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Research Article

First record of the family Protodinychidae Evans, 1957 (Acari: Mesostigmata: Uropodina) from Hungary

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Abstract
Protodinychus punctatus Evans, 1957 was collected in a highway rest area close to Budapest in Hungary. This is the first record of the superfamily Thinozerconoidea Evans, 1957, the family Protodinychidae Evans, 1957 and the genus *Protodinychus* Evans, 1957 in Hungary. We give a new diagnosis for the family and a new description for the species accompanied by new illustrations as well. A key to the species of protodinychid mites is also given.

Key words: Mites, faunistic study, highway rest, Hungary.

Introduction

The suborder Uropodina is divided into three subfamilies: the primitive Thinozerconoidea Halbert, 1915, the modern Polyaspidoidea Evans, 1957 and Uropodoidea Evans 1957. The distribution and the species-richness of Thinozerconoidea are scarcely investigated in the literature. In the last edition of the Manual of Acarology (Lindquist *et al.* 2009), the superfamily was divided into two linkages as Protodinychoidea and Thinozerconoidea without any notes and author names, but two years later, these two groups are lamped again as superfamily Thinozerconoidea in Beaulieu *et al.* (2011). According to Beaulieu *et al.* (2011), two families are placed into the superfamily Thinozerconoidea. Thinozerconidae Halbert, 1915, includes one species *Thinozercon michaeli* Halbert, 1915 which occurs only in Northern Europe where it was collected in decayed debris on tidal zones. The second family is the Protodinychidae Evans, 1957 with three described species. The first one (*P. punctatus* Evans, 1957) occurs in the Northern Europe, the second species (*P. evansi* Huţu & Călugăr, 2002) seems to be endemic for Transylvania, Romania, while the third one (*P. ainscoughi* Huţu & Călugăr, 2002) was found in Canada.

In the framework of a countrywide biodiversity survey of Hungarian highway margins, mites were collected from plants (Kontschán & Kiss 2013, Kontschán *et al.* 2014) and soil samples in highway rest areas. In one of these rest stops close to Budapest, we found an unusual Uropodina species, the *Protodinychus punctatus* Evans, 1957. The superfamily, the family, the genus and the species was not recorded earlier from Hungary (Kontschán 2008).

Material and Methods

Soils, leaf litters and mosses were collected in numerous rest stops of Hungarian highways (see the map in Kontschán *et al.* 2014). The samples were placed into plastic bags and transported to laboratory, where they

were extracted using Berlese funnels. The single specimen of the species that was found was cleared in lactic acid, investigated on half covered deep slides and illustrations were made with the aid of a drawing tube. The specimen found is stored in ethanol and deposited in the Hungarian Natural History Museum, Hungary. Width of the idiosoma was measured at the level of coxae IV. Measurements in the description and scale bars are in micrometres.

Results

Family Protodinychidae Evans, 1957

Diagnosis: Dorsal shield large rounded and ornamented by pits. Pygidial shield present, wider than long. Marginal shields reduced, marginal setae situated on membranous cuticle. Peritrematal shields large and fused with sternal and endopodal shields, their surface covered by pits. Scabellum and pedofossae absent. Peritremes linear, stigmata situated between coxae III and IV. Anal shield large, wider than long in females and bearing 5 circumanal setae. Leg I with ambulacrum and claws, coxae of leg I cylindrical and situated widely from each other. Genital shield of female divided into a large mesogynal and two latigynal shields, latigynal shields bear setae St5. Male genital shield oval with eugenital setae and situated between coxae III. Anal shield in males formed a large ventrianal shield. Tritosternum with narrow base, laciniae with two marginally serrate branches. Deuterostrenum and deuterosternal groove with some denticles. Corniculi horn-like, longer than internal malae, internal malae with smooth margins. Epistome small with some spines.

Type genus: *Protodinychus* Evans, 1957

Notes: One genus with three species.

Genus *Protodinychus* Evans, 1957

Diagnosis: See the family.

Type species: *Protodinychus punctatus* Evans, 1957 by original designation.

Distribution: Since the original description of *Protodinychus ainscoughi* Huţu & Călugăr 2002, no new occurrence has been reported for this species. *P. evansi* Huţu & Călugăr 2002 has been found recently in other part of Transylvania, Romania (Kontschán 2014). *P. punctatus* Evans, 1975 was collected several times after its description; Karg (1989) presented the species from Germany, Salmane & Spungis (2008) from Latvia, and Napierała & Błoszyk (2013) from Poland.

Habitats: The protodinycid mites usually occur in instable habitats (Napierała & Błoszyk (2013), like debris (Karg 1989, Lindquist *et al.* 2009) and washed ashore material from seacoast and riverside (Salmane & Spungis 2008) (*P. punctatus*), in beaver lodge debris (*P. ainscoughi*), peat bog and leaf litter (*P. evansi*) (Huţu & Călugăr 2002, Kontschán 2014).

Key to the protodinychus species (based on females)

1 Mesogynal shield narrow, three times longer than wide, apical margin of genital shield situated between coxae III, anal shield rounded with four pairs of needle-like and one apically serrate setae, dorsal setae apically pilose .....*Protodinychus ainscoughi*

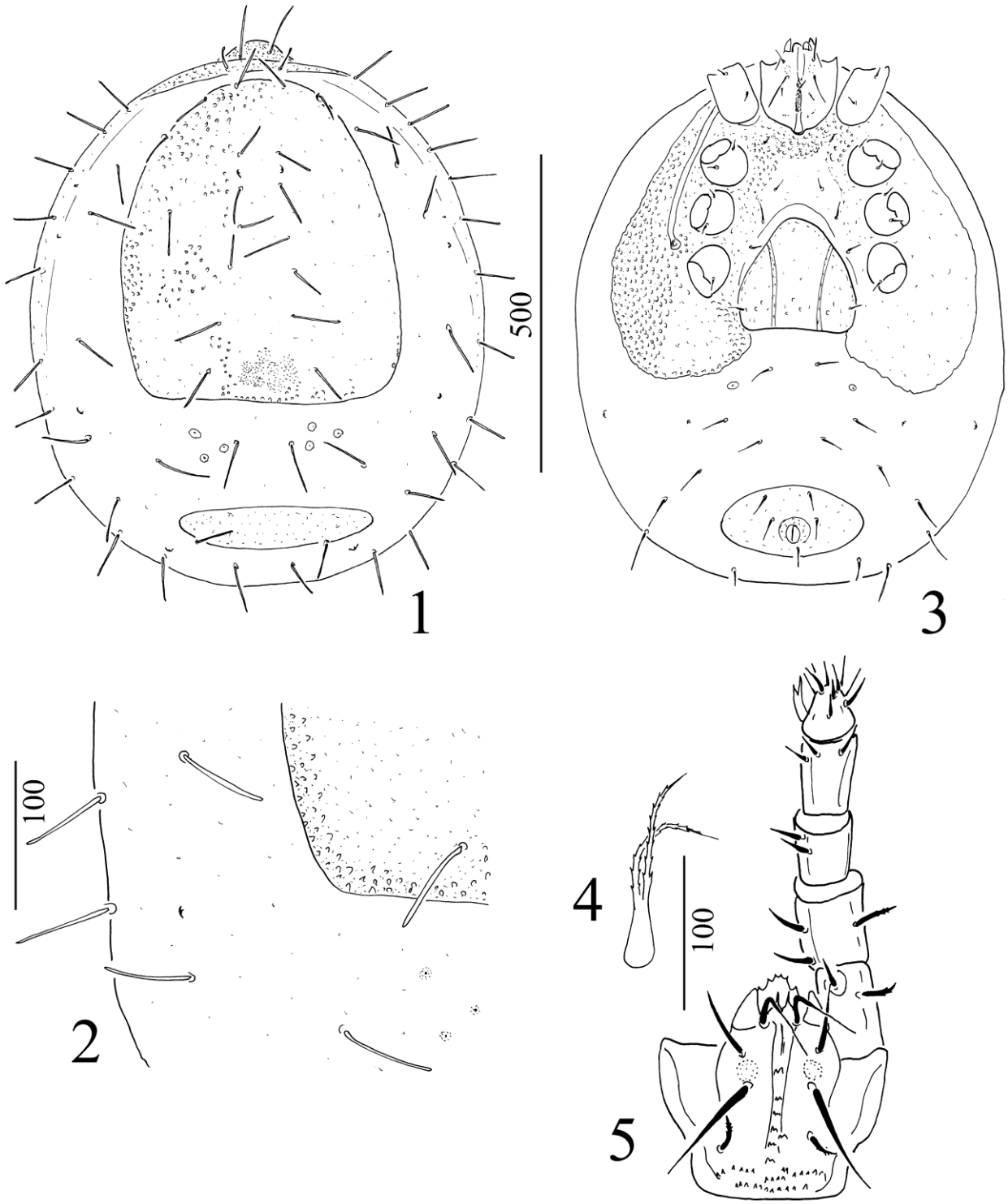
\- Mesogynal shield wider, two times longer than wide, apical margin of genital shield situated between coxae II-III, anal shield rounded with five pairs of needle-like setae, dorsal setae needle-like .....*Protodinychus evansi*

2 One pair of setae situated between dorsal and pygidial shields, mesogynal shield with small pits..... .....*Protodinychus ainscoughi*

\- Two pairs of setae situated between dorsal and pygidial shields, mesogynal shield with oval pits ....*Protodinychus punctatus*

***Protodinychus punctatus* Evans, 1957**

Material examined: One female, Hungary, Budapest, Highway M0, "Ferihegy" rest stop, from soil, 14.X.2013. leg. Ács, A. & Kiss, B.



Figures 1–5. *Protodinychus punctatus* Evans, 1957, female. 1: Dorsal view of body, 2: dorsal setae and ornamentation, 3: ventral view of body, 4: tritosternum, 5: ventral view of gnathosoma and palp.

Description based of newly collected female:
Length of idiosoma 860 µm, width 720 µm (n=1). Shape oval, posterior margin rounded. Color reddish brown.

Dorsal idiosoma (Figure 1): Dorsal shield scutiform (ca 506 µm long and ca 438 µm wide) covered by oval pits and bearing ten pairs of spiniform setae (ca 68–72 µm) (Fig. 2). One pair of lyriform fissures placed on row j, between setae j2 and j3, muscle scars can be seen between last setae on row j. Marginal shield reduced, situated only on anterior margin of dorsal idiosoma, covered by oval pits and bearing with two pairs of setae, first pairs of setae ca 80 µm, second pairs ca 40 µm. Pygidial shield wider (ca 305 µm) than long (ca 64 µm), without setae and sculptural pattern. Two pairs of setae and three pairs of poroids situated between dorsal and pygidial shields. Eight pairs of setae situated on membranous cuticle around dorsal and pygidial shield. Margins of idiosoma with twelve pairs of setae, these setae similar in shape and length to setae on dorsal shield. Two pairs of lyriform fissures and two pairs of poroids situated on membranous cuticle lateral to dorsal and pygidial shields.

Ventral idiosoma (Figure 3): Tritosternum with narrow basis, laciniae divided to marginally serrate branches (Fig. 4). Central area of sternal shield without ornamentation, close to coxae I-III some oval pits can be seen. Sternal setae smooth and needle-like, St1 and St2 shorter (ca 15–17 µm), St3 and St4 longer (ca 28–31 µm), St1-St3 situated anterior to genital opening, St4 at level of anterior margin of coxae IV, St5 (ca 16 µm) placed on latigynal shields. Peritrematal shields fused with sternal and endopodal shields, they covered by oval pits. Stigmata situated between coxae III and IV. Anal shield wider (ca 221 µm) than long ((ca 118 µm), bearing five needle-like setae (ca 32–35 µm). Three pairs of spiniform setae (ca 38–44 µm) and two pairs of poroids situated on membranous cuticle between mesogynal shield and anal shield, two pairs of setae (ca 37–41 µm) placed lateral to and one pair of setae (ca 32–33 µm) situated posterior to anal shield. One pair of lyriform fissures can be seen on lateral margins of membranous cuticle.

Genital shield scutiform, divided into one mesogynal and two latigynal shields, their surface with some oval pits.

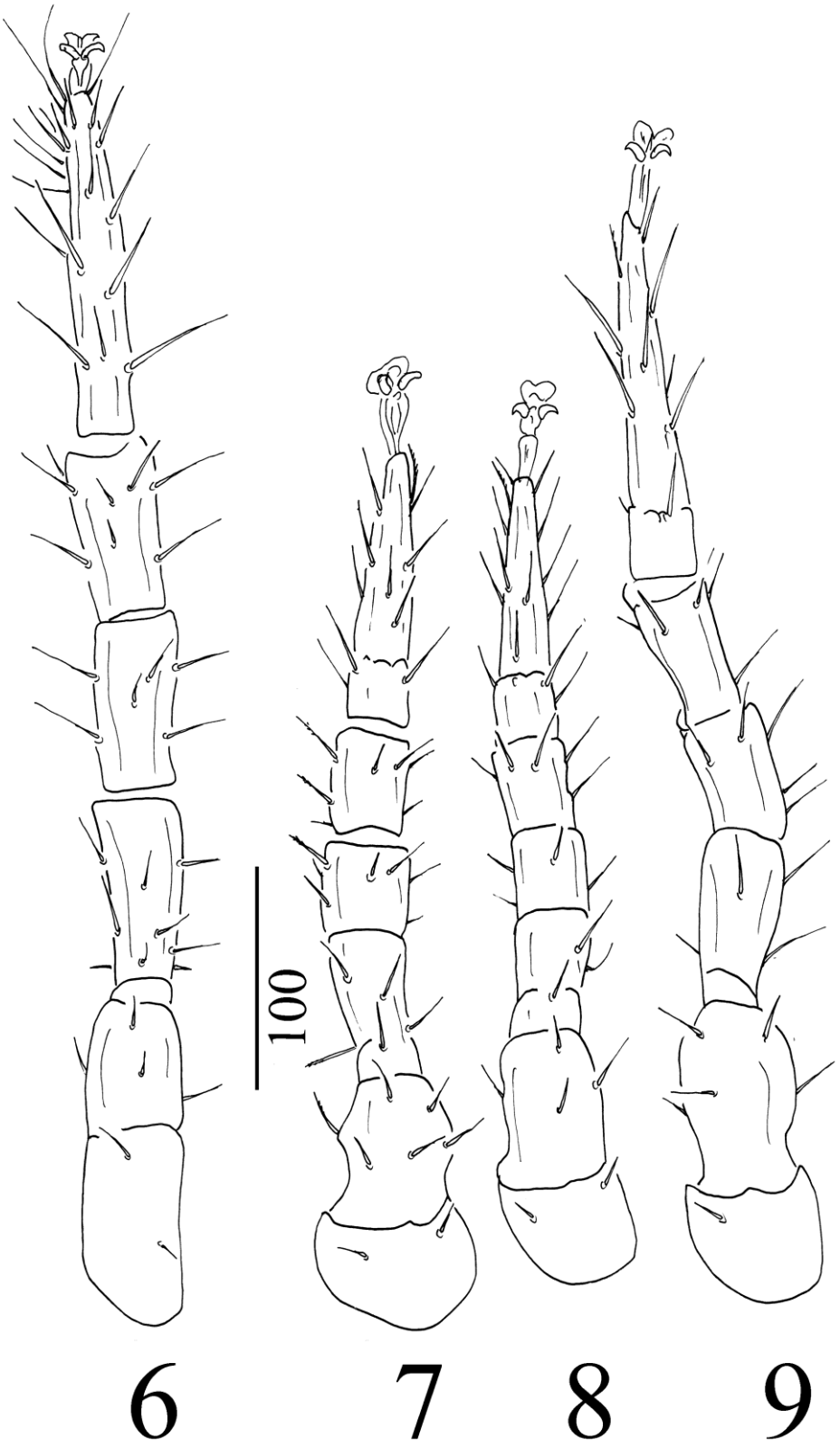
Gnathosoma (Figure 5): Corniculi horn-like, longer than internal malae, internal malae with smooth margins. Epistome small with some spines. Setae h1 (ca 63 µm) smooth and situated at anterior margin of gnathosoma, h2 (ca 46 µm) smooth, h3 very long (ca 77 µm) and smooth and h4 (ca 25 µm) marginally serrate. Deuterosternum and deuterosternal groove with some denticles. Palp trochanter with one smooth setae situated on small platelet, other setae on palp trochanter marginally serrate. One of setae on palp femur marginally serrate, other setae on palp smooth and needle-like. Palp apothele with two claws. Epsitome apically serrate. Chelicerae on visible on the collected single specimen they placed on the inside of body.
Legs (Figures 6-9) Claws present at the tip of the ambulacral prolongation of leg I. Leg I 560 µm, leg II 390 µm, leg III 365 µm, leg IV 489 µm. Majority of legs setae smooth and needle-like, minority of them marginally pilose.

Remarks: On the original description, Evans (1957) presented a single genital shield and a holodorsal shield on the body of the found female specimens. Some years later Athias-Binche & Evans (1981) studied some other newly collected specimens of this species and completed the knowledge of this species with the descriptions of the immature stages and the males; beside these new descriptions they give more new observation on the females as well which were not exactly presented in the original description. These differences are the following: the genital shield of female is divided into a large mesogynal and two latigynal shields (medial epigynal and paired paragynal shields in Athias-Binche & Evans (1981) on page 33 and illustrated on Fig. 16) and presented a pygidial shield posterior to dorsal shield (Athias-Binche & Evans (1981) on page 32 and on Figs 14-15).

Discussion

The family Protodinychidae is a species-poor group within the Uropodina mites (Lindquist *et al*. 2009). The family includes three species which only occur in the north-temperate zone (Evans 1957, Athias-Binche & Evans 1981, Huţu & Călugăr 2002); therefore we suppose that this family has Holarctic distribution. Three known species occur in unstable habitats, mostly in debris of seacoast and riverside (Lindquist *et al.* 2009, Napierała & Błoszyk 2013, Salmane & Spungis 2008), but sphagnum bogs and leaf litter is also acceptable as habitat for the species of this family (Huţu & Călugăr 2002, Kontschán 2014). The new Hungarian locality, the rest stop of a highway, seems to be similar unstable or disturbed habitats. This locality is situated

on the ring-highway of the capital. The close position to Hungarian capital, Budapest, may suggest that the species was introduced by human transport to this place. Either when the highway was built the soil was transported from the original habitat of *P. punctatus* or this species was transported by traffic from northern part of Europe (soil or leaf litter travelled on truck or cars).



Figures 6–9. *Protodinychus punctatus* Evans, 1957, female, legs in ventral view. 6: leg I, 7: leg II, 8: leg III, 9: leg IV.

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