NEW DISTRIBUTIONAL RECORDS OF MITE *KUZINIA LAEVIS* (DUJARDIN, 1849) (ASTIGMATA, ACARIDAE) AND NOTES ON ITS LIFE CYCLE

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Abstract: There are more phoretic species of Acarina associated with bumblebees. *Kuzinia laevis* (Dujardin, 1849) is most frequent among astigmatid mites. In this paper, new distributional records of deutonymph stage of *K. laevis* phoretic on two species of *Bombus* Latreille, 1802 (*B. terrestris* (Linnaeus, 1758) and *B. lapidarius* (Linnaeus, 1758)) are given. Two hundred forty seven deutonymphs were found on three new localities from Slovakia. Life cycle of this mite, along with some notes to its biology and ecology are presented in discussion.

Key words: Acari, Acaridae, Astigmata, bumblebees, *Kuzinia laevis*, life cycle, phoresy.

INTRODUCTION

Bumblebees, along with other species of social Hymenoptera are important pollinators. Their relationship with mites however, is not so well known and documented, as in case of honey bees. From Central Europe, there are only few papers dealing with this subject. Chmielewski (1971) was focusing on phoretic mites to be found on bodies of bumblebees and in their nests. According to his findings, there were 3 most abundant species. Among mesostigmatid mites *Parasitellus fucorum* (De Geer, 1778), among Prostigmata *Scutacarus acarorum* (Goetze, 1870) and astigmatid species *Kuzinia laevis* (Dujardin, 1849). Chmielewski & Baker (2008) focused on phoretic mites, collected from 4 species of bumblebees in Puławy region, Poland. Several phoretic stages of mites were present, most abundant among them were again three previously mentioned species.

Astigmatid mite, *K. laevis* is closely associated with genus *Bombus* (Latreille, 1802) and often occurs in their nests and in phoretic stage (heteromorphic deutonymph) also on bumblebee bodies. Biology and ecology of this mite was deeply studied by Chmielewski (1969; 1991). Species was recorded for the first time in Slovakia by Mašán (2001).

In this paper, some additional findings of *K. laevis* are presented, along with some notes on the life cycle of this mite, previously published mostly in Polish.

MATERIAL AND METHODS

Bumblebee carriers were captured on collection sites by use of aerial insect net or firm tweezers and afterwards put in to flask with 70% ethyl-alcohol. Phoretic deutonymphs of *K. laevis* were then removed from bodies of bee carriers under stereomicroscope Leica EZ4 and mounted on microscope slides using Liquido de Swann. Mites were determined with keys and descriptions in various acarological papers (Zachvatkin 1941, Türk & Türk 1957, Chmielewski & Baker 2008) under the Zeiss Amplival microscope (magnification 100 – 400 ×).

More recent material originates from my own collection. Older samples were kindly loaned to me by

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Dr. Peter Mašán for examination. Material listed below is ordered chronologically:

1. Slovakia, Železná studienka – Bratislava (N 48° 11' 35'', E 17° 5' 15''; altitude 244 m), 1 worker of *Bombus lapidarius* (Linnaeus, 1758) – on body surface, 25. 7. 1995, 3 deutonymphs (leg. P. Mašán).

2. Slovakia, Hrdzavá dolina – Muránska Planina (N 48° 45' 22'', E 19° 59' 19''; altitude 712 m), 1 worker of *Bombus terrestris* – on body surface, 9. 8. 1997, 2 deutonymphs (leg. P. Mašán).

3. Slovakia, floodplain forest near Ereš – Trebišov district (N 48° 27' 21'', E 21° 50' 7''; altitude 102 m), 1 queen of *Bombus terrestris* under old stump bark – on body surface (abdomen and thorax), 12. 10. 2010, 242 deutonymphs (leg. R. Zamec).

4. Slovakia, Zemplínska jelšina – Trebišov district (N 48° 28' 47'', E 21° 47' 29''; altitude 110 m), 3 workers of *Bombus terrestris* on blossoms of *Papaver rhoeas*, 26. 5. 2011, no deutonymphs (leg. R. Zamec).

RESULTS

In total, 247 heteromorfic deutonymphs of *Kuzinia laevis* were present in surveyed material (fig. 1). Inspection of workers yielded only very small number of mites or no mites at all (1 specimen on *B. terrestris* from Železná studienka and 2 specimens on *B. terrestris* from Hrdzavá dolina; 3 specimens of *B. terrestris* from Zemplínska jelšina were free of mites). Great majority of acquired mites originates from single queen of *B. terrestris* overwintering under the bark of old stomp – 242 deutonymphs. Mites were attached mainly on ventral and lateral thorax and ventral abdomen, but smaller amounts were present on almost entire surface of body.

DISCUSSION

Deutonymph of *K. laevis* is known to be phoretic also on other genera from family Apidae (for example *Xylocopa* Latreille, 1802, or *Osmia* Panzer, 1806), but it seems that it has closer bond with *Bombus* – not only because phoresy on this genus is more frequent, but also because other life stages are to be found in bumblebee nests, where they feed mainly on pollen, bee-bread and old combs (Chmielewski 1969; Chmielewski & Baker 2008).

Adult female starts to lay eggs 3 – 4 days after copulation. In bumblebee nests, eggs are laid on every available surface – on sustenance, near entrances and on various nest debris (Chmielewski 1969). In laboratory conditions, females laid 12 eggs a day in average. Life span of adult females is 16 – 53 days, so average number of eggs, laid by one female during it's life is 372 (Chmielewski 1969).

In stable conditions during spring and summer, whole life cycle of this species is taking place inside of the nest. Larva hatches from the egg after 2 – 7 days, and then molts into a mobile protonymph, then to tritonymph (sometimes referred to as homeomorphic deutonymph) and finally to adult mite – male or a female. Every new juvenile stadium has 2–6 day long active phase (2 – 5 in case of tritonymph), then 1 – 3 day lasting dormant phase, before molting into next life stage. Whole cycle from egg to adult specimen lasts 12 – 33 days, and depends on nutrition, temperature and relative air humidity. There are no, or only a negligible number of heteromorphic deutonymphs present (Chmielewski 1969).

However, during autumn when conditions are worsening (especially in old, merging nests), another life stage appears. Protonymphs cease to molt directly into a tritonymph and turns into a heteromorphic deutonymph instead (stage is specially adapted for phoresy). Deutonymphs actively attach themselves on bumblebees present in nest (Chmielewski 1969). Drones and workers are occupied by deutonymphs only weekly, on the other hand, queens are usually heavily infested – ten to one hundred or even more specimens per bee (Chmielewski & Baker 2008). This behaviour is not purposeless. Young queens flee from abolishing nests and overwinter in various holes or gaps, with dormant deutonymphs still attached to their bodies. During spring, when queens are establishing new nests, mites fall of their bodies, molt into a

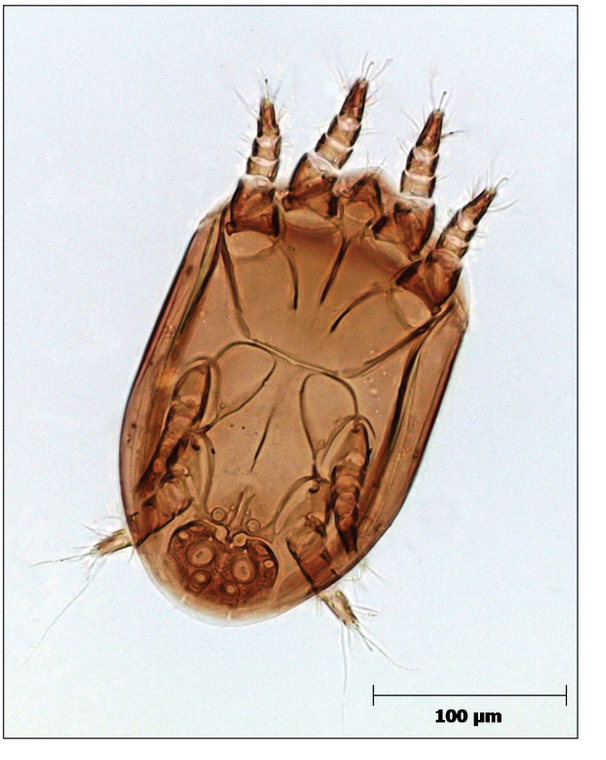

Figure 1. Deutonymph of *Kuzinia laevis*.

tritonymphs – taking up again the standard life cycle (Chmielewski 1969).

Our own findings support abovementioned statements. In studied material, number of collected mites varied greatly for each one carrier specimen, due to caste of bumblebee and date of collection. Specimens collected in spring bore no mites, workers acquired in second half of summer carried only small number of them and queen caught in autumn was infested by more than two hundred mites.

The main taxonomic characters of studied specimens correspond to the published descriptions used for determination (Zachvatkin 1941; Türk & Türk 1957; Chmielewski & Baker 2008), no significant differences were found.

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REFERENCES

Chmielewski W, 1969: Obserwacje nad biologia nowego dla akarofauny polskiej gatunku Kuzinia laevis (Dujardin, 1849) (Acarina, Acaridae). *Polskie Pismo Entomologiczne*, 39: 603–617.

Chmielewski W, 1971: The mites (Acarina) found on bumble-bees (Bombus Latr.) and their nests. *Ekologia Polska (Warszawa)*, 19: 57–71.

Chmielewski W, 1991: Trzmielolubny rozkruszek Kuzinia laevis (Duj.) (Acarida, Acaridae) – rozwój i składanie jaj na pyłku zbieranym przez pszczoły. *Pszczelnicze Zeszyty Naukowe*, 35: 75–82.

Chmielewski W & Baker RA, 2008: Mites (Acarina) phoretic on some common bumblebee species (Bombus spp.) from the Pulawy area (south-eastern Poland). *Journal of Apicultural Science*, 52 (1): 37–47.

Mašán P, 2001: First record of mites (Acari) from Slovakia. *Biologia (Bratislava)*, 56 (5): 496, 502.

Türk E & Türk F, 1957: Systematik und Ökologie der Tyroglyphiden Mitteleuropas. In: Stammer HJ (ed): Beiträge zur Systematik und Ökologie mitteleuropäischer Acarina. Band I, Teil I. *Akademische Verlagsgesellschaft Geest & Portig K.-G., Leipizg*, p. 3–231.

Zachvatkin AA, 1941: Tiroglifoidnye kleshchi (Tyroglyphoidea). Fauna SSSR, Arachnoidea 6 (1). *Academy of Science of SSSR, Moscow, Leningrad*, 475 pp.