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First record of four bee (Hymenoptera: Apidae) associated mite species (Acari) from Democratic People's Republic of Korea

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Four mite species (Acari: Scutacaridae: *Scutacarus acarorum* (Goeze, 1780), Chaetodactylidae: *Sennertia alfkeni* (Oudemans, 1900); Ascidae: *Proctolaelaps longanalis* (Westerboer, 1963), Laelapidae: *Hypoaspis* (*Pneumolaelaps*) *marginepilosa* (Sellnick, 1938) are found on the body of bees deposited in the Hungarian Natural History Museum, Budapest. The host bee species were collect in Democratic People's Republic of Korea; the found four species are collected at first time in Democratic People's Republic of Korea.

Keywords: bee, Democratic People's Republic of Korea, first records, Mites

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Introduction

The bees (Insecta: Apidae) have a very important role in the pollination of natural and the agricultural ecosystems (Morandin *et al*., 2001). Beside the most important honeybees, the bumble bees and the carpenter bees have significant role in the pollination of the plants and flowers on all regions of the Earth (Teper 2005; Sadeh *et al*., 2007; Kingha *et al*., 2012; Fohouo *et al*., 2014).

The study of bees and mites association is a most important task of acarology, but the mites living together with the bees in the Korean Peninsula are scarcely investigated. Only one species (*Sennertia alfkeni* (Oudemans, 1900) was mentioned from Republic of Korea in Zachvatkin's (1941) book, without exact record. This mite species was found on association with Japanese carpenter bee (*Xylocopa appendiculata circumvolans* (Smith, 1873)). Other species bee associated mite species were not presented from Korean Peninsula, neither from Republic of Korea nor Democratic People's Republic of Korea.

Materials and Methods

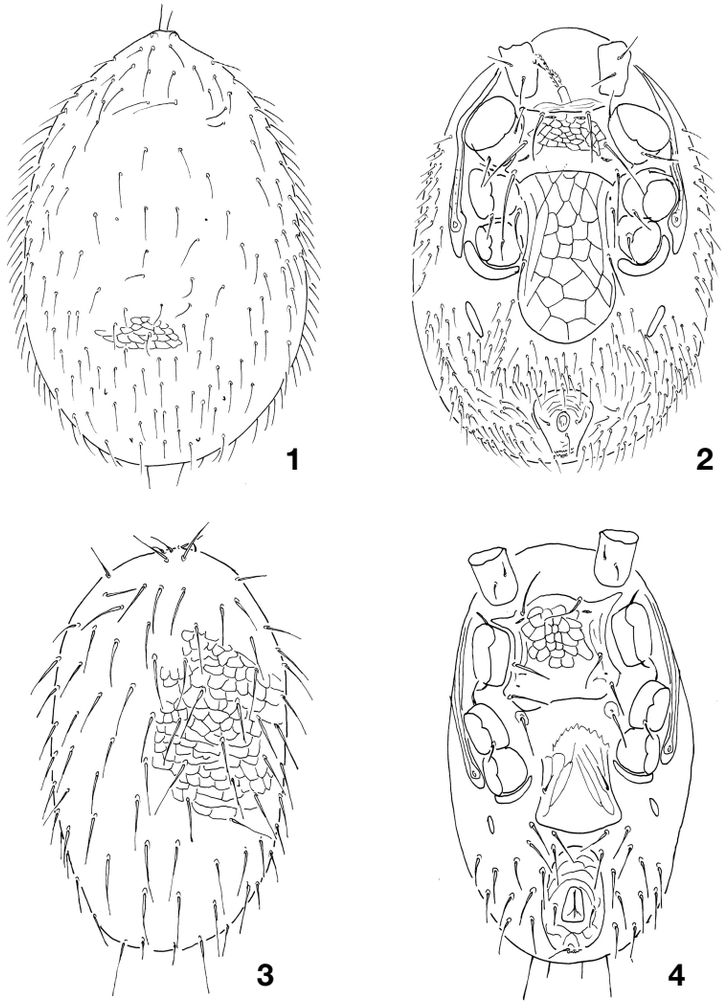
The Hungarian entomologists have been collected bees in Democratic People's Republic of Korea in some field trips in 70's and 80's. These bee specimens were collected by butterfly net and after were deposited in the Hymenoptera Collection of the Hungarian Natural History Museum. During the studies of the bee associated mites, we found four species on the Korean bee material. The mites were separated from the dried body of bee under microscope with aid of brush. Specimens of the found species were cleared in lactic acid and after were preserved in Hoyer media. The collected mites are deposited in the National Institute of Biological Resources (NIBR), Incheon, Republic of Korea.

Results

Acari
Parasitiformes
Mesostigmata
Family Laelapidae

***Hypoaspis* (*Pneumolaelaps*) *marginepilosa* Sellnick, 1938** (Fig. 1, 2)

Material examined: Two females. Democratic People's Republic of Korea, Pyongyang Prov., Paektu-san-milyong, host: *Bombus* sp, 27.VI.1988, leg. Szél, Gy. &



Figs. 1-4. Mesostigmatans collected on bees in North-Korea: 1. *Hypoaspis* (*Pneumolaelaps*) *marginepilosa* Sellnick, 1938 dorsal view, 2. ventral view. 3. *Proctolaelaps longanalis* (Westerboer, 1963) dorsal view, 4. ventral view.

Merkl, O. Four females. Democratic People's Republic of Korea, Pyanggang Prov., 31 km of Paekdu-san road, NW of Samjion, 200 m, host: *Bombus* sp, 28.VI.1988, leg. Szél, Gy. & Merkl, O.

Diagnosis: Dorsal shield hypertrichous, bearing numerous needle-like setae. Seven pairs of setae situated between genital and anal shields on membranous cuticle. Membranous cuticle of marginal area of ventral idiosoma bearing numerous needle-like setae. Sternal setae long, reaching to basis of next setae. Surface of sternal and genital shields with reticulate sculptural pattern.

Notes: The association of this mite species with the bumblebees is mentioned by Karg (1993) from Central and Northern Europe, by Rożej *et al*. (2012) from Poland and from Greece by Kontschán (2015).

Remark: This is the first record of *Hypoaspis* (*Pneumolaelaps*) *marginepilosa* from North-Korea and the Korean Peninsula.

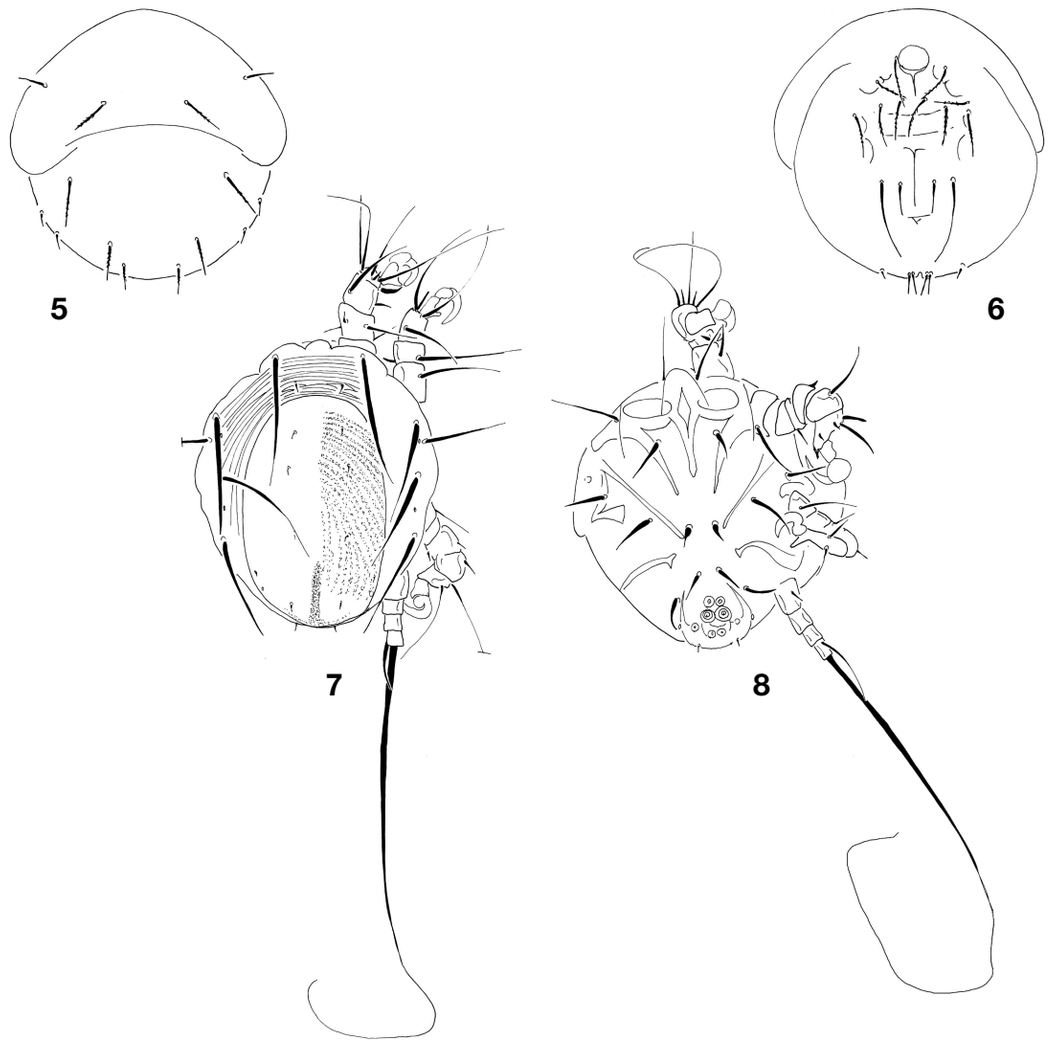
Family Ascidae

***Proctolaelaps longanalis* (Westerboer, 1963)** (Figs. 2-4)

Material examined: One female. Democratic People's Republic of Korea, Pyongyang Prov., Paektu-san-milyong, host: *Bombus* sp, 27.VI.1988, leg. Szél, Gy. & Merkl, O.

Diagnosis: Dorsal setae smooth, long and needle-like, setae on row j long, reaching basis of following setae. Dorsal and sternal shield with reticulate sculptural pattern. Anal opening large situated on posterior area of anal shield. Anterior margin of anal shield situated close to basal margin of female genital shield.

Notes: This species is found in the nest of bumble bees



Figs. 5-8. Mites collected on bees in North Korea: 5. *Scutacarus acarorum* (Goeze, 1780) dorsal view, 6. ventral view. 7. *Sennertia alfkeni* (Oudemans, 1900) dorsal view, 8. ventral view.

and rodent. Some cases, it was found in bark beetle galleries as well (Gwiazdowicz, 2007).
Remark: This is the first record of this mite from North-Korea and the Korean Peninsula.

Trombidiformes
Prostigmata
Family Scutacaridae

***Scutacarus acarorum* (Goeze, 1780)** (Figs. 5, 6)

Material examined: One female. Democratic People's Republic of Korea, Pyongyang Prov., Paektu-san-milyong, host: *Bombus* sp, 27.VI.1988, leg. Szél, Gy. & Merkl, O.

Diagnosis: Dorsal setae (c1, c2, d, f1, h) marginally pilose and long, but not reaching to basis of next setae. Setae e and f2 very short and needle-like. Setae 3a little shorter than 3b, setae 4a twice shorter than 4b.
Notes: This species usually was collected from the nest of bumblebee in Europe, North-America and Mongolia and it was found on the body of the bumblebees as well (Mahunka, 1972).
Remark: This is the first record of *Scutacarus acarorum* from North-Korea and the Korean Peninsula.

Sarcoptiformes
Astigmata Canestrini,
Family Chaetodactylidae

***Sennertia alfkeni* (Oudemans, 1900)** (Figs. 7, 8)

Material examined: Two phoretic deutonymphs. Democratic People's Republic of Korea, Pyongyang Prov., Kyollyong-josuji Reservoar, 30 km E from Pyongyang, host: *Xylocopa* sp, 30.X.1978, leg. Vojnits, A. & Zombori, L.

Diagnosis: Dorsal setae si very short, setae se, c2, cp, d2, e2 very long. Setae c1 situated on hysterosomal shield. Ventral setae 4b short and robust, apical part peaked. Ventral tarsal setae (w) elongated.

Notes: This species occurs only in East-Asia, especially in Japan. Only one uncertain data are known from South-Korea.

Remark: This is the first record of this species from North-Korea.

Discussion

The occurrence of the mites on the body of Hymenopterans is a well-known phenomenon (Klimov and OConnor, 2008), the first data of association of the mites and Hymenopterans were discovered from the Eocene (ca 44-45 Mya) in a Baltic amber (Dunlop *et al*., 2014), but the mites occurring together with bees in several regions of the Earth are scarcely investigated. The role of the mites found on body of the bee is poorly known, but the scutacarids are the parasites and suck the blood of the host insects. The Mesostigmatans can used the bees only for the transporting from the flowers to the bee nests (Schwatz and Huck, 1997) where they can feed the eggs and larvae or other inhabitants of the nest. Similar phenomenon is known in the case of the chaetodactylids as well, the deutonymph of *Sennertia* usually used the host as transporter and they can feed eggs, larvae and pollens in the nests (Klimov and OConnor, 2008).

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References

Dunlop, J., J. Kontschán, D.E. Walter and F. Perrichot. 2014. An ant-associated mesostigmatid mite in Baltic amber. Biology Letters 10:(20140531) 4.

Fohouoa, T. F-N., J.B. Pandoa and J.L. Tamesse. 2014. Pollination efficiency of Xylocopa olivacea (Hymenoptera: Apidae) on Cajanus cajan (Fabaceae) flowers at Yaoundé, Cameroon. International Journal of Tropical Insect Science 34(2):138-148.

Gwiazdowicz, D. 2007. Ascid mites (Acari: Mesostigmata) from selected forest ecosystems and microhabitats in Poland. Wydawinictwo Akademii Rolniczej im. Ausuta Cieszkwskiego w Poznaniu pp. 248.

Karg, W. 1993. Raubmilben. Acari (Acarina), Milben, Parasitiformes (Anactinochaeta) Cohors Gamasina Leach, Die Tierwelt Deutschlands. 59. pp. 523.

Klimov, P. and B.M. OConnor. 2008. Morphology, Evolution, and Host Associations of Bee-Associated Mites of the Family Chaetodactylidae (Acari: Astigmata) with a monographic revision of North American taxa. Museum of Zoology, University of Michigan, no. 199. AnnArbor, USA, pp. 243.

Kingha, B.M.T., T. F-N. Fohouoa, A. Ngakou and D. Brückner. 2012. Foraging and pollination activities of Xylocopa olivacea (Hymenoptera, Apidae) on Phaseolus vulgaris (Fabaceae) flowers at Dang (Ngaoundere-Cameroon) Journal of Agricultural Extension and Rural Development 4(6):330-339.

Kontschán, J. 2015. First record of three mite species (Acari) in Greece collected on commercial bumblebee (Hymenoptera: Apidae: Bombus terrestris Linnaeus, 1758). Ecologica Montenegrina 2(2):158-161.

Mahunka, S. 1972. Tetűatkák-Tarsonemina. Fauna Hungariae, Arachnoidea 18. pp. 215. (in Hungarian)

Morandin, L.A., T.M. Laverty and P.G. Kevan. 2001. Bumble bee (Hymenoptera: Apidae) activity and pollination levels in commercial tomato greenhouses. Journal of Economic Entomology 94:462-467.

Rożej, E., W. Witaliński, H. Szentgyörgyi, M. Wantuch, D. Moroń and M. Woyciechowski. 2012. Mite species inhabiting commercial bumblebee (Bombus terrestris) nests in Polish greenhouses. Experimental and Applied Acarology 56(3):271-282.

Sadeh, A., A. Shmida and T. Keasar. 2007. The carpenter bee *Xylocopa pubescens* as an agricultural pollinator in greenhouses. Apidologie 38:508-517.

Schwatz, H.H. and K. Huck. 1997. Phoretic mites use flowers to transfer between foraging bumblebees. Insect Sociaux 44:303-310.

Teper, D. 2005. Comparison of food plants of Bombus terrestris L. and Bombus lapidarius L. based on pollen analysis of their pollen loads. Journal of Apicultural Science 49(2):43-50.

Zachvatkin, A.A. 1941. Tiroglifoidnue kleshchi Tyroglyphoidea [= Tyroglyphoid mites Tyroglyphoidea]. In: Zernov, S.A. (ed.), Fauna SSSR: Paukoobraznuye, 475. Moscow-Leningrad: Akademiya Nauk SSSR.

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