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Contribution to the knowledge of the oribatid mite genus *Microzetes* (Acari, Oribatida, Microzetidae)

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ABSTRACT — The oribatid mite genus *Microzetes* (Oribatida, Microzetidae) is recorded for the first time in the Philippines; one new species is described herein from secondary forest litter in Samar Island. *Microzetes* (*Microzetes*) *samarensis* **n. sp.** differs from other species of the subgenus by the insertions of notogastral setae *c* and *la* (close to each other vs. distanced in the other species). Updated generic and subgeneric diagnoses for *Microzetes* are given. The taxonomic status of *Teraja* Mahunka, 1995 and the systematic placement of representatives of this genus are discussed, resulting in the following taxonomic proposals: *Microzetes* Berlese, 1913 (= *Teraja* Mahunka, 1995) **n. syn.**; *M. (Microzetes) asymmetricus* (Mahunka, 2001) **n. comb.**; *M. (Microzetes) sungai* (Mahunka, 1997) **n. comb.**; *M. (Megazetes) wongi* (Mahunka, 1995) **n. comb.** The initial systematic placement of *Microzetes flagellifer* and *M. tuberculatus* (in the subgenus *Microzetes*) is supported, and the inclusion of *M. fimbriatus* in *Microzetes* (*Megazetes*) and *Megazetes rugosus* (Mahunka, 1986) in *M. (Microzetes)* is proposed. An identification key to the known taxa of *Microzetes* is provided.

KEYWORDS — mites; morphology; systematics; diagnosis; new species; synonym; combination; finding; key; Philippines

INTRODUCTION

Microzetes is an oribatid mite genus of the family Microzetidae (Acari, Oribatida) that was proposed by Berlese (1913) with *Sphaerozetes* (*Tectoribates*) *mirandus* Berlese, 1908 as type species. At present, it comprises three subgenera (*Microzetes* Berlese, 1913, *Megazetes* Balogh, 1959 and *Stylozetes* Balogh and Mahunka, 1969) and 35 species (see Discussion section below), which are distributed in the southern Palaearctic, Ethiopian and Neotropical regions (see summarized data in Subías 2004, updated 2016).

Among the oribatid mite material collected from the Philippines, we found one new species of *Microzetes*.

The main goal of this paper is to describe and illustrate the adults of *M. (Microzetes) samarensis* **n. sp.** Earlier, only one identified species of Microzetidae, *Berlesezetes ornatissimus* (Berlese, 1913), was registered in the Philippines (Corpuz-Raros 1979).

In addition, updated generic and subgeneric diagnoses and an identification key for *Microzetes* taxa are given. The systematic placement of some microzetid species and genus *Teraja* Mahunka, 1995 is also discussed.

MATERIALS AND METHODS

Material — Holotype (male) and two paratypes (one male and one female): Philippines, Samar Island, Western Samar Province, Basey municipality, Barangay Guirang, Sitio San Isidro, from secondary forest litter, extracted with Berlese funnel, 6.X.2003 (William Sm. Gruezo).

Methods — Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. The body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width in dorsal aspect. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers. Formulas for leg setation are given in parentheses according to the sequence: trochanter – femur – genu – tibia – tarsus (femulus included). Formulas for leg solenidia are given in square brackets according to the sequence: genu – tibia – tarsus. Morphological terminology used in this paper follows that of F. Grandjean: see Travé & Vachon (1975) for general references, Norton (1977) for leg setal nomenclature, and Norton & Behan – Pelletier (2009), for overview. Drawings were made with a camera lucida using a Carl Zeiss transmission light microscope "Axioskop-2 Plus".

SYSTEMATICS

Genus *Microzetes* Berlese, 1913

Type species: Sphaerozetes (Tectoribates) mirandus Berlese, 1908, p. 5

Generic diagnosis

Adult — Rostrum narrowly rounded or truncated, usually with short, median, longitudinal ridge. One pair of lobed structures present (triangular or dentate) or absent. Rostral setae long, thin, setiform or flagellate. Lamellar setae thorn-like, sometimes setiform, exceptionally globule-like, inserted in distal part of lamellae, rarely in antero-medial part or on ventral side of lamellae. Interlamellar setae setiform, long, medium sized or minute, inserted on the basal parts of lamellae. Bothridial setae setiform or thickened, di-

rected backward, with curved or straight tip, ciliate or barbed. Lamellae wide, long, usually with small or strong outer teeth and rounded medial parts, indentation between them present or absent, rarely medial teeth present or distal parts of lamellae broadly rounded, sometimes triangular. Inner margins of lamellae slightly separated, parallel, often with pentagonal, trapezoid or triangular gaps above interlamellar region, basally free or connected by translamella. Interlamellar region trapezoid or triangular. Lamellar and interlamellar apophyses absent. Anterior margin of notogaster slightly convex. Notogaster smooth or with longitudinal and transverse granular bands. Pteromorphs small, rounded or with teeth laterally. Notogastral setae short, thin. Epimeral setal formula 3 – 1 – 3 – 3, setae setiform, sometimes some median setae thickened. Borders of sejugal apodemes usually fused medially. Six pairs of genital, one pair of aggenital, two pairs of anal and two to three pairs of adanal setae short (except g_1 which is often longer). One pair of adanal lyrifissures located near and parallel to anal plates.

Juvenile instars — Poorly known (Grandjean 1936).

Microzetes (Microzetes) Berlese, 1913

Subgeneric diagnosis

Bothridial setae setiform, with attenuate, curved tips. Interlamellar setae minute. Notogastral setae *c* and *la* usually distanced from each other.

Microzetes (Megazetes) Balogh, 1959

Type species: Megazetes micropterus Balogh, 1959, p. 106

Subgeneric diagnosis

Bothridial setae setiform, with attenuate, curved tips. Interlamellar setae of medium size or long. Notogastral setae *c* and *la* usually inserted close to each other.

Microzetes (Stylozetes) Balogh and Mahunka, 1969

Type species: Stylozetes physoseta Balogh and Mahunka, 1969, p. 39

Subgeneric diagnosis

Bothridial setae bacilliform, with thickened, straight tips. Interlamellar setae minute. Notogastral setae *c* and *la* usually distanced from each other.

***Microzetes (Microzetes) samarensis* n. sp.**
(Figures 1 – 3)

Diagnosis — Body size: 225 – 250 × 147 – 168. Generally, body surface smooth, granular bands absent on notogaster. Rostrum rounded. Longitudinal ridge and one pair of triangular lobed structures present near to rostrum. Lamellae distally with outer teeth, rounded and convex medial parts and indentation between them. Inner margins of lamellae separated by pentagonal gap above interlamellar region and connected by translamella basally. Rostral setae flagellate, slightly barbed. Lamellar setae thorn-like, smooth. Interlamellar setae thin, smooth. Bothridial setae long, setiform, ciliate unilaterally in medio-distal parts. Pteromorphs small, rounded. Epimeral setae setiform, smooth, *1a*, *1c* and *2a* shorter than other setae. Sejugal epimeral borders fused medially and with borders of apodemes IV, forming X-structure. Anogenital setae minute, thin, smooth (except longer *g*₁).

Measurements — Body length: 225 (holotype: male), 225 (paratype: male), 250 (paratype: female); notogaster width 155 (holotype), 147 and 168 (paratypes, male and female, accordingly).

Integument — Body color light brownish to brown. General body surface smooth, lateral sides with slight microgranular cerotegument. Pteromorphs with indistinct striae.

Prodorsum (Figs 1A, 2A) — Rostrum rounded. Longitudinal ridge (*r*) developed, short. One pair of lobed structures present near to rostrum, small, triangular, directed upward. Distal parts of lamellae with strong outer teeth (length 24 – 28), rounded and convex medial parts and deep indentation between them. Inner margins of lamellae separated by pentagonal gap above interlamellar region and connected by thick translamella basally. Interlamellar region trapezoid. Rostral setae (*ro*, 36) flagellate, slightly barbed, inserted on tubercles. Lamellar setae (*le*, 32 – 36) thorn-like, smooth. Interlamellar setae (*in*, 4) thin, smooth. Bothridial setae (*bs*, 114 –

123) longer than half of notogaster length, setiform, ciliate unilaterally in medio-distal parts. Exobothridial setae (*ex*, 12) thin, straight, smooth. Tutoria (*tu*) with long knife-like cusps.

Notogaster (Figs 1A – B, 2A) — Anterior margin developed. Pteromorphs small, rounded. Posterolateral parts with slightly developed longitudinal furrows (*f*). Nine pairs of notogastral setae setiform, smooth, *p*₁ and *p*₂ (6) shorter than other setae (12). Setae *lm*, *lp*, *h*₁ and *h*₂ located in two longitudinal, parallel rows. Only lyrifissures *im* distinct, *ia*, *ip*, *ih* and *ips* not visible. Opisthonotal gland openings (*gla*) located posteriorly to *im*.

Gnathosoma (Figs 2B – D) — Generally, morphology is typical for Microzetidae (Grandjean 1936; Engelbrecht 1972; Ermilov *et al.* 2013). Subcapitulum slightly longer than wide (57 – 65 × 53 – 61). Subcapitular setae (*h*, *m*, *a*) setiform, barbed, similar in length (16). Two pairs of adoral setae (*or*₁, *or*₂) minute (4), thin, smooth. Palps (53) with nine setae and one solenidion (+ ω) on palptarsi. Chelicerae (61 – 65) with two setiform setae: *cha* (20 – 24) ciliate unilaterally, *chb* shorter (16), barbed. Cheliceral tubercles (6 – 8) thorn-like, blunt-ended.

Epimeral and lateral podosomal regions (Figs 1B, 2A) — Epimeral setae setiform, smooth, *1a*, *1c* and *2a* (6) shorter than other setae (10 – 12). Setae *3c* inserted on pedotecta II; setae *4c* inserted posteriorly to discidia. Sejugal epimeral borders fused medially and with borders of apodemes IV, forming X-structure. Discidia (*dis*) large, triangular, rounded distally. Circumpedal carinae (*cp*) long, strong.

Anogenital region (Figs 1B, 2A) — Six pairs of genital (*g*₁, 10 – 12; *g*₂ – *g*₆, 4 – 6), one pair of aggenital (*ag*, 4 – 6), two pairs of anal (*an*₁, *an*₂, 4 – 6) and three pairs of adanal (*ad*₁ – *ad*₃, 4 – 6) setae minute, thin, smooth. Adanal lyrifissures (*iad*) distinct.

Legs (Figs 3A – E) — Generally, morphology is typical for Microzetidae (Grandjean 1936; Engelbrecht 1972; Ermilov *et al.* 2013). Claw of each leg smooth. Formulas of leg setation and solenidia: I (1-5-3-4-18) [1-2-2], II (1-5-3-4-15) [1-1-2], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0]; homology indicated in Table 1. Setae *p* setiform on tarsi I, thorn-like on tarsi II – IV. Famulus (ϵ) short, setiform, blunt-ended. Solenidia ω ₁ on tarsi I, ω ₁ and

FIGURE 1: *Microzetes (Microzetes) samarensis* n. sp.: A – dorsal view (legs not illustrated); B – ventral view (gnathosoma and legs not illustrated). Scale bar 50 µm.

FIGURE 2: *Microzetes (Microzetes) samarensis* n. sp.: A – lateral view, right side (gnathosoma and legs not illustrated); B – subcapitulum, ventral view; C – palptarsus, right, antiaxial view; D – anterior part of chelicera, left, paraxial view. Scale bar (A) 50 μm, scale bar (B – D) 20 μm.

FIGURE 3: : *Microzetes (Microzetes) samarensis* n. sp.: A – leg I, right, antiaxial view; B – trochanter, femur and genu of leg II, right, antiaxial view; C – solenidia of leg tarsus II, right, antiaxial view; D – trochanter, femur and genu of leg III, left, antiaxial view; E – leg IV, left, antiaxial view. Scale bar (A, B, D, E; C) 20 μ m.

TABLE 1: Leg setation and solenidia of adult *Microzetes (Microzetes) samarensis* n. sp.

Leg	Tr	Fe	Ge	Ti	Ta
I	v'	$d, (l), bv'', v''$	$(l), v', \sigma$	$(l), (v), \varphi_1, \varphi_2$	$(ft), (tc), (it), (p), (u), (a), s, (pv), (pl), \varepsilon, \omega_1, \omega_2$
II	v'	$d, (l), bv'', v''$	$(l), v', \sigma$	$(l), (v), \varphi$	$(ft), (tc), (it), (p), (u), (a), s, (pv), \omega_1, \omega_2$
III	l', v'	d, l', ev'	l', σ	$l', (v), \varphi$	$(ft), (tc), (it), (p), (u), (a), s, (pv)$
IV	v'	d, ev'	d, l'	$l', (v), \varphi$	$ft'', (tc), (p), (u), (a), s, (pv)$

Note: Roman letters refer to normal setae, Greek letters to solenidia (except ε = famulus). Single prime (') marks setae on the anterior and double prime (") setae on the posterior side of a given leg segment. Parentheses refer to a pair of setae. Tr – trochanter, Fe – femur, Ge – genu, Ti – Tibia, Ta – tarsus.

ω_2 on tarsi II, φ_2 on tibiae I and σ on genua II and III thick, blunt-ended, other solenidia longer, setiform, pointed. Solenidia ω_2 on tarsi I pressed to surface of tarsi.

Type deposition — The holotype is deposited in the collection of the Senckenberg Institution, Gölitz, Germany; two paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology — The specific name *samarensis* refers to the Philippine Island, Samar, where the new species was collected.

Remarks — *Microzetes (Microzetes) samarensis* n. sp. differs from other species of the subgenus by the insertions of notogastral setae *c* and *la* (close to each other vs. distanced in the other species). Additional distinctive characters of the new species from other *Microzetes*-species can be found in the identification key given below.

DISCUSSION

System of the genus *Microzetes* and some morphologically similar taxa is not clearly defined (e.g. see Grandjean 1936; Mahunka 1995; Subías 2004, updated 2016; Ermilov and Anichkin 2011), therefore we offer some explanations.

1. Grandjean (1936) described the genus *Nellacarus* with *Nellacarus petrocoriensis* Grandjean, 1936 as type species; however, after studying the type materials Mahunka (1980) showed the morphological similarity of this genus to *Microzetes*, and he concluded *Nellacarus* as a junior synonym of *Microzetes*.

2. Several genera with similar characters to *Microzetes* were described, namely: *Megazetes* Balogh, 1959, with *Megazetes micropterus* Balogh, 1959 as type species; *Stylozetes* Balogh and Mahunka, 1969, with *Stylozetes physoseta* Balogh and Mahunka, 1969 as type species; and *Nellacaroides* Mahunka, 1998, with *Nellacaroides simplisetus* (Mahunka, 1998) as type species.

Subías (2004) considered *Megazetes* and *Stylozetes* as subgenera of *Microzetes*, and *Nellacaroides* as a junior synonym of the latter genus. Generally, *Microzetes*, *Megazetes* and *Stylozetes* are morphologically similar, but differ from one another (see subgeneric diagnoses above) only by the morphology of bothridial setae and length of interlamellar setae. These differences are insignificant for the genus level status, and therefore, we support the Subías's decision on giving them subgeneric statuses.

The genus *Nellacaroides* differs from *Microzetes* mainly by the absence of complete border between sejugal apodemes, but this character is variable among different genera of Microzetidae, so we agree with Subías's synonymy.

3. Mahunka (1995) described the genus *Teraja* with *Teraja wongi* Mahunka, 1995 as type species. Subsequently, he combined in this genus two *Microzetes* species, *M. fimbriatus* Mahunka, 1988(b) and *M. tuberculatus* Mahunka, 1987 (Mahunka, 1997). Subías (2004) considered *Teraja* as a junior synonym of *Caucasiozetes* Shtanchaeva, 1984, encompassing *Microzetes flagellifer* Mahunka, 1989 in the latter genus. However, *Caucasiozetes* differ from both *Teraja* and *M. flagellifer* by the morphology of lamellar apices, positions of interlamellar and lamellar setae,

and form of lamellar setae (see Mahunka 1995; Ermilov and Anichkin 2011).

Our analysis of morphological traits of *Teraja* show that indeed this is similar to *Microzetes*. Mahunka (1995) listed three main differences: a) lobed structures (Mahunka incorrectly considered it as tutoria) dentate distally; b) two pairs of adanal setae present; and c) borders of sejugal apodemes and apodemes IV fused medially among themselves, forming X-structure. However, later, combining *M. fimbriatus* and *M. tuberculatus* (Mahunka 1987, 1988b) and describing new species of *Teraja*, Mahunka (1997, 2001) recognized that the first two characters are species level ones, because lobed structures show morphological variability, and the number of adanal setae may be either two or three pairs. Also, similar localization of borders of sejugal apodemes and apodemes IV (as X-structure) is known in some *Microzetes*, for example, *M. (Microzetes) lunaris* (Aoki, 1984) and *M. (Microzetes) samarensis* **n. sp.**

Hence, there are no clear morphological differences between the genera *Microzetes* and *Teraja*. Therefore *Teraja* must be considered as a junior synonym of *Microzetes* (not *Caucasiozetes* as proposed by Subías (2004)): *Microzetes* Berlese, 1913 (= *Teraja* Mahunka, 1995) **n. syn.** The following species of *Teraja* must be combined to *Microzetes* as well: *M. (Microzetes) asymmetricus* (Mahunka, 2001) **n. comb.**, *M. (Microzetes) sungai* (Mahunka, 1997) **n. comb.** and *M. (Megazetes) wongi* (Mahunka, 1995) **n. comb.** Also, according to subgeneric diagnoses, we support the initial systematic placement of *M. flagellifer* and *M. tuberculatus* (in the subgenus *Microzetes*) and include *M. fimbriatus* in the subgenus *Microzetes (Megazetes)*.

4. The analysis of literature on *Microzetes* species has revealed an incorrect systematic placement of one species, *Microzetes (Megazetes) rugosus* (Mahunka, 1986), which was described by Mahunka (1986) from Tanzania as a representative of the genus *Megazetes* and included automatically in *Microzetes (Megazetes)* by Subías (2004). However, this species has minute interlamellar setae (vs. medium size or long in *M. (Megazetes)*), therefore it should be combined in the subgenus *M. (Mi-*

crozetes).

Key to known subgenera and species of *Microzetes*

1. Bothridial setae bacilliform, with thickened, straight tips 2.
Subgenus *M. (Stylozetes)* Balogh and Mahunka, 1969
— Bothridial setae setiform, with attenuate, curved tips (5)
2. Rostral setae thickened medio-basally, with flagellate distal parts; outer lamellar teeth minute; body size: 294 – 323 × 201 – 221
..... *M. (Stylozetes) physoseta* (Balogh and Mahunka, 1969). Distribution: Brazil.
— Rostral setae setiform; outer lamellar teeth large, thorn-like (3)
3. Bothridial setae slightly barbed; lamellae longitudinally striate; distal parts of lamellae without median indentation, medial parts rounded, not convex; body size: 247 – 271 × 174 – 184 *M. (Stylozetes) discrepans* (Balogh, 1962). Distribution: Peru.
— Bothridial setae distinctly ciliate; lamellae not striate; distal parts of lamellae with median indentation between outer teeth and convex medial parts (4)
4. Lamellar setae clearly longer than outer lamellar teeth; inner margins of lamellae separated above interlamellar region; body size: 311 × 221 *M. (Stylozetes) spinosus* (Balogh and Mahunka, 1981). Distribution: Paraguay.
— Lamellar setae not longer than outer lamellar teeth; inner margins of lamellae connected above interlamellar region; body size: 359 – 366 × 230 – 234 *M. (Stylozetes) processus* (Balogh and Mahunka, 1977). Distribution: Brazil.
5. Interlamellar setae of medium size or long 6.
Subgenus *M. (Megazetes)* Balogh, 1959
— Interlamellar setae minute (not longer than diameter of bothridia) 14.

Subgenus *M. (Microzetes)* Berlese, 1913

6. Lamellar setae setiform; distal parts of lamellae rounded; body size: 332×266*M. (Megazetes) flagellifer* (Mahunka, 1988a). Distribution: Tanzania.
— Lamellar setae thorn-like; distal parts of lamellae with outer teeth (7)

7. Lamellar setae inserted on ventral sides of lamellae, only distal parts of these setae visible in dorsal view; antero-medial parts of lamellae long, elongate triangular, outer teeth very small; body size: $314 - 346 \times 208 - 220$*M. (Megazetes) tanzicus* (Mahunka, 1983). Distribution: Tanzania.
— Lamellar setae inserted on distal parts of lamellae, these setae completely visible in dorsal view; antero-medial parts of lamellae comparatively short, rounded and convex, outer teeth strong..... (8)

8. Antero-medial parts of lamellae strong, longer than outer teeth; body size: 362×274*M. (Megazetes) pocsi* (Mahunka, 1998). Distribution: Uganda.
— Antero-medial parts of lamellae shorter than outer teeth..... (9)

9. Two pairs of adanal setae present (10)
— Three pairs of adanal setae present..... (12)

10. Notogaster without granular bands; epimeral setae *3a* thick; borders of sejugal apodemes and apodemes IV not fused medially among themselves, not forming X-structure; body size: 273×192*M. (Megazetes) eckeri* (Mahunka, 1982b). Distribution: Ethiopia.
— Notogaster with granular bands; epimeral setae *3a* setiform; borders of sejugal apodemes and apodemes IV fused medially among themselves, forming X-structure (11)

11. Two longitudinal bands short, developed in posterior part of notogaster, not connected by transverse bands; lobed structures with small

teeth distally; body size: $242 - 251 \times 197 - 202$*M. (Megazetes) wongi* (Mahunka, 1995). Distribution: Borneo.
— Two longitudinal bands long developed in centro-posterior part of notogaster, connected by transverse bands; lobed structures with long cilia distally; body size: $240 - 247 \times 194 - 199$*M. (Megazetes) fimbriatus* (Mahunka, 1988b). Distribution: Borneo.

12. Interlamellar setae of medium size, one fourth of lamellae length; pteromorphs laterally with two teeth; lamellae not striate; body size: $170 - 174 \times 124 - 126$*M. (Megazetes) scriptus* (Mahunka, 1988a). Distribution: Tanzania.
— Interlamellar setae long, slightly shorter than lamellae; pteromorphs laterally without teeth; lamellae longitudinally striate (13)

13. Interlamellar setae reaching basal parts of lamellar setae; inner margins of lamellae narrowly triangular above interlamellar region; body size: $340 - 385 \times 252 - 274$ *M. (Megazetes) lineatus* (Mahunka and Mahunka-Papp, 2010). Distribution: Kenya.
— Interlamellar setae not reaching insertions of lamellar setae; inner margins of lamellae trapezoid above interlamellar region; body size: 365×275*M. (Megazetes) micropterus* (Balogh, 1959). Distribution: Angola.

14. Lamellar setae minute, globule-like; body size: 263×148 *M. (Microzetes) baloghi* (Jeleva, 1962) (in Csiszár and Jeleva 1962). Distribution: southern Europe and Iran.
— Lamellar setae well-developed, setiform or thorn-like (15)

15. Lamellar setae setiform (16)
— Lamellar setae thorn-like (18)

16. Distal parts of lamellae with outer teeth; body length: 310.....*M. (Microzetes) asiaticus* (Krivolutsky, 1975). Distribution: Palaearctic region.

— Distal parts of lamellae rounded (17)

17. Lamellar setae short, thin inserted on distal parts of lamellae; body length: 240×154 *M. (Microzetes) caucasicus* (Krivolutsky, 1967). Distribution: eastern Mediterranean.

— Lamellar setae of medium size, slightly thickened, inserted on inner parts of lamellae; body size: 235×150 *M. (Microzetes) viedmai* Subías, Ruiz and Kawhash, 1990. Distribution: Iberia.

18. Distal parts of lamellae with outer and medial teeth; bothridial setae about 2/3 of length of notogaster or longer (19)

— Distal parts of lamellae with outer teeth and without medial teeth; bothridial setae about 1/2 of length of notogaster or shorter (22)

19. Medial teeth of lamellae distinctly longer than outer teeth; body size: $186 - 191 \times 133 - 142$ *M. (Microzetes) asymmetricus* (Mahunka, 2001). Distribution: Borneo.

— Medial teeth of lamellae distinctly longer than outer teeth (20)

20. Notogaster with granular bands; genital setae g_1 short; body size: $396 - 427 \times 281 - 297$ *M. (Microzetes) tuberculatus* Mahunka, 1987. Distribution: Borneo.

— Notogaster without granular bands; genital setae g_1 long (21)

21. Bothridial setae extremely long, longer than length of notogaster; body size: $193 - 206 \times 145 - 153$ *M. (Microzetes) flagellifer* Mahunka, 1989. Distribution: Malay Peninsula.

— Bothridial setae not extremely long, 2/3 of length of notogaster; body size: $189 - 203 \times 131 - 145$ *M. (Microzetes) sungai* (Mahunka, 1997). Distribution: Borneo.

22. Distal parts of lamellae with median indentation between outer teeth and convex medial

parts..... (23)

— Distal parts of lamellae without median indentation, medial parts rounded, not convex (24)

23. Lamellar setae longer than outer teeth of lamellae; borders of sejugal apodemes and apodemes IV fused medially among themselves, forming X-structure; body size: $225 - 250 \times 147 - 168$

..... *M. (Microzetes) samarensis* n. sp. Distribution: Philippines.

— Lamellar setae and outer teeth of lamellae similar in length; borders of sejugal apodemes and apodemes IV not fused medially among themselves, not forming X-structure; $204 - 213 \times 130 - 136$ *M. (Microzetes) rugosus* (Mahunka, 1986). Distribution: Tanzania.

24. Distal parts of lamellae with long outer teeth not shorter than lamellar setae (25)

— Distal parts of lamellae with minute outer teeth shorter than lamellar setae (29)

25. Notogaster with granular bands (26)

— Notogaster without granular bands (28)

26. Two longitudinal granular bands not connected by transverse bands; pteromorphs with numerous teeth; epimeral setae $3a$ thick; body length: 260×275 *M. (Microzetes) pyrenaicus* (Travé, 1956). Distribution: southwestern Europe.

— Two longitudinal granular bands connected by several transverse bands; pteromorphs with one or two teeth; epimeral setae $3a$ thin (27)

27. Lamellar setae thickened, distinctly thinner than outer teeth; antero-medial parts of lamellae truncate, form rectangular corners with outer teeth; body size: $235 - 260 \times 143$

..... *M. (Microzetes) petrocoriensis* (Grandjean, 1936). Distribution: southern Europe.

— Lamellar setae thick, slightly thinner than outer teeth; antero-medial parts of lamellae not truncate, smoothly fused with outer teeth; body size: $230 - 273 \times 145 - 160$ *M. (Microzetes) septentrionalis* (Kunst, 1963) (= *Nellacarus latens* Moritz, 1964). Dis-

tribution: EuroAtlantic.

28. Pteromorphs laterally with three teeth; borders of apodemes IV diagonal; body size: $216 - 228 \times 140 - 148$ *M. (Microzetes) phitosi* (Mahunka, 1979). Distribution: southern Europe.

— Pteromorphs laterally pointed; borders of apodemes IV transverse; body size: $205 - 254 \times 114 - 131$ *M. (Microzetes) adansoni* (Lions, 1966). Distribution: western Mediterranean.

29. Borders of apodemes II distinctly separated medially; body size: $215 - 232 \times 151 - 164$ *M. (Microzetes) simplisetus* (Mahunka, 1998). Distribution: Uganda and Morocco.

— Borders of apodemes II fused medially, forming one transverse band (30)

30. Lamellae connected medio-basally by translamella (31)

— Lamellae separated medio-basally, translamella absent (32)

31. Borders of sejugal apodemes and apodemes IV fused medially among themselves, forming X-structure; lamellar setae distinctly longer than outer teeth of lamellae; body size: $260 - 270 \times 180 - 200$ *M. (Microzetes) lunaris* (Aoki, 1984). Distribution: Japan.

— Borders of sejugal apodemes and apodemes IV not fused medially among themselves, not forming X-structure; lamellar setae slightly longer than outer teeth of lamellae; body size: 240×190 *M. (Microzetes) mirandus* (Berlese, 1908) (see also Mahunka 1980). Distribution: western Mediterranean.

32. Notogaster with granular bands; pteromorphs laterally pointed; body size: $250 - 275 \times 135 - 150$ *M. (Microzetes) costulatus* (Travé, 1956). Distribution: southern Europe.

— Notogaster without granular bands; pteromorphs laterally with teeth (33)

33. Lamellar setae divergent; lamellae not striate; body size: $252 - 267 \times 189 - 204$ *M. (Microzetes) sestasi* Mahunka, 1982a. Distribution: Greece.

— Lamellar setae parallel; lamellae longitudinally striate (34)

34. Lamellar setae thick, dilated in median parts; inner margins of lamellae separated by pentagonal gap above interlamellar region; genital setae g_1 distinctly longer than other genital setae; body size: $231 - 240 \times 149 - 161$ *M. (Microzetes) hellenicus* (Mahunka, 1977). Distribution: southeastern Europe.

— Lamellar setae thickened, not dilated in median parts; inner margins of lamellae parallel above interlamellar region; genital setae g_1 similar to other genital setae in length (35)

35. Borders of apodemes IV distinctly diagonal, border of sternal apodeme between sejugal apodemes and apodemes IV not developed; distance between notogastral setae $lp - lp$ similar to $h_1 - h_1$; body size: 258×160 *M. (Microzetes) castrii* (Mahunka, 1966). Distribution: Italy.

— Borders of apodemes IV almost transverse, border of sternal apodeme between sejugal apodemes and apodemes IV well-developed; distance between notogastral setae $lp - lp$ distinctly longer than $h_1 - h_1$; body size: $246 - 268 \times 156 - 172$ *M. (Microzetes) raczi* Mahunka, 1990. Distribution: Hungary.

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