A New Species of the Genus *Mahunkania* (Acari: Heterostigmata: Pygmephoridae) from Japan

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ABSTRACT

Mahunkania japonica, a new species of Pygmephoridae is described from Japan on the basis of a female specimen collected from a decayed log in which the termite, *Reticulitermes spelatus kyushuensis* (Isoptera: Rhinotermitidae) colonized. It is distinguishable from four other congeners mainly by that two spinelike setae on femur I are very different in size, and that solenidion ω_2 on tibiotarsus I is located well apart from apical ω_1 . Moreover, the species is peculiar in possessing a stout bifurcate process near the base of claw on medial margin of tibiotarsus I. Such an unusual process has not been known in any other species of Pygmephoridae, but is considered extremely modified unguinal setae *u'-u''* and homologous with the "counterpart" of claw in *Pygmephorus* and certain other genera. The remaining species of *Mahunkania* may also possess the same or similar structure.

Key words: *Mahunkania japonica*, Pygmephoridae, Heterostigmata, new species, *Reticulitermes spelatus kyushuensis*, Japan

INTRODUCTION

Mahunkania Rack, 1972, is a small genus belonging to the subfamily Pygmephorinae of the family Pygmephoridae, comprising only four described species at present, viz, *M. hallensis* Rack, 1972 (Germany), *M. secunda* Rack, 1975 (U. S. A.), *M. africana* Mahunka, 1976 (Ghana) and *M. asiatica* Sevastianov and Chidirov, 1992 (Turkmeniya). Mahunka (1976) reported the discovery of *M. hallensis* in Malaysia and Indonesia.

In the original description of *Termitacarus ishiharai* Kurosa, 1994, I mentioned the occurrence of an undescribed species of *Mahunkania* in Japan. Because only one female specimen of the species was available to me at that time, I have made an endeavor for obtaining additional material of the species for a long time, but it proved fruitless. Therefore, I will describe it herein as new to science on the bases of the single specimen.

The terminology of the body structures and the setal notation mainly follow those of Lindquist (1986). All measurements are given in micrometers (μm).

Family Pygmephoridae Cross, 1965

Genus *Mahunkania* Rack, 1972

This genus is known only from the adult female.

Diagnosis. Readily distinguished from all the other genera of the family by possessing the stalk of capitulate sensillus (=seta *sc*₁) provided with spirally arranged spinules, and femur I with 2 short spinelike setae *d* and *l''* besides 2 normal ones.

Description. Gnathosomal capsule normal in shape. Prodorsal shield with 4 pairs of

setae; stigmata guttate or elongate-rectangular; setae sc_1 long-stalked, stalk provided with spirally arranged spinules. Opisthosoma with 7 pairs of dorsal and 3 pairs of caudal (=pseudanal) setae; setae c_2 longer than c_1 ; f longer than d ; e located close to, and much shorter than f ; h_1 as long as, or longer than f ; h_2 much shorter than h_1 ; distance ps_2 - ps_3 longer than ps_1 - ps_2 . Coxisternal plate IV entire with smooth posterior margin, not trilobed. Apodemes generally not well developed, in particular apodemes 3 weak; apodemes 2 V-shaped; secondary transverse apodeme and apodeme 5 absent; apodeme 4 obliterated in lateral half. Anterior and posterior coxisterna with 6(3+3) and 6(3+3) pairs of setae, respectively. All legs not so stout. Leg I 4-segmented. Number of setae (and solenidia in parentheses) on leg segments (trochanter, femur, genu, tibia and tarsus): leg I 1-4-4-6(2φ)+11(2ω), leg II 1-3-3-4(1φ)-6(1ω), leg III 1-2-2-4(1φ)-6, leg IV 1-2-1-4(1φ)-6. Femora I, II and III nearly parallel-sided in dorsoventral view, elongate; femur I with 4 setae, 2 (d and l') are located in proximal half, short and spinelike, the other 2 normal in shape and length. Tibiotarsus I subquadrangular in dorsoventral view, a little thicker than genu, with a simple, sickle-shaped claw apically; pinnaculum absent. Femora III and IV retain vestiges of sutural delineation between basi- and telofemora. Tarsi II, III and IV with a narrow empodium and 2 slender, strongly curved claws. Trochanter IV with lateral margin well arcuate.

Remarks. Besides above features, an unusual structure is found on tibiotarsus I of the present new species as described in the following: a stout, bifurcate process is present near the base of claw on medial margin of tibiotarsus I (Fig. 5). This bifurcate process is considered extremely modified, unguinal setae u' - u'' ,* and moreover, homologous with "counterpart" of claw (Dastych and Rack, 1993) in *Pygmephorus* and certain other genera of the family though appearing entirely useless for the reception of claw in this species. Such a strange process has never been mentioned in the descriptions of all pygmephorids including 4 *Mahunkania* species. In the original description of *M. hallensis*, the type species, Rack (1972) states that "Bein: Krallen ungestielt, nicht endständig, sondern auf der Ventralseite des Tibiotarsus so weit von der Spitze entfernt entspringend, dass man von der Dorsalseite aus nur das Vorderende der Krallen sieht." Judging from this account and accompanying illustrations, she might have taken the process in question for the basal portion of the claw. There is a possibility that all the other species of *Mahunkania* possess the same or similar structure.

***Mahunkania japonica* Kurosa, sp. nov.**

(Figs. 1–10)

Female: Cuticle rather weakly sclerotized. Length of idiosoma 278, width of idiosoma 149, distance between anterior coxal condyles III 90.

Gnathosoma (Figs. 1–4). Gnathosomal capsule broadly oval, somewhat wider than long in forward oriented state; dorsal setae ch_1 and ch_2 nearly on the same level; ch_2 (10) shorter than ch_1 (13), poorly tapered; palpal supracoxal seta pp nearly on a level with, and rather

* A seta located medially near the base of claw and designated as u' (or $?u'$) in some of my previous papers on pygmephorids is, therefore, regarded as subunguinal seta s .

Figs. 1–2. *Mahunkania japonica*, sp. nov., female, habitus. 1. Dorsal aspect; 2. ventral aspect. Scale: 100 μ m.

close to ch_2 , 4–5 in length; ventral seta ca. 6.5 in length. Palpi about 2/3 as long as capsule, projecting beyond apex of subcapitulum; claws distinct, bluntly pointed at apex; femoral seta 8–9, genual seta 10 in length; femurogenual solenidion fusiform, 4–5 in length; so-called accessory setigenous structure slightly proximal to base of solenidion, ca. 3 in length, obovate. Pharyngeal muscular structure barely visible, subdivided into 3 parts.

Idiosomal dorsum (Fig. 1). Prodorsal shield medium in size, strongly arcuate posteriorly, 88 long medially, overlapping anteromedian portion of opisthosomal plate C. Stigmata anterior in position, widely separated, elongate-rectangular (19–21 in length, ca. 3 in width),

Figs. 3–6. *Mahunkania japonica*, sp. nov., female. 3. gnathosomal capsule, dorsal aspect; 4. ditto, ventral aspect. 5. Mediobasal portion of tibiotarsus I, showing claw and bifurcate process (modified setae *u'-u''*), ventral aspect; 6. capitulum sensillum (prodorsal seta *sc*₁), dorsal aspect. Scales: 30 µm for 3 and 4; 15 µm for 5; 25 µm for 6.

diverging antieriad, terminating in a small opening on anterolateral propodosomal margins. Prodorsal setae *v*₁ at some distance posterior to the posterior extremity of stigmata, shorter than their mutual distance; *v*₂ just anterior to base of *sc*₁, much shorter than *v*₁, somewhat weakly tapered; *sc*₁ (Fig. 6) a little more than twice the length of *v*₂, its club provided with spinules, stalk also provided with spirally arranged spinules; *sc*₂ posteromesial of, and 10 apart from base of *sc*₁, nearly as long as their mutual distance, rather attenuate. Opisthosomal dorsum ovate in dorsal view; plate C widely and strongly rounded posteriorly; plate H finely punctured posteriorly. Dorsal setae of opisthosoma generally attenuate, very weakly barbed; *c*₁, *d* and *e* somewhat weakly tapered unlike others; *c*₁ shorter than their mutual distance, not reaching posterior margin of the plate; *c*₂ nearly on a level with, and much longer than *c*₁; *d* a little longer than *c*₁, reaching posterior margin of the plate; *e* a little posterior to, and only 9–10 apart from *f*; *f* nearly as long as their mutual distance; length ratio of *e* to *f* 0.42–0.47; *h*₁ a little longer than *f*, 1.18–1.20 times as long as their mutual distance; *h*₂ slightly anterior to, and only 7 apart from *h*₁; length ratio of *h*₂ to *h*₁ 0.34–0.35. Cupules *ia* and *ip* present, both small. Three pairs of caudal setae subequal in length; *ps*₁ rather close to midline; *ps*₁ and *ps*₂ also close to each other though their alveoli are not adjoining; *ps*₃ some distance apart from *ps*₂. Length and mutual distance (in parentheses) of idiosomal, dorsal and caudal setae: *v*₁ 19–20 (33), *v*₂ 15–15 (57), *sc*₁ 36–39 (64), *sc*₂ 48–49 (48), *c*₁ 27–28 (44), *c*₂ 54–56 (100), *d* 32–34 (53), *e* 29–30 (82), *f* 63–68 (65), *h*₁ 80–81 (68), *h*₂ 28–28 (80), *ps*₁ 20–? (6), *ps*₂ 20–? (12), *ps*₃ 21–21 (36).

Idiosomal venter (Fig. 2). Apodeme 1 and prosternal apodeme moderately developed; apodeme 2 rather weak; sejugal apodeme and apodeme 3 poorly developed; apodeme 4

somewhat widened, but obliterated in portion lateral to seta *3b*. Poststernal apodeme obscured in portion anterior to medial union of apodemes 4. Posterior genital sclerite elongate-triangular though poorly defined anteriorly. Coxal setae generally short and attenuate, very weakly barbed; *1a* located on apodeme 1; *1b* nearly directly posterior to *1a*; *1a* and *1b* not reaching apodeme 2 when directed backward; *1c* not thicker than *1a* and *1b*; mutual distance of *2a* not longer than that of *1a*; *2b* nearly on a level with *2a*, never reaching sejugal apodeme; *2c* slightly posterior to *2a*; mutual distance of *3a* subequal to that of *3b*; *3b* located on apodeme 4; *4c* longer than *4a*. Length and mutual distance (in parentheses) of coxal setae: *1a* 17–19 (24), *1b* 14–15 (26), *1c* 20–21 (58), *2a* 14–14 (24), *2b* 14–15 (24), *2c* 16–16 (65), *3a* 13–13 (30), *3b* 11–12 (34), *3c* 14–14 (73), *4a* 12–12 (25), *4b* 26–26 (36), *4c* 20–? (70).

Figs. 7–8. *Mahunkania japonica*, sp. nov., female, left legs, dorsal aspect. 7. Leg I (arrows indicate bifurcate process); 8. leg II. Scale: 25 μ m.

Figs. 9–10. *Mahunkania japonica*, sp. nov., female, left legs. 9. Leg IV, ventral aspect; 10. leg III, dorsal aspect. Scale: 25 μ m.

Legs (Figs. 7–10). Most of leg setae weakly barbed. Leg I (Fig. 7): femur about twice as long as wide, with 4 setae, 2 of which (*d* and *l''*) are short and spinelike, *l''* (7.5–8.5) distinctly longer than *d* (3–4); tibial setae *l'* and *l''* nearly basal in position; tibiotarsus subquadrangular in dorsoventral view, a little thicker than genu, 43 in length, nearly as long as femur; internal tibiotarsal thickening absent; claw arising from mediodistal corner of the segment, moderate in size, nearly sessil, simple, sickle-shaped though rather straight in basal half; a stout, ca. 8 long, bifurcate process (extremely modified unguinal setae *u'-u''*) present near the base of claw on medial (slightly ventral) margin of the segment (Fig. 5); solenidia and many of tibiotarsal setae located on weak bulges (basal bulge of seta *pl'* is somewhat

Table 1. Distinguishing characteristics of adult females among five species of the genus *Mahunkania*.

Structure	<i>M. hallensis</i> Rack, 1972	<i>M. secunda</i> Rack, 1975	<i>M. africana</i> Mahunka, 1976	<i>M. asiatica</i> Sevastianov and Chidirov, 1992	<i>M. japonica</i> Kurosa, sp. nov.
Stigmata	guttate	elongate-rectangular	elongate-rectangular	guttate	elongate-rectangular
Prodorsal setae v_1	subequal in length to v_2	subequal in length to v_2	much longer than v_2	subequal in length to v_2	much longer than v_2
Prodorsal setae sc_1	less than twice the length of v_2	less than twice the length of v_2	less than twice the length of v_2	much more than twice the length of v_2	a little more than twice the length of v_2
Idiosomal setae e	about $1/2$ as long as f	about $1/2$ as long as f	about $2/3$ as long as f	about $1/3$ as long as f	about $1/2$ as long as f
Idiosomal setae f	a little longer than their mutual distance	a little shorter than their mutual distance	a little shorter than their mutual distance	much longer than their mutual distance	subequal in length to their mutual distance
Idiosomal setae h_1	subequal in length to f	much longer than f	about twice the length of f	subequal in length to f	a little longer than f
Idiosomal setae h_2	about $1/2$ as long as h_1	about $1/4$ as long as h_1	less than $1/4$ as long as h_1	about $1/3$ as long as h_1	about $1/3$ as long as h_1
Caudal setae ps_2	inserted near ps_1	inserted near ps_1	inserted near ps_1	at some distance from ps_1	inserted near ps_1
Caudal setae ps_3	shorter than ps_1 and ps_2	as long as ps_1 and ps_2	shorter than ps_1 and ps_2	longer than ps_1 and ps_2	as long as ps_1 and ps_2
Coxal setae lb	directly posterior to la , not reaching apodeme 2 when directed backward	posterolateral to la , extending beyond apodeme 2 when directed backward	posterolateral to la , extending beyond apodeme 2 when directed backward	posterolateral to la , not reaching apodeme 2 when directed backward	directly posterior to la , not reaching apodeme 2 when directed backward
Coxal setae lc	neither longer nor thicker than la and lb	neither longer nor thicker than la and lb	shorter than, and not thicker than la and lb	much longer and thicker than la and lb	nearly as long as la , not thicker than la and lb
Coxal setae $3a$	placed at nearly equal interval to that of $3b$	placed at somewhat shorter interval than $3b$	placed at nearly equal interval to that of $3b$	placed at much longer interval than $3b$	placed at nearly equal interval to that of $3b$
Seta l'' on femur I	subequal in length to d	subequal in length to d	subequal in length to d	subequal in length to d	distinctly longer than d
Solenidia ω_1 on leg I	just apical in position, somewhat apart from and, moderately larger than ω_2	subapical in position, rather close to, and moderately larger than ω_2	subapical in position, rather close to, and moderately larger than ω_2	subapical (?) in position, rather close to, and much larger than ω_2	just apical in position, well apart from, and somewhat larger than ω_2
Solenidia ϕ on legs II and III	located close to setae d	located apart from setae d	located close to setae d	located close to setae d	located close to setae d
Seta d on femur IV	not reaching apex of tibia	not reaching apex of tibia	not reaching apex of tibia	not reaching apex of tibia	reaching apex of tibia

remarkable); solenidia ϕ_1 and ϕ_2 nearly on the same level; ϕ_1 clavate, 7 in length; ϕ_2 rodlike, much thinner than ϕ_1 , 4 in length; ω_1 arising from angulate, laterodistal corner of the segment, fusiform, 7.5 in length; ω_2 well apart from ω_1 (distance 7.5–8.5), subfusiform, 6 in length; tibial seta k considerably apart from ϕ_1 and ϕ_2 , simply setiform; 5 tarsal eupathidia rather difficult to distinguish from other simple setae. Leg II (Fig. 8): femur more than twice as long as wide, much longer than combined length of genu and tibia, with 3 setae not very different in length; tibial solenidion ϕ located at some distance from base of the segment, very small (ca. 2 in length), subclavate; tibial seta v' located on rather remarkable bulge; tarsal solenidion ω some distance apart from base of the segment, fusiform, 6 in length; pretarsus ca. 9 in length; claws slender, strongly curved; empodium narrow. Leg III (Fig. 10): subequal in length to leg II; femur similar in shape and size to that of leg II; tibia widened in distal half; solenidion ϕ located in distal half of the segment, close to base of seta d , very small (ca. 2 in length), subclavate; pretarsus, claws and empodium as in leg II. Leg IV (Fig. 9): trochanter and femur with lateral margins arcuate; base of trochanter nearly straight; femoral seta d extending fully to apex of tibia; femoral seta v' poorly tapered, somewhat bladelike but with a few barbs; genu and tibia widened in distal half; tibial seta d located near laterodistal corner of the segment, extending beyond claws; tibial seta v'' shaped like femoral v' , poorly tapered, somewhat bladelike but with a few barbs; solenidion ϕ located close to base of seta d , minute, barely visible; tarsus peculiar in shape, viewed dorsoventrally subquadrangular in proximal 3/4 and strongly attenuated in distal 1/4, with lateral margin running straight from base of the segment to the insertion of seta tc' , then abruptly bent mesiad; setae pv'' and pl'' located on bulges, thus medial margin of the segment undulate even in proximal 3/4; claws and empodium as in legs II and III. Length of legs I–IV (measured along longitudinal axis of legs from the basalmost point of femur (legs I–III) or trochanter (leg IV) to the base of claw(s): leg I 100–100, leg II 91–91, leg III 91–93, leg IV 131–132.

Male and larva: Unknown.

Type material: Holotype ♀, Shioya, Saiki-shi, Ôita Pref., Kyushu, Japan, extracted with a modified Tullgren's apparatus from a decayed log in which the termite, *Reticulitermes spelatus kyushuensis* Morimoto (Isoptera: Rhinotermitidae) colonized, 15-VI-1971 (K. Kurosa); deposited in the collection of the National Science Museum (Nat. Hist.) (NSMT), Tokyo 169–0073, Japan.

Etymology: The specific name of the new species is derived from the type locality.

Remarks: Apart from the presence or absence of a bifurcate process near the base of claw on tibiotarsus I, females of 5 species of *Mahunkania* including *M. japonica* can be distinguished from each other by the shape of stigmata and, the arrangement and relative length of a number of body and leg setae (including solenidia) as shown in Table 1. Most important features in identifying the new species are as follows: stigmata elongate-rectangular; 2 short spinelike setae (d and l'') on femur I very different in size; solenidion ω_2 on tibiotarsus I located well apart from apical ω_1 ; seta d on femur IV extending fully to apex of tibia.

Although the type material was extracted from a decayed log in which the termites colonized, it is questionable that this mite has some close relationships with the termite, because only one specimen was discovered in spite of the fairly large termite's nest.

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摘 要

日本産 *Mahunkania* 属 (異気門類ヒナダニ科) の 1 新種 黒佐和義 (東京都豊島区西池袋 5–21–12)

大分県で採取した、ヤマトシロアリ九州亜種 (*Reticulitermes spelatus kyushuensis*) の営巣した朽木から得たヒナダニを新種として *Mahunkania japonica* と命名, 記載した. 本種は同属の既知種とは第 1 脚の腿節に生じる 2 本の刺状の毛の長さに明瞭な差が認められること, 脛付節のソレニジオン ω_2 が末端の ω_1 からかなり離れた位置に生じること, 第 4 脚腿節の毛 d が長くて脛節の末端に達することなどで識別されるほか, 第 1 脚脛付節の内縁末端近くに二岐状の顕著な突起を具える点で隔絶している. ヒナダニ科の既知種で全く報告例を見ないこの異常な突起は u' 毛と u'' 毛の極端に変形したもので, *Pygmephorus* 属などで見られる爪の対応指 (counterpart) と相同のものと考えられる. これは重要な特徴であるが, 同属の既知種で見落とされている可能性がある.