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New and little known oribatid mites from Madagascar (Acari: Oribatida). I.

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Abstract. A list of the newly studied and identified oribatids from Madagascar (Malagasy Republic) is given. Altogether 17 species are mentioned from several sites of the island including four new species and a new subspecies belonging in the families Steganacaridae, Oppiidae and Austrachipteriidae, respectively. Two species, *Eniochthonius sumatranus* Mahunka, 1989 and *Cultroribula bicuspidata* Mahunka, 1978 are recorded for the first time from Madagascar. With 25 figures.

INTRODUCTION

For some time I have been studying the oribatid fauna of Madagascar (Mahunka, 2002, 2009 a, b). The final aim is to write a monograph of this unique and very rich fauna. For achieving this goal I try to identify and discuss as much oribatid species as possible deriving from different parts of the island. In this contribution, I present the species collected by Dr. Csaba Csuzdi in Vohimana Reserve, Dr. Tamás Pócs in several localities of Antsiranana and Tomasina Provinces and Dr. Dénes Balázs in different regions of the great island.

Present article comprises descriptions and/or discussions of 17 species belonging in different oribatid families. Of them, four species (*Notophthiracarus inusitatus, N. pseudosomalicus*, *Fusuloppia variosetosa* and *Lamellobates cuneatus* spp. nov.) and one subspecies (*Austrophthiracarus aokii malagasensis* ssp. nov.) are new to science. Two further, little known species (*Eniochthonius sumatranus* Mahunka, 1989 and *Cultroribula bicuspidata* Mahunka, 1978) are reported for the first time from Madagascar.

In this paper, as in the earlier ones, I follow the system of Norton & Behan-Pelletier (2009), and besides I also use some works which were mentioned in my previous publication on this subject (Mahunka, 2008). In the descriptions I use the morphological terminology of Norton & Behan-Pelletier (2009) and furthermore those of other authors (e.g. Mahunka & Zombori, 1985; Niedbala, 1992, 2001, 2004, 2008; Norton *et al.,* 1997, Weigmann, 2006; Woas, 2002).

Depositories. The material examined is deposited in the Hungarian Natural History Museum, Budapest (HNHM), and some paratypes and voucher specimens in the Muséum d'Histoire naturelle de Genève (MHNG).

LOCALITIES

Afr-311 Madagascar, Ranomafana, E from Fianaratsoa, soil samples from litter of tropical rain forest, 24-26. September 1979. Leg. D. Balázs.

Afr-918 Madagascar, Antsiranana Prov., Réserve Spéciale de Manongarivo. Tall mesic evergreen forest with huge sandstone cliffs and boulders 7.5 km SW of Antanambao village, at the W side of Ambakatra river. At 460-570 m alt. 13°55.5'N, 48°27.3'E. 24. July 1998. Leg. T. Pócs. (No. 9857).

Afr-921 Madagascar, Toamasina Prov., Mananara Nord Biosphere Reserve and National Park. Lowland rainforest on the E slopes of Mahavoho Hill (very wet types along Mahavoho River, with many tree ferns, palms and Pandanus ssp., less humid on slopes) at 220-300 m alt. 16°27'S, 49°46.9-47.5'E. Date: 14-15, Aug. 1998. Leg. T. Pócs. (No. 9878).

Afr-923 Madagascar, Toamasina Prov., Maromizaha forest. Mossy montane rainforest with bamboo (Nastus sp.) undergrowth on the summit ridge of Mt. Maromizaha, south of the Andasibe Nat. Park and the Antananarivo Toamasina road, 2 km W of Anevoka village, at 1080-1214 m alt. 18°57.8'S, 48°27.5'E. Date: 26. August 1998. Leg. T. Pócs. (No. 9890).

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Afr-996 Madagascar, Vohimana Reserve, primary forest. 17. April 2008. Leg. Cs. Csuzdi.

LIST OF THE NEWLY IDENTIFIED SPECIES

CTENACARIDAE Grandjean, 1954

Beklemishevia demeteri Mahunka, 1984
Locality: Afr-921.

ENIOCHTHONIIDAE Grandjean, 1947

Eniochthonius sumatranus Mahunka, 1989
Locality: Afr-923.

EPILOHMANNIIDAE Oudemans, 1923

Epilohmannia insignipes Balogh, 1962
Locality: Afr-923.

EUPHTHIRACARIDAE Jacot, 1930

Microtritia hauseri Mahunka, 1994
Locality: Afr-923.

STEGANACARIDAE Niedbała, 1986

Austrophthiracarus aokii malagasensis ssp. nov.

Hoplophorella vitrina (Berlese, 1962)
Locality: Afr-918.

Notophthiracarus inusitatus sp. nov.

Notophthiracarus pseudosomalicus sp. nov.

Notophthiracarus zebra Balogh, 1962
Locality: Afr-923.

ASTEGISTIDAE Balogh, 1961

Cultroribula bicuspidata Mahunka, 1978
Locality: Afr-921.

CERATOPPIIDAE Kunst, 1971

Trichoppia longiseta Balogh, 1960
Locality: Afr-923.

OPPIIDAE Sellnick, 1937

Fusuloppia variosetosa sp. nov.

Gressitoppia sensilla (Mahunka, 2002)

Locality: Afr-923.

Rugoppia boraha (Mahunka, 1994)
Locality: Afr-921.

MICROZETIDAE Grandjean, 1936

Rhopalozetes madecassus Mahunka, 1993
Locality: Afr-923.

AUSTRACHIPTERIIDAE Luxton, 1985

Lamellobates cuneatus sp. nov.

TEGORIBATIDAE Grandjean, 1954

Lemurobates antsiranana Mahunka, 1997
Localities: Afr-921, Afr-996.

DESCRIPTIONS

Austrophthiracarus aokii malagasensis ssp. nov.

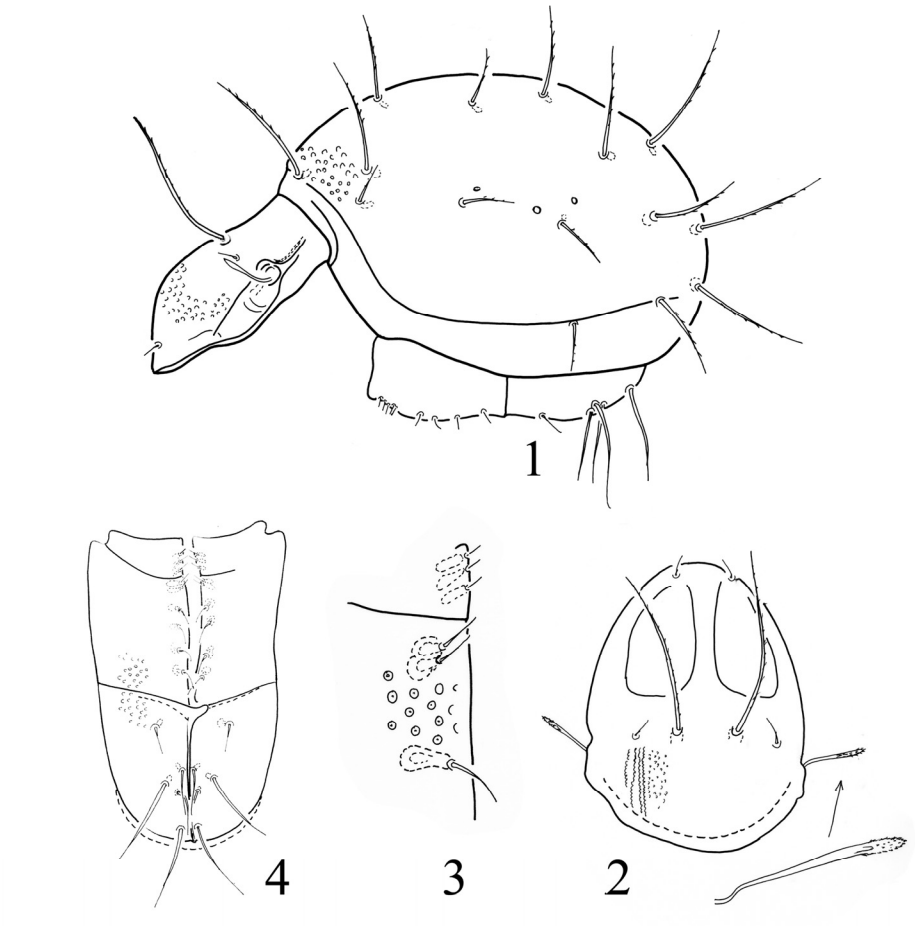
(Figs 1–4)

Material examined. Holotype: Madagascar, Toamasina Province. Maromizaha forest. 26. August 1998. Leg. Dr. T. Pócs (9890) (Afr-923). 1 paratype from the same sample. Holotype (1786-HO-10) and paratype (1786-PO-10) are deposited in the HNHM.

Diagnosis. With the main characters of *Austrophthiracarus aokii* (Mahunka, 1983). Median crista absent, sigillar fields well observable, with parallel median borders. Lateral carina and lateral rim weak, partly short. Sinus line and disinct posterior furrows well observable. Sensillus long with asymmetrical distinct head. Prodorsal and notogastral setae short, bacilliform, notogastral setae varying in length. Formula of genital setae 6:3. Adanal setae ad_2 and ad_3 much longer than anal setae.

Measurements. Length of prodorsum: 347–500 μm, length of notogaster: 556–1014 μm, height of notogaster: 388–626 μm.

Prodorsum. Colour light brown. Ornamented by small foveolae, which ordered in some furrows basally, lateral part along the margin smooth. Median crista absent, sigillar fields well visible (Fig. 2). A distinct lateral carina short, reaching to the relatively long sinus line. Rostral setae very short, straight, setiform. Interlamellar setae erect, covered by short spicules. Lamellar and exobothridial setae minute. Sensillus straight, its peduncle long, thin, its head weakly separated, with roughened distal margin.



Figures 1–4. *Austrophthiracarus aokii malagasensis* ssp. nov. 1 = body in lateral view, 2 = genitor-anal region, 3 = arranged of the anterior genital setae, 4 = prodorsum in dorsal view

Notogaster. Ornamented by strong sculpture (Fig. 1), consisting of small foveolae.

Fifteen pairs of different length notogastral setae. All setae setiform, covered with small acicules or cilia. Two pairs of lyrifissures *ia* and *im* present.

Ventral parts. Formula of genital setae 6:3. Setae g_5–g_6 located very near to each other, in paraxial position. All genital setae arising in one row (Fig. 3). Formula of anoadanal setae 2:3. Anal setae equal in length, thin, setiform. Among the adanal setae ad_1 and ad_2 longer than the anal ones (Fig. 4).

Leg. Chaetotaxy of legs complete type, setae *d* on genu well visible. Setae of *d* on femur I large, well curved interiorly, located near to the anterior margin.

Remarks. The new subspecies comes close to the nominate subspecies, however *aokii malagasensis* can be distinguished from *aokii aokii* by the very short and straight rostral setae arising near its rostral margin (long and curved in *aokii aokii*), by the position of genital setae (arising in two rows in *aokii aokii*), and the shape of sigillar fields of prodorsum. The nominate subspecies was recorded from Kenya and Tansania.

Etymology. The specific epithet refers to the locality of this species.

Notophthiracarus inusitatus sp. nov.

(Figs 5–9)

Material examined. Holotype: Malagasy Republic, Toamasina Province. Maromizaha forest. 26. August 1998. Leg. Dr. T. Pócs (9890) (Afr-923). 2 paratypes from the same sample. Holotype (1787-HO-10) and 1 paratype (1787-PO-10) deposited in the HNHM, 1 paratype in the MHNG.

Diagnosis. Median crista absent, sigillar fields not observable. Lateral carina and lateral rim present. Sinus line and disinct posterior furrows well observable. Sensillus long with asymmetrical distinct head. Prodorsal and notogastral setae short, bacilliform, all equal in length. Formula of genital setae 5:4. Adanal setae ad_2 and ad_3 far removed anteriorly.

Measurements. Length of prodorsum: 110–143 μm, length of notogaster: 230–275 μm, height of notogaster: 120–170 μm.

Prodorsum. Colour light yellow, its dorsal outline uniformly convex anteriorly, straight basally. Ornamented by foveolae anteriorly and by furrows basally (Figs. 5, 8), lateral part along the margin smooth. Median crista absent, fields invisible because of strong sculpture. A distinct lateral carina, long, reaching to the rostrum, sinus line long, lateral rim short not reaching over the sinus line. Rostral, and interlamellar setae erect, latter one similar to notogastral setae, covered by short spicules in its distal part. Lamellar and exobothridial setae minute. Sensillus (Fig. 9) long, its peduncle conspicuously long, thin, its head well separated, asymmetrical, with roughened margin.

Notogaster. Ornamented by strong sculpture medially (in dorsal view), consisting of small foveolae ordered in irregularly longitudinal furrows (Fig. 5). Fifteen pairs of short, rigid, obtuse notogastral setae present, covered with small spicules in their distal end. Setae c_1 and c_3 located much nearer to collar margin than setae c_2. Alveoli of vestigial setae arising between setae f_1. All setae – except *p* setae – nearly equal in length. Two pairs of lyrifissures *ia* and *im* present.

Ventral parts (Figs. 6–7). Anal plates with a distinct, thin ventral edge. Formula of genital setae 5:4. Formula of anoadanal setae 2:3. Anal setae equal in length, thin, setiform. Among the adanal setae ad_1 and ad_3 slightly longer than the anal ones, setae ad_2 much thicker and longer than all of other setae. Adanal setae ad_2 and ad_3 far remote anteriorly from anal setae.

Legs. Chaetotaxy of legs complete type. Setae of *d* on femur I short, well curved interiorly, located near to the anterior margin.

Remarks. The new species is easily distinguishable from all congeners by the shape and arrangements of the adanal setae.

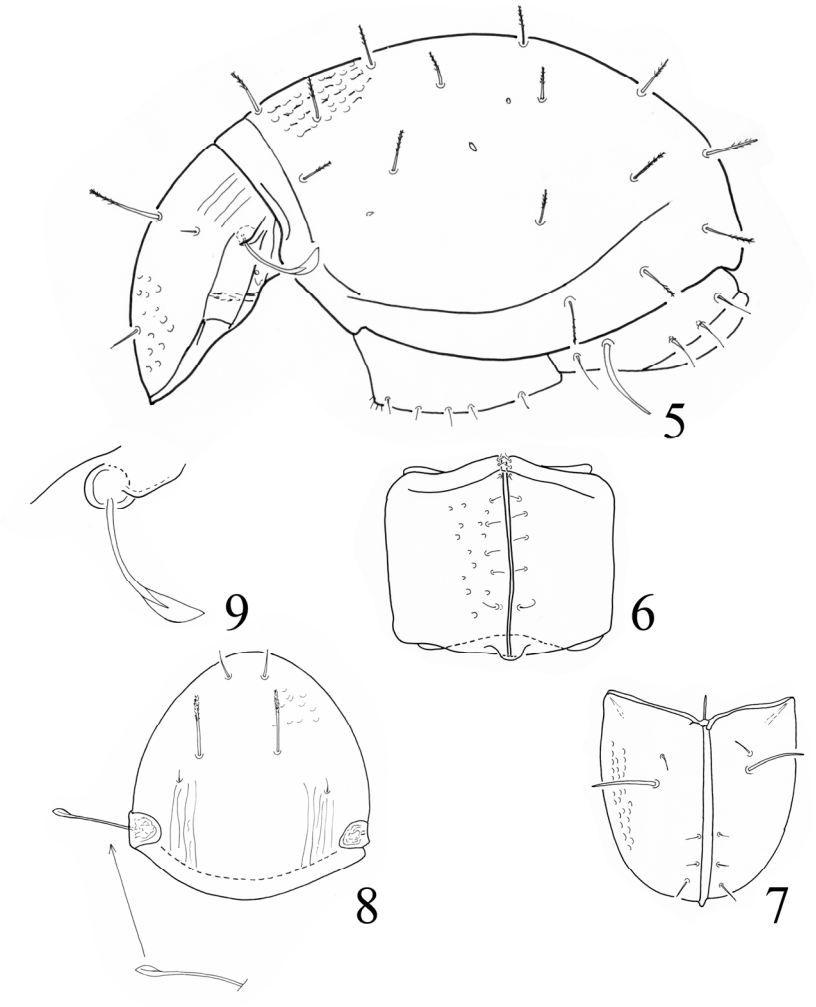
Etymology. The name refers to the unusual position of the adanal setae.

Notophthiracarus pseudosomalicus sp. nov.

(Figs 10–17)

Material examined. Holotype: Madagascar, Toamasina Province. Maromizaha forest. 26. August 1998. Leg. Dr. T. Pócs (9890) (Afr-923)). 1 paratype from the same sample. Holotype (1788-HO-10) and 1 paratype 1788-PO-10) are deposited in the HNHM.

Diagnosis. Median crista absent, sigillar fields well observable. Lateral carina and lateral rim present. Sinus line absent and disinct posterior furrows not observable. Sensillus medium long with distinct head. Prodorsal and notogastral setae short, bacilliform, all equal in length. Genital setae arising in one row. Formula of genital setae



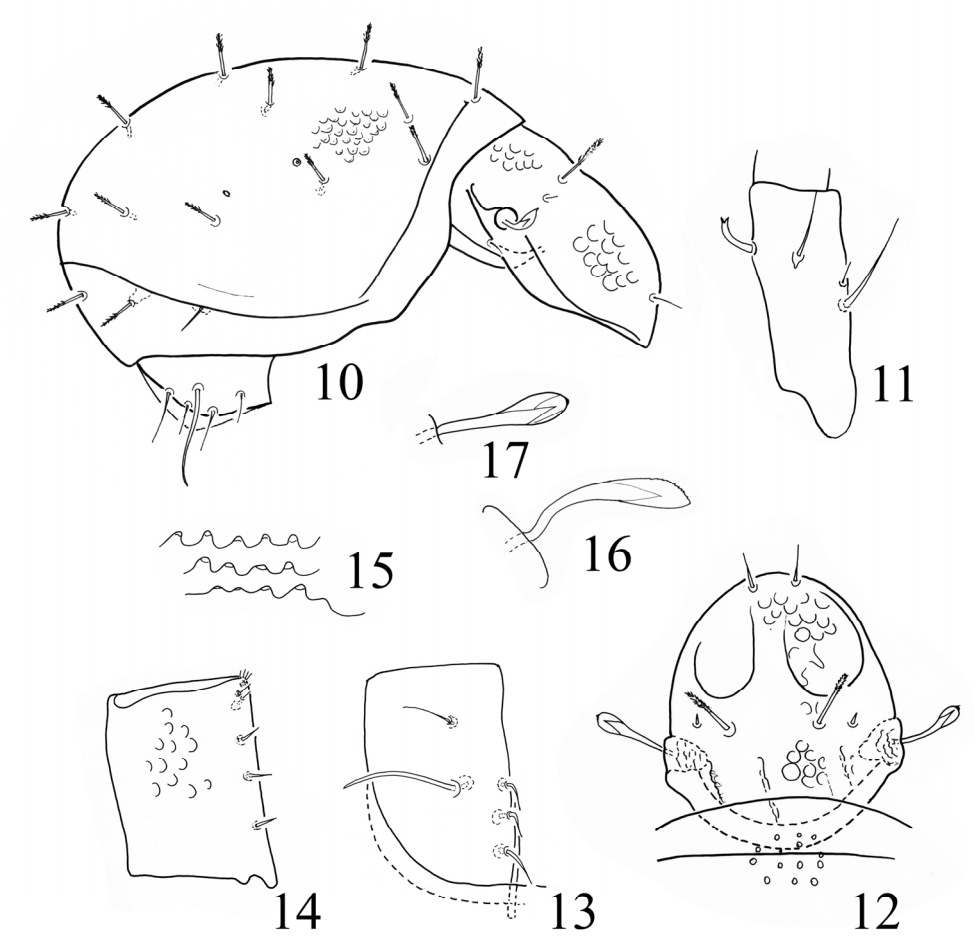
Figures 5–9. *Notophthiracarus inusitatus* sp. n. 5 = body in lateral view, 6 = genital plate, 7 = anoadanal plate, 8 = prodorsum dorsal view, 9 = sensillus

4:5. Adanal setae ad_2 much longer and thicker than anal and other adanal ones. Chaetotaxy of legs of complete type.

Measurements. Length of prodorsum: 164–187 μm, length of notogaster: 318–335 μm, height of notogaster: 218–236 μm.

Prodorsum. Colour light brown, its dorsal outline uniformly convex anteriorly, straight basally. Ornamented by very large foveolae, which compose 1–2 irregular furrows basally. Lateral part along the margin smooth. Median crista absent, sigillar fields well observable, median fields bordered with parallel lines. A short, distinct lateral carina, reaching to the rostrum present. Sinus line absent, lateral rim very narrow (Fig. 10). Rostral setae straight, setiform, smooth (Fig. 12), interlamellar setae erect, covered by short spicules in its distal part. Lamellar setae short, spiniform, wide basally, exobothridial setae minute. Sensillus (Figs. 16–17) comparative long, its peduncle much longer than head, it phylliform, asymmetrical, with roughened margin.

Notogaster. Ornamented by strong sculpture, consisting of small, very deep foveolae ordered in



Figures 10–17. *Notophthiracarus pseudosomalicus* sp. n. 10 = body in lateral view, 11 = femur of leg I, 12 = prodorsum in dorsal view, 13 = anoadanal plate, 14 = genital plate, 15 = sculpture of notogaster, 16, 17 = sensillus in dorsal and lateral view

irregularly longitudinal furrows (Fig. 15). Fifteen pairs of short, rigid, obtuse notogastral setae present, covered with small spicules in their distal end. Setae c_1 and c_3 located nearer to collar margin than setae c_2. Alveoli of vestigial setae arising between setae f_1. All setae – except *p* setae – nearly equal in length. Two pairs of lyrifissures *ia* and *im* present.

Ventral parts. Anal plates with a distinct, thin ventral edge. Formula of genital setae 4:5 (Fig. 14). Formula of anoadanal setae 2:3 (Fig. 13). Anal setae equal in length, thin, setiform, adanal setae ad_1 slightly longer than the anal ones, setae ad_2 much thicker and longer than all of other setae, located near to anal ones.

Legs: Chaetotaxy of legs complete type. Setae of *d* on femur I well developed, with bifurcate distal end (Fig. 11). Seta *d* of leg IV well developed.

Remarks. The new species is very close to *Notophthiracarus parasomalicus* Niedbala, 2001 described from Madagascar, but easily distinguished from its congeners by the complete type of legs (incomplete in *parasomalicus*) and by the shape of setae *d* of leg I. *N. somalicus* (Berlese, 1923) probably does not belong to the genus *Notophthiracarus.*

Etymology. The name refers to the relationship of the new species.

***Fusuloppia variosetosa* sp. nov.**

(Figs 18-22)

Material examined: Holotype: Madagascar, Ranomafana, E from Fianarautsaa, soil samples from litter of tropical rain forest, 24–26. September 1979. Leg. D. Balázs (Afr-311). 1 paratype from the same sample. 2 paratypes: Madagascar, Toamasina Prov., Mananara Nord Biosphere Reserve and National Park. Lowland rainforest on the E slopes of Mahavoho Hill (very wet types along Mahavoho River, with many tree ferns, palms and Pandanus ssp., less humid on slopes) at 220–300 m alt. 16°27'S, 49°46.9–47.5'E. Date: 14-15, Aug. 1998. Leg. T. Pócs. (No. 9878). (Afr-921). Holotype (1789-HO-10) and 2 paratypes (17889-PO-10) are deposited in HNHM, 1 paratype in MHNG.

Diagnosis. Rostrum rounded. Prodorsal surface with tree pairs of interbothridial maculae. Lamellar setae lovated nearer to rostral than interlamellar setae. Sensillus very long, narrow, slightly dilated medially. Twelve pairs of notogastral setae present, two pairs of them very short. Setae c_2 reduced. Coxisternal region well sclerotised apodemes II and sejugal apodemes wide, apodemes IV conspicuously bent along genital opening. Sternal apodema also strong, with drop-shaped features. Genitoanal setal formula 5 – 1 – 2 – 3. Lyrifissures *iad* in adanal position. All legs very long.

Measurements. Length of body: 634–662 μm, width of body: 316–358 μm.

Prodorsum. Rostral part wide, rostrum without sharp apex or incisure, rounded, nearly conical in dorsal view. Median costulae absent, three pairs of maculae located comparatively near to each other, in interbothridial region and three or four larger ones located laterally. Prodorsal setae long, simple, ratio of them: *in* > *le* > *ex* > *ro* (Fig. 18). Interlamellar setae thicker than the others, well pilose, lamellar setae thinner, arising nearer to rostral than interlamellar ones. Exobothridial setae simple. Bothridium well developed, with a small basal lath posteriorly. Sensillus very long, directed laterally, slightly dilated medially (Fig. 19), resembling *Salix* leaves, all distinctly barbed.

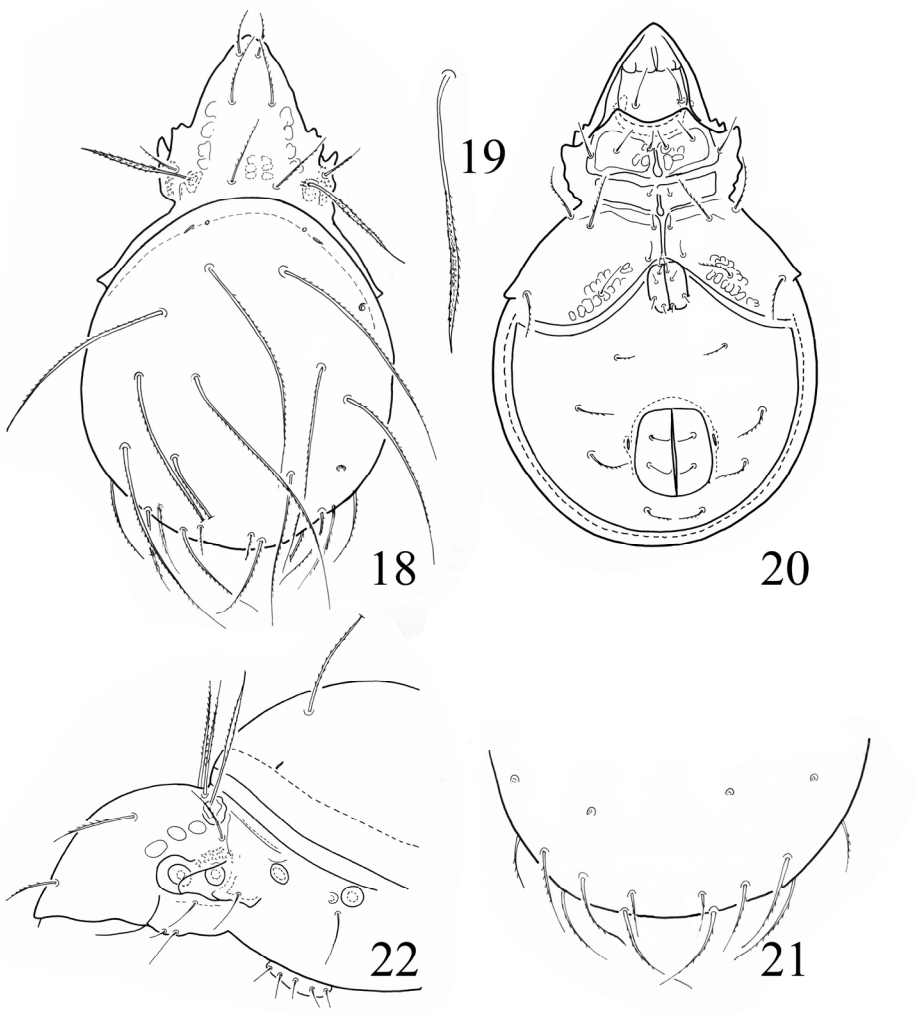
Notogaster. Round in dorsal, semicircle in lateral view. Dorsosejugal suture convex medially, crista absent. Twelve pairs of notogastral setae present, setae c_2 reduced. Two pairs (h_1 and p_1) extremely short simple (Fig. 21), p_2 and p_3 setiform, short. All median setae (*da-dp* and *la-lp*) well developed, extremely long, finely barbed.

Lateral part of podosoma. Exobothridial region well granulate, without longitudinal crest. Pedotecte I and II small, discidium very long (Fig. 22).

Ventral parts. Coxisternal region well sclerotised. Apodemes and epimeral borders – except *ap. 3* and *bo. 3* connected each other. On *bo. 2* and *bo. sej*. with median epimeral fossa. *Bo. 4* distinctly curved, reaching behind genital aperture (Fig. 20). Sternal apodemes mostly developed, but apodema between *ap. 2* and *ap sej*. partly absent. Epimeral surface ornamented by polygonal pattern, epimer 1 granulate anteriorly. Median epimeral setae short, some lateral ones conspicuously long. Some of them finely roughened. All setae in the aggenital region short and simple, setae in the anal region much longer than genito-aggenital ones. Setae ad_1 in post, setae ad_2 in paraanal, lyrifissures *iad* in adanal position. All setae covered by short bristles.

Legs. All segment conspicuously thin, long, exceptionally long all tibia and femora. Leg IV nearly as long as the length of notogaster.

Remarks. Apart from *Fusuloppia variosetosa* sp. nov. two other species belong to the genus *Fusuloppia* Balogh, 1983: the type species of the genus (*Oppia simplex* Balogh, 1961 = *Fusuloppia neonominata* Subias 2004) and an other one published from Tanzania (*Fusuloppia fusuligera* (Balogh, 1962)). The new species is distinguishing from *fusuligera* by the much shorter prodorsal and notogastral setae, from the *neonominata* by the shape of sensillus (its head is well separate in *neonominata*, gradually narrowed anteriorly in the new species), and from both earlier described



Figures 18–22. *Fusuloppia variosetosa* sp. n. 18 = body in dorsal view, 19 = sensillus, 20 = body in ventral view, 21 = posterior part of notogaster, 22 = podosoma in lateral view

species by the much thicker and strongly chitinised *ap. 2*. and *ap. sej.* (much thinner in *neonominata* and *fusuligera*).

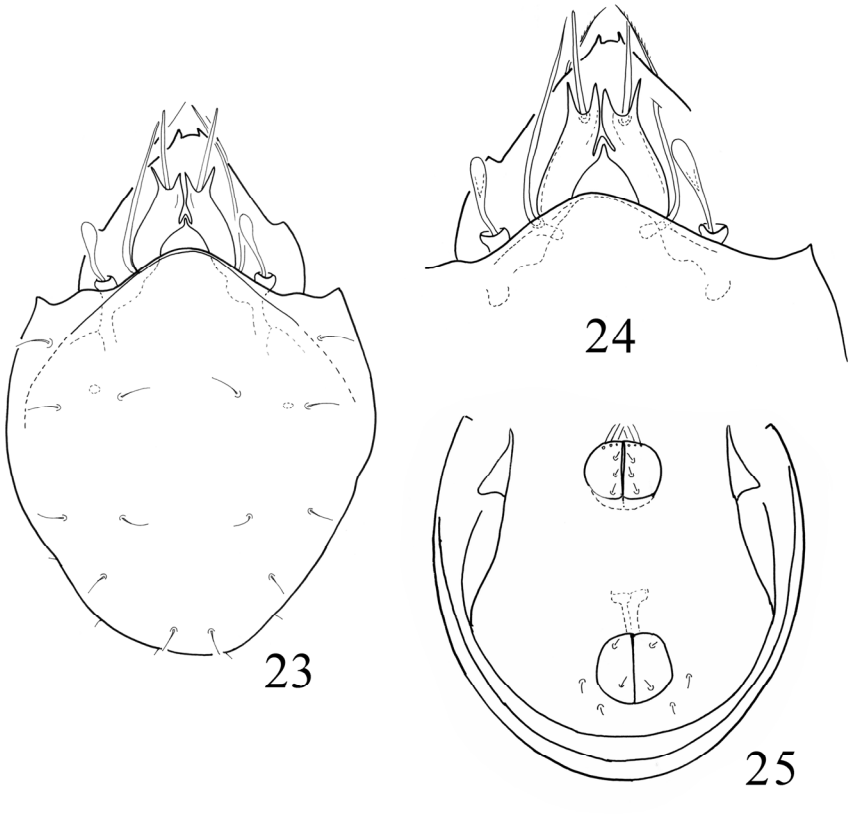
Etymology. The species epithet refers to the conspicuously short posteromarginal and very long notogastral setae in anterior position.

***Lamellobates cuneatus* sp. nov**.

(Figs. 23–25)

Material examined. Holotype: Madagascar, Vohimana Reserve, primary forest. 17. April 2008. Leg. Cs. Csuzdi (Afr-996). 1 paratype from the same sample. Holotype (1790-HO-10) and 1 paratype (1790-PO-10) are deposited in HNHM.

Diagnosis. With the characters of *Lamellobates* (see Nübel-Reidelbach & Woas 1992). Rostral apex with lateral teeth. Between them a convex median elevation. Lamellae concave laterally, with two long, sharply pointed apices. Lamellar setae thick, bacilliform, interlamellar setae much longer, setiform. Sensillus long, fusiform, dilated distally. Ten pairs of fine notogastral setae present. Coxisternal region weakly sclerotised. Genito-anal setal formula 6 – 1 – 2 – 2. Lyrifissures *iad* in adanal position. All legs monodactylous.



Figures 23–25. *Lamellobates cuneatus* sp. n. 23 = body in dorsal view, 24 = prodorsum, 25 = posterior part of ventral plate

Measurements. Length of body: 275–282 μm, width of body: 188–197 μm.

Prodorsum. Rostral part wide, rostral apex with two lateral teeth and a shorter rounded median elevation. Rostral setae long, arising laterally, their form similar to the interlamellar setae. Lamellae conspicuously converging medially, their lateral margin convex distally (Fig. 23). Two apices present bearing bacilliform lamellar setae, both equal in length, median apex wider than the spiniform lateral one. Lamellae basally connected with each other by a bent interlamellar tubercle (Fig. 24). Bothridium well rise from the anterior margin of the notogaster. Sensillus fusiform, dilated distally.

Notogaster. Surface smooth. Anterior margin of notogaster undulate, with a pair of deep hollow laterally. Ten pairs of fine notogastral setae (Fig. 23), and 4 pairs of small sacculi present.

Lateral part of podosoma. Tutorium large, with sharply pointes distal end. Pedotectum I large. Pteromorpha well covered the acetabula II-IV, bearing a small spine laterally.

Ventral parts. Epimeral surface smooth, apodemes weakly developed. Epimeral setae short, simple and thin. Ventral plate smooth. Genito-anal setal formula: 6 – 1 – 2 – 2 (Fig. 25). Anterior genital setae much longer than the three posterior pairs. Two pairs of adanal setae very short, aggenital and anal setae also minute.

Legs. All legs monodactylous.

Remarks. On the basis of the shape of lamellae and lamellar apices the species of the genus *Lamellobates* Hammer, 1958 fall in three groups:

1) Inner apex lost, inner margin rounded (*L. palustris* Hammer, 1958), 2) Inner apex very long, much longer than the outer one (*L. orientalis* Csiszár, 1961), 3) Inner and outer apices equal in length (*L. engelbrechti* Mahunka, 1989).

The new species belongs to the third group. It can be distinguished from all congeners by the conspicuously long and diverging outer lamellar cusp.

Etymology: The species name refers to the shape of the lamellar apices.

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