

# Notes on Some Predatory Mites (Phytoseiidae and Stigmaeidae)<sup>1, 2</sup>

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The present paper deals with mites of the Phytoseiidae and Stigmaeidae taken from plants in Japan. Description of a new species of phytoseiid and redescriptions of two species of stigmaeids are here presented along with notes, mainly new locality records, of four species of phytoseiids. It is known that mites of these families are of economic importance, because these mites are predaceous upon phytophagous mites and insects and their eggs. In fact, some of the present materials were found preying on tetranychids or scale insects. The following is a list of the species herein treated:

## Phytoseiidae

1. *Typhlodromus vulgaris* EHARA
2. *Amblyseius rademacheri* DOSSE
3. *Amblyseius orientalis* EHARA
4. *Amblyseius largoensis* (MUMA)
5. *Phytoseius* (*Dubininellus*) *nipponicus* n.sp.

## Stigmaeidae

6. *Agistemus fleschneri* SUMMERS
7. *Agistemus terminalis* (QUAYLE)

### 1. *Typhlodromus vulgaris* EHARA

*Typhlodromus vulgaris* EHARA, 1959, p. 286, Figs. 1-5; EHARA, 1961, p. 95, Figs. 1-2.

*Specimen examined.* 1 ♀,<sup>3</sup> Higasino, Ehime Pref., Shikoku, 2-VIII-1961 (on citrus), S. MORI leg.

This species was described based on specimens from Hokkaido and Honshu. It is new to Shikoku.

### 2. *Amblyseius rademacheri* DOSSE

*Amblyseius rademacheri*, EHARA, 1959, p. 288, Figs. 6-11.

*Specimens examined.* 2 ♀♀,<sup>4</sup> Iida, Nagano

Pref., Honshu, 29-IX-1957 (on pear and peach), T. MIYASHITA leg.

This species was recorded from Hokkaido by the author, and is new to Honshu.

### 3. *Amblyseius orientalis* EHARA

(Figs. 1-5)

*Amblyseius orientalis* EHARA, 1959, p. 291, Figs. 14-16; EHARA, 1961, p. 96, Fig. 7.

CHANT (1959) thinks that *Amblyseius orientalis* EHARA, 1959, is synonymous with *A. gracilis* (GARMAN, 1958). Through the courtesy of Dr. E. W. BAKER, the present author has examined a paratype (female) of *gracilis* preserved in the U. S. National Museum, in order to clarify whether *orientalis* is conspecific with *gracilis* or not. This paratype was collected from *Mullein verbasum thapsus* at N. Portland, Oregon, on Jan. 29, 1946, by R. L. POST (Lot 46-5209). The collection data are same as in the holotype. Examinations have made clear that *orientalis* is a distinct species from *gracilis* (Figs. 1-6):

1. ♀. Ventrianal shield longer than wide (length: breadth=10:7.8) in *orientalis* but as long as wide in *gracilis* (see also GARMAN'S Fig. 16e based on holotype).

2. ♀. In *orientalis* the ventrianal pores are large, transverse, approximately in line with third pair of preanal setae, whilst in *gracilis* they are minute (as GARMAN described), distinctly posterior to third preanal level.

3. ♀. In *orientalis* four pairs of setae surrounding the ventrianal shield are generally distant from the shield, whereas in *gracilis* one pair of them (third pair) are very close

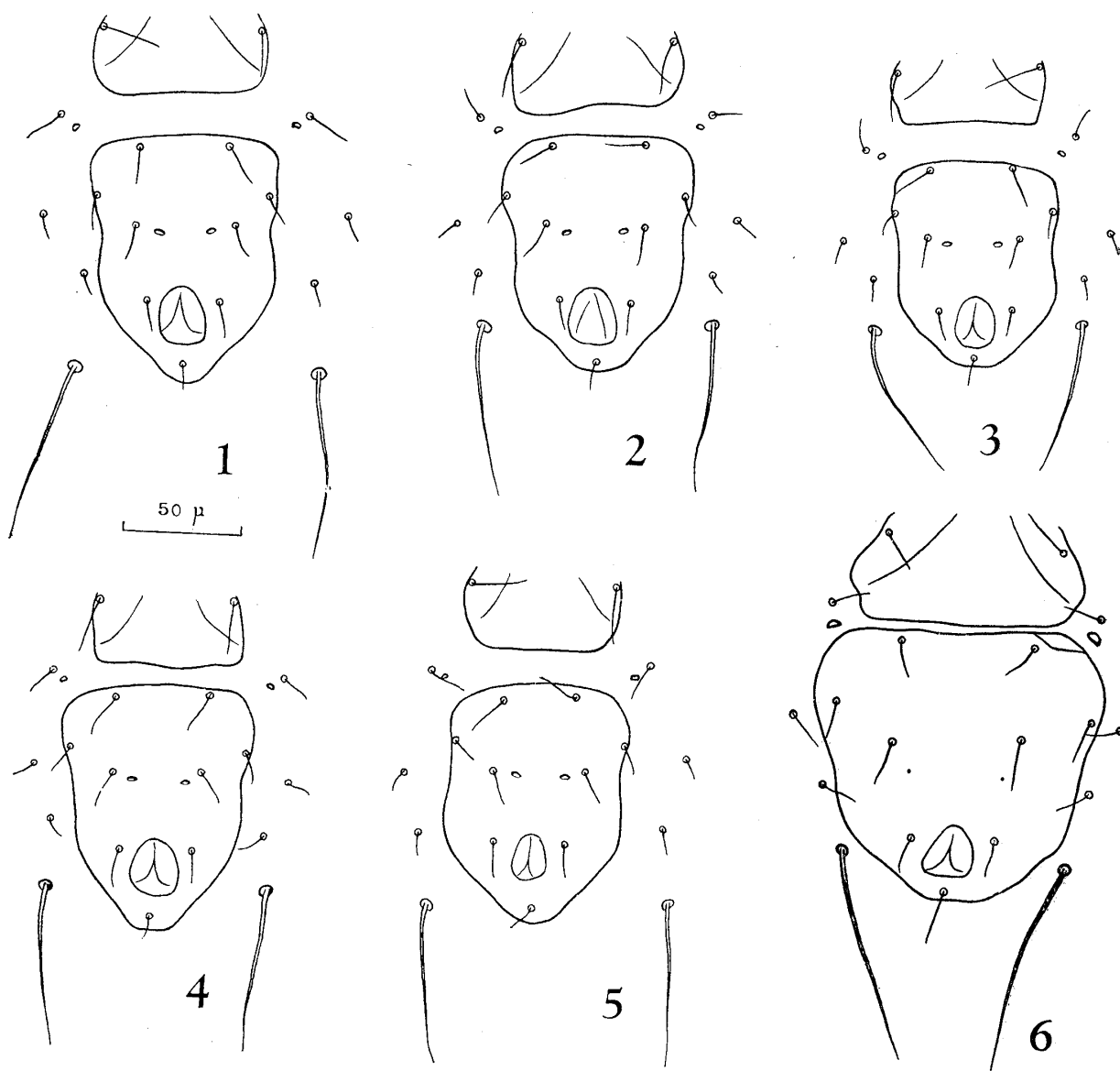
<sup>1</sup> Contribution No. 516 from the Zoological Institute, Faculty of Science, Hokkaido University, Sapporo, Japan.

<sup>2</sup> Aided by a grant from the Scientific Research Fund of the Hokkaido Prefectural Office (1961).

<sup>3</sup> Collected together with specimens of *Amblyseius largoensis* (MUMA).

<sup>4</sup> Collected together with specimens of *Panonychus citri* (McGREGOR).

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Figs. 1-6. Main parts of posterior ventral surfaces of female *Amblyseius* (reticulations omitted). 1-5, *A. orientalis*. 6, *A. gracilis*, paratype.

to margin of the shield and other pairs are distant.

The spermatheca of *orientalis* is as illustrated in EHARA, 1961. The structure of spermatheca of *gracilis* could not be observed.

*Orientalis* was described from specimens collected in Hokkaido. The following specimens from Honshu (*first record*) have been available for the present study: 10 ♀♀ & 1 ♂, Yanagawa, Fukushima Pref., 25-IX-1955 (on

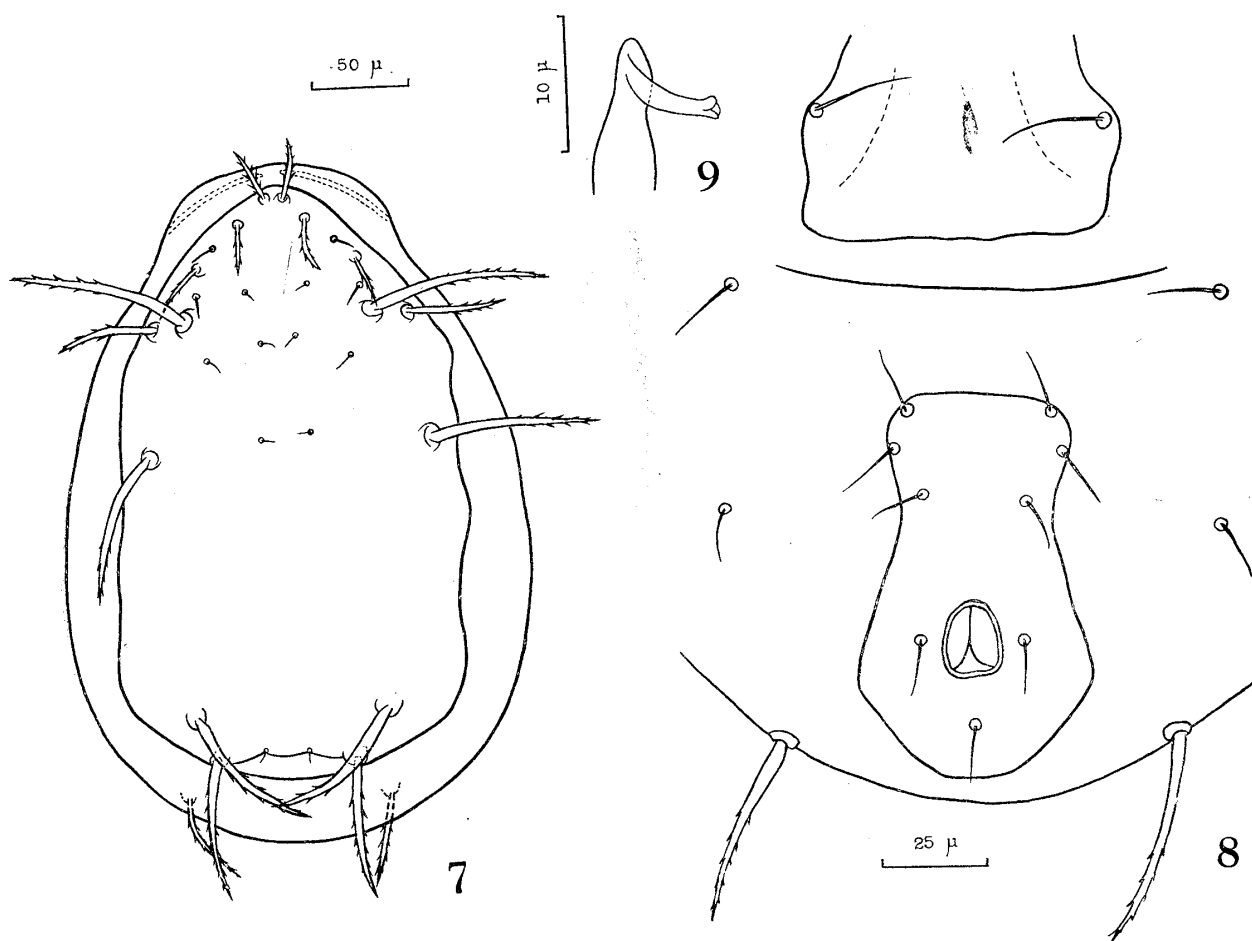
mulberry), O. AMANO leg.; 5 ♀♀<sup>1</sup> & 1 ♂<sup>1</sup>, Manriki Yamanashi Pref., 12-IX-1961 (on grape), I. OSADA leg.

#### 4. *Amblyseius largoensis* (MUMA)

*Amblyseius largoensis*, EHARA, 1959, p. 293, Figs. 17-18; EHARA, 1961, p. 96, Fig. 8.

*Specimens examined*. 8 ♀♀ & 2 ♂♂, Higashino, Ehime Pref., Shikoku, 2-VIII-1961 (oncitrus), S. MORI leg.

<sup>1</sup> Collected together with specimens of *Amblyseius longispinosus* (EVANS) on grape leaves parasitized by numerous eriophyids.



Figs. 7-9. *Phytoseius (Dubininellus) nipponicus* n. sp. 7, dorsum of female. 8, posterior ventral surface of female (reticulations omitted). 9, spermatophoral process of male chelicera.

The male, previously not available to the author, measures  $290\ \mu$  long and  $180\ \mu$  wide. The ventrianal shield of this sex carries three pairs of preanal setae. The spermatophoral process is of *orientalis*-type.

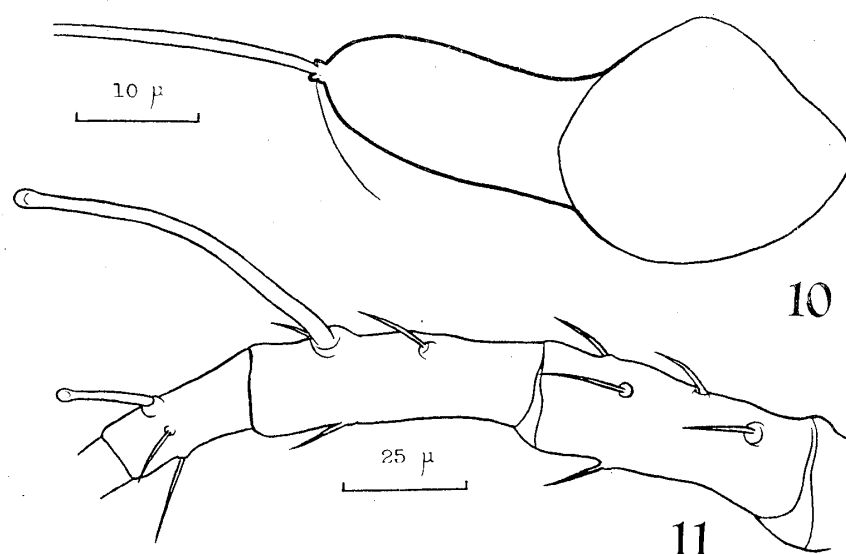
The present specimens were found feeding on *Panonychus citri* (MCGREGOR). *Largoensis* was recorded from Honshu by the author, and is new to Shikoku.

5. *Phytoseius (Dubininellus) nipponicus*  
n. sp.

(Figs. 7-11)

**Female.** Body  $360\ \mu$  long and  $230\ \mu$  wide. Fixed digit of chelicera with three teeth; movable digit unidentate. Hypostome with three pairs of slender setae. Leg IV with a spatulate macroseta on tarsus and tibia, the tarsal seta  $20\ \mu$  long, the tibial seta  $75\ \mu$  long; genu IV without visible macroseta (Fig. 11). Peritreme nearly reaching in front of the base

of seta  $D_1$ ; peritrematal shield ending in a truncate portion behind coxa IV. Dorsal shield faintly reticulate, with fifteen pairs of setae, of which seven are lateral; seta  $S_1$  located on dorsal shield, seta  $D_5$  absent. (Fig. 7). Setae  $D_1$ ,  $L_1$ ,  $L_3$ ,  $L_5$ ,  $L_6$ ,  $L_7$ ,  $M_2$ , and  $S_1$  strongly serrated, thickened and long ( $31$ ,  $31$ ,  $31$ ,  $93$ ,  $85$ ,  $79$ ,  $73$ , and  $50\ \mu$  respectively). Setae  $L_2$  and  $L_4$  short, and setae  $M_1$ ,  $D_2$ ,  $D_3$ ,  $D_4$ , and  $D_6$  minute. Seta  $S_2$  absent. Sternal shield with three pairs of setae. Ventrianal shield much longer than wide and narrower than genital shield, with anterior margin nearly straight and lateral margins concave; widest at the level of anus (Fig. 8). Three pairs of preanal setae located on the ventrianal shield, one seta of each pair widely separated from its partner. Three pairs of setae surrounding the ventrianal shield, the caudalmost pair ( $VL_1$ ) long ( $54\ \mu$ ), thick and serrate. A pair of slender metapodal plates present. Sclerotized neck of sper-



Figs. 10-11. *Phytoseius (Dubininellus) nipponicus* n. sp.  
10, spermatheca. 11, basitarsus, tibia and genu of leg IV  
of female.

matheca broad and subparallel but longer than wide (Fig. 10).

**Male.** Body  $250\ \mu$  long and  $160\ \mu$  wide. Dorsal chaetotactic pattern as in female. Movable digit of chelicera with hammer-shaped spermatophoral process (Fig. 9). Tarsus IV with two macrosetae as in female, the tarsal seta  $22\ \mu$  long and the tibial seta  $35\ \mu$  long. Ventrianal shield broadly triangular, with three pairs of preanal setae.

**Holotype.** ♀, Den-en-chôfu, Tokyo, 4-VIII-1960 (on chrysanthemum), M. KUROSAWA leg.

**Allotype.** ♂, same data as holotype.

**Paratypes.** 6 ♀♀, same data as holotype.

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

**Distribution.** Japan (Honshu).

**Remarks.** This new species resembles *Phytoseius (Dubininellus) corniger* WAINSTEIN, 1959, and *P. (D.) bakeri* CHANT, 1959, in absence of macroseta on genu IV. It is, however, distinct from *corniger* in the chaetotactic pattern of dorsal shield, and in the shape of the macrosetae on leg IV. Further, it differs from *bakeri* in having three pairs of preanal setae on the ventrianal shield, and

also in having one macroseta on tarsus IV. The type materials of this new species were collected together with many specimens of *Bryobia charai* PRITCHARD and KEIFER. No species of the genus *Phytoseius* have hitherto been recorded from Japan.

#### 6. *Agistemus fleschneri* SUMMERS (Figs. 12-14)

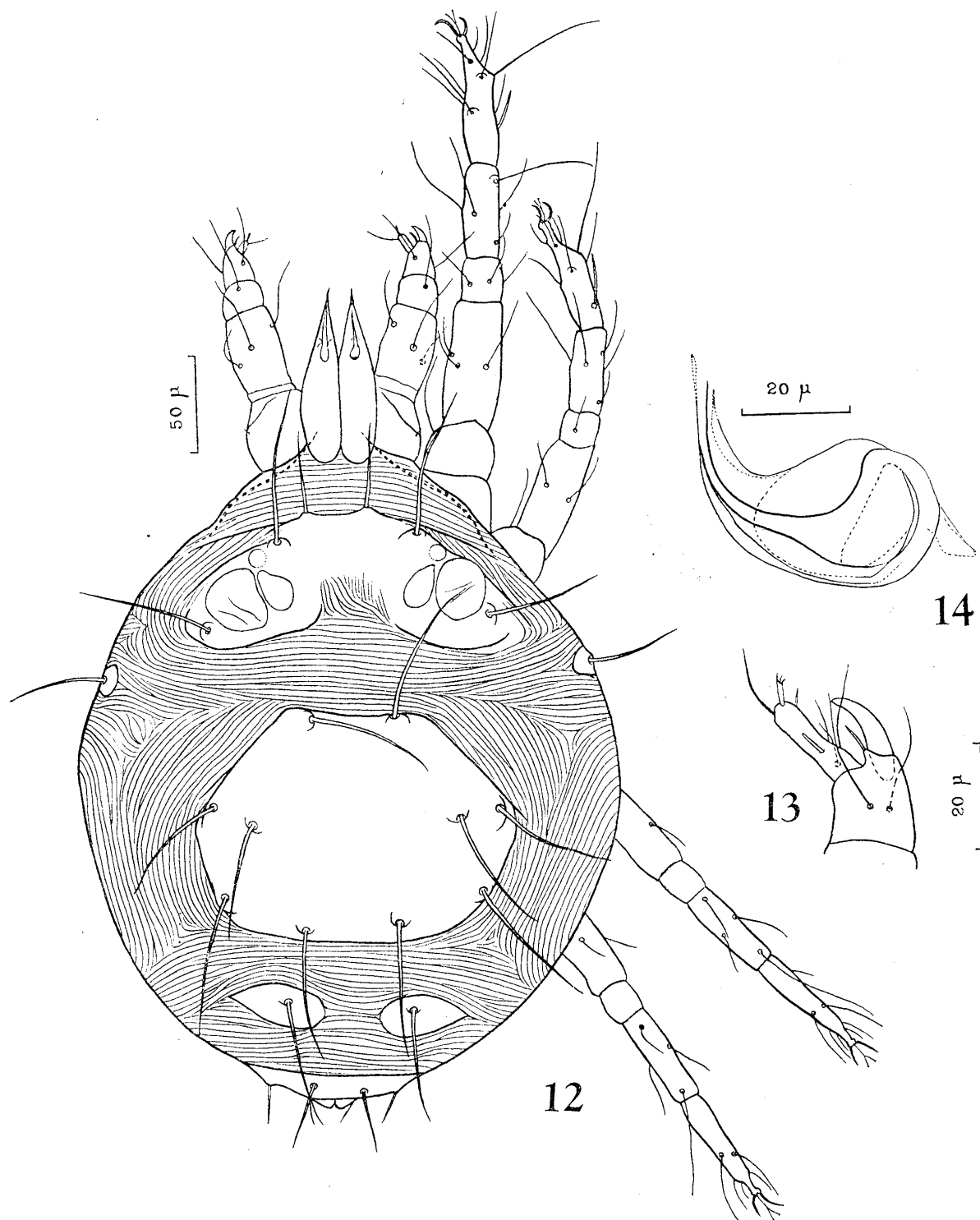
*Agistemus fleschneri* SUMMERS, 1960, p. 237, Fig. 1, left, Figs. 4-7.

**Female.** Body from above oval,  $360\ \mu$  long and  $280\ \mu$  wide, dark red in colour.

Distal segment of palpus with 7 setae including trifid sensillum (Fig. 13). Posterior pair of flagellate setae on ventral surfaces of maxillicoxae, longer than anterior pair of the same; distance between bases of posterior pair shorter than distance between anterior pair. Tarsi I-III each with a prominent solenidion. Dorsum of body finely striated except for 7 plates<sup>1</sup> which carry all dorsal setae. Plates and their chaetotaxy as illustrated (Fig. 12). Dorsal setae 24 in number (12 pairs), stout, long, finely pectinate, arising from tubercles. One pair of eyes located on median propodosomal plate which generally bears sculptures (two conspicuous sculptures in specimens from the tea at Kanaya) between eye and third propodosomal seta on each side; second propodosomal setae longer than distance to bases of third propodosomal setae. Most setae on median metapodosomal plate, longer than distances to bases of neighbouring setae. Genital plate with 2 pairs of setae.

**Male.** Body from above sagittate in outline,  $240\ \mu$  long and  $140\ \mu$  wide. Tarsi I and II each with 2 prominent solenidia; tarsi III and IV each with a solenidion. Median propodosomal and median metapodosomal plates integral;

<sup>1</sup> The descriptive terms adopted are mainly those of SUMMERS (1960). The "plates" of *Agistemus* are not always distinct in outline but are only non-striated regions rather than "plates." In this paper, however, the term "plate(s)" is temporarily retained.



Figs. 12-14. *Agistemus fleschneri* (Kanaya, tea). 12, dorsum of female. 13, two distal segments of palpus. 14, aedeagus (left, caudal).

setae *c* (SUMMERS' label) the shortest among setae on the united plate. Aedeagus sharply bent dorsad in caudal part (Fig. 14).

*Specimens examined.* 4 ♀♀, Hirosaki, Aomori Pref., Honshu, 25-VIII-1954 (on sasa bamboo), S. EHARA leg.; 1 ♂, Yamanashi, Yamanashi Pref., Honshu, 12-IX-1961 (on grape), I. OSADA leg.; 11 ♀♀ & 4 ♂♂, Kanaya, Shizuoka Pref., Honshu, 28-V-1958 (on tea), M. OSAKABE leg.; 3 ♀♀ & 5 ♂♂, Kurume, Fukuoka Pref., Kyushu, 10-X-1957 (on *Citrus Aurantium* subsp. *Junos*), K. INOUE leg.

*Distribution.* Japan (Honshu and Kyushu), *first record*; North and Central America; South Africa.

*Remarks.* The propodosomal plate varies in sculptures among specimens of different populations. The specimens from Hirosaki<sup>1</sup> (sasa bamboo) have longer dorsal setae arising from strong tubercles; the second propodosomal setae are longer than the distance to bases of third propodosomal setae. The specimens collected on tea were found feeding on eggs of *Tetranychus kanzawai* KISHIDA. OSAKABE (1961)<sup>2</sup> observed this mite to feed actively on *Tetranychus kanzawai*, one of the most serious pest of tea in Japan.

#### 7. *Agistemus terminalis* (QUAYLE)

(Fig. 15)

*Caligonus terminalis* Banks: QUAYLE, 1912, p. 499, Fig. 10.

*Agistemus terminalis*, SUMMERS, 1960, p. 234, Fig. 1, right, Figs. 2-3.

The females measure 350  $\mu$  long and 240  $\mu$  wide. Males not known. This species is very similar to *A. fleschneri*, the preceding species, but differs in the following points (so far as the present materials are concerned): Dorsal

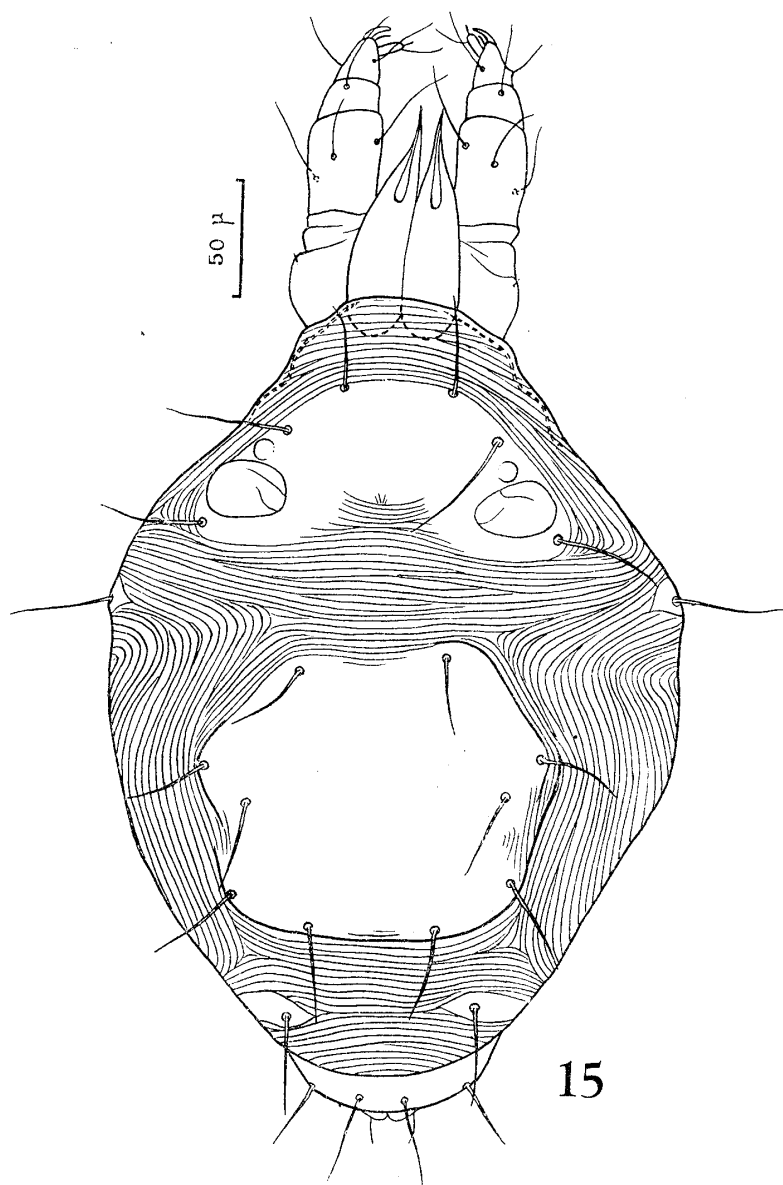


Fig. 15. *Agistemus terminalis*, dorsum of female.

setae of *terminalis* do not arise from tubercles (Fig. 15), while those of *fleschneri* are set on tubercles. Next, in *terminalis* the dorsal setae are slender and shorter than, or as long as distances to bases of neighbouring setae (Fig. 15), whilst, in *fleschneri* most dorsal setae are stout and longer than distances to the same.

The median propodosomal plate of *terminalis* generally bears one irregular sculpture on each side, but the plate of *fleschneri* varies in sculptures among specimens of different populations. In *terminalis* the median portion

<sup>1</sup> These specimens are tentatively referred to *A. fleschneri*.

<sup>2</sup> OSAKABE referred the mite to a stigmaeid mite, through the present author's tentative identification for the species.

of area immediately behind the median propodosomal plate tends to have predominant transverse striae; in *fleschneri*, however, that portion has longitudinal striae in some specimens (Fig. 12) but has transverse striae in other specimens. After SUMMERS' description, in his materials of *terminalis* the posterior pair of setae on the ventral surfaces of the maxillicoxae are equal in length to the anterior pair of the setae. However, in the Japanese specimens of both *terminalis* and *fleschneri* the posterior pair of the setae are longer than the anterior pair. It is also common to *terminalis* and *fleschneri* that the distance between bases of the posterior pair is shorter than the distance between bases of the anterior pair. Further, the two species are not different in genital setae. According to a personal letter from Mr. N. SHINKAJI who collected the present materials, *terminalis* is a predator of the arrow-head scale, *Unaspis yanonensis* Kuwana in Shizuoka Prefecture.

*Specimens examined.* 1 ♀, Okitsu, Shizuoka Pref., Honshu, 13-X-1954 (on citrus in green house), S. EHARA & N. SHINKAJI leg.; 14♀♀, Okabe, Shizuoka Pref., 16-VII-1958 (on citrus), N. SHINKAJI leg.

*Distribution.* Japan (Honshu); North and Central America. This species was recorded from Japan by SUMMERS (1960), based on specimens found in U. S. A. on plants (cypress

foliage, juniper, citrus) imported from Japan into that country.

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#### 摘 要

数種の捕食性ダニ類 (カブリダニ科・ナガヒシダニ科) について

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植物上から見いだされる捕食性ダニ類2科の7種の知見を報告した。両科ともハダニや小形昆虫を捕食する天敵ダニとして知られている。

Phytoseiidae カブリダニ科 (和名新称)

1) *Typhlodromus vulgaris* EHARA

フツウカブリダニ (和名新称)

四国から新たに記録した。

2) *Amblyseius rademacheri* DOSSE

ラデマッヘルカブリダニ (和名新称)

本州から新たに記録した。

3) *Amblyseius orientalis* EHARA

トウヨウカブリダニ (和名新称)

CHANT (1959)は本種が米国産の *Amblyseius gracilis* (GARMAN) のシノニムであると言っているの、著者は彼の説が事実かどうかを確かめるために *gracilis* の副模式標本を精査した。その結果 *gracilis* とは全く別種であることを再確認した。本種の産地に新たに本州を追加した。

4) *Amblyseius largoensis* (MUMA)

ラーゴカブリダニ (和名新称)

四国から新たに記録した。採集者(森介計氏)により本種がミカンハダニを捕食することが認められた。

5) *Phytoseius nipponicus* EHARA, n. sp. (新種)

ケブトカブリダニ (和名新称)

東京でキクの葉上において採集された標本を模式標本として新種を記載した。背毛の状態、肛門前方の毛の配列、第4脚の大形毛の分布と形態などによって同属の近似種から区別される。この属は日本から初めて発見された。

Stigmaeidae ナガヒシダニ科

6) *Agistemus fleschneri* SUMMERS

コブモチナガヒシダニ (和名新称)

長い背毛がこぶから生えていることで7)と区別できる。ポピュレーション間ではなはだしく形態上の変異がある。本州と九州に産する。日本新記録種である。ハダニを捕食する。

7) *Agistemus terminalis* (QUAYLE)

ケボソナガヒシダニ (和名新称)

こぶから生えていない細くて短い背毛を有する。本州に産する。採集者(真梶徳純氏)により本種がヤノネカイガラムシを捕食することが観察された。

ニクバエの味覚感覚毛に分布する  
水受容器の電気生理学的研究

EVANS, D. R. and MELLON, D. JR. (1962) Electrophysiological studies of a water receptor associated with the taste sensilla of the blowfly. J. Gen. Physiol. 45: 487~500.

ニクバエ *Phormia regina* MEIG. の唇弁にある化学感覚毛のうち一番長い毛には糖、塩類、水および動きのそれぞれの刺激に反応する4つの感覚細胞が存在する。そこで2つのガラス毛細管でこの毛をはさみ、マイクロマニプレーターを使ってこの毛の側面を押して穴をあける。この毛細管の中1本には1M コリンクロライドをつめてあり誘導電極として使用する。刺激溶液は第3の他の毛細管に入れてこの毛の先端部にあてる。不関電極として塩類をつめた毛細管を遊離した唇弁の中に入れる。このようにして水受容器細胞の電気的反応をオッシロスコープによって観察した。

蒸溜水による短期間の刺激による水受容器の反応は2相に区別される。つまり最初の急激な放電とそれに続く500 msec 以上も続くより低頻度の安定した放電とである。水に溶質を加えるとその受容器の反応が減少するこ

とから、水がこの受容器にとって最も効果的な刺激物であることがわかった。蔗糖溶液はその浸透圧の対数に比例してこの反応を抑制したが、他の非電解質(グリセロール、マンノース)では抑制効果はあるが濃度と抑制との間に直線的な相関関係は見られなかった。電解質では抑制の度合が変化するの狭い濃度の範囲に限られ、NaCl は0.1Mから0.5Mの間で変化し、CaCl<sub>2</sub> は0.01Mで反応を完全に抑制した。一方他のいかなる細胞の反応も起させ得ないような溶質を混ぜても抑制の現象が見られることから、これは水受容器細胞に対するその溶質の影響であって、4つの細胞間の干渉の関係によるものではないことがわかった。しかしこれから各細胞間の電気的相互関連の可能性を否定することはできない。又この水受容器ではいかなる場合においても最初の放電が後の安定した放電よりも溶質によって抑制されやすいことがわかった。

これらの実験からこの味覚感覚毛に分布する4つの感覚細胞は今まで知られている限りにおいてそれぞれ水、ある種の糖類、ある種の一価の塩類そして動きという4つの刺激に対して今まで考えられたよりも狭い範囲で特異的に感受性を持っていることが示された。

(蚕試 石川誠男)