

First record of the family Rotundabaloghiidae Hirschmann, 1975 in India, with description of two new species of *Angulobaloghia* Hirschmann, 1975 (Acari: Mesostigmata: Uropodina)

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Abstract. Two new species, *Angulobaloghia tamilica* and *Angulobaloghia indica* spp. nov. belonging to the family Rotundabaloghiidae are recorded from India. The new species differ from the previously described congeners in the shape of the females' genital shield and shape and position of sternal and ventral setae.

Keywords. Acari, Uropodina, *Angulobaloghia*, new species, India.

INTRODUCTION

Uropodina mites are small (300 to 1200 μm), yellow or reddish-brown animals, belonging to the soil fauna. They inhabit soil, leaf litter, moss, lichens and bark of tree. Several species live in association with other arthropods and vertebrates as well. More than two thousand species are known worldwide (Wiśniewski and Hirschmann, 1993), but their maximum diversity is reached in the tropical rain forests (Lindquist *et al.*, 2009).

The family Rotundabaloghiidae, a member of Uropodina mites is distributed overall in the tropics (Kontschán, 2010). This family contains an interesting genus *Angulobaloghia* Hirschmann, 1979 of South-East Asian distribution which can easily be recognized by the triangular or semi-circular shape of the genital shield of females.

The genus was established by Hirschmann in 1979 separating several *Rotundabaloghia* Hirschmann, 1975 species with triangular genital shield. Later Hirschmann and his colleagues (Wiśniewski and Hirschmann, 1993; Wiśniewski, 1993 a, 1993 b,) never mentioned again this genus, and the species with triangular genital shield were placed back to the genus *Rotundabaloghia*. A recent phylogenetic analysis of Uropodina by Kontschán (2010) resulted in resurrection the genus *Angulobaloghia* and furthermore he presented oc-

currences of the all species belonging to the family Rotundabaloghiidae. However he did not mention any rotundabaloghid mite from the Indian subcontinent.

During studying the "Berlese" samples of the Hungarian Natural History Museum collected in the Indian subcontinent, two new *Angulobaloghia* species were found which are herewith described.

MATERIAL AND METHODS

Specimens were cleared in lactic acid and drawings were made with the aid of a drawing tube. All specimens are stored in alcohol and deposited in the Soil Zoology Collections of the Hungarian Natural History Museum, Budapest. Abbreviations: h = hypostomal setae, St = sternal setae, ad = adanal setae. All measurements are given in micrometres (μm).

TAXONOMY

Angulobaloghia tamilica sp. nov.

(Figs. 1–4)

Material examined. Holotype, female. As 400, India, Berijam, Palni Hills, Tamil Nadu Nature Reserve, extracted from litter of shola, 8–11. 04.1980. Leg. Gy. Topál.

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Description. Female. Length of idiosoma 370 μm , width 290 μm ($n = 1$). Shape circular, posterior margin rounded.

Dorsal idiosoma (Fig. 1). Marginal and dorsal shields fused. Dorsal setae smooth, needle-like, *ca.* 19–21 μm long. Surface of dorsal idiosoma smooth, several muscle scars present on central area of dorsal shield.

Ventral idiosoma (Fig. 2). Sculptural pattern absent on sternal and ventral shields. Sternal setae smooth and needle-like. St1 (*ca.* 6–7 μm) at level of central area of coxae II, St2 (*ca.* 6–7 μm) at level of anterior margin of coxae III, St3 (*ca.* 10 μm) at level of posterior margin of coxae III, other sternal setae absent. Ventral setae smooth and needle-like, V2 (*ca.* 7 μm) situated at basal line of genital shield, V4 (*ca.* 6 μm) and V7 near posterior part of pedofossae of leg IV. V8 (*ca.* 21 μm) placed between V7 and *ad*, setae *ad* (*ca.* 9 μm) near anal opening. One pair of lyrifissure presents between V7 and V8. Stigmata situated between coxae II and III. Peritremes hook-shaped. Genital shield triangular, its surface smooth. Pedofossae deep, their surface smooth, with separate furrows for tarsi IV. Tritosternum with narrow basis, its laciniae marginally serrate (Fig. 3).

Gnathosoma (Fig. 4). Corniculi horn-like, internal malae smooth and as long as corniculi. Labrum marginally pilose. Hypostomal setae: h1 long (*ca.* 22 μm), smooth and setiform; h2 were broken, h3 long (*ca.* 16 μm) and smooth; h4 short (*ca.* 7 μm) and marginally serrate. Epistome marginally serrate. Palp trochanter with one long and one short smooth setae, other setae on palp smooth or marginally serrate.

Legs. Leg I with claws.

Etymology. The name of the new species refers to the Tamil Nadu state of India where it was collected.

***Angulobaloghia indica* sp. nov.**

(Figs. 5–6)

Material examined. Holotype, female. As 508, India, Debrapani, Darjeeling District, West Ben-

gal, sifted and extracted from litter in indigenous wood 30.05.1980. Leg. Gy. Topál.

Description. Female. Length of idiosoma 340 μm , width 290 μm ($n = 1$). Shape circular, posterior margin rounded.

Dorsal idiosoma (Fig. 5). Marginal and dorsal shields fused. Dorsal setae marginally pilose and *ca.* 21–22 μm long. Surface of dorsal idiosoma covered by small oval pits.

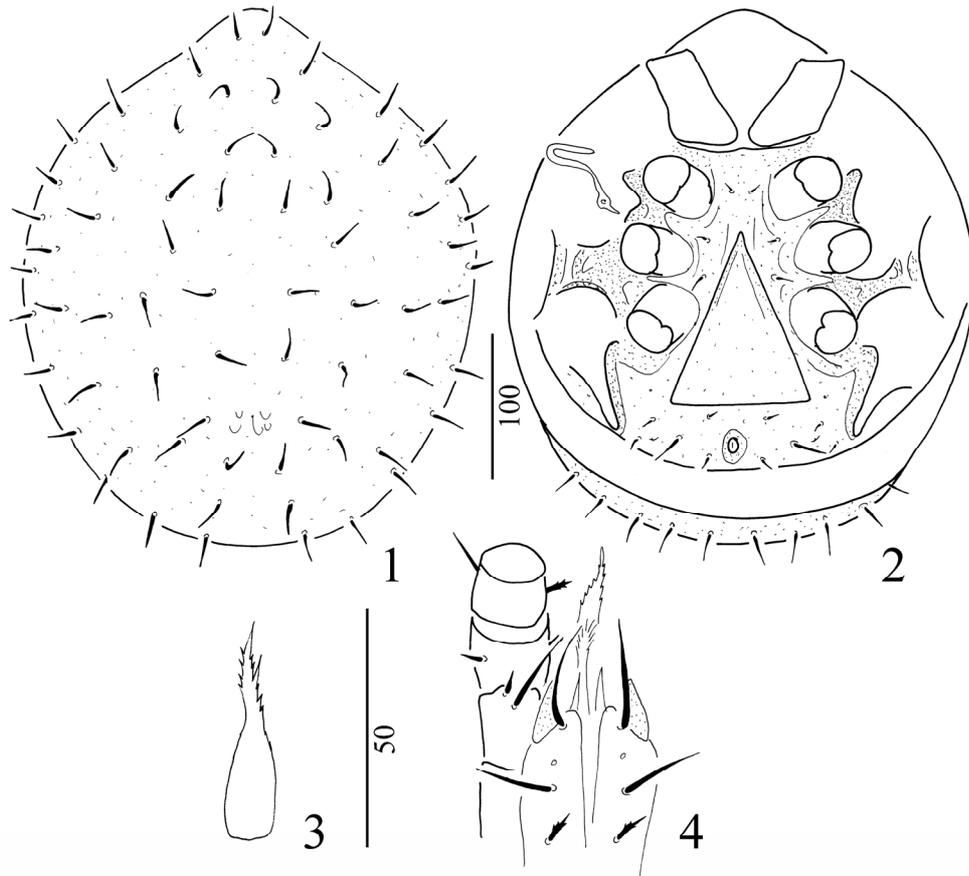
Ventral idiosoma (Fig. 6). Surface of sternal shield with several oval pits, ventral shield without sculptural pattern. Sternal setae smooth and needle-like. St1 short (*ca.* 7 μm) and at level of anterior margin of coxae II, St2 long and robust (*ca.* 26 μm), and at level of posterior margin of coxae II, St3 long and robust (*ca.* 29 μm) at level of posterior margin of coxae III, St4 short (*ca.* 9 μm) and placed at level of anterior margin of coxae IV. Two pairs of lyriform fissures present on sternal shield, first of pair situated near anterior margin of sternal shield, second of pair at level of anterior area of pedofossae of leg IV. Ventral setae smooth and needle-like, V2 (*ca.* 7 μm) situated at basal line of genital shield, V4 absent, V7 (*ca.* 7 μm) near posterior part of pedofossae of leg IV. V8 (*ca.* 14 μm) placed between V7 and *ad*, setae *ad* (*ca.* 8 μm) near anal opening. Stigmata situated between coxae II and III. Peritremes hook-shaped. Genital shield triangular, its surface covered by oval pits. Pedofossae deep, their surface smooth, with separate furrows for tarsi IV. Tritosternum and gnathosoma not clearly visible on the single specimen, because coxae I covered by them.

Legs. Leg I with claws.

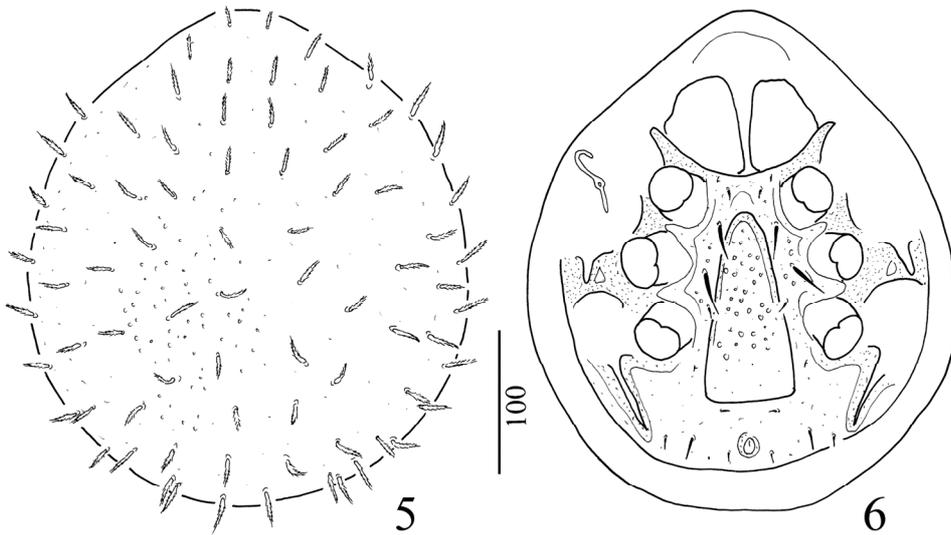
Etymology. The species epithet refers to India.

Key to the *Angulobaloghia* species

- 1 Ventral shield ornamented
..... *A. aokii* (Hiramatsu, 1979)
- Ventral shield smooth 2
- 2 Genital shield of female semi-circular
..... *A. danyii* (Kontschán, 2008)
- Genital shield of female triangular 3



Figures 1–4. *Angulobaloghia tamilica* sp. nov. 1 = Dorsal view, 2 = ventral view, 3 = tritosternum, 4 = palp and ventral view of gnathosoma



Figures 5–6. *Angulobaloghia indica* sp. nov. 5 = Dorsal view, 6 = ventral view

3 Peritremes mushroom-shaped	4
- Peritremes hook-shaped.....	7
4 Genital shield with pattern	5
- Genital shield without pattern.....	6
5 St3 three times longer than other sternal setae	
..... <i>A. cuyi</i> (Hiramatsu & Hirschmann, 1975)	
- St3 as long as other sternal setae	
..... <i>A. pyrigynella</i> (Hirschmann, 1992)	
6 Sternal shield with ornamentation.....	
..... <i>A. vietnamensis</i> (Kontschán, 2008)	
- Sternal shield without ornamentation	
..... <i>A. triangulata</i> (Kontschán, 2008)	
7 Sternal shield with ornamentation.....	8
- Sternal shield without ornamentation	9
8 St2 and St3 three times longer than St1	
..... <i>A. indica</i> sp. nov.	
- St2 and St3 as long as St1	
..... <i>A. luzolensis</i> (Hiramatsu & Hirschmann, 1975)	
9 Genital shield with ornamentation	
..... <i>A. angustigynella</i> (Hirschmann, 1975)	
- Genital shield without ornamentation.....	10
10 St2 and St3 three times longer than St1	
..... <i>A. angullogynella</i> (Hirschmann, 1975)	
- St2 and St3 as long as St1	11
11 Additional setae on sternal shield present	
..... <i>A. latigynella</i> (Hirschmann, 1975)	
- Additional setae on sternal shield absent.....	
..... <i>A. tamilica</i> sp. nov.	

DISCUSSION

Currently India belongs to Asia however this subcontinent earlier was part of the Gondwanaland. After the fragmentation of Gondwanaland (Early Cretaceous), India with Madagascar moved to north and in the late Cretaceous, Madagascar has broken off from India, and India drifted to north, while collided to Asia ca. 50 Mya (Wells 2003). Because of the long connection between Madagascar and India, we can assume that many faunal relationships even in the Uropodina fauna of these two regions exist. Although rotundabaloghid mites (in the genus *Rotundabaloghia*) occur in Madagascar as well, *Angulobaloghia* species are so far unknown from the island (Kontschán, 2007, 2010). According to my assumption, *Angulobaloghia* species colonized the

Indian subcontinent later, from the direction of South-East Asia. In the Quaternary the Philippines and the Greater Sunda Islands were connected to mainland Asia because of the eustatic sea-level drop and consequently the now appearing barriers before the invasion of these mites did not exist (Tougaard 2001).

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