

# The bumblebee mite *Parasitellus fucorum* (De Geer, 1778) (Acariformes: Parasitidae) - a new species for the Faroe Islands

*Humlebi miden Parasitellus fucorum* (De Geer, 1778) (Acariformes: Parasitidae) – ny art for Færøerne

Wojciech Witaliński<sup>1</sup> & Jens-Kjeld Jensen<sup>2</sup>

<sup>1</sup> Department of Comparative Anatomy, Institute of Zoology and Biomedical Research, Jagiellonian University, Gronostajowa 9, 30-387 Kraków, Poland. E-mail: [w.witalinski@gmail.com](mailto:w.witalinski@gmail.com)

<sup>2</sup> Í Geilini 37, FO-270 Nólsoy, Faroe Islands. E-mail: [nolsoy@gmail.com](mailto:nolsoy@gmail.com) Website: [www.jenskjeld.info](http://www.jenskjeld.info)

## Abstract

This is the first report of the bumblebee mite *Parasitellus fucorum* (De Geer, 1778) from the Faroe Islands. The mite was found on two bumblebee queens of the species *Bombus lucorum* (Linnaeus, 1761), one of which was heavily infested, hosting 811 mites. Several mites were additionally infected by heteromorphic deutonymphs (hypopi) of an Acaridae mite (Astigmata). Breeding bumblebees have inhabited the Faroe Islands since 2010. *Parasitellus fucorum* is common on bumblebees in all neighboring countries, recently including Iceland. We expect the appearance of further *Parasitellus* species on the Faroe Islands in the future.

## Sammendrag

Humlebidmiden *Parasitellus fucorum* (Geer, 1778) er fundet for første gang på Færøerne på to humlebier af arten *Bombus lucorum* (Linnaeus, 1761). Den ene dronning havde 811 mider på sig. Flere mider var yderligere befængt med en lille mide uden munddele (hypopi) af en Acaridae mide (Astigmata). Humlebier er kun registreret ynglende på Færøerne siden 2010. *Parasitellus fucorum* er almindelig på humlebier i alle vores nabolande og for nylig også fundet på Island. Vi forventer, at der i fremtiden vil blive fundet andre arter af *Parasitellus* på Færøerne.

## Introduction

Two species of bumblebees, *Bombus pratorum* (Linnaeus, 1761) and *Bombus lucorum* (Linnaeus, 1761), were observed breeding for the first time in the Faroe Islands in 2010 (Madsen & Jensen, 2011). Their further distribution on the islands is stated in Jensen & Madsen (2013). In 2014, the distribution of *Bombus lucorum* had reached Tórshavn (62° 00' N – 06° 46' W), the capital of the Faroe Islands, where the species was observed at several locations.

With the expansion of bumblebees, a new mite species, *Parasitellus fucorum* (De Geer, 1778) appeared on the Faroe Islands. Mites belonging to the genus *Parasitellus* are obligatory associates of bumblebees because the mite deutonymphal stage attaches to bumblebees and in this way disperses to other colonies. For dispersal, mites can use either workers, males or queens, but in autumn, queen bumblebees are especially attractive since they allow the overwintering of mites and infestation of new bumblebee nests (Huck *et al.*, 1998). *Parasitellus* mites are only incidentally associated with other insects or found in the nests of mammals and birds (Hyatt, 1980).

## Material

On Aug. 21<sup>st</sup>, 2016, J-K. J. and Marita Gulkleit visited a *Bombus lucorum* nest found in Hornabøur in central Tórshavn, where two queens infested with mites were collected (Fig. 1.). The bumblebees were killed with chloroform and then phoretic mites were removed with a brush under a stereomicroscope. All mites were kept in 70% alcohol; 86 mites were mounted on microscopic slides and identified by W.W. according to Hyatt (1980). The mites from this study are deposited in alcohol at the Faroe Islands Museum of Natural History, Tórshavn, whereas those on slides are in the collection of W.W. in the Department of Comparative



**Fig. 1.** *Bombus lucorum* queen, Tórshavn, Aug. 21st, 2016, infested with deutonymphs of the mite *Parasitellus fucorum*. Photo: Marita Gulckett.

## Results

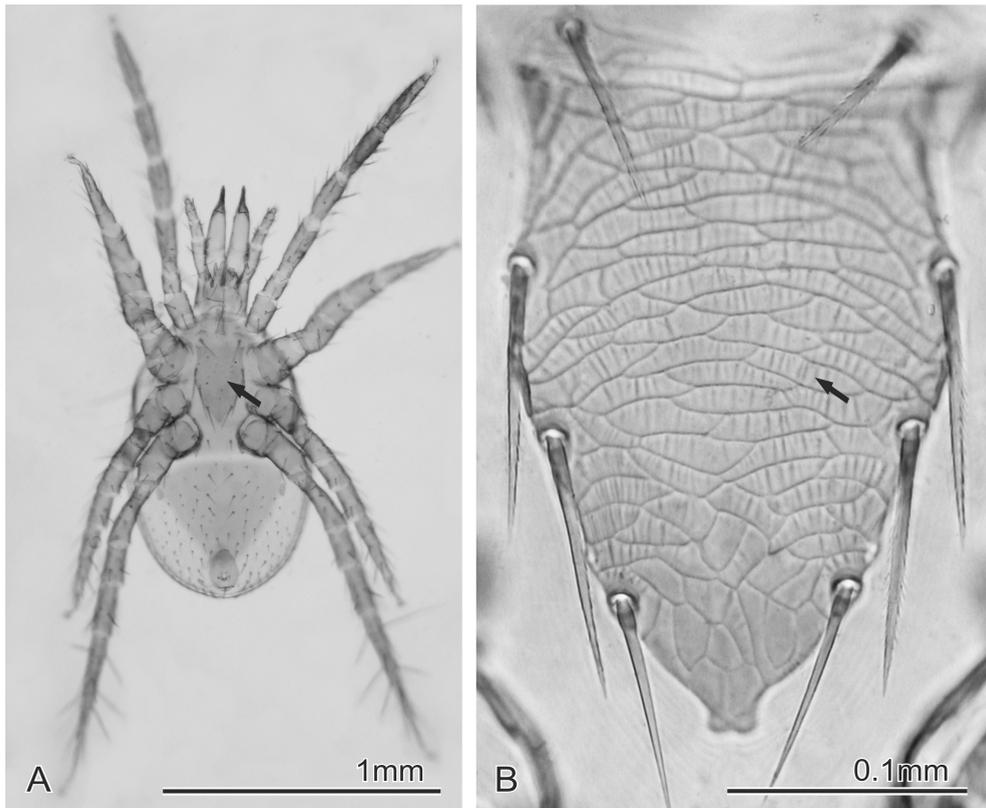
In the vicinity of a nest of the bumblebee *Bombus lucorum*, two bumblebee queens were found rolling in the grass approximately 50 cm from the nest entrance, where they were collected. Apparently they had difficulties flying. The less infested bumblebee queen hosted about 600 mites, whereas on the more infested one there were as many as 811 mites, of which 86 mites were sent to W.W., who identified all to be *Parasitellus fucorum* deutonymphs. Several mites were additionally infected by heteromorphic deutonymphs (hypopi) of an Acaridae mite (Astigmata), which can be also new species on the Faroe Islands. In addition to the two collected queens we observed a smaller numbers of mites on males and workers.

## Discussion

Due to concerns about the viability of the new, small and sensitive bumblebee population in the Faroe Islands, very few specimens have been collected during the seven years of observed breeding. Hence, mites associated with bumblebees have not been reported. Since our finding of *Parasitellus fucorum* is preliminary, the distribution of mites on the Faroe Islands is also not known precisely. However, *P. fucorum* is very common on bumblebees in Europe (Skou et al., 1963; Chmielewski, 1971; Hyatt, 1980; Schousboe, 1987), including on some northern localities such as Denmark (Schousboe, 1987), Norway (Mehl, 1979) and the Kanin Peninsula and reputedly Novaya Zemlya in the European Arctic (Makarova, 2013). This mite species was also recorded in exploited commercial bumblebee nests (Rožej et al., 2012). *Parasitellus fucorum* has recently been registered in Iceland (Ólafsson, 2017) and the host infestation also seems to be high.

*Parasitellus fucorum* is not a true parasite of bumblebees: the bumblebee is used only for phoretic transport of deutonymphs, as the mites preferentially feed on pollen and small arthropods and worms living in the nest (Richards and Richards, 1976; Schmid-Hempel, 1998; Koulianos & Schwarz, 1999). Mites may therefore be beneficial for bumblebees by clearing their nests, but, on the other hand, extremely high infestation can induce a negative effect on the host, decreasing its flight ability and capacity for food provisioning. The load of 811 mites on one host reported in this study is extremely high. Maximum infestations are usually much lower: for example, Huck *et al.* (1998) reported, as a case of extreme infestation, 165 deutonymphs on a *Bombus lapidarius* queen, also suggesting their negative impact on host flight.

*Parasitellus fucorum* can be found dispersing on males and workers, but at the end of the season deutonymphs prefer bumblebee queens (Huck *et al.*, 1998), which give the mites an opportunity to hibernate and then to infect a new bumblebee nest, since bumblebee colonies are annual and only young queens overwinter. Deutonymphs molt into females or males in the nest where insemination occurs (Richards & Richards, 1976; Eickwort, 1994). The bumblebee nest is also the site of egg deposition and subsequent development (larvae, protonymphs then deutonymphs) which is completed in less than 10 days; deutonymphs molt into adults afterwards (Koulianos & Schwarz, 1999).



**Fig. 2.** *Parasitellus fucorum* deutonymph. (A) Ventral side, sternum indicated by arrow. (B) Sternum showing reticulation with characteristic longitudinal striae (arrow).

The genus *Parasitellus* comprises 11 species, and *P. fucorum* is the most common and largest species, usually collected as deutonymphs. These are easy to identify because the

deutonymph sternal shield has a laterally elongated reticulation with a characteristic longitudinal stratification (Fig. 2).

*Parasitellus fucorum* is the first *Parasitellus* species collected from the Faroe Islands, but we suspect the appearance of other species in the future, appearing as invaders with bumblebees either from Europe or Greenland, the home of two species described by Karg (1985), *P. arcticus* and *P. papei*.

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## Litteratur

- Chmielewski W., 1971: The mites (Acarina) found on bumble-bees (*Bombus* Latr.) and in their nests. – *Ekologia Polska* 19: 57-71.
- Eickwort G.C., 1994: Evolution and life-history patterns of mites associated with bees, pp. 218-251. – In: M.A. Houck (ed.): *Mites: Ecological and Evolutionary Analyses of Life-history Patterns*. New York, Chapman & Hall: 356 pp.
- Jensen J.-K. & H.B. Madsen, 2013: To arter af humlebieer yngler på Færøerne (Hymenoptera, Apidae) / Two species of bumblebees breed on the Faroe Islands (Hymenoptera, Apidae). – *Entomologiske Meddelelser* 81: 1-10.
- Huck K., H.H. Schwarz & P. Schmid-Hempel, 1998: Host choice in the foretic mite *Parasitellus fucorum* (Mesostigmata: Parasitidae): which bumblebee caste is the best? – *Oecologia (Berlin)* 115: 379-384.
- Hyatt K.H., 1980: Mites of the subfamily Parasitinae (Mesostigmata: Parasitidae) in the British Isles. – *Bulletin of the British Museum, Natural History (Zoology)* 38: 237-378.
- Karg W., 1985: Die mit Arten der Gattung *Bombus* Latreille vergesellschafteten Raubmilben der Gattung *Parasitus* Latreille, 1795 (Acarina, Parasitiformes). – *Zoologische Jahrbücher Abteilung für Systematik Ökologie und Geographie der Tiere* 112: 525-535.
- Koulianos S. & H.H. Schwarz, 1999: Reproduction, development and diet of *Parasitellus fucorum* (Mesostigmata: Parasitidae), a mite associated with bumblebees (Hymenoptera: Apidae). – *Journal of Zoology, London* 248: 267-276.
- Madsen H.B. & J.-K. Jensen, 2011: Humlebieer på Færøerne (Hymenoptera, Apidae) / Bumblebees on the Faroe Islands (Hymenoptera, Apidae). – *Entomologiske Meddelelser* 79: 19-26.
- Makarova O.L., 2013: Gamasid mites (Parasitiformes, Mesostigmata) of the European Arctic and their distribution patterns. – *Entomological Review* 93: 113-133.
- Mehl R., 1979: Checklist of Norwegian ticks and mites (Acari). – *Fauna Norvegica Serie B* 26: 31-45.
- Ólafsson E., 2017: <http://www.ni.is/biota/animalia/arthropoda/chelicerata/arachnida/acari/mesostigmata/humlimitill-parasitellus-fucorum>
- Richards L.A. & K.W. Richards, 1976: Parasitid mites associated with bumblebees in Alberta, Canada (Acarina: Parasitidae; Hymenoptera: Apidae). II. Biology. – *University of Kansas Science Bulletin* 51: 1-18.
- Rozej E., W. Witaliński, H. Szentgyörgyi, M. Wantuch, D. Morón & M. Woyciechowski, 2012: Mite species inhabiting commercial bumblebee (*Bombus terrestris*) nests in Polish greenhouses. – *Experimental and Applied Acarology* 56: 271-282.
- Schmid-Hempel P., 1998: *Parasites in social insects*. New York, Princeton University Press: 392 pp.
- Schousboe C., 1987: Deutonymphs of *Parasitellus* phoretic on Danish bumble bees (Parasitidae, Mesostigmata; Apidae, Hymenoptera). – *Acarologia* 28: 37-41.
- Skou J.P., S.N. Holm & H. Haas, 1963: Preliminary investigations on diseases in humblebees. – *Den Kongelige Veterinaer- og Landbohøjskole Årsskrift* 1963: 27-41.