

**New records of digger wasps (Hymenoptera: Crabronidae)  
from Altai, with taxonomical notes on *Crossocerus mongolensis*  
Tsuneki, 1972, stat.n.**

**Новые находки роющих ос (Hymenoptera: Crabronidae)  
с Алтая, включая таксономические замечания для  
*Crossocerus mongolensis* Tsuneki, 1972, stat.n.**

**M.V. Mokrousov<sup>1</sup>, M.Yu. Proshchalykin<sup>2\*</sup>  
M.B. Мокроусов<sup>1</sup>, М.Ю. Прощалькин<sup>2\*</sup>**

<sup>1</sup> Institute of Biology and Biomedicine, Lobachevsky State University of Nizhny Novgorod, Gagarina prospekt 23, Nizhny Novgorod 603950, Russia. E-mail: sphecid@inbox.ru

<sup>2</sup> Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, 100-letia Vladivostoka prospekt 159, Vladivostok 690022, Russia. E-mail: proshchalykin@biosoil.ru

<sup>1</sup> Институт Биологии и Биомедицины Нижегородского государственного университета им. Н.И. Лобачевского. Гагарина проспект, 23, Нижний Новгород 603950, Россия.

<sup>2</sup> Федеральный научный центр биоразнообразия наземной биоты Восточной Азии ДВО РАН, 100-летия Владивостока проспект, 159, Владивосток 690022, Россия.

\*Corresponding author.

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КЛЮЧЕВЫЕ СЛОВА: фауна, биоразнообразие, Spheciformes, Россия, Палеарктика.

**ABSTRACT.** New data on collecting of six species of digger wasp family Crabronidae of genera *Alysson* Panzer, 1806, *Belomicrus* A. Costa, 1871, *Crabro* Fabricius, 1775, *Crossocerus* Lepeletier de Saint Fargeau et Brullé, 1835, and *Didineis* Wesmael, 1852 in Altai are provided. *Crossocerus strangulatus* (Bischoff, 1930) is recorded for the first time for Russia, *Alysson ratzeburgi* Dahlbom, 1843, *Belomicrus borealis* Forsius, 1923, *Crabro maeklini* A. Morawitz, 1866, *C. femoralis* F. Morawitz, 1892, and *Didineis sibirica* Gussakovskij, 1937 are newly recorded from Altai. In addition, *Didineis sibirica* also recorded for the first time for Kazakhstan and Mongolia. *Crossocerus mongolensis* Tsuneki, 1972, **stat.n.** is reinstated from synonymy and raised to full species level. The number of Crabronidae species in the fauna of Altai is now increased to 245.

**РЕЗЮМЕ.** Приведены данные о находке на Алтае шести видов роющих ос семейства Crabronidae родов *Alysson* Panzer, 1806, *Belomicrus* A. Costa, 1871, *Crabro* Fabricius, 1775, *Crossocerus* Lepeletier de Saint Fargeau et Brullé, 1835 и *Didineis* Wesmael, 1852. *Crossocerus strangulatus* (Bischoff, 1930) впервые указан с территории России, *Alysson ratzeburgi* Dahlbom, 1843, *Belomicrus borealis* Forsius, 1923, *Crabro maeklini* A. Morawitz, 1866, *C. femoralis* F. Morawitz,

1892 и *Didineis sibirica* Gussakovskij, 1937 впервые приведены для фауны Алтая. Дополнительно *Didineis sibirica* также впервые приводится для Казахстана и Монголии. *Crossocerus mongolensis* Tsuneki, 1972, **stat.n.** восстановлен из синонимов и повышен до видового уровня. Число видов роющих ос семейства Crabronidae известных с Алтая увеличивается до 245.

### Introduction

The present paper is a part of the ongoing research of digger wasps (Spheciformes) of the territory of Russia [Mokrousov *et al.*, 2019, 2020; Akulov *et al.*, 2020; Mokrousov, Proshchalykin, 2021]. It contains new results of a faunistic study of this group in the Altai, a subregion located on the territory of two administrative units in the Asian part of Russia — Altai Territory and the Altai Republic.

In general, the Altai Mountains is a complex mountain system of Central Asia extending approximately 2,000 km in a southeast-northwest direction from the Gobi Desert to the West Siberian Plain, through China, Mongolia, Russia, and Kazakhstan. From a zoogeographical point of view, this territory occupies a unique position. Being at the junction of several zoogeographical subregions, the fauna of this territory, in addition to widespread Palae-

arctic species, is significantly enriched with species from all Palaearctic subregions. This situation together with the high diversity of biotopes therefore determines the high species richness of digger wasps. Currently, 271 species of digger wasps of the families Crabronidae (245) and Sphecidae (26) are known from the territory of Russian Altai (taking the present publication into account). Apparently, the total species richness of digger wasps in this territory exceeds 300 species, thus being among the highest ones in Russia. For comparison, the fauna of digger wasps in the European part of Russia includes 527 species (4 Ampulicidae, 55 Sphecidae, 468 Crabronidae), in Siberia — 332 species (37 Sphecidae, 295 Crabronidae) in the Far East — 299 (18 Sphecidae, 281 Crabronidae). Based on a study of recently collected specimens and museum materials, we provide in this paper additional geographical data for six rarely collected and little-known species of digger wasps of the family Crabronidae, with one species recorded from Russia for the first time, and five species newly recorded from Altai.

## Material and Methods

This paper is based primarily on the materials, collected by M. Yu. Proshchalykin and V.M. Loktionov during the expedition to Altai in 2016, and by M. Yu. Proshchalykin with A.V. Fateryga in 2022, and also on collections of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia [ZISP], Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia [FSCV] and on M.V. Mokrousov's research collection, Nizhny Novgorod, Russia [MMC].

Photographs were taken with a combination of digital camera Canon EOS M200 and Olympus SZX16 stereomicroscope. Final images representing a composite of several photographs taken at different focal planes and then combined using Helicon Focus 7.6.1. All images were post-processed for contrast and brightness using Adobe® Photoshop® v. CC 2017 (×64).

Morphological terminology generally follows Hymenoptera Anatomy Ontology Portal [2023] and Bohart and Menke [1976]: e.g., we have used the following abbreviations: F — flagellomere; L — length; W — width. Body length measurements are rounded to 0.1 mm.

Notes on the general distribution of species follow Antropov *et al.* [2017] and Pulawski [2023]. New distributional records are noted with an asterisk (\*). Abbreviations for the collectors: AF — A.V. Fateryga, MP — M. Yu. Proshchalykin, VL — V.M. Loktionov.

## Species list

### *Alysson ratzeburgi* Dahlbom, 1843

*Alysson ratzeburgi* Dahlbom, 1843: 145, ♀, ♂.

MATERIAL. RUSSIA: 1♀, Altai Rep., 15 km SE Kuray, 50.1861°N 88.1178°E, 22.VI.2022 (MP, AF) [MMC].

DISTRIBUTION. Belgium, France, Spain, Switzerland, Italy, Germany, Austria, Serbia, Poland, Slovakia, Hungary, Romania, Norway, Sweden, Finland, Latvia, Belarus, Russia (Murmansk Prov., Karelian Rep., Leningrad Prov., Moscow Prov., Kirov Prov., Nizhniy Novgorod Prov., Tatar Rep., Tyumen Prov., Khakass Rep., \*Altai, Krasnoyarsk Terr., Irkutsk Prov., Zabaikalskii Terr., Primorskii Terr.), South Korea.

### *Belomicrus borealis* Forsius, 1923

*Belomicrus borealis* Forsius, 1923: 65, ♀.

MATERIAL. RUSSIA: 2♂♂, 3♀♀, Altai Rep., Tydtuyark Riv. vall., 50.073611°N, 88.42°E, 12, 22, 23, 26.VI.2022 (MP, AF) [MMC/FSCV].

DISTRIBUTION. Sweden, Norway, Finland, Russia (Leningrad Prov., Kirov Prov., \*Altai), Kazakhstan.

### *Crabro (Anothyreus) maeklini* A. Morawitz, 1866

*Crabro maeklini* A. Morawitz, 1866: 262, ♂.

MATERIAL. RUSSIA: 1♀, Altai Rep., 15 km SE Kuray, Chuya River, 1600 m, 50°11.163'N 088°07.067'E, 5.VII.2016 (VL, MP) [MMC]; 3♀♀, *ibid.*, 17.VI.2022 (AF) [MMC].

DISTRIBUTION. Norway, Sweden, Finland, Ukraine, Russia (Murmansk Prov., Karelian Rep., Leningrad Prov., Arkhangelsk Prov., Sverdlovsk Prov., \*Altai, Irkutsk Prov., Buryat Rep., Yakutsk Rep., Khabarovsk Terr.), Kazakhstan, Mongolia.

### *Crabro (Hemithyreopus) femoralis* F. Morawitz, 1892

*Crabro femoralis* F. Morawitz, 1892: 161, ♂.

MATERIAL. RUSSIA: 1♂, Altai Rep., 5 km NE Kokorya, 49°57'00"N 89°04'19"E, 24.VI.2022 (MP) [MMC]; 1♂, Altai Rep., "Mars", 50.0639°N 88.3125°E, 25.VI.2022 (MP, AF) [MMC].

DISTRIBUTION. Russia (\*Altai Rep., Krasnoyarsk Terr., Irkutsk Prov., Buryat Rep., Zabaikalskii Terr., Primorskii Terr.), Mongolia, China (Heilongjiang).

### *Crossocerus (Crossocerus) strangulatus* (Bischoff, 1930) Figs 1–4.

*Crabro strangulatus* Bischoff, 1930: 220, ♀, ♂.

MATERIAL. RUSSIA: 1♂, Altai Rep., 15 km SE Kuray, Chuya River, 1600 m, 50°11.163'N 088°07.067'E, 5.VII.2016 (VL, MP) [MMC].

DISTRIBUTION. \*Russia (Altai), Kazakhstan, Uzbekistan, Tajikistan, Kyrgyzstan, Mongolia, Northwestern China, Northern India.

NOTE. Males of *Crossocerus strangulatus* differ from all other species by having a deep depression behind the eyes (Fig. 1). In addition, like *C. bispinosus* de Beaumont, 1967 and *C. kohli* (Bischoff, 1921), males of this species have a characteristic feature – the presence of a spine-like base formed by glued hairs in the anteroventral part of the mesopleura (Fig. 2). Males of *C. strangulatus* also differ from these two species in having a black flattened forebasitarsus (Fig. 4) and flattened flagellomeres 1–3, antenna with long setae (Fig. 3), F1 elongate, ratio L/W near 2.2×.

Females of *C. strangulatus* differ from other species of the subgenus in the following feature complex: precoxal tubercle of mesopleura well developed; mesoscutum in front of mesopostnotum with fine but noticeable longitudinal wrinkles; F1 ratio L/W near 3×, clypeus anteriorly tridentate; metapostnotum smooth, without oblique wrinkles. They differ from *C. kohli* by shape of the clypeus (central anterior lobe almost straight in *C. kohli*), the long F1 (ratio L/W near 2× in *C. kohli*) and the sculpture of the metapostnotum (gently entirely wrinkled at *C. kohli*). To clarify the diagnosis of *C. kohli*, it should be noted that in this species the precoxal tubercle is sometimes clearly visible, and the mesoscutum in front of mesopostnotum is sometimes marked by very short, faint wrinkles.



**Figs 1–4.** Male of *Crossocerus strangulatus* (Bischoff, 1930): 1 — head, dorsal view; 2 — mesosoma, lateral view; 3 — antenna; 4 — foretarsus.  
**Рис. 1–4.** Самец *Crossocerus strangulatus* (Bischoff, 1930): 1 — голова, вид сверху; 2 — мезосома, вид сбоку; 3 — антенна; 4 — передняя лапка.

**Table 1.** Differences between *Crossocerus mongolensis* and *C. yasumatsui*.  
**Таблица 1.** Различия между *Crossocerus mongolensis* и *C. yasumatsui*.

<i>Crossocerus mongolensis</i>	<i>Crossocerus yasumatsui</i>
Females	
Lateral corners of pronotal collar slightly elevated (Fig. 5)	Lateral corners of pronotal collar distinctly elevated (Fig. 6)
Pronotal collar in frontal view (back view) slightly uniformly convex (Fig. 7)	Pronotal collar in frontal view (back view) concave (Fig. 8)
Sculpture of metapostnotum and propodeum smoother (Fig. 9)	Sculpture of metapostnotum and propodeum more developed (Fig. 10)
Pygidial area slightly convex at base (Fig. 11)	Pygidial area completely flat (Fig. 12)
Body size: 6.8–7.0 mm	Body size: 7.1–7.3 mm
Males	
Lateral corners of pronotal collar lower (Fig. 13)	Lateral corners of pronotal collar higher (Fig. 14)
Forefemur distinctly concave ventrally, limited by sharp folds, with lobate-like protrusion along the anterior edge at the base (Fig. 15)	Forefemur ventrally flattened at base, not limited by sharp folds (Fig. 16)
Foretrochanter angulate (Fig. 17)	Foretrochanter not angulate (Fig. 18)
Sculpture of metapostnotum and propodeum smoother (see Fig. 9)	Sculpture of metapostnotum and propodeum more developed (see Fig. 10)
Genae near mandibular base black or brownish, postgenae ventrally with yellow spot	Genae yellow near mandibular base, postgenae ventrally yellow
Body size: 7.0–7.7 mm	Body size: 7.2–7.9 mm

*Crossocerus (Crossocerus) mongolensis* Tsuneki, 1972,  
stat.n.  
Figs 5, 7, 9, 11, 13, 15, 17.

*Crossocerus yasumatsui mongolensis* Tsuneki, 1972: 151, ♀ (holotype: ♀, Mongolia, Hovd Aimag, “Mongol-Altaj-Gebirge, 44 km N von Somon Uenč im Tal, Uenč gol, 1780 m, 8.VII.1966, Z. Kaszab”, [Természettudományi Múzeum, Budapest, Hungary]).

MATERIAL. RUSSIA: 1♂, Tyva Rep., 25 km SE Ersin, Tes-Khem, 50.0798°N 95.352983°E 14.VII.2014 (A. Lelej, MP, VL) [MMC]; 5♂♂, 1♀, Altai Rep., 15 km SE Kuray, 50.1861°N 88.1178°E, 17, 19, 22.VI.2022 (MP, AF) [MMC/FSCV].

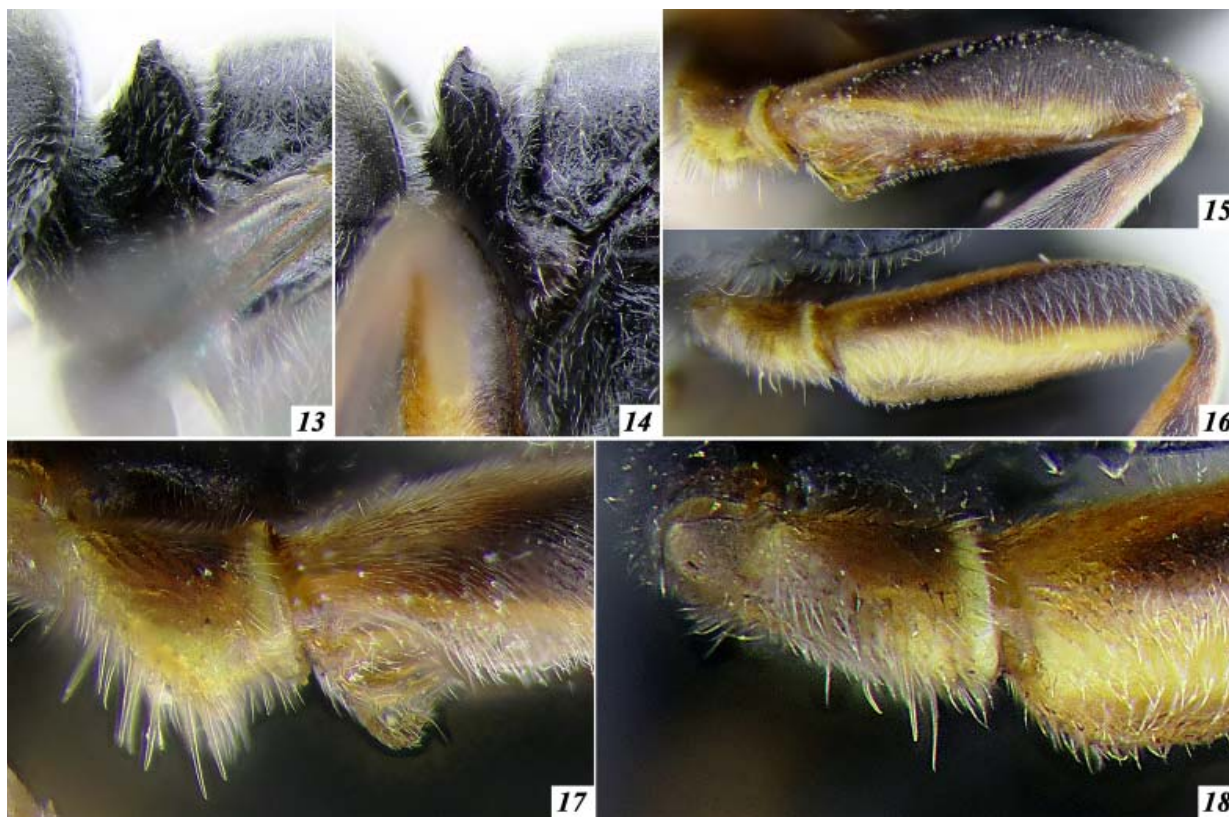
DISTRIBUTION. Russia (Altai, \*Tyva Rep., Irkutsk Prov., Buryat Rep., Zabaikalskii Terr., Yakut Rep., Magadan Prov., Chukot Autonomous Area, Khabarovsk Terr., Amur Prov., Primorskii Terr.), Kazakhstan, Kyrgyzstan, Mongolia.

DISCUSSION. K. Tsuneki [1972] described *Crossocerus yasumatsui mongolensis* very briefly, indicating as a difference only the smoother sculpture of the metapostnotum and propodeum of female. Based on a comparison of females, P. Nemkov [2004: 254] synonymized *Crossocerus yasumatsui mongolensis* Tsuneki, 1972 with *C. yasumatsui* (Tsuneki, 1947) described from Hokkaido, Japan (Tsuneki, 1947). However, a careful comparison of materials from the mainland and the Kunashir Island revealed a number of differences that allow us to judge the species status *Crossocerus mongolensis* Tsuneki,



**Figs 5–12.** Females of *Crossocerus mongolensis* Tsuneki, 1972 (5, 7, 9, 11) from Altai and *C. yasumatsui* (Tsuneki, 1947) from Kunashir Island (6, 8, 10, 12): 5, 6 — pronotal collar, lateral view; 7, 8 — pronotal collar, back view; 9, 10 — metapostnotum and propodeum, dorsolateral view; 11, 12 — pygidial area, dorsolateral view.

**Рис. 5–12.** Самки *Crossocerus mongolensis* Tsuneki, 1972 из Алтая (5, 7, 9, 11) и *C. yasumatsui* (Tsuneki, 1947) с о. Кунашир (6, 8, 10, 12): 5, 6 — воротничок переднеспинки, вид сбоку; 7, 8 — воротничок переднеспинки, вид сзади; 9, 10 — метапостнотум и проподеум, вид сверху и сбоку; 11, 12 — пигидиальное поле, вид сверху и сбоку.



**Figs 13–18.** Males of *Crossocerus mongolensis* Tsuneki, 1972 from Altai (13, 15, 17) and *C. yasumatsui* (Tsuneki, 1947) from Kunashir Island (14, 16, 18): 13, 14 — pronotal collar, lateral view; 15, 16 — foretrochanter and forefemur, ventral view; 17, 18 — foretrochanter and base of forefemur, back view.

**Рис. 13–18.** Самцы *Crossocerus mongolensis* Tsuneki, 1972 из Алтая (13, 15, 17) и *C. yasumatsui* (Tsuneki, 1947) с о. Кунашир (14, 16, 18): 13, 14 — воротничок переднеспинки, вид сбоку; 15, 16 — вертлуг и бедро передних ног, вид снизу; 17, 18 — вертлуг и основание бедра передних ног, вид сзади.

1972, stat.n. The differences between *Crossocerus mongolensis* and *C. yasumatsui* are outlined in Table 1 and Figs 5–18.

#### *Didineis sibirica* Gussakovskij, 1937

*Didineis sibirica* Gussakovskij, 1937: 607, ♀.

**MATERIAL.** RUSSIA: 2♂♂, Altai Rep., Tydtuyaryk Riv. vall., 50.073611°N 88.42°E, 23, 26.VI.2022 (MP, AF) [MMC]; KAZAKHSTAN: 2♀♀, near Lavar, “43.5665°N 78.0893°E”, 5.VI.1998 (V.L. Kazenas) [MMC]; MONGOLIA: 1♂, Ara-Khangai Aimak, 40 km NW of Tsetserleg soum, 9.VII.1975 (M. Kozlov) [ZISP]; 1♀, Selenga Aimak, 20 km NNE Darkhan, 5.VIII.1975 (E. Sugonyaev) [ZISP].

**DISTRIBUTION.** Russia (\*Altai, Irkutsk Prov., Buryat Rep., Zabaikalskii Terr., Primorskii Terr.), \*Kazakhstan, \*Mongolia, South Korea, Japan (Honshu, Kyushu).

### Discussion

In the present study, we list new records for six species of the family Crabronidae from various localities in Russian Altai. Together with published records, 245 crabronid species are currently known to occur in this territory, 83% of the entire fauna of Siberia. For comparison, 622 species have been recorded from Rus-

sia so far, with 468 species occurring in the European part, 295 in the Siberia, and 281 in the Far East.

The number of crabronid species of Altai is supposed to be at least one sixth higher than it is known so far. We expect that some species that were found in Mongolia, Kazakhstan or northern China also occur in Altai, such as *Ceratophorus morio* Vander Linden, 1829, *Crabro lapponicus* Zetterstedt, 1838, *Crossocerus styrius* (Kohl, 1892), *Harpactus morawitzi* Radoszkowski, 1884, *Larra anathema* (Rossi, 1790), *Mimesa sibirica* (de Beaumont, 1937), *Mimumesa beaumonti* (van Lith, 1949), *Miscophus niger* Dahlbom, 1844, *Nysson interruptus* (Fabricius, 1798), *Passaloecus singularis* Dahlbom, 1844, *Pemphredon flavistigma* Thomson, 1874, *P. montana* Dahlbom, 1844, *Psenulus concolor* (Dahlbom, 1843), *P. fuscipennis* (Dahlbom, 1843), *P. laevigatus* (Schenck, 1857), and *Spilomena mocsaryi* Kohl, 1898, and probably also several undescribed species.

**Competing interests.** The authors declare no competing interests.

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