

Brève note – *Short note*

The first record of the rare oligolectic bumblebee *Bombus gerstaeckeri* Morawitz (Hymenoptera: Apidae: *Bombini*) from Ukraine

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Abstract. The oligolectic bumblebee *Bombus gerstaeckeri* Morawitz has been recorded in the Ukrainian Carpathians for the first time during field research from 2002 to 2007. Queens and workers of the species have been observed foraging on two *Aconitum* spp. within 540 m and 1400 m altitude. The additional forage resource of this species, that is *Salvia glutinosa* L., has been recorded at low height. Three competitor bumblebees, not confined only to *Aconitum* spp. have been observed foraging on monkshoods: *B. hortorum* (L.), *B. pascuorum* (Scopoli) and *B. wurflenii* Radoszkowski.

Résumé. Première observation du rare bourdon oligolectique *Bombus gerstaeckeri* Morawitz (Hymenoptera : Apidae : *Bombini*) en Ukraine. Le bourdon oligolectique *Bombus gerstaeckeri* Morawitz a été observé pour la première fois dans les Carpathes ukrainiennes durant les recherches de terrain de 2002 à 2007. Les reines et les ouvrières de cette espèce ont été observées en train de butiner deux *Aconitum* spp. entre 540 et 1400 m d'altitude. Une ressource additionnelle de butinage, *Salvia glutinosa* L. a été observée à basse altitude. Trois bourdons, qui sont concurrents mais pas restreints aux *Aconitum* spp., ont aussi été observés sur ces plantes : *B. hortorum* (L.), *B. pascuorum* (Sopoli) et *B. wurflenii* Radoszkowski.

Keywords: Specialist, monkshoods, Carpathians, *Aconitum*, *Salvia*.

Till recent years the oligolectic species *Bombus gerstaeckeri* Morawitz 1882 was unknown from the Ukrainian Carpathians probably because of small number of its populations, unusual phenology and patchy distribution. The first find was made by chance in 2002 and later on, the species has been searched for purposely in sites with monkshoods growth.

It has been proved that *Bombus gerstaeckeri* feeds almost exclusively on *Aconitum* spp. (Utelli & Roy 2000; Ponchau *et al.* 2006). In the Ukrainian Carpathians these plants grow both in open areas (banks of water-flows, wet meadows) and in mixed and coniferous forests. In any case their growth is connected with surplus of moisture in soil.

Monkshoods are known to be pollinated primary by bumblebees (May 1959; Pyke 1982; Kosior *et al.* 2004). It is considered that such a complex structure of their flowers with unusual arrangement of nectaries, certain rates of nectar secretion and sugar concentration have been developed in consequence of coevolution with bumblebees (Pyke 1978; Brink & deWet 1980; Lavery 1980; Fukuda *et al.* 2001). It is not so easy for naive bee to get nectar reward from monkshood

flower. It must make a series of trials, spending much time and energy, to learn the correct manipulation with flower before success. Only long-tongued bees are able to forage legally for nectar from these flowers, *Bombus gerstaeckeri* having the longest tongue among native bumblebee species.

Although the material collected on the species during our study is insufficient to observe its distribution over the whole Carpathians within Ukrainian territory, the results obtained contribute to the general knowledge on the species: its ranges in Europe, phenology, floral and habitat preferences.

Material and methods

Carrying out the study in 2002, 2003 and 2004 we managed to find *Bombus gerstaeckeri* in three localities of the Ukrainian Carpathians, as follows. A fourth station was discovered in 2007.

1. Zakarpattia region, 48°07'N and 24°28'30"E, Rakhiv district, 10 km NE from Ludy vill., SW macro-slope of the Chornogora Range, Carpathians' Biosphere Reserve, locality "Tovsty Grun", 900–1000 m altitude, the second half of July, 2002, a few queens only (fig. 1, point 1);
2. Ivano-Frankivsk region, within 48°08'–48°09'N and 24°31'40"–24°32'10"E, Nadvirna district, 20 km SW from Vorokhta town, NE macro-slope of the Chornogora Range, Carpathians' National Nature Park, localities "Polonyna Pozyzevska", slopes of Homul Mt. and Dancer Mt., 950–1400 m altitude, the first half of August, 2003, August 2004, queens and workers (fig. 1, point 2);

3. Ivano-Frankivsk region, within 48°26'–48°28'N and 24°32'–24°33'E, Nadvirna district, Jaremtche town and its environs, from 540 m to 800 m altitude, the first half of August, 2004, queens and workers (fig. 1, point 3).

4. Ivano-Frankivsk region, 48°07'15"N–24°41'40"E, Verkhoyna district, Bystrets village, NE mountain spurs of the Chornogora Range, 800 m altitude, 24.VI. 2007, only queens (fig. 1, point 4).

Because of small numbers of *Bombus gerstaeckeri* populations everywhere, only a few specimens from each locality were collected and pinned (housed at State Museum of Natural History, National Academy of Sciences, Ukraine, Lviv). Several dozens of specimens were observed on the whole.

Results

Localities of the species records are mapped on the fig. 1. *Bombus gerstaeckeri* was observed foraging on two species of monkshoods: *Aconitum moldavicum* Hacq. ex Reichenb. and *A. variegatum* L. The first one comes into bloom about two-three weeks earlier than another (the blooming period lasting from the end of June till August). In the Ukrainian Carpathians it grows mainly at low and middle heights, often in urban and semi-natural areas. The blooming period of the latter species is somewhat longer, lasting from the middle of July till September and depending upon altitude, exposure and annual weather conditions.

Along the forest streams in both macro-slopes of the Chornogora Range monkshood plants (*A. variegatum*) were arranged in small patches at a large distance

between them. Often it took us about an hour to wait for a visit of a single specimen of *B. gerstaeckeri*. Foraging of *B. hortorum* (L.) and *B. wurflenii* Radoszkowski on monkshood was observed as well, however, the workers of *B. pascuorum* (Scopoli), foraging legally for pollen and nectar, dominated. Occasional males of *B. pratorum* (L.) also were recorded. The major foraging resources of all these competitors during investigation at higher altitudes were *Galeopsis speciosa* Mill. (Lamiaceae), *Epilobium angustifolium* L., (Onagraceae) and *Circium waldsteinii* Rouy. (Asteraceae). If the latter plant species was growing near monkshoods, it was the preferential foraging resource for *B. hortorum*, and especially for *B. pascuorum*. The foraging speed of *B. gerstaeckeri* was really exciting: it took from one to five seconds for its individuals to manipulate the flower of monkshood. At the same time, we have observed *B. pascuorum* workers, spending from five to fifteen seconds inside the flower. In woodland of the Chornogora Range only a small number of *B. wurflenii* specimens visited monkshood flowers, whereas above the upper forest-limit their foraging activities on this resource increased rapidly, every flower of *A. variegatum* being pierced at 1600 m altitude. At the same time, we have failed to observe *B. gerstaeckeri*, foraging in subalpine zone.

As to Jaremtche town and its environs, the observations of bumblebee fauna were accomplished at the altitudes from 540 m (the town park, banks of two small rivers in nearest vicinity) up to 800 m (large wet meadow in mountain slope). In early August the *Aconitum moldavicum* was in full bloom, some plants ceasing blossom. Owing to the relatively dense growth of monkshood we were able to observe several foraging specimens in a sight every 5–10 minutes. It should be mentioned, that in this site we haven't observed any competition of *B. gerstaeckeri* for monkshood reward with other bumblebees. At this height the population of *B. wurflenii* was lacking, *B. hortorum* and *B. pascuorum* were giving preferences to other floral resources (mainly *Trifolium* spp. and *Betonica officinalis* L.) densely growing all around.

Unfortunately, the terms of our investigation gave no possibility to observe the emergence of *B. gerstaeckeri* males.

The fourth find of the species in Bystrets village was the earliest in the season. We have observed several queens on *A. moldavicum*, some of them were already carrying pollen.

Discussion

The observations on *B. gerstaeckeri* in the Ukrainian Carpathians have turned out the most northern records of the species within its ranges (see the map

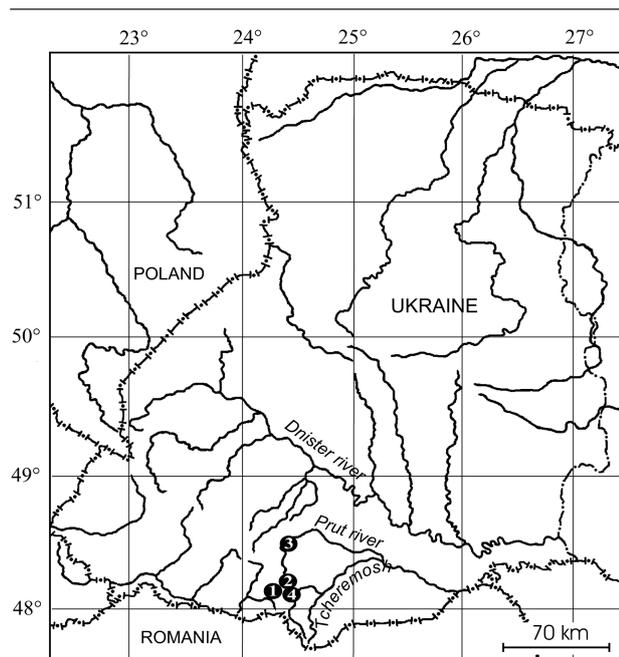


Figure 1
Records of *Bombus gerstaeckeri* Morawitz in Ukraine.

in Ponchau *et al.* 2006). The Ukrainian Carpathians are much lower than the Alps and Pyrénées. The Chornogora Range is the highest mountain chain, Hoverla Mountain (2061 m) being its highest point. The climatic conditions in SW and NE macro-slopes of the Chornogora Range are rather different. The first one is characterized by warmer climate, which enables the spruce forest to grow up to 1500 m altitude and the monkshoods to start blooming earlier in the season. At the same time, in the NE macro-slope the snow melts later and upper forest-line does not exceed 1300 m altitude. Here, the blooming period of *Aconitum* spp. begins one-two weeks later at the same altitude, especially in open sites. We haven't observed essential difference in phenology of bumblebee species in both macro-slopes, except *Bombus gerstaeckeri*. In the NE macro-slope its first queens appear only at the end of July, whereas in warmer conditions of SW macro-slope they have already been foraging in the middle of July. Obviously, the population of *Bombus gerstaeckeri* in the second locality (see map, point 2) is very small, as we have never observed more than five individuals of both castes a day, foraging at the middle of August on the route of our observations.

The environs of Jaremtche town were the only site where rather dense population of *Bombus gerstaeckeri* was observed in comparison with other regions investigated. It is noteworthy, that here, in those places, where *A. moldavicum* patches were surrounded by thick growth of *Salvia glutinosa* L. (Lamiaceae), some queens and workers of *B. gerstaeckeri* were observed foraging for pollen from the latter, switching back to monkshoods in a little while. Our observation confirms both the information of Løken (1960), who has reported about exceptional changes in diet of a close relative oligolectic species *B. consobrinus* Dahlbom, and the recent data on *B. gerstaeckeri*, alternatively foraging from *Delphinium dubium* (Rouy & Foucaud) Pawl. (Ranunculaceae) (Mahé 2007). The conditions of Jaremtche environs seem favorable (especially with a view of resource and nesting site availability) for sustainable existence of *Bombus gerstaeckeri* population, even in spite of rather intensive human activities (recreation, mowing and grazing cattle). Presumably, the populations of *Bombus*

gerstaeckeri in the Ukrainian Carpathians are more abundant at low heights owing to availability of larger forage resources and smaller competition with other bumblebees, especially in the absence of nectar-robbing *B. wurflenii*. Our data on increasing nectar-robbing from this species with growing altitude correspond to observations of other researches (Utelli & Roy 2001). However, the insufficient data obtained during the study, prevent us from making a trustworthy conclusion. More information is necessary.

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