

Sancassania chelone Oudemans, 1916 (Acari: Acaridae) Associated with Pest Beetles: New Records and New Hosts in Hungary

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The hypopi of the species *Sancassania chelone* Oudemans, 1916 were collected from four pest beetle species, namely *Melolontha melolontha* (Linnaeus, 1758); *Melolontha hippocastani* Fabricius, 1801; *Holochelus aequinoctialis* (Herbst, 1790) and *Tropinota hirta* Poda, 1761. The infestation rate was the highest in *H. aequinoctialis* (80%), while it was 50%, 28% and 13% in *M. hippocastani*, *M. melolontha* and *T. hirta*, respectively. The majority of the mites were found on wings in case of the two *Melolontha* species, in contrary, the mites were present on the abdomen of the *H. aequinoctialis* and *T. hirta*. *Melolontha hippocastani* Fabricius, 1801; *Holochelus aequinoctialis* (Herbst, 1790) and *Tropinota hirta* (Poda, 1761) are new host species of *S. chelone*.

Keywords: *Sancassania chelone*, pest beetles, new host, Hungary.

Some species from the beetle family Scarabaeidae are important agricultural pests in Hungary (Sipos et al., 2012; Varga and Molnár, 2013) causing damages on roots and leaves of cultivated plants in agricultural and horticultural areas. The association of mites with scarabaeid beetles is a scarcely investigated field of the acarology in Hungary. Till today only one paper mentioned mites from the scarabaeid pest beetles, Kontschán (2015) presented two mesostigmatan mites from the family Laelapidae in association with *Anoxia orientalis* Krynicky, 1832 and *Polyphylla fullo* Linnaeus, 1758. In this year we studied the mites of four different scarabaeid pest species [*Melolontha melolontha* (Linnaeus, 1758); *Melolontha hippocastani* Fabricius, 1801; *Holochelus aequinoctialis* (Herbst, 1790) and *Tropinota hirta* Poda, 1761]. These pest beetles are very common in Hungary in spring and in early summer, but we have very few information about the pest beetle associated mites from our region, the Carpathian Basin. Some years ago (Mašán, 1998), a new mesostigmatan mite species was discovered in Slovakia; the new species [*Hypoaspis (Hypoaspis) rizotrogi* Mašán, 1998] was collected on the body of *H. aequinoctialis*. During our new studies, we found large number of the hypopi of *Sancassania chelone* Oudemans, 1916.

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Sancassania chelone was collected firstly by Eróss and Mahunka (1971) in different dung samples from Hungary. In this paper, Eróss and Mahunka (1971) did not mention the stages of the collected mites, but we suppose that these specimens were adults, because the hypopi of *Sancassania chelone* Oudemans, 1916 is not a typical dung-dwelling mite, usually it occurs in association with different species of the scarabaeid beetles (Coleoptera, Scarabaeidae) (Klimov, 1997). In the present paper we investigate the rate of the infestation of these beetle species and the position preferences of this mite on the beetles' body.

Materials and Methods

The beetle species were collected in three different parts of Hungary. Specimens of species *Melolontha melolontha* (Linnaeus, 1758) and *Melolontha hippocastani* Fabricius, 1801 were caught on a solitary willow tree in a garden of Pilisvörösvár (15 km to the north of Budapest) using the singling method. The specimens of *Holochelus aequinoctialis* (Herbst, 1790) were collected after the emergence from the soil in Budapest, district XIX, using the singling method. The *Tropinota hirta* (Poda, 1761) were collected by CSALOMON® VARb3k funnel traps baited with a floral attractant (Schmera et al., 2004; Tóth et al., 2004). The bodies of the beetles were studied under microscope. The number of mites on different parts of beetle body (wings, thorax and abdomen) was determined separately. After this, the mites were moved from beetle bodies into lactic acid on microscope slides.

Results

Short description of hypopus of Sancassania chelone Oudemans, 1916 (Fig. 1)

Diagnosis: Small, pale mite. Dorsal body slightly convex. Anterior body tapering anteriorly into a small cone with rounded apex. Dorsal side of body divided into two shields, by sejugal furrow. Sejugal furrow well developed, covered by membranous cuticle. Propodosomal shield bearing three pairs of needle-like setae, but vi longer than sci and sce, hysterosomal shield ten pairs of needle-like setae, h1 Epimera I fused to Y, epimera II free, epimera III and IV weakly sclerotised and free. Suctorial shield large, palposoma with two pairs of short and one pair of larger setae. Setae $\omega 1$ spatuliform.

Distribution: This species is widely distributed in the Palearctic region, from Europe to Japan (Klimov and Tolstikov, 2011).

Ecology: The adult mites can be found in organic material rich soils and dung, while the hypopi live on body of scarabaeid beetles. Because the adult mites prefer the dung and soil, we need to suppose that the hypopi are using the beetle only for transport and they are not parasites of them. We can also presume that the beetles can be infested by the hypopi before leaving the soil.

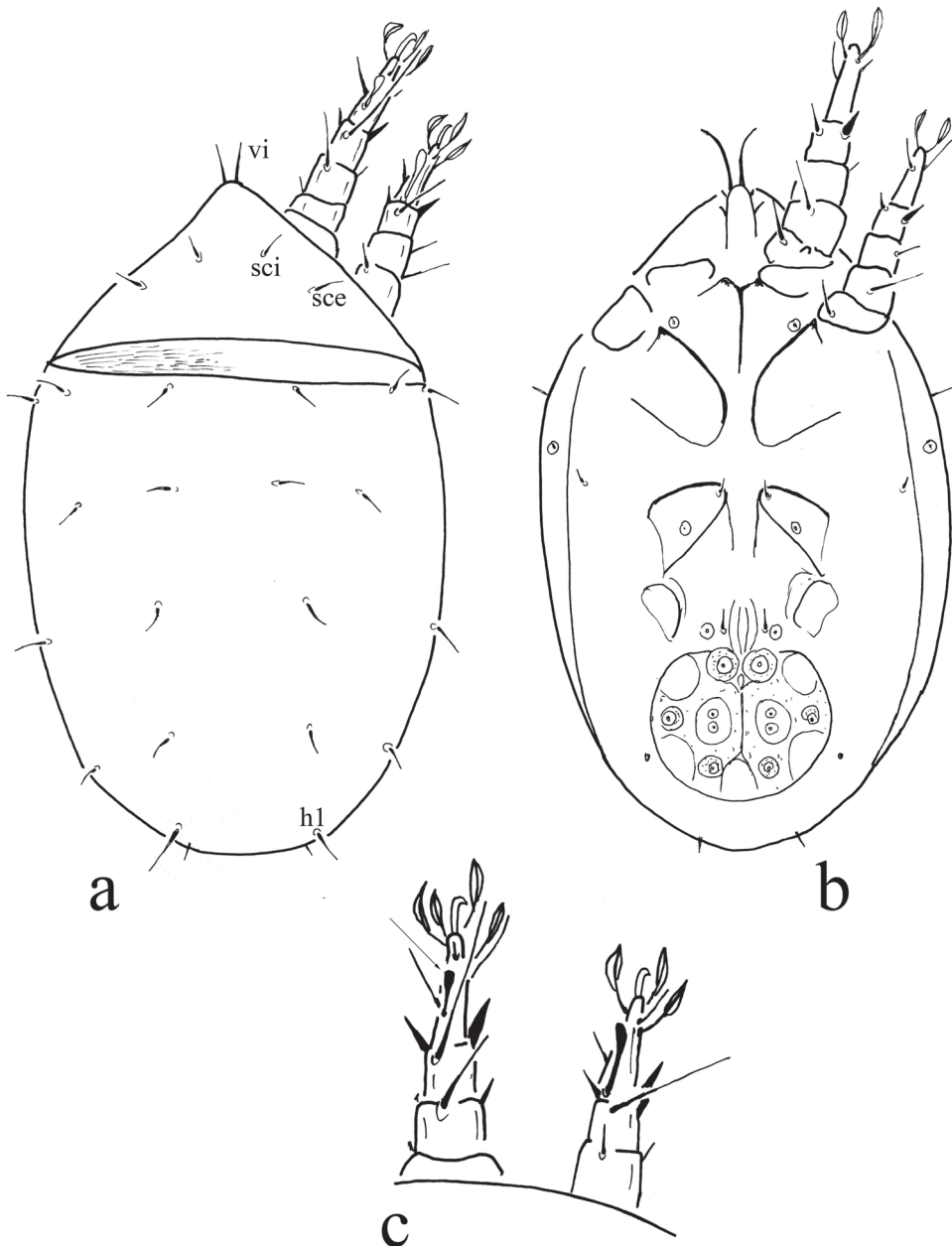


Fig. 1. *Sancassania chelone* Oudemans, 1916, hypopus: a: dorsal view of body, b: ventral view of body, c: dorsal view of end of leg I and II (arrow shows seta ω_1)

Notes to the taxonomy: Fain (1977) mentioned three synonymous names of the *S. chelone* following Samšinak (1960) paper, *Tyroglyphus mycophygus* Moniez, 1892; *Caloglyphus moniezi* Zachvatkin, 1937 and *Caloglyphus spinitarsus* Nesbitt, 1945. The hypopi of *S. chelone* are very similar to *S. michaeli* (Oudemans, 1924), but several differences can be found in the case of adults (see Stammer, 1957).

Rate and place of the infestation

We collected only five specimens of *H. aequinoctialis* in the sampling place, out of which four specimens were infested by the mite hypopi, so the infestation rate was 80%. Two beetle specimens had mites on their wings (8 and 1 specimens). The beetle bodies were covered in higher number by the mites; all infested *H. aequinoctialis* carried mites on the abdomens. The highest mite number on abdomen was 159, the lowest was 8, and average was 48.

More than the half (55%) of the investigated *M. hippocastani* specimens were infested with *S. chelone* hypopi, 90% of the infested beetle specimens had mites on their wings and 54% had mites on the abdomen. The average numbers of the mite specimens were 7 and 3 on the wings and on the abdomen, respectively. Within the investigated beetle species we found mites on the thorax only in the case of *M. hippocastani*.

The infestation rate was lower in the specimens of *M. melolontha*, only 28% of the studied specimens carried mites on their wings and abdomen. The average mite number was similar to the previous species, six on the wings and three on the abdomen.

In *T. hirta*, only three specimens of the investigated 22 had *S. chelone* on their body; the infestation rate is 13%, which is the lowest within the studied pest beetles. We did not find mites on the wings and only few numbers (2-1-2) of the hypopi were detected on the beetle abdomen. The reason of the absence of the mites on wings of *T. hirta* can be the different type of elytra of this beetle. The two elytra are fused on their central part and the beetle cannot elevate them during the flight therefore the wings are mostly hidden. On the contrary, the elytra are not fused in the other three investigated species, during the flight the elytra are elevated, the wings are free and the hypopi can colonize them more easily.

Discussion

The phoresy is an important phenomenon for mites to be transported from one point to another. The majority of the mite taxa use this possibility to search new and source rich habitat. The phoresy is absolutely different from the parasitism, because the passengers do not feed on the host (Walter and Proctor, 2013). The hypopi (deutonymphs) of the family Acaridae usually use the insects for transportation between two habitats, therefore these mites are very often collected on the bodies of different insects, like beetles. Moreover, numerous new species are discovered and described from insect body as well, mostly from hymenopterans and from beetles (like Moser and Roton, 1971; Fain et al., 1999; Philips, 2009). The phoretic species from the genus *Sancassania* are very rarely found on beetle pests, only Al-Deeb and Enan (2010) mentioned the first record of this genus from

United Arab Emirates collected on beetle *Oryctes agamemnon* Burmeister 1847, which is one of the most important pest beetles of date palm in Middle-East. Our results show, that further investigations are needed to reveal the significance of these beetles in transportation of mites belonging to different acarine taxa.

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