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Correspondence

Further information on morphological characteristics of *Macrocheles mammifer* Berlese (Mesostigmata: Eviphidoidea: Macrochelidae)

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The Macrochelidae Vitzthum, 1930 is a very large group of cosmopolitan free-living predatory mites, many of which are found in diverse habitats (Krantz 1998; Halliday 2000; Mašán 2003). This family comprised nearly 450 known species and 15 genera in 2003 (Mašán 2003), while Emberson (2010) has raised some subgenera to genus level and considered about 470 accepted described species for the family. The genus *Macrocheles* Latreille, 1829 is the largest genus of this family with about 400 species distributed all over the world. Its species are found in various microhabitats related to decaying organic material, in associations with insects and in nests of small terrestrial mammals and birds (Krantz 1998; Mašán 2003).

The Iranian fauna of Macrochelidae is relatively poorly known. Faraji *et al*. (2008) listed four genera and 24 species of the family from the country, while Kazemi & Rajaei (2013) provided a list of eight genera and 28 species, following Emberson (2010) generic classification. The recent researchers also removed seven new species of *Macrocheles* Latreille, 1829 described by Gilda *et al*. (2003) and Seifoori *et al*. (2008), from the list.

During this study, morphological characteristics of a newly found species of Macrochelidae are discussed with details. The measurements of dorsal and ventral setae and in some cases their distances, which have not been mentioned in previously studies, are presented here. Most of mite specimens were collected in a closed greenhouse from the final decomposing stages of vermicompost production in complex of manure, sugar beet bagasse, chopped potato and the earthworm *Eisenia foetida* (Savigny, 1826) (Oligochaeta: Lumbricidae) thriving in it, from Āveh in Sāveh County, Markazi Province. One other specimen was collected from vermicompost production in complex of manure, carrot trash, straw and the same species of earthworm from District 18 of Tehran Municipality, Tehran Province. The last one was found in vermicompost from District 19 of Tehran Municipality, Tehran Province, with no detailed information. All the specimens were extracted using a Berlese-Tullgren funnel, then cleared in lactophenol and mounted in Hoyer's medium on microscope slides. They were identified as *Macrocheles* (*Macrocheles*) *mammifer* Berlese, 1918. The slides were photographed with a Zeiss Standard 25 microscope equipped with a Canon G6 camera. All the measurements are given in micrometers (μm). Notation of setae on the dorsal

and ventral idiosomal shields follows Halliday (1986, 1987) and Mašán (2003). Number of specimens measured was nine.

***Macrocheles* (*Macrocheles*) *mammifer* Berlese, 1918 (Fig. 1)**

Morphological observations of studied materials

Idiosomal shield oval, well-reticulated; dorsal idiosomal shield 830–955 long and 565–680 wide (length/width: 1.33–1.51). Sternal shield distinctly punctured, without distinct lines and with two pairs of pores; the anterior border line with a depression at the middle section which extends to the posterior part of the shield; posterior border of the sternal shield without any ornamentations. Length of sternal shield and its width at the mid-level of coxae II 214–235 and 153–160, respectively (length/width: 1.4–1.52); metasternal shields more or less elongated oval; gentital and ventrianal shields distinctly reticulated; Length and maximum width of genital shield 161–175, 190–220, respectively (length/maximum width: 0.76–0.85). Metapodal shields small more or less oval or crescent. Ventrianal shield pentagonal, much wider than long (length: 260–310, maximum width: 345–400, length/maximum width: 0.73–0.82); anterior margin of ventrianal shield straight. Other measurements of morphological characters in examined specimens are presented in Table 1.

Figure 1. *Macrocheles mammifer*, female. Ventral view of idiosoma.

Ventral setae *St1*-*St3*, *ms*, *gs*, *JV1*-*JV3*, adanal setae simple and smooth. Dorsal idiosomal shield with 28 pairs of setae, most of them pilose or plumose in their distal one third to distal half and widened apically. Setae *j1*, *j3*, *j4*, *z2*, *z4*, *s4*, *s5*, *r2*, *r3*, *Z1*,

Z2, *Z4*, *Z5*, *S1*, *S2*, *S4* and *S5* all pilose, and setae *j2*, *j5*, *j6*, *z1*, *z5*, *z6*, *s2*, *s6*, *r4*, *J2* and *J5* all simple and smooth. Bases of setae *j1* close to each other.

Table 1. Lengths of setae and their distances in examined specimens of *Macrocheles* (*Macrocheles*) *mammifer*

Characters	Range	Characters	Range	Characters	Range	Characters	Range
j1	50	*s5*	79–85	*S4*	63–69	*ms↔ms*	171–198
j2	35	*s6*	68–78	*S5*	58–70	*gs*[6]	45–54
j3	53–56	*r2*	78–83	*h1*[1]	70–80	*gs↔gs*	139–158
j4	68–71	*r3*	70–80	*h2*[2]	25–30	*JV1*	55–60
j5	26–35	*r4*	64–66	*h3*[3]	94–101	*JV1↔JV1*	88–105
j6	33–39	*J2*	53–58	*pc*[4]	30–38	*JV2*	45–60
z1	≈ 25	*J5*	38–44	*st1*	56–69	*JV2↔JV2*	203–239
z2	44–55	*Z1*	80–83	*st1↔st1*	58–73	*JV3*	66–75
z4	70–79	*Z2*	75–88	*st2*	40–58	*JV3↔JV3*	134–168
z5	23–35	*Z4*	64–76	*st2↔st2*	103–116	*as*[7]	38–43
z6	38–44	*Z5*	44–50	*st3*	38–48	*as↔as*	45–54
s2	38–46	*S1*	63	*st3↔st3*	163–183	*pa*[8]	≈ 13
s4	65	*S2*	65	*ms*[5]	30–38		

1) Anterior hypostomal seta, 2) External hypostomal seta, 3) Internal hypostomal seta, 4) Palpcoxal seta, 5) Metasternal seta, 6) Genital seta, 7) Adanal seta, 8) Post-anal seta.

Corniculi elongated. Median element of epistum deeply bifid, lateral elements relatively long.

Seven specimens of the species were observed each with one oval egg (most of them with distinct embryo, except one) inside the idiosoma. Length and width of the eggs with embryo were 415–440 and 250–310, and without embryo were 335 and 205, respectively.

Material examined

Markazi Province, Sāveh County: 19 ♀, Āveh (34° 48' 50" N, 50° 25' 23" E, altitude: 987 m a.s.l.), vermicompost, 1 November 2013, leg. Seyed Masoud Ajelleh. **Tehran Province**, Tehran City, District 18 of Tehran Municipality: 1 ♀, Moallem Boulevard, Ghāem Park (35° 39' 1" N, 51° 19' 43" E, altitude: 1126 m a.s.l.), vermicompost, 6 November 2013, leg. Simin Baroozeh; Tehran City, District 19 of Tehran Municipality: 1 ♀, 15 Khordād Street (35° 40' 59" N, 51° 25' E, altitude: 1156 m a.s.l.), vermicompost, 13 November 2013, leg. Simin Baroozeh.

Specimens are deposited in the Acarology Collection of the Department of Entomology, College of Agriculture and Natural Resources, Tehran Science and Research Branch, Islamic Azad University, Tehran, Iran, in the Acarological Collection, Acarological Society of Iran, Department of Plant Protection, College of Agriculture, University of Tehran, Karaj, Iran, and in the authors (AA and SB)' private collections.

Distribution

This species has been reported from all continents, including America, Asia, Europe, Australia and Micronesia (Krauss 1970; Bregetova 1977; Krantz & Whitaker 1988; Halliday 2000; Mašán 2003).

Habitat preference

This species occurs in different microhabits (e.g. litter, compost, manure) and also in association with arthropods, especially beetles, ants and bees (Krauss 1970; Bregetova 1977; Krantz & Whitaker 1988; Mašán 2003). Our observations showed that it was found in localities in altitudes ranging between 987–1156 m a.s.l., which shows it may prefer to live in mid-land area. In one collecting site (Āveh), it was collected in high abundance in decomposing stages of vermicompost, including manure and decaying plant material, as Mašán (2003) classified it as a coprophilous detriticole species which shows a strong affinity to excrements of large herbivores, dunghills and manure, but is found with low to sporadic frequency and abundance in Slovakia.

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References

Bregetova, N.G. (1977) Family Macrochelidae Vitzthum, 1930. *In*: Ghilyarov, M.S. & Bregetova, N.G. (Eds.), *A key to the soil-inhabiting mites, Mesostigmata*. Zoological Institute of the Academy of Sciences: Petrograd. Nauka, Leningrad, USSR, pp. 621–632 [In Russian].

Emberson, R.M. (2010) A reappraisal of some basal lineages of the family Macrochelidae, with the description of a new genus (Acarina: Mesostigmata). *Zootaxa*, 2501: 37–53.

Faraji, F., Hajizadeh, J., Saboori, A. & Rafatifard, M. (2008) Three new records and a key to the Iranian species of Macrochelidae (Acari: Mesostigmata). *Systematic & Applied Acarology*, 13: 231–236.

Glida, H., Latifi, M., Bertrand, M. & Saboori, A. (2003) On three new *Macrocheles* from Iran, and discussion on the infrageneric systematic units. *Acarologia*, 43 (4): 345–351.

Halliday, R.B. (1986) On the systems of notation used for the dorsal setae in the family Macrochelidae (Acarina). *International Journal of Acarology*, 12 (1): 27–35.

Halliday, R.B. (1987) Further observations on the dorsal idiosomal chaetotaxy in the Macrochelidae (Acarina). *International Journal of Acarology*, 13 (1): 51–53.

Halliday, R.B. (2000) The Australian species of *Macrocheles* (Acarina: Macrochelidae). *Invertebrate Taxonomy*, 14: 273–326.

Kazemi, Sh. & Rajaei, A. (2013) An annotated checklist of Iranian Mesostigmata (Acari), excluding the family Phytoseiidae. *Persian Journal of Acarology*, 2 (1): 63–158.

Krantz, G.W. (1998) Reflections on the biology, morphology and ecology of the Macrochelidae. *Experimental & Applied Acarology*, 22 (3): 125–137.
Krantz, G.W. & Whitaker, J.O. (1988) Mites of the genus *Macrocheles* (Acari: Macrochelidae) associated with small mammals in North America. *Acarologia*, 29 (3): 225–259.
Krauss, W. (1970) Die europäischen Arten der Gattungen *Macrocheles* LATREILLE 1829 und *Geholaspis* BERLESE 1918 (Eine systematische Studie aus dem Jahre 1960). *Acarologie, Schriftenreihe für vergleichende Milbenkunde*, 14: 1–60. [In German].
Mašán, P. (2003) *Macrochelid mites of Slovakia (Acari, Mesostigmata, Macrochelidae)*. Institute of Zoology, Slovak Academy of Sciences, NOI Press, Bratislava, 149 pp.
Seifoori, M., Glida, H., Saboori, A. & Bertrand, M. (2008) Iranian macrochelids II short description of four new species what about the genus *Macrocheles*? *Acarologia*, 48 (1–2): 41–46.

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اطلاعات جدیدتر در زمینه‌ی ویژگی‌های ریخت‌شناسی *Macrocheles mammifer* Berlese (Mesostigmata: Eviphidoidea: Macrochelidae)

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