

A faunistic review of the *Gyrinus* species of the Far East of Russia (Coleoptera: Gyrinidae)

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Abstract

Whirligig beetles of the genus *Gyrinus* (Coleoptera: Gyrinidae) occurring in the Far East of Russia are reviewed. The following new records are given: *G. minutus* FABRICIUS - Kamchatka; *G. sachalinensis* KAMIYA - Iurii, Tanfilyeva, Zelionyi, and Urup; *G. opacus* C.R. SAHLBERG - Onekotan and Shumshu; *G. aeratus* STEPHENS - Sakhalin and Kamchatka; and *G. pullatus* ZAITZEV - Sakhalin. *Gyrinus reticulatus* BRINCK, 1940, is synonymized with *Gyrinus sachalinensis* KAMIYA, 1936, syn.n. Material of this species from Sakhalin and the South Kurils has previously been misidentified as *G. curtus* MOTSCHULSKY. The taxonomic species concept of *G. curtus* is revised.

Key words: Coleoptera, Gyrinidae, *Gyrinus*, Far East, Russia, Kurils, faunistics, taxonomy.

Introduction

The Holarctic gyrid fauna is dominated by the genus *Gyrinus* O.F. MÜLLER. Of the known 130 *Gyrinus* species, about 30 occur in Eurasia (OYGUR & WOLFE 1991). Whereas the West Palearctic species are more or less well-known (e.g. HOLMEN 1987), no modern revision has been devoted to the Asian species. Due to inadequate sampling, the faunistics of the genus remains poorly known in most parts of Asia. Recently, MAZZOLDI (1995) updated the Chinese fauna, and LAFER (1989) dealt with the species known from the Far East of Russia. The Japanese fauna has been treated in several more recent publications (NAKANE 1987a, b, 1990; SATÔ 1977, 1985a).

The main aim with the present study is to provide new records of *Gyrinus* species from the Far East of Russia, including Primorye, Khabarovsk region, Kamchatka, Sakhalin and the Kuril Islands. Moreover, the taxonomic species concept of *G. curtus* MOTSCHULSKY is revised.

Material and Methods

Previously published records from the Far East of Russia are reviewed, and new records are added from the following materials: (1) 1992 expedition to South Primorye by the senior author and the late Dr. P. Lindskog; (2) 1993 expeditions to South Primorye and Sakhalin by the senior author and S.K. Kholin; (3) the American-Japanese-Russian Kuril expeditions of 1994-1999; (4) 1997 expeditions to Kamchatka, North Kurils and Sakhalin by S.K. Kholin; and (5) 1997 expedition to Kunashir by Y. Marusik. Additionally, some older records based on the study of specimens in the collections of the Zoological Institute of St. Petersburg (ZISP) are included.

Names of collectors are coded as follows: (AN) A.N. Nilsson, (AR) A. Rasschepkina, (BV) B. Viklund, (DJB) D.J. Bennett, (EMS) E.M. Sayenko, (KLK) K.L. Kurowski, (LJW) L.J. Weis, (NM) N. Minakawa, (PL) P. Lindskog, (PO) P. Öberg, (RG) R.I. Gara, (SK) S. Kholin, (TIR) T.I. Ritchie, (VAT) V.A. Teslenko, and (YM) Y. Marusik.

Review of species

Gyrinus minutus FABRICIUS, 1798

Gyrinus minutus FABRICIUS, 1798:65 (orig. descr.); KAMIYA 1936a:21 (Sakhalin); 1940:131 (Manchuria); BRINCK 1946:151 (Manchuria); OCHS 1950:77 (Sakhalin); MATIS & GRAMMA 1975:227 (Magadan); LAFER 1989:256 (Khabarovsk region, Primorye); OYGUR & WOLFE 1991:25 (descr., distr.); MAZZOLDI 1995:156 (Manchuria); ZASYPKINA et al. 1996:23 (Magadan).

Gyrinus kirbii MARSHAM, 1802:100 (orig. descr.).

Gyrinus ohbayashii SATO, 1985b:51 (orig. descr., Hokkaido).

Gyrinus minutus ohbayashii SATO, 1985: NAKANE 1990:23 (tax. status).

NEW RECORDS

KAMCHATKA: Between Cape Zheltyi and Cape Ilya, ponds inland from bay, 51°33.50' N 157°42.54' E, 27.VII.1999, 5 exs., leg. KLK & NM.

SAKHALIN: Beregovye Langry, lake, 19.IX.1995, 10 exs., leg. SK.

ZISP RECORDS

PRIMORYE: Vindogradovka, 3.VI.1929, 5 exs., leg. Kirichenko; Vladivostok, 31.V.1909, 1 ex., leg. Bergerz; Romanovka, Sutsan district, 15.VII.1916, 4 exs., leg. Emelyanov; Ogorki river, Khanka Lake, 24.IV.1911, 1 ex., leg. Cherskiy; Troitskoe, Khanka Lake, 23.VI.1909, 8 exs., leg. Cherskiy; Kaynolovo, near Gorsk, 4.VIII.1898, 1 ex., leg. Birulya; Evseevka, Iman district, 1.V.1910, 6 exs., leg. Shinzarev; Khanka Lake, Kamen-Ribolov village, 31.VII.1910, 9 exs., leg. Tarobarov.

A Holarctic species with a circumboreal distribution. In the Far East known from NE China and Primorye to Kamchatka on the continent, and from the islands of Sakhalin and Hokkaido. It is seemingly absent from the Kuriles. It is here recorded from Kamchatka for the first time.

Gyrinus sachalinensis KAMIYA, 1936

Gyrinus sachalinensis KAMIYA, 1936b:312 (orig. descr., Sakhalin); 1936a:22 (descr.).

Gyrinus reticulatus BRINCK, 1940:37 (orig. descr., N Honshu); SATO 1977:1 (descr.); 1985a:202 (descr.); NAKANE 1987a:40 (descr.), 1987b:28 (penis illustr.); **syn.n.**

Gyrinus curtus MOTSCHULSKY, 1866: MATSUMURA 1911:112 (misident., Sakhalin: Shiraraka); TAKIZAWA 1931:17 (misident., Kurils: Sashiusu, Sakhalin: Ikusagawa, Toyohara); LAFER 1989:256 (misident., Iturup, Shikotan, Kunashir, Sakhalin).

NEW RECORDS

SAKHALIN: Pionery, small lake, 23.VI.1993, 4 exs., leg. AN & SK; 10 km E of Aniva city, pond near river, 20.VI.1993, 1 ex., leg. AN & SK; Kostromskoye, pond, 18.VI.1993, 6 exs., leg. AN & SK; same, 19.VI.1993, 4 exs., leg. AN & SK; same, 23.VI.1993, 7 exs., leg. AN & SK; Beregovye Langry, pond, 30.IX.1995, 3 exs., leg. SK; Pugachevo, forest pond, 22.IX.1995, 4 exs., leg. SK; Novye Langry, ponds, 20.IX.1995, 4 exs., leg. SK; Moskalvo, 16-17.IX.1995, 8 exs., leg. SK; Kholmsk, *Typha* pond, 21.VI.1993, 6 exs., leg. AN & SK; 13 km W of Okhotskoye village, pond, 20.VI.1993, 11 exs., leg. AN & SK.

KURILS: IURII: Shirokaya Bay, lake, 43°25.38' N 146°04.29' E, 20.VIII.1998, 10 exs., leg. NM. - TANFILYEVA: Tanfilyevka Bay, lake, 43°26.87' N 145°54.05' E, 19.VIII.1998, 10 exs., leg. LJW. - ZELIONYI: Lake Kamenskoye, 6.VIII.1994, 43°30.12' N 146°06.12' E, 9 exs., leg. NM. - SHIKOTAN: Delfin Bay, stream, 43°73.04' N 146°62.06' E, 11.VIII.1994, 3 exs., leg. RG; Dimitrova Bay, pool, 43°47.69' N 146°49.51' E, 13.VIII.1998, 1 ex., leg. EMS; Dimitrova Bay, lake, 43°47.73' N 146°49.61' E, 13.VIII.1998, 3 exs., leg. EMS; Delfin Bay, 43°45.00' N 146°38.97' E, roadside pools, 15.VIII.1998, 11 exs., leg. EMS & LWJ; Delfin Bay, pond, 43°45.04' N 146°39.24' E, 15.VIII.1998, 3 exs., leg. LJW; Zvezdnaya Bay, 43°46.24' N 146°36.36' E, 16.VIII.1998, 76 exs., leg. LJW; Gorobets Bay, marshy ponds, 43°48.02' N 146°42.95' E, 18.VIII.1998, 28 exs., leg. LWJ; Delfin Bay, pond, 43°45.11' N 146°37.41' E, 15.VIII.1998, 58 exs., leg. NM. - KUNASHIR: Lagunnoye Lake, pond, 24.IX.1997, 2 exs., leg. YM; Aliger Lake, 44°02.48' N 145°44.24' E, 31.VII.1994, 1 ex., leg. NM; Aliger Lake, 44°02.59' N 145°44.18' E, 26.VIII.1996, 1 ex., leg. PO; Serebryanoye Lake, roadside pools, 44°03.09' N 145°48.95' E, 22.VIII.1998, 5 exs., leg. LJW; Dlinnoye Lake, pond, 44°24.68' N 146°27.63' E, 28.VII.1998, 3 exs., leg. NM; Yuzhno-Kurilsk, swamp near, 44°01.25' N 145°50.23' E, 17.VIII.1999, 14 exs., leg. KLK & NM; Peshanoye Lake, swamps near, 43°55.02' N 145°37.83' E, 17.VIII.1999, 4 exs., leg. NM. - ITURUP: Peschanyi stream, 13.VIII.1994, 1 ex., leg. RG; Lebedinoye Lake, 17.VIII.1994, 18 exs., leg. RG; Dobroye Lake, 44°44.23' N 147°13.13' E, 23.VIII.1996, 8 exs., leg. NM; 4 km E of Kitovyi village, roadside

pools, 45°15.93' N 147°55.74' E, 29.VII.1997, 13 exs., leg. NM & TIR; 4 km E of Kitovyi village, bog pool, 45°15.82' N 147°55.69' E, 29.VII.1997, 3 exs., leg. TIR; Kasatka Bay, pool, 45°00.45' N 147°43.68' E, 1.VIII.1998, 3 exs., leg. DJB; Kasatka Bay, swamp, 44°58.77' N 147°44.20' E, 31.VII.1998, 2 exs., leg. LJW; Kasatka Bay, roadtrack pools, 44°58.77' N 147°44.20' E, 31.VII.1998, 4 exs., leg. NM; Blagodamyo Lake, roadside pools, 45°01.36' N 147°43.43' E, 1.VIII.1998, 3 exs., leg. NM; Kuybyshevskiy Lake, 45°04.51' N 147°41.98' E, 13.VIII.1999, 23 exs., leg. KLK & NM; Dobroye Nachalo Bay, E of Lesozavodskoye Lake, swamp, 44°46.43' N 147°12.84' E, 14.VIII.1999, 1 ex., leg. KLK & NM. - URUP: Tokotan Lake, marsh, 45°51.25' N 149°47.50' E, 4.VIII.1995, 1 ex., leg. EMS; Katayeva Bay, pools, 45°34.87' N 149°25.29' E, 26.VIII.1995, 15 exs., leg. PO; Lopukhovaya river, ponds, 45°47.79' N 149°54.01' E, 28.VIII.1995, 96 exs., leg. PO; Vstrechniy river, lake & ponds, 45°57.85' N 150°10.80' E, 29.VIII.1995, 13 exs., leg. PO; Tetyaeva Bay, ponds, 45°38.62' N 149°28.72' E, 21.VIII.1996, 87 exs., leg. PO.

ZISP RECORDS

SAKHALIN: Novoaleksandrovsk, 23.V.1973, 1 ex., leg. Kerzhner. - KUNASHIR: Sernevodsk, 7.VI.1973, 1 ex., 16.VII.1973, 1 ex., 27.VIII.1973, 4 exs., leg. Kerzhner; Golovnivo, 8.VI.1973, 1 ex., leg. Kerzhner. - SHIKOTAN: Malokurilsk, 22.VI.1973, 3 exs., leg. Kerzhner.

There is a lot of confusion about the identity of *G. curtus*, first described from Japan. According to SHARP (1884), it was misidentified by RÉGIMBART (1883), who applied the name to the species described by SHARP (1873) as *G. japonicus*. Later workers have followed SHARP (1874), but it was not until KAMIYA (1936b) described his *G. sachalinensis* and BRINCK (1940) his *G. reticulatus* that it became evident that the *G. curtus* of earlier authors like TAKIZAWA (1931) and KAMIYA (1933) had included two different species: one with a very narrow and the other with a somewhat broader penis apex (cf. drawings in BRINCK 1940). Following BRINCK (1940), Japanese authors like SATÔ (1985a) and NAKANE (1987a, b) have applied the name *curtus* to the species with the broader penis apex, whereas LAFER (1989) assigned it to the other species. No lectotype has been selected of *G. curtus*, and according to ZAITZEV (1915), who studied the collection of Motschulsky, the types are probably lost. In this situation, BRINCK (1940) is best regarded as 'first reviser', and consequently the name *G. curtus* is to be used for the species with the broader penis apex. In order to achieve taxonomic stability of this concept of *G. curtus*, a lectotype designation is necessary. As syntypes could not be found in the Motschulsky collection in Moscow, other historical collections known to include Motschulsky duplicates should be searched (HORN et al. 1990).

Gyrinus sachalinensis was described from 10 specimens from south Sakhalin. According to M. Satô (in litt.) the type material was destroyed during World War II. However, of the *Gyrinus* species now known from Sakhalin, Kamiya's description can only refer to this species (English summary: "Closely allied to *Gyrinus japonicus* Sharp, but rather smaller and narrower, and scarcely convex, above black, somewhat bluish, shining, epipleura testaceous. The under surface black, mesosternum dark reddish brown. The male genitalia slender, sharp at the apex; the lateral lobes slightly longer than the middle lobe. Length 6 - 7 mm. Hab. Saghlien (sic!). Holotype (♂), allotype (♀) and 8 paratypes are preserved in the Entomological Laboratory, Tokyo Agricultural College.").

Gyrinus sachalinensis is seemingly endemic to Japan (Honshu and Hokkaido), Sakhalin and the South Kurils. It is here recorded for the first time from the following Kuril Islands: Iurii, Tanfilyeva, Zelionyi, and Urup. The true *G. curtus* is restricted to Japan, where it is known from Hokkaido, Honshu, Shikoku, and Kyushu (SATÔ 1985a).

Gyrinus japonicus SHARP, 1873

Gyrinus japonicus SHARP, 1873:55 (orig. descr.); TAKIZAWA 1931:18 (Hokkaido, Korea); KAMIYA 1933:75 (descr.); BRINCK 1946:152 (Manchuria); MAZZOLDI 1995:158 (Manchuria).

Gyrinus curtus MOTSCHULSKY, 1866: RÉGIMBART 1883:168 (misident.).

NEW RECORDS

KAMCHATKA: Vochkazhty volcanoes, ponds at foothills, 2.VII.1997, 3 exs., leg. SK; Ganalskaya Tundra, man-made lakes, 30.VII.1997, 3 exs., leg. SK.

SAKHALIN: Moskalvo, small lake, 16-17.IX.1995, 1 ex., leg. SK.

ZISP RECORD

KAMCHATKA: Zhupanova, 30.VII.1985, 3exs., leg. Zlobin.

A Holarctic species with a circumboreal distribution. In North America known from Ontario to Alaska and south to New York (OYGUR & WOLFE 1991). The records from Magadan given by MATIS & GRAMMA (1975) were cited as doubtful by LAFER (1989). However, our records from Sakhalin and Kamchatka make the occurrence in Magadan expected, as also approved by ZASYPKINA et al. (1996).

***Gyrinus pullatus* ZAITZEV, 1908**

Gyrinus pullatus ZAITZEV, 1908b:244 (orig. descr.); BRINCK 1946:151 (Manchuria); MATIS & GRAMMA 1975:227 (Magadan); LAFER 1989:257 (Khabarovsk, Primorye); MAZZOLDI 1995:159 (Manchuria).

Gyrinus pullatus forma *nitidior* BRINCK, 1946:152 (orig. descr.).

NEW RECORDS

PRIMORYE: 10 km N of Khasan station, stream pool, 13.VII.1992, 1 ex., leg. AN; 6 km NE of Ryazanovka village, coastal fen, 16.VII.1992, 6 exs., leg. AN; 7 km W of Slavyanka village, fen, 11.VII.1992, 7 exs., leg. AN; 22 km N of Vladivostok city, Sputnik station, ponds, 25.VII.1992, 8 exs., leg. AN; same, 14-16.VI.1993, 5 exs., leg. AN & SK; same, 28.VIII.1993, 1 ex., leg. SK; same, 8.X.1993, 1 ex., leg. SK.

KHABAROVSK REGION: 5 km E of Troitskoye village, Slavyanka at Amur, VI.1993, 2 exs., leg. BV & PL.

SAKHALIN: W of Okhotskoye village, 20.VI.1993, 3 exs., leg. AN & SK.

ZISP RECORDS

PRIMORYE: Khanka Lake, Kamen-Ribolov, 26.VI.1910, 1 ex., leg. Tarobarov; Nikolskoe on Suyfun river, 1876, 1 ex., leg. Khristof; Yakovlevka, Spas district, 14.V.1926, 3 exs., leg. D. Filipov; Raseka Kvashuka at Daubikhz river, 25.VI.1927, 3 exs., leg. Sokarov; Maykhz near Shkotova, 5.VI.1927, 5 exs., leg. Rezvoy; Khorvatovo station, 8.VI.1928, 1 ex., leg. Formosov.

A northern Palearctic species known from Scandinavia and Latvia to the Far East, where it has been recorded from Korea and NE China to Magadan. It is here recorded for the first time from Sakhalin.

***Gyrinus marinus* GYLLENHAL, 1808**

Gyrinus marinus GYLLENHAL, 1808:143 (orig. descr.); KAMIYA 1935:504 (N Kurils); MIYADI 1937:444 (Paramushir, Shumshu); OCHS 1950:77 (Kamchatka, Kurils); OYGUR & WOLFE 1991:37 (descr., distr.); ZASYPKINA et al. 1996:24 (Magadan).

Gyrinus dorsalis GYLLENHAL, 1808:142 (orig. descr.).

Gyrinus aeneus STEPHENS, 1828:95 (orig. descr.).

Gyrinus anthracinus STURM, 1836:102 (orig. descr.).

Gyrinus lembus SCHIÖDTE, 1841:563 (orig. descr.).

Gyrinus marinus var. *epipleuralis* MUNSTER, 1925:32 (orig. descr.).

A Holarctic species, widespread in the Palearctic region, but in the Nearctic restricted to the Yukon Territories and Alaska (OYGUR & WOLFE 1991). In the Far East recorded from Magadan, Kamchatka and the northern Kurils. The Kuril records need verification as they may in fact refer to *G. opacus*.

Discussion

Of the seven *Gyrinus* species known from the Far East of Russia, four have Holarctic distributions, one is transcontinental in Eurasia, and two are restricted to East Asia. Of the East Asian species, *G. japonicus* is in Russia delimited to Primorye, whereas *G. sachalinensis* is absent from the mainland. Among the Kuril Islands, the south ones are inhabited by *G. sachalinensis* (north to Urup), the central ones seemingly lack gyrids, and the northern ones are inhabited by *G. opacus*. The suggested presence of *G. marinus* in the north Kurils needs confirmation before acceptance.

Except for the understudied Khabarovsk region, continental species richness per region reaches three or four species. The higher score is true also for Sakhalin. It thus seems that *Gyrinus* species richness of the Russian Far East is relatively low, when compared to other regions like Scandinavia where the corresponding scores reach ten or more (HOLMEN 1987). The same pattern is true also for diving beetles (KHOLIN & NILSSON 1998).

Species	Kuril Islands							Adjacent areas									
	IU	TA	ZE	SH	KU	IT	UR	ON	PA	SHU	HO	SA	CH	PR	KH	MA	KA
<i>G. minutus</i>											x	x	x	x		x	x
<i>G. sachalinensis</i>	x	x	x	x	x	x	x				x	x					
<i>G. japonicus</i>											x		x	x			
<i>G. opacus</i>								x	x	x						x	x
<i>G. aeratus</i>												x				x	x
<i>G. pullatus</i>												x	x	x	x	x	
<i>G. marinus</i>								?	?	?							x

Table 1: Occurrence of *Gyrinus* species in the Kuril Islands, Sakhalin and adjacent Russian mainland regions. Presence in China and Hokkaido is also noted. Islands and regions coded as: (IU) Iurii, (TA) Tanfilyeva, (ZE) Zelionyi, (SH) Shikotan, (KU) Kunashir, (IT) Iturup, (UR) Urup, (ON) Onekotan, (PA) Paramushir, (SHU) Shumsu, (HO) Hokkaido, (SA) Sakhalin, (CH) China, (PR) Primorye, (KH) Khabarovsk, (MA) Magadan, and (KA) Kamchatka. No *Gyrinus* species are known from the Kuril Islands situated between Urup and Onekotan.

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