Barkhatny Bay; near Lopukhovaya River; Tetyva Bay; Negodnaya Bay; near Vestrechnyi River; Tokotan; Chirpoi [Chirpoy] Isl.: Peschanaya Bay; Simushir Isl.: Srednaya Bay (Ôhara and Jia 2006).

Collecting notes. Decomposing seaweed on the sea coasts, occasionally in parts of the mouth of streams and rivers.

21. *Cercyon* (*Cercyon*) *olibrus* Sharp, 1874
(Figures 11G, 21C)

Material examined. Kunashir Isl.: 1 ex., the sea coast between Saratovskaya and Tyatina rivers, 21–24 vii 2014 (Yu Sundukov), coll. MPU; 4 exs., lower reaches of Saratovskaya River, 14–15 vii 2014 (Yu Sundukov, L Sundukova), coll. MPU, CSR; 1 ex., lower reaches of Saratovskaya River, 22–25 vii 2014 (Yu Sundukov), coll. MPU; 1 ex., near Tretiyakovo, valley of Valentiny Stream, 10 viii 2011 (K Makarov), coll. MPU; 1 ex., south coast of Vodopadny Cape, freshwater mire, 22 viii 2011 (K Makarov), coll. MPU; 1 ex., valley of Andreyeva River, ~1.5 km upstream of mouth, window trap, 19–23 viii 2011 (K Makarov), coll. MPU; 4 exs., the mouth of Bystry Stream, 18 viii 2011 (K Makarov), coll. MPU; 1 ex., near Dubovoe, 25–26 vii 2017 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., near Dubovoe, shore of Khlebnikova River, 21 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 26 exs., near Golovnino, at light, 20 viii 2017 (K Makarov, Yu Sundukov), coll. MPU, CAP.

Published records. Kunashir Isl. (Shatrovskiy 1989b; Ôhara and Jia 2006).

Collecting notes. Decaying fungi and plant debris in river valleys, less often on mire shores, in droppings, or on dead fish at river mouths (Figure 4E).

22. *Cercyon* (*Cercyon*) *quisquilius* (Linnaeus, 1760)
(Figures 12A, 21D)

Material examined. Kunashir Isl.: 9 exs., near Golovnino, at light, 20 viii 2017 (K Makarov, Yu Sundukov), coll. CAP, MPU.

Published records. Kuril Islands: Iturup Isl.: Rubetsu (Ôhara and Jia 2006); Kunashir Isl.: Alekhino (Ryndevich et al. 2017).

Collecting notes. Collected at light at the border of floodplain areas with regular grazing of cows.

23. *Cercyon* (*Cercyon*) *rotundulus* Sharp, 1884
(Figures 12B, 21E)

Material examined. Kunashir Isl.: 1 ex., r. [river] Severyanka, 15 vii [19]88, (Kovalev), coll. CAK; 1 ex., Okhotskoe pober. [coast of the Sea of Okhotsk], m. [cape] Stolbchaty, 25 vii 1985, (NB Nikitskiy), coll. ZMMU.

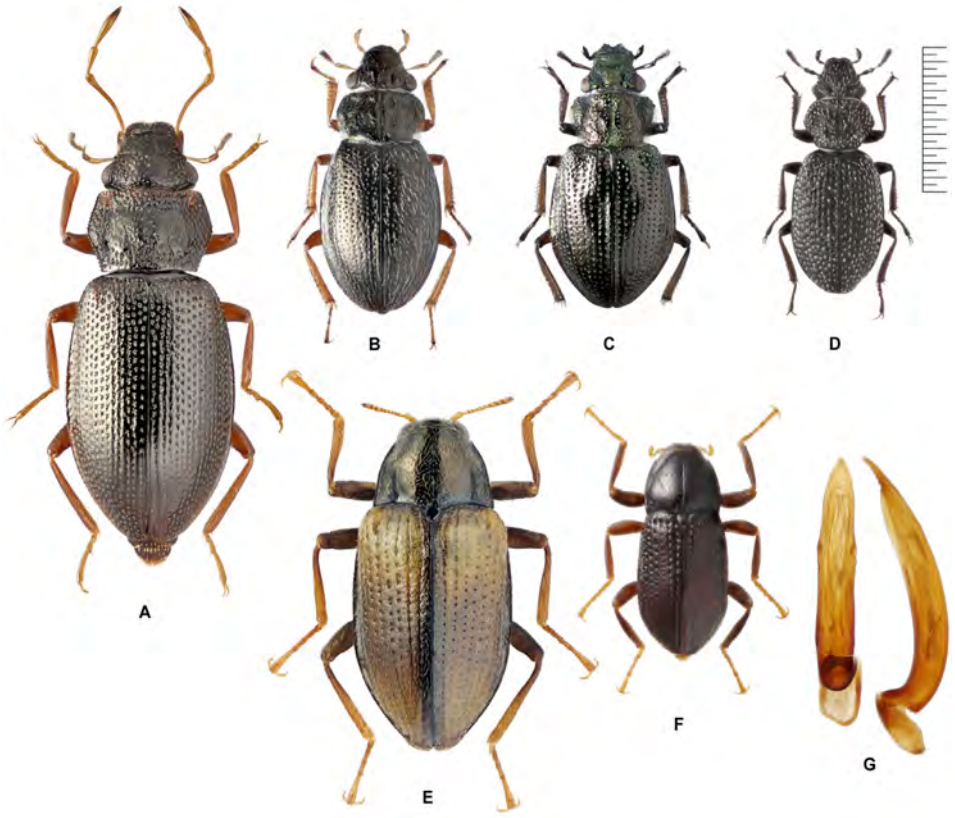

Figure 15. Hydraenidae and Elmidae of South Kurils: A, *Hydraena riparia*; B, *Ochthebius inermis*; C, *O. hasegawai*; D, *O. yoshitomii*; E, *Heterlimnius hasegawai*; F, *Zaitzeviaria gotoi*: F, habitus, G, male genitalia. <scale bar: 1.0 mm (A–F) >

Published records. Kunashir Isl., Mendeleevo (Ryndevich 2006); Kuril Islands: Kunashir Isl. (Ôhara and Jia 2006).

Collecting notes. Collected at light and in decaying plant remains, including the sea coast.

24. *Cercyon* (*Cercyon*) *saluki* Ryndevich, 1998
(Figures 12F, 21G)

Material examined. Kunashir Isl.: 1 ex., bay east of Shpil Rock, 2 viii 2013 (K Makarov), coll. CAP; 12 exs., ravine ~ 1 km SE Dokuchaevo, 1 viii 2013 (K Makarov, Yu Sundukov), coll. MPU, CAP; 4 exs., lower reaches of Dalny Stream, 9 viii 2013 (K Makarov, Yu Sundukov), coll. CAP; 4 exs., hills between Severyanka and Zolotaya rivers, 1 vii 2008 (K. Makarov), coll. MPU, CAP; 4 exs., lower reaches of Zolotaya River, 14 viii 2013 (K Makarov), coll. CAP; 2 exs., lower reaches of Saratovskaya River, 10–16 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR; 1 ex., lower reaches of Saratovskaya River, 14–15 vii 2014 (Yu Sundukov, L Sundukova), coll. MPU; 4 exs., lower reaches of Saratovskaya River, 12–18 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR; 19 exs., hills south of Stolbchaty Cape, 21 vii 2013 (K Makarov, Yu Sundukov, L Sundukova), coll. MPU, CSR; 15 exs., near Tretiyakovo, valley of Valentiny Stream, 10 viii 2011 (K Makarov), coll. MPU, CAP; 1 ex., near Mendeleevo, 16–17 ix 1975 (BA. Korotyaev), coll. CSR; 6 exs., cordon Alekhinsky, 1 viii 2011 (SA Kurbatov), coll. CSK, CSR; 1 ex., cordon Alekhinsky, Danilovo

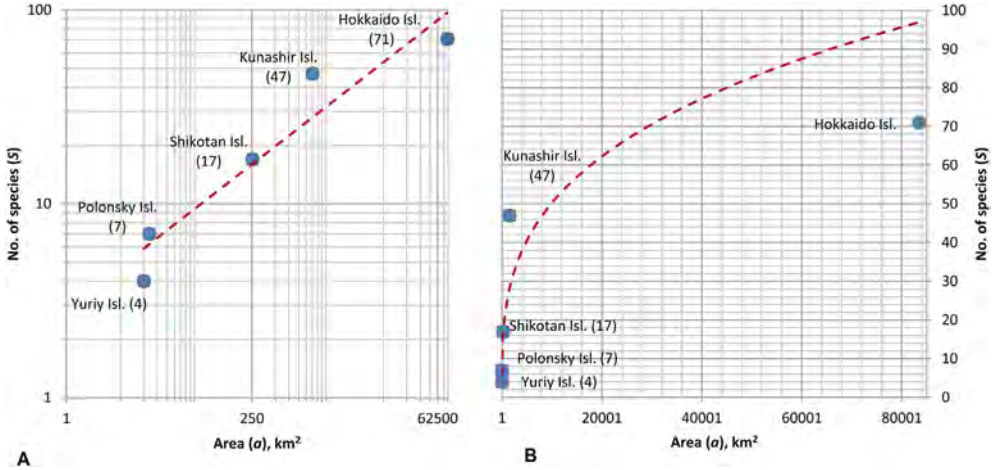

Figure 16. The number of species from studied Polyphaga families in Kunashir and the islands of the Lesser Kuril Chain. Graphs in logarithmic (A) and (B) linear coordinates. The dependence of the number of species on the island area is well approximated by the power function $S = 2{,}8848a^{0{,}3102}$ ($R^2 = 0{,}910$).

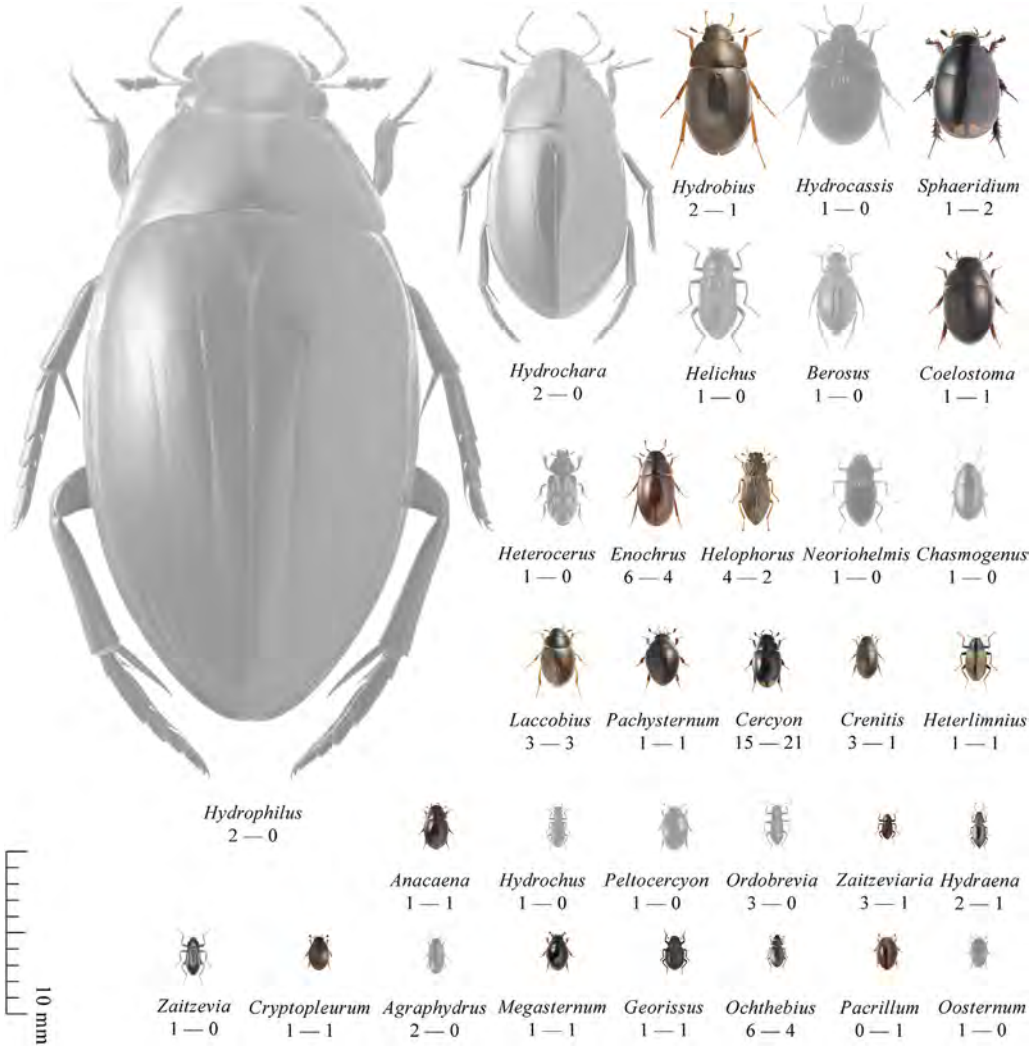

Figure 17. Comparison of the dimensional structure of the aquatic Polyphaga fauna of Kunashir and Hokkaido. The left number under the generic name refers to Hokkaido, the right one refers to Kunashir. Genera absent in Kunashir are given in semitones. <scale bar: 10.0 mm>.

Natural Boundary, 8 viii 2009 (K Makarov, A Zaitsev), coll. CSR; 1 ex., cordon Alekhinsky, north-west shore of Lake Peschanoe, 7 viii 2011 (K Makarov), coll. CAP; 31 exs., hills south-west of Lake Peschanoe, 21 viii 2011 (K Makarov, A Zaitsev), coll. MPU, CAP; 27 exs., middle reaches of the Alekhina River, 4 viii 2011 (K Makarov, A Zaitsev), coll. MPU, CAP; 4 exs., hills 2.5 km west of Sernovodsk, 20 viii 2011 (A Zaitsev), coll. MPU; 1 ex., valley of Andreyeva River, ~1.5 km upstream of mouth, window trap, 19–23 viii 2011 (K Makarov), coll. MPU; 2 exs., cordon Ozerny, 21–28 vii, 1 viii 2011 (SA Kurbatov), coll. CSK, CSR; 2 exs., the caldera of Golovnin Volcano, near Lake Goryacheye, 14–17 vii 2015 (Yu Sundukov, L Sundukova), coll. CSR; 3 exs., Ozernaya River valley, 15 vii 2008 (K Makarov), coll. CAP; 2 exs., Ozernaya River valley, 27 vii 2011 (A Zaitsev), coll. CAP; 5 exs., middle reaches of Ozernaya River, 16 vii 2008 (K Makarov), coll. CAP; 1 ex., 1.5 km south-west mouth of Ozernaya River, the sea coast, 26 vii 2011 (K Makarov), coll. MPU; 1 ex., 8 km west-south-west of Puzanova Cape, 21 viii 2011 (K Makarov), coll. CAP; 1 ex., 2 km south-east of Ivanovsky Cape, 16 viii 2011 (A Zaitsev), coll. MPU; 1 ex., the mouth of Bystry Stream, 18 viii 2011 (K Makarov), coll. MPU. Shikotan Isl.: 1 ex., Tserkovnaya Bay, 23 ix–3 x 2012 (Yu Sundukov), coll. CAP.

Published records. Kunashir Isl.: Mendeleevo (Ryndevich 1998, 2006); Kunashir Isl. (Ôhara and Jia 2006).

Collecting notes. In decaying plant remains, fungi and under the bark of the rotten alburnum of *Ulmus*, occasionally in decomposing weed on the shores of lakes and the sea (Figure 4C). Some specimens were collected at light and by window trap (Figure 4D).

25. *Cercyon* (*Cercyon*) *setulosus* Sharp 1884
(Figures 12E, 21H)

Material examined. Kunashir Isl.: 1 ex., stream mouth ~1 km east of Dokuchaevo, 4 viii 2013 (L Sundukova), coll. CAP; 2 exs., hills between Severyanka and Zolotaya rivers, 1 vii 2008 (K Makarov), coll. CAP; 1 ex., sandy terraces near Lake Valentiny, 16 viii 2017 (K Makarov), coll. MPU; 2 exs., near cordon Saratovsky, 2–4 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR; 1 ex., near Lake Il'inskoye, 17 viii 2017 (K Makarov), coll. MPU; 2 exs., Yuzhnokurilsky Cape, 20–22 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., hills south of Stolbchaty Cape, 21 vii 2013 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., near Mendeleevo, 15th km, sulfur-spring, 29 vi 1985 (NB Nikitskiy), coll. CSR; 1 ex., the mouth of the stream between Stolbchaty Cape and Krugly Cape, 12 viii 2011 (K Makarov), coll. CAP; 38 exs., cordon Alekhinsky, 1 viii 2011 (SA Kurbatov), coll. CSK, CSR; 2 exs., cordon Alekhinsky, 7 viii 2011 (K Makarov, A Zaitsev), coll. CAP; 2 exs., cordon Alekhinsky, a small lake, 7 viii 2011 (K Makarov), coll. CAP; 1 ex., cordon

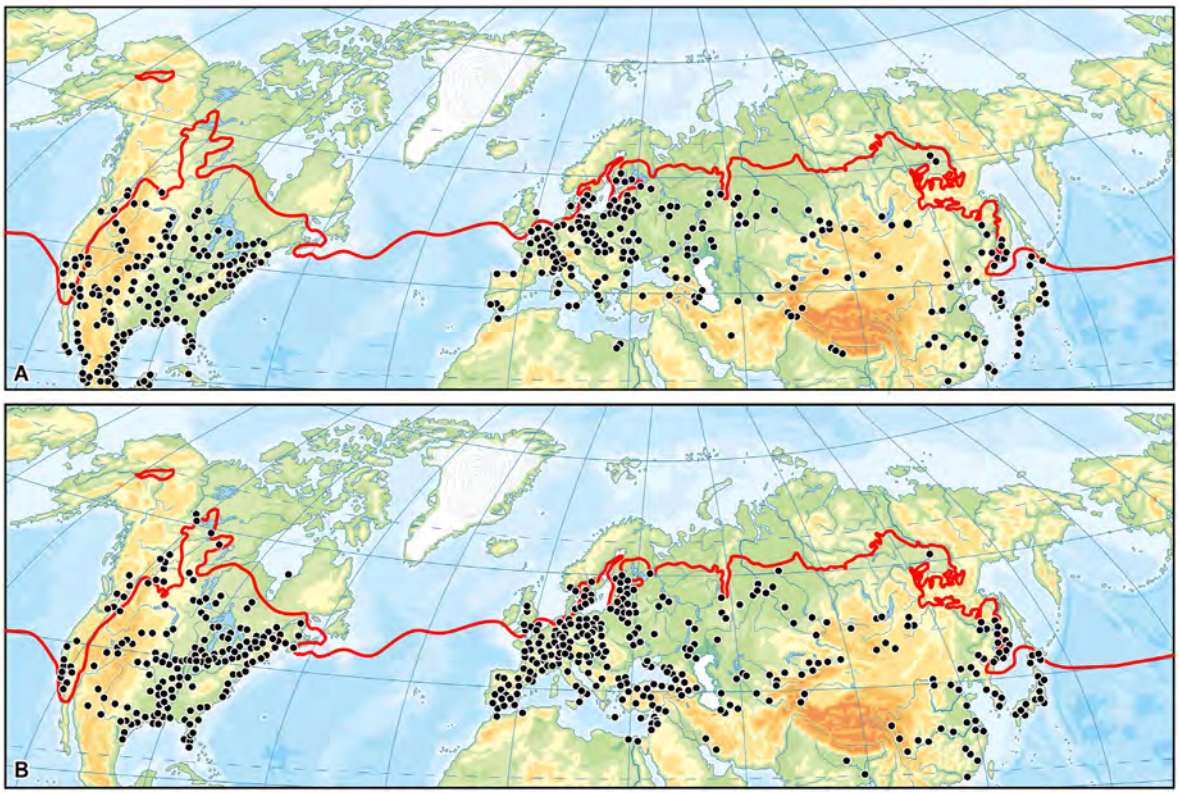

Figure 18. Distribution of species of the genera *Hydrophilus* (A) and *Hydrochara* (B) in the northern hemisphere according to literature data. Isotherm of July +16°C is given according to: *Physico-geographical atlas of the world* 1964, with simplifications.

Alekhinsky, north-west shore of Lake Peschanoe, 7 viii 2011 (K Makarov), coll. CAP; 1 ex., lakes in the valley south of western shore of Lake Peschanoe, 8 viii 2011 (K Makarov), coll. CAP; 1 ex., Sernovodsk, 28 vi 1985 (NB Nikitskiy), coll. CSR; 2 exs., the mouth of Belkina River, ocean coast, under log and drift-wood, 20 v 2011 (A Matalin), coll. CAP; 3 exs., south coast of the Alekhina Cape, 31 vii 2011 (K Makarov), coll. CAP; 22 exs., bay south-west of Odinoky Stream, 3 viii 2011 (K Makarov), coll. CAP; 5 exs., the sea coast near Okhotskoe Natural Boundary, 23 vii 2011 (K Makarov), coll. CAP; 3 exs., cordon Ozerny, 21–28 vii, 1 viii 2011 (SA Kurbatov), coll. CSK, CSR; 6 exs., 0.3 km south-west from mouth of Ozernaya River, h ~ 125, 27 vii 2011 (K Makarov), coll. CAP; 26 exs., 1.5 km south-west mouth of Ozernaya River, the sea coast, 26 vii 2011 (K Makarov), coll. CAP, MPU; 2 exs., the mouth of stream, 1 km north of Blizhny Island, 26 vii 2011 (K Makarov), coll. CAP; 2 exs., Ivanovsky Cape, 11–16 vi 2013 (Yu Sundukov, L Sundukova), coll. CSR; 7 exs., south coast of Ivanovsky Cape, 11 vi 2011 (A Matalin), coll. CAP; 1 ex., west of Bystry Stream, the sea coast, 27–28 v 2013 (Yu Sundukov, L Sundukova), coll. MPU; 12 exs., watershed of Golovnina and Khlebnikova rivers, 15–17 vi 2015 (Yu Sundukov), coll. MPU, CSR; 9 exs., the mouth of Sennaya River, 2.5 km east of Paltusovo, 17 vi 2011 (A Matalin), coll. CAP; 47 exs., the mouth of Sennaya River, 2.5 km east of Paltusovo, 11 viii 2011 (K Makarov), coll. CAP. Yuri Isl.: 1 ex., east coast of middle cape, 26. viii–04 ix 2016 (Yu Sundukov, L Sundukova), coll. CAP. Polonsky Isl.: 34 exs., Moryakov Bay, 2 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU; 6 exs., Udobnaya Bay, 6 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU. Tanfiliev Isl.: 1 ex., Zorkaya Bay, 7 vi 2017 (Yu Sundukov), coll. MPU.

Published records. Southern Kuril Islands (Shatrovskiy 1989b), Southern Kuril Islands: Urup Isl., Kunashir Isl., Shikotan Isl. (Shatrovskiy 1992); Southern Kuril Islands (Kirejtshuk and Shatrovskiy 2001b); Kuril Islands: Kunashir Isl., Shikotan Isl., Urup Isl.: Natalie Bay; near Obzhitaya River, Novo-Kurilskaya Bay; near Bystraya River; Negodnaya Bay; near Vestrechnyi River; Tetyva Bay; Ekaruma [Ekarma] Isl.: Shpilevoy Cape (Ôhara and Jia 2006).

Collecting notes. Decomposing algae on the sea coasts, rarely in debris on shores of freshwater lakes.

26. *Cercyon* (*Cercyon*) *sundukovi* Ryndevich, Hoshina & Prokin, 2019
(Figures 12F, 21I)

Published records. Kunashir Isl.: lower reaches of Saratovskaya River, cordon Alekhinsky (Ryndevich et al. 2019).

27. *Cercyon* (*Cercyon*) *symbion* Shatrovskiy, 1989
(Figures 12G, 22A)

Material examined. 1 ex., Kunashir Isl.: stream mouth ~1 km east of Dokuchaevo, 4 viii 2013, (L Sundukova), coll. CAP; 3 exs., near Lake Il'inskoye, 17 viii 2017 (K Makarov), coll. MPU; 1 ex., cordon Alekhinsky, 7 viii 2011 (K Makarov, A Zaitsev), coll. CAP; 1 ex., bay south-west of Odinoky Stream, 3 viii 2011 (K Makarov), coll. CAP; 1 ex., cordon Andreyevsky, 22 v 2011 (A Matalin), coll. CAP; 2 exs., the mouth of Belkina River, ocean coast, under log and drift-wood, 20 v 2011 (A Matalin), coll. CAP; 1 ex., stream mouth 2 km south of Ivanovsky Cape, 11 vi 2011 (A Matalin), coll. CAP; 2 exs., 2.5 km south of Ivanovsky Cape, 11 vi 2011 (A Matalin), coll. CAP. Yuri Isl.: 17 exs., east coast of middle cape, 26 viii–04 ix 2016 (Yu Sundukov, L Sundukova), coll. CAP. Polonsky Isl.: 31 exs., Moryakov Bay, 2 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., south-western cape, 5 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU; 45 exs., Udobnaya Bay, 6 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU; 5 exs., outpost, 29 viii–9 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU.

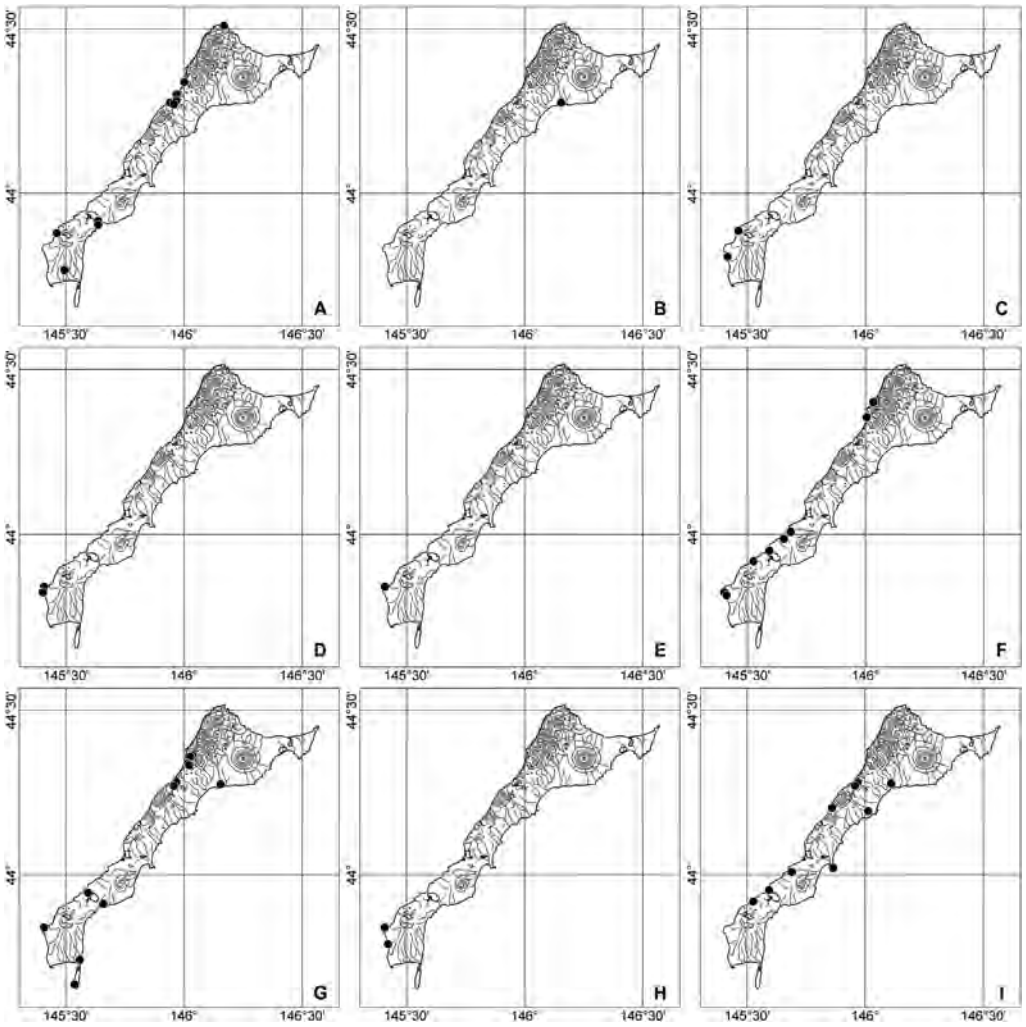

Figure 19. Distribution of Helophoridae, Georissidae and Hydrophylidae in Kunashir Island: A, *Helophorus matsumurai*; B, *H. nigricans*; C, *Georissus canalifer*; D, *Laccobius bedeli*; E, *L. kunashiricus*; F, *L. oscillans*; G, *Hydrobius fuscipes*; H, *Anacaena asahinai*; I, *Crenitis apicalis*.

Published records. Southern Kuril Islands (Shatrovskiy 1989b); Kunashir Isl.: Goryachiy Plyazh, Sernovodsk, Yuzhno-Kurilsk; Shikotan Isl.: Malokurilsk, [Malokurilskoye]; Iturup Isl. (Shatrovskiy 1992); Southern Kuril Islands (Kirejtshuk and Shatrovskiy 2001b), Kunashir Isl.: Sernovodsk, Goriachiy Klyuch (Ryndevich 2001); Kuril Islands: Kunashir Isl., Shikotan Isl., Urup Isl.: Otkrytyi Bay; near Shabalina River; Natalie Bay; near Obzhitaya River; Negodnaya Bay; near Vestrechnyi River; Iturup Isl., Alaid [Atlasov] Isl.: Alaidskaya Bay, Kharimkotam Isl.: Severgina Bay, Paramushir Isl.: Murakani-wan, Brynkhanovo Bay; Shelekhova Bay; Shelekhovo; Putyatino; Shiashkotan Isl.: Zakatnaya Bay; Simushir Isl.: Srednaya Bay; Shumshu Isl.: 2 km south of Pochtareva Cape (Ôhara and Jia 2006).

Collecting notes. Decomposing seaweed on coasts, often on sandy beaches.

28. *Cercyon* (*Cercyon*) *unipunctatus* (Linnaeus, 1758)

(Figures 12H, 22B)

Published records. Kunashir Isl.: Alekhino Outpost, erroneously listed as "cordon Alekhinskiy" (Ryndevich et al. 2017).

Collecting notes. Cow excrements.

29. *Cercyon* (*Cercyon*) *unipustulatus* Nakane, 1982
(Figure 13A, 22C)

Material examined. Kunashir Isl.: 1 ex., lower reaches of Saratovskaya River, 12–18 vii 2014 (Yu. Sundukov), coll. MPU; 2 exs., Ivanovsky Cape, Grozovoe, 11–16 vi 2013 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., 2 km north of Dubovoe, 24 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 10 exs., near Golovnino, at light, 20 viii 2017 (K Makarov, Yu Sundukov), coll. MPU.

Published records. Kunashir Isl.: cordon Alekhinsky (Ryndevich et al. 2017).

Collecting notes. Collected at light and in cow and horse excrements.

30. *Cercyon* (*Cercyon*) *ustus* Sharp, 1874
(Figure 13B, 22D).

Published records. Kunashir Isl.: riv. [River] Severyanka (Ryndevich 2014).

31. *Cercyon* (*Cercyon*) *versus* Shatrovskiy, 1989
(Figure 13C, 22E)

Material examined. Kunashir Isl.: 4 exs., lower reaches of Saratovskaya River, 10–16 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR, MPU; 2 exs., lower reaches of Saratovskaya River, 14–15 vii 2014 (Yu Sundukov, L Sundukova), coll. CSR, MPU; 22 exs., lower reaches of Saratovskaya River, 12–18 vii 2014 (Yu Sundukov), coll. MPU, CSR; 3 exs., near cordon Saratovsky, 2–4 vii 2014 (Yu

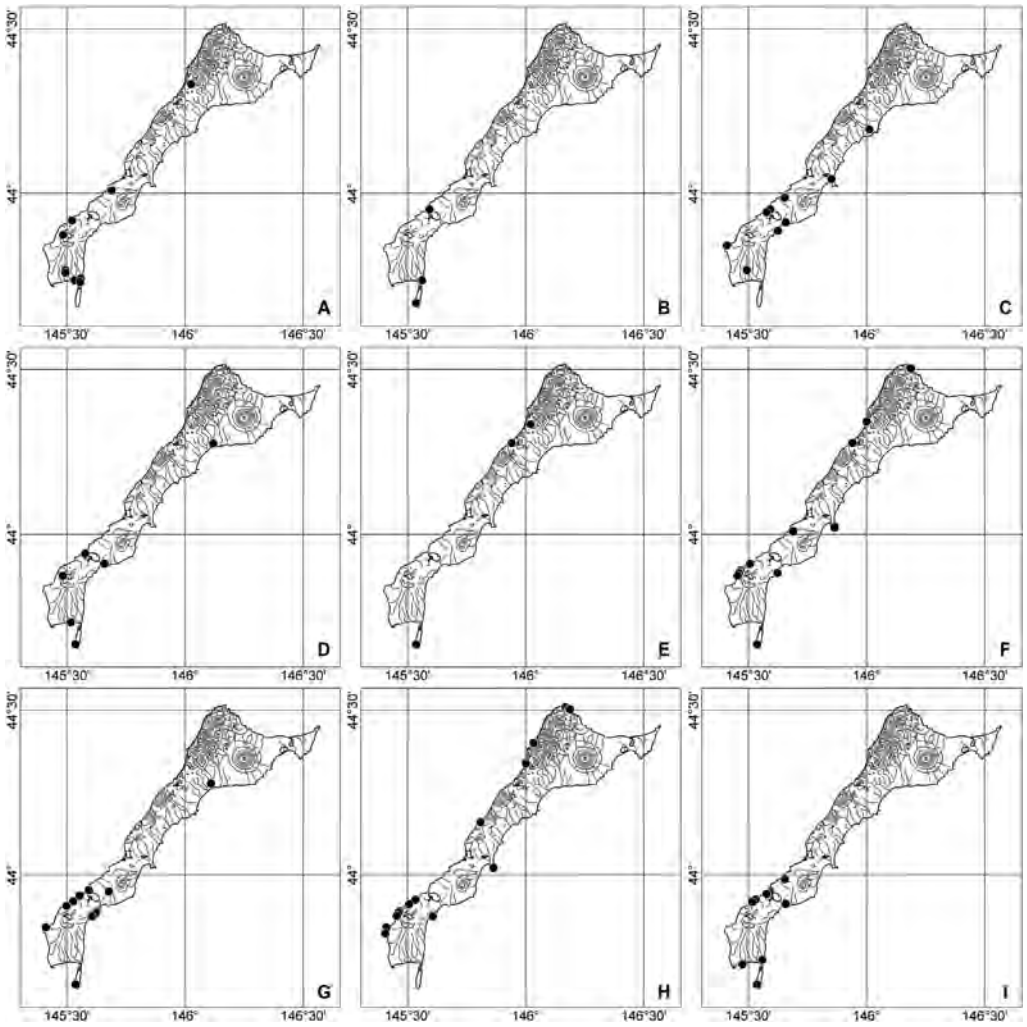

Figure 20. Distribution of Hydrophylidae in Kunashir Island: A, *Enochrus simulans*; B, *E. testaceus*; C, *E. vilis*; D, *E. affinis*; E, *Coelostoma orbiculare*; F, *Cercyon algarum*; G, *C. aptus*; H, *C. dux*; I, *C. korbianus*.

Sundukov, L Sundukova), coll. MPU, CSR; 9 exs., the mouth of Asin Stream, under bear droppings, 30 v 2011 (A Matalin), coll. CAP; 1 ex., hills south of Lake Pehchanoe, 21 viii 2011 (A Zaitsev), coll. CAP; 12 exs., hills south-west of Lake Peschanoe, 2 viii 2011 (K Makarov, A Zaitsev), coll. CAP; 1 ex., the caldera of Golovnin Volcano, near Lake Goryacheye, 14–17 vii 2015 (Yu Sundukov, L Sundukova), coll. CSR; 1 ex., Ozernaya River valley, window traps on *Abies* sp., 22–29 vii 2011 (K Makarov), coll. CAP; 1 ex., Ivanovsky Cape, 18–21 ix 2014 (Yu Sundukov), coll. MPU; 1 ex., Ivanovsky Cape, 2 km south of Grozovoe, small stream, 2 vi 2015 (Yu Sundukov), coll. MPU; 1 ex., Ivanovsky Cape, Grozovoe, 11–16 vi 2013 (Yu Sundukov, L Sundukova), coll. MPU; 2 exs., the mouth of Bystry Stream, 18 viii 2011 (K Makarov), coll. CAP. Polonsky Isl.: 2 exs., southwestern cape, 5 ix 2017 (Yu Sundukov, L Sundukova), coll. MPU.

Published records. Kunashir Isl.: (Shatrovskiy 1989b); Kunashir Isl.: Lagunnoe, Filatova River, klyutsh [spring] Zolotoy, Mendeleevo; Shikotan Isl. (Shatrovskiy 1992); Kunashir Isl.: Lesnaya River, Kisly Stream, Iturup Isl. Rubetsu, Simushir Isl.: Kitoboynaya Bay, Urup Isl.: Novo-kurilskaya Bay; near Bystraya River; Smuglyi Bay; near Rybnaya River; Katayeva Bay; near Van-der-linda lighthouse (Ôhara et Jia 2006); Kunashir Isl.: Sernovodsk; Lake Peschanoe, Ivanovsky Cape, lower reaches of Saratovskaya River, Lake Goryacheye, Simushir Isl.: Kitoboynaya Bay; Urup Isl.: Rybnaya River, Smugly Bay, Novo-Kurylsk Bay (Ryndevich et al. 2017).

Collecting notes. Decaying plant remains, decaying fungi, occasionally in bear droppings in river valleys and on the sea coast.

32. *Cercyon* (*Clinocercyon*) *retius* Ryndevich & Prokin, 2017 (Figure 12C, 21F).

Published records. Kunashir Isl.: type material localities (Ryndevich and Prokin 2017).

Collecting notes. Excrements, decaying fungi, sap of trees, rarely the mire shores.

33. *Cercyon* (*Conocercyon*) *vagus* Sharp, 1884 (Figure 13D, 22F)

Material examined. Kunashir Isl.: 9 exs., lower reaches of Saratovskaya River, 12–18 vii 2014 (Yu Sundukov, L Sundukova), coll. MPU, CSR; 1 ex., near Mendeleevo, 15 vii 1985 (NB Nikitskiy), coll ZMMU; 1 ex., near Mendeleevo, 12–16 ix 1975 (B Korotyaev), coll. CSR; 1 ex., hills south of Lake Peschanoe, 8 vii 2008 (K Makarov), coll. MPU; 1 ex., hills 2.5 km west of Sernovodsk, 20 viii 2011 (A Zaitsev), coll. MPU; 1 ex., cordon Ozerny, 21–28 vii, 1 viii 2011 (SA Kurbatov), coll. CSK; 1 ex., Ozernaya River valley, window traps on *Abies* sp., 22–29 vii 2011 (K Makarov), coll. MPU; 1 ex., 15 km south of Sernovodsk, 7 vi [19]93 (IM Kerzhner), coll. CSR. Shikotan Isl.: 1 ex., Malokurilsk, 20 vi 1973 (IM Kerzhner), coll. ZISP; 2 exs., valley of Otrada River, h ~ 45, 21 vi 2011 (I Melnik), coll. MPU.

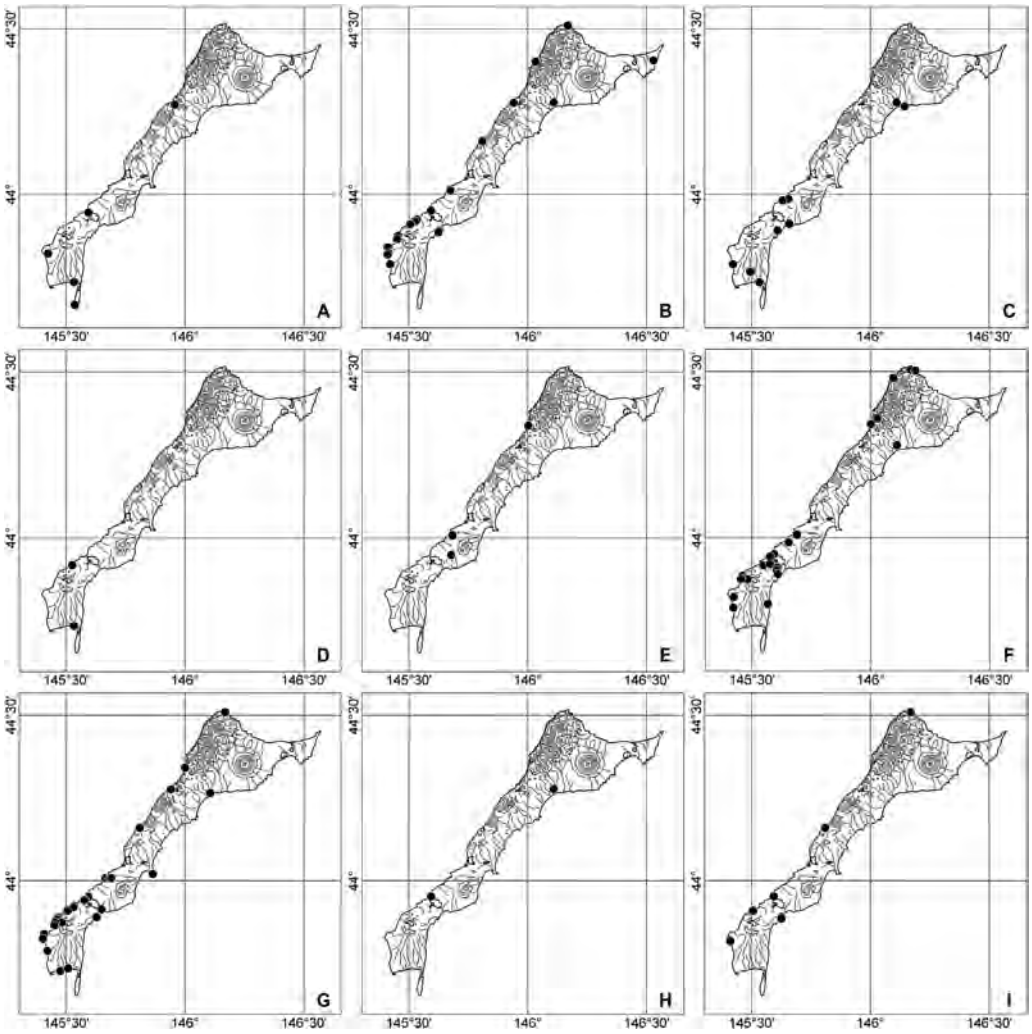

Figure 21. Distribution of Hydrophylidae in Kunashir Island: A, *Cercyon marinus*; B, *C. numerosus*; C, *C. olibrus*; D, *C. quisquilius*; E, *C. rotundulus*; F, *C. retius*; G, *C. saluki*; H, *C. setulosus*; I, *C. sundukovi*.

Published records. Kunashir Isl. (Shatrovskiy 1989b); Kunashir Isl. (Ôhara and Jia 2006); Kunashir Isl.: Mendeleevo, Shikotan Isl.: Malokurilsk (Ryndevich 2007).

Collecting notes. Decaying plant remains and fungi, more often in valley forests.

34. *Cercyon* (*Paracercyon*) *analis* (Paykull, 1798)
(Figure 13F, 22G)

Material examined. Kunashir Isl.: 1 ex., Yuzhno-Kurilsk, 7 vii 1985 (SV Saluk), coll. MPU; 1 ex., south coast of Vodopadny Cape, freshwater mire, 22 viii 2011 (K Makarov), coll. MPU.

Published records. Kunashir Isl.: Mendeleevo (Ryndevich 2003).

Collecting notes. Decaying plant remains and wet soil on shores of freshwater mire near the sea coast.

35. *Cercyon* (*Paracycreon*) *laminatus* Sharp, 1873
(Figures 13E, 22H)

Material examined. Kunashir Isl.: 1 ex., south coast of Vodopadny Cape, freshwater mire, 22 viii 2011 (K Makarov), coll. CAP; 9 exs., the mouth of Bystry Stream, 18 viii 2011 (K Makarov), coll. CAP; 7 exs., near Golovnino, at light, 20 viii 2017 (K Makarov, Yu Sundukov), coll. MPU.

Published records. Southern Kuril Islands (Shatrovskiy 1989b; Ôhara and Jia 2006); Kunashir Isl.: Mendeleevo (Ryndevich 2008).

Collecting notes. Decaying plant remains on shores of freshwater mires, sometimes on dead fish at stream mouths (Figure 4E).

* **36. *Cryptopleurum subtile*** Sharp, 1884
(Figures 14A, 22I)

Material examined. Kunashir Isl.: 1 ex., the sea coast near Lake Valentiny, 16 viii 2017 (Yu Sundukov), coll. MPU; 1 ex., lower reaches of Saratovskaya River, 12–18 vii 2014 (Yu Sundukov), coll. CAP; 1 ex., the caldera of Golovnin Volcano, near Lake Goryacheye, 14–17 vii 2015 (Yu Sundukov, L Sundukova), coll. MPU; 3 exs., Ivanovsky Cape, 0.5 km east of Grozovoe, 19–21 ix 2013 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., Ivanovsky Cape, 2 km south of Grozovoe, small stream, 2 vi 2015 (Yu Sundukov), coll. CSR; 16 exs., the mouth of Bystry Stream, 18 viii 2011 (K Makarov), coll. CAP.

Collecting notes. Decaying plant remains, sometimes on the sea coasts.

37. *Megasternum japonicum* Shatrovskiy, 1989
(Figure 14B, 23A).

Published records. Kunashir Isl.: south-east vicinities of Lake Peschanoye (Fikáček et al. 2012b).

Collecting notes. Decaying fungi.

38. *Pachysternum haemorrhoum* Motschulsky, 1866
(Figure 14C, 23B)

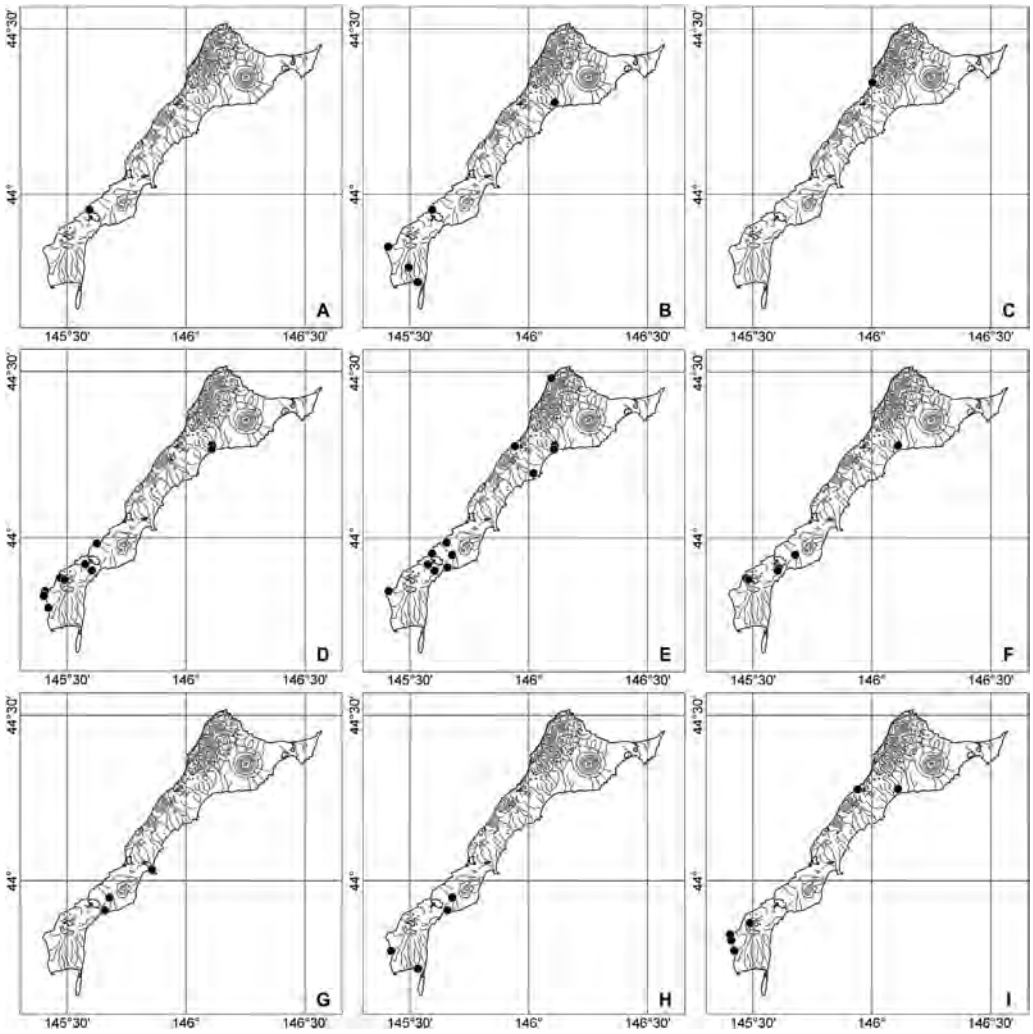

Figure 22. Distribution of Hydrophylidae in Kunashir Island: A, *Cercyon symbion*; B, *C. unipunctatus*; C, *C. unipustulatus*; D, *C. ustus*; E, *C. verus*; F, *C. vagus*; G, *C. analis*; H, *C. laminatus*; I, *Cryptopleurum subtile*.

Material examined. Kunashir Isl.: 1 ex., Yuzhno-Kurilsk, 6 vii 2013 (Yu Sundukov), coll. MPU; 1 ex., near Tretiyakovo, valley of Valentiny Stream, 10 viii 2011 (K Makarov), coll. CAP; 2 exs., the mouth of Asin Stream, 2 viii 2009 (K Makarov, A Zaitzev), coll. MPU; 1 ex., the mouth of Asin Stream, under bear droppings, 30 v 2011 (A Matalin), coll. CAP; 1 ex., hills south-west of Lake Peschanoe, 21 viii 2011 (A Zaitsev), coll. CAP; 2 exs., valley of Andreyeva River, ~1.5 km upstream of mouth, in the litter, 23 v 2011 (A Matalin), coll. CAP; 1 ex., Alekhino Outpost, 3 viii 2008 (I Melnik), coll. MPU; 1 ex., 8 km west-south-west of Puzanova Cape, 21 viii 2011 (K Makarov), coll. CAP; 4 exs., the mouth of Bystry Stream, 18 viii 2011 (K Makarov), coll. CAP. Shikotan Isl.: 1 ex., Krabozavodskoe, 15–16 vi 2012 (Yu Sundukov), coll. CAP; 1 ex., Krabozavodskoe, 7 ix 2012 (Yu Sundukov, L Sundukova), coll. CAP.

Published records: Kunashir Isl., Shikotan Isl. (Shatrovskiy 1989b); Kunashir Isl., Shikotan Isl. (Ôhara and Jia 2006); Kuril Islands: Kunashir Isl., dolina ruchiya Asin U. Tretiyakovo [floodplane of the brook Asin, south Tretiyakovo], ca. 43°59′03″N 145°37′33″E; Alekhinskaya zastava [border station "Alekhinskaya"], ca. 43°55′06″N 145°31′34″E; Iturup Isl., vulk. Atsu-Napuri, zal. Dobroe nachalo [Atsu-Napuri volcano, Dobroe Nachalo gulf], dry meadow on hillocks, on a surface (Fikáček et al. 2012b).

Collecting notes. Decaying fungi and plant remains, less often on carrion, including dead fish, or in bear droppings.

39. *Pacrillum lucidum* (Shatrovskiy, 1989)
(Figures 14D, 23C)

Material examined: Kunashir Isl.: 1 ex., eastern shore of Lake Valentiny, 27 vi 2008 (K Makarov), coll. CAP; 1 ex., the caldera of Golovnin Volcano, near Lake Goryacheye, 16 vii 2015 (Yu Sundukov, L Sundukova), coll. MPU.

Published records. Kunashir Isl.: Mendeleevo (Shatrovskiy 1992); Kunashir Isl. (Ôhara and Jia 2006).

Collecting notes. Decaying fungi and birch sap flows.

Tribe Sphaeridiini Latreille, 1802

* **40. *Sphaeridium lunatum*** Fabricius, 1792
(Figure 14E, 23D)

Material examined: Kunashir Isl.: 1 ex., dunes north of Yuzhno-Kurilsk, 30 v 2017 (Yu Sundukov), coll. MPU; 1 ex., cordon Alekhinsky, 7 vii 2015 (Yu Sundukov, L Sundukova), coll. CSR; 2 exs., cordon Alekhinsky, 11–14 ix 2014 (Yu Sundukov), coll. CSR, MPU; 1 ex., flood-plain of the Alekhina River near mouth, 3 vi 2011 (K Makarov), coll. CAP; 1 ex., Alekhino Outpost, 5 viii 2011 (K Makarov), coll. CAP; 1 ex., near Alekhino Outpost, under cow dung on grass, 4 vi 2011 (A Matalin), coll. CAP; 1 ex., the caldera of Golovnin Volcano, near Lake Goryacheye, 14–17 vii 2015 (Yu Sundukov, L Sundukova), coll. CAP; 1 ex., the caldera of Golovnin

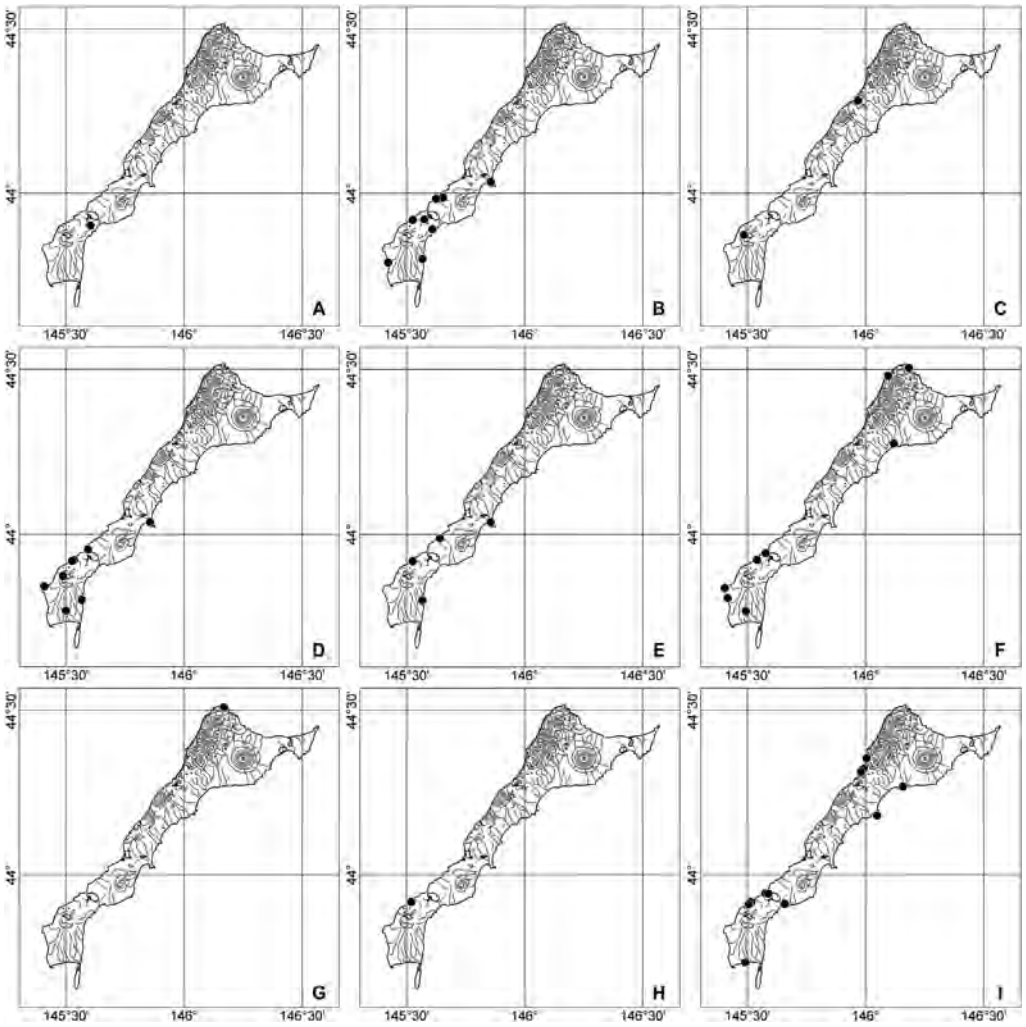

Figure 23. Distribution of Hydrophilidae and Hydraenidae in Kunashir Island: A, *Megasternum japonicum*; B, *Pachysternum haemorrhoum*; C, *Pacrillum lucidum*; D, *Sphaeridium lunatum*; E, *S. scarabaeoides*; F, *Hydraena riparia*; G, *Ochthebius inermis*; H, *O. hasegawai*; I, *O. yoshitomii*.

Volcano, south shore of Lake Goryacheye, 4–7 vii 2016 (Yu Sundukov, L Sundukova), coll. MPU; 5 exs., 8 km west-south-west of Puzanova Cape, 21 viii 2011 (K Makarov), coll. CAP; 2 exs., Ivanovsky Cape, 11–16 vi 2013 (Yu Sundukov, L Sundukova), coll. MPU; 2 exs., Ivanovsky Cape, 14–15 vii 2013 (Yu Sundukov, L Sundukova), coll. CSR; 2 exs., Cape Ivanovsky, 16–17 vii 2013 (Yu Sundukov), coll. MPU; 1 ex., Ivanovsky Cape, Grozovoe, 11–16 vi 2013 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., Ivanovsky Cape, Grozovoe, 14–15 vii 2013 (Yu Sundukov, L Sundukova), coll. CAP; 1 ex., near Dubovoe, 21 viii 2017 (K Makarov), coll. MPU. Shikotan Isl.: 4 exs., Krabozavodskoe, 7 ix 2012 (Yu Sundukov, L Sundukova), coll. CAP.

Collecting notes. Droppings of bears, cows, less often on carion.

* **41. *Sphaeridium scarabaeoides*** (Linnaeus, 1758)
(Figures 14F–G, 23E)

Material examined. Kunashir Isl.: 3 exs., dunes north of Yuzhno-Kurilsk, 30 v 2017 (Yu Sundukov), coll. MPU; 1 ex., the mouth of Tretiyakova Stream, bear droppings, 30 v 2011 (K Makarov), coll. CAP; 5 exs., Alekhino Outpost, 5 viii 2011 (K Makarov), coll. CAP; 1 ex., 8 km west-south-west of Puzanova Cape, 21 viii 2011 (K Makarov), coll. CAP. Shikotan Isl.: 3 exs., Krabozavodskoe, 7 ix 2012 (Yu Sundukov, L Sundukova), coll. CAP.

Collecting notes. Same as previous species.

Family Hydraenidae Mulsant, 1844
Subfamily Hydraeninae Mulsant, 1844
Tribe Hydraenini Mulsant, 1844

42. *Hydraena* (*Hydraena*) *riparia* Kugelann, 1794
(Figures 15A, 23F)

Material examined. Kunashir Isl.: 2 exs., south coast of Dokuchaeva Bay, 30 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 2 exs., 1 km north of Dalny Stream, 8–12 viii 2014 (K Makarov, Yu Sundukov), coll. MPU; 1 ex., watershed of Saratovskaya and Tyatina rivers, 5–8 vii 2014 (Yu Sundukov, L Sundukova), coll. MPU; 10 exs., cordon Alekhinsky, north-west shore of Lake Peschanoe, 7 viii 2011 (K Makarov), coll. CAP; 1 ex., southern slope of Alekhina Cape, window traps, 5 viii 2011 (K Makarov), coll. CAP; 1 ex., Ivanovsky Cape, 0.5 km east of Grozovoe, 2–4 vi 2013 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., Ivanovsky Cape, 0.5 km east of Grozovoe, 16–17 vi 2013 (Yu Sundukov, L Sundukova), coll. MPU; 3 exs., Ivanovsky Cape, 0.5 km east of Grozovoe, 23–26 v 2013 (Yu Sundukov, L Sundukova), coll. MPU; 1 ex., the mouth of Vodopadny Stream south of Ivanovsky Cape, 18 viii 2011 (K Makarov), coll. CAP; 3 exs., near Dubovoe, shore of Khlebnikova River, 21 viii 2017 (K Makarov, Yu Sundukov), coll. MPU. Shikotan Isl.: 7 exs., Tserkovnaya Bay, 24 v–10 vi 2012 (Yu Sundukov), coll. MPU; 3 exs., Tserkovnaya Bay, 24–25 vi 2012 (Yu Sundukov), coll. MPU.

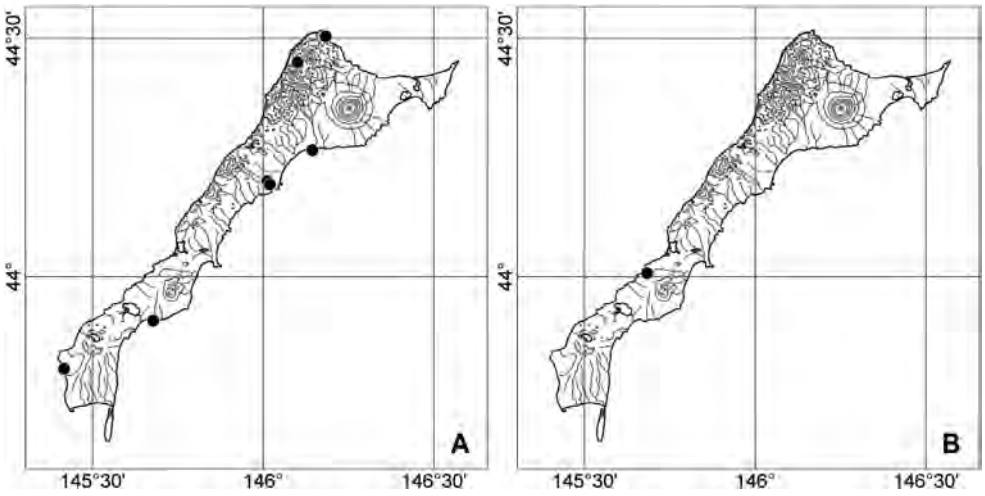

Figure 24. Distribution of Elmidae in Kunashir Island: A, *Heterlimnius hasegawai*; B, *Zaitzeviaria gotoi*.

Published records. Kunashir Isl. (Shatrovskiy 1989a; Palatov 2014).

Collecting notes. Rocky shores of streams and small rivers, sometimes in debris on the lake shores.

Subfamily Ochthebiinae C.G. Thomson, 1860

* **43. *Ochthebius* (*Ochthebius*) *hasegawai*** Nakane & Matsui, 1986 (Figure 15C, 23H)

Material examined. Kunashir Isl.: 1 ex., stream mouth ~1 km east of Dokuchaevo, 1 viii 2013 (L Sundukova), coll. MPU.

Collecting notes. Collected on pebbles at the mouth of a small stream.

Note. Ochthebius mamagri Shatrovskiy, 1989, described from "Primorsky Krai, 15 km E Kamenushka," was synonymized with this species by Jäch (1998a).

** **44. *Ochthebius* (*Ochthebius*) *inermis*** Sharp, 1884 (Figure 15B, 23G).

Material examined. Kunashir Isl.: 10 exs., Alekhino Outpost, stream 1 vi 2011 (A Matalin, I Melnik), coll. CAP, MPU; 2 exs., stream 3 km from the outpost in Alekhina Bay, 43°54′17"N 145°29′21"E, 30 vii 2013 (D. Palatov), coll. MPU.

Collecting notes. Shores of very small streams, including thermal ones (in the zone of cooled water).

Note. The record of *Ochthebius* (*Ochthebius*) *satoi* Nakane, 1965 for Kunashir (Palatov 2014) refers to *O. inermis*.

45. *Ochthebius* (*Ochthebius*) *yoshitomii* Jäch & Delgado, 2014 (Figure 15D, 23I)

Material examined. Kunashir Isl.: 10 exs., south face of Prasolova Cape, 11 viii 2017 (K Makarov, Yu Sundukov), coll. MPU; 5 exs., Rogacheva Isl. near mouth of Filatova River, 28–29 vi 2017 (Yu Sundukov), coll. MPU; 3 exs., coast of Okhotsk Sea, ca. 2 km N Lake Mikhaylovskoye, 26 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., south coast of Vodopadny Cape, 22 viii 2011 (K Makarov), coll. CAP; 1 ex., lakes in the valley south of the western shore of Lake Peschanoe, 8 viii 2011 (K Makarov), coll. CAP; 5 exs., 1 km south-west of Alekhino, coastal rockery, 3 viii 2011 (K Makarov, A Zaitsev), coll. CAP; 1 ex., bay south-west of Odinoky Stream, 3 viii 2011 (K Makarov), coll. CAP; 1 ex., the mouth of Khlebnikova River, 4 km east of Paltusovo, 11 viii 2011 (K Makarov), coll. CAP.

Published records. Kunashir Isl.: 42 exs. adults + numerous larvae, 44°18′50″N, 145°58′56″E, Ohkhotsk Sea coast south-west of the mouth of Severjanka River, 26 vii 2013 (K Makarov), coll. MPU; 2 exs., 43°56′33″N, 145°35′20″E, Danilovo, west coast of Lake Peschanoe, 1 viii 2011 (K Makarov), coll. MPU; 11 exs., 43°54′58″N, 145°31′00″E, 1 km south-west of Alekhino, coastal rockery, 3 viii 2011 (A Zaitsev, K Makarov), coll. MPU; 1 ex., 44°16′06″N, 146°09′30″E, the mouth of Tyatina River, 6 ix 2009 (A Prosvirov), coll. MPU (Prokin et al. 2016).

Note. The correct type locality of this species is: 44°18′50″N, 145°58′56″E, sea shore, about 3.5 km SW of the mouth of Severjanka River, Kunashir Island, Kuril Islands, Russian Far East (Prokin et al. 2016). In the original description, Krugly Cape, 44°00.28′N, 145°39.38′E, was erroneously listed as type locality (Jäch and Delgado 2014).

Collecting notes. Rocky sea coasts, in cracks of stones (Figure 3C) and in small freshwater rock pools.

Family Elmidae Curtis, 1830
Subfamily Elminae Curtis, 1830
Tribe Elmini Curtis, 1830

46. *Heterlimnius hasegawai* (Nomura, 1958) (Figures 15E, 24A)

Material examined. Kunashir Isl.: 4 exs., south coast of Dokuchaeva Bay, 30 vii 2013 (K Makarov, Yu Sundukov), coll. CAP; 1 ex., Dokuchaeva Ridge, acid lake south of Vodopadnoe Lake, 6 viii 2017 (K Makarov), coll. MPU; 1 ex., the sea coast between Saratovskaya and Tyatina rivers, 21–24 viii 2014 (Yu Sundukov), coll. MPU; 1 ex., lower reaches of Filatova River, 2 ix 2009 (A Prosvirov), coll. MPU; 1 ex., lower reaches of Filatova River, Bolysheva Stream, 31 vii–1 viii 2014 (Yu Sundukov), coll. MPU; 1 ex., Vodopadny Cape, small stream, 22 viii 2011 (K Makarov), coll. MPU; 7 exs., the mouth of Vodopadny Stream south of Ivanovsky Cape, 18 viii 2011 (K Makarov), coll. CAP.

Published records. Shikotan Isl., Iturup Isl. (Kamite 2009); Kuril Islands (Jung et al. 2014); Kunashir Isl. (Palatov 2014).

Collecting notes. Rocky shores and mouths of small streams, one specimen collected in a slightly acidic small thermal lake.

47. *Zaitzeviaria gotoi* (Nomura, 1959) (Figures 15F–G, 24B)

Published records. Kunashir Isl.: Stolbovskoy Stream near hot springs "Stolbovskie" S Stolbchaty Cape, 44°0′31.59"N, 145°40′47.13"E (Palatov 2014).

Note. This species was recorded from Kunashir Isl. by Prokin et al. (2016) under the name *Z. brevis* (Nomura, 1958).

Discussion

In total, taking into account the literature data (Shatrovskiy 1984, 1989a, 1989b, 1992; Nillson et al. 1995; Ryndevich 1995, 1998, 2001, 2003, 2006, 2007, 2014; Kirejtshuk and Shatrovskiy 2001b; Ôhara and Jia 2006; Kamite 2009; Fikáček et al. 2012b; Jäch and Delgado 2014; Jung et al. 2014; Palatov 2014; Prokin et al. 2016; Ryndevich and Prokin 2017; Ryndevich et al. 2017, 2019), 47 species of Polyphaga from studied five families are known for this time from Kunashir Island and the Lesser Kurils. The largest number of species is represented by Hydrophilidae (38 species from 12 genera). The fauna of Hydraenidae of the studied islands is represented by four species, Helophoridae and Elmidae—two species each, and Georissidae—one species. All 47 species are recorded from Kunashir.

Kunashir Island, the largest in the considered group of islands, is distinguished from others by a highest variety of environmental conditions. The island is characterized by aquatic ecosystems of various types—from thin water films on coastal rocks (Figure 3C) and in the thermal field zone (Figure 3F) to small rivers and lakes (Figures 2A–B, 3A–B). The highly developed relief of the island and its location on the border of the Okhotsk Sea and the Pacific Ocean cause a noticeable difference in conditions of the western and eastern coasts. The eastern coast is much colder during the warmer months, where rainy and foggy weather prevails. The high diversity of landscapes and habitat conditions is accompanied by a high species richness of beetles (Kryvolutskaja 1973; Pietsch et al. 2003; Bogatov et al. 2006), including the families of Polyphaga discussed herein.

In the fauna of Kunashir Island, among studied Polyphaga families, a little more than a third (18 out of 47) species are hydrobionts, water living.

Two Helophoridae species are found in small rivers and lakes on the island. *Helophorus matsumurai*, known from Sakhalin, Hokkaido, and the extreme north of Honshu (Angus 1995), was also recorded from Zeleny Island (Nilsson et al. 1995). On Kunashir, it was collected in the coastal zone of small rivers and lakes in different parts of the island. In contrast, *H. nigricans*, species of Siberian origin (Angus 1995), were collected only on the rather cold Pacific coast in the northern part of the island.

Species of *Hydrobius* and *Enochrus* were collected mostly in highly overgrown stagnant water bodies and slowly flowing streams, and only *Enochrus testaceus* does not occur north of Mendeleev Volcano.

Finally, some species of Hydrophidae, Hydraenidae, and Elmidae inhabit mainly small streams with low water level (*Laccobius oscillans*, *Crenitis apicalis*, *Hydraena riparia*, *Heterlimnius hasegawai*). It is interesting that all of them, except of *Crenitis apicalis*, inhabit both freshwater bodies and acidic thermal springs. However, a number of species (*Laccobius bedeli*, *L. kunashiricus*, *Anacaena asahinai*, *Ochthebius inermis*) have not been found north of the Sernovodsky Isthmus. The distribution of *Ochthebius yoshitomii* on the island is especially noteworthy. Adults and larvae of this species are found in mass in rather small temporary pools on coastal rocks above the splash zone. However, in small numbers, both adults and larvae of this species were found in the lower part of the rocks—in cracks, only sometimes flooded by the surf. Another highly specialized inhabitant of the supralittoral zone, *Aegialites kunashirensis* Zerche, 2004 (Salpingidae), also lives there. Although both species are wingless, they are relatively evenly distributed along the coast. These flightless species are known from Hokkaido and other islands of Japan, and *Ochthebius yoshitomii* also from Paramushir and the Commander Islands (Jäch and Delgado 2014; Sazhnev 2018). The presence of this species on all these islands proves the fact that the dispersal on the islands does not necessarily imply the ability of insects to fly.

The single Kuril representative of the Georissidae (*Georissus canalifer*) was found in the southern part of the island on coastal cliffs with groundwater outcrops “weeping rocks”.

The maximum number of taxa (28 species from seven genera) is represented by the subfamily Sphaeridiinae (Hydrophilidae). These hydrophilids inhabit various decaying organic substrates of different origins. Among them, two ecological complexes stand out: detritobionts and saprobionts.

The complex of detritobionts includes species that inhabit detritus—decomposing organic (mostly plant) remains in water or near water (mostly sea, river, and lake detritus on water edge). Such species lives not very deep under the water near shore (they also occur in wet sand or other substrates along the banks of water bodies). Quite common in Kunashir is a group of littoral sea detritobionts from the genus *Cercyon*, inhabiting accumulations of organic remains (seaweed, under drift-wood, and other detritus) on the sea coasts (*Cercyon algarum*, *C. aptus*, *C. dux*, *C. numerosus*, *C. setulosus*, and *C. symbion*). Some of them are found almost along the entire coast of Kunashir (*Cercyon dux*, *C. numerosus*, *C. setulosus*), others (*Cercyon algarum*, *C. aptus*, *C. symbion*) prefer sandy shores. Perhaps, it was about these beetles Snow (1897) wrote “Small beetles of several species are common on all the islands.” The freshwater detritobionts, such as *Cercyon marinus*, *C. korbianus* и *Coelostoma orbiculare,* inhabit decomposing freshwater weeds and algae on shores of rivers, lakes, and mires or in the water near the shore among aquatic plants.

Terrestrial saprobiont hydrophilids (*Cercyon olibrus, C. saluki, C. laminatus, Pachysternum haemorrhoum, Cryptopleurum subtile, Sphaeridium lunatum*, etc.) inhabit rotting fungi and plants, animal droppings (primarily of bears). In addition, these species are often found in rotting fish and remains of large leaves of *Lysichiton camtschatcensis* (L.) Schott, left by bears after feeding. *Cercyon olibrus, C. saluki*, *C. retius* and *Pachysternum haemorrhoum* are often collected on decaying fungi. *Pacrillum lucidum* and *Megasternum japonicum* have been found only on decaying fungi. Some of these species are not uncommon on rotting fish and can also be found in decomposing seaweed on the coast (*Cercyon olibrus*, *C. laminatus* and *Pachysternum haemorrhoum*). Such species as *Cercyon quisquilius, C. unipunctatus* and *C. unipustulatus* are confined to places where cows and horses graze and were found only in excrements. As in other ecological groups, a number of species (*Cercyon korbianus*, *C. quisquilius*, *C. analis*, *C. laminatus*, *Pachysternum haemorrhoum*, and both *Sphaeridium*) were not found north of the South Kuril Isthmus.

Thus, unlike a number of other Coleopteran taxa (Shavrin and Makarov 2019; Sundukov and Makarov 2019), hydrophilids are quite widespread in Kunashir, and the differentiation of their fauna due to the difference in climate between the western and eastern coasts is practically not expressed. The group of species, which is not found north of the Sernovodsky or South Kuril isthmuses, is rather interesting in the historical sense. They comprise almost a quarter of the fauna (12 species from seven genera) and differ markedly in lifestyle, making it unlikely that there is a single ecological reason explaining such distribution limitation. It was proposed that straits that existed at the site of these isthmuses in the Holocene opened earlier than the Izmena Strait, which separated Kunashir from Hokkaido (Nevedomskaya 1998), and that limited the dispersal of a number of plant and animal species to the north. However, in relation to the ability for a well-flying lifestyle, which is confirmed for the most part of the listed species, which were collected at light, such a mechanism seems unlikely, especially since almost half of these species are known from other islands of the archipelago (Shikotan, Yuri, and others). Some of these species (for example, *Cercyon unipunctatus, C. quisquilius, Pachysternum haemorrhoum* and both *Sphaeridium* species) are

typical inhabitants of cow excrements, and cattle breeding in Kunashir is limited to the southern part of the island. Thus, the distribution of some hydrophilids in the Kuril Islands, as well as a number of species of Carabidae (Sundukov 2014; Sundukov and Makarov 2016), is associated with human agricultural activities.

For the island fauna (Kunashir, Lesser Kurils, and Hokkaido), there is an obvious connection between the species richness and the area of the island (Figure 16). In comparison with Kunashir, Hydraenidae has not yet been found on the islands of the Lesser Kuril Chain, and the families Helophoridae, Georissidae, and Elmidae are represented there by one species each, and the species richness of water scavenger beetles is significantly lower than in Kunashir. The fauna of Hydrophilidae of small islands contains mainly marine detritobionts widespread in East Asia: *Cercyon aptus*, *C. numerosus*, *C. setulosus* and *C. symbion* (Figure 17).

The obtained parameters of the classical power dependence $S = Ca^Z$ (Sugihara 1981; Dengler 2009; Santos et al. 2010; Triantis et al. 2012; Matthews et al. 2019) generally comparable to those known for the island beetle faunas (Niemelä 1988; Niemelä et al. 1987; Browne and Peck 1996; Kotze et al. 2000; Fattorini 2002; Zalewski and Ulrich 2006; Trichas et al. 2008): $C = 2.8455$ (from 0.525 to 11.321); $Z = 0.3104$ (from 0.06 to 0.449). The relatively high value of Z in our case may indirectly indicate a significant role of extinction processes (Fattorini and Borges 2012) in the formation of the beetle fauna of five studied families on Kunashir Island and the Lesser Kurils.

The Pleistocene cooling (especially the last one) had a significant impact on the flora and fauna of the Kuril Islands. During this period, tundra and forest-tundra prevailed on Kunashir, and permafrost was widespread on the Lesser Kurils (Razjigaeva et al. 2011). On the contrary, Holocene climate fluctuations were largely mitigated by the influence of the ocean (Razjigaeva et al. 2014), which did not have a catastrophic effect on the fauna of the islands, in contrast to volcanic processes (Razjigaeva and Ganzey 2004).

Consequently, in the Pleistocene, part of the species could have survived in refugia, where thermal manifestations of volcanism could provide conditions for their life, as it was assumed for terrestrial Coleoptera (Makarov and Sundukov 2014; Shavrin and Makarov 2019; Sundukov and Makarov 2019) and other taxa of insects (Lelej et al. 2002). However, the possibilities of water beetles to survive in such conditions are limited since most of the waters in the hydrothermal zone are highly acidified.

For Hokkaido, the nearest large island, 71 species of the studied families are known at the moment (Minoshima and Hayashi 2011; Minoshima 2016; Hoshina 2018; Kamite and Hayashi 2019; Nakajima 2020; Nakajima et al. 2020; Suzuki 2020; Species/Subspecies List of Hokkaido Beetle 2020). This is only 1.4 times more than on Kunashir Island (47 species), while the areas of these islands differ 55 times. Six species recorded from Kunashir (*Cercyon korbianus* Kniž, 1912; *C. saluki* Ryndevich, 1998; *C. retius* Ryndevich & Prokin, 2017; *C. sundukovi* Ryndevich, Hoshina & Prokin, 2019; *Pacrillum lucidum* (Shatrovskiy, 1989); *Sphaeridium lunatum* Fabricius, 1792) are not found in Hokkaido yet. This fact shows a very good level of faunal investigation of studied families in Kunashir.

The known range of *Cercyon saluki* and *C. sundukovi* limited only to Kunashir and Shikotan. Formally, these species are endemic to these islands, but in our opinion, they are more widespread. The real reason for their absence in Japan and possibly on the mainland is the insufficient study of this group of hydrophilids.

Unlike Kunashir and the Kuril Islands as a whole (Figure 16), one representative of the family Hydrochidae was found in Hokkaido (*Hydrochus laferi* Shatrovskiy, 1989), one species of Dryopidae (*Helichus ussuriensis* Lafer, 1980), as well as Heteroceridae, (*Heterocerus fenestratus* Thunberg, 1784), which is also recorded from Iturup Island (Skalický 2008). In addition, several genera, i.e. *Oosternum*, *Hydrocassis*, *Agraphydrus*, *Chasmogenus*, *Neoriohelmis*, *Ordobrevia* (Minoshima and Hayashi 2011; Minoshima 2016; Hoshina 2018; Kamite and Hayashi 2019; Suzuki 2020), and species, i.e. *Enochrus japonicus* (Sharp, 1873), *E. umbratus* (Sharp, 1884), *Hydrobius pauper* Sharp, 1884, *Ochthebius hokkaidensis* Jäch, 1998, *O. nakanei* Matsui, 1986, *Zaitzeviaria gotoi* (Nomura, 1959), etc. (Sharp 1884; Hebauer 1994; Jäch 1998a, 1998b; Minoshima and Hayashi 2011; Angus and Jia 2014; Suzuki 2020), known from Hokkaido are still not found on the Kuril Islands. Genera absent in Kunashir are distributed mainly in the subtropical and tropical zones (Hansen 1999; Fikáček et al. 2015) and are known in Hokkaido only from the southern part of the island. The northern part of Hokkaido, like Kunashir, is located in the subtaiga zone, but the southern is in the nemoral one (zone of broadleaf forests). Thus, the differences between the faunas of Hokkaido and Kunashir are at least partially connected with the landscape-zonal differences of the islands.

In this aspect, another feature of Hydrophilidae fauna of the of Kunashir and the Lesser Kuril Chain is interesting—the absence of larger beetles, representatives of the genera *Hydrophilus* Geoffroy, 1762 and *Hydrochara* Berthold, 1827, while, on the contrary, *Hydrophilus acuminatus* (Motschulsky, 1853), *H. dauricus* (Mannerheim, 1852), *Hydrochara affinis* (Sharp, 1873), *H. libera* (Sharp, 1884) are known from Hokkaido (Minoshima and Hayashi, 2011; Minoshima et al. 2012; Sharp 1884; Smetana 1980; Suzuki 2020; Watanabe 1976).

According to published data (Nikulina 2002; Prozorova et al. 2002; Ganzey and Ivanov 2012; Palatov 2014; Inoda et al. 2015; Sato et al. 2017) and to the observations of the authors, there are suitable water bodies in Kunashir and the necessary ecological conditions for these species; therefore, the Southern Kurils, in particular the Kunashir Island, can potentially be inhabited by these well-flying beetles. Large Hydrophilidae are either absent in the fauna of many oceanic islands [Ireland Island (Przewoźny 2017), Hawaiian Islands (Hansen 1995), Galápagos Islands (Peck 2008), Seychelles Islands (Gerlach 2009), Bermuda Islands (Hilburn and Gordon 1989), Sri Lanka Island (Srarmühlner 1986), Tobago Island (Peck et al. 2002), Commander Islands (Sazhnev 2018), Snares Islands (Ordish 1974), Brunette Island (Larson et al. 1999), Pulau Tioman (Hendrich and Yang 1999)] or represented by allochthonous or presumably allochthonous elements [Azores Islands (Lamelas-López et al. 2017), Socotra Island (Fikáček et al. 2012a), Prince Edward Island (Majka 2008), Barbados Island (Peck 2009)]. Therefore, the absence of large hydrophilids of the genera *Hydrochara* and *Hydrophilus* on the islands of the Kuril archipelago is expected, but the reasons for this phenomenon are not clear. In our opinion, a possible reason is illustrated by the superposition of the generic ranges of *Hydrochara* and *Hydrophilus* on the map of July isotherms in the Northern Hemisphere (Figure 18). Data on the distribution of species of these genera are taken from a number of publications and own observations (Smetana 1980, 1988; Shatrovskiy 1986, 1989; Averenskiy 1999; Hansen 1999; Kirejtshuk and Shatrovskiy 2001b; Petrov 2005; Sidorenko 2005; Bezmaternykh 2008; Bukhkalo et al. 2011; Minoshima and Hayashi 2011; Kadirov and Shulaev 2012; Minoshima et al. 2012; Arce-Pérez and Morón 2013; Prokin et al. 2013; Short and McIntosh 2014; Dorzhieva 2015; Rassi et al. 2015; Kozminykh 2017). It is evident from the Figure 18 that the species of these genera are almost never found north of the July isotherm +16°C. Perhaps, the main obstacle to their dispersal to the Kuril Islands is the lack of enough temperature supply for development. A good confirmation of this hypothesis is the absence of large hydrophilids in the fauna of such a large island as Ireland, located just north of the July isotherm +16°C (Przewoźny 2017).

Conclusions

During the period of ten years of studies on Kunashir Island and the Lesser Kurils, 47 species from five families (Helophoridae, Georissidae, Hydrophilidae, Hydraenidae, and Elmidae) of mainly aquatic Polyphaga have been found.

Two species (*Enochrus vilis* (Sharp, 1884) and *Ochthebius inermis* Sharp, 1884) are recorded for Russia for the first time. Fifteen species, *Helophorus nigricans* Poppius, 1907, *Georissus canalifer* Sharp, 1888, *Laccobius bedeli* Sharp, 1884, *Anacaena asahinai* Satô, 1982, *Crenitis apicalis* Reitter, 1896, *Enochrus simulans* Sharp, 1873, *E. testaceus* (Fabricius, 1801), *E. affinis* (Thunberg, 1794), *Coelostoma orbiculare* Fabricius, 1775, *Cercyon korbianus* Kniž, 1912, *C. marinus* Thomson, 1853, *Cryptopleurum subtile* Sharp, 1884, *Sphaeridium lunatum* Fabricius, 1792, *S. scarabaeoides* (Linnaeus, 1758), *Ochthebius hasegawai* Nakane & Matsui, 1986, are recorded as new for the fauna of Kunashir Island and the Lesser Kurils.

Thus, the species richness of these islands is quite high and is comparable to the fauna of the nearest large island, Hokkaido (71 species from eight families of Polyphaga). In terms of size and location, the Lesser Kurils and Kunashir belong to the group of islands, the fauna of which is formed primarily under the influence of migrations (Ali 2017). On the basis of paleoclimatic reconstructions (Razjigaeva et al. 2011), we supposed that such a rich fauna was formed in the Holocene mainly as a result of (re)colonization. At the same time, in addition to flight, a large role in the dispersal of a number Polyphaga was played by sea currents carryover.

The role of relic elements is negligible. Possibly, *Zaitzeviaria gotoi*, *Heterlimnius hasegawai*, *Ochthebius inermis* and *Laccobius oscillans*, which are able to inhabitat in thermal waters can be considered as relict populations in Kunashir. During the glacial period, they could have survived in the thermal zones of Kunashir Island on the Dokuchaeva Ridge. A similar fact has been proven for other groups of animals (Sundukov and Makarov 2019).

Additionally, the fauna of Hydrophilidae of the Lesser Kuril Chain includes migratory elements, which could have penetrated the islands as a result of human activity (in particular, *Cercyon unipunctatus, C. quisquilius, Pachysternum haemorrhoum, Sphaeridium lunatum* and *S. scarabaeoides*).

Unlike other Coleoptera groups with uneven distribution on Kunashir due to faunogenetic reasons and the difference in the climate of the Okhotsk Sea and Pacific coasts (Makarov et al. 2013; Shavrin and Makarov 2019; Sundukov and Makarov 2016, 2019), the distribution of Polyphaga is more homogeneous and includes only a single group of species limited to the southern part of the Kunashir Island. We assume that such distribution of these groups of beetles and the absence of several genera (*Oosternum*, *Hydrocassis*, *Agraphydrus*, *Chasmogenus*, *Neoriohelmis*, *Ordobrevia*) in Kunashir and Lesser Kurils are caused by temperature conditions. Possibly, the main reason for the absence of large water scavenger beetles from genera *Hydrophilus* and *Hydrochara* in Kunashir and Lesser Kurils is the location of these islands north to the July isotherm +16°C.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

We are grateful to R.A. Angus (Helophoridae) and M.A. Jäch (Hydraenidae and Elmidae) or checking the identifications of some species; to Y. Minoshima and H. Shaverdo for consultations on Japanese Hydrophilidae; to S.A. Kurbatov (All-Russian Research Institute of Chemical Agents of Plant Protection Moscow, Russia), I.V. Melnik (Moscow, Russia), N.B. Nikitskiy (Zoological Museum of Moscow State University, Moscow, Russia), S.V. Saluk (State Scientific and Production Association "Scientific and Practical Center of the National Academy of Sciences of Belarus on Bioresources," Minsk, Belarus), A.V. Matalin and A.A. Zaitsev (Moscow State Pedagogical University, Moscow, Russia), D.M. Palatov and A.S. Prosvirov (M.V. Lomonosov Moscow State University, Moscow, Russia), L. Sundukova (Lazo, Russia) for the loan of the material; to A.V. Zemoglyadchuk (Baranovichi State University, Baranovichi, Belarus) for the habitus photos of *Cercyon vagus* and *C. unipunctatus*; to A.V. Kovalev (Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia) for the habitus photo of *Cercyon sundukovi*; to A.V. Matalin and A.A. Zaitsev for the photos of local habitats, to A.K. Tishechkin (Plant Pest Diagnostics Branch, California Department of Food & Agriculture, Sacramento, U.S.A.) for language revision of text, and anonymous reviewers and editor for valuable comments. The work of A. Prokin was carried out within the framework of Russia State Assignment no 121051100109-1.

References

Ali JR. 2017. Islands as biological substrates: classification of the biological assemblage components and the physical island types. *Journal of Biogeography* 44: 984–994.

Angus R, Jia F. 2014. *Helophorus orientalis* Motschulsky new to Japan and some comments on the fauna. *Latissimus* 35:5.

Angus RB. 1995. The *Helophorus* species of China, with notes on the species from neighbouring areas (Coleoptera). In: Jäch MA, Ji L, editors. *Water Beetels of China, 1*. Wien: Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein. pp. 185–206.

Arce-Pérez R, Morón MÁ. 2013. El género *Hydrophilus* (Coleoptera: Hydrophilidae: Hydrophilina) en México y Centroamérica. *Revista mexicana de biodiversidad* 84 (1):140–152. https://doi.org/10.7550/rmb.32113.

Averenskiy AI. 1999. *The catalog of beetles of Yakutia*. Yakutsk: YaNC SO RAN [In Russian].

Barkalov VYu, Eremenko NA. 2003. *Flora of the "Kuril'sky" Nature Reserve and the "Little Kurils" Preserve (Sakhalin Oblast)*. Vladivostok: Dalnauka [In Russian].

Barkalov VYu. 2009. *Flora of the Kuril Islands*. Vladivostok: Dalnauka [In Russian].

Bates HW. 1883. Supplement to the geodephagous Coleoptera of Japan, chiefly from the collection of Mr. George Lewis, made during his second visit, from February, 1880, to September, 1881. *The Transactions of the Entomological Society of London* 1883:205–290. pl. xiii.

Bezborodov VG. 2014. Lamellicorn beetles (Coleoptera: Scarabaeoidea) of Kuril Islands (Sakhalin Region, Russia): taxonomical structure, fauna, ecology and zoogeography. *Caucasian Entomological Bulletin* 10 (1):33–46 [In Russian].

Bezmaternykh DM. 2008. *Zoobenthos of the Upper Ob River tributaries*. Barnaul: Altaiskii universitet [In Russian].

Bogatov VV, Pietsch ThW, Storozhenko SYu, et al. 2006. Origin patterns of the terrestrial and freshwater biota of Sakhalin Island. *Vestnik DVO RAN* 2:32–47 [In Russian].

Browne J, Peck SB. 1996. The long-horned beetles of south Florida (Cerambycidae: Coleoptera): biogeography and relationships with the Bahama Islands and Cuba. *Canadian Journal of Zoology* 74:2154–2169.

Bukhkalo SP, Galich DE, Sergeeva EV, et al. 2011. *The notes of the fauna of beetles in the southern taiga of Western Siberia (in the basin of the Lower Irtysh)*. Moscow: KMK Scientific Press Ltd [In Russian].

Dengler J. 2009. Which function describes the species-area relationship best? A review and empirical evaluation. *Journal of Biogeography* 36:728–744.

Dorzhieva OD. 2015. Pedobionts in the vicinity of Ulan-Ude. *Vestnik Buryatskogo Gosudarstvennogo Universiteta* 4:153–156 [In Russian].

Fattorini S. 2002. Biogeography of the tenebrionid beetles (Coleoptera, Tenebrionidae) on the Aegean Islands (Greece). *Journal of Biogeography* 29:49–67.

Fattorini S, Borges PAV. 2012. Species-area relationships underestimate extinction rates. *Acta Oecologica* 40:27–30.

Fikáček M, Angus RB, Gentili E, et al. 2015. Family Hydrophilidae Latreille, 1802. In: Löbl I, Löbl D, editors. *Catalogue of Palaearctic Coleoptera*. Revised and Updated Edition, vol. 2. Leiden-Boston: Brill. pp. 37–76.

Fikáček M, Delgado JA, Gentili E. 2012a. The Hydrophiloid beetles of Socotra Island (Coleoptera: Georissidae, Hydrophilidae). *Acta Entomologica Musei Nationalis Pragae* 52 (suppl. 2):107–130.

Fikáček M, Jia F, Prokin A. 2012b. A review of the Asian species of the genus *Pachysternum* (Coleoptera: Hydrophilidae: Sphaeridiinae). *Zootaxa* 3219:1–53.

Fukuda T, Yamagishi H, Loguntsev A, et al. 2015. Vascular plants from Kunashiri Island, the southernmost island of the Kuril Islands, island arc between

Hokkaido and Kamchatka peninsula. *Check List: Online Journal of Biodiversity Data* 11 (1):1–15. https://doi.org/10.15560/11.1.1553.
Gage S, Joneson SL, VYu Barkalov, et al. 2006. A newly compiled checklist of the vascular plants of the Habomais, the Little Kurils. *Biodiversity and Biogeography of the Kuril Islands and Sakhalin* 2:67–91.
Ganzey KS, Ivanov AN. 2012. Landscape diversity of the Kuril Islands. *Geography and Natural Resources* 33:142–148. https://doi.org/10.1134/S1875372812020072.
Gentili E. 1995. The genus *Laccobius* Erichson in China and neighbouring areas. In: Jäch MA, Ji L, editors. *Water Beetles of China 1. Wien: Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein*. pp. 245–286.
Gerlach J, editor. 2009. *The Coleoptera of the Seychelles islands*. Sofia–Moscow: Pensoft Publ.
Gurjeva EL, Kryvolutskaja GO. 1968. The fauna of click beetles (Coleoptera, Elateridae) of the Kuril Islands. Vladivostok. In: Kurentsov AI, Konovalova ZA, editors. *Fauna and ecology of insects of the Far East*. pp. 42–49 [In Russian].
Hansen M. 1995. A review of the Hawaiian Hydrophilidae (Coleoptera). *Pacific Science* 49 (3):266–288.
Hansen M. 1999. *World Catalogue of Insects*In *Hydrophiloidea (s. str.) (Coleoptera)*, vol. 2. Stenstrup: Apollo Books.
Hebauer F. 1994. The *Crenitis* of the Old World (Coleoptera, Hydrophilidae). *Acta Coleopterologica* 10 (2):3–40.
Hendrich L, Yang CM. 1999. A contribution to the knowledge of the water beetle fauna of Pulau Tioman, Peninsular Malaysia (Coleoptera: Noteridae, Dytiscidae, Hydrophilidae, Hydraenidae, Scirtidae, Limnichidae). *The Raffles Bulletin Of Zoology* Suppl. 6:253–262.
Hilburn DJ, Gordon RD. 1989. Coleoptera of Bermuda. *Florida Entomologist* 72 (4): 673–692.
Hoshina H. 2018. Discovery of second japanese species of the genus *Peltocercyon* (Coleoptera: Hydrophilidae: Sphaeridiinae) with description of a new species. *Japanese Journal of Systematic Entomology* 24 (2):293–395.
Inoda T, Inoda Y, Rullan JK. 2015. Larvae of the water scavenger beetle, *Hydrophilus acuminatus* (Coleoptera: Hydrophilidae) are specialist predators of snails. *European Journal of Entomology* 112 (1):145–150.
Jäch MA. 1998a. Hydraenidae: II. The Taiwanese and Japanese species of *Ochthebius* Leach (Coleoptera). In: Jäch MA, Ji L, editors. *Water Beetles of China, 2*. Wien: Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein. pp. 173–193.
Jäch MA. 1998b. Revision of the Palearctic species of the genus *Ochthebius* Leach XX. The *O. (Asiobates) rugulosus* Wollaston species complex (Coleoptera: Hydraenidae). *Koleopterologische Rundschau* 68:175–187.
Jäch MA, Delgado JA. 2014. Revision of the Palearctic species of the genus *Ochthebius* Leach XXIX. The Asian species of the *O. vandykei* group (Coleoptera: Hydraenidae). *Koleopterologische Rundschau* 84:81–100.
Jung SW, Jäch MA, Bae YJ. 2014. Review of the Korean Elmidae (Coleoptera: Dryopoidea) with descriptions of three new species. *Aquatic Insects* 36 (2):93–124.
Kadirov AG, Shulaev NV. 2012. The fauna of water beetles of the Republic of Tatarstan (Dytiscidae, Gyrinidae, Noteridae, Haliplidae, Hydrophilidae, Helophoridae, Hydrochidae, Georissidae, Elmidae). *Uchyonye Zapiski Kazanskogo Universiteta* 154 (2):198–205 [In Russian].
Kamite Y. 2009. A revision of the genus *Heterlimnius* Hinton (Coleoptera, Elmidae). *Japanese Journal of Systematic Entomology* 15 (1):199–226.
Kamite Y, Hayashi M. 2019. A new species of the genus *Hydrocassis* Deyrolle & Fairmaire (Coleoptera, Hydrophilidae) from Yaku-shima Island, Japan, with notes on the japanese members. *Japanese Journal of Systematic Entomology* 25 (2):169–178.
Kanô T. 1933. Coleopterous insects from the Northern Kuriles, with some considerations on the Insect fauna of the Kurile Islands. *Bulletin of the Biogeographical Society of Japan* 4 (2):91–121 [In Japanese].
Kirejtshuk AG, Shatrovskiy AG. 2001a. Family Helophoridae. In: Tsalolikhin SJ, editor. *Key to freshwater invertebrates of Russia and adjacent lands*. St.-Petersburg: Nauka. pp 279–300, 676–695. [In Russian].
Kirejtshuk AG, Shatrovskiy AG. 2001b. Family Hydrophilidae. In: Tsalolikhin SJ, editor. *Key to freshwater invertebrates of Russia and adjacent lands*St.-Petersburg: Nauka. pp 300–326, 696–725. [In Russian].
Kobayashi K. 1931. On a collection from Shikotan, Kuriles. *Transactions of the Kansai Entomological Society* 2:59–66.
Kôno H. 1935a. Die Heteromeren aus den Kurilen (Col.). (1. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 9 (3):85–89.
Kôno H. 1935b. Die Malacodermen aus den Kurilen (Col.). (2. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 9 (3):95–98.
Kôno H. 1935c. Die Rüsselkafer aus den Kurilen. (3. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 9 (3):99–107.
Kôno H. 1935d. Die Lammelicornien aus den Kurilen. (4. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 9 (4):162–165.
Kôno H. 1935e. Die Curculioniden aus den Kurilen. II. (5. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 10 (1–2):52–63.
Kôno H. 1936a. Die Heteromeren aus den Kurilen. II. (6. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 10 (3):104–106.
Kôno H. 1936b. Die Clavicornien aus den Kurilen. (7. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 10 (4):148–153.
Kôno H. 1936c. Die Cerambyciden aus den Kurilen. (8. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 11 (1–2):28–35.
Kôno H. 1937a. Die Malacodermen aus den Kurilen. II. (9. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 11 (3):96–98.
Kôno H. 1937b. Die Lammelicornien aus den Kurilen. II. (10. Beitrag zur Kenntnis der Käferfauna der Kurilen). *Insecta Matsumurana* 12 (1):6–8.
Kotze DJ, Niemelä J, Nieminen M. 2000. Colonization success of carabid beetles on Baltic islands. *Journal of Biogeography* 27:807–819.
Kozminykh VO. 2017. Fauna of hydrophilid beetles (Insecta, Coleoptera, Hydrophilidae) of the Perm area. *Innovacii V Nauke, Novosibirsk* 12 (73):5–14 [In Russian].
Kryvolutskaja GO. 1962. *On the long-horned beetle fauna of the Southern Kuril Islands. Problems of Zoological Studies in Siberia, Gorno-Altaisk: Gorn0-Altaiskoye Kniznoye Izdatelstvo*. pp. 141–148 [In Russian].
Kryvolutskaja GO. 1965. The fauna of bark beetles (Coleoptera, Ipidae) of the Southern Kuril Islands. In: _Anonumous, editor. *Silvicultural Research in the Far East*, vol. 1. Vladivostok: Siberian Division, Academy of Sciences of the USSR. pp. 219–244 [In Russian].
Kryvolutskaja GO. 1966. Fauna of long-horned beetles (Coleoptera, Cerambycidae) of the Southern Kuril Islands. In: Anonymous, editor. *Forest Insect Pests of the Soviet Far East*. Vladivostok: Siberian Division, Academy of Sciences of the USSR. pp. 43–64 [In Russian].
Kryvolutskaja GO. 1973. *The entomofauna of the Kuril Islands. Principal features and origin*. Leningrad: Nauka [In Russian].
Kryvolutskaja GO, Medvedev LN. 1966. The fauna of leaf beetles (Coleoptera, Chrysomelidae) of the Kuril Islands. In: Anonymous, editor. *Forest Insect Fauna of the Kuril Islands, Kamchatka, and Magadan Province*. Moscow: Nauka. pp. 25–33 [In Russian].
Kryzhanovskij OL, Belousov IA, Kabak II , et al. 1995. *A checklist of the ground-beetles of Russia and adjacent lands (Insecta, Coleoptera, Carabidae)*. Sofia, Moscow: Pensoft Publ.
Kryzhanovskij OL, Okhotina MV, Bromlei GF, et al. 1975. A review of the ground-beetles (Coleoptera, Carabidae) of the Kuril Islands. *Entomologicheskie issledovaniya na Dalnem Vostoke. Trudy Biologo-Pochvennogo Instituta DVO an SSSR* 28 (3):119–142 [In Russian].
Kuwayama S. 1967. *Insect fauna of the southern Kurile Islands*. Sapporo: Hokunokai.
Lafer GSh. 1999. Contributions to the knowledge of Coleoptera fauna (Insecta) of Kunashir, Kuril Islands. *Far Eastern Entomologist* 77:1–16.
Lafer GSh. 2002. Ground beetles (Coleoptera, Caraboidea) of southern oceanic islands of the Greate Kuril Ridge. *Euroasian Entomological Journal* 1:47–66 [In Russian].
Lamelas-López L, Raposeiro PM, Borges PAV, et al. 2017. Annotated checklist of aquatic beetles (Coleoptera) and true bugs (Heteroptera) in the Azores Islands: new records and corrections of colonization status. *Zootaxa* 4353 (1):117–132.
Larson D, Larson M, Fancy D, et al. 1999. Ground and water beetles of Brunette Island, Newfoundland (Insecta: Coleoptera). *Northeastern Naturalist* 6 (3):199–210.
Coleoptera. Pt. 1. In: Lehr PA, editor. 1989. *Keys of the Insects of the Far East of USSR*, vol. III. Leningrad: Nauka. p. 572 [In Russian].
Coleoptera. Pt. 2. In: Lehr PA, editor. 1992. *Keys of the Insects of the Far East of USSR*, vol. III. St.-Petersburg: Nauka. p. 704 [In Russian].
Coleoptera. Pt. 3. In: Lehr PA, editor. 1996. *Keys of the Insects of the Far East of USSR*, vol. III. Vladivostok: Dalnauka. p. 556 [In Russian].
Lelej AS, Storozhenko SYu. 2010. Insect taxonomic diversity in the Russian Far East. *Entomological Review* 90 (2):372–386.
Lelej AS, Storozhenko SYu, Kholin SK. 2002. The insects (Insecta). In: Storozhenko SYu, Bogatov VV, Lelej AS, editors. *Flora and fauna of the Kuril Islands. Materials of the International Kuril Island Project*. Vladivostok: Dalnauka. pp. 96–108 [In Russian].
Majka ChG. 2008. The aquatic Coleoptera of Prince Edward Island, Canada: new records and faunal composition. *ZooKeys* 2:239–260.
Makarov AV. 2019. *Illustrative map generator*. Available at, https://github.com/loafermka/bmpgen2. (Accessed 12 January 2020).
Makarov KV, Melnik IV, Matalin AV. 2013. Specific and local fauna of the winged islands of Kunashir. In: Zamotajlov AS, editor. *Biodiversity. Bioconservation. Biomonitoring: Collection of materials of the International scientific-practical conference*. Maykop: ASU Publishing House. pp. 54–56 [In Russian].
Makarov KV, Sundukov YN. 2014. *Bembidion (?Nipponobembidion) ruruy* sp. n., a new brachypterous ground beetle (Coleoptera, Carabidae) from Kunashir Island, Kuriles, Russia. *ZooKeys* 463:75–93.
Makarov KV, Sundukov YN. 2016. Distribution and biology of the ground beetle *Carabus (Damaster) blaptoides rugipennis* on Kunashir Island, Kurile Islands, Russia. *Nature Conservation Research* 1 (3):44–52.
Makarov KV, Sundukov YN, Korepanov MK. 2019. A review of the genus *Odacantha* (Coleoptera, Carabidae) of the Russian Far East. *Far Eastern Entomologist* 380:8–19.
Mannerheim CG von. 1853. Dritter Nachtrag zur Kaferfauna der Nord-Amerikanischen Lander des Russischen Reiches. *Bulletin de la Societe Imperiale des Naturalistes de Moscou* 26:95–273.
Matsushita M. 1933. Ueber die neuen Cerambyciden-arten Japane. *Insecta Matsumurana* 7 (3):103–110.
Matthews TJ, Rigal F, Triantis KA, et al. 2019. A global model of island species–area relationships. *PNAS* 116 (25):12337–12342. https://doi.org/10.1073/pnas.1818190116.
Minoshima Y. 2016. Taxonomic review of *Agraphydrus* from Japan (Coleoptera: Hydrophilidae: Acidocerinae). *Entomological Science* 19 (4):351–366. https://doi.org/10.1111/ens.12213.
Minoshima Y, Hayashi M. 2011. Larval morphology of the Japanese species of the tribes Acidocerini, Hydrobiusini and Hydrophilini (Coleoptera: Hydrophilidae). *Acta Entomologica Musei Nationalis Pragae* 51 (suppl):1–118.

Minoshima Y, Iwata Y, Hayashi M. 2012. Morphology of the immature stages of *Hydrochara libera* (Sharp) (Coleoptera, Hydrophilidae). *Elytra* 2 (2):285–302.
Miwa Y. 1929. On the elaterid-species from Saghalien and Kuriles. *Zoological Magazine* 41 (492):441–454. In Japanese.
Miwa Y. 1934. *The fauna of Elateridae in the Japanese Empire*, vol. 65. Formosa: Report of the Department of Agriculture, Government Research Institute. pp. 1–281.
Motschulsky V de. 1850. *Die Kafer Russlands*. Moscou: W. Gautier.
Motschulsky V de. 1860. Coleopteres de la Siberie orientale et notamment en particulier des rives de l'Amour. In: Schrenck L von, editor. *Reisen und Forschungen im Amur-Lande in den Jahren 1854–1856 im Auftrage der Kaiserl. Akademie der Wissenschaften zu St. Petersburg. Band II. Zweite Lieferung. Coleopteren. Mit 28 colorierten Tafeln und 3 Karten*. St. Petersburg: Kaiserliche Akademie der Wissenschaften.
Nakajima J. 2020. *List of Aquatic Coleoptera and Hemiptera of Japan* [In Japanese]. Available at, http://kuromushiya.com/mlist/mlist.html. (Accessed 17 March 2020).
Nakajima J, Hayashi M, Ishida K, et al. 2020. *Aquatic Coleoptera and Hemiptera of Japan*. Tokyo: Bun-ichi Sogo Shuppan [In Japanese].
Nakane T. 1961. New or little-known Coleoptera from Japan and its adjacent regions. *XV. Fragmenta Coleopterologica* 1:1–5.
Nakane T. 1966. New or little-known Coleoptera from Japan and its adjacent regions. XXIII. *Fragmenta Coleopterologica* 13:51–54.
Nevedomskaya IA. 1998. Origin of the land flora and fauna of Kunashir Island. *Vestnik Sakhalinskogo Museya* 5:313–317 [In Russian].
Niemelä J. 1988. Habitat occupancy of carabid beetles on small islands and the adjacent Åland mainland, SW Finland. *Annales Zoologici Fennici* 25:121–131.
Niemelä J, Haila Y, Ranta E, et al. 1987. Distribution of carabid beetles in four boreal archipelagoes. *Annales Zoologici Fennici* 24:89–100.
Nikulina TV. 2002. The freshwater algalflora. In: Storozhenko SYu, editor. *Flora and fauna of Kuril Island (Materials of International Kuril Island Project)*. Vladivostok: Dalnauka. pp. 23–34 [In Russian].
Nilsson AN, Kholin SK, Angus RB. 1995. Faunistics and species richness of water beetles of the genus *Helophorus* (Coleoptera, Helophoridae) of the Far East of Russia and Japan. *Japanese Journal of Systematic Entomology* 1 (2):217–221.
Ôhara M, Jia F-L. 2006. Terrestrial hydrophilid beetles of the Kuril Archipelago. *Biodiversity and Biogeography of the Kuril Islands and Sakhalin* 2:129–150.
Ohta J. 1929. Beiträge zur Coccinelliden-Fauna aus Sachalin und Kurilen. *Insecta Matsumurana* 3 (2–3):57–62.
Ordish RG. 1974. Arthropoda of the Subantarctic Islands of New Zealand (3). Coleoptera: Hydrophilidae. *Journal of the Royal Society of New Zealand* 4 (3):307–314.
Palatov DM. 2014. New data on the benthic macroinvertebrate fauna in fresh waters of Kunashir Island. *Vladimir Ya. Levanidov's Biennial Memorial Meetings* 6:509–522 [In Russian].
Peck S. 2009. The beetles of Barbados, West Indies (Insecta: Coleoptera): Diversity, distribution and faunal structure. *Insecta Mundi* 73:1–51.
Peck SB. 2008. The beetles of the Galápagos Islands, Ecuador: Evolution, ecology and diversity (Insecta: Coleoptera). *Journal of Insect Conservation* 12:729–730.
Peck SB, Cook J, Hardy jr JD. 2002. Beetle fauna of the island of Tobago, Trinidad and Tobago, West Indies. *Insecta Mundi* 16 (1–3):9–23.
Petrov KA. 2005. Review of the hydrophiloid beetles of the Moskow Region. *Russian Entomological Journal* 14 (1):69–73 [In Russian].
Pietsch ThW, Bogatov VV, Amaoka K, et al. 2003. Biodiversity and biogeography of the islands of the Kuril Archipelago. *Journal of Biogeography* 30:1297–1310.
Poppius B. 1906. Zur Kenntnis der Pterostichen-Untergattung *Cryobius* Chaud. *Acta Societatis pro Fauna et Flora Fennica* 28 (5):1–280.
Prokin AA, Litovkin SV, Jäch MA. 2016. New records of Hydraenidae and Elmidae (Coleoptera) from Russia and adjacent countries. *Fragmenta Faunistica* 58 (2): 99–110.
Prokin AA, Petrov PN, Zhgareva NN. 2013. Fauna of water beetles (Coleopera) of the environs of Borok (Yaroslavl Oblast, Russia). In: Prokin AA, Petrov PN, Zhavoronkova OD, et al., editors. *Hydroentomology in Russia and adjacent countries: Materials of the Fifth All-Russia Symposium on Amphibiotic and Aquatic Insects*. Filigran: Yaroslavl'. pp. 140–144 [In Russian with English Title and Summary].
Prozorova LA, Sayenko EM, Bogatov VV. 2002. The freshwater mollusks. In: SYu Storozhenko, editor. *Flora and fauna of Kuril Island (Materials of International Kuril Island Project)*. Vladivostok: Dalnauka. pp. 82–95 [In Russian].
Przewoźny M. 2017. *Catalogue of Palearctic Hydrophiloidea (Coleoptera)*. Available at, http://www.waterbeetles.eu/. (Accessed 17 March 2020).
Rassi P, Karjalainen S, Clayhills T, et al. 2015. Kovakuoriaisten maakuntaluettelo 2015 [Provincial List of Finnish Coleoptera 2015]. *Sahlbergia* 21 (suppl. 1):1–164.
Razjigaeva NG, Ganzey LA. 2004. *Changing island geosystems under the influence of catastrophic processes as exemplified by the South Kuril Islands in the Late Pleistocene – Holocene. Vestnik FEB RAS 2*. pp. 90–101 [In Rusian].
Razjigaeva NG, Ganzey LA, KhA Arslanov, et al. 2011. Paleoenvironments of Kuril Islands in Late Pleistocene-Holocene: Climatic changes and volcanic eruption effects. *Quaternary International* 237:4–14.
Razjigaeva NG, Ganzey LA, Grebennikova TA, et al. 2014. The evolution of the landscapes of the Kuril Islands in the Holocene. *Proceedings of the RAS, Geographical Series* 3:43–50. In Rusian.
Ryndevich SK. 1995. *Cercyon dux* Sharp – a new species of hydrophilid for the fauna of Russia (Coleoptera, Hydrophilidae)]. *Trudy Zoologicheskogo Muzeya BGU* 1: 75–76 [In Russian].
Ryndevich SK. 1998. New species of beetles of the genus *Cercyon* (Coleoptera: Hydrophilidae) from Russian Far East. *Pakistan Journal of Zoology* 30 (1):59–60.
Ryndevich SK. 2001. On identification of species of the *Cercyon dux* group (Coleoptera: Hydrophilidae). *Zoosystematica Rossica* 10 (1):79–83.
Ryndevich SK. 2003. Some records of Dytiscidae, Helophoridae, Hydrochidae, Hydrophilidae and Hydraenidae in Russia and other regions. *Latissimus* 16:17–20.
Ryndevich SK. 2006. Review of species of the genus *Cercyon* Leach, 1817 of Russia and adjacent regions. II. Subgenus *Cercyon* Leach, 1817. *Cercyon olibrus* and *C. rotundulus* groups (Coleoptera: Hydrophilidae). *Zoosystematica Rossica* 15 (2): 311–314.
Ryndevich SK. 2007. Review of species of the genus *Cercyon* Leach, 1817 of Russia and adjacent regions. III. Subgenera *Clinocercyon* Orchymont, 1942 and *Conocercyon* Hebauer, 2003 (Coleoptera: Hydrophilidae). *Zoosystematica Rossia* 16 (2):315–320.
Ryndevich SK. 2008. Review of species of the genus *Cercyon* Leach, 1817 of Russia and adjacent regions. IV. The subgenera *Paracycreon* Orchymont, 1924 and *Dicytocercyon* Ganglbauer, 1904 (Coleoptera: Hydrophilidae). *Zoosystematica Rossica* 17 (2):89–97.
Ryndevich SK. 2014. Hydrophiloid fauna (Coleoptera: Hydrophiloidea) of Palaearctic subtaiga zone. *BarSU Herald. Series of Biological Sciences (General Biology), Agricultural Sciences, Agronomy* 2:19–35 [In Russian].
Ryndevich SK, Angus RB. 2020. Redescription of *Hydrobius pauper* (Coleoptera: Hydrophilidae), with a key to the Eurasian species of the genus *Hydrobius*. *Zoosystematica Rossica* 29 (1):77–86.
Ryndevich SK, Hoshina H, Prokin AA. 2019. Review of species of the genus *Cercyon* of Russia and adjacent regions. VI. Subgenus *Cercyon*, the *C. shinanensis* group (Coleoptera: Hydrophilidae). *Zoosystematica Rossica* 28 (2):258–266. https://doi.org/10.31610/zsr/2019.28.2.258.
Ryndevich SK, Jia F, Fikáček M. 2017. A review of the Asian species of the *Cercyon unipunctatus* group (Coleoptera: Hydrophilidae: Sphaeridiinae). *Acta Entomologica Musei Nationalis Pragae* 57 (2):535–576.
Ryndevich SK, Prokin AA. 2017. Two new species of *Cercyon* (*Clinocercyon*) from Russian Far East (Coleoptera: Hydrophilidae). *Zootaxa* 4300 (1):125–134. https://doi.org/10.11646/zootaxa.4300.1.7.
Santos AMC, Whittaker RJ, Triantis KA, et al. 2010. Are species–area relationships from entire archipelagos congruent with those of their constituent islands? *Global Ecology and Biogeography* 19:527–540.
Sato Sh, Inoda T, Niitsu Sh, et al. 2017. Asymmetric larval head and mandibles of *Hydrophilus acuminatus* (Insecta: Coleoptera, Hydrophilidae): Fine structure and embryonic development. *Arthropod Structure & Development* 46:824–842.
Sazhnev AS. 2018. New records of water beetles (Coleoptera: Helophoridae, Hydrophilidae, Hydraenidae) from Commander Islands. *Far Eastern Entomologist* 365:26–30.
Sharp D. 1896. The Rhynchophorous Coleoptera of Japan. Part IV. Otiorhynchidae and Sitonides, and a new genus of doubtful position from the Kurile islands. *The Transactions of the Entomological Society of London* 1896:81–115.
Sharp DS. 1884. The water beetles of Japan. *The Transactions of the Entomological Society of London* 1884:439–464.
Shatrovskiy AG. 1984. Review of the hydrophilids of the genus *Laccobius* Er. (Coleyptera, Hydrophilidae) of the fauna of the USSR. *Emologicheskoe Obozrenie* 63:301–325 [In Russian].
Shatrovskiy AG. 1986. Water beetles of the genus *Hydrochara* (Coleoptera, Hydrophilidae) of the USSR fauna. *Vestnik Zoologii* 4:29–34 [In Russian].
Shatrovskiy AG. 1989a. Family Hydraenidae. In: Lehr PA, editor. *Keys of the Insects of the Far East of USSR*. Leningrad: Nauka. pp. 260–264 [In Russian].
Shatrovskiy AG. 1989b. Family Hydrophilidae. In: Lehr PA, editor. *Keys of the Insects of the Far East of USSR*. Leningrad: Nauka. pp. 264–293 [In Russian].
Shatrovskiy AG. 1992. New and little known Hydrophiloidea (Coleoptera) from Southern Primorye territory and adjacent regions. *Entomological Review* 71 (2): 359–371.
Shavrin AV, Makarov KV. 2019. Contribution to the knowledge of the fauna of rove beetles of the subfamily Omaliinae MacLeay, 1825 (Coleoptera: Staphylinidae) of Kunashir Island, Kurile Islands. *Russian Entomological Journal* 28 (1):36–53.
Short AEZ, McIntosh CEIV. 2014. Review of the giant water scavenger beetle genus *Hydrophilus* Geoffroy (Coleoptera: Hydrophilidae) of the United States and Canada. *The Coleopterists Bulletin* 68 (2):187–198.
Sidorenko EM. 2005. To the study of the hydrophiloids of the Volgograd region. *Izvestiya Volgogradskogo Gosudarstvennogo Pedagogicheskogo Universiteta* 4 (13): 62–73 [In Russian].
Skalický S. 2008. A review of Japanese Heteroceridae (Coleoptera). *Acta Musei Moraviae, Scientiae Biologicae* 93:47–52.
Smetana A. 1980. Revision of the genus *Hydrochara* Berth. (Coleoptera: Hydrophilidae). *Memoris of the Entomological Society of Canada* 112 (suppl. S111):1–100.
Smetana A. 1988. Review of the family Hydrophilidae of Canada and Alaska (Coleoptera). *Memoirs of the Entomological Society of Canada* 142:1–316.
Snow HJ. 1897. *Notes on the Kuril Islands*. London: John Murray.
Species/Subspecies List of Hokkaido Beetle. [In Japanese]. Available at: http://www.pref.hokkaido.lg.jp/ks/skn/syuasyumokuroku_konchu.kouchu.pdf. [Date accessed: 17 March 2020].
Srarmühlner F. 1986. Checklist of the fauna of mountain streams of tropical Indopacific Islands. *Annalen des Naturhistorischen Museums in Wien, Series B* 88/89: 457–480.

Sugihara G. 1981. S = CA^z, z ~ 1/4: a reply to Connor and McCoy. *American Naturalist* 117:790–793.
Sundukov YuN. 2014. Features of formation of the modern fauna of ground beetles (Coleoptera, Carabidae) of Shikotan Island, Kuriles. *A.I. Kurentsov's Annual Memorial Meetings* 25:25–33 [In Russian].
Sundukov YuN. 2017. The ground beetles (Coleoptera, Carabidae) of the Yuri Island, Southern Kuriles. *A.I. Kurentsov's Annual Memorial Meetings* 28:101–110 [In Russian].
Sundukov YuN. 2019. The ground beetles (Coleoptera, Carabidae) of the Polonskogo Island, Southern Kuriles. *A.I. Kurentsov's Annual Memorial Meetings* 30:140–152. https://doi.org/10.25221/kurentzov.30.12 [In Russian].
Sundukov YuN, Makarov KV. 2013. The ground beetles (Coleoptera, Carabidae) of Shikotan Island, Kuril Islands, Russia. *Euroasian Entomological Journal* 12:339–348 [In Russian].
Sundukov YuN, Makarov KV. 2014. Review of the family Rhysodidae (Coleoptera: Adephaga) of Kuril Islands, Russia. *Far Eastern Entomologist* 273:18–20.
Sundukov YuN, Makarov KV. 2016. New or little-known ground beetles (Coleoptera: Carabidae) of Kunashir Island, Kurile Islands, Russia. *Russian Entomological Journal* 25 (2):121–160.
Sundukov YuN, Makarov KV. 2019. The Dokuchaev Ridge as a main faunistic refugium of Kunashir Island. *A.I. Kurentsov's Annual Memorial Meetings* 30:63–79 [In Russian].
Suzuki Sh. 2020. A list of all Japanese beetles (2020). Available at, https://japanesebeetles.jimdofree.com. (Accessed 13 March 2020).
Tamanuki K. 1933. A list of the Longicorn-beetle from Saghalien, with the descriptions of one new species, one new variety and one new aberrant form. *Insecta Matsumurana* 8 (2):69–88.
Triantis KA, Guilhaumon F, Whittaker RJ. 2012. The island species–area relationship: Biology and statistics. *Journal of Biogeography* 39:215–231.
Trichas A, Lagkis A, Triantis KA, et al. 2008. Biogeographic patterns of tenebrionid beetles (Coleoptera, Tenebrionidae) on four island groups in the south Aegean Sea. *Journal of Natural History* 42:491–511.
Watanabe N. 1976. Morphological study of the male ninth abdominal segment in the subfamily Hydrophilinae (Coleoptera). I. Tribe Hydrophilini. *Entomological Review of Japan* 29 (1/2):43–47.
Yoshitomi H, Nikitsky N. 2004. Scirtid beetles (Insecta, Coleoptera, Scirtidae) from Sakhalin and the Kuril Islands. *Biodiversity and Biogeography of the Kuril Islands and Sakhalin* 1:45–47.
Zalewski M, Ulrich W. 2006. Dispersal as a key element of community structure: the case of ground beetles on lake islands. *Diversity and Distributions* 12:767–775.
Zerche L. 2004. Revision der Gattung *Aegialites* Mannerheim (Coleoptera: Salpingidae: Aegialitinae). *Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie)* 666:1–116.

Further reading

Medvedev LN. 1966. Fauna Lycidae (Coleoptera) Kurilskikh ostrovov, poluostrova Kamchatki, Magadanskoy oblasti. In: Soboleva RG, Ivliev LA, editors. *Entomofauna lesov Kurilskikh ostrovov, poluostrova Kamchatka, Magadanskoy oblasti*. Moscow–Leningrad: Nauka. pp. 34–38 [In Russian].
Physico-geographical atlas of the world. 1964. *Moscow: AN USSR and the Main Directorate of Geodesy and Cartography of the GGK USSR* [In Russian].

Appendix A

Appendix A. The geographical coordinates of the localities in 2008-2017

Locality	Latitude	Longitude
Kunashir Isl.		
Stream mouth ~1 km east of Dokuchaevo [abandoned]	44°30′34″	146°10′06″
Ravine ~ 1 km SE Dokuchaevo	44°30′21″	146°10′01″
South coast of the Dokuchaeva Bay	44°30′16″	146°10′58″
Bay east of Shpil Rock	44°30′11″	146°11′14″
Lower reaches of the Dalny Stream	44°28′52″	146°05′42″
1 km north of Dalny Stream	44°29′19″	146°6′24″
Dokuchaeva Ridge, acid lake south of Lake Vodopadnoe	44°27′01″	146°06′04″
Lovzova Peninsula, source of the Malyi Stream	44°24′17″	146°31′44″
Stream mouth near Moristy Island	44°24′02″	146°01′59″
Hills between Severyanka and Zolotaya rivers	44°20′29″	146°00′01″
South face of Prasolova Cape	44°21′15″	146°0′19″
Mouth of the right tributary of the Zolotaya River	44°21′47″	146°02′10″
Lower reaches of Zolotaya River	44°21′41″	146°02′08″
Mouth of the Severyanka River	44°20′16″	146°00′05″
Right slope of Severyanka River valley	44°19′58″	146°01′15″
Valley of the Tyatina River, 1-2 km upstream of mouth	44°19′30″	146°09′17″
Coast of Okhotsk Sea, ca. 2 km N Lake Mikhaylovskoye	44°18′46″	145°58′54″
Shore of Lake Mikhaylovskoye	44°18′01″	145°58′07″
Eastern shore of Lake Valentina	44°16′53″	145°58′04″
Mouth of the Medny Stream	44°16′34″	145°56′27″
Sandy terraces near Lake Valentina	44°16′34″	145°56′27″
Sea coast near Lake Valentina	44°16′34″	145°56′27″
Watershed of Saratovskaya and Tyatina rivers	44°16′28″	146°07′09″
South shore of Lake Valentina	44°16′14″	145°57′25″
Near cordon (= forester's cabin) Saratovsky	44°15′57″	146°06′23″
Sea coast between Saratovskaya and Tyatina rivers	44°15′56″	146°08′37″
Lower reaches of the Saratovskaya River	44°15′46″	146°06′13″
Lower reaches of Filatova River, Bolysheva Stream	44°12′02″	146°00′45″
Lower reaches of the Filatova River	44°11′38″	146°00′55″
Rogacheva Island near mouth of Filatova River	44°10′45″	146°02′53″
Near Lake Il'inskoye	44°09′35″	145°48′34″
Near Nazarovo Outpost	44°12′13″	145°51′36″
Near Yuzhno-Kurilsk, mire between the sea coast and the Serebryanka River	44°03′22″	145°51′37″
Dunes north of Yuzhno-Kurilsk	44°02′31″	145°51′40″
Yuzhnokurilsky Cape	44°01′14″	145°51′52″
Mouth of the Stolbovskoy Stream	44°00′39″	145°40′29″
17 km south-west Yuzhno-Kurilsk, thermal spring	44°00′26″	145°40′59″
Hills south of Stolbchaty Cape	44°00′20″	145°42′05″
Mouth of the Tretiyakova Stream	43°59′17″	145°38′28″
Mouth of the stream between Stolbchaty Cape and Krugly Cape	44°00′28″	145°39′53″
Mouth of the Asin Stream	43°58′59″	145°37′33″
Cordon Alekhinsky	43°57′17″	145°35′34
Cordon Alekhinsky, Danilovo Natural Boundary	43°57′16″	145°35′38″
Cordon Alekhinsky, lake	43°57′01″	145°35′35″

(*continued on next page*)

(*continued*)

Locality	Latitude	Longitude
Cordon Alekhinsky, nort-west shore of Lake Peschanoe	43°56′41″	145°35′39″
Western shore of Lake Peschanoe	43°56′37″	145°35′18″
Cordon Alekhinsky, south-west shore of Lake Peschanoe	43°56′33″	145°33′20″
Lakes in the valley south of western shore of Lake Peschanoe	43°56′29″	145°34′38″
Coast of Okhotsk Sea, south of Znamenka Cape	43°56′12″	145°33′15″
Tretiyakovo env., valley and right source of Valentiny Stream	43°58′38″	145°40′39″
Near Tretiyakovo, valley of the Valentiny Stream	43°56′05″	145°39′29″
South coast of the Alekhina Cape	43°55′25″	145°32′02″
Southern slope of Alekhina Cape	43°55′22″	145°32′27′
Flood-plain of the Alekhina River near mouth	43°55′14″	145°32′09″
Hills south-west of Lake Peschanoe	43°55′13″	145°34′32″
Alekhino Outpost	43°55′06″	145°31′34″
Alekhino Outpost, stream	43°55′06″	145°31′34″
Near Alekhino Outpost	43°55′06″	145°31′34″
Middle reaches of the Alekhina River	43°55′00″	145°32′54″
Thermal spring 1 km south-east of Alekhino Outpost	43°54′58″	145°31′11″
1 km south-west of Alekhino, coastal rockery	43°54′58″	145°31′00″
Vodopadny Cape	43°54′27″	145°40′40″
Lower reaches of the Sernovodka River, mire	43°54′54″	145°38′11″
South coast of Vodopadny Cape	43°54′39″	145°39′31″
Bay south-west of the Odinoky Stream	43°54′36″	145°30′25″
Hills 2.5 km west of Sernovodsk	43°54′33″	145°36′26″
Eastern shore of Lake Glukhoe	43°54′11″	145°38′12″
Valley of the Andreyeva River, ~1.5 km upstream of mouth	43°53′26″	145°36′34″
Mouth of the Belkina River, ocean coast, under log and drift-wood	43°53′26″	145°37′39″
Sea coast near Okhotskoe Natural Boundary	43°53′23″	145°27′58″
Cordon Andreyevsky	43°53′15″	145°37′33
Hills south of Lake Peschanoe	43°53′15″	145°37′33
Near cordon Andreyevsky, ocean coast	43°53′15″	145°37′33″
Lower reaches of the Andreyeva River	43°53′04″	145°36′22″
Northern coast of Chetverikova Cape	43°53′01″	145°37′30″
Mouth of the Ozernaya River	43°53′07″	145°27′44″
0.3 km south-west from mouth of the Ozernaya River	43°52′55″	145°27′38″
Ozernaya River valley	43°52′44″	145°28′16″
Middle reaches of the Ozernaya River	43°52′31	145°28′25″
1.5 km south-west mouth of the Ozernaya River, sea coast	43°52′27″	145°27′16″
Cordon Ozernyi	43°52′26″	145°28′56″
Caldera of Golovnin Volcano, western shore of Lake Goryacheye	43°52′25″	145°28′59″
North coast of Puzanova Cape	43°52′23″	145°36′23″
Caldera of Golovnin Volcano, near Lake Goryacheye	43°52′22″	145°29′11″
Caldera of Golovnin Volcano, south shore of Lake Goryacheye	43°52′16″	145°29′26″
Mouth of stream, 1 km north of Blizhny Island	43°51′54″	145°27′03″
Ivanovsky Cape, Grozovoe	43°50′28″	145°24′29″
Near cordon Ivanovsky	43°50′23″	145°24′40″
Ivanovsky Cape, 0.5 km east of Grozovoe	43°50′20″	145°24′52″
Ivanovsky Cape	43°50′14″	145°24′28″
Ivanovsky Cape, 2 km south of Grozovoe	43°49′28″	145°24′09″
2 km south-east of Ivanovsky Cape	43°49′16″	145°25′26″
Stream mouth 2 km south of Ivanovsky Cape	43°49′13″	145°24′32″
2.5 km south of Ivanovsky Cape	43°49′04″	145°24′40″
South coast of Ivanovsky Cape	43°49′04″	145°24′40″
3 km south-east of Ivanovsky Cape	43°48′33″	145°24′44″
Mouth of the Vodopadny Stream south of Ivanovsky Cape	43°48′20″	145°24′59″
8 km west-south-west of Puzanova Cape	43°48′00″	145°34′02″
West of the Bystry Stream	43°47′18″	145°25′19″
Mouth of the Bystry Stream	43°47′18″	145°25′19″
2 km north of Dubovoe	43°46′44″	145°29′44″
Near Dubovoe	43°46′10″	145°29′51″
Near Dubovoe, shore of the Khlebnikova River	43°45′58″	145°29′38″
Watershed of the Golovnina and Khlebnikova rivers	43°44′51″	145°30′10″
Watershed of Rikorda and Belozerskaya rivers	43°44′26″	145°33′33″
Watershed of the Golovnina and Khlebnikova streams	43°44′20″	145°30′12″
Coastal marshes between Belozerskaya and Rikorda rivers	43°44′07″	145°33′43″
Near Golovnino, at light	43°44′04″	145°32′01″
East of Golovnino, flood-plain	43°44′04″	145°32′01″
Mouth of the Khlebnikova River, 4 km east of Paltusovo	43°43′59″	145°29′33″
Mouth of the Rikorda River	43°43′52″	145°33′12″
Mouth of the Sennaya River, 2.5 km east of Paltusovo	43°43′44″	145°28′34″
Veslovsky Peninsula 1.5 km north of Veslo Cape	43°39′57″	145°32′12″
Shikotan Isl.		
The Tserkovnaya Bay	43°44′43″	146°37′32″
Valley of the Otrada River	43°51′10″	146°50′54″
Krabozavodskoe	43°50′02″	146°45′16″
The hill on the creek valley Vesoliy	43°50′00″	146°52′36″

(*continued*)

Locality	Latitude	Longitude
Polonsky Isl.		
Southwestern cape	43°37′45″	146°17′48″
The Moryakov Bay	43°38′14″	146°18′24″
The Udobnaya Bay	43°38′13″	146°20′11″
Outpost	43°38′45″	146°18′53″
Yuri Isl.		
East coast of middle cape	43°25′23″	146°04′09″
Tanfiliev Isl.		
Zorkaya Bay	43°25′57″	145°53′55″