New record of Momonidinae (Acari: Hydrachnidiae: Momoniidae) from Japan

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ABSTRACT

Momonides landbergi Lundblad, 1971 is newly recorded from Iriomote Island, Okinawa, southern Japan. This is the first record of the subfamily Momonidinae from Japan. Characteristics of the present Japanese specimens accord well with those of the specimens from Indonesia originally described by Lundblad (1971), except for somewhat smaller number of genital acetabula of the Japanese specimens. The present record extends northward the worldwide distribution of *M. landbergi* to near the Palearctic region.

Key words: new record, *Momonides landbergi*, Momonidinae, Hydrachnidiae, Japan

INTRODUCTION

The family Momoniidae is placed in the superfamily Arrenuroidea in the subcohort Hydrachnidiae (Lindquist et al., 2009). The Momoniidae consist of five subfamilies, Momoniinae, Cladomomoniinae, Cyclomomoniinae, Momonidinae and Stygomomoniinae, containing 59 species in 13 genera.

The family inhabits rivers, lakes, springs, and subterranean waters in all biogeographical regions of the world (Cook, 1974; Smith, 1991). In Japan, so far only three species in the subfamily Stygomomoniinae, listed below, have been recorded from well water in Hokkaido, Tokyo, Ishikawa, and Hyogo (Abé, 2005).

Stygomomonia (*Stygomomonia*) *rotunda* Imamura, 1956

S. (S.) hachiojiensis Imamura, 1959

S. (Allomomonia) kantoensis Imamura, 1959

Recently, one of the authors (S. Morimoto) collected two specimens of the family Momoniidae from a stream on Iriomote Island in Okinawa, southern Japan. The taxonomic identification of these momoniid specimens is executed in the present study.

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MATERIALS AND METHODS

On March 21 and October 21 in 2016, S. Morimoto collected two momoniid specimens in Nishi Funatsuki River at 10 m above sea level on Iriomote Island in Okinawa, southern Japan (Fig. 1). The river, about 10 m in width and 40 cm in maximum depth, flows swiftly from an upstream dam. The mites were collected by means of sweeping the riverbed using a plankton net with a mesh of 300 μm aperture and preserved in Imamura's fluid (Imamura, 1965). Thereafter, the mites were mounted in glycerin jelly, and the cover slips were sealed with Canada balsam

Fig. 1. Provenance of the material used in the present study.

Fig. 2. Schematic diagram of the genital field of male and female for measurements of length and width.

under a stereomicroscope. The mites were investigated under a light microscope.

The body parts were measured in the following scheme: (1) idiosoma: length—from the anterior-most margin of the first coxal plate to the terminal end of the idiosoma, width—at the widest point; (2) idiosomal plate or sclerite: length—from the anterior- to posterior-most margins along the longitudinal median axis, width—at the widest point; (3) leg segments: length—straight dorsal length from the proximal base to the distal end; (4) palp segments: length—straight dorsal and ventral length from the proximal base to the distal end, height—at the highest point; (5) chelicera: length—straight ventral length from the proximal base to the distal end; (6) genital field (Fig. 2): length—from the anterior to posterior margins of the gonopore along the longitudinal median axis, width—at the widest point of the gonopore in the male and of the genital plate in the female; (7) distance among idiosomal plates, gonopore, and anal papilla: distance between the nearest margins along the longitudinal median axis.

Figures were drawn based on photos taken with a digital camera attached to an eyepiece of the microscope, and measurements were made with an ocular micrometer.

The material has been deposited in the Museum of Nature & Human Activities, Sanda, Hyogo, 669-1546 Japan.

RESULTS

As a result of precise taxonomic examination, the specimens were identified as *Momonides landbergi* Lundblad, 1971. The genus *Momonides* is the only genus in the subfamily Momonidinae. Therefore, this is as well the first record of the subfamily Momonidinae from Japan. The taxonomic characteristics of *M. landbergi* are outlined below based on the Japanese male and female specimens. Measurements are given in micrometers (μm).

Family Momoniidae Viets, 1926
(Japanese name: Momodani-ka)

Subfamily Momonidinae Lundblad, 1941
(New Japanese name: Madara-momodani-aka)

Genus *Momonides* Lundblad, 1941
(New Japanese name: Madara-momodani-zoku)

Momonides landbergi Lundblad, 1971
(New Japanese name: Tsumeboso-madara-momodani)
Momonides landbergi Lundblad, 1971: 351-352, Fig. 50, plates XXVII-128,
XXVIII-129, 130; Cook, 1974: 786, Fig. 1657; Smit and Pešić, 2014: 64-66.
(Figs. 3-18)

Specimens examined: one female, Nishi Funatsuki riverbed (24°18'10"N, 123°51'34"E), Komi, Taketomi, Yaeyama District, Okinawa Prefecture, Japan, March 21, 2016, S. Morimoto leg.; one male, same locality as above, Oct. 21, 2016, S. Morimoto leg.

Male (MNHAH A2-013573): Body brownish with distinct red eyes (Fig. 3). Dorsal length 418, width 372, L/W 1.12; ventral length 474.

Idiosoma oval, entirely covered with several irregularly ramiform porous sclerites linked with soft membranous cuticle (Fig. 4). First coxa protruding anteriorly from idiosoma (Fig. 5). Anterior coxal group (first and second coxae) 150 long, 210 wide (both sides), partly broken. Posterior coxal group (third and fourth coxae) 193 long, 260 wide. Anterior and posterior coxal groups separated from each other at intervals of 10-25. Elongate single ramiform sclerite 133 long, 55 wide, placed between right and left posterior coxal groups (Fig. 5). Genital field subterminal, placed posteriorly to fourth coxa (Fig. 5). Gonopore, 70 long, 56 wide, with three pairs of acetabula subdivided into numerous smaller acetabula arranged in three distinct groups, first (= anterior) pair each with 4-5 acetabula, second pair with 9-10 acetabula, third pair with 8-9 acetabula, surrounded by a sclerotized ring bearing six-lobed outer extensions (Fig. 6). Distance from posterior margin of fourth coxal plate to anterior margin of gonopore 10. Anal field papilliform, placed terminal on venter (Fig. 5). Distance from posterior margin of gonopore to tip of anal papilla 75.

Palp five segmented (Fig. 8). Femur longer than tibia. Ratio of dorsal length of femur to tibia 1.13. Length and height of each segment given in Table 1. Trochanter and femur with one and five dorsal setae, respectively. Genu with four dorsal setae. Tibia with two dorsal setae and two robust ventral spines. Tarsus with two dorsal and one ventral setae, ventro-distally with two short heavy spines, and one long curved distal claw (Fig. 8). Chelicera claw-like in form (Fig. 9), consisting of two segments. Basal segment 65 long, claw segment 25 long.

Legs with several kinds of setae (Figs. 10-13) and entirely ornamented with regular honeycomb pattern (Fig. 14). Tibia of first leg elongate and robust (Fig. 10). Length of each segment given in Table 2. Dorsal length of tarsus of first leg exceeding a half-length of tibia. Ratio of dorsal length of tarsus to tibia of first leg 0.55.

First tarsus gently raised in proximal portion, bearing a distally curving single claw with two clawlets at the middle of the shaft (Fig. 15). Claw of first tarsus 58 long. Other tarsalia bearing a

Figs. 3-5. *Momonides landbergi*. 3: Dorsal view of the unmounted female, 4: dorsal view of idiosoma (male), 5: ventral view of idiosoma (male). Scale bars: 100 μ m.

pair of trifurcate bending claws with thin ventral claw-blade (Fig. 16).

Female (MNHAH A2-013574): Body oval. Dorsal length 530, width 490, L/W 1.08; ventral length 576. General characteristics similar to the male except for the genital field.

Anterior coxal group 158 long, 200 wide. Posterior coxal group 215 long, 263 wide. Elongate single ramiform sclerite 136 long, 57 wide. Genital field placed posteriorly to fourth coxa.

Figs. 6-7. *Momonides landbergi*. 6: Genital field (male), 7: genital field (female) (partly broken). Scale bars: 50 μ m.

Table 1. Measurements of the left palp segments in the male.

Palp segment	Trochanter	Femur	Genu	Tibia	Tarsus	Total
Dorsal length	25	45	28	40	35	173
Ventral length	16	30	20	33	35	134
Maximum height	20	33	28	25	12	—

Gonopore (partly broken), 120 long, 108 wide, with numerous smaller acetabula arranged in three distinct groups, first (= anterior) pair each with 5 acetabula, second pair with 10-11 acetabula, third pair with 5-8 acetabula (Fig. 7), surrounded by pregenital and postgenital sclerites as well as right and left sclerites each bearing three-lobed outer extensions (Fig. 7). Distance from posterior margin of fourth coxa to anterior margin of gonopore 61. Distance from posterior margin of gonopore to tip of anal papilla 40.

Measurements of leg segments given in Table 2. Ratio of dorsal length of tarsus to tibia of first leg 0.56. First tarsus with a single claw 73 long, 9 high (Fig. 17). Other tarsus bearing a pair of trifurcate claws (Fig. 18).

Remarks

At present, the genus *Momonides* contains four species: *Momonides trabecularis* Lundblad, 1941; *M. lundbladi* Angelier, 1951; *M. landbergi* Lundblad, 1971; and *M. ghanaensis* Smit, 2012. *Momonides landbergi* is different from its congeners as follows: (1) a sclerite surrounding gonopore of the male with six lobed outer extensions; (2) dorsal length of first tarsus exceeding a half-length of tibia; (3) first tarsus not sharply raised in proximal portion; (4) single claw of first tarsus elongate and with two ventral clawlets at the middle of the shaft.

Figs. 8-13. *Momonides landbergi*. 8: Left palp (male), 9: right chelicera (male), 10: right first leg (male), 11: right second leg (male), 12: telofemur to tarsus of the right third leg (male), 13: telofemur to tarsus of the right fourth leg (male). Scale bars: 50 μ m.

Table 2. Dorsal length of the first leg segments.

Leg segment	Trochanter	Basifemur	Telofemur	Genu	Tibia	Tarsus	Total
Male	28	78	95	94	205	112	612
Female	28	88	108	105	233	130	692

Figs. 14-18. *Momonides landbergi*. 14: Surface structure of the right first tibia (male) 15: tarsus of the left first leg (male), 16: tip of the tarsus of the left second leg (male), 17: tarsus of the left first leg (female), 18: tip of the tarsus of the right fourth leg (female). Scale bars: 25 μ m.

Table 3. Size comparison between original and present material for the male of *Momonides landbergi*.

Data source	Idiosoma				Anterior coxal group (III+IV)		Posterior coxal group (III+IV)	
	Ventral length	Dorsal length	Width	Dorsal length/width	Length	Width	Length	Width
Lundblad (1971)	515	442	*405	1.09	*166	*212	*216	*271
Present study	474	418	372	1.12	150	210	193	260

(Continued)

Data source	Central sclerite		Gonopore		Distance between fourth coxal plate and tip of anal papilla	Distance between gonopore and tip of anal papilla
	Length	Width	Length	Width		
Lundblad (1971)	*143	*69	82	*72	*166	*77
Present study	133	55	70	56	153	75

* based on original figure

(Continued)

Data source	Dorsal length of palp segment					Dorsal length of first leg segment					Length of first claw	
	Trochanter	Femur	Genu	Tibia	Tarsus	Trochanter	Basifemur	Telofemur	Genu	Tibia		Tarsus
Lundblad (1971)	28	50	34	45	36				107	107	128	0.55
Present study	25	45	28	40	35	28	78	95	94	205	112	0.55

* based on original figure

Momonides landbergi was originally described by Lundblad (1971) based on male and female specimens from Java. There are no distinct morphological differences between the Japanese male in the present study and the male described by Lundblad (1971). However, it should be noted that the male in Cook (1974) has somewhat larger number of acetabula than the Japanese male. Judging from the figure 1657 in Cook (1974), the male has three pairs of acetabular groups: first (= anterior) pair each with 7-8 acetabula (4-5 in Japanese male), second pair with 13 acetabula (9-10 in Japanese male), third pair with 12 acetabula (8-9 in Japanese male). Such an inconsistency seems to be geographic variation.

Size comparisons of each body part between the male in the original description (Lundblad, 1971) and the present Japanese male specimen are given in Table 3. Such a comparison for the female was unfortunately not practicable because of the partly destroyed condition of the Japanese female specimen and the lack of a description of detailed measured values and figuration of the female by Lundblad (1971). Based on the size comparison of each body part in the male, there are no clear differences between the Japanese specimen and the original description.

Momonides landbergi was originally recorded from a waterfall in Java, an island of Indonesia,

Fig. 19. Worldwide distributions of *Momonides landbergi*. A: Nishi Funatsuki River, Iriomote Island, Okinawa, Japan (present study); B: Kipungit River, Poring Hot Springs, Mt. Kinabalu; unnamed creek along Bansadon Trail, Inobong, Crocker Range, Borneo Island, Malaysia (Smit and Pešić, 2014); C: Kali Larangan River, Pagilaran, Java Island, Indonesia (Lundblad, 1971).

by Lundblad (1971). Thereafter, the species was also recorded from a river and a creek in Borneo, an island of Malaysia in the Oriental region, by Smit and Pešić (2014). Consequently, the present study extends northward the worldwide distribution of *M. landbergi* nearly to the Palearctic region (Fig. 19).

The following water mites were collected together with *M. landbergi*, in Iriomote Island: *Hydrodroma* sp., *Oxus* sp., *Torrenticola* spp., *Albia* sp., *Axonopsis* sp., *Atractides* sp., *Hygrobates* spp., *Neumania* sp., *Arrenurus* sp., and *Mideopsis* sp.

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摘要

マダラモモダニ亜科 (ダニ亜綱：ミズダニ亜団：モモダニ科) の日本初記録
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国内で初めてツメボソマダラモモダニ *Momonides landbergi* Lundblad, 1971 が沖縄県西表島の河川から記録された。これは、マダラモモダニ亜科 Momonidinae の日本初記録である。本種の日本産個体は Lundblad (1971) により記載されたインドネシア産個体より性感体の数が若干少なかったが、他の分類形質に大きな違いは見られなかった。今回の西表島からの記録により、本種の分布域が東洋区南部から旧北区付近にまで広がった。