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THE SLUG MITE *RICCARDOELLA (PRORICCARDOELLA) OUDEMANSI* (PROSTIGMATA, EREYNETIDAE) FROM UKRAINE

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The Slug Mite *Riccardoella (Proriccardoella) oudemansi* (Prostigmata, Ereynetidae) from Ukraine. Zabludovskaya S. A., Badanin I. V. — The mite Riccardoella (Proriccardoella) oudemansi (Prostigmata, Ereynetidae) parasitizing the lung mollusks, is redescribed based on numerous specimens from Ukraine. These mites were first found in the fauna of Ukraine in the early 1990th.

Key words: *R.* (*P.*) *oudemansi,* tritonymph (TN), riccardoella mites, molluscs.

Клещ слизней *Riccardoella (Proriccardoella) oudemansi* (Prostigmata, Ereynetidae) из Украины. Заблудовская С. А., Баданин И. В. — На многочисленном материале дано переописание паразитирующего у легочных моллюсков клеща *Riccardoella (Proriccardoella) oudemansi* Thor, 1932 (Prostigmata, Ereynetidae), впервые обнаруженного в фауне Украины в начале 1990-х гг.

Ключевые слова: *R.* (*P.*) *oudemansi*, тритонимфа (TN), клещи-риккарделлы, моллюски.

Introduction

Over a long period of time, most of numerous publications on mites from genus *Riccardoella* Berlese, 1923 (Ereynetidae, Prostigmata) dealt with two morphologically very close species — *R. limacum* (Schrank, 1776) and *R. oudemansi* (Thor, 1932). The authors even could not distinguish precisely which of these two species they were dealing with. The only work on study of anatomy, morphology and biology of ereynetidae mites parasitizing molluscs was the article of Turk & Philips published in 1945 (Turk, Philips, 1945). The same may be said about the only publication in the USSR on finding *Riccardoella limacum* in Armenia on slug *Monochroma brunneum* (Arutunjan, 1972). The description and drawings given in this article clearly show that in fact the author saw *Riccardoella* (*P.*) *oudemansi*, species close to *Riccardoella limacum*.

In 1986, the revision of genus *Riccardoella* Berlese, 1923 (Fain, Goethem, 1986) confirmed validity of this genus, and both morphological and biological differences for *R. limacum* and *R. oudemansi* were established, as well as distinctive features between two species. This resulted in allocation of *R. oudemansi* into new subgenus *Proriccardoella* where all known species were included except for *R. limacum,* the only representative of nominative subgenus *Riccardoella* (Fain, Goethem, 1986). Also, these authors considered species from subgenus *Proriccardoella* as the most primitive within genus *Riccardoella,* but more advanced evolutionarily than free-living mites of the genus *Ereynetes* from the same subfamily.

Today, 6 species from genus *Riccardoella* were described. This genus includes nominative species from subgenus *Riccardoella* — *R.* (*R.*) *limacum* Schrank, 1776, and the other five species (two of which are free-living) comprise the subgenus *Proriccardoella.*

Now, slugs from families Agriolimacidae, Limacidae, Arionidae, Milacidae, and snails from families Polygiridae and Helicidae are the main hosts for mites of the subgenus *Proriccardoella. Riccardoella* (*Riccardoella*) *limacum* is found mainly on snails from family Helicidae. Parasitic *Riccardoella* are natural enemies of gastropod molluscs and can do significant economic damage during mass reproduction causing death of their hosts — edible molluscs (Arutunjan, 1972; Flechtmann, 1985; Cagan, Shoaib, 2003). Moreover, molluscs are vectors and intermediate hosts for cestodes, trematodes and bacteria.

Riccardoella mites were found almost on all continents but recorded mostly in the Western Europe (Baker, 1945; Plate, 1951; White, 1959; Fain, Goethem, 1986; Zacharda, 1978; Andre, 2004). These data were expanded by findings of *R.* (*P.*) *oudemansi* parasitizing slugs, and free-living species *R.* (*P.*) *canadensis* in Ukraine (Zabludovskaya, 1994, 1996).

Our studies revealed wide distribution of the *Riccardoella* mites, and particularly species *R.* (*P.*) *oudemansi,* in Ukraine. We found this species in Kyiv, Kharkiv oblasts and Crimea region on *Deroceras reticulatum* (Agriolimacidae), *Limax maximus*, *L. maculatus* (Limacidae) and *Arion subfuscus* (Arionidae). In Donetsk oblast, living male and female from this species were found in winter under the bark on the apple tree. *Deroceras reticulatum* and *Limax maculatus* appeared to be the new host species for this mite (Zabludovskaya, 1991).

Material and methods

The material available allowed us to do complete examination of all life cycle stages of this species both for its identification and observation of individual characters of *R.* (*P.*) *oudemansi.* Setae are described by nomenclature of A. Fain (1963). The full description of the female and electronic images of some structures were made with the aid of camera DCM−500B and microscope K. Zeiss Imager M1 are added.

Genus *Riccardoella* Berlese, 1923
Subgenus *Proriccardoella* Fain et Goethem, 1986
Riccardoella (Proriccardoella) oudemansi (Thor, 1932)
(= *Riccardoella oudemansi* Thor, 1932; = *Riccardoella jenynsi* Thor, 1933)

Results and discussion

Female: length and width of idiosoma (LID x WID) — 313−405 x 228−296 μm; *gnathosoma: (*LGn x WGn) — 59 x 59 μm; total length of palps — 34 μm; legs I−IV (without coxa, μm): (219−222) — (181−183) — (186−188) — (214−216); tarsi I−IV (μm): (56−57) — (48−50) — (50−51) — (50−52), respectively. Line pattern and placing on gnathobase, coxae and legs correspond to species.

Male: LID x WID — (245−296) x (160−194) μm; LGn x WGn — (51−61) x 57 μm; total length of palps — 32 μm.

Larva: LID x WID — (148−167) x (114−135) μm; LGn x WGn — 43 x 40 μm; length of palps — 27 μm; legs I — III — 117−94−91 μm, respectively.

Deutonymh (DN): (LID x WID) — (228−313) x (256 x 302) μm; total palp length — 29 μm; legs I−IV — 160−125−131−137 μm, respectively.

Tritonymh (TN) (fig. 1): (LID x WID) — 291 x 232 μm; (LGn x WGn) — 49 x 53 μm; length of palps — 30 μm.

Chaetotaxy (by female): cuticle of dorsal idiosomal surface is finely sclerotized and folded with characteristic for all family "cristae" with distinct swelling. Dorsal setae, setae on palps and legs are cylindrical, without apical flagellum-like structure, characteristic for close species *Riccardoella limacum*. On propodosoma, 4 pair of ordinary setae: vertical internal (vi) — 26 x 3.8 μm, distance between them (vi-vi) — 41 μm; vertical external (ve): 6.4 μm; (ve-ve) — 88 μm; scapular internal (long propodosomal sensillae) (Sci or Sa) — 115 μm, (Sa-Sa) — 78 μm and scapular external (sce) — 32 μm. The second pair of long sensillae (Sp) no more than 107 μm, is on opisthosoma and presents in all stages except for a larva. Dorsal setae d1-d5 — 20−22−23−23−19 μm; d1-d2 — 88 μm. Lateral setae l1 and l5−32 and 20 μm, respectively.

The setae on ventral surface are narrow. Intercoxal ic1−3−10 μm; genital in female (ge) and male (gm) — 12 μm; internal genital in male are very short, slightly widened; anal setae (ae and ai) — 14 and 12 μm, respectively.

Hypostome bears 2 pairs of setae: lower small barbed — 6.4 μm, and upper very little flagellate — 4 μm.

Male's testicle is wide — 87 x 113 μm. Genital suckers in female are larger — 9 x 9 μm, than those in male — 7,5 x 6 μm.

Solenidia of tarsi I, II and palptarsus are long, cylindrical, 10 μm, 8 μm, and 6.25 μm, respectively.

Famulus (k") of ereynetal organ (fig. 2) apically is forked, as long as 75−86% of length of satellite seta (t) — 18−24 μm (k"): 24−28 μm (t) (i. e. 1: 1,2−1,33).

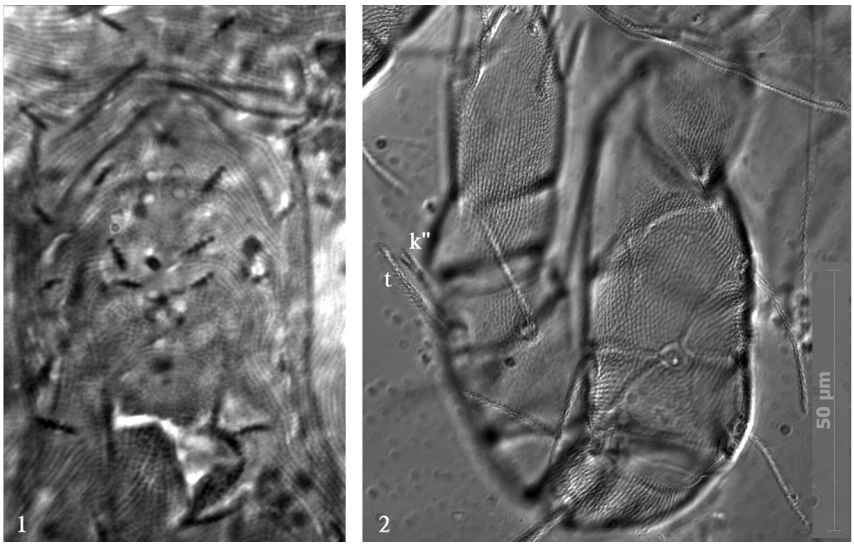

Рис. 1. *R.* (*P.*) *oudemansi*, генитальный регион тритонимфы (TN).

Fig. 1. *R.* (*P.*) *oudemansi*, genital region of tritonymph (TN).

Рис. 2. *R.* (*P.*) *oudemansi*, эрейнетальный орган на голени ноги I: *1* — внутренний соленидий с каналом; 2 — щетинка-фамулюс (*k"*); *3* — простая опушенная щетинка-сателлит (*t*).

Fig. 2. *R.* (*P.*) *oudemansi*, ereynetal organ on tibia I: *1* — internal solenidion with canaliculus; *2* — seta-famulus (*k"*); *3* — simple barbed satellite seta (*t*).

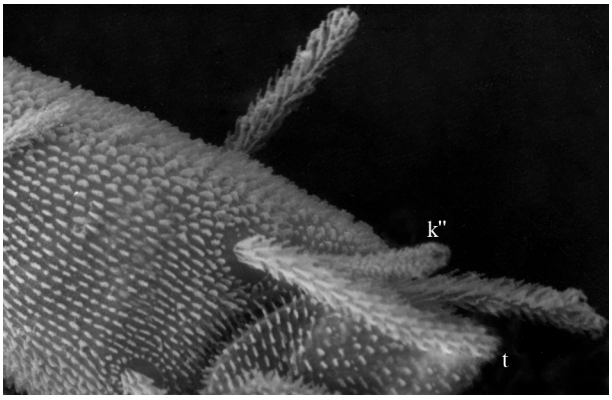

Рис. 3. *R.* (*P.*) *oudemansi*, голень ноги I: *1* — щетинка-фамулюс (*k"*) эрейнетального органа; *2* — щетинка-сателлит эрейнетального органа (*t*).

Fig. 3. *R.* (*P.*) *oudemansi*, tibia I: *1* — seta-famulus (*k"*) of ereynetal organ; *2* — satellite seta (*t*) of ereynetal organ.

Seta on segments legs I–IV, including coxa, are distributed as follows: coxa — 2–1–3–1; trochanter — 1–1–1–0; femur — 6–4–3–3; genu — 4–4–3–3; tibia — 5 (+k")–3–3–3; tarsus — 12–9–8–8. All tarsi bear two apical short swollen setae. Palptarsus is ended with three cylindrical setae.

Therefore, our specimens have a number of characters distinguishing them from species *Riccardoella limacum* and presented in work of Fain, Goethem (1986).

The differences between our specimens and other species of subgenus *Proriccardoella* are clearly expressed and are as follows.

R. (*P.*) *reaumuri:* the number of coxal setae (2–1–2–1 — in *R.*(*P.*) *reaumuri*)*;* longer forked famulus (k") of ereynetal organ and the ratio to satellite seta (t) (1 : 1.6–1.72 in *R.* (*P.*) *reaumuri*); larger solenidion on tarsi I–II (7 and 5 µm — in *R.* (*P.*) *reaumuri*);

shape and size of dorsal setae. Moreover, apical swollen setae on tarsi are much larger than those in *R.* (*P.*) *reaumuri*.

R. (*P.*) *triodopsis* differs by 4 barbed setae on palptarsus, lanceolate famulus (k"), and much longer solenidia on tarsi I–II.

R. (*P.*) *canadensis:* our species have larger palps (24 μm in *R.* (*P.*) *canadensis)* and, mainly, differs by shape and size of solenidion tarsi II — 3.7 μm in our male specimen (spherical in *R.* (*P.*) *canadensis*). Moreover, famulus (k") in *R.* (*P.*) *canadensis* is lanceolate rather than the fork.

R. (*P.*) *zadielensis* has different hypostomal pattern of chitinous bands, lanceolate famulus (k") of ereynetal organ and ovoid solenidia on tarsi I and II.

Comparative analysis of our specimens *Riccardoella (Proriccardoella) oudemansi* and data previous authors (Thor, 1932; Fain, Goethem, 1986) have not revealed sharp distinctions except for smaller idiosoma (313–405 μm vs. 375–480 μm) and shorter solenidia of tarsi I-II and palptarsus (10.8 and 6.25 μm in our specimens vs. 12–14, 10–12 и 6–8,5 μm in Fain, Goethem (1986)). Also, our specimens are larger, in particular gnathosoma (59 x 59 μm vs. 56 x 48 μm in Thor, 1932).

Consequently, we found out that this species is widely spread on the territory of Ukraine and in fact is *Riccardoella* (*Proriccardoella*) *oudemansi* Thor, 1932.

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