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## Journal of Threatened Taxa

Building evidence for conservation globally

[www.threatenedtaxa.org](http://www.threatenedtaxa.org)

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

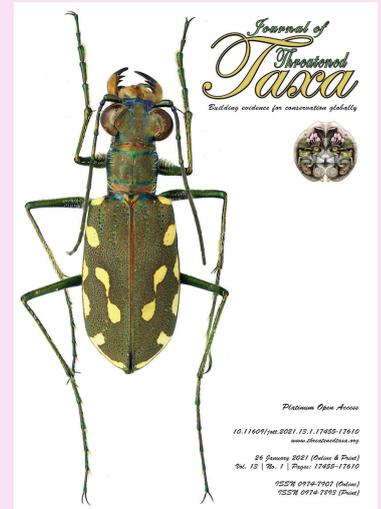
### NOTE

### IS *BOMBUS POMORUM* (PANZER, 1805) (HYMENOPTERA: APIDAE) A NEW BUMBLEBEE FOR SIBERIA OR AN INDIGENOUS SPECIES?

Alexandr Byvaltsev, Svyatoslav Knyazev & Anatoly Afinogenov

26 January 2021 | Vol. 13 | No. 1 | Pages: 17574–17579

DOI: 10.11609/jott.5889.13.1.17574-17579



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## Is *Bombus pomorum* (Panzer, 1805) (Hymenoptera: Apidae) a new bumblebee for Siberia or an indigenous species?

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The bumblebee fauna of Siberia has not been well studied historically, but great progress has been made in the last two decades (Konusova & Yanushkin 2000; Byvaltsev 2008, 2013; Knyazev et al. 2010; Kupianskaya et al. 2014; Byvaltsev et al. 2013, 2015, 2016). These and other data are summarized in the Annotated Catalogue of the Hymenoptera of Russia (Levchenko et al. 2017). There are 55 species in Siberia, with 52 in each of the western and eastern parts. There is information about one species newly recorded for Western Siberia – *Bombus pomorum* (Panzer, 1805) previously known only from Europe, Anatolia, the Caucasus and the Ural region.

*B. pomorum* is one of three species of the *pomorum*-group (formerly *Rhodobombus*) subgenus *Thoracobombus* Dalla Torre, 1840 (Williams 1998). The species can be distinguished from the other members of the group by its predominately brightly red coloured metasoma. There are some colour patterns of *B. mesomelas* Gerstaecker, 1869, with red hair, although in most cases the last tergum of *B. pomorum* has red hairs, whereas it has black hairs in *B. mesomelas*. There are three main colour patterns of *B. pomorum* females,

which have been regarded as a subspecies by some authors (Özbek 2002; Rasmont et al. 2015b), but are considered here to all be *B. pomorum* s. l.: thorax and two first metasomal terga black (nominative taxon in Western and Central Europe, western Anatolia); thorax and first metasomal tergum yellow banded (*B. uralensis* Morawitz, 1881 in the territory of European Russia to Chelyabinsk); thorax and first metasomal tergum with the pale bands (*B. pomorum* var. *canus* Schmiedeknecht, 1883 in eastern Anatolia and the Caucasus region). Males everywhere are usually paler than females, and the variation is not so distinct.

The previous known distribution of *B. pomorum* is from Denmark, southern Switzerland (58°N) (Løken 1973), and France (Rasmont et al. 1995), to Sverdlovsk and Chelyabinsk regions in the east (Popov 1923), and to Greece (Olympus) (Anagnostopoulos 2005), northern Anatolia (Rasmont & Flagthier 1996), and Transcaucasia (Skhirtladze 1981; Kirkitadze & Japoshvili 2015) in the south. Only five specimens were recorded from Britain (Kent) between 1834 and 1864 (Jeffers 2017). These could be cases of rare migration (Alford 1975) or they

**Editor:** Alexander B. Ruchin, the Mordovia State Nature Reserve, Republic of Mordovia, Russia.

**Date of publication:** 26 January 2021 (online & print)

**Citation:** Byvaltsev, A., S. Knyazev & A. Afinogenov (2021). Is *Bombus pomorum* (Panzer, 1805) (Hymenoptera: Apidae) a new bumblebee for Siberia or an indigenous species? *Journal of Threatened Taxa* 13(1): 17574–17579. <https://doi.org/10.11609/jott.5889.13.1.17574-17579>

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**Funding:** None.

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

**Acknowledgements:** We are grateful to Paul H. Williams (Natural History Museum, London) for English language editing and two anonymous reviewers for valuable comments.

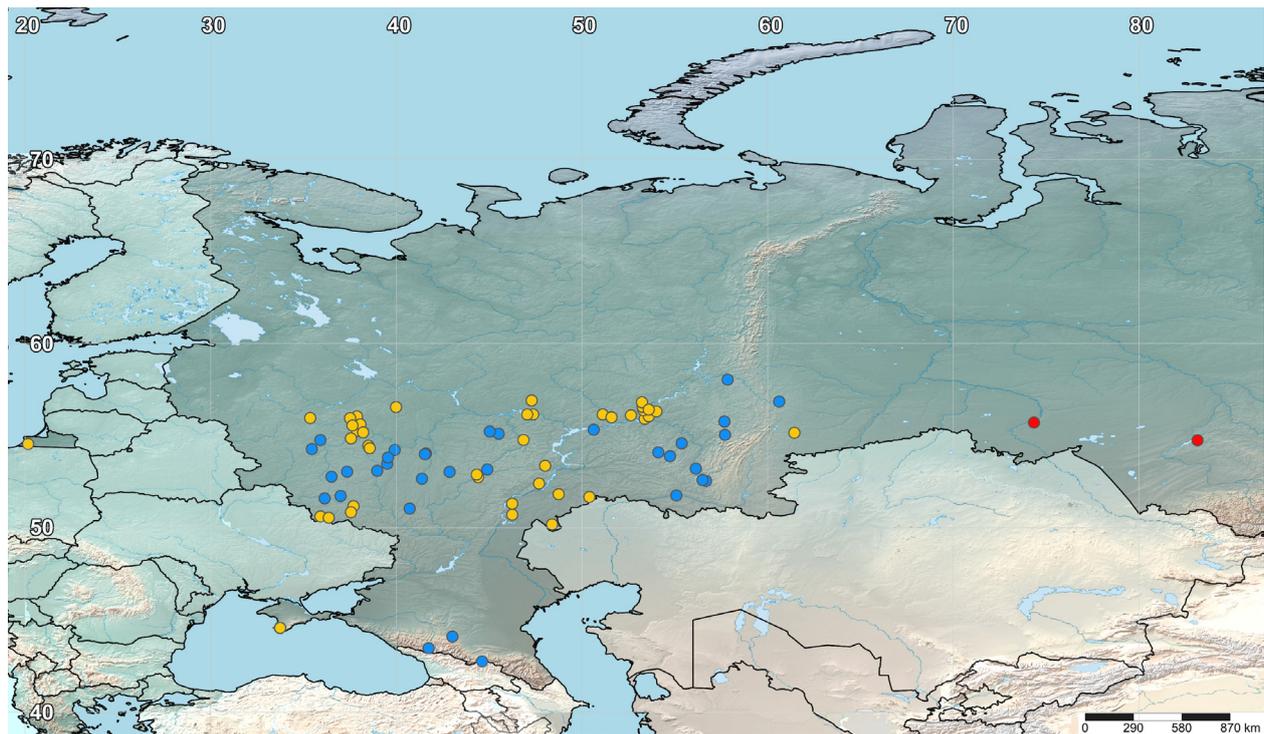


Figure 1. Distribution of *Bombus pomorum* in Russia: yellow dots—literature data | blue—material examined | red—new records. There are no detailed data for Ulyanovsk region, thus there are no dots on the map in this territory. The map was compiled using the online mapping software SimpleMapp (Shorthouse 2010).

could have arrived as queens hibernating in flower pots transported from garden-plant nurseries (Williams et al. 2018). *B. pomorum* is a meadow species in the steppe and forest–steppe zones and in the mountains, with a broad range of feeding plants. Nests are underground, frequently in small rodent holes (Skorikov 1923; Efremova 1991).

Two specimens (a queen and a worker) of *B. pomorum* were collected in the forest-steppe of the West Siberian Plain by S. Knyazev and A. Afinogenov in 2017 and 2019 respectively. Label data: queen – Russia, Omsk region, Gorkovskiy District, Serebryanoe vill. [village] vic. [vicinity], 55°43′0.29″N & 74°20′21.88″E [55.717°N & 74.339°E], 03.vi.2017, S.A. Knyazev leg. [Knyazev private collection, Omsk, Russia]; worker – Russia, Novosibirsk region, Agroles, 54.756°N & 83.146°E, flowerbed with *Tagetes* sp., 1– 10.ix.2019, A. Afinogenov [Novosibirsk State University, Novosibirsk, Russia – NSU].

The queen of *B. pomorum* was sent to A. Byvaltsev by S. Knyazev with other bumblebees for determination in the winter of 2018, but we decided not to publish this information until supported by rediscovery of more specimens. A new worker was sent for determination by A. Afinogenov, so we now have no doubt about the presence of this species in Western Siberia.

Comparative material from Europe, the Caucasus, and the Ural regions including several types of related taxa, considered here to be part of *B. pomorum* s. l., were examined in Zoological Institute RAS (St. Petersburg, Russia – ZISP) by A. Byvaltsev: *B. uralensis* Morawitz, 1881 (replacement name for *B. rufescens* Eversmann, 1852), *Fervidobombus oreas* Skorikov, 1926, *F. pomorum flavotestaceus* Skorikov, 1926. Other members of *pomorum*–group have also been studied – several specimens of *B. mesomelas* from Spain and Italy and numerous specimens of *B. armeniacus* Radoszkowski, 1877 from different parts of its range. The queen (Image 1a) agrees closely in colour pattern with *B. uralensis*: metasomal terga 2–6 reddish, thorax and first segment of metasoma yellow, head, legs, and the band on the thorax between wings black. The worker specimen is paler (Image 1b) but agrees well with some workers from the European part of Russia in the ZISP collection, including having tergum sixth black.

The queen was collected on the high right bank of the Irtysh river, on the southern slope of a clay cliff with steppe meadow, where the bee was in flight (Image 2). The worker was collected visiting *Tagetes* sp. in the Agroles settlement near Novosibirsk.

*B. pomorum* is a new record for Siberia, and



Image 1. Specimens of *Bombus pomorum* collected in Western Siberia: a—queen (© S. Knyazev) | b—worker (© A. Byvaltsev).



Image 2. The locality where the queen specimen of *Bombus pomorum* was collected, description in the text (© S. Knyazev).

for the Omsk and Novosibirsk regions. Thus, the bumblebee fauna of Siberia includes 56 species, with 53 species recorded for Western Siberia. *B. wurflenii* Radoszkowski, 1859 and *B. lapidarius* (Linnaeus, 1758) were listed as “possible inhabitants” based on literature records that are probably erroneous (Byvaltsev 2008) and unconfirmed for the present for this territory, so they are not part of the fauna of Siberia. There are 39 species in the Novosibirsk region and 28 in the Omsk region. *Bombus hypnorum* (Linnaeus, 1758), *B. lucorum* (Linnaeus, 1761), *B. semenoviellus* Skorikov, 1910 are absent for the Omsk region in the catalogue (Levchenko et al. 2017), but are well known to occur there (Knyazev et al. 2010).

The new finds expand the range of *B. pomorum* eastwards by approximately on 1,400km. Thus, the distribution of *B. pomorum* in Russia (Figure 1) includes the following regions from specimens examined: Kursk,

Orel, Kaluga, Voronezh, Lipetsk, Tambov, Ryazan, Nizhny Novgorod, Penza, Orenburg, Tatarstan, Bashkortostan, Perm, Sverdlovsk, Chelyabinsk, North Ossetia, Karachay–Cherkessia, Stavropol, Omsk, Novosibirsk; with additional literature records – Kaliningrad (Alfken, 1912), Moscow (Panfilov 1957; Levchenko 2012), Chuvashia (Syoletina 1967), Ulyanovsk, Samara (Efremova 1991), Belgorod (Prisnyi 2005), Saratov (Anikin & Kondratiev 2006), Ivanovo (Tikhomirov 2007), Udmurtia (Adakhovskiy 2012), Kirov (Yuferev & Levchenko 2014), Crimea (Rasmont et al. 2015a), Penza (Dobrolubova 2015), and Bryansk (Goloshchapova & Prokofiev 2016). The map with distribution in Europe and Western Asia was published by Rasmont et al. (2015a).

*B. pomorum* was assessed as being vulnerable in Europe using the IUCN Red List Criteria (Rasmont et al. 2015b) because of a population decline, estimated to be more than 30% over the last 10 years so that it is



considered to be facing a high risk of extinction in the wild. The bee was in the Red Book of the USSR (Panfilov et al. 1984), but excluded from the main list of threatened taxa of the Red Book of the Russian Federation (2001) and moved to the “Appendix 3” as a species in needs of monitoring. Federal protection is weak at present. In many regions of Russia, *B. pomorum* is in the regional Red Books – Kursk (Bausov 2002), Belgorod (Prisnyi 2005), Saratov (Anikin & Kondratiev 2006), Ivanovo (Tikhomirov 2007), Sverdlovsk (Olshvang 2008), Moscow City (Berezin 2011), Ryazan (Ananieva & Nikolaeva 2011), Tambov (Ganzha & Ishin 2012), Udmurtia (Adakhovskiy 2012), Nizhny Novgorod (Zryanin 2014), Kirov (Yuferev & Levchenko 2014), Bryansk (Goloshchapova & Prokofiev 2016), Chelyabinsk (Lagunov & Gorbunov 2017), and Moscow (Levchenko 2018). In some regions, however, this species is included only in the appendix as a species in needs of monitoring – Orenburg (Belov 2019), Lipetsk (Aleksandrov et al. 2014), Ulyanovsk (Artemieva et al. 2015) or moved from the main list to the appendix – Kaluga (Antokhina 2017), or completely excluded – Rostov (Arzanov 2014), Tatarstan (Nazirov 2016). Reliable data for a significant decline in this species are available only for the Moscow region (Panfilov 1957; Berezin et al. 1996; Levchenko 2012, 2018). Based on the collection in the ZISP, *B. pomorum* was abundant in the beginning of the 20<sup>th</sup> century in the Orel and Ryazan regions. There are 995 among the 1,314 pinned specimens of *B. pomorum* in the ZISP collected between 1910 and 1924 from the Orel region and 984 of these specimens are from near the Mohovoe settlement (53.05°N & 37.35°E), 257 specimens are from the Ryazan region collected between 1899 and 1927, and most (248) are from near the Gremyachka Village (53.48°N & 39.51°E) collected by Andrey Petrovich Semyonov–Tyan–Shansky. This does not mean that the bee was rare in other regions, but only that there were no regular observations. It is likely that *B. pomorum*, however, is not an abundant species at present in many parts of its range, but special studies are required.

There is a question whether *B. pomorum* is a recent invader of the forest–steppe of Western Siberia or whether it has always lived there. There are several examples of expansion of bumblebees to the west – *B. hypnorum* (Goulson & Williams 2001; Prŷs-Jones 2019), *B. semenoviellus* (Smitsen & Rasmont 2000; Šima & Smetana 2012), *B. schrencki* Morawitz, 1881 (Levchenko 2012). There is no doubt about these cases, because there is a long history of bumblebee studies in Europe. The first comprehensive faunistic review of bumblebees in the forest-steppe and steppe zones of the West Siberian

Plain was done only at the end of the first decade of the current century (Byvaltsev 2008). For example, among the species listed in that paper *B. sylvarum* Linnaeus, 1761 was recorded for the first time for Siberia with the easternmost observation in the Kurgan region (55.11°N & 66.95°E). Later the recorded range was extended to 54.10°N & 75.02°E in the Omsk region based on two specimens collected in 1996 and 2008 (Byvaltsev 2010; Knyazev et al. 2010). After the species was found in Altai Territory in 2011 and in the Novosibirsk region in 2014, so the range was extended to 83°E (Levchenko et al. 2017). Thus, it is possible that *B. sylvarum* is an indigenous species for the south of Western Siberia but was not discovered until regular observations were made. Nevertheless, there is a chance that our study coincided in time with a range expansion of this species which was able to begin in the end of 20<sup>th</sup> century.

The second case is likely, because there are no specimens of *B. sylvarum* from Western Siberia in the collections of the Institute of Systematics and Ecology of Animals SB RAS (Novosibirsk, Russia) and NSU. The species was never collected previously in the Omsk region by S. Knyazev, although his observations in localities of known records have been annual since 2005, so the species must be very rare. There were no records of this bee during regular studies in the Altai Territory between 2005 and 2008 (Byvaltsev 2013) or in Novosibirsk and its environs between 2001 and 2006 (Byvaltsev 2009). Although the increasing of percentage of specimens of *B. sylvarum* during studies in 2011–2012 in the south of the Omsk region has been documented (Byvaltsev et al. 2013). The first record of this bee in Altai Territory was in near the Klepechikha Village in 2011 (Levchenko et al. 2017), but the species was not collected there in either 2005 or 2008 (Byvaltsev 2013). *B. sylvarum* is regularly seen near Novosibirsk since the first record in 2014.

*B. pomorum* is not a commercially-reared bee like *B. terrestris* (Linnaeus, 1758), and most probably the observation is not a result of delivery of goods by people, as it has been for many pest species. The spread eastwards of European species into Siberia is documented for butterflies (Knyazev & Kosterin 2003; Knyazev et al. 2017, 2019). Thus, the discovery of *B. pomorum* in Western Siberia looks more likely to be a result of the natural expansion of this European and West Asian species. Further research of this question is required, including the application of modern molecular techniques of population ecology for studying the relationship between populations in Siberia and those in Europe.

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

January 2021 | Vol. 13 | No. 1 | Pages: 17455–17610  
Date of Publication: 26 January 2021 (Online & Print)  
DOI: 10.11609/jott.2021.13.1.17455-17610

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