

Rediscovery of the potential endemic bug species *Parapiesma unicolor* (Wagner, 1954) (Heteroptera, Piesmatidae) in the Dovrefjell mountains of Norway

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Parapiesma unicolor (Wagner, 1954) (Heteroptera, Piesmatidae) was described from several specimens collected in cushions of *Silene acaulis* (L.) Jacq. in Central Norway, close to Vålåsjø in Oppland, Dovrefjell. The species has never been found elsewhere in the World and it may be considered as one of the very few potential endemics of Norway. In 2021, a few specimens were rediscovered at Fokstugu, close to the type locality. Comprehensive search for the species on the host plant in several sites at Dovrefjell during the last decades, has not been successful. The lack of multiple records of *Parapiesma unicolor* indicates a very local and sporadic occurrence that should be considered in conservation planning and management actions both regarding the bug species and its host plant.

Key words: Heteroptera, Piesmatidae, *Piesma*, *Parapiesma unicolor*, Norway, Dovrefjell, Fennoscandia, Palaearctic.

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Introduction

The small bug family Piesmatidae Amyot & Serville, 1843 (Heteroptera) includes six genera and about 40 species worldwide, of which 15 species in the two genera, *Piesma* Lepeletier & Serville, 1828 and *Parapiesma* Péricart, 1974, are present in the Palaearctic zone (Heiss & Péricart 2001). In Norway, there are only four species: *Piesma capitatum* (Wolff, 1804), *Piesma maculatum* (Laporte, 1833) and *Parapiesma quadratum* (Fieber, 1844), which have a wide distribution in the Palaearctic, and *Parapiesma unicolor* (Wagner 1954) which so far is only recorded from Norway (Coulanus 1998, Heiss & Péricart 2007, Fauna Europaea 2022).

The habitus of the Piesmatidae is strikingly similar to the Tingidae, however the two families are distantly related. The Piesmatidae belong

to its own superfamily Piesmatoidea, and they are characterized by the presence of ocelli, a stridulatory apparatus, as well as the scutellum not covered by the pronotum (Heiss & Péricart 1983). All species are small in size, being 1.25–4 mm in body length. The two genera *Piesma* and *Parapiesma* are easily distinguished by the presence two or three longitudinal carinae in the apical half of pronotum, respectively.

Parapiesma unicolor can be separated from other congeneric species based on the following characters: small size (2.1–2.6 in length); surface rather shiny; color uniformly greenish brown to reddish brown; third antennal segment hardly longer than fourth; side margin of pronotum weakly sinuate in the middle with only one row of areolae (Wagner 1954, Heiss & Péricart 1983, 2007).

The Piesmatidae are strictly phytophagous

and are mainly associated with the plant families Chenopodiaceae and Carophyllaceae (Heiss & Péricart 1983). The two *Piesma*-species prefer xerophilous habitats and can be found on Chenopodiaceae in dry arable fields and wasteland, while the halophilous species *Parapiesma quadratum* is regularly found in large amounts along the coast on different species of Chenopodiaceae. *Parapiesma unicolor*, on the other hand, is associated with *Silene acaulis* (Carophyllaceae), and has been only recorded from the type locality in the mountains of Central Norway (Heiss & Péricart 1983, 2007).

Parapiesma unicolor was described by Wagner (1954) based on 22 males and 31 females found by Oscar Sjöberg close to Vålåsjø, Oppland in Central Norway on the 15th of July 1953. The type material, one holotype (Figure 1) and 25 paratypes, has been deposited in the Biological Museum, Lund University, Sweden. The type locality was described as sandy banks with scarce vegetation of a small stream in the mountain birch region at 975 m asl. The specimens were sitting inside cushions of *Silene acaulis* between partly decomposed stems. There are several small rivers close to Vålåsjø, but no current records of *Silene*

acaulis are registered in Artskart (2022). It is therefore hard to locate exactly where the type specimens were found.

Due to the seemingly restricted distribution of *Parapiesma unicolor* this species may be targeted for conservation planning, as it might be one of the very few insect species endemic to Norway. The aim of this paper was to search for *Parapiesma unicolor* in the Dovrefjell area to achieve a better understanding of the current population status of the species.

Material and methods

The approach for finding *Parapiesma unicolor* was first to search for the host plant *Silene acaulis*. This pioneer plant is very common in the Dovrefjell area at disturbed sites along small rivers, roadsides and paths, heavily grazed areas as well as wind eroded exposed sites. The plant prefers sand or gravel substrate with regularly access to moisture (Molenda *et al.* 2012). The specific search for *Parapiesma unicolor* were performed by sifting cushions of the host plant *Silene acaulis*. During the years 1997 to 2015



FIGURE 1. Holotype, male, of *Parapiesma unicolor* (Wagner, 1954). Photo: Christopher Fägerström.

the search area was restricted to Vinstradalen, Finnshøa, and Sæterfjellet in Oppdal municipality, Trøndelag, which has rich occurrences of *Silene acaulis*. In 2021, the search was performed more systematically in specific sites where *Silene acaulis* were registered in Artskart (2022). In this period the areas Kongsvoll, Nordre Knutshø, Vinstradalen in Oppdal, Trøndelag, and Hjerkin, Hjerkinnhøa, Tverrfjellet, Vålåsjø and Fokstua in Dovre municipality, Oppland, were visited. More than one hundred cushions of *Silene acaulis* were sifted irregularly during the period of about 20 years.

The morphological study of the specimen was conducted with Wild M10 stereomicroscope. Reference material is deposited in the insect collections at NTNU University Museum in Trondheim (NTNU). The coordinates are given in decimal degrees (Grid: Latitude/Longitude hddd. dddd°; datum: WGS84). The faunistic divisions within Norway follow Endrestøl (2021) and are given in bold. The new county division introduced

from 1 January 2020 has not been implemented in this study.

Results

Despite sifting more than hundred cushions of *Silene acaulis* in different parts of the Dovrefjell area, the species was not found before a more specific search close to the type locality was performed. It was not possible to find current occurrences of *Silene acaulis* at the immediate vicinity of Vålåsjø, however, several observation sites for the plant, a few kilometres away from the lake were visited. *Parapiesma unicolor* was found in only one of the sites: Norway, OPPLAND [ON], Dovre: Fokstugu, 960 m asl. [62.11387°N–9.29205°E], 30 August 2021, 3 males and 1 female in cushions of *Silene acaulis* (Figure 2, 3 and 4).



FIGURE 2. Male of *Parapiesma unicolor* (Wagner, 1954), dorsal view. Photo: Arnstein Staverløkk.



FIGURE 3. Male of *Parapiesma unicolor* (Wagner, 1954), lateral view. Photo: Arnstein Staverløkk.



FIGURE 4. Habitat of *Parapiesma unicolor* (Wagner, 1954), at Fokstugu, Dovre, Oppland in Central Norway, 30 August 2021. Photo: Frode Ødegaard.

Discussion

The present finding of *Parapiesma unicolor* represents the first confirmed record of the species after the type specimens were found in 1953. This

rediscovery confirms that the species still have viable populations, however, the comprehensive search over a large geographical area for many years indicates that the species has a very local and sporadic occurrence. As most Piesmatidae



FIGURE 5. *Silene acaulis* may serve as a keystone species in mountain ecosystems. Unndalen, Oppdal, Trøndelag in Central Norway, 12 July 2015. Photo: Frode Ødegaard.

are shown to be xerophilous species, it might be expected that *Parapiesma unicolor* prefers climatically warm sites at lower altitudes within the distributional range of the host plant. *Silene acaulis* is most commonly found at altitudes from 1200–1500 m asl in the Dovrefjell area (Artskart 2022), however both the type locality and the current collection site for *Parapiesma unicolor* are situated below 1000 m asl., where the plant is quite rare. This altitudinal zone at Dovrefjell has also been in the process of upward treeline expansion during the last decades due to climatic changes combined with changes in land use (Bryn & Potthof 2018). These changes may have affected the distribution pattern of *Silene acaulis* and eventually the amount of potential habitat for *Parapiesma unicolor*.

The peculiar growth form of *Silene acaulis* (Figure 5) and the protected environment inside the cushions may serve as a foundation for other

plant species (nurse plant) as well as habitats for a wide range of arthropods living in disturbed and harsh environments in the mountains (Molenda *et al.* 2012). The plant is also very popular among flower visiting insects in the mountains, such as bumble bees. Thus, *Silene acaulis* may be seen as a keystone species in mountain ecosystems. Since *Parapiesma unicolor* is one of the very few potential endemic species of Norway, this species as well as its host plant should be emphasized in conservation planning and management actions. *Parapiesma unicolor* is obviously much more restrictedly distributed than its host plant, and it is recommended to increase effort for revealing a better knowledge related to viability and the true range and habitat requirements of the species in the future.

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