Two Triaenonychid Harvestmen from the Northeast, Japan
(Triaenonychidae, Opiliones, Arachnida)

Seisho SUZUKI
Zoological Laboratory, Faculty of Science, Hiroshima University, Hiroshima

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Two Triaenonychid Harvestmen from the Northeast, Japan
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ABSTRACT

Two triaenonychid harvestmen, *Kainonychus akamai akamai* (Suzuki) (Paranonychinae) and *Mutsunonychus fuscus* n. gen. and sp. (Kaolinonychinae) are recorded from the Hakkôda-Towada-Hachimantai area, the Northeast, Japan. The latter species is the first Japanese representative of the Kaolinonychinae. The genus *Mutsunonychus* is important in intervening between the Kaolinonychinae and Paranonychinae. The finding of this genus supports the author’s previous statements regarding the closeness between the travunoid harvestmen of the Japanese Islands and those of North America.

In the previous paper (Suzuki, 1975b), occurrence of true triaenonychid harvestmen in the Japanese Islands and the Korean Peninsula was published. Quite recently further occurrence of the Triaenonychidae in Japan has been ascertained. The newly collected material consists of two triaenonychids from the Hakkôda-Towada-Hachimantai area, the Northeast, Japan, of which one is described as new genus and species: *Mutsunonychus fuscus*, in this article. The genus is fallen under the Kaolinonychinae on account of the structure of the hind claws in juveniles. However, strangely enough it also shows close affinity to the North American *Paranonychus* of a different subfamily Paranonychinae. It thus appears that the *Mutsunonychus* is intervening between the Kaolinonychinae and Paranonychinae.

Suborder Laniatores
Superfamily Travunoidea Kratochvîl, 1958
Family Triaenonychidae Soerensen, 1886
Subfamily Kaolinonychinae Suzuki, 1975
Genus *Mutsunonychus* Suzuki, n. gen.

Scute with areas clearly delineated, conical eye tubercle on anterior margin. Sternum narrow, with blunt apex, widening posteriorly. Spiracles exposed. Integument coarsely granular, dark brown.

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Ricardo Pinto-da-Rocha
Palpi widened, weakly armed with simple spines; femur with but one proximoventral spine.

Tarsal formula 3–5–4–4. Distitarsi of first leg with two segments, of second with three segments. Femur of first leg with one to two spines, second trochanter of first leg with one ventral spine. Claws on third and fourth tarsi usually with three pairs of lateral branches, median prong without ventral tooth.

Secondary sexual dimorphism not apparent in palpi or chelicerae, somewhat appears in genital operculum.

Penis with sclerotized dorsal process, but without ventral process. Ovipositor with prominent lateral setae but no dorsal and ventral setae.

Juvenile. Hind claws with four pairs of lateral spines.

Type species: *Mutsunonychus fuscus* n. sp.

Notes: This genus belongs in the Kaolinonychinae because of the presence of the hind claws with four pairs of lateral spines (branches) in juveniles. Within the Kaolinonychinae it is separated from the *Kaolinonychus* known from only the Korean Peninsula by having the palpi which are reduced and armed with but a few simple spines and the stout penis shaft. Further, it is related to the North American *Paranonychus* of a different subfamily Paranonychinae. That is, the structure of the palpi, penis and ovipositor is much alike between the both genera. However, they are distinctive in the juvenile hind claw that is considered important for subfamilial separation (Suzuki, 1975b); namely, juvenile *Mutsunonychus* has four pairs of branches on the hind claw, while juvenile *Paranonychus*, only three pairs. For this reason, they must differ at subfamily level. The finding of this intermediate genus supports the validity of the author’s statements (Suzuki, 1975a, b) that close relationships exist between the travunoid harvestmen of the Japanese Islands (or East Asia) and those of North America.

1. *Mutsunonychus fuscus* Suzuki, n. sp.

(Jap. nam.: Mutsu-nisetatezume-zatōmushi)

(Figs. 1–25; Map 1)

Type-series: Male holotype, Sukayu-zawa, Sukayu Spa, Hakkōda area, Aomori pref., taken from leaf litter in beech forest, at about 800 m in altitude, 2–VIII–1975. Paratypes: 1 ♀, 1 pull., Sukayu-zawa, 31–VII–1975; 2 ♂, 1 ♀, 4 pulli, Sukayu-zawa, 2–VIII–1975; 1 ♂, Nenokuchi, Towada area, Aomori pref., at 400 m in altitude, 4–VIII–1975; 1 ♂, Wainai, Towada area, Akita pref., in dwarf bamboo bush near the shore of L. Towada, at 405 m in altitude, 4–VIII–1975; 1 ♂, Mikaeri-tōge Pass, Hachimantai area, Akita pref., in leaf debris in *Abies mariessii* and *Sasa kurilensis* forest, at 1,580 m in altitude, 6–VIII–1975; 1 ♂, near Mikaeri-tōge Pass, Hachimantai area, Iwate pref., in leaf debris in *Abies mariessii* and *Sasa kurilensis* forest, at 1,580 m in altitude, 6–VIII–1975; 1 ♂, Sukayu-zawa, Sukayu Spa, 22–IX–1975. (Unless otherwise noted, all specimens were collected by N. Tsurusaki). The holotype and all other speci-
mens used for this study are deposited in the Zoological Laboratory of Hiroshima University.

Description:

Measurements: ♀ (in parentheses ♂): scute 1.40–1.53 (1.68) mm wide at widest portion, 1.37–1.60 (1.57) mm long. Total body length 1.72–1.98 (2.18) mm. Chelicera ♀: proximal segment 0.23 mm wide, 0.78 mm long; distal segment 0.25 mm wide, 0.61 mm long; total length 1.39 mm.
Figs. 3-25. *Mutsunonychus fuscus* n. gen. and sp. 3) Dorsal and 4) lateral view of male (Sukayu Spa). 5) Ventral view of sternum and second to fourth coxae, genital operculum removed, 6) (Sukayu Spa). 6) Lateral view of left male chelicera. 7) Ectal view of left male palpus. 8) Mesal view of right male palpus. 9-10) Ventral views of male and female genital operculums. 11) Lateral view of trochanter and femur of male first leg. 12) Lateral view of tibia, metatarsus and tarsus of male first
Two Triaenonychids from Japan

Measurements of palpus and legs (in mm):

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<th>Tr</th>
<th>Fe</th>
<th>Pa</th>
<th>Ti</th>
<th>Mt</th>
<th>Ta</th>
<th>Total</th>
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<td>(0.83)</td>
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<td>(0.88)</td>
<td>(0.42)</td>
<td>(0.79)</td>
<td>(1.03)</td>
<td>(0.65)</td>
<td>4.04</td>
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</table>

W: width; L: length; in parentheses ♂.

**Male:** Anterior margin of scute nearly straight or somewhat rounded. Surface of scute and free tergites granular, with numerous small, scattered tuberculations, giving roughened appearance. Eye tubercle conical, extends over anterior margin of scute, armed with small tuberculations. Scutal areas not divided, but in some specimens fourth area and very rarely third area divided; areas marked with light rusty yellow furrows, armed with numerous scattered tuberculations; free tergites each with similar tuberculations.

Venter finely granular, more or less roughened. Coxa I with several coarse tubercles, two or three distal tubercles enlarged. Coxa II with numerous enlarged tubercles on the retrolateral surface. Coxa III with a row of marginal humps anteriorly and posteriorly, number of humps differs in individuals. Coxa IV with a posterior row of marginal humps, and numerous coarse tubercles on the prolateral surface. In addition, coxae II, III and IV with sparse short hairs. Sternum wedge-shaped, with blunt apex, widening posteriorly. Maxillary processes from second coxae setose. Genital operculum triangular, with pointed apex, extends to third coxae, granular, clothed with numerous hairs, dorsal groove usually present. Free sternites and anal plate uniformly granular, roughened. Spiracles exposed.

Chelicerae with constriction on proximal segment, finely granular on mesal and ectal surfaces; distal segment widened, unarmed except for a few sparse hairs; fingers rather short, immovable finger with five enlarged teeth, movable finger with eight or nine small teeth.

Palpi reduced, all segments short but stout. Coxa armed ventrally with two setaceous distal tubercles, trochanter with two blunt ventral tubercles. Femur

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leg. 13-15 Dorsal views of hind claws in juveniles: 13, right fourth leg (branching formula 4+1+4); 14, left fourth leg (5+1+4); 15, right third leg (5+1+5). 16) Lateral view of hind claw of right fourth leg, $\equiv (3+1+3)$ (Onuma Spa). 17-21 Dorsal views of hind claws in adults: 17, right fourth leg, $\equiv (3+1+3)$ (Hachimantai); 18, left third leg, $\equiv (4+1+3)$ (Nenokuchi); 19, right fourth leg, $\equiv (3+1+4)$ (Onuma Spa); 20, left fourth leg, $\equiv (2+1+3)$ (Onuma Spa); 21, right fourth leg, $\equiv (3+1+1)$ (Onuma Spa). 22) Lateral view of penis (Nenokuchi). 23) Ventral view of penis (Nenokuchi). 24) Ventral view of distal segment of penis (Sukayu Spa). 25) Ovipositor. Magnifications. 3-4 x30; 6-8, 11 x45; 5, 9-10, 12, 22-23, 25 x50; 24 x140; 14-15, 18 x220; 13, 16-17, 19-21 x270.
thickened distally, arched above; along the ventral ridge present a single low, setaceous tubercle at base and very low blunt tubercle near apex; medial surface with one very short distal tubercle; dorsal surface smooth except for two or three very short setae. Patella with one low distomedial tubercle. Tibia widened, flattened beneath, with one small and one enlarged setaceous tubercle on the ectal ridge and two small setaceous tubercles on the mesal ridge; one or two tubercles on the ventral surface. Tarsus relatively small, flattened, with a row of three short spines and one distal spur along both ridges; claw curved, with sharp pointed apex.

Legs relatively short but robust; fourth femur curved. Trochanters, femora, patellae, tibiae and metatarsi very finely granular. Femur of first leg with two ventral spines, first and second trochanters with one spine. Calcaneus of metatarsi very short. Claws of third and fourth legs usually with three pairs of distolateral branches on rather slender median prong (see variations), central prong without a ventral tooth.

Coloration. Dorsum of animal characteristically dark brown, with intricate reticulations of reddish yellow on the carapacal region and eye tubercle. Scutal areas bordered with reddish yellow cross line; posterior margin of scute and each free tergite likewise reddish yellow. Four enlarged reddish yellow spots arranged in a longitudinal series on each side of scute near lateral margins; one pair of similar but smaller spots on each free tergite. Coxae of all legs reddish yellow, with brownish mottling, darker distally; genital operculum and free sternites reddish yellow, with a dark brown band on the latter. Chelicerae and palpi yellow entirely, without dark pigment. Trochanters, femora, patellae, tibiae and metatarsi of all legs dark brown, with reddish yellow reticulations above; tarsi lighter, in some specimens tarsi of third and fourth legs brownish above.

Penis. Shaft 0.15 mm wide at widest portion, 0.75 mm long, dorsal process 0.25 mm long. Shaft moderately widened, widest at base, from laterally narrower distally and acutely bent below. Penis with sclerotized dorsal process and no ventral process. Dorsal process elongated, narrowing toward apex, with two pairs of distal setae. Aedeagus applies to dorsal process, does not extend the apex of dorsal process.

Female: Similar in appearance to male, but body slightly larger. Genital operculum wider than that of the male, with two blunt shoulders, as in Fig. 10, not extends to third coxae. Ovipositor with elongated acute lobes. Lateral lobes with two pairs of long apical setae.

Juveniles: Hind claws with four pairs of lateral branches on median prong (see variations). First to fourth scutal areas usually divided as shown in Fig. 2.

Variations: The collection contains seven males and six females from five localities and four juveniles from one locality. The branching formulae of hind legs in juveniles are as shown in Table 1. Except for but two exceptions, the great majority have the formula 4+1+4. For this reason, 4+1+4 must be considered typical to the juveniles of this species. The two exceptional claws found in the ind. nos. 1 and 2 are illustrated in Figs. 14 and 15, respectively.
The claw shown in Fig. 14 has five ectal and four mesal branches, of which proximalmost one on the ectal side is exceedingly small in size compared with all the others of normal length. Likewise, that pictured in Fig. 15 has a reduced proximalmost branch on both sides of the central prong. From this it may be concluded that the juvenile hind claw with eight branches resulted from that with ten branches. Also, this may explain the evolutionary relationship between the Kaolinonychinae and Nippononychinae.

The branching formulae of hind claws in adults vary widely as shown in Table 2. Specimens consistently showing 3+1+3 formula are rather few. Most specimens have one, two or three hind claws with aberrant formulae. Hind claws with such aberrant formulae are illustrated in Figs. 16–21 with those of normal formula. Of 47 claws from thirteen specimens 30 (64%) exhibit 3+1+3 formula. Hence 3+1+3 formula must be considered typical of this species. The remaining aberrant formulae have the following frequencies: 4+1+3 (17%), 3+1+2 (9%), 3+1+4 (6%), 2+1+3 (2%) and 3+1+1 (2%). This wide

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**TABLE 1**

Branching formulae of hind claws in juveniles of Mutsunonychus fuscus (All Sukayu-zawa)

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<th>III R</th>
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Boldface indicates number other than 4.

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**TABLE 2**

Branching formulae of hind claws in adults of Mutsunonychus fuscus

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- indicates not examined; boldface number other than 3.
variability emphasizes the necessity of having numerous specimens from different localities for correct identification.

*Distribution:* Seems to be confined to the Northeast, Japan (Map 1).

Map 1. Distribution of *Mutsunonychus fuscus* and *Kainonychus akamai akamai* in the Northeast, Japan. (●: *Mutsunonychus fuscus*; ▲: *Kainonychus akamai akamai*).

Subfamily Paranonychinae Briggs, 1971

2. *Kainonychus akamai akamai* (Suzuki)

(Map 1)


*Specimens examined:* 1 ♂, 3 ♀, 1 pull., near Mikaeri-tōge Pass, Hachimantai
Two Triaenonychids from Japan

area, Iwate pref., in leaf debris in *Abies mariessi* and *Sasa kurilensis* forest, at 1,580 m in altitude, 8–VIII–1975, N. Tsurusaki leg. According to the collector, this species coexisted with *Mutsunonychus fuscus* described just above, and at least, on the Hachimantai area both species seem to be syntopic.

**Distribution:** Nagano, Yamanashi (type locality), Gunma, and Iwate prefectures.

**Notes:** All specimens examined agree well with those from other localities.

**ACKNOWLEDGMENTS**

The author wishes to thank Mr. N. Tsurusaki and Mr. I. Goto who helped him in collecting material. He also wants to thank the Mount Hakkōda Botanical Laboratory, Tōhoku University, and Dr. M. Yamanaka, for the hospitality and excellent facilities made available to him during his stay in September of 1975.

**LITERATURE**


