Opusc. Zool. Budapest, 2009, 40 (1): 3–8

Cerviconema cygneum and *Papuadorus amplus,* two new genera and species (Nematoda: Dorylaimida) from high altitude regions

I. ANDRÁSSY[1]

Abstract. Two new species of dorylaimid nematodes each representing a new genus are described and illustrated. *Cerviconema* gen. n., with *C. cygneum* sp. n. from Bolivia as type, belongs to the family Paraxonchiidae and is characterized by the strongly tapered neck, small head, simple and medium-long odontostyle, short cylindrus, paired gonads, transverse vulva and conoid tail. *Papuadorus* gen. n., with *P. amplus* sp. n. from Papua New Guinea as type, belongs to the family Nordiidae and can be characterized by the long and slender odontostyle, rod-like odontophore, amphidelphic genital organ, longitudinal vulva, great number of contiguous supplements and conoid tail.

This paper presents descriptions of two new nematode species that represent a new genus each. They were collected at high altitude – over 3000 m above sea level – in two tropical regions: one, *Cerviconema cygneum* gen. et sp. n. in Bolivia, and another, *Papuadorus amplus* gen. et sp. n. in Papua New Guinea. Both species – and genera as well – belong to the order Dorylaimida, suborder Dorylaimina and the superfamily Dorylaimoidea.

Cerviconema gen. n.

Paraxonchiidae. Body moderately long, excessively tapered in anterior region and curved in posterior half. Cuticle smooth. Cephalic region very small, about one-fourth of body width at neck base, slightly offset; lips hardly separated. Amphids caliciform. Odontostyle thin, somewhat longer than labial width, aperture occupying one-third of its length. Oesophagus enlarged well behind its middle. Oesophago-intestinal junction with a disc-like structure. Didelphic. Vulva transverse, sclerotized. Prerectum short. Tail short, conoid, ventrally curved. Male not known.

Type species. Cerviconema cygneum sp. n.

As regards its general shape and especially its strongly narrowed anterior body, *Cerviconema* gen. n. can be placed in the family Paraxonchiidae. According to Andrássy (2009), four genera (including 17 species) belong to this family: *Paraxonchium* Krall, 1958 (13 species), *Gopalus* Khan, Jairajpuri & Ahmad, 1987 (monotypic), *Tendinema* Siddiqi, 1995 (two species) and *Parapalus* Loof & Zullini, 2000 (monotypic). The new genus differs from them as follows. a) From *Paraxonchium* by the inconspicuous subcuticular glands, thin and straight odontostyle (*vs*. thick, mostly curved with large aperture), presence of a cardial disc (*vs*. cardia with three small separate cells), and by the other shaped tail (*vs*. straight-conoid, subdigitate or elongate). b) From *Gopalus* by the more strongly narrowed anterior region, offset head, shorter odontostyle (*vs*. as long as two labial diameters), structure of cardia, heavily sclerotized vulval lips, and by the strongly curved tail (*vs*. straight-conical with subdigitate tip). c) From *Tendinema* by the smooth cuticle (*vs*. transversely striated), offset head, odontostyle with shorter aperture, presence of cardial disc, well sclerotized vulval lips, and by the conoid, pointed tail (*vs*. conoid-rounded). d) From *Parapalus* by the less separated head, shorter odontostyle (*vs*. nearly twice as long as labial width), disc-like cardia, heavily sclerotized vulval lips, and by the strongly curved tail (*vs*. straight-conoid).

Etymology. Composed of the Latin *cervix* = neck and the Greek *nema (νεμα)* = a thread.

[1]*Dr. István Andrássy,* ELTE Állatrendszertani és Ökológiai Tanszék, MTA Zootaxonómiai Kutatócsoport (Department of Systematic Zoology and Ecology of the Eötvös Loránd University, Systematic Zoology Research Group of the Hungarian Academy of Sciences), Pázmány Péter sétány 1/C, 1117 Budapest, Hungary.

Cerviconema cygneum sp. n.

(Fig. 1 A–F)

Holotype female: L = 1.40 mm; a = 25; b = 3.7; c = 40; c' = 1.2; V = 53 %.

Paratype females (n = 2): L = 1.28–1.44 mm; a = 26–27; b = 3.9–4.0; c = 41–44; c' = 1.1–1.2; V = 49–52 %.

General structures. Body C- or G-shaped upon fixation, fairly robust at middle and in posterior part, but strikingly tapered in anterior region to the very small knob-like head; 46–55 µm wide at mid-region. Cuticle smooth, 2.0–2.5 µm thick on most body and 3.5–4.0 thick on tail. Subcuticular glands inconspicuous. Lip region unusually small, 10.0–10.5 µm wide, slightly offset, lips amalgamated. Body at posterior end of oesophagus 4.2–4.6 times as wide as head. Amphids cup-shaped with aperture half of corresponding body width.

Odontostyle thin and symmetrical, 13–14 µm long, 1.2–1.4 times as long as labial diameter, aperture occupying about one-third of stylet length. Guiding ring simple, thin. Oesophagus 320–380 µm long, gradually widened at 60–65 % widened. Cylindrus strongly structured, oesophageal glands inconspicuous. Dorsal gland unusually small, located at 69–71 % of oesophagus length or 17–19 % of total body length. Glandularium 102–108 µm long. Cardia with three cells forming a disc-like structure. Distance between posterior end of oesophagus and vulva a bit shorter or longer than oesophagus.

Female. Genital system amphidelphic, well developed. Each gonad 3.8–5.0 body widths long or occupying 14–18 % of body length. Vulva transverse with heavily sclerotized inner lips. Vagina 28–34 µm long, mostly longer than half corresponding body diameter. No uterine eggs. Rectum 0.9–1.1, prerectum 1.0–1.8 anal body widths long. Vulva–anus distance equal to 18–20 tail lengths. Tail 31–34 µm long (2.3–2.5 % of entire length of body), conoid, ventrally curved with finely rounded to pointed tip.

Male. Not found.

Type specimens. Holotype female on slide No. 12539. Paratypes: two females and two juveniles; all in the collection of the author.

Type habitat and locality. Sphagnum bog at Coroico about 60 km north-east of La Paz, Cordillera Real, 3200 m above sea level, Bolivia; collected in November, 1966 by J. Balogh, S. Mahunka and A. Zicsi.

Cerviconema cygneum sp. n. can easily be identified by its general shape and size, the strongly narrowed neck, small head, posteriorly widened oesophagus, structure of cardia as well as by the shape of the tail.

Etymology. The species epithet *cygneum* (Latin) comes from *cygnus* = a swan, and means: swan-like, referring to the long and narrow neck.

Papuadorus gen. n.

Nordiidae. Body nearly 2 mm in length, robust. Cuticle smooth. Head offset, narrow. Odontostyle enchodeloid, long and slender, odontophore rod-like. Guiding apparatus double. Dorsal nucleus at mid-region of oesophagus, PS nuclei rather far from posterior end of cylindrus. Female amphidelphic with longitudinal vulva and very thick vagina. Male supplements numerous (20 or more) and contiguous, all lying anterior to spicula. Tail similar in sexes, short, conoid, ventrally curved.

Type species. Papuadorus amplus sp. n.

As for the general habit, and particularly the shape and structure of the feeding apparatus, this genus undoubtedly belongs to the family Nordiidae and the subfamily Pungentinae. It is closely related to the genera *Enchodelus* Thorne, 1939 and *Heterodorus* Altherr, 1952 (containing 23 and 25 species, respectively; see Andrássy, 2009), but differs from them by the longitudinal vulva, thick vagina and the great number of the contiguous supplements in males (*vs.* supplements 6–16 in *Enchodelus,* and 4–9 in *Heterodorus,* and well spaced in both genera). Moreover, the new genus differs from *Enchodelus* by all the supplements lying well before the spicula, and by the conoid, sharply pointed tail (*vs*. posterior supplements

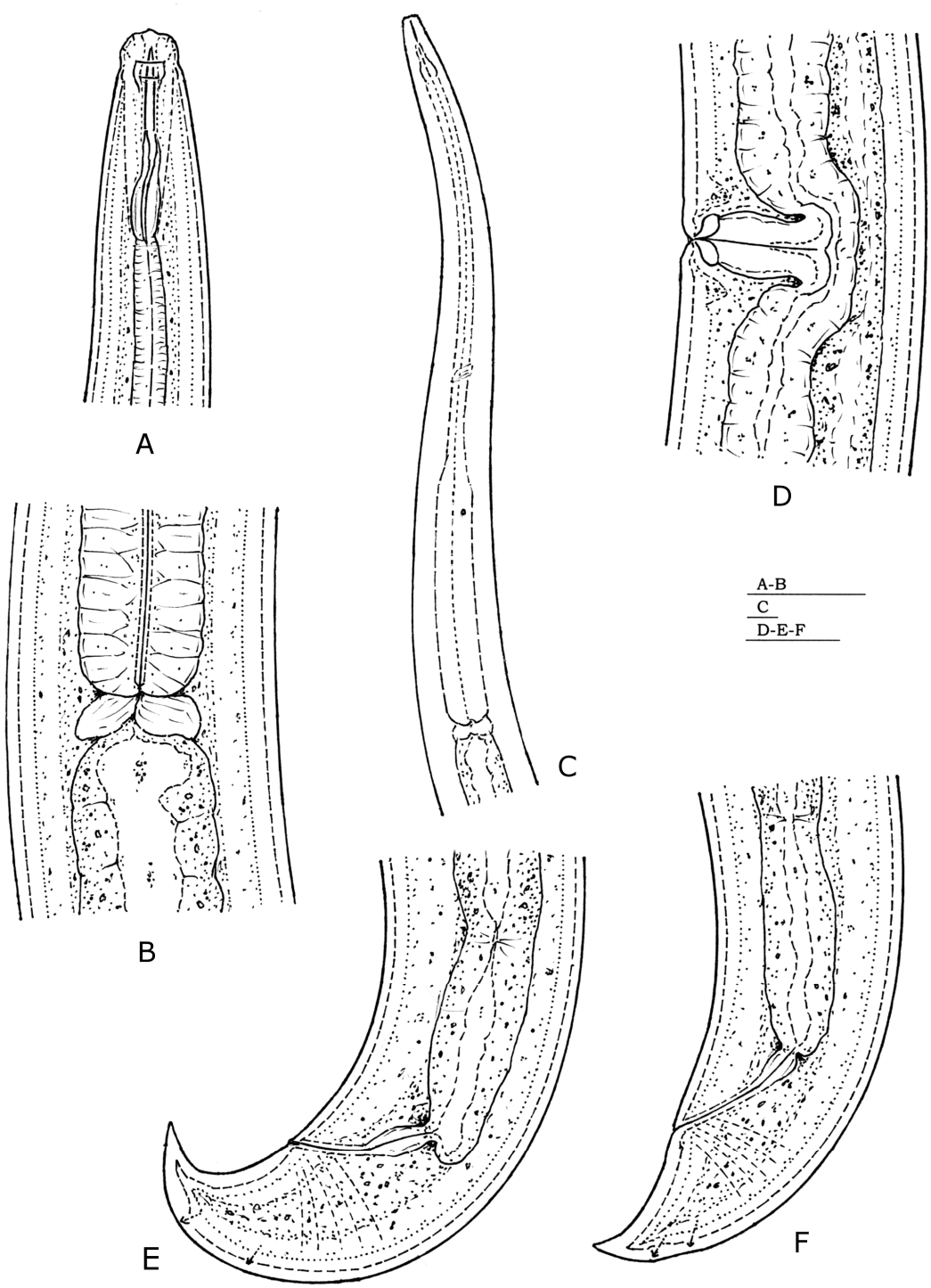


Figure 1. *Cerviconema cygneum* sp. n. A: anterior end; B: oesophago-intestinal junction (*nota bene:* A and B are of the same magnification!); C: neck region; D: vulval region; E–F: female tail. (Scale bars 20 μm each)

located in the range of the spicula, and tail broadly rounded).

In having a longitudinal vulva and a high number of ventromedial supplements, *Papuadorus* gen. n. can be compared with another nordiid genus, *Lanzavecchia* Zullini, 1988 (containing two species). However, it is differentiated from that by the muscular odontophore, double guiding ring, ventrally curved tail, as well as by the contiguous arrangement of the supplements.

Etymology. Papua + *dorus* where the Greek *dory (δόρυ)* = a lance or spear.

***Papuadorus amplus* sp. n.**

(Fig. 2 A–E)

Holotype female: L = 2.00 mm; a = 26; b = 3.6; c = 30; c' = 1.5; V = 53 %.

Paratype female: L = 2.05 mm; a = 24; b = 4.0; c = 31; c' = 1.6; V = 55 %.

Paratype males (n = 3): L = 1.83–1.87 mm; a = 23–26; b = 3.5–3.9; c = 28–33; c' = 1.2–1.4.

General structures. Body robust, 72–86 µm wide at mid-region. Cuticle smooth and thin, 1.5–2.0 µm thick on most body and 3.0–3.5 µm thick on tail. Lip region cap-like, 20–21 µm wide, strongly offset by a deep depression; lips amalgamated. Body strongly widened behind head, at posterior end of oesophagus 3.6–4.2 times as wide as lip region. Amphids cup-like, their apertures about half as wide as corresponding body.

Odontostyle long and slender, 38–40 µm long in females and 35–36 µm long in males; 1.7–2.0 times as long as labial diameter; as thick as or somewhat thicker than cuticle at the same level. Odontophore rod-like with a swollen muscular sleeve, 58–62 µm long, 1.5–1.8 times longer than stylet. Guiding ring double, comparatively high. Oesophagus 490–550 µm long, occupying one-fourth or more of body length, gradually widened somewhat before its middle. Dorsal oesophageal nucleus distinct, lying at 50 % of oesophagus length or 12–13 % of total body length. AS nuclei inconspicuous, PS nuclei at 70–72 %. Glandularium 245–275 µm long.

Female. Reproductive system amphidelphic, each genital branch 5.0–5.5 times as long as body diameter or occupying 20–22 % of body length. Vulva a long longitudinal slit, vagina unusually strong, 48–55 µm long, reaching to more than half of body diameter. No uterine eggs observed. Rectum 1.4–1.5, prerectum 3.2–5.4 anal body widths long. Vulva–anus distance equal to 12–13 tail lengths. Tail 66–70 µm long, occupying only 3.0–3.6 % of entire length of body, conoid, ventrally curved, and pointed on tip.

Male. Testes two. Spermatozoa more or less globular. Spicula 112–115 µm, almost twice as long as tail. Ventromedial supplements 20–24, in most part contiguous; their series occupying 175–208 µm. Prerectum beginning within the row of supplements. Tail similar to that of female, 57–65 µm long.

Type specimens. Holotype female on slide No. 13027. Paratypes: one female, four males and one juvenile; all in the collection of the author.

Type habitat and locality. Wet moss growing on a large rock at about 4000 m above sea level, Mt. Wilhelm, Papua New Guinea; collected in August, 1968 by J. Balogh and I. Loksa.

Etymology. The Latin epithet *amplus* means: considerable or significant, and refers to the general appearance of this illustrious nematode species.

REFERENCES

ALTHERR, E. (1952): Les Nématodes du Parc national suisse. (Nématodes libres du sol.) – *Ergebnisse der wissenschaftlichen Untersuchungen der Schweizerischen National Park, 26: 315–356.*

ANDRÁSSY, I. (2009): *Free-living nematodes of Hungary (Nematoda errantia), III.* Csuzdi, Cs. & Mahunka, S. (eds.): Pedozoologica Hungarica, 5, Budapest, 608 pp.

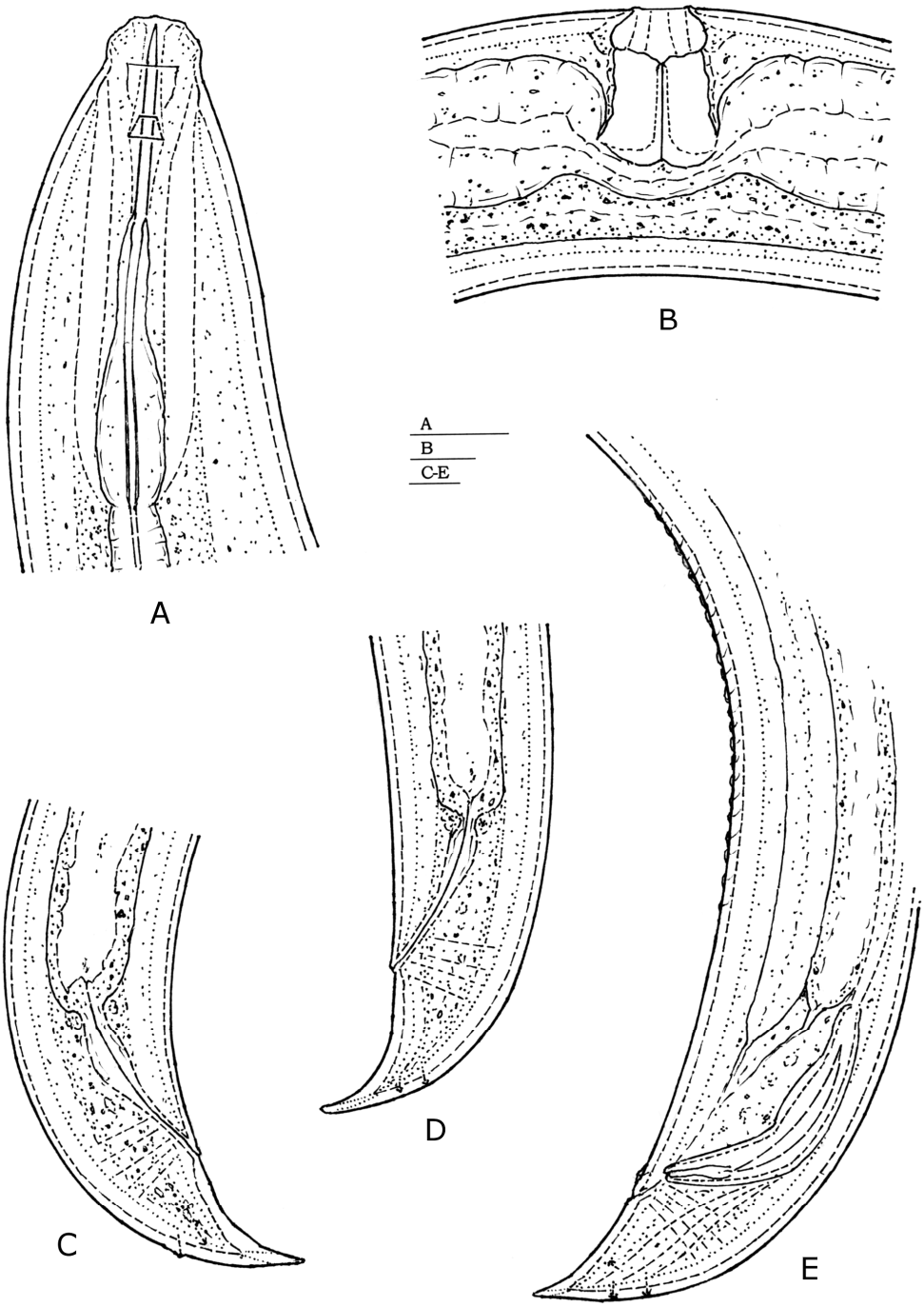


Figure 2. *Papuadorus amplus* sp. n. A: anterior end; B: vulval region; C–D: female tail; E: male posterior end. (Scale bars 20 µm each)

KHAN, T. H., JAIRAJPURI, M. S. & AHMAD, W. (1988): *Gopalus swarupi* gen. n., sp. n. (Nematoda: Dorylaimida) from India. *Indian Journal of Nematology, 17: 288–291.*

KRALL, E. L. (1958): *Paraxonchium striatum* n. gen., n. sp. (Nematoda, Belondiridae), a new free-living soil nematode from Estonia. *Eesti NSV Teaduste Akadeemia Toimetised, 7: 272–276.*

LOOF, P. A. A. & ZULLINI, A. (2000): Freeliving nematodes from nature reserves in Costa Rica. 1. Dorylaimina. *Nematology, 2: 605–633.*

SIDDIQI, M. R. (1995): Nematodes of tropical rainforests. 5. Seven new genera and forty two new species of dorylaims. *Afro-Asian Journal of Nematology, 5: 72–109.*

THORNE, G. (1939): A monograph of the nematodes of the superfamily Dorylaimoidea. *Capita Zoologica, 8: 1–261.*

ZULLINI, A. (1988): A new genus and five species of nematodes from Ethiopian lakes. *Revue de Nématologie, 11: 279–288.*

Opusc. Zool. Budapest, 2009, 40 (1): 9–15

New records of earthworms from Guadeloupe with description of a new species (Oligochaeta: Glossoscolecidae, Acanthodrilidae, Megascolecidae and Eudrilidae)

Cs. Csuzdi[1] and T. Pavlíček[2]

Abstract. A small earthworm material from Guadeloupe Islands (French West-Indies) was studied. Altogether 14 earthworm species were collected, 12 of which are common tropical peregrine. On the other hand, two seem to be endemic in the islands. One of these native species, *Eutrigaster (Graffia) musciphila* (James, 1996) is reported for the first time after the original description, the other, *Periscolex nevoi* sp. nov. is proved to be new to science.

Earthworms are low disperser animals and due to their intolerance of salt water they were thought to be lacking from real volcanic islands (Michaelsen, 1903: Omodeo, 1963; Sims 1980), such as the Lesser Antilles including Guadeloupe. This widely held view has been challenged by James (1996) who described a quite rich earthworm fauna from Guadeloupe including nine species new to science and recently by Csuzdi (2005) recording a highly endemic earthworm fauna on São Tomé Island (Golf of Guinea). It seems that small scale over-water dispersal could not be excluded even in the case of earthworms. This possibility is further corroborated by the present material which, apart from numerous introduced peregrine worms, contains also a *Periscolex* Cognetti, 1905 species proved to be new to science.

TAXONOMY

Family Glossoscolecidae Michaelsen, 1900

Periscolex nevoi sp. nov.

(Figs. 1–3)

Material examined. **Holotype**. Hungarian Natural History Museum (HNHM) AF/5265, Guadeloupe, Mt. Caraïbes, rain forest. Leg. T. Pavlíček & P. Cardet, 23.09.2007. **Paratype**. HNHM AF/5371, 1 ex. Guadeloupe, Mt. Caraïbes,

Etymology. The new species is dedicated in honour of Prof. Dr. Eviatar Nevo, the renowned evolutionary biologist, to mark his eightieth birthday.

Diagnosis. Length: 42–43 mm, diameter: 2.5–3 mm, setae perichaetin cca. 30 per segment. Pigmentation greenish-brown on dorsum paler on ventrum. Clitellum on *xiv–xxii*, tubercles on *xviii–xxii*. Spermathecae drop-shaped, open in 6/7, 7/8, 8/9.

Description. *Holotype*: length 43 mm, diameter just after the clitellum 3 mm. Number of segments 175. *Paratype*: 42 mm long and 2.5 mm wide. Number of segments 202. Colour greenish-brown, intensive on dorsum and pale on ventrum. Head with a small proboscis, first two segments small, the others are of normal size. Setal arrangement perichaetin with about 30 setae per segment. Nephridiopores lateral cca. ½ circumference apart. Clitellum circular on segments *xiv–xxii*. Tubercula pubertatis on segments *xviii–xxii*. Male pore minute on the tubercles in intersegmental furrow 18/19, female pores paired on the posterior rim of segment *xiv*. Spermathecal pores three pairs in 6/7, 7/8, 8/9 just above the line of nephridiopores. Genital setae lacking, normal setae smooth, sigmoid with a small nodulus, cca. 310 μm long.

[1]*Dr. Csaba Csuzdi,* Systematic Zoology Research Group of the Hungarian Academy of Sciences, and Department of Zoology, Hungarian Natural History Museum, 1088 Budapest, Baross u. 13, Hungary. E-mail: csuzdi@nhmus.hu.

[2]*Dr. Tomás Pavlíček*, Institute of Evolution, University of Haifa, Haifa 31905, Israel. E-mail: contact@tomas-pavlicek-biologie.net

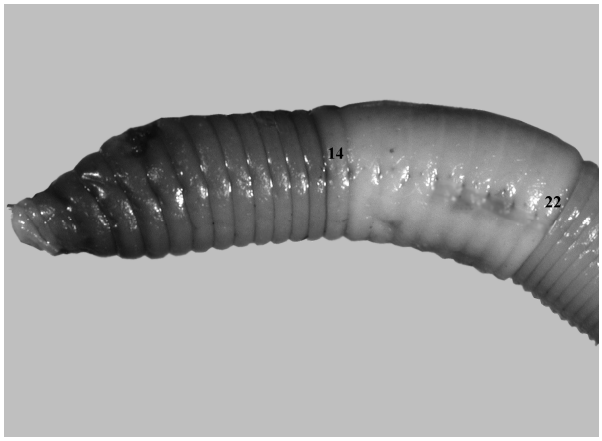


Figure 1. *Periscolex nevoi* sp. nov.

Internal characteristics: All septa membranous, muscular gizzard large in *vi*. Calciferous glands large with small ventral heads in segment *vii*. The structure of the glands simple with several small trabecules and a large central lumen ("Leistentaschen"). Intestine begins in 16/17, typhlosole large lamellar. Testes and funnels paired in segments *x–xi,* enclosed in oesophageal testis sacs. These sacs unite on both sides and continue in a pair of long seminal vesicles stretching back to segment *xxv–xxviii*. Three pairs of small drop-shaped spermathecae in segment 7–9.

Remarks. The new species resembles *Periscolex yuya* Righi & Römbke, 1987 by having perichaetin setae and three pairs of spermathecae, but differs from it in the position of the tubercles, in the shape of spermathecae and in lacking the hairy ornamentation of the normal setae.

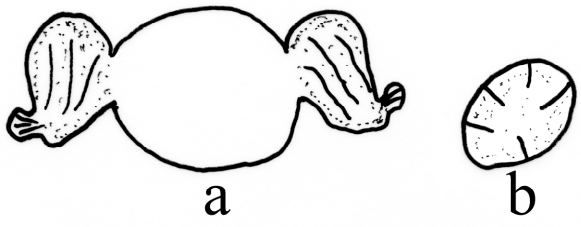


Figure 2. *Periscolex nevoi* sp. nov. a = calciferous glands in segment 7; b = cross section of a calciferous gland

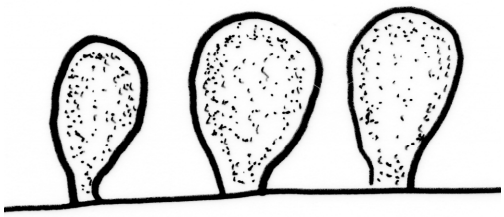


Figure 3. *Periscolex nevoi* sp. nov. Spermathecae

Pontoscolex (Pontoscolex) corethrurus (Müller, 1857)

Lumbricus corethrurus Müller, 1857: 113.
Urochaeta hystrix Perrier, 1872: 142.
Urochaeta dubia Horst, 1885: 7.
Urochaeta australiensis Beddard, 1891: 278.
Pontoscolex corethrurus: Beddard 1892b: 127.
Pontoscolex hawaiensis Beddard, 1895: 660.
Pontoscolex corethrurus: Michaelsen 1918: 234.
Pontoscolex (*Pontoscolex*) *corethrurus*: Righi 1984: 163.
Pontoscolex corethrurus: Blakemore 2002: 238. (for complete synonymy)

Material examined. HNHM AF/5285, 1 ex. Guadeloupe, Basse Terre, La Soufrière. Leg. T. Pavlíček & P. Cardet, 16.10.2007., HNHM AF/5264, 3 ex. Guadeloupe, Mt. Caraïbes, rain forest. Leg. T. Pavlíček & P. Cardet, 23.09.2007., HNHM AF/5271, 1 ex. Guadeloupe, Marie-Galante island, Grand-Bourg forest grazing area. Leg. T. Pavlíček & P. Cardet, 19.10.2007. HNHM AF/5277, 4 ex. Guadeloupe, Basse-Terre, Lézarde River, waterfall. Leg. T. Pavlíček & P. Cardet, 20.10.2007., HNHM AF/5280, 1 ex. Guadeloupe, Grande-Terre, Les Grands-Fonds, forest. Leg. T. Pavlíček & P. Cardet, 19.10.2007., HNHM AF/5283, 4 ex. Guadeloupe, Grande-Terre, near of Baillargent river. Leg. T. Pavlíček & P. Cardet, 17.10.2007., HNHM AF/5285, 3 ex. Guadeloupe, Grande-Terre, Les Grands-Fonds, forest. Leg. T. Pavlíček & P. Cardet, 19.10.2007., HNHM AF/5288, 1 ex. Guadeloupe, Basse-Terre, Lézarde River, waterfall. Leg. T. Pavlíček & P. Cardet, 20.10.2007., HNHM AF/5291, 2 ex. Guadeloupe, Basse-Terre, Grand Étang, forest. Leg. T. Pavlíček & P. Cardet, 15.10.2007., HNHM AF/5293, 2 ex. Guadeloupe, Basse-Terre, Vieux-Bourg, mangrove. Leg. T. Pavlíček & P. Cardet, 27.09.2007.

Remarks. This is the most widely distributed peregrine glossoscolecid species. It occurred almost in every sample in the present material as well.

Acanthodrilidae Claus, 1880

Dichogaster (Diplothecodrilus) affinis (Michaelsen, 1890)

Benhamia affinis Michaelsen, 1890: 9.
Benhamia mexicana Rosa, 1891: 394.
Benhamia crassa Beddard, 1893: 681
Benhamia floresiana Horst, 1893: 34.
Dichogaster affinis: Michaelsen 1900: 345.
Dichogaster sinuosa Stephenson, 1931c: 74.
Dichogaster sinica Chen, 1938: 420.
Dichogaster sinensis Chen, 1938: 421. (nomen nudum).
Dichogaster affinis: Csuzdi & Zicsi 1989: 135.
Dichogaster (Diplothecodrilus) affinis: Csuzdi 1995: 112.

Material examined. HNHM AF/5269, 1 ex. Guadeloupe, Marie-Galante island, Grand-Bourgh forest grazing area. Leg. T. Pavlíček & P. Cardet, 19.10.2007., HNHM AF/5281, 3ex. Guadeloupe, Grande-Terre, Les Grands-Fonds, forest. Leg. T. Pavlíček & P. Cardet, 19.10.2007.

Remarks. This is a widely distributed peregrine species of East African origin. It occurs mainly in tropical and subtropical countries. Its northernmost field record is from the Dade County, Florida, USA (Csuzdi, 1997).

Dichogaster (Diplothecodrilus) annae (Horst, 1893)

Benhamia annae Horst, 1893: 32.
Benhamia parva Michaelsen, 1896: 31.
Benhamia travancorensis Fedarb, 1898: 433.
Dichogaster annae: Michaelsen 1900: 347.
Dichogaster curgensis Michaelsen, 1921: 54.
Dichogaster curgensis var. *unilocularis* Stephenson, 1931: 69.
Dichogaster cheranganiensis Černosvitov, 1938: 298.
Dichogaster silvestris cacaois Righi, 1968: 376.
Dichogaster servi Righi & Ayres, 1975: 311.
Dichogaster (Diplothecodrilus) annae: Csuzdi 1995a: 112.

Material examined. HNHM AF/5261, 1 ex. Guadeloupe, Mt. Caraïbes, in Bromeliads. Leg. T. Pavlíček & P. Cardet, 26.09.2007., HNHM AF/5276, 3 ex. Guadeloupe, Basse-Terre, Colas river. Leg. T. Pavlíček & P. Cardet, 14-30.09.2007.

Dichogaster (Diplothecodrilus) bolaui (Michaelsen, 1891)

Benhamia bolavi Michaelsen, 1891: 9.
Benhamia malayana Horst, 1893: 35.
Benhamia octonephra Rosa, 1895: 137.
Benhamia palmicola Eisen, 1896:132.
Benhamia rugosa Eisen, 1896: 136.
Benhamia bolavi pacifica Eisen, 1900: 209.
Dichogaster bolaui: Michaelsen 1900: 340.
Dichogaster bolaui decanephra Michaelsen, 1915: 191.
Benhamia lageniformis Friend, 1916: 262.
Dichogaster bolaui malabaricus Stephenson, 1920: 257.
Dichogaster (Diplothecodrilus) bolaui: Csuzdi 1995: 112.

Material examined. HNHM AF/5255, 1 ex. Guadeloupe, Marie-Galante island, Grand-Bourg forest. Leg. T. Pavlíček & P. Cardet, 30.09.2007., HNHM AF/5270, 1 ex. Guadeloupe, Marie-Galante island, Grand-Bourg forest grazing area. Leg. T. Pavlíček & P. Cardet, 19.10.2007., HNHM AF/5275, 3 ex. Guadeloupe, Basse-Terre, Colas river. Leg. T. Pavlíček & P. Cardet, 14-30.09.2007.

Remarks. This is the most frequent introduced peregrine *Dichogaster* species all over the tropics and subtropics. In Europe and possibly other temperate regions *D. (Dt.) bolaui* occurs in greenhouses and even invades the sewer systems. This is the only known domicole earthworm species so far (Rota & Schmidt, 2006; Csuzdi *et al*., 2008).

Eutrigaster (Graffia) musciphila (James, 1996)

Dichogaster musciphila James, 1996: 30.

Material examined. HNHM AF/5259, 6 ex. Guadeloupe, Basse-Terre, La Soufrière. Leg. T. Pavlíček & P. Cardet, 16.10.2007.

Remarks. Our specimens agree well with the description of James (1996), except for the dimensions of the penial setae which are the following: length 500 μm, diameter 9 μm.

Megascolecidae Rosa, 1891

Amynthas corticis (Kinberg, 1867)

Perichaeta corticis Kinberg, 1867: 102.
Megascolex diffringens Baird, 1869: 40.
Amynthas corticus (sic lapsus): Sims and Easton 1972: 234.
Amynthas corticus: Easton 1981: 49.
Amynthas corticis: Easton 1982: 726.
Amynthas corticis: Blakemore 2003: 6 (for complete synonymy).

Material examined. HNHM AF/5256, 4 ex. Guadeloupe, Basse-Terre, La Soufrière. Leg. T. Pavlíček & P. Cardet, 16.10.2007., HNHM AF/5292, 1 ex. Guadeloupe, Basse-Terre, Grand Étang, forest. Leg. T. Pavlíček & P. Cardet, 15.10.2007.

Amynthas rodericensis (Grube, 1879)

Perichaeta rodericensis Grube, 1879: 554.
Perichaeta dyeri Beddard, 1892a: 157.
Perichaeta sinensis Beddard, 1892a: 158.
Perichaeta trinitatis Beddard, 1896: 206.
Perichaeta monilicystis Michaelsen, 1892: 251.
Pheretima rodericensis: Michaelsen 1900: 299.
Amynthas rodericensis: Sims and Easton 1972: 235.
Amynthas rodericensis: Blakemore 2002: 186.

Material examined. HNHM AF/5254, 1 ex Guadeloupe, Marie-Galante island, Grand-Bourg forest. Leg. T. Pavlíček & P. Cardet, 30.09.2007., HNHM AF/5257, 1 ex. Guadeloupe, Basse-Terre, La Soufrière. Leg. T. Pavlíček & P. Cardet, 16.10.2007., HNHM AF/5260, 1 ex. Guadeloupe, Mt. Caraïbes, in Bromeliads. Leg. T. Pavlíček & P. Cardet, 26.09.2007., HNHM AF/5263, 6 ex. Guadeloupe, Mt. Caraïbes, rain forest. Leg. T. Pavlíček & P. Cardet, 23.09.2007., HNHM AF/5266, 4 ex. Guadeloupe, Basse-Terre, Colas river. Leg. T. Pavlíček & P. Cardet, 04.10.2007., HNHM AF/5264, 3 ex. Guadeloupe, Marie-Galante island, Grand-Bourg forest grazing area. Leg. T. Pavlíček & P. Cardet, 19.10.2007., HNHM AF/5273, 2 ex. Guadeloupe, Basse-Terre, Colas river. Leg. T. Pavlíček & P. Cardet, 14-30.09.2007., HNHM AF/5282, 2 ex. Guadeloupe, Grande-Terre, Les Grands-Fonds, forest. Leg. T. Pavlíček & P. Cardet, 19.10.2007., HNHM AF/5284, 3 ex. Guadeloupe, Grande-Terre, near of Baillargent river. Leg. T. Pavlíček & P. Cardet, 17.10.2007., HNHM AF/5294, 2 ex. Guadeloupe, Basse-Terre, Vieux-Bourg, mangrove. Leg. T. Pavlíček & P. Cardet, 27.09.2007.

Metaphire houlleti (Perrier, 1872)

Perichaeta houlleti Perrier, 1872: 99.
Perichaeta campanulata Rosa, 1890: 115.
Perichaeta udekemi Michaelsen, 1892: 240.
Perichaeta guillelmi Michaelsen, 1895: 32.
Pheretima houlleti: Michaelsen 1900: 273.
Pheretima wimberleyana Stephenson, 1925: 62.
Pheretima houlleti tortuosa Gates, 1926: 454.
Metaphire houlleti: Sims & Easton 1972: 238.
Metaphire houlleti: Blakemore 2002: 201.

Material examined. HNHM AF/5274, 3 ex. Guadeloupe, Basse-Terre, Colas river. Leg. T. Pavlíček & P. Cardet, 14-30.09.2007., HNHM AF/5272, 1 ex. Guadeloupe, Marie-Galante island, Grand-Bourg forest grazing area. Leg. T. Pavlíček & P. Cardet, 19.10.2007.

Perionyx excavatus Perrier, 1872

Perionyx excavatus Perrier, 1872: 126.
Perionyx gruenewaldi Michaelsen, 1891: 33.
Perionyx koboensis Stephenson, 1914: 391.
Perionyx fulvus Stephenson, 1916: 322.
Perionyx turaensis Stephenson, 1920: 216.
Perionyx excavatus: Gates 1972: 141.

Material examined. HNHM AF/5287, 1 ex. Guadeloupe, Grande-Terre, Les Grands-Fonds, forest. Leg. T. Pavlíček & P. Cardet, 19.10.2007.

Pithemera bicincta (Perrier, 1875)

Perichaeta bicincta Perrier, 1875: 1044.
Perichaeta bicincta: Michaelsen 1900: 419.
Perichaeta violacea Beddard, 1895: 407.
Pheretima bicincta: Gates 1972: 170.
Pithemera bicincta: Sims & Easton, 1972: 202.

Material examined. HNHM AF/5278, 1 ex. Guadeloupe, Basse-Terre, Lézarde river, waterfall. Leg. T. Pavlíček & P. Cardet, 20.10.2007., HNHM AF/5289, 3 ex. Guadeloupe, Basse-Terre, Lézarde river, waterfall. Leg. T. Pavlíček & P. Cardet, 20.10.2007.

Polypheretima elongata (Perrier, 1872)

Perichaeta elongata Perrier, 1872: 124.
Perichaeta biserialis Perrier, 1875: 1044.
Perichaeta acystis Beddard, 1895: 423.
Pheretima elongata: Michaelsen, 1900: 265.
Metapheretima elongata: Sims & Easton, 1972: 252.
Polypheretima elongata: Easton 1979: 53.

Material examined. HNHM AF/5253, 3 ex. Guadeloupe, Marie-Galante Island, Grand-Bourg forest. Leg. T. Pavlíček & P. Cardet, 30.09.2007., HNHM AF/5267, 1 ex. Guadeloupe, Marie-Galante island, Grand Bourgh forest grazing area. Leg. T. Pavlíček & P. Cardet, 19.10.2007., HNHM AF/5286, 1 ex. Guadeloupe, Grande-Terre, Les Grands-Fonds, forest. Leg. T. Pavlíček & P. Cardet, 19.10.2007.

Pontodrilus litoralis (Grube, 1855)

Lumbricus litoralis Grube, 1855: 127.
Pontodrilus litoralis: Michaelsen 1900: 180.
Pontodrilus litoralis: Blakemore 2002: 129 (for complete synonymy)
Pontodrilus litoralis: Blakemore 2007: S4.

Material examined. HNHM AF/5262, 14 ex. Guadeloupe, Vieux-Bourg, mangrove. Leg. T. Pavlíček & P. Cardet, 29.09.2007.

Remarks. This species is widely distributed in the Mediterranean and on shorelines of the tropics. Its circummundane distribution has long been disputed, recently by Blakemore (2007), who favours a dual mechanism of distribution; overwater dispersal and human transportation.

Eudrilus eugeniae (Kinberg, 1867)

Lumbricus eugeniae Kinberg, 1867: 98.
Eudrilus decipiens Perrier, 1871: 1176.
Eudrilus lacazii Perrier, 1872: 75.
Eudrilus boyeri Beddard, 1886: 302.
Eudrilus sylvicola Beddard, 1887: 372.
Eudrilus julieni Horst, 1890: 225.
Eudrilus roseus Michaelsen, 1892: 224.
Eudrilus erudiens Ude, 1893: 71.
Eudrilus eugeniae: Michaelsen, 1900: 402.
Eudrilus eugeniae: Sims 1987: 386.

Material examined. HNHM AF/5273, 1 ex. Guadeloupe, Basse-Terre, Lézarde river, waterfall. Leg. T. Pavlíček & P. Cardet, 20.10.2007., HNHM AF/5290, 6 ex. Guadeloupe, Basse-Terre, Lézarde river, waterfall. Leg. T. Pavlíček & P. Cardet, 20.10.2007.

Remarks. The presence of this African peregrine worm in Guadeloupe is not surprising. It has been introduced overall in the tropics for vermicomposting as "African nightcrawler".

REFERENCES

BAIRD, W. (1869): Description of a new species of earthworms (*Megascolex diffringens*) found in North Wales. *Proceedings of the Zoological Society of London*, 1869: 40–43.

BEDDARD, F.E. (1886): Descriptions of some new or little-known earthworms, together with an account of the variations in structure exhibited by *Perionyx excavatus*. *Proceedings of the Zoological Society of London*, 1886: 298–314.

BEDDARD, F.E. (1887): Contributions to the anatomy of earthworms. Nos. I., II., III. *Proceedings of the Zoological Society of London*, 1887: 372–392.

BEDDARD, F.E. (1891): The classification and distribution of earthworms. *Proceedings of the Royal Physical Society Edinborough,* 10: 235–290.

BEDDARD, F.E. (1892a): On some species of the genus *Perichaeta* (sensu stricto). *Proceedings of the Zoological Society of London*, 1892: 153–172.

BEDDARD, F.E. (1892b): The earthworms of the Vienna Museum. *Annals and Magazine of Natural History,* 9: 113–134.

BEDDARD, F.E. (1893): On some new species of earthworms from various parts of the world. *Proceedings of the Zoological Society of London,* 1892: 666–706.

BEDDARD, F.E. (1895): *A monograph of the Order of Oligochaeta*. Clarendon press, Oxford, pp. 769.

BEDDARD, F.E. (1896): On some earthworms from the Sandwich Islands collected by Mr. R. L. Perkins, with an appendix on some new species of *Perichaeta*, etc. *Proceedings of the Zoological Society of London,* 1896: 194–211.

BLAKEMORE, R.J. (2002): *Cosmopolitan Earthworms an Eco-Taxonomic Guide to the Peregrine Species of the World*. VermEcology, PO BOX 414 Kippax, ACT 2615, Australia. Pp. 426 + 80 figs.

BLAKEMORE, R.J. (2003): Japanese Earthworms (Annelida: Oligochaeta): A Review and Checklist of Species. *Organisms, Diversity and Evolution,* 3 (suppl. 11): 1–43.

BLAKEMORE, R.J. (2007): Origin and means of dispersal of cosmopolitan *Pontodrilus litoralis* (Oligochaeta: Megascolecidae). *European Journal of Soil Biology*, 443: S3–S8.

ČERNOSVITOV, L. (1938): Mission scientifique de l'Omo, Oligochaeta. *Mémoires du Muséum national d'Histoire naturelle*, 8: 255–318.

CHEN, Y. (1938): Oligochaeta from Hainan, Kwantung. *Contributions from the Biological Laboratory of the Science Society of China (Zoology) Nanking,* 12(10): 375–427.

CSUZDI, CS. (1995): A catalogue of Benhamiinae species (Oligochaeta, Acanthodrilidae). *Annalen des Naturhistorischen Museums in Wien*, 97B: 99–123.

CSUZDI, CS. (1997): Neue und bekannte Regenwürmer aus dem Naturhistorischen Museum, London (Oligochaeta: Acanthodrilidae). *Opuscula Zoologica Budapest*, 29-30: 35–47.

CSUZDI, CS. & ZICSI, A. (1989): Neue *Dichogaster*-Arten aus der Kongo-Region (Oligochaeta, Octochaetidae). – *Mitteilungen aus dem Hamburgischen zoologischen Museum und Institut*, 86: 133–152.

CSUZDI, CS., PAVLÍČEK, T. & NEVO, E. (2008): Is *Dichogaster bolaui* (Michaelsen, 1891) the first domicole earthworm species? *European Journal of Soil Biology,* 44: 198–201.

EASTON, E.G. (1979): A revision of the 'acaecate' earthworms of the *Pheretima* group (Megascolecidae: Oligochaeta): *Archipheretima*, *Metapheretima*, *Planapheretima*, *Pleinogaster* and *Polypheretima*. *Bulletin of the British Museum (Natural History) Zoology,* 35(1): 1–128.

EASTON, E.G. (1981): Japanese earthworms, a synopsys of the Megadrile species (Oligochaeta). *Bulletin of the British Museum (Natural History) Zoology,* 40(2): 33–65.

EASTON, E.G. (1982): Australian Pheretimoid Earthworms (Megascolecidae, Oligochaeta), A Synopsis with the Description of a New Genus and Five New Species. *Australian Journal of Zoology,* 30: 711–735.

EISEN, G. (1896): Pacific Coast Oligochaeta. *Memoires of the California Academy of Sciences*, 2(5): 123–198.

EISEN, G. (1900): Researches in American Oligochaeta with especial reference to those of the Pacific Coast and adjacent islands. *Proceedings of the Californian Academy of Sciences,* 2: 85–276.

FEDARB, S.M. (1898): On some Earthworms from British India. *Proceedings of the Zoological Society of London,* 1898: 445–450.

FRIEND, H. (1916): Alien Oligochaets in England. *Journal of the Royal Microscopical Society London,* 1916: 262–271.

GATES, G.E. (1926): Notes on Rangoon earthworms. The peregrine species. *Annals and Magazine of Natural History,* (9)17: 439–473.

GATES, G.E. (1972): Burmese Earthworms, an introduction to the systematics and biology of Megadrile oligochaetes with special reference to South-East Asia. *Transactions of the American Philosophical Society,* 62(7): 1–326.

GRUBE, E. (1855): Beschreibungen neuer oder wenig bekannter Anneliden. *Archiv für Naturgeschichte, Berlin,* 21: 81–136.

GRUBE, E. (1879): Annelida. In: An account of the petrological, botanical and zoological collections made in Kerguelen's Land and Rodriguez during Transit of Venus Expeditions carried out by order of Her Majesty's Government in the years 1874-75. *Philosophical Transactions of the Royal Society,* 168: 554–556.

HORST, H. (1885): Vermes. *Midden Sumatra,* 4(12): 1–11.

HORST, H. (1890): Sur quelques Lombriciens exotiques appartenant au genre *Eudrilus*. *Mémoires de la Société Zoologique Française,* 3: 223–240.

HORST, H. (1893): Earthworms from the Malay Archipelago. *Zoologische Ergebnisse einer Reise in Niederländisch-Ost-Indien*, 3: 28–77.

JAMES, S.W. (1996): Nine new species of *Dichogaster* (Oligochaeta, Megascolecidae) from Guadeloupe (French West Indies). *Zoologica Scripta*, 25: 21–34.

KINBERG, J.G. (1867) Annulata nova (Continuatio). *Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar Stockholm,* 23: 97–103.

MICHAELSEN, W. (1890): Beschreibung der von Herrn Dr. Franz Stuhlmann im Mündungsgebiet des Sambesi gesammelten Terricolen. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg,* 7: 1–30.

MICHAELSEN, W. (1891): Oligochaeta des Naturhistorischen Museums in Hamburg. IV. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten, Hamburg*, 8: 3-42.

MICHAELSEN, W. (1892): Terricolen der Berliner Zoologischen Sammlung (II). *Archiv für Naturgeschichte, Berlin,* 57(2): 209–261

MICHAELSEN, W. (1895): Zur Kenntnis der Oligochaeten. *Abhandlungen und Verhandlungen des Naturwissenschaftlichen Vereins in Hamburg,* 13: 1–37.

MICHAELSEN, W. (1896): Die Regenwürmer Ost-Afrikas. *Die Tierwelt der Deutsch-Ost-Afrika Berlin,* 4: 1–48.

MICHAELSEN, W. (900): Oligochaeta. *Das Tierreich*, 11: 1–575.

MICHAELSEN, W. (1903): *Die geographische Verbreitung der Oligochäten*. Friedländer & Sohn, Berlin, pp. 186.

MICHAELSEN, W. (1915): Zentralafrikanische Oligochäten. *Ergebnisse der Zweiten Deutschen Zentral-Afrika Expedition 1910-1911,* 1: 185–317.

MICHAELSEN, W. (1921): Oligochäten vom westlichen Vorderindien und ihre Beziehungen zur Oligochätenfauna von Madagaskar und den Seychellen. *Mitteilungen aus dem Naturhistorischen Museum in Hamburg,* 38: 27–68.

MÜLLER, F. (1857): *Lumbricus corethrurus*, Bürstenschwanz. *Archiv für Naturgeschichte,* 23: 113–116.

OMODEO, P. (1963): *Distribution of the terricolous Oligochaetes on the two shores of the Atlantic*. In: North Atlantic Biota and their History. Pergamon Press, London. p. 127–151.

PERRIER, E. (1871): Description of *Eudrilus* and *Eu. decipiens*. *Les Comptes Rendus de l'Académie des Sciences, Paris,* 73: 1175–1176.

PERRIER, E. (1872): Recherches pour servir à l'histoire des Lombriciens terrestres. *Nouvelles Archives du Muséum d'Histoire Naturelle de Paris,* 8: 5–198.

PERRIER, E. (1875): Sur les vers de terre des îles de Philippines et de la Cochinchine. *Les Comptes Rendus de l'Académie des Sciences, Paris,* 81: 1043–1044.

RIGHI, G. & AYRES, I. (1975): Alguns Oligochaeta sul Brasileiros. *Revista Brasileira de Biologia, Rio de Janeiro,* 35: 309-316.

RIGHI, G. (1968): Sobre alguns Oligochaeta do Brasil. *Revista Brasileira de Biologia,* 28: 369–382.

RIGHI, G. (1984): *Pontoscolex* (Oligochaeta, Glossoscolecidae) a new evaluation. *Studies on Neotropical Fauna and Environment,* 19: 159–177.

ROSA, D. (1890): Viaggio di Leonardo Fea in Birmania e Regioni Vicine. - XXVI. Perichetidi. *Annali del Museo Civico di Storia Naturale di Genova,* 30: 107–122.

ROSA, D. (1891): Die exotischen Terricolen des K.K. Naturhistorischen Hofmuseums. *Annalen des k.k. Naturhistorischen Hofmuseums, Wien,* 6: 379–406.

ROSA, D. (1895): Contributo alla Studio dei Terricoli Neotropicali. *Memoire della Reale Academia Delle Scienze di Torino,* 45: 89–152.

ROTA, E & SCHMIDT, O. (2006): *Dichogaster bolaui* (Oligochaeta: Octochaetidae), an unusual invader in a swimming pool in Ireland. *Journal of Natural History* 40(3/4): 161–167.

SIMS, R.W. (1987): A review of the Central African earthworm family Eudrilidae (Oligochaeta). In Pagliani & Omodeo (eds.) *On earthworms, Selected symposia and Monographs* 2 (Modena: Mucchi), pp. 359–388.

SIMS, R.W. (1980): A classification and the distribution of earthworms, suborder Lumbricina (Haplotaxida: Oligochaeta). *Bulletin of the British Museum (Natural History) Zoology,* 39: 103–124.

SIMS, R.W. & EASTON, E.G. (1972:. A numerical revision of the earthworm genus *Pheretima* auct. (Megascolecidae:Oligochaeta) with the recognition of new genera and an appendix on the earthworms collected by the Royal Society North Borneo Expedition. *Biological Journal of the Linnean Society*, 4: 169–268.

STEPHENSON, J. (1914): Zoological results of the Abor Expedition, 1911–12. XXIX. Oligochaeta. *Records of the Indian Museum*, 8: 365–410.

STEPHENSON, J. (1916): On a collection of Oligochaeta belonging to the Indian Museum. *Records of the Indian Museum*, 12: 299–354.

STEPHENSON, J. (1920): On a collection of Oligochaeta from the lesser known parts of India and from Eastern Persia. Memoirs of the Indian Museum, 7(3): 191–261.

STEPHENSON, J. (1925): On some Oligochaeta mainly from Assam, South India and the Andaman Islands. *Records of the Indian Museum*, 27: 43–73.

STEPHENSON, J. (1931): Oligochaeta from Burma, Kenya and other parts of the World. *Proceedings of the Zoological Society of London*, 1931: 33–92.

UDE, H. (1893): Beiträge zur Kenntnis ausländischer Regenwürmer. *Zeitschrift für Wissenschaftliche Zoologie,* 57: 57–75.

ZICSI, A. (1989): Über zwei *Periscolex*-Arten aus dem Andengebiet Kolumbiens und Ekuadors (Oligochaeta: Glossoscolecidae). (Regenwürmer aus Südamerika 10.). *Revue suisse de Zoologie*, 96: 19–24.

ZICSI, A. (1992): Über weitere neue und bekannte Arten der Gattung *Periscolex* (Oligochaeta: Glossoscolecidae). Regenwürmer aus Südamerika 16. *Revue suisse de Zoologie*, 99(1): 211–217.

Opusc. Zool. Budapest, 2009, 40 (1): 17–21

Some rare species of the genera *Amphidelus* and *Aporcelaimellus* (Nematoda: Dorylaimida) from Sas Hill, Budapest, Hungary

M. KISS[1]

Absrtact. Four rare nematode species from Sas Hill in Budapest are described and illustrated. They are *Amphidelus lagrecai* Vinciguerra & De Francisci, 1973, *Amphidelus coluber* Andrássy, 1973, *Aporcelaimellus alius* Andrássy, 2002 and *Aporcelaimellus amylovorus* (Thorne & Swanger, 1936) Heyns, 1965. Of them, *A. lagrecai* is new to the fauna of Hungary.

One of the most widely studied natural area of Budapest is Sas Hill (Sas-hegy in Hungarian). With its 266 meter height above sea level and about 30 hectar extent, it is the most significant natural value in the centre of the capital. It is a dolomite hill of late Triassic origin, rising sharply from the Kelenföld Plain, on the right side of river Danube. Due to its unique flora and fauna, which contain Mediterranean elements, Sas Hill has been protected since 1958, and recently is part of the Duna–Ipoly National Park in northern Hungary.

The special biota of Sas Hill has been studied by several authors. Of the invertebrate fauna, the spiders were studied by Balogh (1935) and the enchytraeids by Boros (2007). However, the best general picture of the flora and fauna was drawn by Loksa (1977). As for nematodes of the region, rather few data has been published so far.

MATERIALS AND METHODS

Nematodes were isolated using Bearmann's funnel method (Andrássy & Farkas, 1988). They were fixed in FAA and then transferred in anhydrous glycerine by a slow method. The nematodes were examined using a light microscope. Drawings were made with the aid of a *camera lucida*. Measurments were taken by an ocular micrometer, curved structures measured along medial line. The permanent glass slides are preserved in the collection of the author, later they will be deposited at the Zoological Department of Hungarian Natural History Museum, Budapest.

DESCRIPTIONS

Amphidelus lagrecai Vinciguerra & De Francisci, 1973

(Fig. 1 A–E)

Females: (n = 2) L = 1.2–1.4 mm; a = 48–52; b = 4.2–4.6; c = 14–15; c' = 7–8; V = 60–63 %.

Male: unknown.

General characters. Body slender, transparent, C-shaped after fixation, tapering at the both extremities, more markedly at the posterior one. Cuticle smooth, 2 µm thick. Anterior end rounded, lips small, flat, 7–8 µm wide. Labial sensillae large. Stoma very small and unarmed. Amphids less than two labial widths from lips. Amphidial aperture transverse, 2.5 µm wide, slit-like, amphi-

[1]*Márta Kiss*, MTA Zootaxonómiai Kutatócsoport, ELTE Állatrendszertani és Ökológiai Tanszék (Systematic Zoology Research Group of Hungarian Academy of Sciences, Department of Systematic Zoology and Ecology of Eötvös Loránd University), Pázmány Péter sétány 1/C, 1117 Budapest, Hungary. e-mail: kissklio8@gmail.com

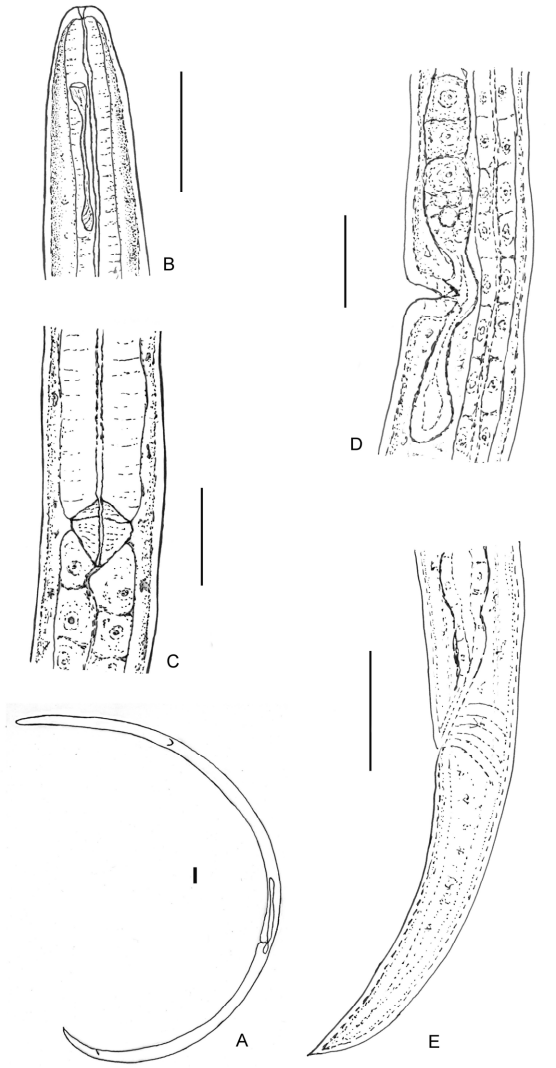


Figure 1. *Amphidelus lagrecai* Vinciguerra & De Francisci, 1973. A: entire body; B: anterior end; C: cardial region; D: vulval region; E: female tail. (Scale bars 20 µm each)

dial duct between fovea and sensilla long. Excretory pore not seen. Oesophagus 283–290 µm long, occupying 20–23 % of entire body lenght. Glandularium 52–56 µm long, 19–23 % of oesophagus length.

Female. Gential organ prevulval with postvulval sac and spermatheca. Vagina swollen, vulva „open". Vagina thick-walled. Uterus small, ovary reflexed. Mature egg not observed. Gonad 132–138 µm long, occupying 10–11 % of body

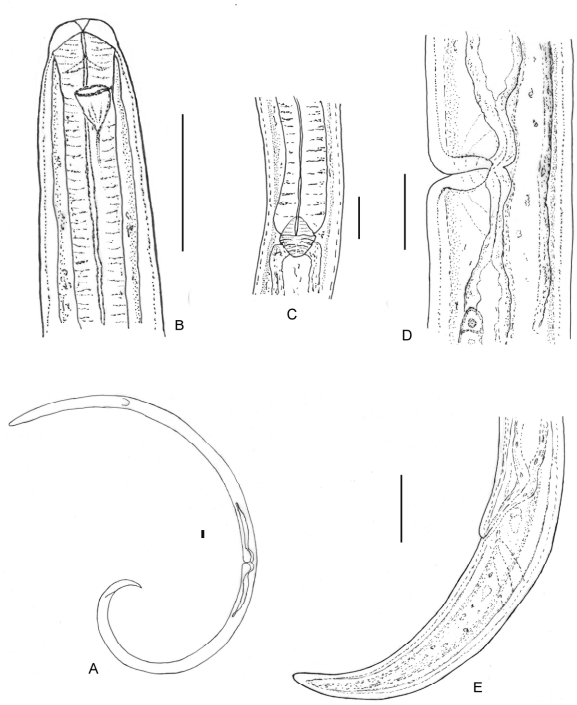


Figure 2. *Amphidelus coluber* Andrássy, 1973. A: entire body; B: anterior end; C: cardial region; D: vulval region; E: female tail. (Scale bars 20 µm each)

length, postvulval sac 23–25 µm. Rectum as long as 0.7–0.8 anal body widths. Tail elongate-conoid, ventrally arcuate with sharp thorn-like mucro.

Habitat and locality. Soil from closed rocky grassland, Sas Hill; collected in April, 2007 by the author.

Amphidelus lagrecai lives in soil and moss and is known from Italy (Alpi Apuane) and Greece (Termopili) (Clausi & Vinciguerra, 1998). It is new to the fauna of Hungary.

Amphidelus coluber Andrássy, 1973

(Fig. 2 A–E)

Females (n = 5): L = 2.2–2.6 mm; a = 40–60; b = 5.5–6.1; c = 24–30; c' = 3–4; V = 50–55 %.

Male: unknown.

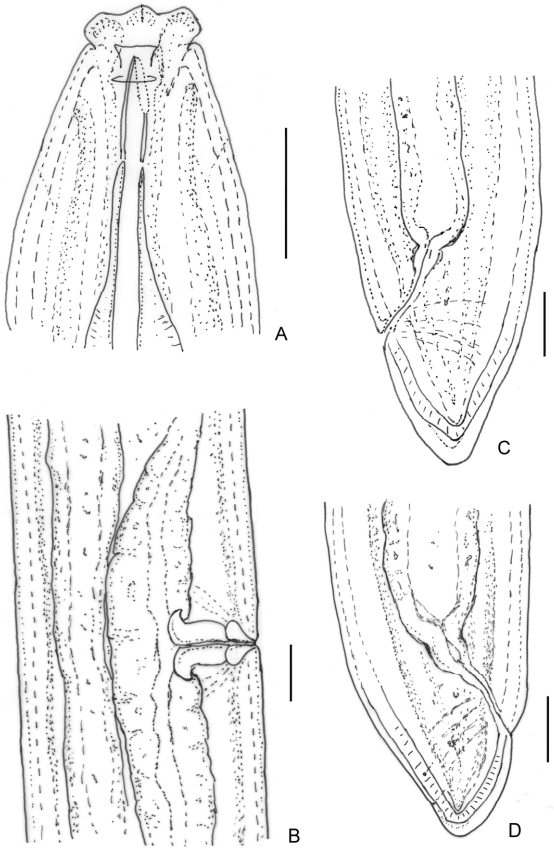


Figure 3. *Aporcelaimellus alius* Andrássy, 2002. A: anterior end; B: vulval region; C–D: female tail. (Scale bars 20 µm each)

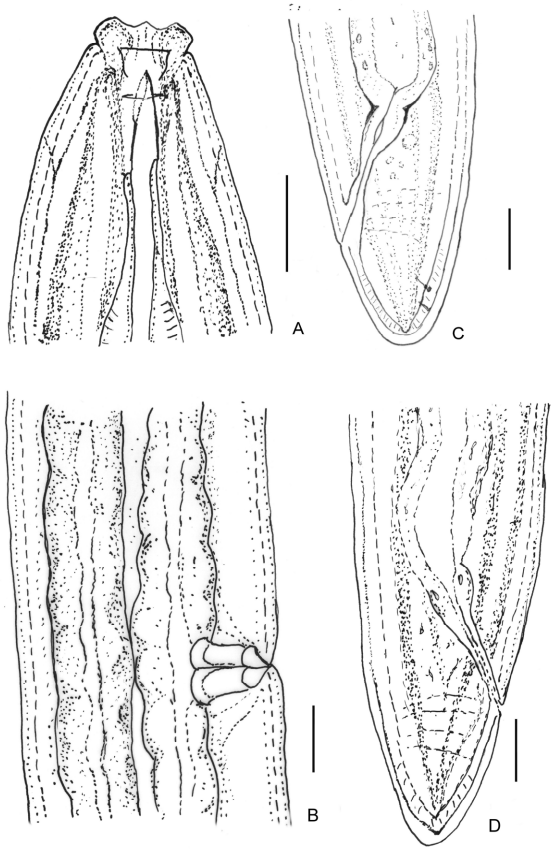


Figure 4. *Aporcelaimellus amylovorus* (Thorne & Swanger, 1936) Heyns, 1965. A: anterior end; B: vulval region; C–D: female tail. (Scale bars 20 µm each)

General characters. Body long, very slender and C-shaped after fixation, tapering at the both extremities. Head broadly rounded, 9.5–10 µm wide. Lips hardly discernible. Amphids located 24–26 µm from anterior end. Amphid aperture transverse, 2.5–3 µm wide, slit-like, amphidial duct between fovea and sensilla long. Cuticle 2.5 µm thick, smooth. Stoma hardly discernible, unarmed. Oesophagus short, 356–392 µm, 15–16 % of entire lenght of body. Excretory pore not or hardly seen, it is 36–37 µm from head. Glandularium 24–26% of entire lenght of oesophagus.

Female. Genital apparatus amphidelphic. Vulva „open". Mature eggs not observed. Distance between vulva and anus 11.5 times as long as anal body widths. Three glands open at the junction rectum–intestine. Tip of tail pointed.

Habitat and locality. Soil from rocky grassland, Sas Hill; collected in April, 2007 by the author.

This species has been recorded from Switzerland, Hungary, Kenya, South Africa and Mexico (Andrássy, 1977, 1990, 2002a).

Aporcelaimellus alius Andrássy, 2002

(Fig. 3 A–D)

Females (n = 5): L = 1.80–2.24 mm; a = 20–24; b = 3.2–4.5; c = 40–80; c' = 0.7–1.0; V = 46–49 %.

Male: unknown.

General characters. Body robust. Cuticle 3–4 µm thick on mid-body, and 6–8 µm thick on middle of tail, consisting of two distinct layers of different refraction; inner layer very finely striated. Head 17–18 µm wide.Labial region set off by a deep constriction. Lips hardly separated from one another. Odontostyle strong, 21–23 µm long, aperture a little more than half of stylet length. Amphids cup-shaped, occupying half of corresponding body width or little more. Guiding apparatus aporcelaimoid. Oesophageal cylindrus strongly muscular. Gland nuclei well recognizable: D = 56–58 %, AS1 = 21–25 %, AS2 = 49–50 %, PS1 = 71–73 %, PS2 = 72–75 %. Body at posterior end of oesophagus 4.1–4.5 times as wide as head.

Female. Vulva transverse, inner lips heavily sclerotized, 12–16 µm wide. Genital organ amphidelphic, moderately short, 17–25 % of full body lenght. Mature eggs 75–80 × 27–30 µm. Rectum 1.3–1.5, prerectum 1.5–2 anal body diameters long. Tail as long as 0.7–1.0 anal body width. Outer layer of cuticle on tail tip always thicker than inner layer.

Habitat and locality. Soil from closed and opened rocky grasslands, Sas Hill; collected in February, April and October, 2007 by the author.

Andrássy (2002 b) described this species from Fertő–Hanság National Park, Hungary.

Aporcelaimellus amylovorus (Thorne & Swanger, 1936) Heyns, 1965

(Fig. 4 A–D)

Females (n = 12): L = 1.67–2.21 mm; a = 24–26; b = 3.9–4.8; c = 42–52; c' = 1.0–1.1; V = 45–48 %.

Males: unknown.

General characters. Body plump and medium sized, 72–83 µm wide at mid-body, sometimes C-shaped after fixation. Cuticle smooth, 2.5–3.0 µm thick at midbody, 5–6 µm thick on tip of tail, with finely striated inner layer. Lip region set off by a deep constriction, 15–18 µm wide, lips angular. Odontostyle robust, 18 µm long, relativly short, dorylaimoid, with wide lumen. Aperture occupying half the stylet length. Guiding apparatus aporcelaimoid. Amphids cup-shaped, occupying half of corresponding body width or a little more. Oesophagus 415–438 µm long, ocupying 20–25% of body lenght. Gland nuclei distinct: D = 60–62 %, AS1 = 27–30 %, AS2 = 42–44 %, PS1 = 67–69 %, PS2 = 70–72 %. Glandularium 38–40 % of full length of oesophagus. Body at posterior end of oesophgaus 3.8–4.1 times wider than head.

Female. Vulva transverse, lips heavily sclerotized. Vagina 28–35 µm long. Reproductive system amphidelpic. Each genital branch 2.1–2.5 times as long as anal body diameter. Mature eggs not observed. Distance vulva–anus equal to 2.1–2.4 body widths. Rectum as long as anal body diameter. Tail more convex ventrally than dorsally, tail terminus broadly rounded. Rectum nearly equal to anal body diameter.

Habitat and locality. Soil from closed and opened rocky grasslands, Sas Hill; coll. February, April, August and October, 2007 by the author.

Aporcelaimellus amylovorus has hithero been recorded from Hungary (Fertő–Hanság National Park), India and the United States (Andrássy, 2002b).

REFERENCES

ANDRÁSSY, I. (1977): Die Gattungen *Amphidelus* Thorne, 1939, *Paramphidelus* n. gen. und *Etamphidelus* n. gen. (Nematoda: Alaimidae). *Opuscula Zoologica Instituti Zoosystematici Universitatis Budapestinensis, 14: 3–43.*

ANDRÁSSY, I. (1990): Szabadon élő fonálférgek (Nematoda) a magyar faunában. *Állattani Közlemények, 76: 1–38.*

ANDRÁSSY, I. (2002a): The genus *Cristamphidelus* Siddiqi & Vinciguerra, 1991 and a general survey of the family Alaimidae (Nematoda). *Journal of Nematode Morphology and Systematics, 4 (2): 51-82.*

ANDRÁSSY, I. (2002b): Free-living Nematodes from the Fertő–Hanság National Park, Hungary. *In: Mahunka, S. (ed.): The fauna of the Fertő–Hanság National Park, Budapest, 21–97.*

ANDRÁSSY, I. & FARKAS, K. (1988*): Kertészeti növények fonálféreg kártevői. Agronematológiai kézikönyv.* Mezőgazdasági Kiadó, Budapest, 419 pp.

BALOGH, J. (1935): *A Sas-hegy pókfaunája. Faunisztikai, rendszertani és környezettani tanulmány. (The spider fauna of the Sas-hegy. A faunistical, taxonomical and ecological study.)* Sárkány Nyomda Rt., Budapest, 59 pp.

BOROS, G. (2007): The enchytraeid fauna (Annelida: Oligochaeta) of the Sas-hegy Nature Conservation Area, Hungary. *Opuscula Zoologica Instituti Zoosystematici Universitatis Budapestinensis, 36: 31–35.*

CLAUSI, M. & VINCIGUERRA, M. T. (1998): Revision of the genus *Amphidelus* Thorne, 1939 (Nematoda: Alaimidae). *Journal of Nematode Morphology and Systematics, 1: 57–98.*

LOKSA, I. (1977): A Sas-hegy növény és álatvilágának jellemzése. *In: Papp, J. (ed.): A budai Sas-hegy élővilága. Akadémia Kiadó, Budapest, 99 pp.*

Opusc. Zool. Budapest, 2009, 40 (1): 23–33

Uropodina mites (Acari) collected in Costa Rica, I

J. KONTSCHÁN[1]

Abstract. In this paper six Uropodina species are presented from Costa Rica. Two of them, *Oplitis pecki* Hirschmann, 1991 and *Uroobovella faceta* Hiramatsu & Hirschmann, 1978 are already known, however the other four species; *Rotundabaloghia unisetosa*, *Trigonuropoda caudosetosa*, *Brasiluropoda costaricana* and *Cyllibula forroi* spp. nov. proved to be new to science. *Oplitis peckisimilis* Hirschmann, 1991 and *O. ellipsioides* Hirschmann, 1991 are synonymized with *O. pecki*.

Uropodina species of Neotropical soils, mosses and leaf litters have been well investigated in general. There are, however, several countries in this region which were little studied in our respect, as for instance Belize, Nicaragua, Guyana and French Guyana (Wiśniewski, 1993). Costa Rica also belongs to the less investigated countries in the Neotropical Region, only Elzinga and Rettenmeyer (1966, 1970, 1975), Hirschmann (1975) and Elzinga (1981, 1982, 1995) reported a number of *Trichocylliba* species from there. Recently, Vazquez and Klompen (2007) listed some mites from Costa Rica mentioning 15 unidentified uropodine species of the genera *Eutrachytes, Nenteria, Oplitis, Polyaspis, Uroobovella, Urodiaspis* and *Uropoda*.

János Balogh, the world-wide renowned Hungarian acarologist led several expeditions to Central and South America. He and his co-workers from the Department of Systematic Zoology and Ecology of the Eötvös Loránd University as well as from the Department of Zoology of the Hungarian Natural History Museum collected thousands of "Berlese" samples from all over the world including most of the Neotropical countries (Zicsi & Csuzdi, 2008). Recently, this material is deposited in the Soil Zoology Collections of the Hungarian Natural History Museum. My first results of the investigation of the Costa Rican materials are herewith presented.

MATERIALS AND METHODS

The specimens were cleared in lactic acid and drawings were made with *camera lucida*. The specimens identified including the types are stored in alcohol and deposited in the Soil Zoology Collections of the Hungarian Natural History Museum, Budapest. All measurements are given in micrometers (μm).

RESULTS

Uroobovella faceta Hiramatsu & Hirschmann, 1978

(Fig. 1)

Uroobovella faceta Hiramatsu & Hirschmann, 1978: 74-75. Fig. 81.

Uroobovella faceta: Wiśniewski & Hirschmann 1993: 162., Wiśniewski 1993a: 239., Wiśniewski 1993b: 414.

Material examined. Four females and one male, Costa Rica, Northern part, cca. 400–500 m a.s.l., rainforest, from leaf litter and soil, 16.I. 1993; leg. J. Balogh.

Distribution. Ecuador and Costa Rica.

Remarks. Hiramatsu and Hirschmann (1978) placed it in the genus *Uroobovella* Berlese, 1903 on the basis of the gnathosomal region. In my opinion the shape of idiosoma, dorsal, marginal

[1]*Dr. Jenő Kontschán,* MTA Zootaxonómiai Kutatócsoport és Magyar Természettudományi Múzeum (Systematic Zoology Research Group of the Hungarian Academy of Sciences, and Hungarian Natural History Museum), H-1088 Budapest, Baross u. 13, Hungary. E-mail*: kontscha@zool.nhmus.hu*

and ventral setae, and shape of the peritreme suggest that this species better belongs to a new, still undescribed genus.

This is the first record of this species from Costa Rica.

Oplitis pecki Hirschmann, 1991

(Fig. 2)

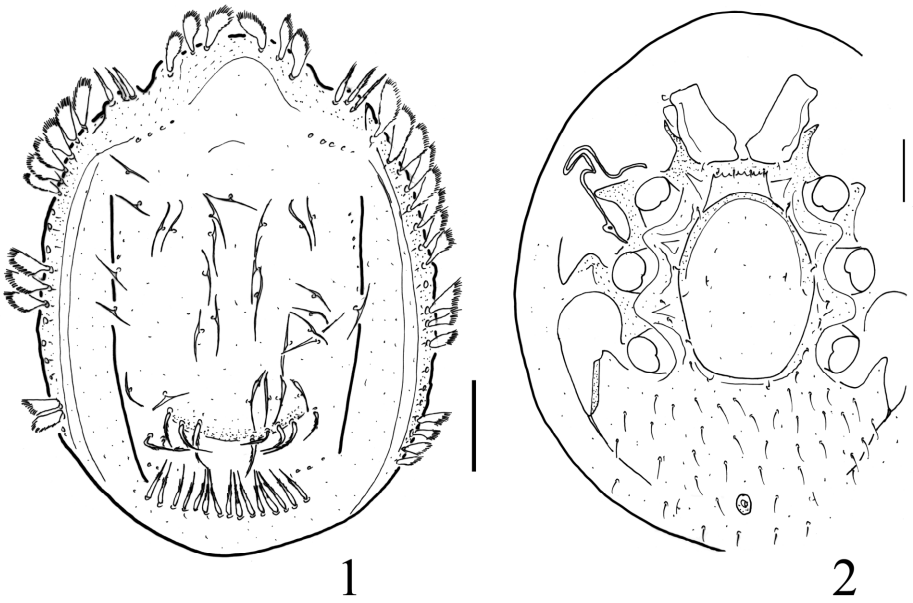
Oplitis pecki Hirschmann, 1991: 84. Figure in page 85.
Oplitis pecki: Wiśniewski & Hirschmann 1993: 61., Wiśniewski 1993a: 240., Wiśniewski 1993b: 390.
Oplitis peckisimilis Hirschmann, 1991: 82-84. Figure in page 83. **syn. nov.**
Oplitis peckisimilis: Wiśniewski & Hirschmann 1993: 61., Wiśniewski 1993a: 240., Wiśniewski 1993b: 390.
Oplitis ellipsioides Hirschmann, 1991: 84 and 86. Figure in page 86. **syn. nov.**
Oplitis ellipsioides: Wiśniewski & Hirschmann 1993: 61., Wiśniewski 1993a: 240., Wiśniewski 1993b: 389.

Material examined. Three females and one male, Costa Rica, Santa Cruz, Universidad de Costa Rica, cca. 150 m a.s.l., 17.I.1992; leg. J. Balogh.

Distribution. Galapagos Archipelago and Costa Rica.

Remarks. When described *Oplitis pecki, Oplitis peckisimilis* and *Oplitis ellipsioides,* Hirschmann (1991) mentioned that they differ from each other in the proportion of length and width of the genital shields. In my opinion, these differences are not enough for establishing new species, they represent merely variations among different populations within the same species.

This is the first record of this species from Costa Rica.



Figures 1–2. 1 = *Uroobovella faceta* Hiramatsu & Hirschmann, 1978; 2 = *Oplitis pecki* Hirschmann, 1991. (Scale bar 100 μm)

***Rotundabaloghia unisetosa* sp. nov.**

(Figs. 3–9)

Material examined. Holotype: female, Costa Rica, Arenal, Northern part, cca. 400–500 m a.s.l., rainforest, from moss of trees, 16.I.1993; leg. J. Balogh. Paratype: male, locality and date same as that of the holotype. Other paratypes: four females and three males, Costa Rica, Santa Cruz, Universidad de Costa Rica, cca. 150 m a.s.l. from decayed wood with soil, 17.I.1992; leg. J. Balogh.

Diagnosis. Sternal setae St2 and St3 long and needle-like, St1 three times and St4 two times shorter than other sternal setae. All ventral setae smooth, V2 and V7 long and wide, *ad* and V6 slightly shorter than V2 and V7. V8 absent. Sternal, genital and ventral shields without ornamentation. Genital shield of female scutiform. Dorsal setae bearing short hairs on their apical part.

Female. Length of idiosoma 300–310 µm, width 250–270 µm (n = 5). Shape circular, posterior margin rounded.

Dorsal side (Fig. 3). Marginal and dorsal shields fused. All dorsal setae bearing short hairs on their apical margins (Fig. 4). Sculptural pattern of dorsal shield absent.

Ventral side (Fig. 5). Sternal and ventral shields without ornamentation. Two pairs of sternal setae (St2 and St3) long and smooth, St1 three times shorter than St2 and St3. St4 two times shorter than St2 and St3. St1 placed near the anterior margin of genital shield, St2 near the anterior margin of coxae II, St3 near the central region of coxae III. St4 can be found near the anterior margin of coxae IV. All ventral setae smooth and needle-like. V2 can be seen near the basal margin of the genital shield, V7 near the metapodal line, V6 between V2 and V7. V8 absent. Setae *ad* similar to ventral setae and placed near the anal platelets. One pair of lyriform fissures can be found near the posterior margin of coxae IV. Tritosternum not clearly visible.

Stigmata situated between coxae II and III. Peritreme hook-shaped.

Genital shield scutiform, without ornamentation on its surface and without process on its apical margin.

Gnathosoma (Fig. 6). Corniculi horn-like, internal malae short and smooth. Hypostomal setae are as follows: h1 long, smooth and setiform, h2 two times shorter than h1, setiform and smooth, h3 1.5 times longer than h2, setiform and with serrated margins, h4 as long as h2, setiform, with serrated margins. Labrum with hairs on its apical part. Epistome narrow and apical part bears short hairs (Fig. 7). Chelicera as is shown on Fig. 8. Palp trochanter with two smooth setae, other setae of the palp smooth and simple.

Male. Length of idiosoma 310–320 µm, width 270–280 µm (n = 4). Shape circular, posterior margin rounded.

Dorsal side. Ornamentation and chaetotaxy of dorsal shield similar as for the female.

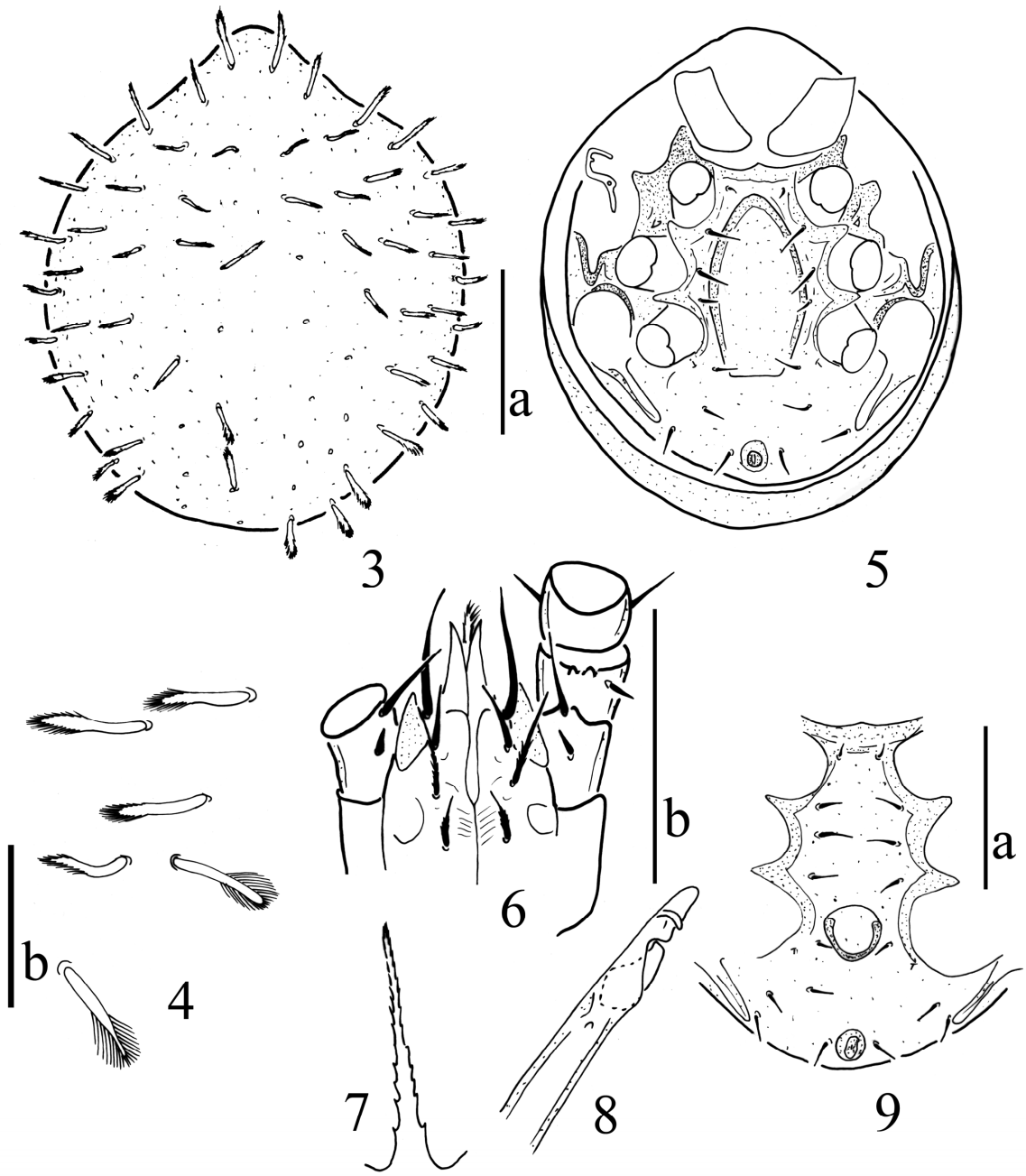
Ventral side (Fig. 9). Sternal and ventral shields without ornamentation. Two pairs of sternal setae (St2 and St3) long and smooth, St1 three times shorter than St2 and St3. St4 two times shorter than St2 and St3. St1 placed near the anterior margin of sternal shield, St2 near the anterior margin of coxae II, St3 near the central region of coxae III. St4 can be found near the anterior margin of coxae IV. St5 present and placed near the posterior margin of genital shield. All ventral setae smooth and needle-like. Shape and position of ventral setae same as that of the females (Fig. 14).

Genital shield oval and placed between coxae IV.

Gnathosoma. Same as in females.

Etymology. The specific epithet refers to the single seta in the metapodal line.

Remarks. Missing of setae V8 is an unusual character in the genus *Rotundabaloghia.* Recently we do not know any other species of this genus without V8 setae.



Figures 3-9. *Rotundabaloghia unisetosa* sp. nov. 3 = dorsal view, 4 = dorsal setae, 5 = ventral view, 6 = ventral view of gnathosoma, 7 = epistome, 8 = chelicera (female), 9 = sternal region of male. (Scale bar: a: 100 μm, b: 50 μm)

***Trigonuropoda caudosetosa* sp. nov.**

(Figs. 10–15)

Material examined. Holotype: female. Costa Rica, Sierra de La Muerte, El Empalme, Lower Montana Rain Forest, 2150 m a.s.l., from leaf litter, 24.I.1992; leg. J. Balogh. Paratypes: three males, locality and date same as holotype.

Diagnosis. All dorsal setae smooth, long and setiform, but several very long dorsal setae can be found near the anterior margin of caudal cavity. Marginal setae shorter than dorsal setae. Ornamentation lacking on dorsal and marginal shields. Scalloping can be seen between dorsal and marginal shields on the caudal region. Ventral setae similar to dorsal setae. Genital shield of female scutiform, peritreme M-shaped.

Female. Length of idiosoma 470 µm, width 330 µm (n = 1). Shape oval, posterior margin rounded

Dorsal side (Fig 10). Dorsal and marginal shields fused on the anterior region. All dorsal setae long, smooth and setiform. Posterior region of dorsal shield with a cavity, which has a well sclerotised posterior margin. Dorsal setae on anterior margin of dorsal cavity 1.5 times longer than other dorsal setae (Fig. 12). Marginal setae smooth, setiform and three times shorter than dorsal setae (Fig. 11). Dorsal and marginal shields without ornamentation.

Ventral side (Figs 2 and 13). Sternal and ventral shields without sculptural pattern, all sternal setae short, smooth and needle-like. St1 placed near the anterior margin of genital shield, St2 near central region of coxae II, St3 near central region of coxae III. St5 can be found at the basal part of genital shield. Ventral setae four times longer than sternal setae, all sternal setae smooth, and setiform. Ventral setae situated in four rows: first row can be found on the level of posterior margin of coxae IV, second row on central region of metapodal line, third on the level of anal platelets and fourth on level of postanal setae. Ornamentation of ventral shield lacking. Tritosternum with narrow basis and trifurcated laciniae (Fig. 14).

Stigmata situated between coxae II and III. Peritreme long, M-shaped.

Genital shield scutiform, without patterns and process. Genital shield localized between coxae II and IV.

Gnathosoma (Fig 14). Corniculi horn-like, internal malae short and smooth. The ventral part of gnathosoma with the following hypostomal setae: h1 smooth and long, h2 setae five times shorter than h1 and smooth, h3 smooth and two times shorter than h1, h4 smooth and trifurcated. Labrum with short hairs. Epistome with serrated margin on its basal part, and with short hairs on its apical part. Chelicera not clearly visible.

Male. Length of idiosoma 460–470 µm, width 310–340 µm (n = 3). Shape oval, posterior margin rounded. Dorsal side similar to that of the female.

Ventral side (Fig 15): Sternal shield without ornamentation. Sternal setae smooth, short and needle-like. Ventral setae similar to that of the female.

Genital shield of male circular and situated between coxae IV.

Gnathosoma. Same as in females.

Nymphs and larva are unknown.

Etymology. The specific epithet refers to the long caudal setae.

Remarks. The presence of the dorsal cavity and the shape and length of the dorsal setae is unique in the genus *Trigonuropoda*.

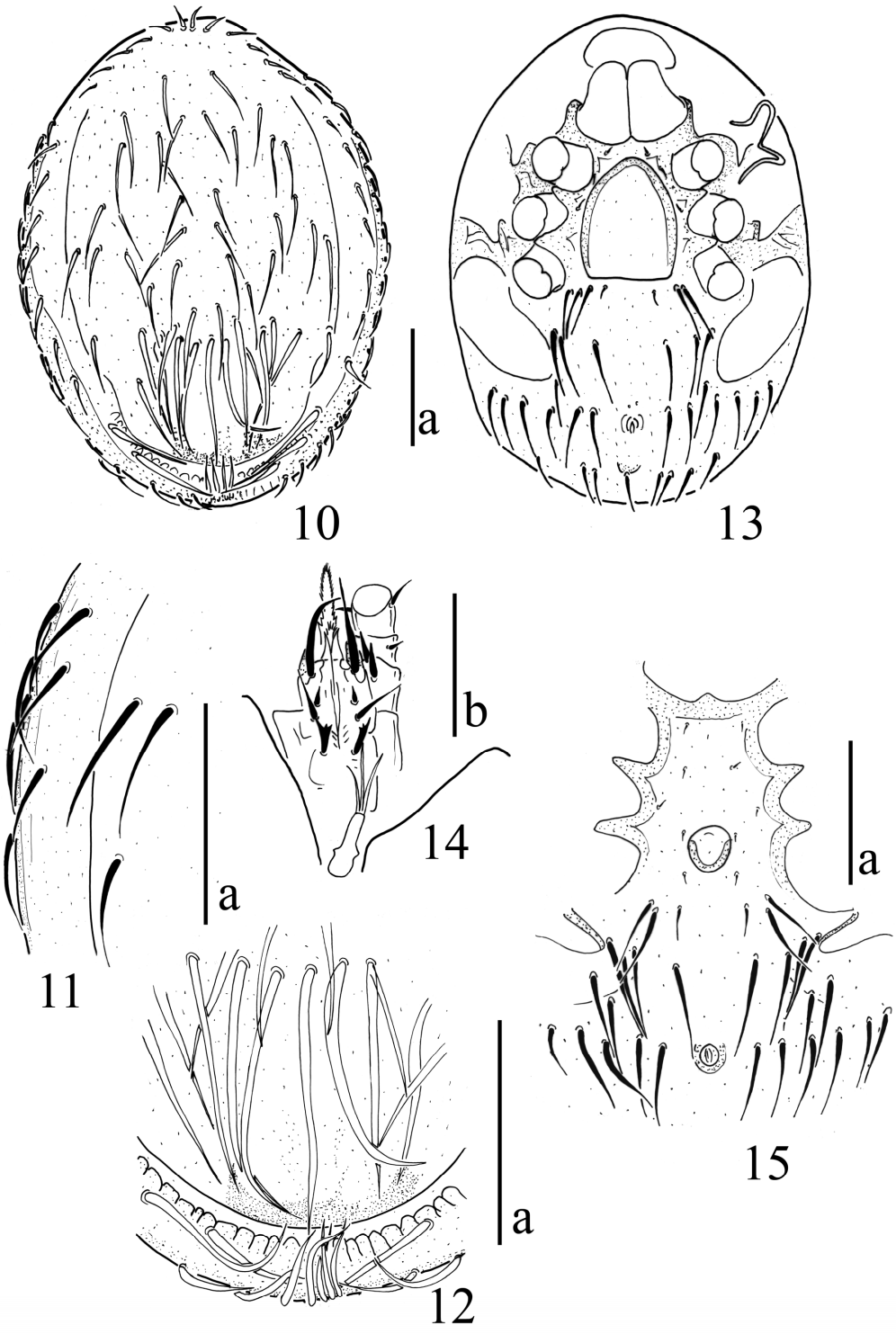
***Brasiluropoda costaricana* sp. nov.**

(Figs. 16–22)

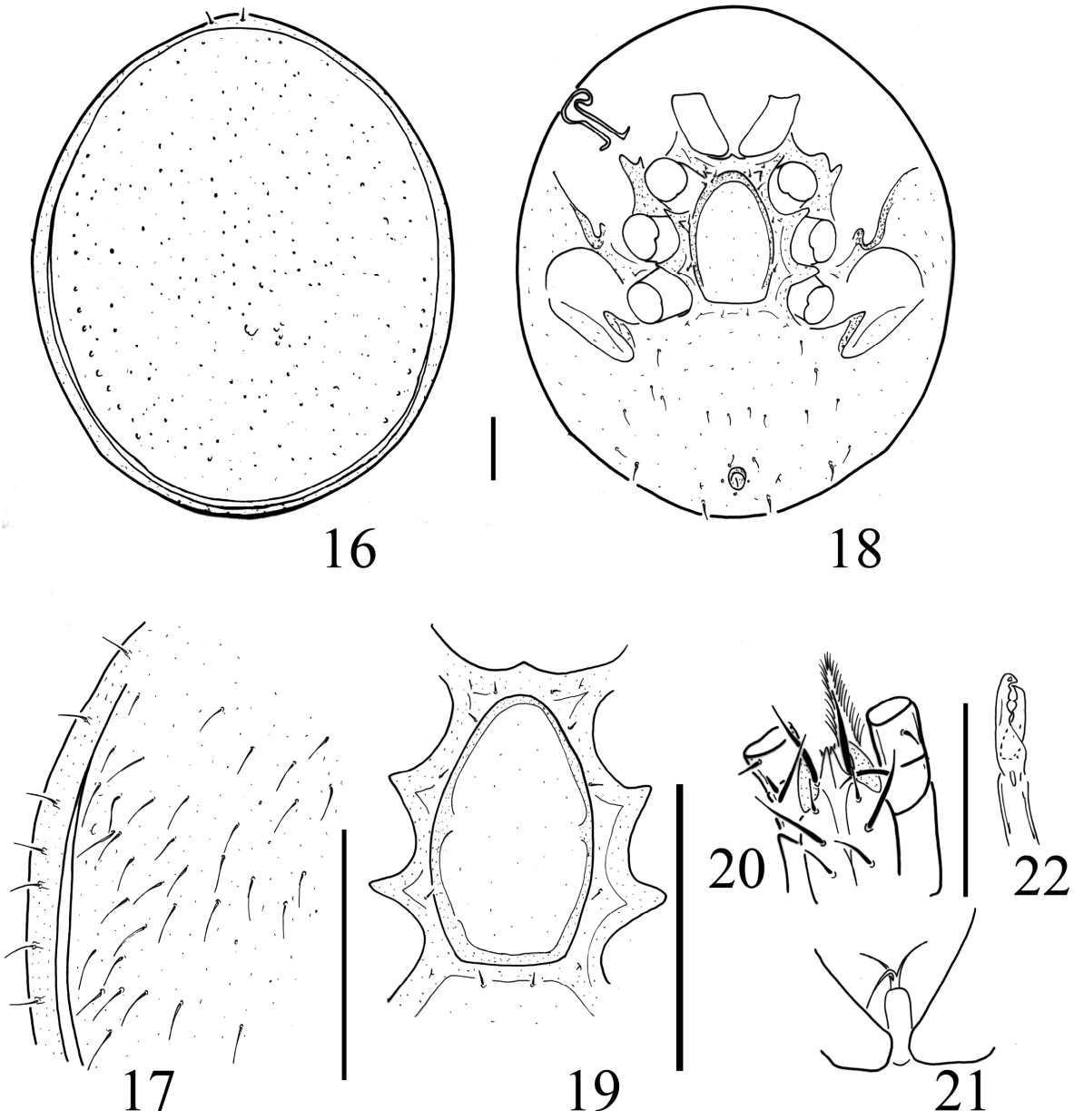
Material examined. Holotype: female: Costa Rica, Sierra de La Muerte, Cerro La Muerty, 3400 m a.s.l., Montana Rain Forest, from mixed moss, 24.I.1992; leg. J. Balogh. Paratypes: two females, locality and date same as in holotype.

Diagnosis. All dorsal and marginal setae smooth, narrow and needle-like. Sternal setae short, smooth and needle-like, ventral setae two times longer than sternal setae. Eight ventral setae can be found in a row between the anal platelets and the metapodal lines. Peritreme asymmetric, mushroom-shaped.

Female. Length of idiosoma 780–800 µm, width 670–690 µm (n = 3). Shape oval, posterior margin rounded. *Dorsal side* (Fig. 16). Dorsal and marginal shields separated. Ornamentation on dor-



Figures 10–15. *Trigonuropoda caudosetosa* sp. nov. 10 = dorsal view, 11 = marginal setae, 12 = caudal setae 13 = ventral view, 14 = ventral view of gnathosoma (female), 15 = sternal region of male. (Scale bar: a: 100 μm, b: 50 μm)



Figures 16–22. *Brasiluropoda costaricana* sp. nov. 16 = dorsal view, 17 = marginal- and dorsal setae, 18 = ventral view, 19 = genital shield of female, 20 = ventral view of gnathosoma, 21 = tritosternum, 22 = chelicera. (Scale bar 100 μm)

sal and marginal shields lacking. All dorsal and marginal setae smooth, narrow and needle-like (Fig. 17).

Ventral side (Fig. 18). Sternal and ventral shields without sculptural pattern, all sternal setae short, smooth and needle-like (Fig. 19). St1 placed near the anterior margin of genital shield, St2 near anterior region of coxae II, St3 near posterior region of coxae III, St4 near anterior margin of coxae IV. St5 can be found at the basal part of genital shield. One pair of lyriform fissure can be found near St1, an other pair placed near

St5. Ventral setae two times longer than sternal setae, all ventral setae smooth, and needle-like. Eight ventral setae placed in a row between anal platelets and metapodal lines. Tritosternum with narrow basis and trifurcated laciniae. (Fig. 21).

Stigmata situated between coxae II and III. Peritreme long, asymmetric mushroom-shaped.

Genital shield scutiform, without patterns and process. Genital shield localized between coxae II and IV.

Gnathosoma (Fig. 20). Corniculi horn-like, internal malae short and smooth. The ventral part of gnathosoma with the following hypostomal setae: h1 smooth and long, h2 setae three times shorter than h1 and smooth, h3 smooth and as long as h1, h4 smooth and as long as h2. Epistome with short hairs on its apical part. Chelicera is shown in Fig. 22.

Nymphs and larva are unknown.

Etymology. This species is named after the country where it was collected.

Remarks. The new species with its asymmetric mushroom-shaped peritreme belongs to the *mahunkai* species group.

Key to the species of the *mahunkai* group

1 Ornamentation on sternal and ventral shields present .....
..... ***B. eustructura*** Hirschmann & Zirngiebl-Nicol, 1975
– Ornamentation on sternal and ventral shields absent.....2
2 Ventral setae short.....3
– Ventral setae very long.....
..... ***B. loksai*** Zirngiebl-Nicol & Hirschmann, 1975
3 Eight ventral setae arranged in a row.....
.....***B. costaricana*** sp.nov.
– Ventral setae not not arranged in a row.....
..... ***B. mahunkai*** Zirngiebl-Nicol & Hirschmann, 1975

Cyllibula forroi sp. nov.

(Figs. 23–28)

Material examined. Holotype: female: Costa Rica, Arenal, Northern part, cca. 400-500 m a.s.l., rainforest, from leaf litter and soil, 16.I.1993. leg. J. Balogh. Paratypes: one female and two males, locality and date same as holotype.

Diagnosis. All dorsal and marginal setae needle-like and bear short hairs on their margins. Sternal and ventral setae short, smooth and needle-like. Several long (two times longer than other ventral setae) smooth and setiform setae can be seen near the margin of ventral shield. Peritreme S-shaped.

Female. Length of idiosoma 610–620 μm, width 540–550 μm (n=2). Shape oval, posterior margin rounded.

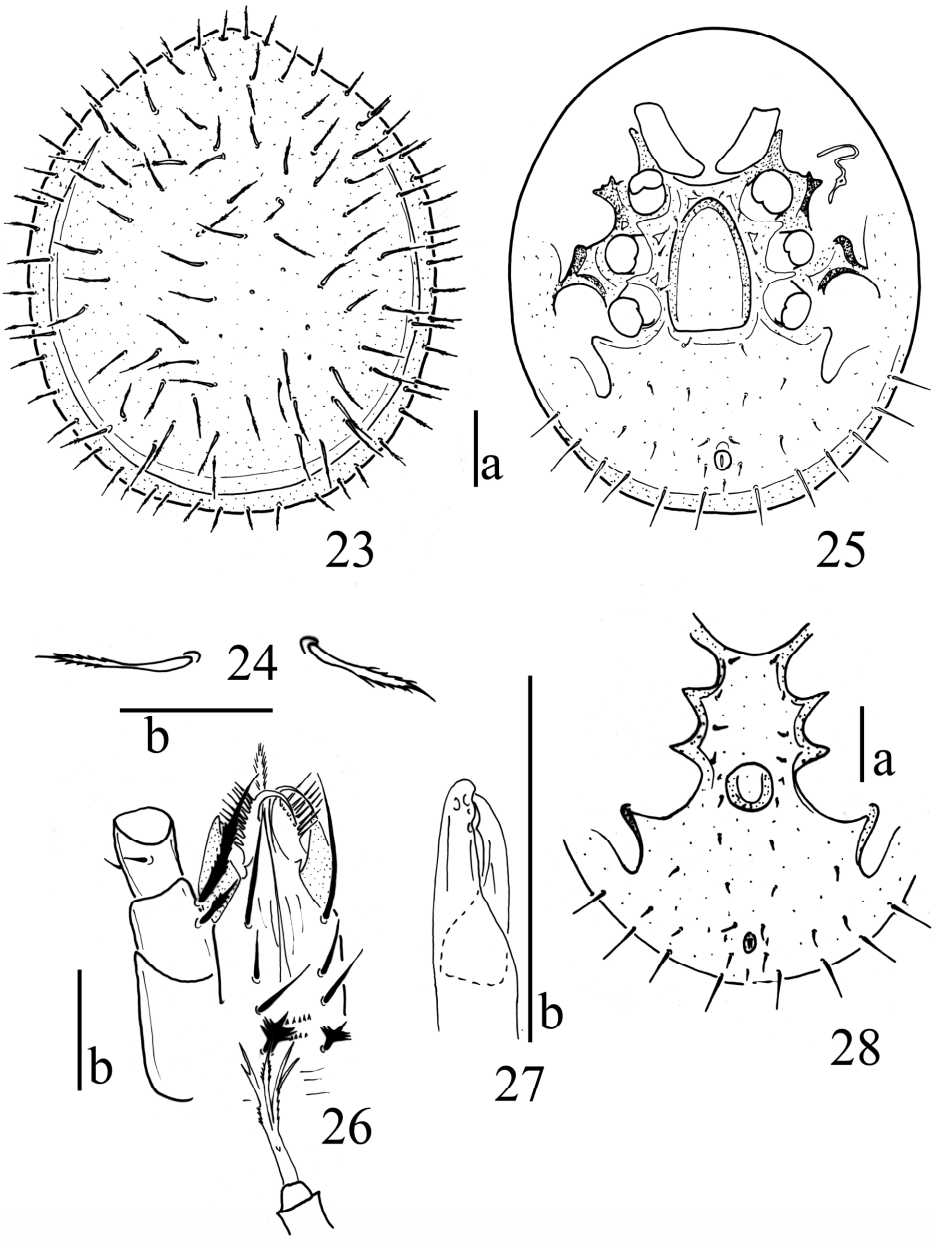
Dorsal side (Fig. 23). Dorsal and marginal shields fused on the anterior region. Ornamentation on dorsal and marginal shields lacking. All dorsal and marginal setae needle-like and bear short hairs on their margins (Fig. 24).

Ventral side (Fig. 25). Sternal and ventral shields without sculptural pattern, all sternal setae short, smooth and needle-like. St1 placed near the anterior margin of genital shield, St2 near posterior margin of coxae II, St3 near central region of coxae III, St4 near central region of coxae IV. St5 can be found at the basal part of genital shield. Ventral setae smooth, needle-like and as long as sternal setae. Several longer setae can be found near the caudal margins of ventral shield. One pair of lyriform fissures can be seen near the anal platelets. Tritosternum with narrow basis and trifurcated laciniae provided with serrated margin (Fig. 26).

Stigmata situated between coxae II and III. Peritreme S-shaped.

Genital shield scutiform, without patterns and process. Genital shield localized between coxae II and IV.

Gnathosoma (Fig. 20). Corniculi horn-like, internal malae long and with several branches on the margin. The ventral part of gnathosoma with the following hypostomal setae: h1 smooth and long, h2 setae three times shorter than h1 and smooth, h3 smooth and as long as h2, h4 short and antler-shaped. Epistome with short hairs on its apical part. Chelicera is shown in Fig. 27.



Figures 23–28. *Cyllibula forroi* sp. nov. 23 = dorsal view, 24 = dorsal setae, 25 = ventral view, 26 = ventral view of gnathosoma and tritosternum, 27 = chelicera (female), 28 = sternal region of male. (Scale bar a: 100 μm, b: 50 μm)

Male. Length of idiosoma 620–630 μm, width 510–540 μm (n=2). Shape oval, posterior margin rounded. Dorsal side similar to that of the female.*Ventral side* (Fig 28): Sternal shield without ornamentation. Sternal setae smooth, short and needle-like, one pair of lyriform fissures can be found near the genital shield. Ventral setae similar to female. Genital shield of male circular and situated between coxae IV. *Gnathosoma.* Same as in the females.

Nymphs and larva are unknown.

Etymology. I dedicate this new species to Dr. László Forró, Crustacean specialist, head of the Department of Zoology of the Hungarian Natural History Museum.

Remarks. The new species with its S-shaped peritreme belongs to the *kaszabi* species group. The dorsal setae with short hairs and the antler-shaped h4 setae are unique for this species in the *kaszabi* group.

ZOOGEOGRAPHICAL NOTES

Six Uropodina species are listed in the present work from Costa Rica. One of the already known species, *Uroobovella faceta* Hiramatsu & Hirschmann, 1978 was originally described from Ecuador (Hiramatsu & Hirschmann, 1978, Wiśniewski 1993a). I suppose that this species has a wider distribution in Central and South America.

The other known species *Oplitis pecki* was described from the Galapagos Island, however the genus *Oplitis* is a world-wide distributed genus, and urgently need to be revised.

One of new species (*Brasiluropoda costaricana*) is the 15th species of the neotropical genus *Brasiluropoda* Hirschmann & Zirngiebl-Nicol, 1964. The members of this genus occur only in Brasilia, Paraguay and Peru (Wiśniewski 1993a). This is the first record of the genus from Central America.

The *Cyllibula* Berlese, 1916 species are widely distributed in the Neotropical region (Brasilia, Cuba and other Caribbean Islands, Mexico, Bolivia, Peru, Paraguay, Chile and Venezuela (Wiśniewski 1993a, Kontschán 2007), in Polynesia, Malaysia, West-Africa and Europe (Wiśniewski 1993a). This is the first record of the genus from Costa-Rica.

The circum-tropical and species-rich genus *Rotundabaloghia* has not been recorded from Costa Rica so far; the species of this genus occur in every tropical regions of the world. Recently more than 60 species are described from Central- and South-America (Kontschán 2007, 2008a), so the occurrence of the genus in Costa, Rica is not surprising.

Trigonuropoda caudosetosa sp. nov. belongs to the monotypic circumtropical family Trigonuropodidae, There are only two species recorded for continental South America so far (Peru; Wiśniewski 1993a) and 12 species are known from the Caribbean Islands (Cuba and Dominican Republic; Kontschán, 2008 b).

Acknowledgements. This paper was supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences.

REFERENCES

ELZIGA, R. J. (1981): The generic status and six new species of Trichocylliba (Acari: Uropodina). *Acarologia,* 23(1): 3–18.

ELZINGA, R. J. (1982): The genus *Antennequesoma* (Acari: Uropodina) and description of four new species. *Acarologia,* 23 (4) 319–325.

ELZINGA, R. J. (1995): Six new species of *Trichocylliba* (Acari: Uropodina) associated with army ants. *Acarologia,* 36(2): 107–115.

ELZINGA, R. J. & RETTENMEYER, C. (1966): A neotype and new species of *Planodiscus* (Acarina: Uropodina) found on doryline ants. *Acarologia,* 8(2): 191–199.

ELZINGA, R. J. & RETTENMEYER, C. (1970): Five new species of *Planodiscus* (Acarina: Uropodina) found on doryline ants. *Acarologia,* 12(1): 59–70.

ELZINGA, R. J. & RETTENMEYER, C. (1975): Seven new species of *Circocylliba* (Acarina: Uropodina) found on army ants. *Acarologia,* 16(4): 595–611.

HIRAMATSU, N. & HIRSCHMANN, W. (1978): Gangsystematik der Parasitiformes. Teil 282. Teilgänge, Stadium von 4 neuen *Uroobovella*–Arten und *Uroobovella pectinata* (Hirschmann, 1973) der *Pulchella*–Gruppe aus Neuguinea und Ekuador (Dinychini, Uropodinae). *Acarologie. Schriftenreihe für Vergleichende Milbenkunde,* 24:73–79.

HIRSCHMANN, W. (1975): Gangsystematik der Parasitiformes. Teil 198. Stadien von 4 neuen Uropodiden-Arten aus „Manual of Acarology" von G.W. Krantz. *Acarologie. Schriftenreihe für Vergleichende Milbenkunde,* 21: 17–18.

HIRSCHMANN, W. (1991): Gangsystematik der Parasitiformes. Teil 528. Die Ganggattung *Oplitis* Berlese, 1884 – Artengruppen – Bestimmungstabellen – Diagnosen – (Trachyuropodini, Oplitinae). *Acarologie. Schriftenreihe für Vergleichende Milbenkunde,* 38: 1–106.

KONTSCHÁN, J. (2007): A new *Rotundabaloghia* Hirschmann, 1975 species from Cuba (Acari: Mesostigmata: Uropodina). *Acta Zoológica Mexicana (n.s),* 23: 135–137.

KONTSCHÁN, J. (2008 a): New and rare *Rotundabaloghia* species (Acari: Uropodina) from the tropics. *Opuscula Zoologica Budapest,* 39: 15–41.

KONTSCHÁN, J. (2008 b): *Trigonuropoda* (*Baloghiatrigon*) *dominicana* sp. nov. from the Dominican Republic, with notes on the subgenus *Baloghiatrigon* Hirschmann, 1979 (Acari: Uropodina: Trigonuropodidae). *Zootaxa,* 1856: 55–66.

VÁZQUEZ, M. M. & KLOMPEN, H. (2007): New records of Uropodina mites from México, Guatemala, Belize and Costa Rica. *Dugesiana,* 14(1): 27–37.

WIŚNIEWSKI, J. (1993a): Gangsystematik der Parasitiformes. Teil 549. Die Uropodiden der Erde nach Zoogeographischen Regionen und Subregionen geordnet. (Mit Angabe der Lande). *Acarologie. Schriftenreihe für Vergleichende Milbenkunde,* 40: 221–291.

WIŚNIEWSKI, J. (1993b): Alphabetisches Verzeichnis der Uropodiden (Gattungen, Arten, Synonyma). *Acarologie. Schriftenreihe für Vergleichende Milbenkunde,* 40: 371–429.

WIŚNIEWSKI, J. & HIRSCHMANN, W. (1993) Gangsystematik der Parasitiformes. Teil 548. Katalog der Ganggattungen, Untergattungen, Gruppen und Arten der Uropodiden der Erde. *Acarologie. Schriftenreihe für Vergleichende Milbenkunde,* 40: 1–220.

ZICSI, A. & CSUZDI, CS. (2008): Report on the soil–zoological expeditions to Ecuador and Colombia between 1986–1993. I. List of localities and habitats of "Berlese" samples. *Opuscula Zoologica Budapest,* 37: 71–88

Opusc. Zool. Budapest, 2009, 40 (1): 35–46

Millipedes (Diplopoda) of the Aggtelek National Park, Northeast Hungary

E. LAZÁNYI and Z. KORSÓS[1]

Abstract. Twenty-two species of millipedes (Diplopoda) were recorded during a survey of the Aggtelek National Park in north-eastern Hungary, consisting of one-fifth of the total Hungarian millipede fauna. The relatively low representation may be due to the general pitfall trap collecting method, thus leaving out species with special habitat requirements such as bark-dwellers, etc. Species worth mentioning, however, could still be recorded: *Glomeris tetrasticha*, *Polyzonium germanicum*, *Enantiulus tatranus*, and *Unciger transsilvanicus* were only collected in very few occasions. Specimens of *Mastigona bosniensis* Verhoeff, 1897, *M. bosniensis hungaricum* Loksa, 1953, and *M. mehelyi* Verhoeff, 1897 were found so similar and geographically so closely occurring to each other, that they are considered here as synonyms. The same is true for *Enantiulus tatranus evae* (Loksa, 1968) which we consider identical with the nominal form.

INTRODUCTION

Investigation on the Hungarian National Parks (NP) and exploration of their flora and fauna have been carried out for decades, and monographs have been compiled to represent almost all animal groups of the investigated sites (Kaszab & Mahunka, 1981). The project is quite a unique venture worldwide, as very few works have been done with the aim of complete faunal lists of certain geographical areas (Báldi, 1999). Data acquired in that way do not only give a comprehensive picture for later comparative purposes, but also provide essential records for the conservation biology, too. The millipede fauna of the National Parks of Hungary received relatively little attention up to now (Loksa, 1983; Korsós, 1987; Korsós & Dányi,. 2002).

The Aggtelek National Park is situated at the north-eastern border of Hungary, and was founded in 1985. After the survey carried out by the staff of the Hungarian Natural History Museum (HNHM), a two-volume monograph has been written on its fauna (Mahunka, 1999b). Unfortunately, due to lack of time, an overview of the millipede species was left out from that book. The aim of the present study is to fill the gap, and thus to contribute to a better knowledge of the millipede fauna of Hungary.

MATERIAL AND METHODS

The project to study the Aggtelek National Park by the Hungarian National History Museum started in 1987, and officially lasted for four years, but additional collectings were performed until 2002. Soil animals and hence millipedes (Diplopoda) were collected from numerous sampling sites, a complete list of which is given by Mahunka (1999a). Sampling times each year covered the usual activity period of millipedes, i.e. from March till November. Material deriving from pitfall traps, siftings and hand-collectings were sorted in the upcoming years.

These data are supplemented by records from an additional National Biodiversity Monitoring Project organized also by the NP in 2002 and 2005. In this way, two additional collecting sites were investigated, which are under the protection and supervisorship of the NP Directorate but do not constitute part of the NP itself. These are the Mohos Peatbogs and the Piroska Hill, both belonging to the municipality of Kelemér, and the latter is being part of the Putnoki Hills. Pitfall

[1]*Eszter Lazányi* and *Dr. Zoltán Korsós,* Department of Zoology, Hungarian Natural History Museum, H-1088 Budapest, Baross u. 13, Hungary. E-mails: pesca12@gmail.com, korsos@nhmus.hu

traps in this project were emptied every second week, from May till October. Millipede records of the monitoring project are incorporated into the present publication.

All millipede specimens were preserved in 70% ethanol, and are deposited in the Myriapod Collection of the HNHM. For identification we used a Nikon SM-800 stereo microscope, and the relevant publications (Blower, 1985; Schubart, 1934). We also compared our results with works dealing with the Slovakian millipede fauna (Mock, 2001, 2008).

Here we present the millipede fauna of the Aggtelek NP in the usual taxonomical arrangement (see e.g. Korsós, 2005). At each species we give the list of localities according to the followings: at first the administrative unit (name of settlement or municipality), and at second the geographical name of the locality. Common geographical names of the latter are translated into English (e.g. hill, lake), but if they constitute an integrated part of the Hungarian name (i.e. they are written merged together), we did not translate them (e.g. Szelcepuszta *vs*. Szelce-valley).

Exact date and other circumstances of the records (e.g. name of collector) are only presented if the species in question is considered as rare in Hungary or has only sporadic occurrences. Summarized number of localities and occurrences (i.e. collecting dates) are provided in the remark section of each species paragraph, as well as other taxonomical, geographical and ecological observations.

RESULTS

POLYXENIDA

Polyxenidae

Polyxenus lagurus (Linnaeus, 1758)

Scolopendra lagura Linnaeus, 1758: 637.
Pollyxenus lagurus: Latreille 1802-1804: 45.
Polyxenus lagurus: Latzel 1884: 70., Loksa 1953: 178.

Localities. Varbóc, Bokány-hilltop; Jósvafő, Tohonya-crag; Szin, Szelcepuszta.

Remarks. Typical bark-dwelling species, once found under barks, twice sifted.

GLOMERIDA

Glomeridae

Glomeris hexasticha Brandt, 1833

Glomeris hexasticha Brandt, 1833: 197.
Glomeris hexasticha: Jermy 1942: 21-24., Loksa 1968a: 266-272.

Localities. Aggtelek, Aggteleki-lake; Aggtelek, Baradla-hilltop; Aggtelek, Haragistya; Aggtelek, Ménes-valley; Aggtelek, Mihály-láza; Aggtelek, Patkós-side; Aggtelek, former Haragistya Forester House; Jósvafő, Hosszú-valley; Jósvafő, valley of the Kecső-stream; Jósvafő, Lófej-valley; Jósvafő, Nagy-side; Jósvafő,Szelce-valley; Jósvafő, Hotel Tengerszem; Perkupa, Telekes-valley; Háló-valley; Szin, Kuhogy; Szin, Őzes-crag; Szin, Patkós-valley; Szin, Szelcepuszta; Szinpetri, Szőlő-hill; Szögliget, Derenk; Szögliget, Ménes-valley; Szögliget, Ménes-valley, Ménes-lake; Szögliget, Ménes-valley, Ménes-stream; Szögliget, Patkós-side; Szögliget, Patkós-valley; Szögliget, Szádvár; Trizs; Zádorfalva, Szuha-valley; Kelemér, Mohos-peatbogs; Kelemér, Piroska-hill.

Remarks. The most abundant species in the Aggtelek NP, with 76 occurrences in 31 localities. Its abundance is not surprising, as *Glomeris hexasticha* is a common forest species in Hungary. We found it in almost all kind of woodland: hornbeam, oak, pine, beech, cherry, hawthorn, and even on open grass slopes and in karst sinkholes. Loksa (1968a, 1979) also reported this species twice in the Bükk Mountains. A complex taxonomical review on the Hungarian glomerid species was written by Jermy (1942).

Glomeris tetrasticha Brandt, 1833

Glomeris tetrasticha Brandt, 1833
Glomeris connexa: C. L. Koch 1847: 97.
Glomeris connexa: Schubart 1934: 41-43., Jermy 1942: 37-42., Loksa 1953: 178.
Glomeris tetrasticha: Hoess 2000: 13., Hoess & Scholl 2001: 18.

Localities. Aggtelek, Ménes-valley; Jósvafő, Tohonya-valley; Szin, Őzes-crag; Szin, Patkós-valley; Szin, Patkós-valley, Puska Pál-spring; Szögliget, Ménes-valley; Szögliget, Ménes-stream; Szögliget, Medvekerti-spring; Szögliget, Patkós-side.

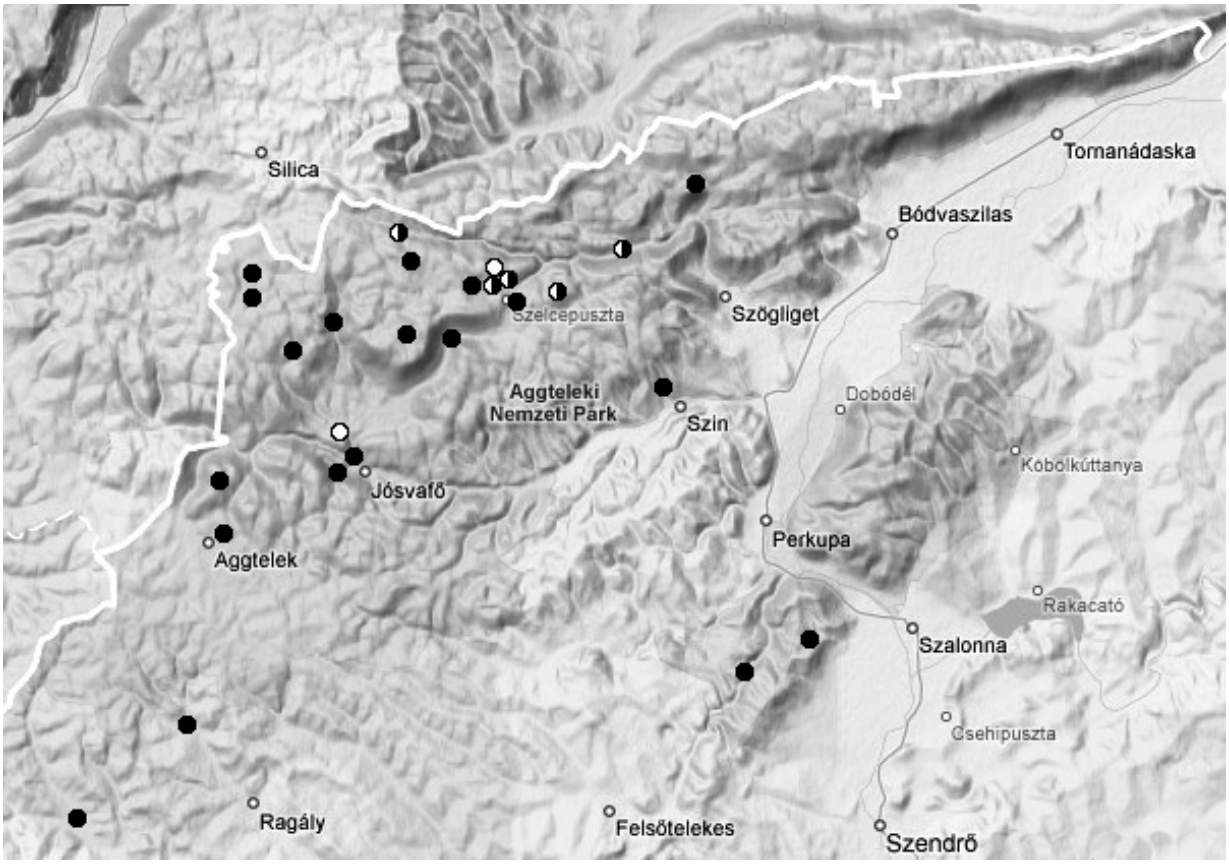


Figure 1. Distribution of *Glomeris hexasticha* (black circles) and *G. tetrasticha* (white circles) in the Aggtelek National Park

Remarks. The species occurred 9 times in 10 localities, 6 times together with *G. hexasticha*. The three separate localities are also close to other *G. hexasticha* occurrences so we can assume that the two species have overlapping distributions (Fig. 1). Loksa (1953) and Szlávecz & Loksa (1991) found these two species together in Bátor-liget.

POLYZONIIDA

Polyzoniidae

Polyzonium germanicum Brandt, 1837

Polyzonium germanicum Brandt, 1837: 179.
Polyzonium germanicum: Loksa 1968a: 266.

Locality. Jósvafő, Tohonya-crag.

Remarks. A single record is from an oak forest on limestone rock, collected by sifting, 6. Sep. 1989, leg. O. Merkl. Loksa (1968a, 1979) also found this species in oak and beech forests in the Bükk Mountains.

CHORDEUMATIDA

Mastigophorophyllidae

Mastigona bosniensis (Verhoeff, 1897)

Heteroporatia bosniense Verhoeff, 1897a: 193-195.
Mastigona bosniensis: Jeekel 1971: 67.
Heteroporatia bosniense hungaricum Loksa, 1953: 179. **syn. nov.**
Heteroporatia bosniense: Loksa 1968a: 272-276.
Mastigona bosniensis: Loksa 1988: 164.
Heteroporatia mehelyi Verhoeff, 1897a: 195-196. **syn. nov.**

Localities. Jósvafő, Hosszú-valley; Szögliget, Ménes-valley and Szin, Szelcepuszta.

Remarks. *M. bosniensis* was found only once at the first two sampling sites, whereas *M. mehelyi*

three times at the third locality. We found numerous female and juvenile specimen of *Mastigona* spp. at other collecting localities, too, but they could not be assigned to species. Even *Mastigona* males are hard to identify because the specific difference is only the number of teeth (denticles) at the end of the spear-shaped lamella (= „Stachelblatt") located mesally on the anterior gonopods (in *M. bosniensis* there are 1-4 teeth, in *M. vihorlatica* 6-8, and in *M. mehelyi* there is none). Hauser (2004) considered this small trait too variable, so he suggested *M. vihorlatica* (Attems, 1899) and *M. bosniensis* (Verhoeff, 1897a) to be synonyms (although did not explicitly stated it). Here we tentatively suggest *M. mehelyi* (Verhoeff, 1897a) to be also a junior synonym of *M. bosniensis*, thus in Aggtelek NP only *M. bosniensis* occurs.

Loksa (1953) described a new subspecies of *M. bosniensis* from Bátorliget (*H. bosniense hungaricum*). The original description fits both for *M. bosniensis* and *M. mehelyi*, therefore we suggest the subspecies as a synonym of *M. bosniensis*. Loksa (1968 *a*, 1979) also recorded *M. bosniensis* several times from Hungary, twice from the Bükk Mountains. A fourth species, *M. transsylvanica*, was described by Verhoeff (1897b) without gonopod illustrations from the South Carpathians. The species was recorded from Northeast Hungary, Jósvafő, by Matic & Ceuca (1969), but in the light of the above-mentioned observations, we think that this species also needs a careful revision.

JULIDA

Julidae

Cylindroiulus arborum Verhoeff, 1928

Cylindroiulus arborum Verhoeff, 1928: 291-294.
Cylindroiulus arborum: Loksa 1962: 160., Korsós & Enghoff 1990: 350-352.

Locality. Szin, Patkós-valley.

Remarks. The single record is from beech litter, 15.Nov.1988, leg. Z. Korsós. It is a central and eastern European species, living in forests but sometimes in man-made habitats as well (Schubart, 1934). We found only one female specimen, but according to the structure of the vulvae, metazonital striae, and number of setae on the anal valves it could well be distinguished from other species of the *Cylindroiulus truncorum*-group (Korsós & Enghoff, 1990; Schubart, 1934). This is the second occurrence in Hungary, the first record was in the same region, in Lillafüred (Loksa; 1962).

Enantiulus nanus **(Latzel, 1884)**

Julus nanus Latzel, 1884: 264-267.
Leptophyllum nanum: Verhoeff 1910: 56., Loksa 1968b: 266-288, 1979: 88, 91.
Enantiulus nanus: Hoffman 1980: 110.

Localities. Aggtelek, Hosszú-valley; Aggtelek, Patkós-side; Jósvafő, Tengerszem; Jósvafő, Vass Imre-cave; Szin, Patkós-valley; Szin, Patkós-valley, Puska Pál-spring; Szinpetri, Szőlő-hill; Szögliget, Ménes-valley; Szögliget, Ménes-valley, Ménes-lake; Trizs, Eresztvény-hilltop.

Remarks. This is a relatively widespread species in the NP, it occurred 10 times in 10 localities. Loksa (1968 *a*) found it as a dominant species in the Bükk Mountains, too.

Enantiulus tatranus **(Verhoeff, 1907)**

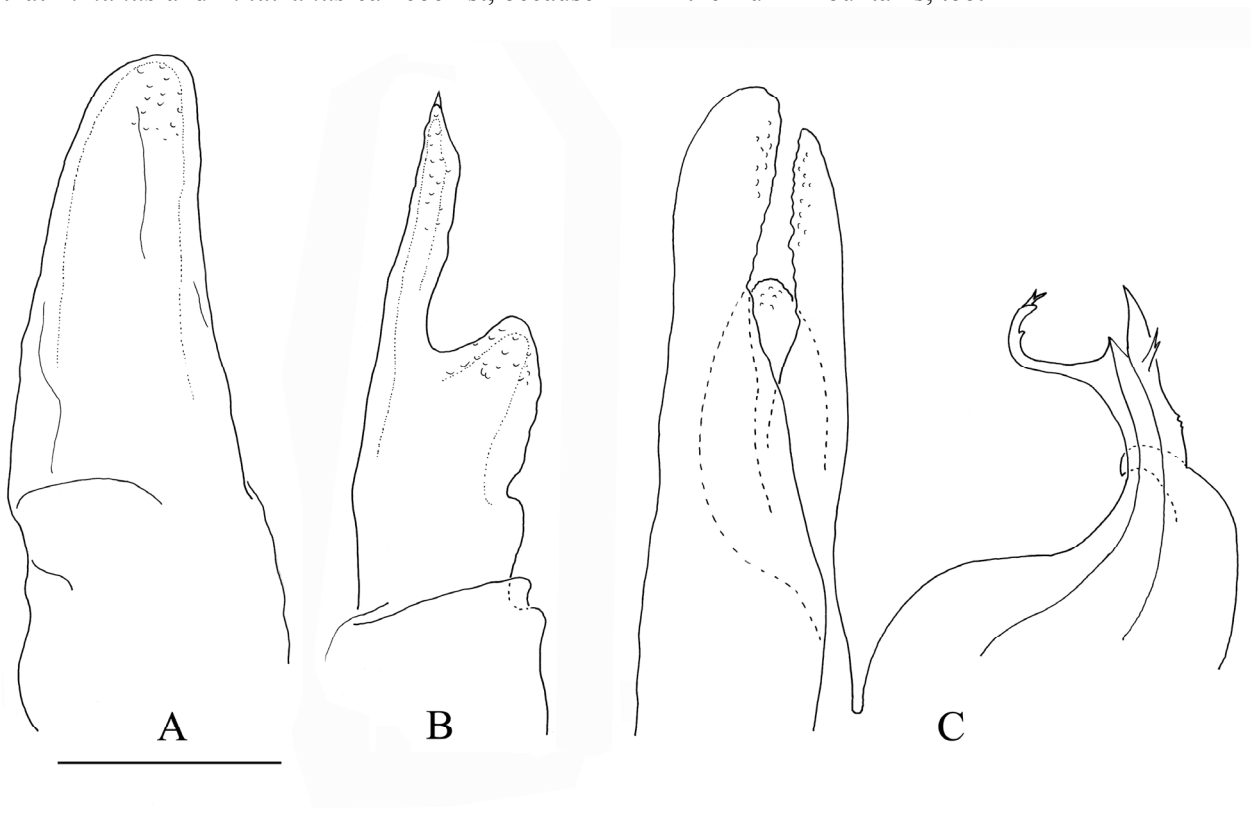
Leptophyllum tatranum Verhoeff, 1907: 319-320.
Leptophyllum tatranum evae Loksa, 1968a: 61-62. **syn. nov.**
Enantiulus tatranus: Hoffman 1980: 110.

Locality. Szögliget, Ménes-valley.

Remarks. It was found only at a single locality, 26. Sep. 1988, leg. Z. Korsós.

Loksa (1968b) described a new subspecies of *Leptophyllum (= Enantiulus) tatranum* from the neighbouring Bükk Mts. (*L. tatranum evae*), based on differences in the structure of the promerite and mesomerite (Figs. 28–29 in Loksa, 1968b). Verhoeff (1907), when describing the species *L. nanum*, also gave illustrations of the opisthomerite and the mesomerite (Fig. 45 in Verhoeff, 1907), but not of the promerite. Even so, when comparing the two descriptions, no substantial difference can be observed. Our two male specimens did also not confirm the validity of the subspecies (Figs. 2–3), so we regard *Leptophyl-*

lum tatranum evae Loksa, 1968 as a synonym of *Enantiulus tatranus* (Verhoeff, 1907). It seems that *E. nanus* and *E. tatranus* can coexist, because the latter was also found twice in the Ménes-valley. Loksa (1968a, 1968b) found both species in the Bükk Mountains, too.



Figures 2. *Enantiulus tatranus* male gonopods. A = right promerite, caudal view. B = right mesomerite, frontal view. C = entire left gonopod, mesal view. (Scale 0.1 mm)

Julus terrestris Linnaeus, 1758

Julus terrestris Linnaeus, 1758: 639., Loksa 1973: 81., 1988: 170.

Locality. Varbóc, Bokány-hilltop.

Remarks. Finding this species at a single locality (under bark, 9. May 1989, leg. O. Merkl) is surprising, because in Transdanubia, Western Hungary, *Julus terrestris* is a quite common forest-dweller. Loksa found it in several places in Eastern Hungary (e.g. Loksa, 1953, 1983), but did not mention it from the Northern Mountain Range.

Kryphioiulus occultus (C. L. Koch, 1847)

Allajulus occultus C. L. Koch, 1847: 117-118.
Cylindroiulus occultus: Verhoeff 1907: 284., Loksa 1953: 179.
Kryphioiulus occultus: Read 1990: 107.

Locality. Jósvafő, Nagy-side.

Remarks. Single record on a hillside, under stones and bark, 25. Apr. 1990, leg. O. Merkl.

Leptoiulus proximus (Nemec, 1896)

Julus (Leptoiulus) proximus Nemec, 1896: 3-4.
Julus (Leptoiulus) ciliatus buekkensis: Verhoeff 1899: 201.
Leptoiulus trilobatus buekkensis: Verhoeff 1908: 441.
Leptoiulus proximus: Attems 1927: 137., Loksa 1979: 88, 91.

Localities. Aggtelek, Ménes-valley; Aggtelek, Mihálylája; Aggtelek, Patkós-side; Bódvarákó, Esztramos-hill; Jósvafő, Nagy-side; Jósvafő, Szelce-valley; Jósvafő, Tohonya-valley; Jósvafő, Vass Imre-cave; Perkupa, Telekes-side; Perkupa, Telekes-valley; Szin, Háló-valley; Szin, Szelcepuszta; Szinpetri, Szőlő-hill; Szögliget, Patkós-valley.

Remarks. A widespread species in the Aggtelek NP, it has occurred in 18 times (at 14 localities), but in the Mohos-peatbogs at Kelemér, and in the Putnoki Hills, Piroska-hill, it is replaced by *L. trilobatus*. *L. proximus* was also found in the Bükk Mountains (Loksa, 1979).

Leptoiulus trilobatus (Verhoeff, 1894)

Julus trilobatus Verhoeff, 1894a: 12.
Julus (Leptoiulus) ciliatus: Verhoeff 1897b: 115-116.
Leptoiulus trilobatus: Verhoeff 1908: 440.

Localities. Kelemér, Mohos-peatbogs; Kelemér, Piroska-hill.

Remarks. It is a characteristic species for closed, undisturbed forests in good condition, but was only found 8 times at the Mohos-peatbogs, and 7 times on the Piroska-hill. In the latter place we found it four times in a mass occurrence, i.e. in more than 100 individuals.

Megaphyllum projectum Verhoeff, 1894

Megaphyllum projectum Verhoeff, 1894b: 323-324.
Brachyiulus projectus: Verhoeff 1897b: 111-112.
Chromatoiulus projectus: Schubart 1934: 278-280., Loksa 1979: 88.
Chromatoiulus projectus dioritanus: Loksa 1968a: 268.
Megaphyllum projectum: Hoffman 1980: 104.
Megaphyllum projectum dioritanum: Loksa 1988: 164., 1991: 131-132.

Localities. Aggtelek, Ménes-valley; Aggtelek, Patkós-side; Aggtelek, Szelcepuszta; Jósvafő, Fertős-hilltop; Jósvafő, Nagy-side; Jósvafő, Szelce-valley; Jósvafő, Tohonya-valley; Jósvafő, Vass Imre-cave; Szin, Háló-valley; Szin, Őzes-crag; Szin, Patkós-valley; Szin, Szelcepuszta; Szögliget, Derenk; Szögliget, Ménes-valley; Szögliget, Patkós-valley; Trizs; Kelemér, Mohos-peatbogs; Kelemér, Piroska-hill.

Remarks. A typical forest species, found in hornbeam, oak, pine, and slope woodlands. It had 55 occurrences at 18 sampling sites with lots of specimens, especially in Piroska-hill, where it had at almost each occasion a mass occurrence. Loksa (1979) and Szlávecz and Loksa (1991) found the species very common in Hungary, also in the Bükk Mountains.

Megaphyllum unilineatum (C. L. Koch, 1838)

Iulus unilineatus C. L. Koch, 1838: 22.
Brachyiulus (Chromatoiulus) unilineatus: Verhoeff 1897b: 114-115.
Chromatoiulus unilineatus: Attems 1927: 220.
Chromatoiulus unilineatus: Loksa 1953: 179; 1983: 68.
Megaphyllum unilineatum: Hoffman 1980: 104, 113.
Megaphyllum unilineatum: Loksa 1988: 162-164, 170.

Localities. Aggtelek, Baradla-hilltop; Bódvarákó, Ostromosalja; Jósvafő, Nagy-side; Jósvafő, Patkós-spring; Szin, Patkós-valley; Szögliget, Ménes-valley; Tornanádaska, Kétágú-hill.

Remarks. It is a common species in dry, disturbed habitats (e.g. Loksa, 1983); its limited occurrence (7 times in 7 localities) in the Aggtelek NP is not outstanding.

Nemasoma varicorne C. L. Koch, 1847

Nemasoma varicorne C. L. Koch, 1847: 116.
Isobates varicornis: Latzel 1884: 240-243., Loksa 1957: 194.
Nemasoma varicorne: Enghoff 1985: 41.

Localities. Jósvafő, Nagy-side; Jósvafő, Szelce-valley; Szendrő, Közép-hill; Szin, Háló-valley; Szögliget, Ménes-valley.

Remarks. The species is a typical bark-dweller, therefore its relatively low abundance (7 occurrences in 5 localities) in the pitfalls is not surprising.

Ophyiulus pilosus (Newport, 1842)

Julus pilosus Newport, 1843: 316.
Iulus fallax: Meinert 1868:15-16.
Iulus (Leptoiulus) fallax: Verhoeff 1898: 132, 135.
Ophiiulus fallax: Verhoeff 1908: 433., Loksa 1962: 160-162.
Ophyiulus pilosus: Chamberlin 1922: 9., Loksa 1988: 170.

Localities. Aggtelek, Haragistya; Aggtelek, Hosszú-valley; Aggtelek, Patkós-side; Jósvafő, Lófej-valley; Szendrő, Határ-valley; Szin, Háló-valley; Szinpetri, Szőlő-hill; Szögliget, Patkós-valley; Trizs.

Remarks. We found only female specimens (10 occurrences, from April till August, but mainly in May and June, in 9 localities, in various habitats), which is surprising because the species is rather frequent in other Hungarian forests, and even in synanthropic habitats. A review of the Hungarian subspecies of *O. pilosus* was made by Loksa (1962), but most of them are based on possibly random morphological variation which needs a more careful mass analysis to decide their taxonomical status.

Unciger foetidus (C. L. Koch, 1838)

Iulus foetidus C. L. Koch, 1838: 22.
Oncoiulus foetidus: Verhoeff 1899: 190-191.
Unciger foetidus: Lohmander 1925: 60-61., Loksa 1953: 179.

Localities. Aggtelek, Ménes-valley; Aggtelek, Patkós-side; Aggtelek, Szelcepuszta; Bódvarákó, Esztramos-hill; Jósvafő, Hotel Tengerszem; Jósvafő, Tohonya-valley; Szin, Patkós-valley; Szin, Szelcepuszta; Szögliget, Patkós-valley; Kelemér, Mohos-peatbogs; Kelemér, Piroska-hill.

Remarks. It has occurred 2 times in Kelemér, once on Piroska-hill, and 15 times in the other 9 localities. The species is characteristic for closed, undisturbed deciduous forests in good condition (e.g. Loksa, 1953).

Unciger transsilvanicus (Verhoeff, 1899)

Oncoiulus foetidus transsilvanicus Verhoeff, 1899: 191.
Unciger transsilvanicus: Jeekel 1971: 168.

Localities. Aggtelek, Ménes-valley; Aggtelek, Mihály-láza; Aggtelek, Patkós-side; Jósvafő, Hosszú-valley; Jósvafő, Nagy-side; Jósvafő, Szelce-valley; Szin, Szelcepuszta; Szögliget, Derenk; Szögliget, Ménes-valley; Zádorfalva, Szuha-valley.

Remarks. Similarly frequent forest species like *U. foetidus*, with 17 occurrences in 10 localities. It seems that the two species have overlapping distributions, they co-occurred several times (in 3 localities of the 10) (Fig. 3).

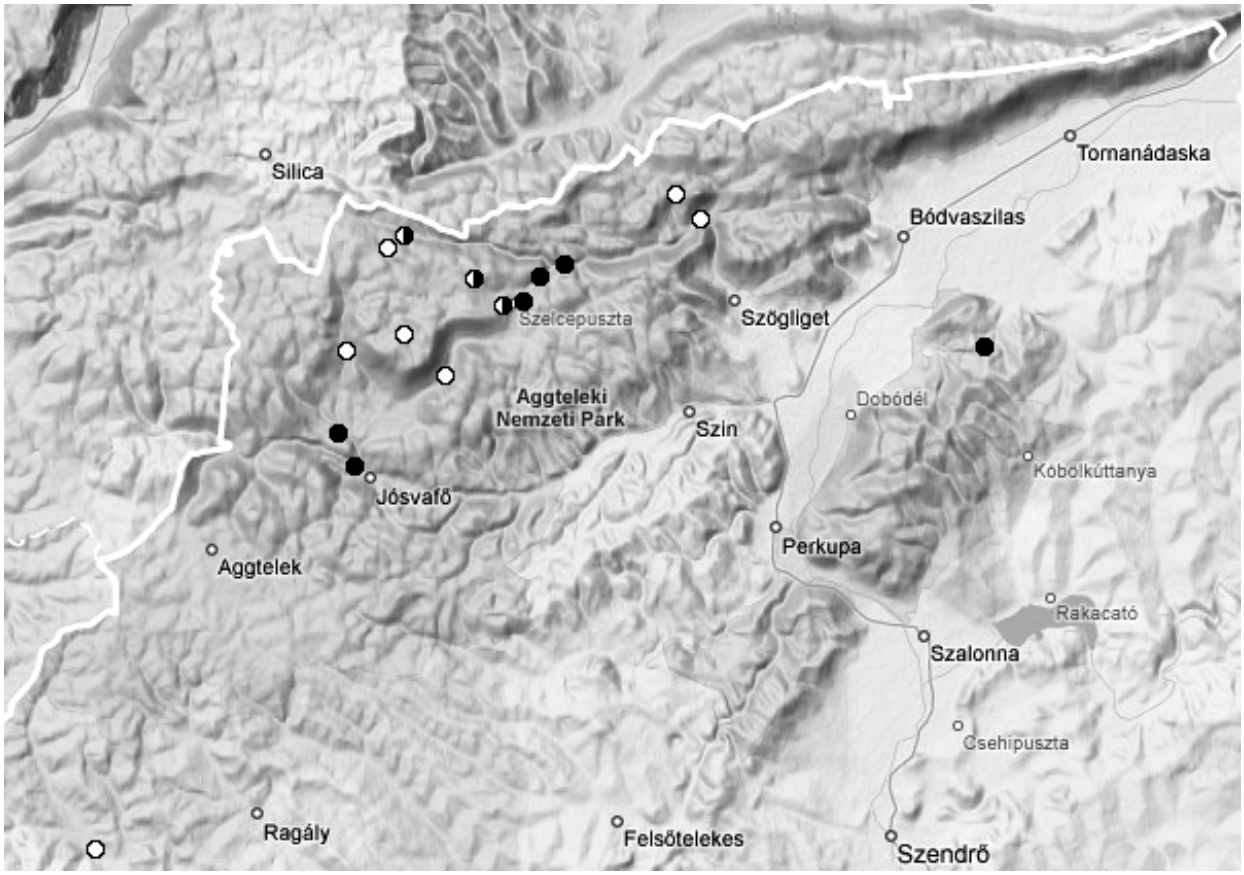


Figure 3. Distribution of *Unciger foetidus* (black circles) and *U. transsilvanicus* (white circles) in the Aggtelek National Park

POLYDESMIDA

Polydesmidae

Brachydesmus superus Latzel, 1884

Brachydesmus superus Latzel 1884: 130-132.
Brachydesmus superus Loksa 1955: 386.

Locality. Zádorfalva, Szuha-valley.

Remarks. Only a single record: 2. May 1988, leg. Z. Korsós, but this can be due to the bark-dwelling habit of the species, hence difficult to catch in pitfalls. Loksa (1955) found it in great mass near Lake Velence.

Polydesmus complanatus (Linnaeus, 1761)

Julus complanatus Linnaeus 1761: 502.
Polydesmus illyricus: Verhoeff 1893: 273-275.
Polydesmus complanatus Porat 1870: 820., Lohmander 1925: 16-17., Loksa 1954: 217-218.

Localities. Aggtelek, Haragistya; Aggtelek, Ménes-valley; Aggtelek, Mihály-láza; Aggtelek, Patkós-side; Bódvarákó, Esztramos-hill; Jósvafő, Fertős-hilltop; Jósvafő, Hosszú-valley; Jósvafő, Nagy-side; Jósvafő, Tengerszem; Szin, Hálóvalley; Szin, Patkós-valley; Szin, Szelcepuszta; Szögliget, Ménes-valley; Szögliget, Patkós-valley; Trizs; Kelemér, Mohos-peatbogs; Kelemér, Piroska-hill.

Remarks. The species occurred 7 times in Kelemér, 9 times on Piroska-hill, and 24 times in the other 17 Aggtelek NP localities. *Polydesmus complanatus* is one of the most common millipede species in Hungary, with little requirement limitations in almost every kind of habitats. Despite its bark-dwelling way of life, it is also quite conspicuous and easy to collect for non-specialist entomologists as well. A review and identification key to the *Polydesmus* species and subspecies of the Carpathian Basin was made by Loksa (1954).

Polydesmus denticulatus C. L. Koch, 1847

Polydesmus denticulatus C. L. Koch, 1847: 135.
Polydesmus denticulatus Loksa 1954: 217, 220.

Locality. Szögliget, Patkós-valley.

Remarks. The single locality is at 350 m a.s.l., in an open woodland, collected by pitfall trap, May–Aug. 1987, leg. Gy. Szél & L. Ádám. The species can be much more frequent but due to its bark-dwelling habit, may not easily be caught by pitfalls. The only other species in our pitfall trap was *P. complanatus.* The co-occurrence of the two species is not surprising, Loksa (1953, 1955, 1991) found them together many times.

Strongylosoma stigmatosum (Eichwald, 1830)

Julus stigmatosus Eichwald, 1830: 124.
Strongylosoma pallipes: Latzel 1884: 168-170., Loksa 1953: 179.
Strongylosoma stigmatosum: Jeekel 1967: 166., Szlávecz & Loksa 1991: 804.

Localities. Aggtelek, Ménes-valley; Perkupa, Telekes-valley; Szin, Patkós-valley; Szögliget, Ménes-valley; Szögliget, Patkós-valley.

Remarks. Having 10 occurrences in 5 localities, the species is a rather typical forest-dweller, preferring undisturbed deciduous woodlands. According to Loksa (1953), the species prefers humid forests and riversides.

DISCUSSION

The present list of the Aggtelek NP contains 22 millipede species which makes up 21.5% of the Hungarian millipede fauna (Korsós, 1994, 1998, 2005). This low representation may be due to the major usage of pitfall traps because even if most of the Hungarian millipede species are surface-dwellers, some other species live in special habitats (e.g. under bark), in need of special collecting techniques. In the Aggtelek project we applied hand-collecting and sifting, too, but some species were still quite rare, and could be obtained only by these methods, e.g. *Polyxenus lagurus*, *Polyzonium germanicum*, *Julus terrestris*, *Kryphioiulus occultus*.

If we wanted to compare the species of different habitats, there are several problems blurring the results. In case of many samples we did not have information on the habitat, but frequency comparison and habitat choice is also difficult to judge because some regions of the Aggtelek NP were more frequently visited than others. We can also assume that the most abundant species have

more widespread distribution, hence they live in very different habitats. In a typical oak–hornbeam forest (*Querco–Carpinetum*) the most common species was *Megaphyllum projectum* and *Leptoiulus trilobatus*, whereas in the non-native pine forests *Glomeris hexasticha* and *Polydesmus complanatus* were collected most frequently. *Unciger foetidus* is also a typical deciduous forest-dweller, and it is worth mentioning that in the north-eastern part of the country it co-exists with *U. transsilvanicus*.

There are several species which are interestingly missing from our list, though they are present in the millipede fauna of neighbouring Slovakia (Mock, 2001, 2008). We could expect to find several *Trachysphaera* species for instance, *T. costata* (Waga, 1858) and *T. acutula* (Latzel, 1884); from the polyzoniidans *Polyzonium eburneum* Verhoeff, 1907 and *P. transsilvanicum* Verhoeff, 1898; from the chordeumatidans *Haasea flavescens* (Latzel, 1884), *Craspedosoma rawlinsii* Leach, 1814, and *Hylebainosoma tatranum* Verhoeff, 1899. In the case of the latter species, Loksa (1962) even described a subspecies (*H. tatranum josvaense*) from the Aggtelek NP, but we could not recollect it.

From the julidans, about a dozen species are lacking, such as the three blaniulids (*Blaniulus guttulatus* (Fabricius, 1798), *Nopoiulus kochii* (Gervais, 1847), *Proteroiulus fuscus* (Am Stein, 1857); julids like *Brachyiulus bagnalli* (Curtis, 1845), *Cylindroiulus boleti* (C.L. Koch, 1847), *Julus curvicornis* Verhoeff, 1899, *Julus scandinavius* Latzel, 1884, *Leptoiulus baconyensis* (Verhoeff, 1899), *L. tussilaginis* (Verhoeff, 1907), *Ommatoiulus sabulosus* (Linnaeus, 1758), and *Xestoiulus imbecillus* (Latzel, 1884). From the polydesmidans, one could expect *Polydesmus montanus* Daday, 1889, *P. polonicus* Latzel, 1884, and *P. tatranus* Latzel, 1882. Apart of these species, recent additions to the Slovakian millipede fauna were *Cylindroiulus caeruleocinctus* (Wood, 1864) (Mock, 2006) and *Polydesmus inconstans* Latzel, 1884 (Mock, 2004), both from the territory of the city of Kosice, East Slovakia. They both could occur in the Aggtelek NP, too.

Unfortunately, all these species are still demanding from our list. It may mean that: (1) our faunistical survey was incomplete due to plain methodology (emphasis on pitfall traps, and with relatively little effort put into other collecting methods); or (2) there are important zoogeographical differences between the territories of north-eastern Hungary and adjoining Slovakia.

It should also be mentioned that one of the major attractions of the Aggtelek NP, the Baradla–Domica karst cave system was completely left out from our project. Although there are not any troglobiont millipedes known from the Hungarian part of this cave habitat, new records exist from the Western Carpathian caves showing that the subterranean fauna can still contain surprises (Mock & Tajovsky, 2008).

Acknowledgements – We would like to express our sincere gratitude to the Directorate of the Aggtelek National Park for supporting the Museum during the faunistical survey and for the permits issued to collect and preserve millipede samples. Viktor Virók (Aggtelek NP) is acknowledged for his organisation to provide the biodiversity monitoring samples for identification. László Dányi and Jenő Konstchán (Hungarian Natural History Museum) gave helpful comments during the preparation of the manuscript.

REFERENCES

ATTEMS, C. (1927): Über palaearktische Diplopoden. *Archiv für Naturgeschichte*, 92(1-2): 1–256.

BÁLDI, A. (1999): Biodiversity in Hungary: advantages and limits of taxonomically complete faunal inventories. *Natural Areas Journal*, 19: 73–78.

BRANDT, J. F. (1833): Tentaminum quorundam monographicorum Insecta Myriapoda Chilognathi Latreillii spectantium prodromus. *Bulletin de la Societé Impériale des Naturalistes de Moscou*, 6: 194-209.

BRANDT, J. F. (1837): Note sur un ordre nouveau de la classe des Myriapodes et sur l'etablissement des sections de cette classe d'animaux en général. *Bulletin Scientifique publié par l'Académie Impériale des Sciences de Saint-Pétersbourg*, 1(23): 178–179.

BLOWER, J. G. (1985): Millipedes. Synopses of the British Fauna, N. S., No. 35, E.J. Brill, London, 242 pp.

CHAMBERLIN, R. V. (1922): Further notes on the nomenclature of North American Julidae and Nema-

somidae. *Proceedings of the Biological Society of Washington*, 35: 7–10.

EICHWALD, E. (1830): Zoologia specialis. Pars altera. Vilnae, IV+233 pp.

ENGHOFF, H. (1985): The millipede family Nemasomatidae. With the description of a new genus, and a revision of *Orinisobates* (Diplopoda: Julida). *Entomologica scandinavica*, 16: 27–67.

HAUSER, H. (2004): Zur taxonomie und Systematik von *Mastigona bosniensis* (Verhoeff, 1897) und *Mastigona vihorlatica* (Attems, 1899) (Diplopoda, Chordeumatida, Mastigophorophyllidae). *Entomologische Nachrichten und Berichte*, 48(2-3): 215–218.

HOESS, R. (2000): Bestimmungschlüssel für die *Glomeris*-Arten Mitteleuropas und angrenzender Gebiete. *Jahrbuch des Naturhistorischen Museums Bern*, 13: 3–20.

HOESS, R. & SCHOLL, A. (2001): Allozyme and literature study of *Glomeris guttata* Risso, 1826, and *Glomeris connexa* Koch, 1847, a case of taxonomic confusion (Diplopoda: Glomeridae). *Zoologischer Anzeiger*, 240: 15–33.

HOFFMAN, R. L. (1980): *Classification of the Diplopoda*. Muséum d'Histoire naturelle, Genève, 237 pp.

JEEKEL, C. A. W. (1967): Notes on the nomenclature and taxonomy of European Paradoxosomatidae (Diplopoda, Polydesmida). *Entomologische Berichten*, 27: 166-172.

JEEKEL, C. A. W. (1971): *Nomenclator generum et familiarum Diplopodorum: A list of the genus and family-group names in the class Diplopoda from the 10th edition of Linnaeus, 1758, to the end of 1957*. Monografieen van de Nederlandse Entomologische Vereniging 5: 1–412.

JERMY, T. (1942): Rendszertani tanulmány a magyarországi plesioceratákról. (Diplopoda) (Systematische Studien an ungarländischen Plesioceraten [Diplopoda].) *Matematikai és Természettudományi Közlemények*, 39: 1–82. (in Hungarian, with German summary)

KASZAB, Z. & MAHUNKA, S. (1981): Introduction. In: Mahunka, S. (ed.): *The fauna of the Hortobágy National Park, I.* Hungarian Natural History Museum, Budapest, pp. 9–13.

KOCH, C. L. (1838): Deutschlands Crustaceen, Arachniden und Myriopoden. Ein Beitrag zur deutischen Fauna. Heft 22, Regensburg.

KOCH, C. L. (1844): Deutschlands Crustaceen, Arachniden und Myriopoden. Heft 40, Regensburg.

KOCH, C. L. (1847): System der Myriapoden mit den Verzeichnissen und Berichtigungen zu Deutschlands Crustaceen, Myriapoden und Arachniden. In: PANZER & HERRICH-SCHÄFFER, A.: *Kritische Revision der Insectenfaune Deutschlands*, III. Bändchen, Regensburg, 196 pp.

KORSÓS, Z. (1987): Diplopoda and Chilopoda of the Kiskunság National Park. – In: Mahunka, S. (ed.): *The fauna of the Kiskunság National Park, II.* Akadémiai Kiadó, Budapest, pp. 73–77.

KORSÓS, Z. (1994): Checklist, preliminary distribution maps, and bibliography of millipedes in Hungary (Diplopoda). *Miscellanea zoologica hungarica* **9**: 29–82.

KORSÓS, Z. (1998): Az ikerszelvényesek (Diplopoda) faunisztikai és taxonómiai kutatásának helyzete és irányai Magyarországon. (Status and directions of faunistic and taxonomical research of millipedes in Hungary.) *Folia historico naturalia Musei Matraensis*, 22: 85–98.

KORSÓS, Z. (2005): The millipede fauna (Diplopoda) of Hungary: a zoogeographical account. *Abstracts of lectures and posters, 13th International Congress of Myriapodology*, 25-29 July 2005, Bergen, Norway, p. 24.

KORSÓS, Z. & DÁNYI, L. (2002): Millipedes (Diplopoda) and centipedes (Chilopoda) of the Fertő-Hanság National Park, Hungary. In: MAHUNKA, S. (ed.): *Fauna of the Fertő-Hanság National Park*. HNHM, Budapest, pp. 183–190.

KORSÓS, Z. & ENGHOFF, H. (1990): The *Cylindroiulus truncorum*-group (Diplopoda: Julidae). *Entomologica Scandinavica*, 21: 345–360.

LATREILLE, P. A. (1802-1804): *Histoire naturelle, générale et particulière des Crustacés et des Insectes.* Dufart, Paris, 467 pp.

LATZEL, R. (1884): *Die Myriopoden der Österreichisch-ungarischen Monarchie. Zweite Hälfte. Die Symphylen, Pauropoden und Diplopoden.* Alfred Hölder, Wien, 414 pp.

LINNAEUS, C. (1758): *Systema Naturae per Regnia tria Naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* Editio 10, reformata. 823 pp.

LINNAEUS, C. (1761)*: Fauna Svecica sistens Animalia Sveciae Regni: Mammalia, Aves, Amphibia, Pisces, Insecta, Vennes.* Editio altera. Stockholm, XLVIII+ 578 pp.

LOHMANDER, H. (1925): Sveriges Diplopoder. *Göteborgs Kungliga Vetenskaps- och Vitterhets-Samhälles handlingar, 4. Följden* 30(2): 1–115.

LOKSA, I. (1953): Bátorliget ikerszelvényes-faunája, Diplopoda [Millipede fauna of Bátorliget]. In: Székessy, V.(ed.): *Bátorliget élővilága. [The fauna and flora of Bátorliget.]* Akadémiai Kiadó, Budapest, pp. 178–181 (in Hungarian).

LOKSA, I. (1954): Die *Polydesmus*-Arten des Faunengebietes des Karpatenbeckens. *Annales historico-naturales Musei nationalis hungarici*, 5: 215–224.

LOKSA, I. (1957): Ergebnisse der Überprüfung einer Diplopodensammlung von J. Daday. *Annales Universitatis Scientiarum Budapestinensis de Rolando Eötvös Nominatae, Sectio Biologica*, 1: 189–195.

LOKSA, I. (1962): Einige neue und wenig bekannte Diplopoden aus Ungarn. *Annales Universitatis Scientiarum Budapestinensis de Rolando Eötvös Nominatae, Sectio Biologica*, 5: 157–170.

LOKSA, I. (1968a): Einige Diplopodenformen aus Ungarn. *Opuscula Zoologica Budapest*, 8(1): 57–62.

LOKSA, I. (1968b): Quantitative Makrofauna-Untersuchungen in den Waldböden des Bükkgebirges (Ungarn). *Annales Universitatis Scientiarum Budapestinensis de Rolando Eötvös Nominatae, Sectio Biologica*, 9-10: 266–289.

LOKSA, I. (1973): Bodenzoologische Untersuchungen in den Alkali-Waldsteppen von Margita, Ungarn. I. Untersuchungen der Arthropoden-Makrofauna, nebst Bemerkungen über die Oniscinea-Arten. *Opuscula Zoologica Budapest*, 11: 79–93.

LOKSA, I. (1979): Quantitative Untersuchungen über die Makrofauna der Laubstreu in Zerreichen- und Hainsimsen-Eichen-Beständen des Bükk-Gebirges. *Opuscula Zoologica Budapest*, 16: 87–96.

LOKSA, I. (1983): Diplopoda and Chilopoda from the Hortobágy National Park. In: Mahunka, S. (ed.): *The fauna of the Hortobágy National Park*. Akadémiai Kiadó, Budapest, pp. 67–69.

LOKSA, I. (1988): Über einige Arthropoden-Gruppen aus dem Biosphäre-Reservat des Pilis-Gebirge (Ungarn) 1. Die Diplopoden, Chilopoden, Weberknechte und Spinnen vom Szamár-Berg. *Opuscula Zoologica Budapest*, 23: 159–176.

LOKSA, I. (1991): Über einige Arthropoden-Gruppen aus dem Pilis-Biosphären-Reservat (Ungarn) 2. Die Diplopoden, Chilopoden, Weberknechte und Spinnen aus dem Gebiet zwischen Kakas-Berg (Pilisszentkereszt) und Ispán-Wiese (Mikula-haraszt). *Opuscula Zoologica Budapest*, 24: 129–141.

MAHUNKA, S. (1999a): Thoughts on the occasion of the 25th anniversary of national park research in Hungary – Introduction. In: Mahunka, S. (ed.): *The fauna of the Aggtelek National Park, I.* Hungarian Natural History Museum, Budapest, pp. 11–20.

MAHUNKA, S. (1999b): *The fauna of the Aggtelek National Park, I–II.* Hungarian Natural History Museum, Budapest, 775 pp.

MATIC, Z. & CEUCA, T. (1969): Contribuţii la cunoaşterea miriapodelor (Chilopoda şi Diplopoda) din fauna R. P. Ungare. *Studia Universitatis Babeş-Bolyai, Seria Biologia*, 14(1): 105–110.

MEINERT, F. V. A. (1868): Danmarks chilognather. *Naturhistorisk Tidskrift*, 3(5): 1-32.

MOCK, A. (2001): Millipedes of the Slovak Republic. *Myriapodologica Czecho-Slovaca,* 1: 25-38.

MOCK, A. (2004): First record of *Polydesmus inconstans* Latzel, 1884 (Diplopoda, Polydesmidae) in Slovakia. *Biologia*, Bratislava, 59(5): 552.

MOCK, A. (2006): First record of *Cylindroiulus caeruleocinctus* (Diplopoda, Julidae) in Slovakia. *Biologia*, Bratislava, 61(2): 144.

MOCK, A. (2008): Distribution of millipedes (Diplopoda) along a climatic inversion compared to their thermopreferences: a case study from the Zadiel Gorge (Slovakia). In: Voigtländer, K. (ed.): Abstracts 14th International Congress of Myriapodology, Görlitz, Germany. *Peckiana,* 6: 67.

MOCK, A. & TAJOVSKY, K. (2008): *Mecogonopodium carpathicum* n. sp. (Diplopoda: Chordeumatida: Attemsiidae), a new troglophilic millipede from Slovakia. *Zootaxa,* 1778: 26–36.

NÉMEC, B. (1896): Zur Kenntnis der Diplopoden Böhmens. *Sitzungsberichte der königlichen böhmischen Gesellschaft der Wissenschaften, Mathematisch-naturwissenschaftliche Classe*, 1896: 1–8.

NEWPORT, G. (1843): Description of a new British Julus, *Iulus sandvicensis* and *I. pilosus*. *Annals and Magazine of Natural History*, 11: 316.

OLIVIER, A. G. (1792): *Encyclopédie méthodique. Dictionnaire des Insectes, 7.* Paris, IV+ 827 pp.

PORAT, C. O. (1870): Om några Myriapoder från Azorerna. *Öfversigt af Kongliga Vetenskaps-Akademiens förhandlingar* 27(7): 813–823.

READ, H. J. (1990): The generic composition and relationships of the Cylindroiulini – a cladistic analysis (Diplopoda, Julida: Julidae). *Entomologica scandinavica*, 21: 97–112.

SCHUBART, O. (1934): Tausendfüssler oder Myriapoda I: Diplopoda. In: Dahl, F. (ed.): *Die Tierwelt Deutschlands und der angränzenden Meeresteile, Teil 28.* Gustav Fischer Verlag, Jena, 318 pp.

SZLÁVECZ, K. & LOKSA, I. (1991): Diversity of soil arthropods in the Bátorliget Nature Reserve, Hungary. In: Zombori, L. & Peregovits, L. (1992): *Proc. 4th ECE/XIII. SIEEC, Gödöllő 1991*, pp. 801-807.

VERHOEFF, K. W. (1893): Neue Diplopoden aus dem österreichischen Küstenlande. *Berliner Entomologische Zeitschriften*, 38: 267–278.

VERHOEFF, K. W. (1894a): Beiträge zur Diplopoden-Fauna Tirols. *Verhandlungen der Zoologisch-botanischen Gesellschaft in Wien*, 44: 9–34.

VERHOEFF, K. W. (1894b): Zur Kenntnis der Copulationsorgane der Juliden, über eine neue Juliden-Gat-

tung und eine neue *Tachypodojulus*-Art. *Zoologischer Anzeiger*, 17(456): 321–325.

VERHOEFF, K. W. (1897a): Ueber Diplopoden aus Bosnien, Herzogowina und Dalmatien. *Archiv für Naturgeschichte*, 63: 139–156; 181–204.

VERHOEFF, K. W. (1897b): 1. Beiträge zur vergleichenden Morphologie, Gattungs- und Artsystematik der Diplopoden, mit besonderer Berücksichtigung derjenigen Siebenbürgens. *Zoologischer Anzeiger*, 20(528): 97–125.

VERHOEFF, K. W. (1898): Über Diplopoden aus Bosnien, Herzogowina und Dalmatien. IV. Theil: Julidae. *Archiv für Naturgeschichte*, 64: 119–160.

VERHOEFF, K. W. (1899): Beiträge zur Kenntniss paläarktischer Myriopoden. IX. Aufsatz: Zur Systematik, Phylogenie und vergleichenden Morphologie der Juliden sowie über einige andere Diplopoden. *Archiv für Naturgeschichte*, 65 (1): 183–220.

VERHOEFF, K. W. (1907): Bekannte und unbekannte Diplopoden aus Deutschland und Österreich-Ungarn. *Mitteilungen aus dem Zoologischen Museum in Berlin*, 3: 261–337.

VERHOEFF, K. W. (1908): Über Diplopoden. 10. (30.) Aufsatz: Zur Kenntnis der Juliden und über einige Polydesmiden. *Archiv für Naturgeschichte*, 73(1): 423–474.

VERHOEFF, K. W. (1910): Über Diplopoden. 18. (38.) Aufsatz: Die nordböhmisch-sächsische Fauna und ihre Bedeutung für die Zoogeographie Mitteleuropas. *Sitzungsberichte und Abhandlungen. Naturwissenschaftliche Gesellschaft ISIS, Dresden. 1910 (1911) Abh. S.* , 20–66.

VERHOEFF, K. W. (1928): Beiträge zur Systematik, Morphologie und Geographie europäischer Ascospermophoren. *Zoologische Jahrbücher*, *Abteilung für Systematik, Ökologie und Geographie der Tiere*, 54: 243–314.

Opusc. Zool. Budapest, 2009, 40 (1): 47–62

Further taxonomical and faunistical studies on oribatids of Kenya (Acari: Oribatida)

S. MAHUNKA[1] and L. MAHUNKA-PAPP[2]

Abstract. Newly studied and identified oribatids are presented from Kenya. Altogether 14 species are listed, among them six – *Oribotritia* (*Berndotritia*) *microsetosa* sp. n., *Eremulus csuzdii* sp. n., *Austrocarabodes patakii* sp. n., *Dolicheremaeus borbolai* sp. n., *Teratoppia* (*Teratoppia*) *nasalis* sp. n., *Galumna* (*Bigalumna*) *rimosa* sp. n. – are described as new to science. One of the new species, *Galumna* (*Bigalumna*) *rimosa* sp. n. represents a new subgenus as well. 33 figures.

INTRODUCTION

In our earlier papers on the oribatids from East Africa (mainly Kenya and Tanzania), we discussed the aims and the so far attained results of our studies in this region (Mahunka & Mahunka-Papp, 2007, 2008, 2009). The results of our research are published in parts. In this paper we list or discuss 14 species belonging to different families (Hypochthoniidae, Sphaerochthoniidae, Oribotritiidae, Hermanniellidae, Eremulidae, Heterobelbidae, Carabodidae, Tetracondylidae, Oppiidae, Mochlozetidae, Hemileiidae, Oripodidae and Galumnidae) of the group Oribatida. Five had already been mentioned earlier in other publications, while six species are new to science. For one species of the latter we established also a new subgenus (*Bigalumna* subgen. n.). In connection with two earlier known species, *Teratoppia* (*Teratoppiella*) *pectinata* (Balogh, 1961) and *Tuberemaeus foveolatus tridactylus* (Balogh, 1959), we make some remarks and give figures on their morphology and relations.

In the description and terminology we follow those of our previous papers (e.g. Mahunka & Mahunka-Papp, 2007, 2008; see also the References). All the material examined is deposited partly in the Muséum d'Histoire naturelle de Genève (MHNG), partly in the Hungarian Natural History Museum, Budapest (HNHM).

LIST OF LOCALITIES

Afr-950 (HNHM): Kenya, Shimba Hills National Park, Shimba Hills lodge. Wet decaying debris, litter and soil under trees. 10. 03. 2001. Leg. S. Mahunka and L. Mahunka-Papp.

Afr-978 (HNHM): Kenya, Muguga, near to Nairobi, experimental forest station. Moss and bark from a primary forest patch. 20. 11. 2004. Leg. Cs. Csuzdi.

G-77/31 (MHNG): Kenya, Tana River district. 10 km nord de Garsen. Tamisage sous bois mort. 23. X. 1977. Leg. V. Mahnert and J.-L. Perret.

G-77/50 (MHNG): Kenya, Kiambu district. Kikuyu Escarpment, entre Limuru et carrefoir Naivasha/Naroko, alt. 2000 m. Tamisage dans le forêt. 3. XI. 1977. Leg. V. Mahnert and J.-L. Perret.

G-77/71 (MHNG): Kenya, Nakuru district. Près de Longonot, échantillon de terre (racines des sous-arbrisseaux, sur sol de lave), alt. 200 m, 10. XI. 1977. Leg. V. Mahnert and J.-L. Perret.

LIST OF THE IDENTIFIED SPECIES

HYPOCHTHONIIDAE Berlese, 1910

Malacoangelia remigera Berlese, 1913
Locality: G-77/71.

SPHAEROCHTHONIIDAE Grandjean, 1954

Sphaerochthonius cf. *splendidus* (Berlese, 1904)
Locality: G-77/31.

[1]*Prof. Dr. Sándor Mahunka*, MTA Zootaxonómiai Kutatócsoport és Magyar Természettudományi Múzeum Állattára (Systematic Zoology Research Group of the Hungarian Academy of Sciences, and Department of Zoology, Hungarian Natural History Museum), H-1088 Budapest, Baross u. 13, Hungary. E-mail: mahunka@nhmus.hu

[2]*Luise Mahunka-Papp*, Magyar Természettudományi Múzeum Állattára (Department of Zoology, Hungarian Natural History Museum), H-1088 Budapest, Baross u. 13, Hungary.

ORIBOTRITIIDAE Grandjean, 1954

Oribotritia (*Berndotritia*) *microsetosa* sp. n.

HERMANNIELLIDAE Grandjean, 1934

Hermanniella dubiosa Mahunka, 2007
Locality: G-77/50.

EREMULIDAE Grandjean, 1965

Eremulus csuzdii sp. n.

HETEROBELBIDAE Balogh, 1961

Heterobelba spumosa Mahunka, 1983
Locality: G-77/71.

CARABODIDAE C. L. Koch, 1837

Austrocarabodes patakii sp. n.

TETRACONDYLIDAE Aoki, 1961

Dolicheremaeus borbolai sp. n.

OPPIIDAE Sellnick, 1937

Teratoppia (*Teratoppia*) *nasalis* sp. n.
Teratoppia (*Teratoppiella*) *pectinata* (Balogh, 1961)
Locality: G-77/71.

MOCHLOZETIDAE Grandjean, 1960

Mochlozetes atypicus Mahunka, 1982
Locality: G-77/31.

HEMILEIIDAE J. Balogh et P. Balogh, 1984

Tuberemaeus foveolatus tridactylus (Balogh, 1959)
Locality: G-77/50.

ORIPODIDAE Jacot, 1925

*Benoibates rugosus*Mahunka, 2001
Locality: G-77/50.

GALUMNIDAE Jacot, 1925

Galumna (*Bigalumna*) *rimosa* sp. n.

NOTES ON THE STUDIED SPECIES AND DESCRIPTION OF NEW TAXA

Oribotritia (Berndotritia) microsetosa sp. n.
(Figs. 1–5)

Material examined: Holotype: Kenya, Nakuru district. Près de Longonot, échantillon de terre (racines des sous-arbrisseaux, sur sol de lave), alt. 200 m, 10. XI. 1977. Leg. V. Mahnert and J.-L. Perret (G-77/71). 10 paratypes from the same sample. Holotype and 5 paratypes: deposited in MHNG, 5 Paratypes: (1779-PO-2009): in HNHM.

Diagnosis: Sensillus thin, setiform. Fourteen pairs of notogastral setae present, setae c_2 and *cp* minute, setae c_3 longest of all, but very thin. Other setae setiform, sickle-shaped. Ano-adanal suture partly absent. Nine pairs of genital, two pairs of aggenital, one pair of anal and three pairs of adanal setae present. All legs tridactylous, setae *u* on tarsus IV spiniform, short.

Measurements: Length of aspis: 346–610 μm, length of notogaster: 720–1095 μm, height of notogaster: 542–804 μm.

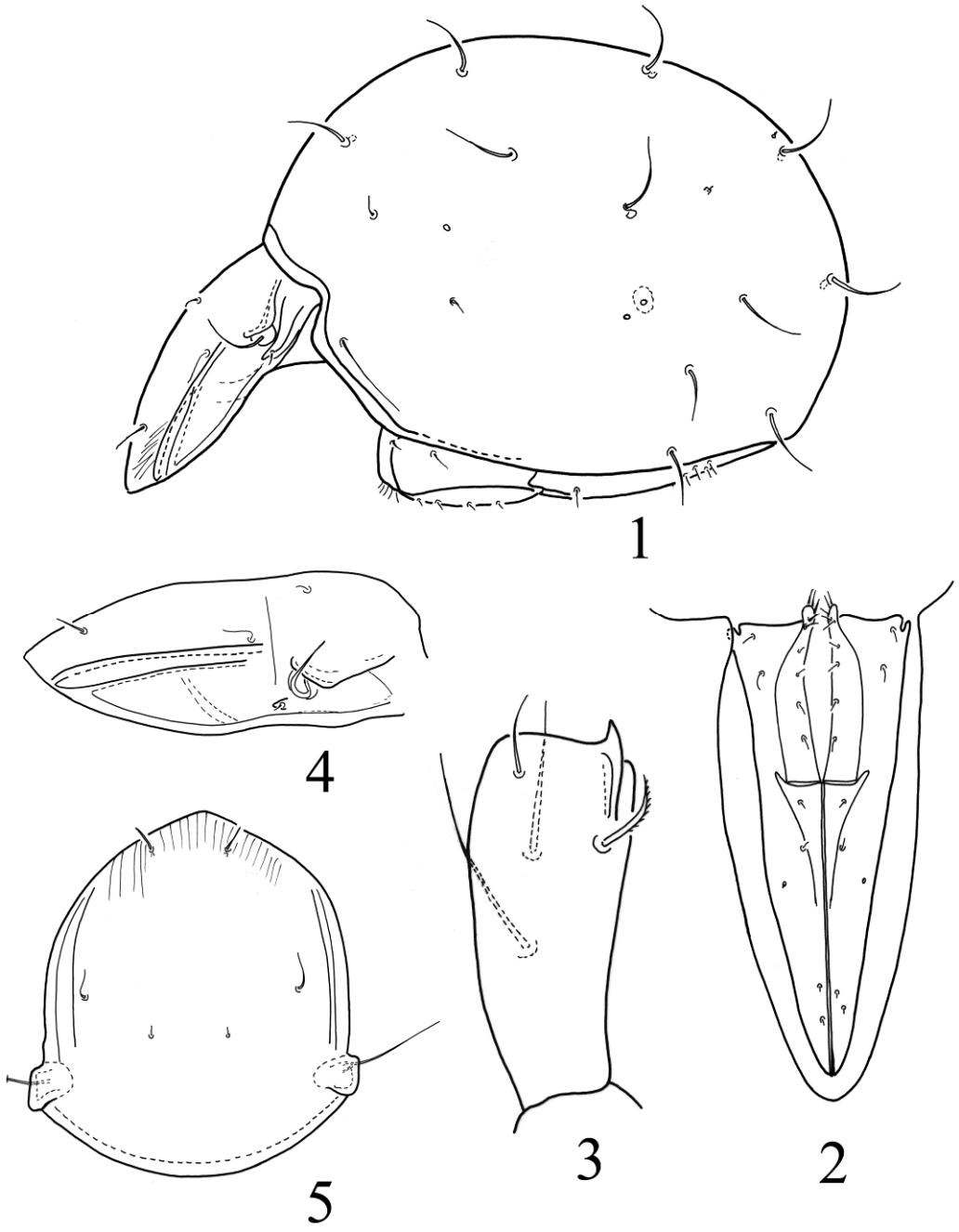
Aspis: Rostral part finely striate (Fig. 5). Two pairs of long and strong lateral carinae and a well developed lateral rim present (Fig. 4). Rostral setae erect, straight, lamellar setae longer, interlamellar ones shorter than the others, the two latter very thin, curved (Fig. 1). Sensillus setiform, smooth.

Notogaster: Fourteen pairs of normal and two pairs of vestigial setae present, among them c_2 and *cp* minute, c_3 longest of all (Fig. 1), filiform, all others curved and roughened. Setae ps_3 shorter than ps_2. Two pairs of lyrifissures and the openings of lateral gland also visible.

Ventral regions (Fig. 2) Genital plates bearing 9 pairs of setae, 5 longer pairs on the cleft, they are longer than the 4 other pairs. Two pairs of aggenital setae present, anterior setae shorter than the posterior one. Ano-adanal suture partly reduced, absent behind the adanal lyrifissures. One pair of anal, three pairs of adanal setae present.

Legs: All tarsi tri- and homodactylous. Femur I as shown on Fig. 3. Unguinal setae of tarsus IV spiniform.

Remarks: The new species is well characterised first of all by the thickened, spiniform unguinal setae and the partly reduced ano-adanal suture. On the basis of these characters the new



Figures 1–5. *Oribotritia* (*Berndotritia*) *microsetosa* sp. n. 1 = body in lateral view, 2 = anogenital region, 3 = femur I, 4 = aspis in lateral view, 5 = aspis in dorsal view

species can be placed in the subgenus *Berndotritia* Mahunka, 1990. However, some features, e.g. the presence of two pairs of lateral carinae, the simple and short sensillus, the short prodorsal setae and the minute c_2 and *cp* setae on the notogaster, distinguish it from the related species.

Etymology: Named after the two pairs of minute notogastral setae.

***Eremulus csuzdii* sp. n.**
(Figs. 6–8)

Material examined: Holotype: Kenya, Muguga, near to Nairobi, experimental forest station. Moss and bark from a primary forest patch. 20. 11. 2004. Leg. Cs. Csuzdi (Afr-978). 6 paratypes from the same sample. Holotype (1780-HO-2009) and 4 paratypes (1780-PO-2009): deposited in HNHM, 2 paratypes: in MHNG.

Diagnosis: Rostrum rounded, its apex nasiform. Costulae narrow, S-shaped, their apices well separated from the posterior part. Transcostula mostly present, interlamellar setae short, hardly reaching over it. Interlamellar and interbothridial region with some alveoli. Sensillus short, slightly dilated medially and curved distally, covered by wide and short spines. Eleven pairs of short notogastral setae observable, varying in length, setae p_1 and p_2 much shorter than other setae. Epimeral, genital and aggenital setae mostly stellate. Anogenital setal formula: 6 – 3 – 2 – 3. Lyrifissures *iad* located far from the anal plates.

Measurements: Length of body: 384–412 μm, width of body: 234–253 μm.

Prodorsum: Rostral apex well protruding anteriorly, rounded. The whole prodorsal and notogastral surface covered by secretion granules. Prodorsal surface ornamented by alveoli basally, some similar ones observable along the lamellae. Costulae long and narrow, S-shaped, their margin ornamented by alveoli. A transversal lath present in front of the costulae, a transcostula also visible between the basal parts of lamellae. Rostral and lamellar setae comparatively long, setiform, much longer than the interlamellar ones, which do not reach much over the transcostula. Lamellar apices well separated from the basal parts. Interlamellar region with large foveolae of different sizes (Fig. 6). Exobothridial setae much shorter, simple. Sensillus widened medially, long, directed outwards, covered by short and thick spines, with flagellate distal end.

Notogaster: Surface ornamented by a typical pattern, consisting of foveolae ordered in transversal fields. One pair of small humeral condyles and eleven pairs of notogastral setae present, great differences observable in their lengths. All setae slightly dilated basally (Fig. 6), smooth or hardly roughened. Setae c_1 and h_1 shortest of all, setae p_1 and p_2 also shorter than the median setae.

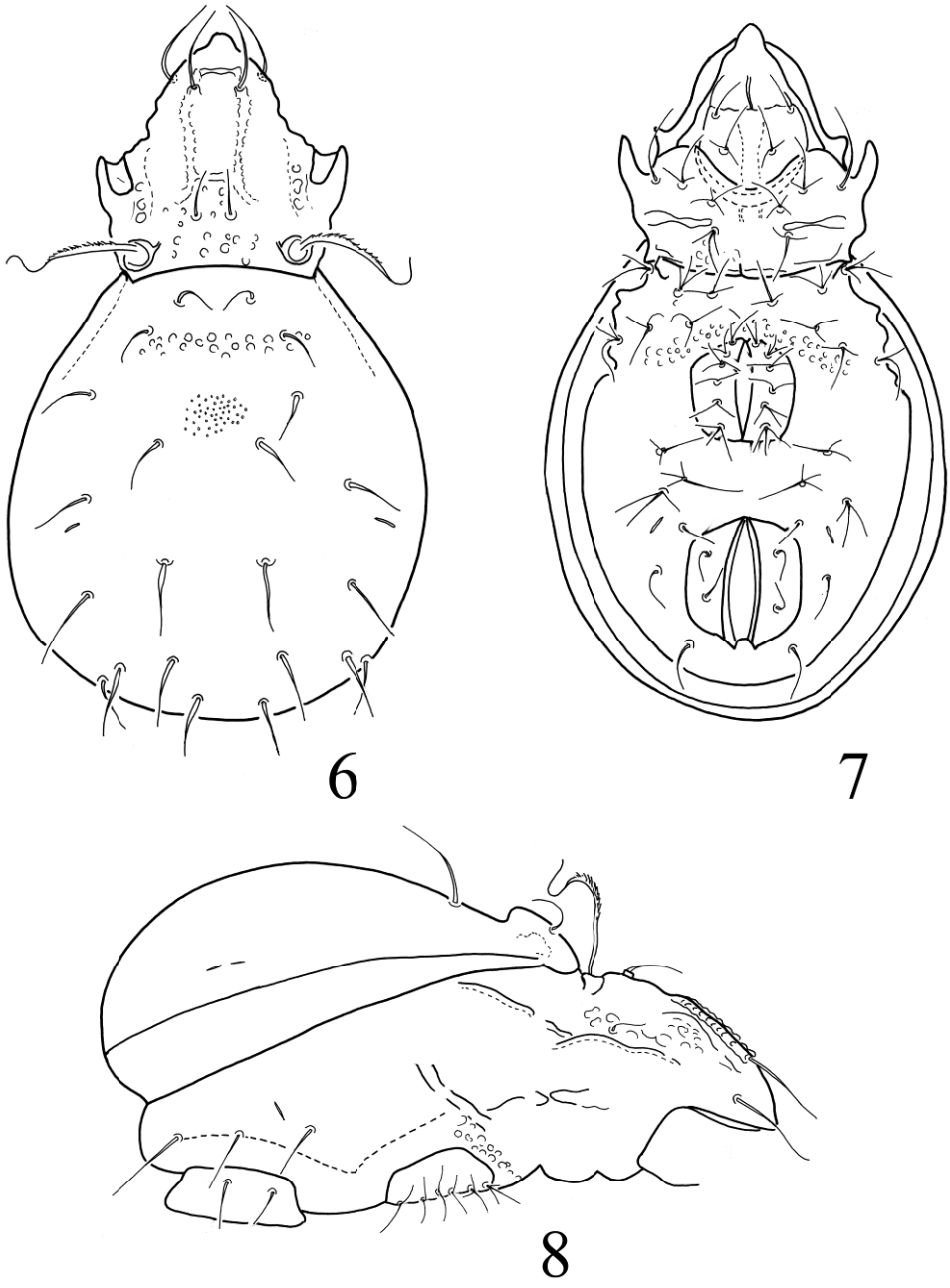
Lateral part of the body (Fig. 8): Tutorium distinct but short. A long lateral lath and some larger foveolae observable in the lateral part of prodorsum. Anterior part of the notogaster separated by a deep, transversal hollow from the posterior part (Fig.). Lyrifissures *ip* and *ips* located very near to each other. Pedotecta I narrow, pedotecta II-III hardly visible. A pair of well sclerotised condyles present on both side in the sejugal region.

Ventral parts (Fig. 7): The shape of the apodemes and epimeral borders typical for the genus. Posterior border of this region (*bo. 4*) weak, its arched surface covered by foveolae. Great differences exist among the epimeral setae: setae *1c* simple, setiform, all the others stellate.

Surface of the ventral plate nearly smooth, only some weak foveolae exist. Surface of the genital and anal plates smooth. Genital and aggenital setae also stellate, anal and adanal ones simple setiform. Anal setae equal in length or shorter than the adanal ones, among the latter ad_1 longer than the others. Lyrifissures *iad* located far from the anal aperture, in inverse apoanal position.

Remarks: The identification of the species of the genus *Eremulus* Berlese, 1908 is complicated, however in the studying some features identification is possible. The new species is clearly distinguishable from the other species of this genus by the transversal lath and transversal costulae, the shape of its sensillus, by the varying notogastral setae and by the position and form of the ventral setae and lyrifissures.

Etymology: We dedicate the new species to our dear friend and collaborator Dr. Csaba Csuzdi, who has also collected several interesting oribatid species.



Figures 6–8. *Eremulus csuzdii* sp. n. – 6 = body in dorsal view, 7 = body in ventral view, 8 = body in lateral view

Austrocarabodes patakii sp. n.
(Figs. 9–4)

Material examined: Holotype: Kenya, Nakuru district. Près de Longonot, échantillon de terre (racines des sous-arbrisseaux, sur sol de lave), alt. 200 m, 10. XI. 1977. Leg. V. Mahnert and J.-L. Perret (G-77/71). 10 paratypes from the same sample. Holotype and 6 paratypes: deposited in MHNG, 4 paratypes: (1781-PO-2009): in HNHM.

Diagnosis: Rostrum widely rounded without median apex. Lamellae wide covering the prodorsal margin. A short translamella present. Interlamellar surface foveolate. All prodorsal setae – except the phylliform lamellar one – long, bacilliform, finely aciculate. Interlamellar setae arising anteriorly on the interlamellar surface. Sensillus fusiform, with short, dilated head. Dorsosejugal suture conspicuously convex, a pair of short humeral projectings present. Notogastral surface covered by irregular tubercles, ordered in a longitudinal line or forming a polygonate pattern. Ten pairs of very long, curved notogastral setae. Apodemes and epimeral borders, excepting the sternal one, compose a close network. Genitoanal setal formula: 4 – 1 –2 – 3. Genital and aggenital setae simple, adanal setae phylliform.

Measurements: Length of body: 637–776 μm, width of body: 373–444 μm.

Prodorsum: Rostrum wide, rounded, without median apex. Lamellae slightly dilated anteriorly, with obtuse apices. Translamella short, present. Interlamellar surface covered by tubercles. Lamellar and rostral setae phylliform, curved backwards, interlamellar setae long, bacilliform, curved outwards, wide, phylliform, with two veins. Sensillus (Fig. 14) dilated distally, slightly curved backwards, distinctly barbed.

Notogaster: Dorsosejugal suture protruding into interlamellar surface, convex, nearly triangular in shape. Humeral apophyses small, not projecting forewards. Notogastral surface ornamented by large, round tubercles, mostly scattered, sometimes arranged in longitudinal rows. Fourteen pairs of nearly bacilliform, strongly curved notogastral setae (Fig. 9) present, all without veins, their surface also with small cyclically arranged aciculae. No difference in their lengths.

Lateral part of podosoma: Lamellae rounded anteriorly. Tutorium bifurcate, a short part directed to the lamellae. Pedotectum I large, without foveolae.

Ventral parts (Fig. 10): Apodemes and borders – excepting sternal one anteriorly – typical for the genus, well sclerotised and observable. Sternal region wide, a short part of it thickened anteriorly. Behind the epimeral borders 4 a pair of longitudinal laths present, curved backwards and outwards. Epimeral setae (Figs 11, 13) varying in length and shape, inner setae short or minute, some of them (*3c, 4b* and *4c*) slightly dilated basally. Ventral plate ornamented by round pustules. Genital and aggenital setae (Fig. 12) thin, fine, setiform. Anal setae bacilliform, adanal ones also dilated, slightly phylliform. Lyrifissures *iad* hardly observable, located far from the anal aperture.

Legs: Surface of all segments smooth. Femora of legs III with ventrodistal spur, legs IV with blade-like crest ventrally.

Remarks: On the basis of the very long and curved notogastral setae the new species belongs to the *A. elegans* (Hammer, 1966) group. It is clearly distinguishable from the other representatives of this species group by the shape of sensillus and the shape of anal and adanal setae.

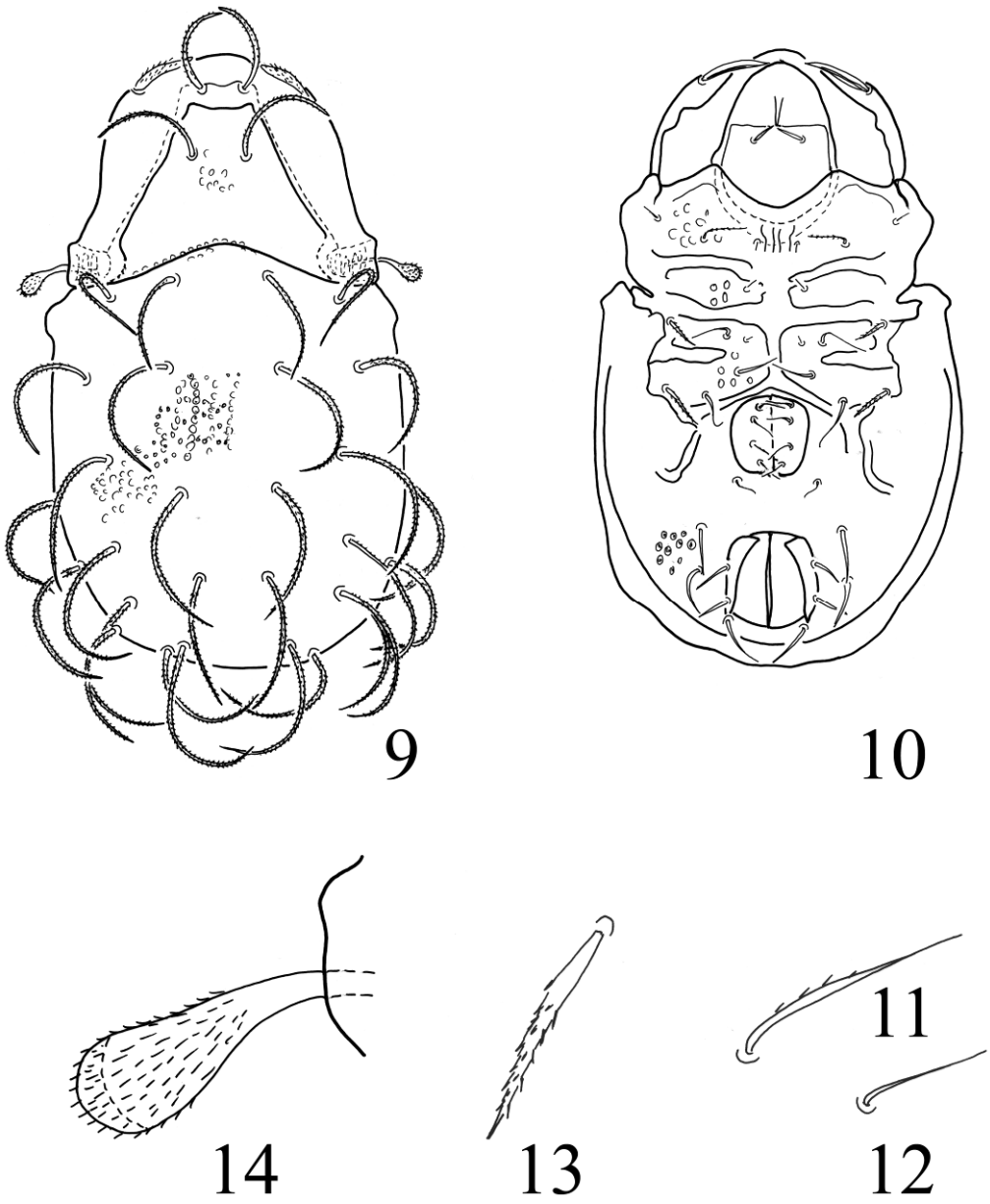
Etymology: We dedicate the new species to our friend Mr. László Pataki (Budapest), on the occasion of his 60th birthday.

***Dolicheremaeus borbolai* sp. n.**

(Figs. 15–19)

Material examined: Holotype: Kenya, Shimba Hills National Park, Shimba Hills lodge. 10. 03. 2001. Leg. S. Mahunka and L. Mahunka-Papp (Afr-950). Holotype (1782-HO-09): deposited in HNHM.

Diagnosis: Rostrum rounded, simple. Lamellae narrow and long, their apices reaching over the insertion of lamellar setae. Interbothridial region with a pair of converging lines consisting of small curves. Sensillus short, slightly lanceolate. Two pairs of prodorsal and two pairs of notogastral sejugal condyles present, median noto-

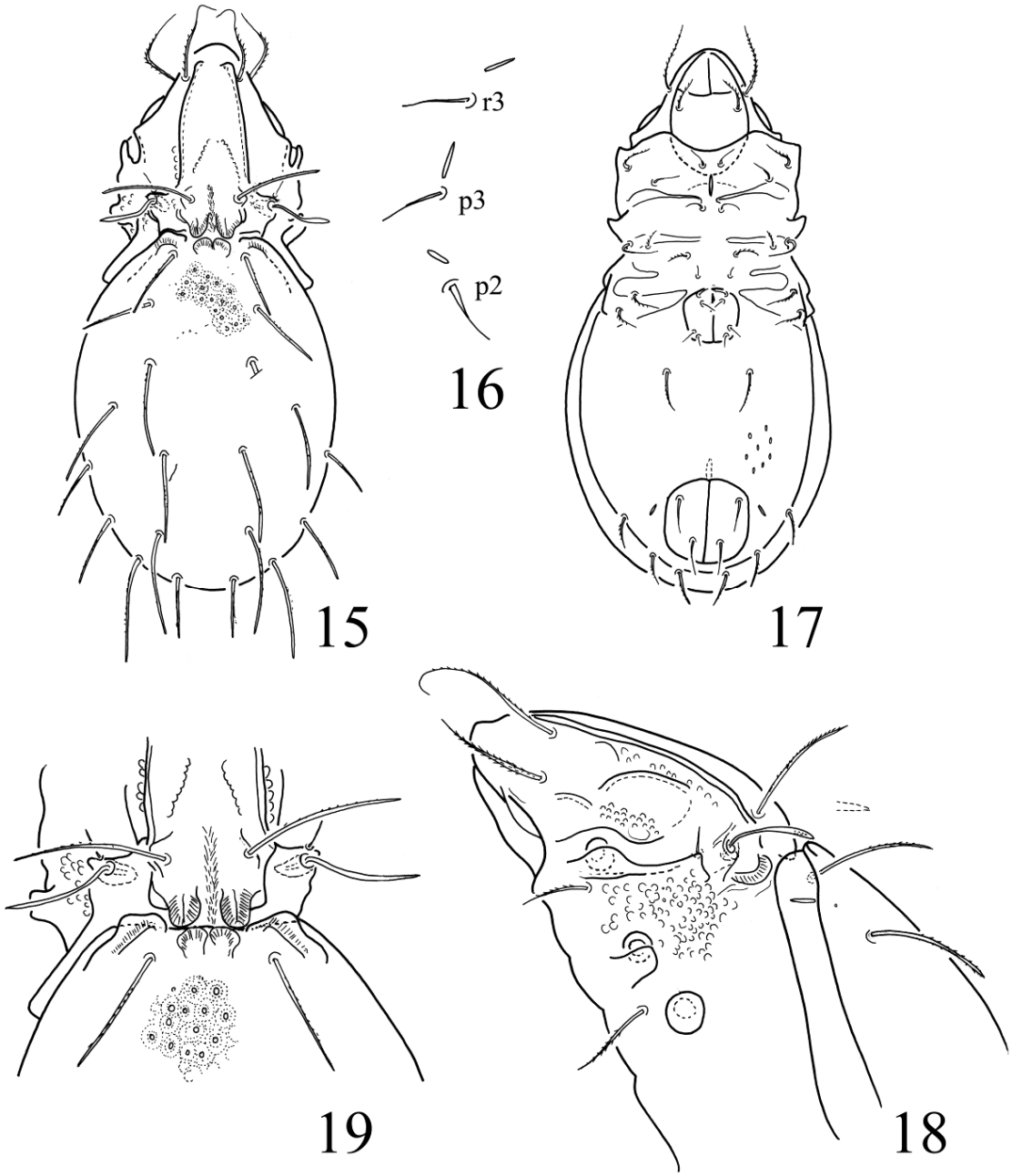


Figures 9–14. *Austrocarabodes patakii* sp. n. – 9 = body in dorsal view, 10 = body in ventral view, 11 = seta *1b*, 12 = genital seta, 13 = seta *3c*, 14 = sensillus.

gastral condyles located very near to each other. Ten pairs of long notogastral setae observable, varying in lengths, setae p_1 much shorter than p_2. Epimeral setae normal, all short and pilose. Adanal setae shorter than the anal and aggenital ones. Lyrifissures *iad* in inverse apoanal position. Type of the ultimate setae of leg: L – L – L – L.

Measurements: Length of body: 1080 μm, width of body: 540 μm.

Prodorsum: Rostral apex round, its surface smooth. The whole prodorsal surface also nearly smooth, however, some small tubercles and tuberculate fields observable along the lamellae on the lateral parts. Lamellae very long and nar-



Figures 15–19. *Dolicheremaeus borbolai* sp. n. – 15 = body in dorsal view, 16 = lyrifissures and setae in lateromarginal position, 17 = body in ventral view, 18 = podosoma in lateral view, 19 = rostral part in anterior view

row, their anterior part bent inwards. Distal apices reaching over the insertion of the lamellar setae (Fig. 19). Interlamellar region with peculiar converging lines (Fig. 15). Both pairs of prodorsal condyles distinct, median ones rounded, lateral ones angulated. Rostral and lamellar setae simple, setiform, finely ciliate. Lamellar setae longer than the rostral setae and bent inwards. Interlamellar setae longer and thicker than the preceding ones. Exobothridial setae much shorter, simple. Sen sillus simple, short, directed outwards, lanceolate.

Notogaster: Surface ornamented by a peculiar pattern consisting of punctate polygonal fields with small alveoli in their middle. Two pairs of condyles present, median pair (co. nm.) rounded,

located near to each other, nearly touching the other. Lateral pair of condyles (co. nl.) much larger, simple and flat. Ten pairs of mostly long notogastral setae present, great differences existing in their lengths. All setae hardly ciliate, their distal end similar to interlamellar ones. Setae c_2, h_1 and p_3 shortest of all. Lyrifissures *iad* located in inverse apoanal position.

Lateral part of podosoma (Fig. 18): Tutorium distinct but short, curved. Lateral lamelliform expansion short, distinct, directed to the insertion of rostral setae. Pedotecta 1 narrow, pedotecta 2-3 rectangular in lateral view. Sejugal region pustulate. Lyrifissures *ips* (Fig. 16) located between setae p_3 and r_3.

Ventral parts (Fig. 17): The shape of apodemes and epimeral borders typical for the genus, but the posterior border of this region (*bo. 4*) weak, hardly observable. Great differences existing among the epimeral setae, setae *1c*, *3c*, *4c* and *4b* longer than *1a*, *2*a*, 3a* and *4a*. Surface of the ventral plate nearly smooth, along the margin with some weak foveolae. Surface of the genital plate smooth and much darker than the ventral plate. Anterior pair of the genital setae shorter than the others. Aggenital setae comparatively longer than the adanal ones. These equal in length, shorter also than the anal ones, surpassing aggenital, anal and adanal setae partly pilose, last ones slightly widened. Lyrifissures *iad* located far from the anal aperture, in inverse apoanal position.

Legs: Type of ultimate setae: L – L – L – L. Aggenital, anal and adanal setae partly pilose, all slightly widened. Tarsi of legs II-III with small dorsal teeth.

Remarks: On the basis of the converging interlamellar lines and the position of the median notogastral condyles the new species is unique in the genus *Dolicheremaeus*. Some other features (sculpture of the notogaster, ratio of the anal and adanal setae) also well distinguish the new species from all congeners.

Etymology: We dedicate the new species in honour to our friend Prof. Dr. J. Borbola (Budapest), who helped us in our work in different way.

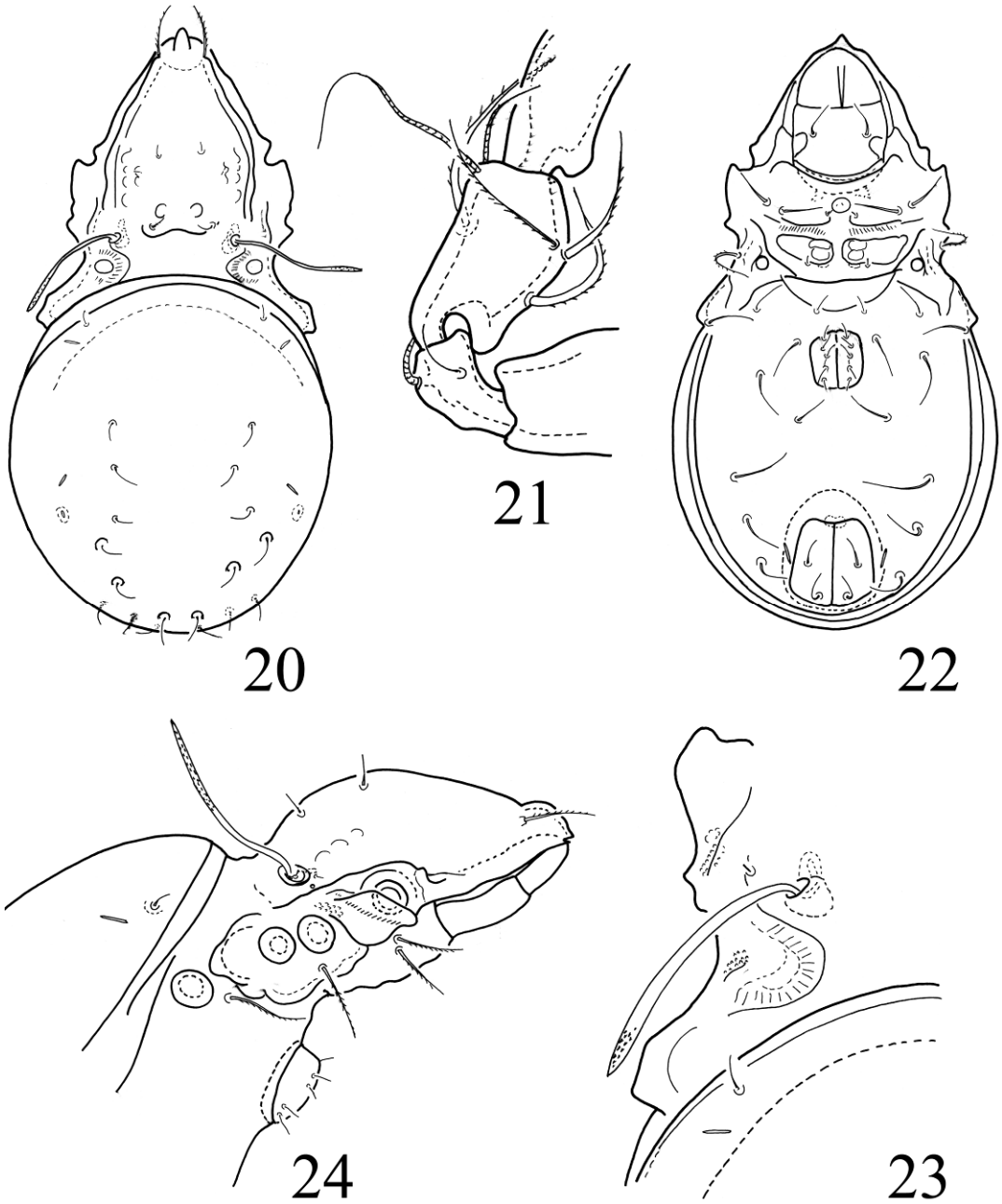
Teratoppia (Teratoppia) nasalis sp. n.
(Figs. 20–24)

Material examined: Holotype: Kenya, Shimba Hills National Park, Shimba Hills lodge. Wet decaying debris, litter and soil under trees. 10. 03. 2001. Leg. S. Mahunka and L. Mahunka-Papp (Afr-950). Holotype (1783-HO-2009) deposited in HNHM.

Diagnosis: Rostrum rounded, with a projecting median tooth. Prodorsum with lateral costulae reaching to the insertion of thick and well pilose rostral setae. Lamellar and interlamellar setae minute, one pair of maculae present between them. Behind the interlamellar setae a waved transversal line present. Sensillus smooth, long, hardly dilated. A pair of light spots present behind bothridia. Ten pairs of notogastral setae, the c_2 shortest of all. Sensillus thin, finely roughened. Apodemes 3 – 4 absent. Some epimeral setae long, setae *2a* reduced. Five pairs of genital setae present. Lyrifissures *iad* in direct apoanal position.

Measurements: Length of body: 423 μm, width of body: 242 μm.

Prodorsum: Rostral part rounded, bearing a strong median crest, like a nasiform median apex in dorsal view, reaching over the dorsal margin (Fig. 25). Lamellar costula absent, a pair of well developed lateral laths present. They are long reaching to the rostral setae. A pair of indistinct swellings laterally and a pair of larger, irregular, punctate (or porose?) maculae present in the interbothridial region. Behind the latter a waved, distinct but thin transversal line visible. Rostral setae well pilose and well developed, much stronger than the other, minute prodorsal setae. Bothridium cup-shaped, with small opening. Sensillus long, thin, its distal part hardly dilated and finely roughened. Behind the bothridium a well chitinised, semicircular formation (Fig. 23) visible framing the light spot.



Figures 20–24. *Teratoppia* (*Teratoppia*) *nasalis* sp. n. – 20 = body in dorsal view, 21 = tibia of leg II, 22 = body in ventral view, 23 = basal part of prodorsum in dorsal view, 24 = prodorsum in lateral view

Notogaster: Dorsosejugal margin rounded. Ten pairs of short notogastral setae present, c_2 shorter and thinner than the others. Setae *la, lm* and *lp* thinner than $h_1 - h_3$, their alveoli also smaller than those of latter (Fig. 20). Setae *l* and *h* arising one after the another. Setae p_1 directed outwards.

Lateral part of podosoma: Rostral crest well visible in lateral view (Fig. 24). Pedotecta 1 large, with straight dorsal margin. Pedotecta 2-3 reduced. Discidium well developed. Some lateral fields distinctly granulated. Exobothridial setae minute.

Ventral parts (Fig. 22) Anterior part of the epimeral region well sclerotised, posterior part without apodemes or borders, epimeral region not framed posteriorly. Sejugal apodemes distinct, bearing a pair of well framed light spots. Behind the sejugal apodemes an arched thin line present. Epimeral setae different in lengths and thick, setae *1b* and *1c* arising near to each other, strong, setae *1a* minute. Setae *2a* absent, setae *3c* and *4c* distinctly ciliate. Surface of genital plates smooth, 5 pairs of genital setae arising in longitudinal rows. Anal setae directed forewards, adanal setae longer than the anal ones. Setae ad_1 and ad_2 in para-anal, setae ad_3 in preanal position. Lyrifissures *iad* in direct apoanal position, located near to the anal opening.

Legs: All of normal teratoppiid type. Tibia and genu of leg I shown on Fig. 21.

Remarks: The new species without doubt belongs to the genus *Teratoppia* Balogh, 1959. On the basis of the prodorsal structure, as well as the position and form of the notogastral setae the new species is closest to *T. creta* (Mahunka, 1986). However, the rostral part of the new species bearing a nasiform apex (two large teeth present in *creta*). The new species is distinguished from *creta* also by the 5 pairs of genital setae (6 pairs setae present nearly all heretofore known species).

Etymology: Named after the shape of the nasiform rostral apex.

Teratoppia (Teratoppiella) pectinata **Balogh, 1961**
(Figs. 25–27)

The species was described by Balogh (1961) from Tanzania, in Meru Region. Later, Balogh transferred to the genus *Teratoppiella* Balogh, 1983, which was changed to be as subgenus by Subias & P. Balogh (1989). In the description of the species Balogh did not mention or figure the ventral regions, although, it is very important for the identification. Therefore on the basis of the newly collected specimens we give a complete description including some new drawings (Figs 25–26):

Dorsal side: Rostral setae well pilose and much ticker than the filiform lamellar and interlamellar ones. A very weak, hardly observable translamellar line present. Exobothridial setae minute, setae c_2 clearly visible. Sensillus with 4-6 branches.

Lateral view (Fig. 26): Sejugal region concave.

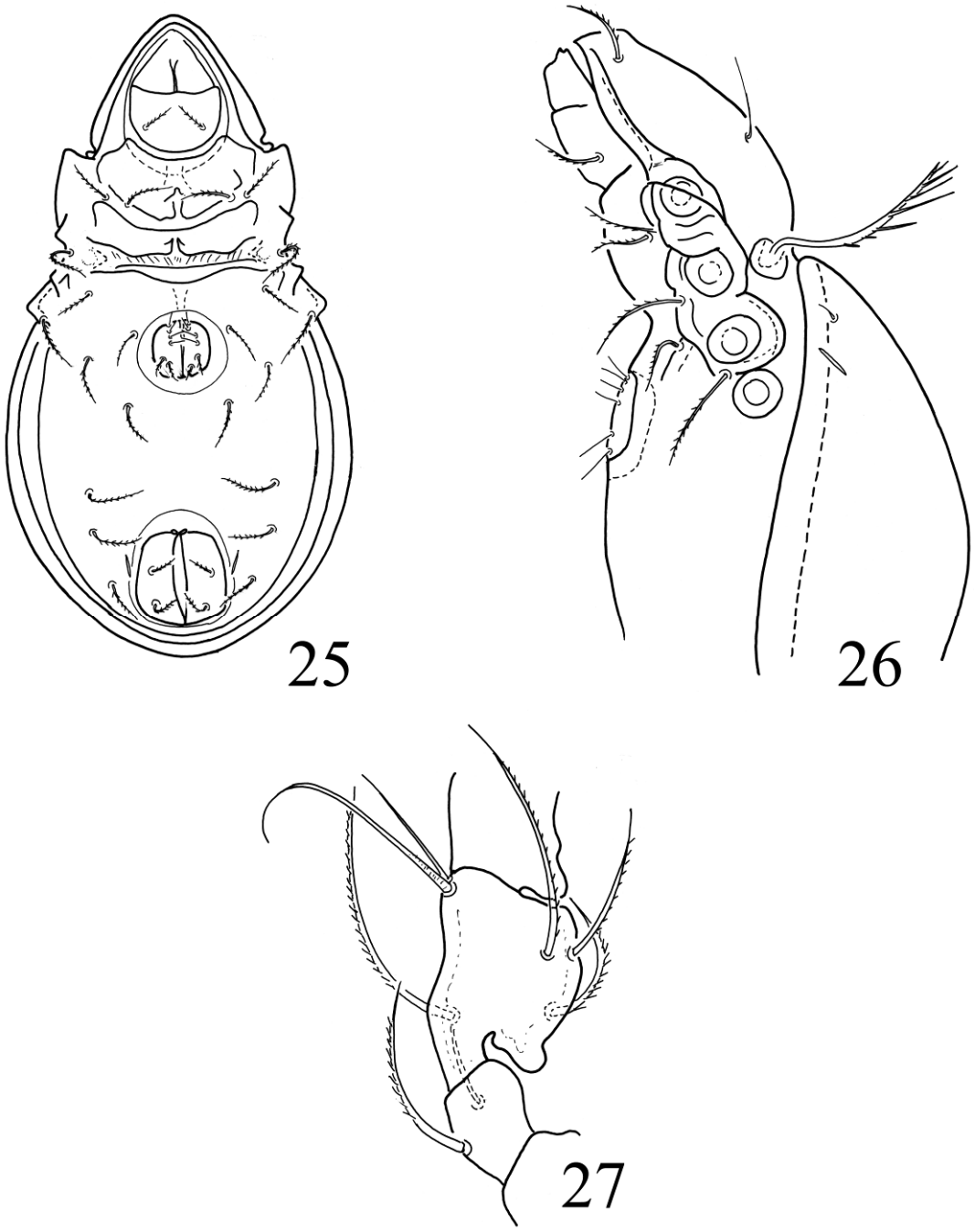
Ventral parts: Anterior part of the epimeral region with two well sclerotised apodemes and borders, sejugal one wider than *ap. 2*. Sternal apodema only partly observable, no connection between the two transversal borders. Posterior part of the epimeral region without apodemes or borders. Behind the sejugal apodemes an arched thin line present. Epimeral setae different in lengths and thick, setae *1b* and *1c* arising near to each other, strong, setae *1a* minute. Setae *2a* absent, setae *3c* and *4c* distinctly ciliate. Surface of genital plates smooth, 6 pairs of genital setae present. Anal setae directed forewards, adanal setae much longer than the anal ones. Setae ad_1 and ad_2 in paraanal, setae ad_3 in preanal position, Lyrifissures *iad* in direct apoanal position, located near to the anal opening.

Legs: Tibia of leg II as shown on fig. 27.

Tuberemaeus foveolatus tridactylus **(Balogh, 1959)**
(Figs. 28–29)

The subspecies of this species was described by Balogh (1959) as a *forma nova*. He gave figure only from the claw of leg I. In spite of this short description the identity of the newly collected specimens and of the Balogh's description is inevitable.

Balogh did not study either the basic species or the subspecies, however some clear differences exist between them. Therefore we give some drawings about the lateral side and other parts of *foveolatus tridactylus*.



Figures 25–27. *Teratoppia* (*Teratoppiella*) *pectinata* (Balogh, 1961) – 25 = body in dorsal view, 26 = body in lateral view, 27 = tibia of leg II

First of all we draw attention to the form of lamellae and the presence of the prelamella, which reaches to the insertion of the rostral setae (Fig. 29).

The male is much smaller than the female. Measurements of the studied specimens: length of female: 423 μm, that of male: 378 μm, width of female: 274 μm, that of male: 218 μm.

Figures 28–29. *Tuberemaeus foveolatus tridactylus* (Balogh, 1959) – 28 = anterior part of body in dorsal view, 29 = podorsum in lateral view

Galumna (*Bigalumna*) subgen. n.

Diagnosis: Rostral apex sharply pointed. Lamellar and sublamellar lines distinct, lamellar setae inserted between lamellar lines. Notogaster with ten pairs of alveoli, four pairs of porose areas and one median porus present. Lyrifissures *iad* in adanal popsition. Postanal porose area very small, elliptical. All legs bidactylous.

Type species: *Galumna* (*Bigalumna*) *rimosa* sp. n.

Remarks: The new taxon is well characterised by the form of rostral apex and first of all, by the bidactylous legs. These features were unknown in this genus.

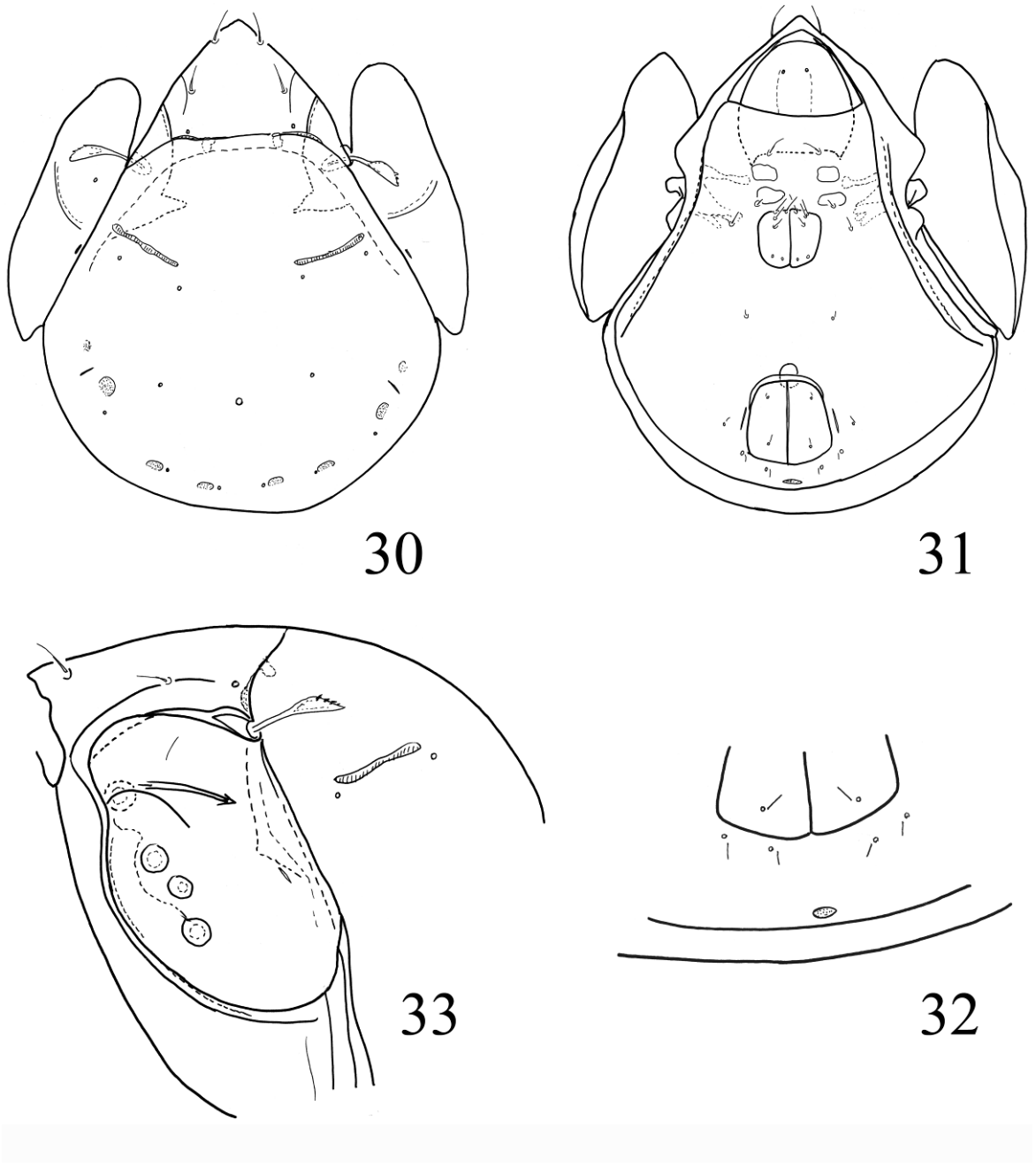
Galumna (*Bigalumna*) *rimosa* sp. n.
(Figs. 30–33)

Material examined: Holotype: Kenya, Tana River district. 10 km nord de Garsen. Tamisage sous bois mort, 23. X. 1977. Leg. V. Mahnert and J.-L. Perret (G-77/31). 4 paratypes from the same sample. Holotype and 2 paratypes: deposited in MHNG, 2 Paratypes (1784-PO-2009): in HNHM.

Diagnosis: Whole body conspicuously wide. Rostrum conical, with sharply pointed apex. Lamellar and sublamellar lines distinct, lamellar setae inserted between lamellar lines. Rostral and lamellar setae short, equal in length, interlamellar setae represented only their alveoli. Sensillus short, its head asymmetrically lanceolate, its end with some acicules or bristles. Dorsosejugal suture distinct. Ten pairs of alveoli, four pairs of porose areas and one median porus present on the notogaster. Among porose areae *Aa* conspicuously long, very narrow, A_1 slightly larger than the remaining ones. Surface of genital and anal plates smooth. Lyrifissures *iad* in adanal position. Postanal porose area very small, elliptical. Bidactylous legs.

Measurements: Length of body: 302–318 μm, width of body: 230–247 μm.

Prodorsum: Rostrum conical, rostral apex triangular, sharply pointed in dorsal view. Lamellar and sublamellar lines distinct, sublamellar ones



Figures 30–33. *Galumna* (*Bigalumna*) *rimosa* sp. n. – 30 = body in dorsal view, 31 = body in ventral view, 32 = podosoma in lateral view, 33 = postanal part of body

stronger than the lamellar ones (Fig. 32). Rostral and lamellar setae equal in length, lamellar setae inserted between lamellar lines, very near to them. Interlamellar setae reduced, represented only by alveoli. Areae porosae dorsosejugales narrow, elongated, present behind the interlamellar setae. Sensillus short, its head asymmetrically lanceolate, its end sharply pointed, with some acicules or bristles.

Notogaster: Dorsosejugal suture distinct, its median part hardly concave or straight. Ten pairs

of setal alveoli and four pairs of areae porosae and a distinct median porus present. Porose areae *Aa* conspicuous, very long, narrow, split-like (Fig. 30). A_1 round and larger than the slightly oval A_2 and A_3. Lyrifissures *ia* located marginally.

Lateral part of podosoma (Fig. 32): Lamellar lines directed toward the insertion of interlamellar setae. Surface of pteromorphae smooth.

Ventral parts (Fig. 31): Epimeral region ornamented by two pairs of nearly angular fields. All epimeral setae minute. Surface of genital and anal plates smooth, genital setae slightly longer than aggenital, anal and adanal ones. Postanal porose area (Fig. 33) very small, sometimes hardly observable.

Legs: All legs bi- and heterodactylous.

Remarks: See the remarks after the description of the new subgenus.

Etymology: Named after the very narrow, split-like porose area *Aa*.

Acknowledgements – This work was supported by the Hungarian Scientific Research Fund (OTKA number T45889)**.** First of all we should like to thank for making available to study the samples of the Musée d'Histoire naturelle of Geneva, specifically the collectors, the former museum director Dr. V. Mahnert and his co-worker, J.-L. Perret, and the once and present keepers of the institute, Dr. B. Hauser and Dr. P. Schwendinger. Special thanks are due to Dr. Csaba Csuzdi for his help in preparing our manuscript. We should also like to thank Dr. Lajos Zombori for reviewing the English text of this paper.

REFERENCES

BALOGH, J. (1959): Some oribatid mites from Eastern Africa (Acari: Oribatidae). *Acta Zoologica Academiae Scientiarum Hungaricae,* 5(1–2): 13–32.

BALOGH, J. (1962): LXXV. Acari Oribates. Resultats Scientifiques des Missions Zoologiques de L' I.R.S.A.C. en Afrique Orientale (P. Basilewsky et N. Leleup, 1957). *Annales du Musée royal de l'Afrique Centrale, Sciences zoologiques,* 110: 90–131.

BALOGH, J. & BALOGH, P. (1992): *The oribatid mites genera of the World. I–II.* Hungarian Natural History Museum, Budapest, 263+375 pp.

BALOGH, J. & BALOGH, P. (2002): *Identification keys to the oribatid mites of the Extra-Holarctic Regions. I–II.* Well-Press Publishing Limited, Budapest, 453+504 pp.

BEHAN-PELLETIER, V. (2001): *Phylogenetic relationships of Hypozetes (Acari: Tegoribatidae)*. In: Halliday, R. B. , Walter, D. E., Proctor, H. C. , Norton R. A. & Colloff, M. J. (eds.): Acarology: Proceedings of the 10th International Congress, p. 50–57.

MAHUNKA, S. (2001): Arboricolous oribatid mites (Acari: Oribatida) from Kenya. *Folia entomologica hungarica*, 62: 11–22.

MAHUNKA, S. & MAHUNKA-PAPP, L. (1992): A report on the second soil-zoological collecting trip in Kenya. *Folia entomologica hungarica,* 53: 121–126.

MAHUNKA, S. & MAHUNKA-PAPP, L. (1992): Taxonomical and faunistical studies on oribatids collected in Kenya (Acari: Oribatida) I. *Acta Zoologica Academiae Scientiarum Hungaricae,* 53 (1): 51–74.

MAHUNKA, S. & MAHUNKA-PAPP, L. (2008): Poronotic oribatids from Kenya (Acari Oribatida). *Tropical Zoology,* 21: 75-90.

MAHUNKA, S. & MAHUNKA-PAPP, L. (2009): New and little known oribatids from Kenya, with description of two new genera (Acari Oribatida). *Journal of Natural History*, 43 (9–12): 737–768.

NIEDBAŁA, W. (2001): Study on the diversity of ptyctimous mites (Acari, Oribatida) and quest for centres of its origin: the fauna of the Ethiopian Region. *Monographs of the Upper Silensian Museum,* 3: 1–245.

NIEDBAŁA, W. (2004): Zoogeography of the ptyctimous mites (Acari: Oribatida) of Madagascar and other eastern African islands. *International Journal of Tropical Insect Science,* 24 (4): 330–335.

SUBÍAS, L. S. (2004): Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes, Oribatida) del Mundo (1758-2002). *Graellsia,* 60: 3–305.

SUBÍAS, L. S. (2008) Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes, Oribatida) del Mundo (exepto fósiles) (Originally published in *Graellsia* 60: 3–305, 2004, actualized in May 2008), 540 pp. Pdf.

WALLWORK, J. A. (1961): Some Oribatei from Ghana. VII. Members of the „family" Eremaeidae Willmann (2nd series). The genus *Oppia* Koch. *Acarologia,* 3(4): 637–658.

WALLWORK, J. A. (1962): Some Oribatei from Ghana. IX. The genus *Tetracondyla* Newell, 1956 (2nd series). *Acarologia,* 4(3): 440–456.

WEIGMANN, G. (2006): Hornmilben (Oribatida). *Die Tierwelt Deutschlands, 76.* 520 pp.

WOAS, S. (2002): *4. 1. Acari: Oribatida*. in: Adis, J. (ed.) Amazonian Arachnida and Myriopoda. Pensoft Publishers, Sofia–Moscow, pp. 21–291.

Opusc. Zool. Budapest, 2009, 40 (1): 63–71

First records of zerconid mites (Acari: Mesostigmata, Zerconidae) from Cyprus with description of *Prozercon semiseparatus* sp. nov.

ZS. UJVÁRI[1]

Abstract. Elaborating a material collected from different habitats in Cyprus, *Prozercon semiseparatus* sp. nov. and an already known species, *Zercon plumatopilus* Athias-Henriot, 1961 are recorded. Description of the new species and redescription of female, male and deutonymph of the known species, mentioning differential characters between specimens collected in Italy, Slovenia and Cyprus, are presented. With 16 figures.

INTRODUCTION

Cyprus is the third largest island in the Mediterranean region, with an area of 9251 km$^{2.}$ It is situated 72 kms south of Turkey and 105 kms west of Syria. Formation of the island is estimated between 92–85 million years ago, with the genesis of the uplifted oceanic crust fragment called Troodos Massif (Gass, 1980). Till the late Miocene the massif constituted a low-lying island, however this temporal stage was followed by several uplifts. 5.9 million years ago (late Miocene) the strait of Gibraltar has closed, accordingly the Mediterranean basin was isolated from the Atlantic Ocean, resulting in a huge decrease in the Mediterranean sea level. By this time, a few ridges have come to the surface, connecting Cyprus to the Levantine coast (Pavlíček & Csuzdi, 2008). These ridges have existed over a million year, hence they could have served as migratory routes between the island and the Levantine region. Several evidences exist supporting this fact, for example similarities by autchtonous species between the earthworm fauna of Cyprus and the Levantine region (Pavlíček & Csuzdi, 2006, 2008).

Constituting a bridge between three continents – Europe, Africa and Asia – and having a great variety in local temperature and rainfall – from semi-desert plains of Mesaoria to the alpine regions of Troodos Mts. – Cyprus is considered a biodiversity hotspot area with a high number of endemisms (Myers *et al*., 2000).

Regarding to observations on the Zerconidae fauna of the East Mediterranean region, our knowledge is quite scarce and sparse. Only the fauna of Turkey can be considered well-known by several faunistical (e. g. Urhan & Ayyildiz, 1992, 1996a; Urhan, 1999; Urhan *et al.*, 2007) and taxonomical papers (e. g. Urhan, 1998, 2002, 2008; Urhan & Ayyildiz, 1996 b; Urhan & Ekiz, 2002) published between 1992 and 2008. Only one paper studied the fauna of a member of the Aegean Archipelago, Crete, mentioning two new and a known Zerconidae species from the island (Ujvári, 2008). The Levantine fauna is currently unknown, so as the fauna of Cyprus.

MATERIALS AND METHODS

Specimens collected were cleared with lactic acid and mounted in glycerine. Preparations were examined under a light microscope; drawings were made with a camera lucida. Mites are stored in 75% ethanol and deposited in the Soil Zoology Collection of the Hungarian Natural History Museum, Budapest. The terminology of setae in descriptions follows Błaszak (1974).

[1]*Zsolt Ujvári,* Systematic Zoology Research Group of the Hungarian Academy of Sciences, and Hungarian Natural History Museum, H-1088 Budapest, Baross u. 13., Hungary. E-mail*:* zs_ujvari@yahoo.com

DESCRIPTIONS

Prozercon (s. str.) semiseparatus sp. nov.

(Figs 1–4.)

Material examined. Holotype: female, E-2153: Cyprus, Troodos Mts., Kakopetria, 750 m, leaf litter, 06.04.2007, leg. Csuzdi, Cs.; Paratypes: 2 ♀, 1 ♂, locality same that of the holotype.

Diagnosis. Podonotal i_{3-5} and s_1 setae smooth and needle-like, others differently pilose or plumose. On opisthonotum eight pairs of marginal setae, each densely plumose, setae R_{6-8} significantly shorter than R_{1-5}. Every I-, Z- and S-setae pilose. Setae I_{1-5} and Z_{1-4} situated on large tubercules, not any of them reaching the following's bases. S_1 – as the shortest setae of opisthonotum – situated (antero)-laterally to Z_1. The shield covered with large, distinct spots and irregular cavities. Podonotal and opisthonotal shields not completely separated. Dorsal fossae well sclerotized, with oblique axes. Posterolateral tips of peritremal shield reaching between insertions of setae R_3 and R_4 at females and to setae R_4 at males.

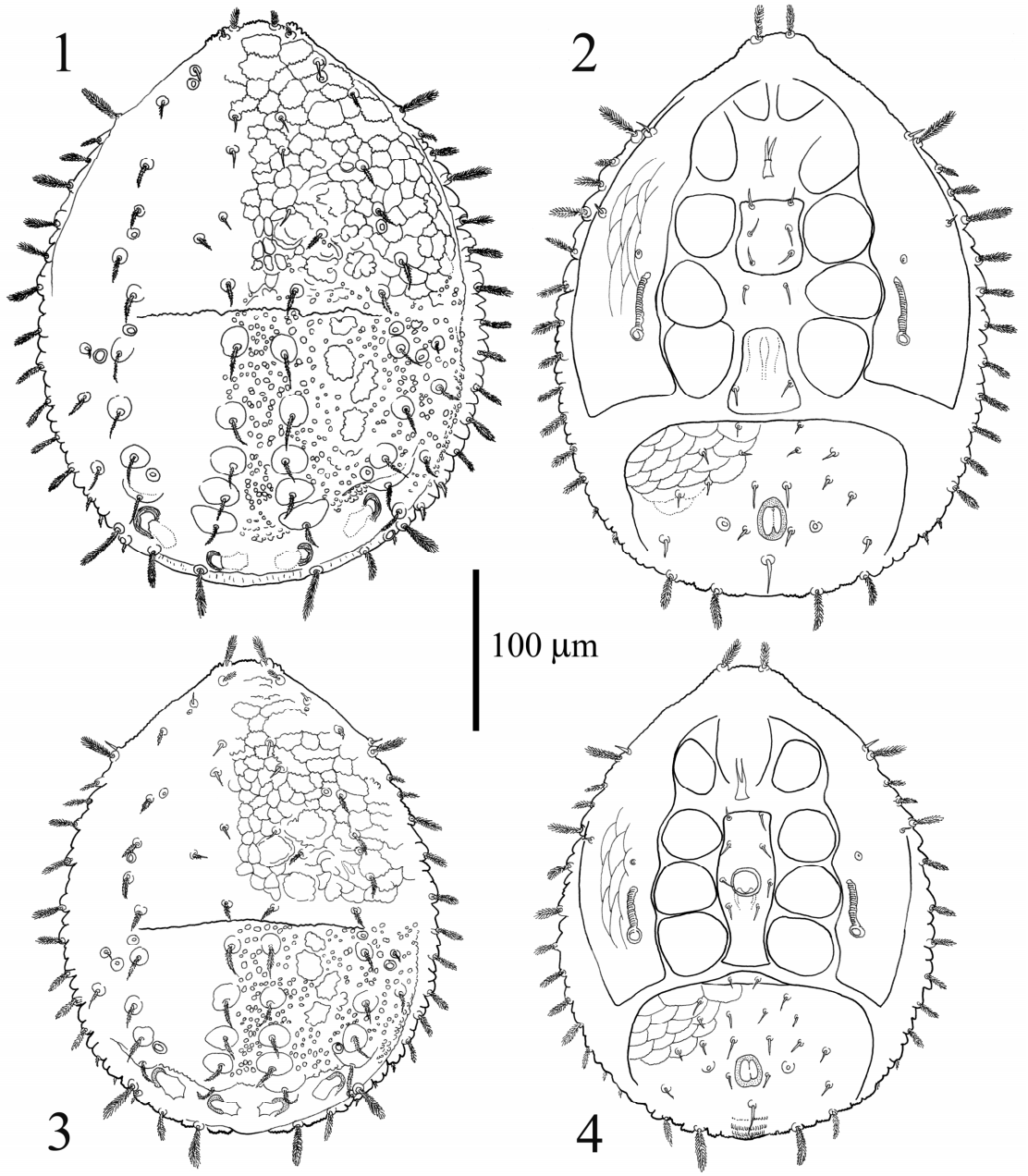
Description. Female. Length of idiosoma: 350 μm; width: 275 μm (based on three specimens).

Dorsal side (Fig. 1). Podonotal and opisthonotal shields not clearly separated, seem to be fused laterally, fissure between shields on lateral parts hardly perceptible. On podonotum, twenty-two pairs of different setae: i-row with six pairs, z-row with two pairs, s-row with five pairs, r-row with seven pairs and p-row (presented on ventral figure) with two pairs. Setae i1 and members of marginal r-row densely plumose. Setae i_{3-5} and s_1 smooth, needle-like, others in i-, z- and s-row pilose. Pores po_1 situated posteriorly to s_1, po_2 lying on the line connecting s_3 and i_4, closer to s_3, po_3 on the line connecting s_4 and s_5, closer to s_4. The shield covered with irregular and tile-like pattern, posterior part punctuated.

On opisthonotum, twenty-three pairs of different setae: I-row with six pairs, Z-row with five pairs, S-row with four pairs and R-row with eight pairs. Every single seta on this shield pilose or plumose. Setae I_{1-5} situated on large, bulb-like tubercles, with descending length from I_1 to I_5, but size of the enlarged bases grow posteriorly. Setae I_6 – as the longest opisthonotal seate – densely plumose, situated on posterior margin of opisthonotum. Setae Z_{1-4} uniform, similarly to I_2 pilose, medium-sized and sitting on large protuberances. Setae Z_5 brush-like, plumose. Submarginal setae S_1 short, barely pilose, with (antero)-lateral position to Z_1, S_2 and S_3 uniform, pilose, but shorter than similar Z-setae. S_4 nearly as long as I_6, brush-like plumose. Not any of I-, Z- and S-setae reaching the following's bases. Only I_6, Z_5 and S_4 reaching beyond margins of the shield. Marginal R-setae plumose, R_{1-5} slightly elongated, others considerably shorter. Pores Po_1 situated anteriorly to setae Z_1, Po_2 just under the line connecting Z_1 and S_1, equidistant from insertions of the two setae, Po_3 lying postero-medially to setae Z_3, Po_4 close to insertions of S_4. Whole opisthonotum covered with large, distinct spots, irregular pits can be found between I and Z setal rows. Dorsal fossae saddle-like, well sclerotized, with strikingly oblique axes.

The size of setae and the distances between their insertions as in Table 1 (measurements are given as mean of the three specimens, in micrometers).

Ventral side (Fig. 2). Shape and chaetotaxy of peritremal, sternal and genital shields typical for the genus *Prozercon*. Peritremes straight, setae p_1 and p_2 short, smooth, typical for the subgenus *Prozercon*. Posterolateral tips of peritremal shield reaching between insertions of setae R_3 and R_4. Anterior margin of ventroanal shield with one pair of setae. Postanal seta not reaching the posterior margin of idiosoma. Peritremal and ventroanal shields covered with reticulate and tile-like pattern.



Figures 1–4. *Prozercon semiseparatus sp. n.*: 1 = dorsal view of female, 2 = ventral view of female, 3 = dorsal view of male, 4 = ventral view of male

Male. Length of idiosoma: 295 μm; width: 235 μm (based on one specimen).

Dorsum and venter (Figs. 3–4). Shape, chaetotaxy and sculpturing pattern of dorsal idiosoma as in female. Sternogenital shield with four pairs of setae. Chaetotaxy of ventroanal shield as in female. Ventroanal and peritremal shields with tile-like pattern.

The size of setae and the distances between their insertions as in Table 2 (measurements are given in micrometers).

Juvenile stages. Unknown.

Etymology. The name of the species refers to that the opisthonotal and podonotal shields that are not clearly separated on lateral parts.

Differential characters. The new species differs from the other *Prozercon* species in bearing plumose marginal R-setae by the large opisthonotal protuberances. According to the dorsal and ventral chaetotaxy, it resembles *Prozercon mersinensis* Urhan, 1998, but because of the large dorsal tubercules can be related to *Prozercon verruciger* Mašan & Fenďa, 2004 and *Prozercon rekaae* Ujvári, 2008 as well. The above species can be distinguished according to Table 3.

Zercon plumatopilus Athias-Henriot, 1961

(Figs 5–16.)

Material examined. E-2148: Cyprus, Platres, Kaledonia waterfall, 1330 m, *Pinus nigra* forest, 31.03.2007, leg. Csuzdi, Cs. (3 ♀, 1 deutonymph); E-2149: Cyprus, Platres, Kaledonia waterfall, 1290 m, leaf-litter under *Quercus alnifolia* bush, 31.03.2007, leg. Csuzdi, Cs. (12 ♀, 1 ♂, 1 deutonymph); E-2150: Cyprus, Platres, before Milomelos waterfall, 1000 m, *Quercus alnifolia* and *Platanus* leaf litter, 01.04.2007, leg. Csuzdi, Cs. (1 ♂); E-2151: Cyprus, Troodos Mts., rocky slope with *Quercus*, 04.04.2007, leg. Csuzdi, Cs. (4 ♀).

Description of female. Length of idiosoma: 420–450 μm; width: 330–345 μm (based on nineteen specimens).

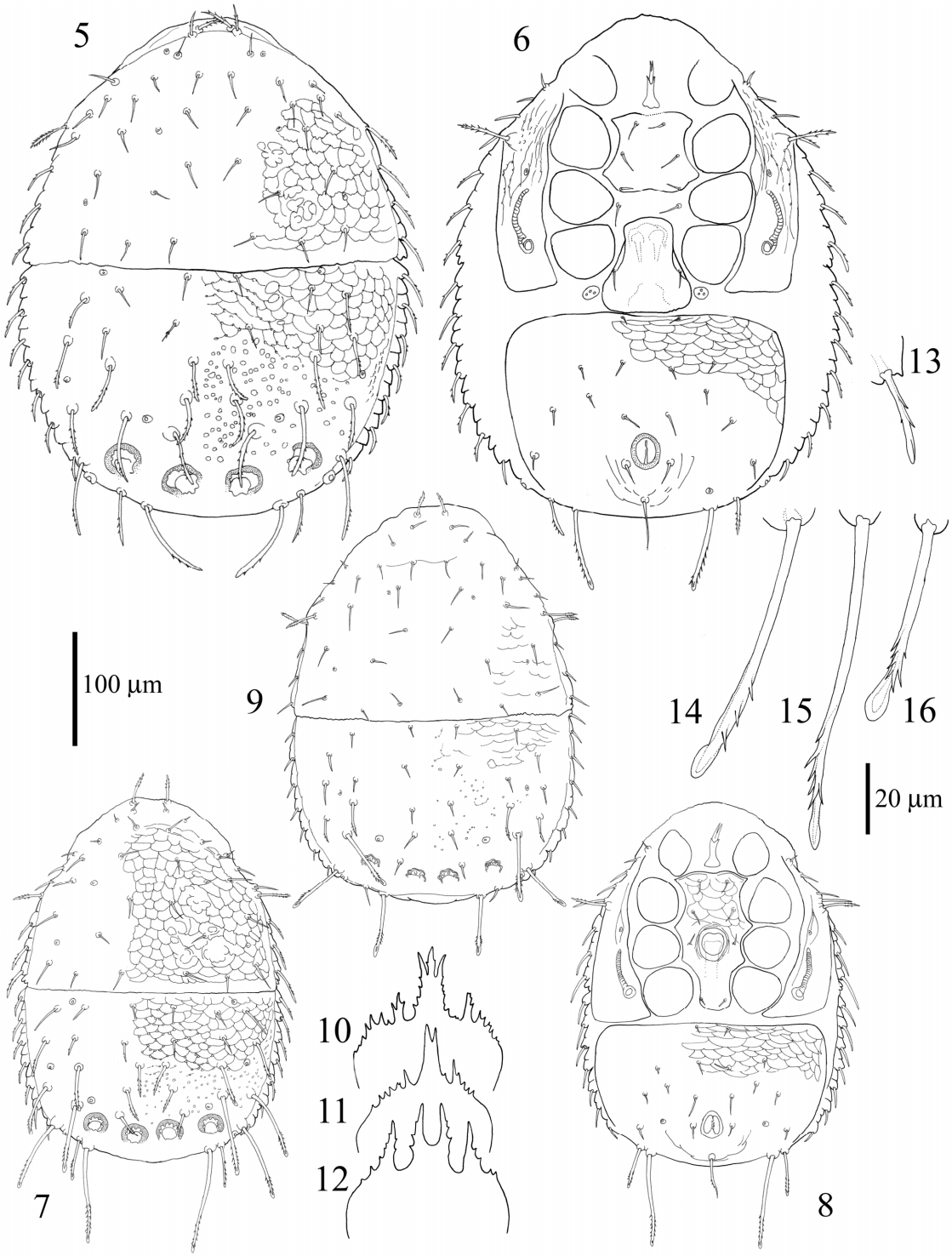
Dorsal side (Figs. 5 and 10). On podonotum twenty-three pairs of setae: i-row with six pairs, z-row with two pairs, s-row with six pairs, r-row with seven pairs and p-row with two pairs. Setae i_{1-2} and most of marginal r-setae differently pilose. Other podonotal setae smooth, needle-like. Pores po_1 situated antero-laterally to s_1, po_2 lying on the line connecting s_4 and i_4, equidistant from their bases, po_3 outside the line connecting s_5 and s_6, equidistantly. The shield covered mostly with tile-like pattern, irregular patches can be observed. On opisthonotum, twenty-two pairs of different setae: I-row with six pairs, Z-row with five pairs, S-row with four pairs and R-row with seven pairs. Setae I_1 and S_1 short, smooth and needle-like, other setae thicker, differently pilose, with hyaline tips. Setae I_2 not reaching the bases of I_3, apically barely pilose. Setae I_{3-5} elongated, pilose on distal two-thirds, I_3 and I_4 reaching the followings bases. Setae I_6 – as the longest opisthonotla setae –distally pilose, with hyaline ending (Fig. 14). Setae Z_2 smooth or with very fine apical pilosity, reaching bases of Z_3. Setae Z_{3-5} and S_{1-4} elongated, distally pilose. Seate S_4 1.4 times longer than medial setae I_5. Setae S_{2-3} not reaching the margins of opisthonotum. Marginal R-setae thickened, moderately pilose (Fig. 13), as long as setae Z_2. Pores Po_1 situated antero-laterally to Z_1, Po_2 on or outside the line connecting bases of S_2 and S_3, Po_3 lying on the line connecting bases of Z_4 and I_5, Po_4 close to insertions of S_4. Anterolateral part of opisthonotum baering tile-like pattern, anteromedial parts reticulated, posterior parts covered with large, distinct spots. Dorsal fossae large, well sclerotized, with converging axes.

The size of setae and the distances between their insertions as in Table 4 (measurements are given in micrometers).

Ventral side (Fig. 6). Shape and chaetotaxy of peritremal, sternal and genital shields typical for the genus *Zercon*. Peritremal shield finely reticulated, anteriorly punctuated. Adgenital shields present, bearing three pores. Anterior margin of ventroanal shield with one pair of setae, the shield itself covered with tile-like pattern.

Male. Length of idiosoma: 320–335 μm; width: 230–240 μm (based on two specimens).

Dorsum & venter (Figs 7, 8 and 11). Situation of setae and pores on podonotum and opisthonotum as in female, but length of some dorsal setae differ significantly from the ones of other sex. Setae I_{3-5} relatively shorter, setae I_6 (Fig. 15), Z_4 and S_4 much more elongated than in female, latter 3 times longer than I_5. Dorsal fossae with parallel axes, posterior margins of them more strongly lobed than in female. Setae Z_2 apically barbed, not reaching the insertions of Z_3. Sternogenital shield



Figures 5–16. *Zercon plumatopilus*: 5 = dorsal view of female, 6 = ventral view of female, 7 = dorsal view of male, 8 = ventral view of male, 9 = dorsal view of deutonymph, 10 = tectum of female, 11 = tectum of male, 12 = tectum of deutonymph, 13 = R-seta of female, 14 = seta I_6 of female, 15 = seta I_6 of male, 14 = seta I_6 of deutonymph. (Figures 5–9 with 100 µm scale, figures10–16 with 20 µm scale)

with four pairs of setae. Chaetotaxy of ventroanal shield as in female. Peritremal, sternogenital and ventroanal shields with tile-like pattern.

The size of setae and the distances between their insertions as in Table 5 (measurements are given in micrometers).

Deutonymph. Length of idiosoma: 350 μm; width: 250 μm (based on two specimens).

Dorsal side (Figs 9 and 12). Podonotal setae i_1 and r_1 distally barbed, others smooth, needle-like. Setae i_1, s_4, s_6 and r_1 1.5 times longer than other podonotal setae. On opisthonotum, I_{1-5}, Z_{1-2}, S_{1-2} and marginal R_{1-7} setae short, approximately equal in length, smooth, others differently elongated, thickened, apically barbed, with hyaline endings. Setae I_6 (Fig. 16.), Z_4 and S_4 markedly longer than others. Pores Po_2 situated on the line connecting the insertions of S_2 and Z_3, Po_3 lying over the line connecting the bases of Z_4 and I_5. Podonotum weakly sclerotized, inchoate tile-like pattern can be observed on posterolateral parts of the shield. Anterolateral parts of opisthonotum bearing tile-like ornamentation as well, median and posterior parts finely punctuated. Dorsal fossae smaller, with undulate anterior margins.

The size of setae and the distances between their insertions as in Table 6 (measurements are given in micrometers).

Protonymph and larva. Unknown.

Distribution. Italy, Slovenia and Ciprus.

Remarks on females. On opisthonotum, various pilosity of setae can be observed. Setae I_1 seem to be always smooth, other, more anteriorly situated ones (I_2, Z_{1-2}, S_{1-2}) from scarcely to densely pilose, remaining ones densely pilose, often with hyaline tips. The specimens found in Italy (Athias-Henriot, 1961) and the others from Slovenia (Košir, 1974) differ mostly in degree of pilosity of opisthonotal setae, moreover other, small differences can be noticed. Specimens collected in Cyprus are much like the Slovenian ones. Košir (1974) mentioned that these differences are insufficient for establishing a new species, but he was uncertain about the soundness of identification, noting it with a question mark in his papers. In my opinion – according to Košir – these differences could be attributed to interspecific variability of different populations, but further investigations on Italian specimens are necessary.

More important characters are typical and common in specimens collected from the mentioned countries and Cyprus: all marginal r- and R-setae pilose. Pilose setae of opisthonotum bear hyaline tips; pores Po_2 situated on (or just inside or outside) the line between insertions of S_2 and S_3; pores Po_3 lying on the line connecting insertions of I_5 and Z_4; dorsal cavities large, strongly sclerotized, with oblique axes; sculpturing pattern of opisthonotum anteriorly reticulated, posteriorly punctuated; anterior margin of ventroanal shield with one pair of setae.

Differences between the three type of specimens as in Table 7.

REFERENCES

ATHIAS-HENRIOT, C. (1961): Mesostigmates (Urop. excl.) edaphiques mediterraneens (Acaromorpha, Anactinotrichida) (Collect. Prof. H. Franz et C. Athias-Henriot). *Acarologia*, 3: 381–509.

BŁASZAK, C. (1974): Monografie Fauny Polski. Tom. 3. Zerconidae (Acari, Mesostigmata) Polski. *Polska Akademia Nauk, Zaklad zoologii systematycznej i doświadczalnej, Państwowe Wydawnicztwo Naukowe, Warszawa, Kraków*, pp. 315.

GASS I. A., (1980): *The Troodos massif: Its role in the unravelling of the ophiolite problem and its significance in the understanding of constructive plate margin processes*. In: Panayiotou, A. (ed.): Ophiolites. Proceedings International Ophiolite Symposium, 1979, Nicosia, p. 23–25.

MCCALLUM, J.E. & ROBERTSON, A.H.F. (1990): *Pulsed uplift of the Troodos Massif – evidence from the Plio-Pleistocene Mesaoria basin*. In J. Malpas, E.M. Moores, A. Panayiotou & C. Xenophontos (eds.): Ophiolites, Oceanic Crustall Analogues. Proceedings of the Symposium "Troodos 1987".

Geology Survey Department, Ministry of Agriculture, Natural Resources and Environment, Nicosia, p. 217–29.

MYERS, N. R. A., MITTERMEIER, C. G., MITTERMEIER, G. A. B., FONSECA, D. A., KENT, J. (2000): Biodiversity hotspots for conservation priorities. *Nature*, 403: 853–858.

KOŠIR, M. (1974): Description of a new *Zercon* and a new *Prozercon* species from Yugoslavia and the record of *Zercon plumatopilus* (?) Athias-Henriot, 1961 (Acarina, Mesostigmata: Zerconidae). *Biolški Vestnik*, 22: 75–88.

PAVLÍČEK, T. & CSUZDI, CS. (2006): Species richness and zoogeographic affinities of earthworms in Cyprus. *European Journal of Soil Biology* 42, 111–116.

PAVLÍČEK T, & CSUZDI CS. (2008): Does the autochthonous earthworm fauna immigrated from the Levant to Cyprus? In: Pavlícek, T. & Cardet, P (eds.): *Advances in Earthworm Taxonomy III*. p. 189–200.

UJVÁRI, ZS. (2008): Zerconid mites (Acari: Mesostigmata: Zerconidae) from Crete, Greece, with description of two new species. *Opuscula Zoologica Budapest*, 39: 99–108.

URHAN, R. (1998): Some new species of the family Zerconidae (Acari: Mesostigmata) from Turkey. *Journal of Natural History*, 32: 533–543.

URHAN, R. (1999): Türkiye faunası İçin Yeni Bir Tür, *Prozercon (s. str) rafalskii* Błaszak, 1971 (Acari, Zerconidae). *Turkish Journal of Zoology*, 3: 873-875.

URHAN, R. (2002): New zerconid mites (Acari: Gamasida: Zerconidae) from Turkey. *Journal of Natural History*, 36: 2127-2138.

URHAN, R. (2008): Two new species of *Zercon* C. L. Koch (Acari, Mesostigmata, Zerconidae) from Turkey: *Zercon longisetosus* sp. n. and *Zercon osmanelinensis* sp. n. *Turkish Journal of Zoology*, 32: 217–224.

URHAN, R. & AYYILDIZ, N. (1992): Türkiye faunası İçin Yeni Bir Tür *Prozercon* Sellnick, 1943 (Acari, Mesostigmata, Zerconidae). *Turkish Journal of Zoology*, 17: 83–89.

URHAN, R. & AYYILDIZ, N. (1996a): Türkiye faunası İçin Dört Yeni *Zercon* C. L. Koch, 1836 (Acari, Mesostigmata, Zerconidae) türü. *Turkish Journal of Zoology*, 20: 293–302.

URHAN, R. & AYYILDIZ, N. (1996b): Three new species of the genus *Prozercon* Sellnick (Acari, Zerconidae) from Turkey. *Acarologia*, 37: 259–267.

URHAN, R., AYYILDIZ, N., TOLUK, A., KOÇOĞLU, E., TAŞDEMIR, A. (2007): *Zercon agnostus* Błaszak, 1979 (Acari: Zerconidae) Üzerine Bir Çalişma. *Journal of Arts and Sciences*, 7: 171–179.

URHAN, R. & EKIZ, A. N. (2002): Systematic studies on zerconid mites (Acari: Gamasida, Zerconidae) of Turkey. *Acta Zoologica Academiae Scientiarum Hungaricae*, 48: 225–235.

Table 1. Length of opisthonotal setae and longitudinal distances between their bases in *Prozercon semiseparatus* sp. n. female (values in μm)

I_1	22 (21-23)	**Z_1**	18 (17-18)	**S_1**	7 (6-7)
I_1-I_2	42 (39-45)	**Z_1-Z_2**	37 (35-38)	**S_1-S_2**	29 (27-30)
I_2	20 (18-22)	**Z_2**	18 (17-18)	**S_2**	15 (14-15)
I_2-I_3	29 (28-29)	**Z_2-Z_3**	31 (29-33)	**S_2-S_3**	45 (42-46)
I_3	15 (14-15)	**Z_3**	19 (19-20)	**S_3**	15 (14-15)
I_3-I_4	21 (19-22)	**Z_3-Z_4**	21 (17-26)	**S_3-S_4**	42 (40-44)
I_4	15 (15-16)	**Z_4**	17 (17-18)	**S_4**	29 (27-32)
I_4-I_5	19 (18-21)	**Z_4-Z_5**	35 (34-36)		
I_5	14 (13-15)	**Z_5**	23 (23-24)		
I_5-I_6	29 (27-30)				
I_6	31 (29-33)				

Table 2. Length of opisthonotal setae and longitudinal distances between their bases in *Prozercon semiseparatus* sp. n. male (values in μm)

I_1	20 (19-21)	**Z_1**	15 (14-16)	**S_1**	6 (6-7)
I_1-I_2	34 (33-35)	**Z_1-Z_2**	30 (30-31)	**S_1-S_2**	24 (24-25)
I_2	18 (17-18)	**Z_2**	15 (14-15)	**S_2**	12 (11-12)
I_2-I_3	22 (21-23)	**Z_2-Z_3**	31 (29-33)	**S_2-S_3**	26 (25-27)
I_3	14 (14-15)	**Z_3**	17 (16-17)	**S_3**	13 (12-13)
I_3-I_4	18 (17-19)	**Z_3-Z_4**	16 (15-17)	**S_3-S_4**	40 (40-41)
I_4	16 (15-16)	**Z_4**	17 (15-20)	**S_4**	26 (24-28)
I_4-I_5	15 (14-15)	**Z_4-Z_5**	33 (32-34)		
I_5	14 (14-15)	**Z_5**	18 (17-18)		
I_5-I_6	25 (24-26)				
I_6	26 (25-26)				

Table 3. Differential characters between *Prozercon semiseparatus* sp. n., *Prozercon mersinensis* Urhan, 1998, *Prozercon rekaae* Ujvári, 2008 and *Prozercon verruciger* Mašan & Fenďa, 2004

Prozercon sp. n.	***Prozercon mersinensis***	***Prozercon rekaae***	***Prozercon verruciger***
Podonotal i_{1-2}, i_6, z_{1-2}, s_{2-5} and all marginal r-setae pilose,	Podonotal i_1, z_2, s_5 and marginal r-setae pilose, others smooth	Podonotal i_1 and marginal r-setae pilose, others smooth	Podonotal i_1 and marginal r-setae pilose, others smooth
Opisthonotal marginal setae elongated (R_{1-5}), or short (R_{6-8}), pilose	Opisthonotal marginal setae elongated (R_{1-5}), or short (R_{6-8}), pilose	Opisthonotal marginal setae short, thickened, pointed and smooth	Opisthonotal marginal setae short, thickened, pointed and smooth
I_{1-5} and Z_{1-4} seate situated on large protuberances	Opisthonotum without large protuberances	I_{1-5} and Z_{1-4} seate situated on large protuberances	I_{1-5} and Z_{1-4} seate situated on large protuberances
Z_1 2.5 times longer than S_1	Z_1 2.5 times longer than S_1	S_1 slightly longer than Z_1	S_1 slightly shorter than Z_1
Setae S_{2-3} not reaching margins of	Setae S_{2-3} not reaching margins of opisthonotum	Setae S_{2-3} reaching margins of opisthonotum	Setae S_{2-3} reaching margins of opisthonotum
Dorsal fossae well sclerotized, with oblique axes	Dorsal fossae well sclerotized, with parallel axes	Dorsal fossae large, strongly sclerotized, with parallel axes	Dorsal fossae weakly developed

Table 4. Length of opisthonotal setae and longitudinal distances between their bases in *Zercon plumatopilus* female (values in μm)

I_1	21 (20-22)	**Z_1**	22 (19-24)	**S_1**	33 (31-35)
I_1-I_2	46 (44-48)	**Z_1-Z_2**	39 (38-40)	**S_1-S_2**	41 (40-43)
I_2	20 (20-21)	**Z_2**	25 (24-25)	**S_2**	39 (35-44)
I_2-I_3	38 (38-39)	**Z_2-Z_3**	28 (25-30)	**S_2-S_3**	61 (60-62)
I_3	37 (35-36)	**Z_3**	47 (45-49)	**S_3**	42 (41-43)
I_3-I_4	34 (33-34)	**Z_3-Z_4**	48 (47-48)	**S_3-S_4**	49 (48-49)
I_4	43 (42-44)	**Z_4**	62 (59-64)	**S_4**	71 (66-76)
I_4-I_5	33 (33-34)	**Z_4-Z_5**	73 (68-79)		
I_5	51 (50-53)	**Z_5**	48 (45-50)		
I_5-I_6	71 (71-73)				
I_6	78 (75-79)				

Table 5. Length of opisthonotal setae and longitudinal distances between their bases in *Zercon plumatopilus* male (values in μm)

I_1	14 (13-15)	**Z_1**	16 (16-17)	**S_1**	29 (29-30)
I_1-I_2	33 (31-35)	**Z_1-Z_2**	26 (24-29)	**S_1-S_2**	31 (31-32)
I_2	17 (16-17)	**Z_2**	17 (17-18)	**S_2**	36 (35-36)
I_2-I_3	25 (24-25)	**Z_2-Z_3**	26 (25-26)	**S_2-S_3**	46 (43-49)
I_3	30 (29-30)	**Z_3**	41 (40-42)	**S_3**	55 (46-65)
I_3-I_4	25 (24-26)	**Z_3-Z_4**	33 (29-37)	**S_3-S_4**	33 (31-36)
I_4	26 (22-30)	**Z_4**	68 (62-73)	**S_4**	69 (66-72)
I_4-I_5	25 (24-25)	**Z_4-Z_5**	39 (33-46)		
I_5	23 (22-24)	**Z_5**	37 (36-37)		
I_5-I_6	42 (40-43)				
I_6	93 (89-98)				

Table 6. Length of opisthonotal setae and longitudinal distances between their bases in *Zercon plumatopilus* deutonymph (values in μm)

I_1	10 (9-11)	**Z_1**	13 (12-13)	**S_1**	16 (15-16)
I_1-I_2	35 (34-35)	**Z_1-Z_2**	43 (41-43)	**S_1-S_2**	27 (25-29)
I_2	11 (10-11)	**Z_2**	12 (11-13)	**S_2**	17 (16-19)
I_2-I_3	36 (33-38)	**Z_2-Z_3**	23 (19-25)	**S_2-S_3**	29 (26-31)
I_3	13 (12-14)	**Z_3**	31 (30-31)	**S_3**	24 (22-26)
I_3-I_4	26 (24-27)	**Z_3-Z_4**	28 (25-29)	**S_3-S_4**	46 (46-47)
I_4	15 (14-15)	**Z_4**	60 (56-61)	**S_4**	50 (48-51)
I_4-I_5	27 (26-29)	**Z_4-Z_5**	51 (49-52)		
I_5	13 (12-13)	**Z_5**	16 (14-17)		
I_5-I_6	33 (32-33)				
I_6	54 (53-55)				

Table 7. Differences between *Zercon plumatopilus* specimens collected in three different countries

Specimens from Italy	**Specimens from Slovenia**	**Specimens from Cyprus**
setae r_{1-7} and R_{1-7} densely pilose	setae r_{1-7} and R_{1-7} slightly pilose	setae r_{1-7} and R_{1-7} slightly pilose
setae I_2, Z_{1-2} and S_{1-2} densely pilose	setae I_2, Z_{1-2} and S_{1-2} smooth or slightly pilose	setae I_2, Z_{1-2} and S_{1-2} smooth or slightly pilose
setae I_2 and I_3 equal in length	setae I_3 1.5 times longer than I_2	setae I_3 2 times longer than I_2
I_2 reaching the bases of I_3	I_2 not reaching the bases of I_3	I_2 not reaching the bases of I_3
S_3, Z_4 and I_5 not reaching the margins of opisthonotum	S_3, Z_4 and I_5 reaching beyond the margins of opisthonotum	S_3, Z_4 and I_5 not reaching the margins of opisthonotum