

## Bumblebee fauna (Hymenoptera, Apidae: *Bombus* Latreille) of Chelyabinsk region (Russia)

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The annotated list of 36 species of bumblebees of Chelyabinsk region is presented. Ten species are newly recorded for this region: *Bombus ruderarius* (Müller, 1776); *B. campestris* (Panzer, 1801); *B. bohemicus* Seidl, 1837; *B. barbutellus* (Kirby, 1802); *B. quadricolor* (Lepelletier, 1832); *B. sylvestris* (Lepelletier, 1832); *B. rupestris* (Fabricius, 1793); *B. patagiatus* Nylander, 1848; *B. semenoviellus* Skorikov, 1910; *B. lapidarius* (Linnaeus, 1758). The features of bumblebees' distribution in the region and their ecological peculiarities are considered.

**Key words:** Bombus; Bumblebee; Chelyabinsk region; distribution; Fauna; Insecta, Ural

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### Introduction

Bumblebees belong to one of the most flourishing groups of the order Hymenoptera. Numerous plants would not exist without pollination by bumblebees and bees. The study of bumblebees in the Urals began with their economic use as pollinators of red clover in 1930 by V.V. Alpatov. With the development of gardening in the Southern Urals (the 70-ies of XX century) there appeared the first scientific works on identification of pollinators - bees. The first attempts of studying bumblebees in this region refer to 1986, when Z.I. Tyumaseva organized and conducted a series of expeditions on the implementation of the Russian national program "Bioshield", performing the operation "Bumblebee". Within the framework of this program (from 1986 to 1996), the inventory of bumblebees and the inventory of their colonies in mountain-forest zone of the Southern Urals was carried out, their habitats were indicated, the recommendations to protect these insects were given.

From 2000 to 2005, a systematic research on the species composition of bumblebees in different climatic zones of the Southern Urals was conducted by N.A. Rezhikova led by Prof. Z.I. Tyumaseva (Rezhikova, Tyumaseva, 2004). In addition, there was a work (Lagunov, 2005) on the bumblebees' fauna of the Chelyabinsk region, where 26 species were listed. However, this region remained insufficiently studied until now. It is difficult to overestimate the role of bumblebees in pollination, as these insects with their proboscis longer than that of bees can penetrate even in the deepest corollas. They acquired this ability because of co-evolution with higher flowering plants. At present, 75–85% of all the flowering flora, 90% of which are cultivated plants, need bumblebees and bees for pollination (Tyumaseva, 1988). So, since 2009, the authors continued the study of the species composition and bio-ecological characteristics of bumblebees in different ecosystems of Southern Urals.

The aim of the present study is to reveal the species composition of bumblebees and their distribution within the studied region.

### Materials and methods

The study of species diversity and ecology of bumblebees was carried out stationary and semi-stationary in the spring-summer-autumn periods from 2009 to 2016 in different ecosystems of Southern Urals, there were also one-time collections near Chelyabinsk, Kyshtym, Kopeysk, Korkino, Minyar, Asha, Sim, Verkhny Ufaley, Yuzhnouralsk, Magnitogorsk, and Troitsk cities. To identify the species composition, the bumblebees were caught on flowers of crops in the fields and in the thickets of plants

by mowing an entomological net. Additionally, the bumblebees were caught on individual flowers with a small net of gaze. The collection was conducted throughout the daylight hours. The accounting of bumblebees was carried out by the method of stationary registration sites and the route method (Pesenko, 1982).

The ecological-faunistic research was conducted in zonal and azonal ecosystems of the Southern Urals. As a result, 36 bumblebee species of the genus *Bombus* Latr were registered. The general distribution of species is given after a series of works (Panfilov, 1981, 1982, 1984; Demidova, Tyumaseva, 2011; Levchenko, 2012; Byvaltsev et al., 2016; Williams et al., 2012, 2015). The status and volume of most taxa was adopted in accordance with the works of P.H. Williams (Williams, 1998, 2016).

## Results

### An annotated list of the Bumblebee (Hymenoptera, Apidae: *Bombus* Latreille) of Chelyabinsk region

#### *Bombus (Subterraneobombus) Vogt, 1911*

##### *B. (Subterraneobombus) distinguendus* Morawitz, 1869

**Distribution.** Russia: Europe north to 67° N, S Ural, S Siberia, Far East to Kamchatka N Kazakhstan, Uzbekistan, N Mongolia; N America (Aleutian Islands, Alaska).

**Ecology.** Inhabits the mountain forest zone of the Southern Urals. Registered in the Ilmen Nature Reserve and East Ural Nature Reserve (Lagunov, 2005). Recorded in forest belts, in floodplain meadows and fields of the Chelyabinsk Region and surrounding area of Chelyabinsk, Kopeysk. Included in the Red Book of the Chelyabinsk region.

##### *B. (Subterraneobombus) subterraneus latreillellus* Kirby, 1802

**Distribution.** Russia: Europe to the Perm Territory and the Orenburg region north to 62° N, SW Siberia, Altai, Irkutsk region, Buryatia, the Trans-Baikal Territory. Europe from Norway, England and Spain, Turkey, Caucasus, Transcaucasia, Iran, NE Kazakhstan, Kyrgyzstan (Issyk-Kul Lake), N China (Xingjiang), N Mongolia. Introduced to New Zealand.

**Ecology.** Inhabits the meadows of mountain-forest zone and the wet areas of forest-steppe. Found in the Troitskiy zakaznik. Included in the Red Book of the Chelyabinsk region.

##### *B. (Subterraneobombus) fragrans* (Pallas, 1771)

**Distribution.** Russia: European part up to 55° N, N Caucasus, S Siberia, Buryatia. Turkey, Transcaucasia, Iran, N Kazakhstan, Kyrgyzstan, W China.

**Ecology.** Met in the stony steppe of the Chelyabinsk Region and in the steppe areas of the forest-steppe. Registered in the Troitsk and Bredinsky districts. Nests in the holes of rodents in the ground. Included in the Red Book of Russia.

#### *Bombus (Megabombus) Dalla Torre, 1880*

##### *B. (Megabombus) hortorum* (Linnaeus, 1761)

**Distribution.** Russia: European part, N Caucasus, Ural, Siberia to Yakutia and Khakassia, Primorsky Krai. Europe to 70° N, Asia from Turkey to N Mongolia, New Zealand.

**Ecology.** Recorded in the grass areas of the steppe and forest-steppe zones. Found in the Ilmen Nature Reserve (Elin, 1987; Rudoiskatel, Podgorbunskih, 1999) and East Ural Nature Reserve (Fedorov, 1981). The largest population of the bumblebees is registered in the bean fields. Included in the Red Book of the Chelyabinsk region.

##### *B. (Megabombus) consobrinus* Dahlbom, 1832

**Distribution.** Russia: S European part, Ural, Siberia, Far East. Scandinavia, E Kazakhstan, Mongolia, N China, N Japan, S Korea.

**Ecology.** Separate specimens are found in floodplain meadows of Karagaily-Ayat river (Kartalinsky distr.) and Ai river (Satkinsky distr.). Found in Ilmen Nature Reserve and East Ural Nature Reserve (Tyumaseva, Lagunov, 1991). Rare species with a limited habitat, found locally. Included in the Red Book of Russia.

##### *B. (Megabombus) ruderatus* (Fabricius, 1775)

**Distribution.** Russia: Moscow region (Levchenko, 2012), Tatarstan, Orenburg region. S Ural. Madeira, Azores, Europe from the south of Sweden north to 59° N, N Africa, introduced to New Zealand, Chile and Argentina.

**Ecology.** Found in steppe meadows overgrown with cereal grasses and motley grass. Inhabits the steppe zone (Kartalinsky distr.) and mountain forest zone (Satkinsky distr.) of the Chelyabinsk region. Found in Bashkortostan and the Orenburg region. Included in the Red Book of the Chelyabinsk region.

#### *Bombus (Thoracobombus) Dalla Torre, 1880*

##### *B. (Thoracobombus) muscorum* (Linnaeus, 1758)

**Distribution.** Russia: European part, S Ural, Siberia, S Far East. Europe to 68° N, N Asia from Turkey to NE China (Hebei).

**Ecology.** Found in meadows and river banks of the forest-steppe and mountain-forest zones of Southern Urals. Recorded in the vicinity of Minyar, Ashi, Sim, in Ilmen Nature Reserve. Prefers plants of the families: leguminous, composite, labiate and willowherbs. Male flight on the territory of the Chelyabinsk Region from the end of July to the beginning of September. Included in the Red Book of Russia.

***B. (Thoracobombus) humilis*** Illiger, 1806

*B. solstitialis* (Panzer, 1806) (Lagunov, 2005)

**Distribution.** Russia: European part, N Caucasus, S Ural, S Siberia, Far East. Europe to 64° N, Asia from Turkey to S Korea and China (Sichuan).

**Ecology.** Single specimens were found in the forest-steppe zone.

***B. (Thoracobombus) schrencki*** Morawitz, 1881

**Distribution.** Russia: European part south to 54° N, Siberia, Far East. In Europe to Poland, E Kazakhstan, N China, S Korea, N Japan.

**Ecology.** Found in Ilmen Nature Reserve and national parks "Taganay" and "Zyuratkul" (Lagunov, 2005). Inhabits the mountain forest zone. The largest number is recorded in forest glades of mixed forest. Included in the Red Book of the Chelyabinsk region.

***B. (Thoracobombus) ruderarius*** (Müller, 1776)

*B. derhamellus* (Kirby, 1802)

**Distribution.** Russia: European part, S Siberia to Baikal Lake. Europe to 67° N, Turkey, Transcaucasia, Iran, N Kazakhstan, mountains of the East of Central Asia.

**Ecology.** Inhabits the steppe and forest-steppe zones of the Chelyabinsk region.

***B. (Thoracobombus) pascuorum*** (Scopoli, 1763)

*B. agrorum* (Fabricius, 1787) (Lagunov, 2005)

**Distribution.** Russia: European part, N Caucasus, Ural, Siberia, Far East. Europe north to 71° N, N Asia from Turkey to S Korea.

**Ecology.** Inhabits in all ecosystems of the Southern Urals. Active pollinator of the leguminous. Population number common, distributed locally. Included in the Red Book of the Chelyabinsk region.

***B. (Thoracobombus) veteranus*** (Fabricius, 1793)

*B. equestris auct., nec.* (Fabricius, 1793) (Lagunov, 2005)

**Distribution.** Russia: European part, S Ural, S Siberia to Irkutsk region. Europe to 65° N, N and E Kazakhstan, Uzbekistan, Kyrgyzstan, N Mongolia.

**Ecology.** Inhabits the forest-steppe zone of the Southern Urals. Found in the Troitskiy Zakaznik (Ponomarev, 1975). Prefers open areas with abundance of legumes and buckwheat. Included in the Red Book of the Chelyabinsk region.

***B. (Thoracobombus) pomorum*** (Panzer, 1805)

**Distribution.** Russia: Voronezh, Moscow, Orenburg, Sverdlovsk, Chelyabinsk and Perm Regions (Levchenko, 2012). Europe: from Southern Sweden to 58° N, Turkey.

**Ecology.** Inhabits the steppe and forest-steppe zones of the Southern Urals. Nests in the ground, sometimes met in burrows of gophers and other rodents. Females leave the wintering grounds on the territory of the Chelyabinsk region in late May and early June. Prefer feeding on plants of the borage family, more rarely found on leguminous, composite and labiate. Included in the Red Book of the Chelyabinsk region.

***B. (Thoracobombus) armeniacus*** Radoszkowski, 1877

**Distribution.** Russia: European part south of 54° N, N Caucasus (Panfilov, 1956), S Siberia to W Sayans. E Europe, Turkey, Transcaucasia, Iran, N Kazakhstan, mountains of the east of Central Asia, W China (E Tien Shan) (Byvaltsev et al., 2016).

**Ecology.** Inhabits the steppe zone of the Southern Urals. Single specimens were found in the Troitskiy Zakaznik. Flight from May to September. Nests in burrows of rodents. Included in the Red Book of Russia.

***B. (Thoracobombus) laesus*** Morawitz, 1875

**Distribution.** Russia: south of the European part to 54° N, N Caucasus, W Siberia, Krasnoyarsk Territory. E Europe west to Austria, Turkey, Transcaucasia, Iran, N Kazakhstan, mountains of the east of Central Asia, W China (E Tien Shan) (Byvaltsev et al., 2016).

**Ecology.** Inhabits the steppe zone of the Southern Urals (Orenburg region). Found in Ilmen Nature Reserve (Elin, 1987). Included in the Red Book of the Chelyabinsk region.

***B. (Thoracobombus) humilis*** Illiger, 1806

*B. solstitialis* (Panzer, 1806) (Lagunov, 2005)

**Distribution.** Russia: European part, N Caucasus, S Ural, S Siberia and Far East. Europe to 64° N, Asia from Turkey to South Korea and China (Sichuan).

**Ecology.** Found in pine and light deciduous forests, as well as in the meadows of the mountain-forest zone of Southern Urals. Found in the Troitskiy Zakaznik (Ponomarev, 1975). Active pollinator of legumes.

***Bombus (Psithyrus) Lepeletier, 1832***

*B. (Psithyrus) campestris* (Panzer, 1801)

**Distribution.** Russia: European part, Siberia, S Far East. Europe to 63° N, N Asia from Turkey to China (Ningxia).

**Ecology.** Inhabits in all ecosystems of the Southern Urals. Locally distributed.

*B. (Psithyrus) bohemicus* Seidl, 1837.

**Distribution.** Russia – everywhere except in the extreme north of Siberia. Europe north to 70° N, Asia from Turkey to South Korea and South China (Yunnan).

**Ecology.** Inhabits meadows in the mountain forest zone. Kleptoparasites in colonies of other bumblebees: *B. lucorum*, *B. distinguendus* and *B. terrestris*.

*B. (Psithyrus) barbutellus* (Kirby, 1802)

**Distribution.** Russia: European part, S Siberia to Yakutia and Transbaikalia, Primorsky Krai. Europe north to 62° N, N Asia from Turkey to NE China (Hebei).

**Ecology.** Inhabits the forest-steppe zone of the Southern Urals (Troitskiy zakaznik).

*B. (Psithyrus) quadricolor* (Lepelletier, 1832)

**Distribution.** Russia: European part south to 51° N, N Caucasus, Ural, W Siberia. Europe (except the Mediterranean), NE Turkey, Transcaucasia, Iran.

**Ecology.** Inhabits the steppe and forest-steppe zones of the Southern Urals. Kleptoparasites in colonies of other bumblebees

*B. (Psithyrus) sylvestris* (Lepelletier, 1832)

**Distribution.** Russia: European part south to 54° N, W Siberia, Krasnoyarsk Territory, Yakutia, Far East. Europe до 70° N, CB Turkey, Transcaucasia, C Kazakhstan, Mongolia, South Korea.

**Ecology.** Found in the steppe areas of the forest-steppe zone of the Chelyabinsk region.

*B. (Psithyrus) rupestris* (Fabricius, 1793).

**Distribution.** Russia: European part, N Caucasus, S Ural, Siberia, Far East. Europe to 66° N, NE Turkey, Transcaucasia, Mongolia, N China.

**Ecology.** Found locally, in the steppe meadows and in the floodplain of rivers of the Chelyabinsk region.

*Bombus (Pyrobombus) Dalla Torre, 1880*

*B. (Pyrobombus) hypnorum* Linnaeus, 1758

**Distribution.** Russia: European part, Ural, Siberia, Far East. Europe to 71° N; Transcaucasia, Asia to NE Kazakhstan and NE India to Japan and Taiwan.

**Ecology.** Inhabits moist forests and floodplain meadows of Southern Urals. Found on grasses in the vicinity of cities and villages. Found near the Lake Turgoyak (Lagunov, 2004). Included in the Red Book of the Chelyabinsk region.

*B. (Pyrobombus) modestus* Eversmann, 1852

**Distribution.** Russia: NE European part, S Siberia to Transbaikalia, Yakutia, Far East. E Kazakhstan, Mongolia, N China, S Korea.

**Ecology.** Found in Ilmen Nature Reserve. Prefers plants of the figwort family. Registered near Chebarkul, Satka, Yuryuzan, Chelyabinsk, Kusa, and Kasli cities. Included in the Red Book of the Chelyabinsk region.

*B. (Pyrobombus) pratorum* (Linnaeus, 1761)

**Distribution.** Russia: European part, Caucasus, Ural, W Siberia, Altai, Yakutia. Europe to 71° N, Turkey, Transcaucasia, Iran.

**Ecology.** Inhabits mixed forests of Southern Urals. Single specimens were registered in the Chelyabinsk region (Kartalinskiy, Satkinskiy regions), and in the floodplain meadows. Life cycle ends in the second decade of July. Included in the Red Book of the Chelyabinsk region.

*B. (Pyrobombus) jonellus* (Kirby, 1802)

**Distribution.** Russia: except the European part to the south 52° N. Europe (except the Mediterranean), Transcaucasia, N Mongolia, W Canada, Alaska.

**Ecology.** Found in mixed forest glades of Southern Urals.

*Bombus (Bombus)* (in the strict sense)

*B. (Bombus) sporadicus* Nylander, 1848

**Distribution.** Russia: N and E European part to 55° N, Ural, Siberia, Far East. Europe north 59° N, E Kazakhstan, Mongolia, N China and S Korea.

**Ecology.** Found locally in the mountain-steppe zone of the Chelyabinsk region. Included in the Red Book of Russia.

*B. (Bombus) terrestris* (Linnaeus, 1758)

**Distribution.** Russia: European part to 61° N, S Ural, south of W Siberia. Europe, Kazakhstan, W China. Introduced to Australia, Japan, Chile (Levchenko, 2012).

**Ecology.** Registered in the meadows, south of the mountain-forest zone and in the steppe zone (Troitskiy zakaznik (Nature Reserve), Chebarkul, Kusinsky, and Satka dist.). Included in the Red Book of the Chelyabinsk region.

*B. (Bombus) cryptarum* (Fabricius, 1775)

*B. lucorum* (Linnaeus, 1761) (Lagunov, 2005)

**Distribution.** Russia: everywhere except the European part to the south 54° N. Europe (except the Mediterranean), N Asia from Turkey to Japan, N America from Alaska to Alberta.

**Ecology.** Registered in all the landscape and climatic zones of Southern Urals. Nests in the holes of rodents, under roots of trees. Number common. Included in the Red Book of the Chelyabinsk region.

***B. (Bombus) patagiatus*** Nylander, 1848

**Distribution.** Russia: NE of the European part to Karelia and the Perm region, Siberia, Far East. Mongolia, China, Korea.

**Ecology.** Found on glades of mixed forests Southern Urals. Is on the brink of extinction. Included in the Red Book of Russia.

***Bombus (Cullumanobombus) Vogt, 1911***

***B. (Cullumanobombus) cullumanus serrisquama*** Morawitz, 1888

**Distribution.** Russia: European part north to 56° N, S Ural, W Siberia, Khakassia, Krasnoyarsk Territory. W Europe (Pyrenees) and E Europe to Hungary, Asia from the NE of Turkey to C of Afghanistan and China (Xinjiang).

**Ecology.** Registered in the steppe zone, as well as in the meadows of the mountain-forest zone of the Chelyabinsk region. Found on legumes, efficient pollinator of the red clover and alfalfa. Nests in the ground, using dry vegetation and roots of herbs. Found in burrows of rodents (Tyumaseva, 1988). Included in the Red Book of the Chelyabinsk region.

***B. (Cullumanobombus) semenoviellus*** Skorikov, 1910

**Distribution.** Russia: European part south to 53° N, Ural, Siberia; eastwards to Yakutia and Transbaikalia. N and E Europe, E Kazakhstan.

**Ecology.** Found in the mountain forest zone of Southern Urals.

***Bombus (Melanobombus) Dalla Forre, 1880***

***B. (Melanobombus) sichelii*** Radoszkowski, 1860

**Distribution.** Russia: NE European part of the Vologda region and Bashkortostan, Siberia, Far East. S Europe (mountains), NE Turkey, Caucasus, N Kazakhstan, Mongolia, N Korea, N China.

**Ecology.** Found in the forests of Bashkortostan (Nikiforuk, 1957).

***B. (Melanobombus) lapidarius*** (Linnaeus, 1758)

**Distribution.** Russia: Crimea, Moscow region, S Ural, W Siberia. Europe north to 67° N.

**Ecology.** Found in the mountain forest zone of Southern Urals. Southern Urals. Found from April to September.

***Bombus (Kallobombus) Dalla Torre, 1880***

***B. (Kallobombus) soroensis proteus*** Gerstaecker, 1869

**Distribution.** Russia: European part, N Caucasus, Ural, S Siberia to Baikal Lake. Europe to 71° N, Turkey, Transcaucasia, Iran, N and E Kazakhstan, mountains of Central Asia, N Mongolia.

**Ecology.** Inhabits meadows, mottled grass areas along rivers of the forest-steppe zone of Southern Urals, additionally, found in the floodplain meadows and on the roadsides of the steppe zone roads of the Chelyabinsk region. Feeds on composites, to a lesser degree - on labiates. Included in the Red Book of Russia.

***Bombus (Bombias) Robertson, 1903***

***B. (Bombias) confusus paradoxus*** Dalla Torre, 1882

**Distribution.** Russia: European part to 60° N, S Ural and S Siberia to Krasnoyarsk Territory. Europe, N Kazakhstan.

**Ecology.** Registered in the mottled grass areas of the forest-steppe and steppe zones of the Chelyabinsk region (Tyumaseva, 1988). Found in floodplain meadows of Karagaily-Ayat River (Kartalinsky distr.) and Ai river (Satkinsky distr.). Included in the Red Book of the Chelyabinsk region.

***Bombus (Alpinobombus) Skorikov, 1914***

***B. (Alpinobombus) wurflenii mastrucatus*** Gerstaecker, 1869

***Bombus uralicus*** Pittioni, 1923 (Lagunov, 2005)

**Distribution.** Russia: the mountains Southern Urals. Alps, Pyrenees, Carpathians, mountains of Scandinavia.

**Ecology.** Considered a glacial relic. Registered in the Chelyabinsk region on the single founding in Ilmen Nature Reserve (Elin, 1987). Found in the forests of Bashkortostan. Included in the Red Book of the Chelyabinsk region and Red Book of Russia.

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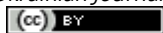
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