

Georissidae, new record to the mainland of China, with redescription of *Georissus crenulatus* (Rossi) (Coleoptera: Hydrophiloidea)

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Abstract: Family Georissidae Laporte, 1840 and the species *Georissus crenulatus* (Rossi, 1794) are recorded from the Chinese mainland for the first time. *Georissus crenulatus* (Rossi) is redescribed based on six specimens from Beijing, China. The specimens examined are deposited in the Institute of Zoology, Chinese Academy of Sciences, and the private collection of Hongliang Shi in Beijing. This is the type species of *Georissus* Latreille, 1809, widely distributed in Palearctic, from Western Europe to Russian Far East.

Key words: beetles; Polyphaga; taxonomy

中国大陆新记录科——圆牙甲科及细齿圆牙甲的重新描述（鞘翅目：牙甲总科）

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摘要: 报道中国大陆鞘翅目 1 新记录科新记录种, 即圆牙甲科 Georissidae 和细齿圆牙甲 *Georissus crenulatus* (Rossi, 1794)。根据采自中国首都北京的 6 头标本对细齿圆牙甲进行再描述。凭证标本存放在中国科学院动物研究所和史宏亮在北京的个人收藏。该种是圆牙甲属的模式种, 广泛分布于古北区, 包括欧洲, 亚洲西部、中部及北部。

关键词: 甲虫; 多食亚目; 分类

Introduction

Georissidae Laporte, 1840 is a small family of water beetles represented by a single genus *Georissus* Latreille, 1809. They occur on all continents except Antarctica. *Georissus* is comprised of three subgenera (Satô 1972): *Georissus*, *Neogeorissus* and *Nipponogeorissus*. So far, 83 species have been described (Hansen 1999; Short & Fikáček 2011; Fikáček 2012;

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Fikáček *et al.* 2012; Yasuda & Yoshitomi 2022). All three subgenera occur in the Palaearctic Region, with a total of 24 species known (Fikáček & Przewoźny 2015; Przewoźny 2022).

Representatives of *Georissus* are generally riparian, inhabiting wet sand or soil by lakes or rivers (Archangelsky *et al.* 2005; Jäch 1998), although a species from Borneo was found to be terrestrial, inhabiting leaf-litter in cloud forest (Fikáček 2012). Adults are reported to cover themselves with a coating of mud and sand as camouflage (Bameul 1989). Adults of *Georissus* are capable of flying and are sometimes attracted by light at night (Shepard 2003).

Georissus has been recorded from many countries adjacent to China, including Russia (Litovkin & Fikáček 2011; Zinchenko 2014), Mongolia (Sazhnev & Prokin 2017), Japan (Satô 1972; Yasuda & Yoshitomi 2022), Malaysia (Deleve 1974b), Vietnam (Deleve 1969, 1974a), Burma (Arrow 1939), India (Satô 1979), and Kazakhstan (Litovkin 2018). Yet, the georissid fauna of China has hardly been investigated. This family has been reported only from Taiwan in China (Kôno 1936). Although Jäch (1998) mentioned its occurrence in China, it has never been formally documented on the Chinese mainland.

In this paper, *Georissus crenulatus* (Rossi, 1794) is recorded from Beijing and redescribed, being the first georissid documented from the Chinese mainland.

Material and methods

The specimens photographed were first soaked in hot water for about half an hour, then removed to a solution of 0.06% Tween and cleaned with an ultrasonic cleaner for 3 minutes. Then the samples were cleaned with a brush to remove any dirt. The photographs of habitus were taken using a Nikon D5100 digital camera attached to a Leica S8AP0 microscope. Some body part images were taken with a large depth of field 3D Digital Microscope (Keyence VHX-1000C). The male genitalia were placed in glycerol and photographed with a Zeiss Scope A1 microscope.

Morphological terminology largely follows Bameul (1990) and Yasuda & Yoshitomi (2022).

The specimens examined are deposited in the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS) and the private collection of Hongliang SHI, Beijing, China (CSHL). The abbreviation TL indicates type locality.

Taxonomy

Georissus (Georissus) crenulatus (Rossi, 1794) (Figs 1–8, 10–11)

Byrrhus crenulatus Rossi, 1794: 81. TL: Italy, northwest (“Etruria”).

Georissus crenulatus: Mulsant & Rey, 1872: 14.

Pimelia pygmaea Fabricius, 1798: 45. TL: Sweden.

Cathammistes pygmaea: Illiger, 1807: 297.

Georissus pygmaeus: Latreille, 1809: 378.

Trox dubius Panzer, 1799: 5. TL: Germany, Dresden.

Georissus punctatus Grimmer, 1841: 40. TL: Austria, Steiermark.

Georissus major Motschulsky, 1843: 647. TL: Georgia, River Kura at Tbilisi.

Georissus incisus Motschulsky, 1843: 649. TL: France, Paris.

Georissus integro-striatus Motschulsky, 1843: 650. TL: Georgia, River Alazani.

Georissus crenulatus ssp. *integrostriatus*: Ganglbauer, 1904: 93.

Georissus spinicollis Motschulsky, 1843: 653. TL: Russia (Caucasus), River Malka.

Georissus mutilatus Motschulsky, 1843: 655. TL: Kazakhstan, River Irtysh at Semipalatinsk.

Georissus bisulcatus Motschulsky, 1843: 657. TL: Estonia.

Georyssus siculus Ragusa, 1873: 233. TL: Italy, Sicily, Oreto R. near Palermo.

Georyssus nepos Fairmaire, 1879: 182. TL: N. Africa (?Algeria), La Chiffa.

Georyssus crenulatus var. *corcyraeus* Sahlberg, 1903: 25. TL: Greece, Corfu, Kalichipulo.

Specimens examined. 1♀ 1 spec., Beijing, Changping District, Shahe Reservoir, 38.7 m, 40.1368°N, 116.2896°E, 27-III-2022, leg. Changpeng YAN & Meiyong LIN (IZCAS); 1♂1♀, Beijing, Yanqing District, riverbank of Guishui, 475 m, 40.4404°N, 115.8584°E, 03-IV-2021, wetland of *Phragmites australis*, leg. Hongliang SHI & Ganyan YANG (CSHL); 2♀, Beijing, Haidian District, Jiufeng, 04-VI-2006, leg. Ye LIU (CSHL).

Redescription. Size, Shape and Coloration (Figs 1, 2). Length: 1.77 mm, width: 1.08 mm. Oval, dorsum convex, black, slightly shiny.

Head (Fig. 3). Labrum transverse, 3.5 times as wide as long, with a long hair near the lateral margin on each side. Clypeus distinctly rimmed in front, separated into three areas by two curved longitudinal grooves; middle area provided with some large foveae and a few smaller ones; lateral area scattered with sparse foveae; posterolateral very indented, separated from the eyes with a deep antennary furrow; posterior separated from the frons by a deep V-shaped clypeo-frontal furrow. The frons and vertex bordered with a deep furrow on lateral and posterior sides and separated by a median frontal furrow which connects to the clypeo-frontal furrow to form a Y-shaped furrow; several large foveae range along this Y-shaped furrow. Antennae short, 9-segmented, with 3-segmented pubescent club.

Pronotum (Fig. 4). Cuculiform, completely covering the head in dorsal view, 1.27 times as wide as long, widest at the base; anterior margin bordered, slightly crenulated. Anterior 1/3 of the pronotum with a series of confluent punctures, sometimes merged into short grooves, rather wide and shallow, forming a complex pattern in the shape of a half moon, cut in half by a median longitudinal groove consisting of a series of discontinuous punctures. The posterior 2/3 of pronotum with the disc smooth and shining, lateral margin with a short groove on each side. The lateral border on the posterior 1/3 provided with 4–5 denticles. Posterior edge provided with posterior grooves made up of a row of punctures. Scutellum inconspicuous.

Elytra (Fig. 5). Globose, very convex, almost as wide as long, sides regularly rounded, widest in the middle. Humeral bulges distinct, protruding. Surface with ten rows of longitudinal punctures, intervals smooth, slightly elevated, with some sparse punctuation on the posterior part. The punctures on the inner rows are larger than that on the outer rows. Basal punctures placed in a transverse impression along the anterior margin. Row 1–6 complete and parallel, ending in a lateroapical depression; row 7 interrupted by line 6, about 2/3 as long as the elytron; row 8 short, about 1/3 as long as the elytron, interrupted at both ends by rows 7 and row 9, consisting of 6–8 punctures; row 9–10 complete, ending against line 1–6. Lateral margin crenulated along its entire length. The frontolateral corner with a short row of denticles.

Abdomen (Fig. 6). Short, with five visible sternites. Sternite I large, strongly bulging; middle of anterior margin with a short row of denticles; surface smooth, granulation indistinct;

posterior with two large teeth. Sternite II–IV short, equal in length, granulation indistinct; sternite II with two weak teeth against the teeth on sternite I, barely visible. Sternite V rounded, granulation distinct and dense.



Figures 1–8. *Georissus crenulatus* (Rossi, 1794) 1. Habitus, dorsal view; 2. Habitus, lateral view; 3. Head; 4. Pronotum; 5. Elytron; 6. Abdomen; 7. Male sternite IX; 8. Aedeagus. Scale bars = 0.5 mm (Figs 1, 2); 0.1 mm (Figs 3–8).

Legs. Femora dilated, with 3 rows of tubercles forming longitudinal carinae on both sides. Anterior tibiae dilated; all tibiae crenulated on their external edge. Tarsi with five segments visible (tarsal formula 5-5-5), the last segment longest, but shorter than the preceding segments combined; claws short.

Male genitalia (Figs 7, 8). Aedeagus 0.47 mm long. Parameres slightly longer than phallobase; lateral margins bulbous at apical portion, rounded apically; internal margins subparallel-sided, with long setae densely at apical portion. Median lobe shorter than parameres, tapering towards the apex, narrowly rounded at apex, slightly angular at apex. Phallobase about 2.0 times as long as wide, sub-parallel. Sternite IX U-shaped.

Distribution. China (Beijing); Mongolia; Russia (West Siberia, East Siberia, Far East); Kazakhstan; Turkey; Russia (Europe); Europe.



Figures 9–13. Habitats of *Georissus crenulatus* (Rossi, 1794). 9. Shahe reservoir, the arrow indicates the collecting site; 10. A walking beetle on pathway by the reservoir, showing that the beetle camouflages itself with sand and mud; 11. A beetle vs a finger of a 9 year-old boy, showing the minute size of the beetle; 12. The pathway by the reservoir on March 27, the arrow indicates the collecting point; 13. The same pathway by the reservoir on July 2, a light trap was set on the pathway.

Discussion

Georissidae is the sixth family of superfamily Hydrophiloidea reported from the Chinese mainland, after Epimetopidae (Ji & Jäch 1998) and Spercheidae (Jia & Wen 2007). Jäch (1998) mentioned that “*Georissus* Latreille occurs in China, but the genus was not treated by Wu

(1937) and it is in need of a taxonomic revision.” “Occurs in China” was probably talking about the report from Taiwan, China by Kôno (1936), without any species or specimen information from Chinese mainland. Thus, our study represents the first formal report of the family Georissidae from the Chinese mainland. At this point, all the families of Hydrophiloidea have now been documented as occurring on the Chinese mainland.

Georissidae are typical riparian beetles, and were called “Minute Mudloving beetles” by Jäch (1998). Just like members of the Sphaeriusidae (Liang & Jia 2018), they are also frequently ignored in field collecting due to their cryptic habit, minute size as well as their remarkable camouflage (Figs 10, 11). Two individuals (Figs 10, 11) were collected from a pathway by the Shahe Reservoir, Beijing (Fig. 9) on March 27, when it was still cold and there were no green plants (Fig. 12). The beetles were all covered by sand and mud when we found them (Figs 10, 11). Since most of specimens in the world have been collected by light trap, we tried to collect more specimens by light trap on July 2, when it was warmer and plants were growing (Fig. 13). Unfortunately, we failed to find more individuals. Zhang (2018) described 8 new species and a species new to China in her Master’s Thesis based on specimens collected from southern China. However, all species recorded by Zhang have not been published yet (personal communication with Dr. Fenglong JIA, 17-XI-2022). Considering the general distribution pattern of this group around China, especially in Japan and South-East Asia, it is reasonable to assume that there are more new species of Georissidae to be discovered in China, especially in southern China.

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