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Some Mites of the Families Phytoseiidae and Blattisocidae from Japan (Acarina: Mesostigmata)[1]

By

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(With 49 Text-figures)

The Phytoseiidae are of economic importance, because of their food habits of preying on photophagous mites. Mites of the closely related family Blattisocidae Garman (=Aceosejidae Baker and Wharton) are at least partly predaceous, though their feeding habits are not well known (Evans, Sheals and MacFarlane 1961, Chant 1963).

Such being the case, phytoseiids and also blattisocids are now receiving attention in the field of biological control of agricultural pests. In recent years many taxonomic papers on these mites have been published. From Japan ten species of phytoseiids (Ehara 1958, 1959, 1962, Chant 1960) and four species of blattisocids (Berlese 1924, Ehara 1961, Kamo and Hatsushika 1962, Chant 1963) were known prior to this study. These species are as follows:

Phytoseiidae

1. *Typhlodromus* (*Neoseiulus*) *vulgaris* Ehara[2]
2. *Typhlodromus* (*Neoseiulus*) *juniperus* Chant[2),3)]
3. *Amblyseius finlandicus* (Oudemans)
4. *Amblyseius largoensis* (Muma)
5. *Amblyseius longispinosus* (Evans)
6. *Amblyseius japonicus* (Ehara)
7. *Amblyseius tsugawai* Ehara
8. *Amblyseius rademacheri* Dosse
9. *Amblyseius orientalis* Ehara
10. *Phytoseius* (*Phytoseius*) *nipponicus* Ehara[4)]

Blattisocidae

1) Contribution No. 671 from the Zoological Institute, Faculty of Science, Hokkaido University, Sapporo, Japan.

2) Subgeneric name not given in the original description.

3) Known only from a female collected on juniper imported from Japan at Seattle, Washington, U.S.A.

4) Originally described as *Phytoseius* (*Dubininellus*) *nipponicus*. *Dubininellus* Wainstein is a synonym of *Phytoseius* Ribaga s. str. (Pritchard and Baker 1962).

1. *Neojordensia orientalis* Chant[1)]
2. *Proctolaelaps brevipilus* (Berlese)
3. *Blattisocius dentriticus* (Berlese)[2)]
4. *Blattisocius keegani* Fox[3)]

The present paper deals with twelve species of phytoseiids and blattisocids from Japan, as listed below, of which four are new to science and three are new to Japan.

Phytoseiidae
1. *Typhlodromus* (*Neoseiulus*) *bambusae* n. sp.
2. *Typhlodromus* (*Neoseiulus*) *vulgaris* Ehara
3. *Amblyseius sojaensis* n. sp.
4. *Amblyseius largoensis* (Muma)
5. *Amblyseius longispinosus* (Evans)
6. *Amblyseius chilenensis* Dosse
7. *Amblyseius oguroi* n. sp.
8. *Amblyseius tsugawai* Ehara

Blattisocidae
9. *Proctolaelaps pygmaeus* (Müller)
10. *Lasioseius porulosus* De Leon
11. *Lasioseius sugawarai* n. sp.
12. *Blattisocius dentriticus* (Berlese)

The types of the new species are preserved in the Zoological Institute, Faculty of Science, Hokkaido University.

Family Phytoseiidae

1. *Typhlodromus* (*Neoseiulus*) *bambusae* n. sp.

(Jap. Name: Take-kaburidani)

(Figs. 1-4)

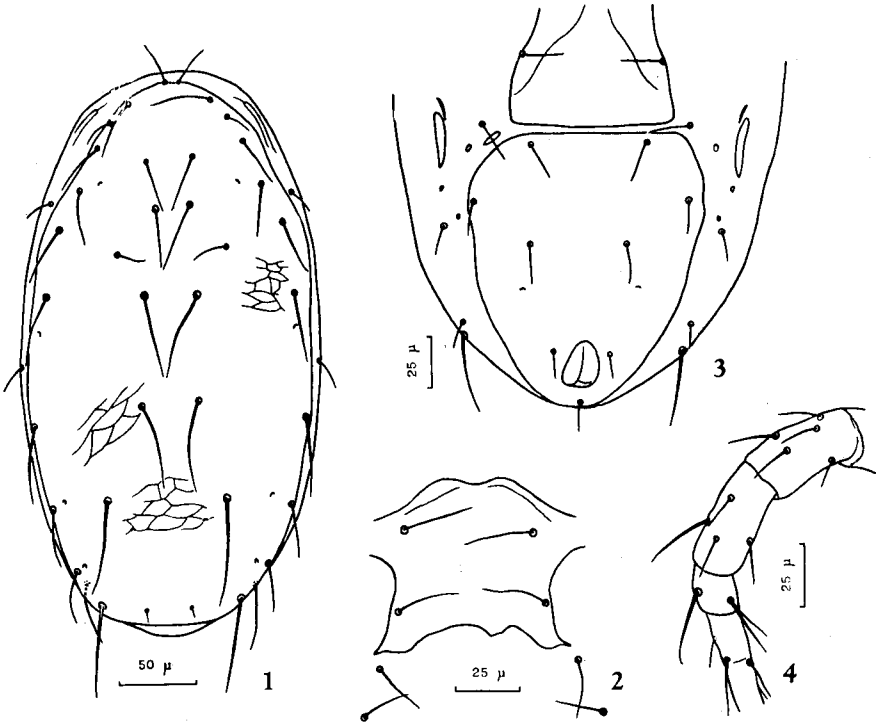
Female. Dorsal shield reticulate, with at least four pairs of pores; six pairs of dorsocentral setae. Setae on dorsal shield smooth, dissimilar in length: $L_1 > D_1$; L_{10} (obscurely pectinate)$=M_2 > L_7 \geqq L_6 > L_8 > L_9$; dorsocentral setae D_1 to D_5 successively increasing in length, seta D_6 minute. Setae S_1 and S_2 on interscutal membrane. Peritreme not extending beyond level of seta L_1. Sternal shield with two pairs of setae, the third and fourth pairs of sternal setae not set on platelets. Ventrianal shield large, longer than wide, wider than genital shield, with three pairs of preanal setae; a pair of small pores much posterior to posterior pair of preanals, distance between pores longer than distance between posterior preanals. Four pairs of setae surrounding ventrianal shield, the caudal pair (VL_1)

1) Known only from a female collected on yam roots imported from Japan to Philadelphia.

2) Recorded as *Melichares* (*Blattisocius*) *dentriticus* (Berlese) (Ehara 1961).

3) Recorded as *Melichares keegani* by Kamo and Hatsushika (1962).

very long. Two pairs of slender matapodal platelets, the anterior pair very small; a few minute platelets near metapodal platelets. Spermatheca with cervix cylindrical. Chelicera impossible to examine because of positions of specimens. Tibia IV with macroseta; basitarsus IV with macroseta slightly longer than long setae on basitarsus and tarsus IV proper. Measurements in microns: idiosoma length 340, idiosoma width 200; lengths of setae: L_1 35, L_2 17, L_3 29, L_4 32, L_5 35, L_6 44,



Figs. 1–4. *Typhlodromus* (*Neoseiulus*) *bambusae* n. sp., ♀. 1, dorsum of idiosoma. 2, sternal shield. 3, posterior ventral surface. 4, genu, tibia and tarsus of leg IV.

L_7 46, L_8 35, L_9 28, L_{10} 57, M_1 22, M_2 60, D_1 22, D_2 32, D_3 39, D_4 49, D_5 54, D_6 9, S_1 17, S_2 19, VL_1 35, macrosetae of leg IV: tibia 49, basitarsus 54; largest seta on tibia IV 33.

Male. Not known.

Types. Holotype: ♀, Tottori, Tottori Pref., 5–VII–1964 (T. Godô leg.), on *Chimonobambusa marmorea* Makino. Paratypes: 2♀♀, near Sugadaira, Nagano Pref., 3–VIII–1964 (S. Ehara leg.), on sasa bamboo.

Remarks. This species is similar to *Typhlodromus* (*Neoseiulus*) *pectinatus* Athias-Henriot from Algeria, but is different from *pectinatus* in its smooth

dorsal idiosomal setae and its large ventrianal shield.

2. *Typhlodromus* (*Neoseiulus*) *vulgaris* Ehara

Typhlodromus vulgaris Ehara, 1959, p. 286, Figs. 1-5.

Specimen examined. One ♀, Mt. Hikosan, northern Kyushu, 20–X–1955 (S. Ehara leg.), on plum.

This species has been known from Hokkaido, Honshu and Shikoku (Ehara 1959, 1962), and Hong Kong (Swirski and Shechter 1961). It is new to Kyushu.

3. *Amblyseius sojaensis* n. sp.

(Jap. Name: Kôzuke-kaburidani)

(Figs. 5–8)

Female. Dorsal shield reticulate, with a number of very small pores; six pairs of dorsocentral setae. Setae on dorsal shield: L_9 the longest, stout, very slightly pectinate; relative lengths: $D_1 \geqq L_4 \geqq L_1$; remaining setae shorter; $L_2 = L_3$; $L_6 > L_5$; $L_7 = L_8 > M_2$. Setae S_1 and S_2 on interscutal membrane. Peritreme reaching approximately to middle of coxa I. Sternal shield as figured. Ventrianal shield longer than wide, widest at level of anus, about as wide as genital shield. Three pairs of preanal setae on ventrianal shield, two mesial pairs of those being nearly in a line; pores inside and caudad from middle setae on each side; paranal setae at level of anterior end of anus. Four pairs of setae surrounding ventrianal shield. A pair of slender metapodal platelets. Cervix of spermatheca slender, narrower than atrium. Chelicera impossible to examine because of positions of specimens. Leg IV with macroseta on genu, tibia and basitarsus. Measurements in microns: idiosoma length 370, idiosoma width 260; lengths of setae: L_1 23, L_2 18, L_3 17, L_4 26, L_5 13, L_6 18, L_7 21, L_8 20, L_9 51, M_1 11, M_2 14, D_1 27, D_2 10, D_3 10, D_4 12, D_5 14, D_6 6, S_1 15, S_2 14, VL_1 28, macrosetae of leg IV: genu 36, tibia 33, basitarsus 50; length of peritreme[1] 145.

Male. Not known.

Types. Holotype: ♀, Sôja, Gumma Pref., 25–IX–1963 (K. Okabe leg.), on mulberry. Paratype: 1♀, data same as for holotype.

Remarks. Amblyseius sojaensis resembles *A. victoriensis* (Womersley) (Australia), from which it differs in the relative lengths of setae D_1 and L_1, and of setae L_1 and L_9. Further, *A. sojaensis* is similar to *A. stipulatus* Athias-Henriot (Algeria), but has shorter dorsal idiosomal setae. For instance, the seta L_1 is shorter than the distance to seta L_2, whereas in *stipulatus* it reaches the base of seta L_2.

4. *Amblyseius largoensis* (Muma)

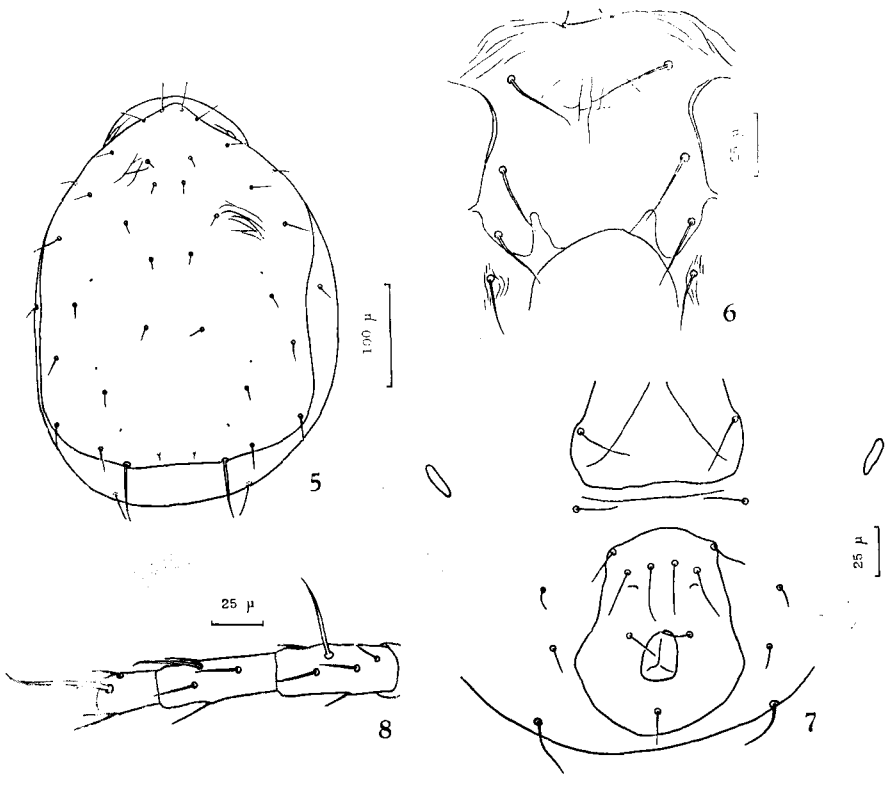
Amblyseiopsis largoensis Muma, 1955, Ann. Ent. Soc. Amer., 48: 266, Figs. 10–12.

Specimen examined. One ♀, Miyazaki, Miyazaki Pref., 28–X–1955 (S.

1) In this connection, the female peritreme of the allied species *Amblyseius finlandicus* (Oudemans) is 95μ in length.

Ehara leg.), on papaya in greenhouse.

In Japan this species has been known from Honshu and Shikoku (Ehara 1959, 1962). It is new to Kyushu.



Figs. 5–8. *Amblyseius sojaensis* n. sp., ♀. 5, dorsum of idiosoma. 6, sternal shield. 7, posterior ventral surface. 8, genu, tibia and basitarsus of leg IV.

5. *Amblyseius longispinosus* (Evans)

Typhlodromus longispinosus Evans, 1952, Ann. Mag. Nat. Hist., 12, 5: 413, Figs. 1, 2.

Specimens examined. Seventeen ♀♀ & 1♂, Nase, Amami-ôshima Island, 17–IV–1964 (M. Sakae leg.), on sugar cane.

This species is new to Amami-ôshima Island. It is common in Japan proper, and in laboratory culture of spider mites it occurs often to attack them.

6. *Amblyseius chilenensis* Dosse

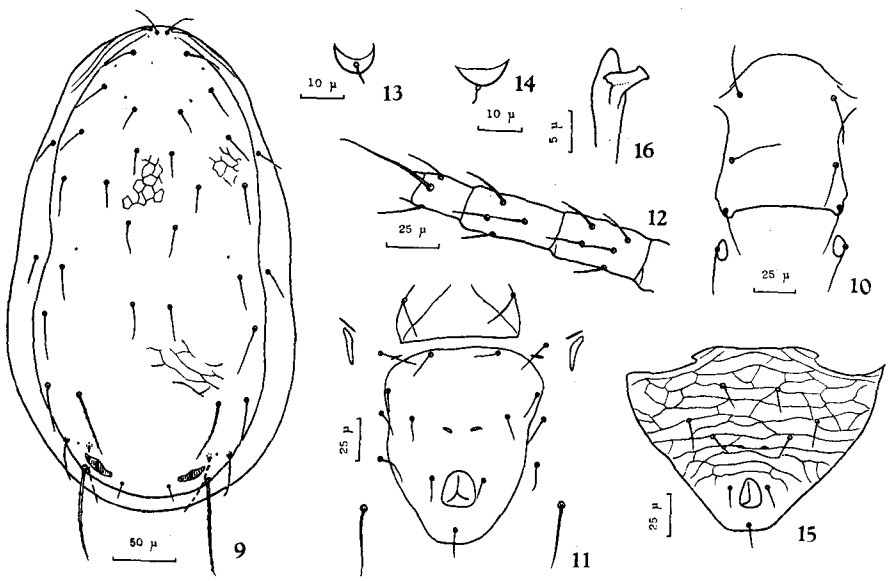
(Jap. Name: Miyako-kaburidani)

(Figs. 9–16)

Typhlodromus chilenensis Dosse, 1958a, p. 3, Fig. 4; Dosse, 1958b, p. 55, Figs. 11–15 (original description).

Amblyseius chilenensis, González & Schuster, 1962, p. 10, Fig. 3.

Female. Dorsal shield reticulate, with many pairs of very small pores; six pairs of dorsocentral setae. Setae on dorsal shield: L_9 and M_2 stout and pectinate; relative lengths: $L_9>M_2>L_6=L_7>L_8\geqq L_4\geqq L_5$; $L_4>L_1>D_1$. Setae S_1 and S_2 on interscutal membrane. Peritreme not extending between setae D_1. Sternal shield well defined, longer than wide, reticulate, with three pairs of setae; metasternal platelets as figured. Ventrianal shield longer than wide, wider than genital shield, with lateral margins slightly concave. Three pairs of preanal setae on ventrianal shield; a pair of transverse, large pores between and slightly behind posterior pair of preanals. Four pairs of setae surrounding ventrianal shield, seta VL_1 very long. Two pairs of slender metapodal platelets, the anterior pair very narrow. Spermatheca with cervix broad and short. Chelicera impossible to examine because of positions of specimens. Leg IV with macroseta on tibia and basitarsus: the tibial macroseta slightly larger than remaining setae on this segment, the



Figs. 9–16. *Amblyseius chilenensis*. 9, dorsum of idiosoma, ♀. 10, sternal shield, ♀. 11, ventrianal shield, ♀. 12, genu, tibia and basitarsus of leg IV, ♀. 13, 14, spermatheca. 15, ventrianal shield, ♂. 16, spermatophoral process of male chelicera.

basitarsal macroseta very long, with tip obscurely enlarged. Measurements in microns: idiosoma length 350, idiosoma width 190; lengths of setae: L_1 23, L_2 23, L_3 21, L_4 26, L_5 24, L_6 32, L_7 31, L_8 28, L_9 63, M_1 17, M_2 44, D_1 18, D_2 16, D_3 16, D_4 20, D_5 24, D_6 12, S_1 20, S_2 20, VL_1 43, macrosetae of leg IV: tibia 23, basitarsus 46; largest seta on genu IV 18.

Male. Setae S_1 and S_2 on interscutal membrane. Peritreme reaching level of seta D_1. Ventrianal shield with three pairs of preanal setae; a pair of transverse, large pores between and slightly behind posterior pair of preanals. Spermatophoral process of chelicera as figured. Macrosetae on leg IV as in female. Measurements in microns: idiosoma length 280, idiosoma width 170; lengths of setae: L_1 18, L_2 17, L_3 17, L_4 23, L_5 22, L_6 27, L_7 29, L_8 26, L_9 49, M_1 15, M_2 43, D_1 17, D_2 14, D_3 14, D_4 17, D_5 22, D_6 9, S_1 17, S_2 17, VL_1 31, macrosetae of leg IV: tibia 20, basitarsus 38; largest seta on genu IV 14.

Specimens examined. One ♀ & 4 ♂♂, Meguro, Tokyo, 28–VI–1963 (Y. Ito leg.), on *Boehmeria nivea* Gaud; 1♀, 5–VIII–1963, other data same as for the above. (The author has had a chance to examine a female specimen from Chile, presented by R. H. González.)

Distribution. Japan (Honshu), new locality record; Chile.

Biology. The present materials, together with individuals of *Phytoseius* (*Phytoseius*) *nipponicus* Ehara, were found preying on the cyclamen mite, *Tarsonemus pallidus* Banks, on *Boehmeria nivea* Gaud. In Chile, *A. chilenensis* is known to feed on *Brevipalpus chilensis* Baker (González and Schuster 1962).

7. *Amblyseius oguroi* n. sp.

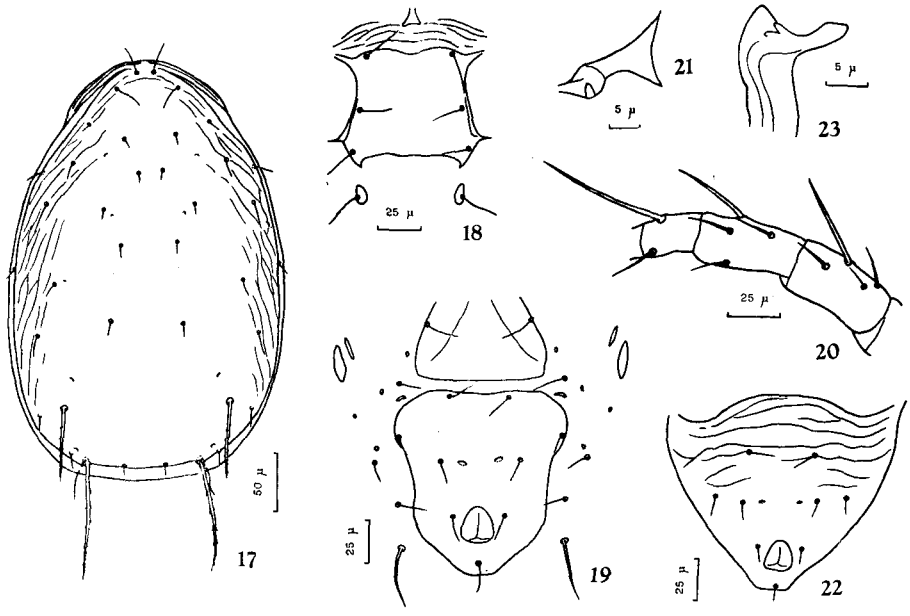
(Jap. Name: Kita-kaburidani)

(Figs. 17-23)

Female. Dorsal shield reticulate along lateral margins; with at least six pairs of pores; six pairs of dorsocentral setae. Setae on dorsal shield: L_9 and M_2 long, pectinate; remaining setae short or minute; relative lengths: $L_9 > M_2$; $D_1 \fallingdotseq L_1 \fallingdotseq L_4$; $L_3 > L_2$; $L_6 > L_5$. Setae S_1 and S_2 on interscutal membrane. Peritreme extending beyond seta D_1. Sternal shield wider than long, with three pairs of setae; metasternal platelets as figured. Ventrianal shield longer than wide, wider than genital shield; the lateral margins concave. Three pairs of preanal setae on ventrianal shield; a pair of conspicuous pores being in line with posterior preanals. Four pairs of setae and several pairs of minute platelets surrounding ventrianal shield. Two pairs of slender metapodal platelets, the posterior pair much larger. Spermatheca as figured. Fixed digit of chelicera multidentate. Leg IV with macroseta on genu, tibia and basitarsus. Measurements in microns: idiosoma length 340, idiosoma width 220; lengths of setae: L_1 22, L_2 13, L_3 17, L_4 24, L_5 12, L_6 18, L_7 14, L_8 13, L_9 87, M_1 10, M_2 60, D_1 23, D_2 9, D_3 9, D_4 9, D_5 12, D_6 7, S_1 14, S_2 10, VL_1 32, macrosetae of leg IV: genu 37, tibia 32, basitarsus 55.

Male. Setae S_1 and S_2 may occur on the dorsal shield or on the interscutal

membrane. Ventrianal shield with three pairs of preanal setae, the caudal two pairs and a pair of pores being approximately in a line. Spermatophoral process of chelicera as figured. Macrosetae on leg IV as in female. Measurements in microns: idiosoma length 280, idiosoma width 180; lengths of setae: L_1 25, L_2 10, L_3 16, L_4 20, L_5 10, L_6 17, L_7 14, L_8 11, L_9 57, M_1 9, M_2 40, D_1 21, D_2 9, D_3 8, D_4 10, D_5 10, D_6 5, S_1 14, S_2 10, VL_1 25, macrosetae of leg IV: genu 25, tibia 23, basitarsus 46.



Figs. 17–23. *Amblyseius oguroi* n. sp. 17, dorsum of idiosoma, ♀. 18, sternal shield, ♀. 19, ventrianal shield, ♀. 20, genu, tibia and basitarsus of leg IV, ♀. 21, spermatheca. 22, ventrianal shield, ♂. 23, spermatophoral process of male chelicera.

Types. Holotype: ♀, Sendai, Miyagi Pref., 6–X–1961 (S. Ehara leg.), on *Mallotus japonicus* Muell. Arg. Allotype: ♂, data same as for holotype. Paratypes: 3 ♀♀, data same as for holotype; 1 ♀, Morioka, Iwate Pref., 25–VIII–1964 (H. Sugawara leg.), on apple; 1 ♀ & 1 ♂, Akkeshi, Hokkaido, 1~4–VIII–1954 (C. Oguro leg.), on *Aruncus sylvester* Kostel.

Remarks. Amblyseius oguroi is closely allied to *A. asiaticus* (Evans) (Southeast Asia), *A. callunae*[1] Willmann (Europe) and *A. alpinus*[2] Schweizer (Europe), but is different from them in the relative lengths of the seta D_1 and the anterior lateral

1), 2) Of these species fine redescriptions are found in the paper of Westerboer and Bernhard (1963).

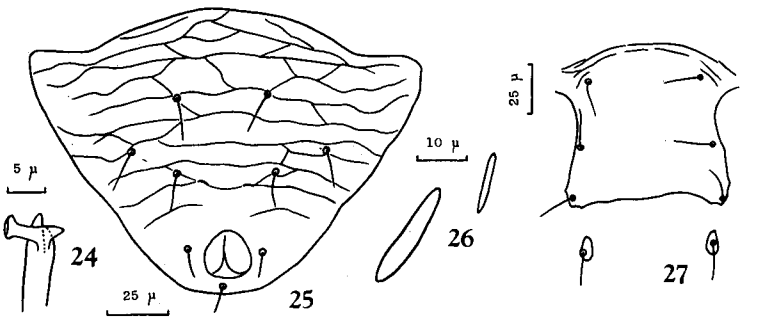
setae on the dorsal shield. Further, this species is similar to *A. dentilis* (De Leon) from Florida and *A. sabali* (De Leon) from Mexico. It is distinguished from *dentilis* by the lengths of setae L_9 and M_2 on the dorsal shield, and the shape of the spermatheca, and also from *sabali* by the shape of the spermatheca and the spermatophoral process of male chelicera. This species is named in honor of Dr. Chitaru Oguro who kindly offered specimens of mites treated in this paper to the author.

8. *Amblyseius tsugawai* Ehara

(Figs. 24–27)

Amblyseius tsugawai Ehara, 1959, p. 290, Figs. 12, 13.

Male. Setae S_1 and S_2 on interscutal membrane. Ventrianal shield with three pairs of preanal setae; a pair of pores between and caudad from posterior pair of preanals. Spermatophoral process of chelicera as figured. Leg IV with macroseta on genu, tibia and basitarsus. Measurements in microns: idiosoma length 280, idiosoma width 180; lengths of setae: L_1 31, L_4 37, L_9 69, M_2 38, D_1 21, VL_1 24, macrosetae of leg IV: genu 35, tibia 32, basitarsus 55.



Figs. 24–27. *Amblyseius tsugawai*. 24, spermatophoral process of male chelicrea. 25, ventrianal shield, ♂. 26, metapodal plates, ♀. 27, sternal shield, ♀.

Specimens examined. Two ♀♀, Morioka, Iwate Pref., 4–IX–1963 (T. Oku leg.), on soy bean; 1 ♀, Morioka, 7–VIII–1964 (S. Ehara leg.), on clover; 7 ♀♀ & 1 ♂, Morioka, 25–VIII–1964 (H. Sugawara leg.), on apple; 4♀♀ & 1 ♂, 27–IX–1964, other data same as for the preceding collection.

Remarks. *Amblyseius tsugawai* was known only from a single female specimen found on apple in Kuroishi, Aomori Prefecture. Its spermatheca was described later (Ehara 1961). Male of this species is here described for the first time. The relative lengths of main dorsal setae of both sexes are: $L_9 > M_2 \geqq L_4 > L_1 > D_1$; $L_3 \geqq L_2$; $L_6 > L_5$. In both sexes, the macroseta of basitarsus IV is approximately one and a half times the length of the macroseta of genu IV, the latter being slightly longer than the macroseta of tibia IV. According to Mr. T. Oku (personal communication), this

mite, together with *Amblyseius rademacheri* Dosse, actively preys upon *Tetranychus urticae* Koch in soy bean fields.

Family Blattisocidae

9. *Proctolaelaps pygmaeus* (Müller)

(Jap. Name: Hosoge-mayoidani)

(Figs. 28-33)

Gamasus pygmaeus Müller, 1859, Zeits. Naturw., 9: 29.
Hypoaspis hypudaei Oudemans, 1902, Tijdschr. Ent., 45: 21, Figs.
Typhlodromus bulbicolus Oudemans, 1929, Ent. Ber., 8 (169): 15, 29.
Garmania bulbicola, Nesbitt, 1951, Zool. Verh., 12: 46, Pl. 20.
Proctolaelaps (Proctolaelaps) hypudaei, Evans, 1958, p. 199, Figs. 33, 34; Hughes, 1961, The mites of stored food, p. 228, Figs. 308, 309, 310a, 311a.
Proctolaelaps hypudaei, Mathys & Tencalla, 1959, p. 645, Figs. 23–27.
Proctolaelaps pygmaeus, Samšiňák, 1960, Českosl. Parasitol., 7: 302, 306; Chant, 1963, p. 259, Figs. 19–21.

Female. Dorsal shield reticulate, with a pair of conspicuous pores; with 43 pairs of simple setae, 20 on posterior region. Setae on dorsal shield mostly long and more or less similar in length; setae of J series approximately as long as distances between bases; seta Z_5 noticeably longer than remaining setae. Setae M_6 and M_7 not set on dorsal shield. Peritreme extending to paravertical setae; peritrematal plate free posteriorly. Endopodal plates conspicuous in region of coxae III and IV. Sternal shield with three pairs of setae; metasternal platelets as figured. Genital shield with posterior margin convex. Anal shield typically oval, with large anus. Twelve pairs of setae surrounding anal shield. Two pairs of very slender metapodal platelets. Spermatheca not seen. Chelicera with fixed digit multidentate. Tectum variable, denticulate. Corniculi sinuous, anterior pair of rostral setae stout, spine-like. Tarsus IV proper with a very long seta. Measurements in microns: idiosoma length 390, idiosoma width 260; lengths of setae: verticals 29, humerals 32, Z_4 40, Z_5 51, VL_1 34, macroseta of basitarsus IV 72.

Male. Ventrianal shield with five pairs of preanal setae. Spermatophoral process of movable digit of chelicera as figured. Measurements in microns: idiosoma length 280, idiosoma width 190; lengths of setae: verticals 23, humerals 23, Z_4 29, Z_5 38, VL_1 25, macroseta of basitarsus IV 59.

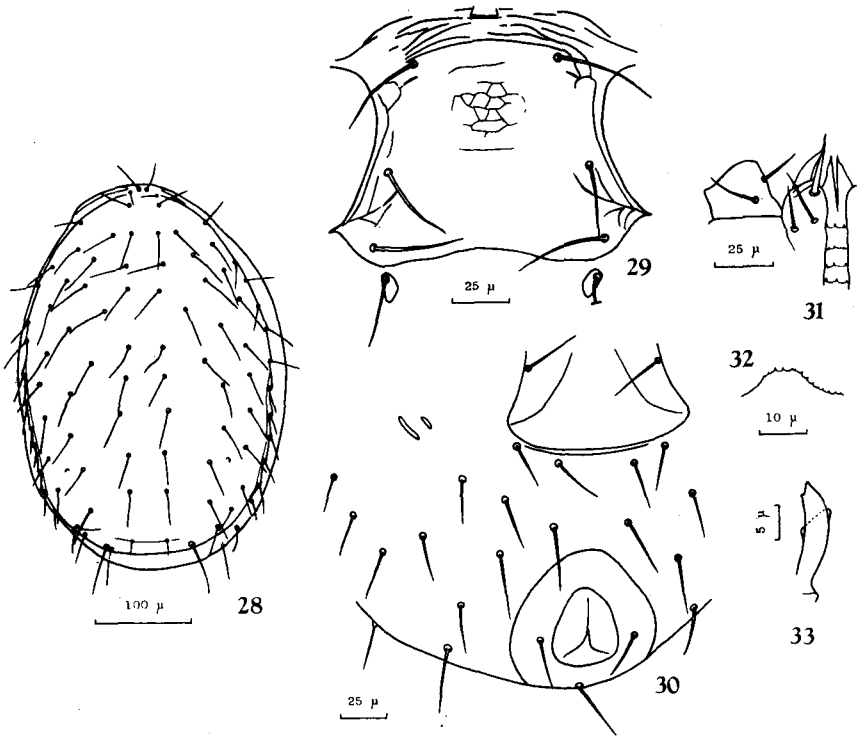
Specimens examined. Three ♀♀ & 2 ♂♂, Okitsu, Shizuoka Pref., 18–VIII–1959 (N. Shinkaji leg.), on citrus fruit; 1♀, Kurume, Fukuoka Pref., 5–VI–1963 (K. Inoue leg.), from potato in laboratory.

Distribution. Japan (Honshu and Kyushu), new locality record; Europe, North America, Indonesia, Australia, New Zealand, Algeria, South Africa.

Remarks. Proctolaelaps pygmaeus is distinctive in having sinuous corniculi and stout, spine-like rostral setae (Evans, 1958, Chant 1963).

Biology. The biology of this mite was studied by Mathys and Tencalla (1959) and by others. In summary, it is not only saprophagous in habit but predaceous

upon mites and other small arthropods. Of the present specimens, those from citrus fruit were found associated with numerous individuals of the citrus rust mite, *Aculus pelekassi* Keifer[1], while those from potato in laboratory were with the white peach scale, *Pseudaulacaspis pentagona* (Targioni).



Figs. 28–33. *Proctolaelaps pygmaeus*. 28, dorsum of idiosoma, ♀. 29, sternal shield, ♀. 30, posterior ventral surface, ♀. 31, rostrum, ♀. 32, tectum, ♀. 33, spermatophoral process of male chelicera.

10. *Lasioseius porulosus* De Leon

(Jap. Name: Kobu-mayoidani)

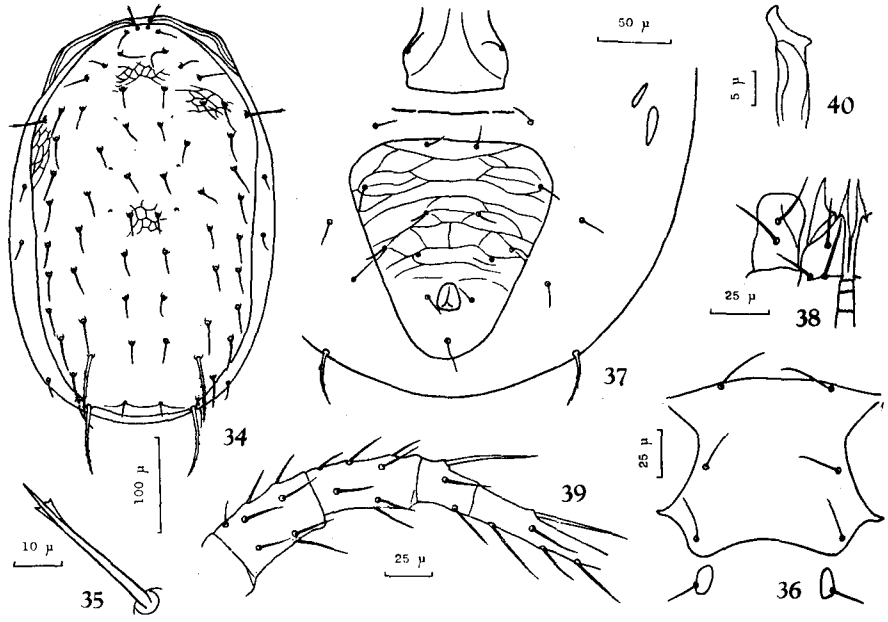
(Figs. 34–40)

Lasioseius porulosus De Leon, 1963, p. 204, Figs. 36–38.

Female. Dorsal shield faintly reticulate, with a few pairs of very small pores; with 31 pairs of setae, 15 on posterior region. Setae on dorsal shield set on tubercles, mostly short, simple; vertical and humeral setae, sometimes and paravertical setae, faintly flanged; setae Z_4 and Z_5 long, stout; some caudal

1) Identified by Mr. H. H. Keifer.

setae, usually Z_4, Z_5 and S_5, serrate; setae of J series shorter than distances between their bases. Three pairs of marginal setae on interscutal membrane, one on anterior region. Peritreme extending to vertical setae; peritrematal plate fused posteriorly to exopodal plate. Endopodal plates poorly developed. Sternal shield with three pairs of setae; metasternal platelets as usual. Ventrianal shield triangular, slightly longer than wide, much wider than genital shield; four pairs of



Figs. 34–40. *Lasioseius porulosus*. 34, dorsum of idiosoma, ♀. 35, humeral seta, ♀. 36, sternal shield, ♀. 37, posterior ventral surface, ♀. 38, rostrum, ♀. 39, genu, tibia and tarsus of leg IV, ♀. 40, spermatophoral process of male chelicera.

preanal setae; a pair of pores inside of and slightly caudad from posterior pair of preanals. An elongate, sometimes fragmented, platelet on membrane between ventrianal and genital shields. Four pairs of setae surrounding ventrianal shield, seta VL_1 longer, stouter, and serrate. Two pairs of unparallel metapodal platelets, the posterior pair wide. Spermatheca not observable. Fixed digit of chelicera with 10 to 12 teeth, the movable digit with four (rarely more) teeth. Tectum denticulate, without noticeable processes. Corniculi and rostral setae as figured. Tarsus II proper with two unpaired lanceolate setae; tarsus III proper with one lanceolate seta. Leg IV with one macroseta on basitarsus, and with one macroseta on tarsus proper. Measurements in microns: idiosoma length 440, idiosoma width 270; lengths of setae: verticals 25, humerals 38, Z_3 34, Z_4 62, Z_5 65, S_4 32, S_5 30, VL_1 35,

macrosetae of leg IV: basitarsus 42, tarsus proper 47.

Male. Two cephalic pairs of marginal setae on dorsal shield. Ventrianal shield with seven pairs of preanal setae. Spermatophoral process of movable digit of chelicera as figured. Measurements in microns: idiosoma length 340, idiosoma width 200; lengths of setae: verticals 22, humerals 29, Z_3 26, Z_4 40, Z_5 44, S_4 26, S_5 23, VL_1 19, macrosetae of leg IV: basitarsus 35, tarsus proper 40.

Specimens examined. Eleven ♀♀ & 3 ♂♂, Akkeshi, Hokkaido, 1–VIII–1954 (C. Oguro leg.), on wild strawberry; 6 ♀♀ & 1 ♂, 4–VIII–1954, on *Adenocaulon bicor* Hook, var. *adhaerescens* Makino, 1♀, 1～4–VIII–1954, on *Aruncus sylvester* Kostel, other data same as for the above.

Distribution. Japan (Hokkaido), new locality record; U.S.A. (Tennessee).

Remarks. The female of *Lasioseius porulosus* is characterized in the lengths of setae Z_4 and Z_5, the shape of the ventrianal shield, and the position of the ventrianal pores. The male, previously unknown, is described here for the first time.

11. *Lasioseius sugawarai* n. sp.

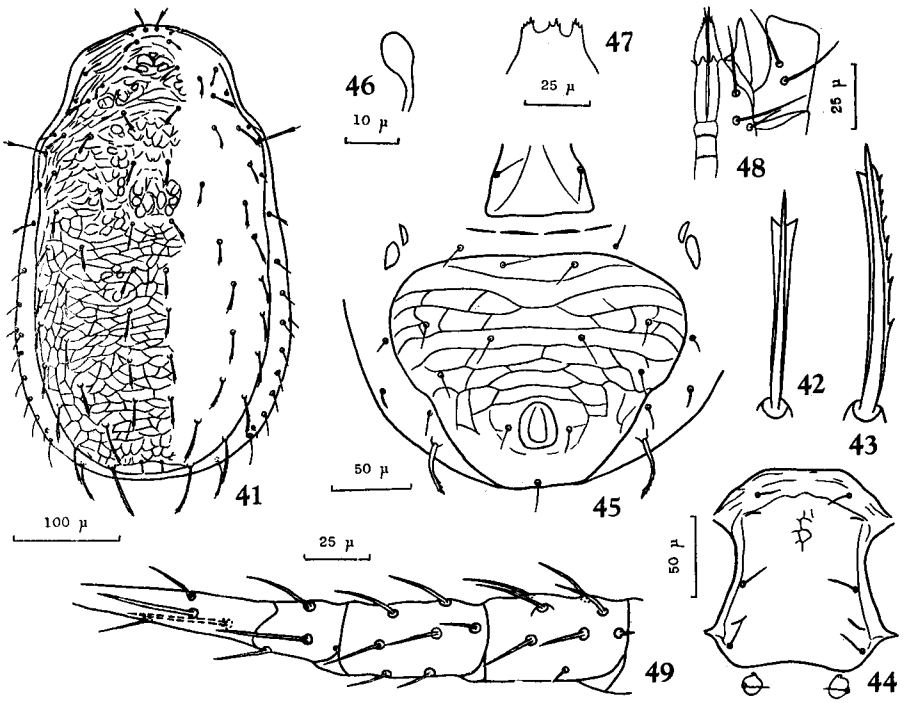
(Jap. Name: Kazari-mayoidani)

(Figs. 41–49)

Female. Body heavily sclerotized. Dorsal shield reticulate as figured; with 36 pairs of setae, 21 on the anterior region. Setae on dorsal shield arising from small tubercles, those on anterior region flanged except for four pairs of minute setae (paraverticals and three pairs of peripheral setae including a pair of peg-like setae); humeral setae longer; all setae on posterior region flanged, caudal pairs except J_5 larger, serrate; setae of J series shorter than distances between bases. Marginal setae on interscutal membrane, one pair of flanged setae and one pair of simple setae in anterior region, and nine (seven upper and two lower) pairs of simple setae in posterior region. Peritreme not extending to vertical setae; peritrematal plate fused posteriorly to exopodal plate. Endopodal plates conspicuous in rergion of coxae III and IV. Sternal shield longer than wide, with three pairs of setae; metasternal platelets with minute process anteriorly. Ventrianal shield large, wider than long, much wider than genital shield, with four pairs of preanal setae. Four elongate platelets on membrane between ventrianal and genital shields. Five pairs of setae surrounding ventrianal shield, seta VL_1 serrate and flanged. Two pairs of metapodal platelets, the anterior pair slender, the posterior pair longer and wide. Spermatheca small. Fixed digit of chelicera with 13 to 15 teeth, the movable digit with three teeth. Tectum with three denticulate processes. Corniculi and rostral setae as figured. Tarsus II proper with a long lanceolate seta. Basitarsus IV with one macroseta on dorsum, tarsus IV proper with one dorsal and one ventral macrosetae. Measurements in microns: idiosoma length 430, idiosoma width 270; lengths of setae: verticals 23, humerals 39, Z_4 40, Z_5 47, S_4 37, S_5 39, VL_1 33, macrosetae of leg IV: basitarsus 35, tarsus proper (dorsal) 35, tarsus proper (ventral) 35.

Male. Not known.

Types. Holotype: ♀, Morioka, Iwate Pref., 9–IV–1964 (H. Sugawara leg.), on strawberry. Paratypes: 7 ♀♀, data same as for holotype.



Figs. 41–49. *Lasioseius sugawarai* n. sp., ♀. 41, dorsum of idiosoma. 42, flanged seta on dorsal shield. 43, flanged, serrate seta on dorsal shield. 44, sternal shield. 45, posterior ventral surface. 46, spermatheca. 47, tectum. 48, rostrum. 49, genu, tibia and tarsus of leg IV.

Remarks. This new species closely resembles *Lasioseius analis* Evans from Uganda, but differs from it in the chaetotaxy of tarsus IV. This species is named in honor of Dr. Hiroo Sugawara, Morioka Branch, National Horticultural Research Station, Morioka.

12. *Blattisocius dentriticus* (Berlese)

Lasioseius (*L.*) *dentriticus* Berlese, 1918, Redia, 13: 133.

Specimens examined. One ♂, Sapporo, Hokkaido, 19–VII–1957 (Sh. F. Sakagami leg.), from nest of 2nd generation of a social bee, *Lasioglossum* (*Evylaeus*) *duplex* (Dalla Torre); 4 ♀♀ & 1 ♂, Morioka, Iwate Pref., 9–IV–1964 (H. Sugawara leg.), on strawberry; 1 ♂, Susaka, Nagano Pref., 11–VIII–1962 (Y. Itō leg.), on apple; 5 ♀♀ & 2 ♂♂, Kurume, Fukuoka Pref., 5–VI–1963 (K. Inoue leg.), from

potato culture in laboratory ; 1♀, Kurume, 11-VI-1963 (K. Inoue leg.), from potato culture in laboratory.

In the male, two pairs of marginal setae are set on the dorsal shield, whereas those of female arise from the interscutal membrane. This mite was previously recorded from Hokkaido and Kyushu (Ehara 1961, as *Melichares* (*Blattisocius*) *dentriticus*), and is new to Honshu. *Blattisocius dentriticus* has been found in a variety of habitats in many parts of the world. Chant (1963) mentioned that this species seems very similar in its biology to those Phytoseiidae that have been studied and differs only in details. Of the specimens here studied, those from potato culture in laboratory were found associated with the white peach scale, *Pseudaulacaspis pentagona* (Targioni), or with the horned wax scale, *Ceroplastes pseudoceriferus* (Green).

Summary

1. This paper is concerned with twelve species belonging to the families Phytoseiidae and Blattisocidae from Japan.

2. The following four species are described as new: *Typhlodromus* (*Neoseiulus*) *bambusae*, *Amblyseius sojaensis*, *A. oguroi* and *Lasioseius sugawarai*.

3. *Amblyseius chilenensis* Dosse, *Proctolaelaps pygmaeus* (Müller) and *Lasioseius porulosus* De Leon are first recorded from Japan and redescribed.

4. The male of *Amblyseius tsugawai* Ehara is described for the fist time.

5. New locality and habitat records are given of the following species: *Typhlodromus* (*Neoseiulus*) *vulgaris* Ehara, *Amblyseius largoensis* (Muma), *A. longispinosus* (Evans) and *Blattisocius dentriticus* (Berlese).

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