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SOME PREDATORY MITES OF THE GENERA *TYPHLODROMUS* AND *AMBLYSEIUS* FROM JAPAN (*PHYTOSIEIIDAE*)

(With 18 Text-figures)

BY

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The genera *Typhlodromus* and *Amblyseius* were formerly distinguished by relative setal length, but there are some species which are transitional in this character. Recently, Chant (1957 a, 1957 b) combined the genera *Typhlodromus* and *Amblyseius* as subgenera of *Typhlodromus sensu lato*. On the basis of a comprehensive study of setal development (Chant, 1958), he defined that the subgenus *Typhlodromus* has more than four pairs of anterior lateral setae on the dorsum, while the subgenus *Amblyseius* bears four pairs of anterior lateral setae. Athias-Henriot (1958) elevated the subgenera *Typhlodromus* and *Amblyseius* in Chant’s sense to two independent genera. For the time being, the present author prefers to recognize the genera *Typhlodromus* and *Amblyseius*, in agreement with Athias-Henriot’s treatment.

In a previous paper the author (1958) recorded three species of the genus *Typhlodromus* from Japan. According to the above definition of the genera, the scientific name of these three species should be changed as follows:

*Amblyseius finlandicus* (Oudemans)
*Amblyseius longispinosus* (Evans)
*Amblyseius japonicus* (Ehara)

This is the second paper treating mites belonging to the *Phytoseiidae* from Japan. The following is a list of the species here reported:

*Typhlodromus vulgaris* n. sp.
*Amblyseius longispinosus* (Evans)
*Amblyseius rademacheri* Dosse
Amblyseius tsugawai n. sp.
Amblyseius orientalis n. sp.
Amblyseius largoensis (Muma)

Most of the specimens here studied were collected by the author himself; some of them were forwarded to him by Prof. R. Hayashi (Toyama University), Mr. N. Hikichi (Fukushima Prefectural Horticultural Experiment Station), Mr. H. Horihuchi (National Tôhoku Agricultural Experiment Station), Mr. M. Kohono (Kagoshima Prefectural Fruit Tree Experiment Station), Prof. M. Shibuya (Kagoshima University), and Mr. C. Tsugawa (Aomori Prefectural Apple Experiment Station). The author is very grateful to the above-mentioned gentlemen.

For suggestions or information his thanks are also due to Dr. E. W. Baker (U. S. National Museum, Washington, D. C.), Dr. D. A. Chant (Entomology Laboratory, Belleville, Ontario), Dr. G. Dosse (Institut für Pflanzenschutz der Landwirtschaftlichen Hochschule, Hohenheim bei Stuttgart), and Dr. P. Garman (Connecticut Agricultural Experiment Station, New Haven, Connecticut). Furthermore, he wishes to thank Dr. M. H. Muma (Florida Citrus Experiment Station, Lake Alfred, Florida) for lending specimens of a few Florida species. Finally, grateful acknowledgement must also be extended to Prof. Tohru Uchida who kindly made most expert suggestions.

Typhlodromus vulgaris n. sp. (Fig. 1-5)

Female. Body from above oval, 360 µ long and 240 µ wide in widest part, generally grayish white in colour and sometimes pinkish. Fixed digit of chelicerae with three teeth distally; movable digit with a distal and two subdistal adjacent teeth. Leg IV with a spatulate macroseta on the genu, tibia and tarsus, that on tarsus the longest; these setae arising approximately perpendicularly to the axis of each segment. Peritreme long, not extending between the setae D₁; the posterior portion curving around coxa IV, and ending in acute angle. Dorsal shield reticulate, with five pairs of pores (Fig. 1), and carrying eighteen pairs of setae: ten in the lateral, two in the median, and six in the dorsal rows. Among these setae, L₁₅ the longest (66 µ) and D₆ the shortest; M₄ more or less paired with L₉, slightly shorter than V₁₄ which is shorter than L₁₀. Sternal shield with three pairs of setae. Ventrianal shield longer than wide and wider than genital shield, with anterior margin convex and lateral margins concave. The shield reticulate, with four pairs of preanal setae, with a pair of pores behind the third preanals, and with a pair of paraanal setae. Four pairs of setae surrounding ventrianal shield, one (V₁₄) long.

Male. Body elliptical in contour, 260 µ long and 160 µ wide in widest part. Similar to female in dorsal chaetotactic pattern, but M₄ about as long as VL₁₄. Movable digit of chelicerae bearing Y-shaped spermatophoral process. Tarsus IV
with three macrosetae as in female. Ventrianal shield broadly triangular, reticulate, with four pairs of preanal setae.

Holotype. ♀, Sapporo, Hokkaido, 14-VIII-1958 (on apple), S. EHARA leg.
Allotype. ♂, same data as holotype.


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

*Distribution.* Japan (Hokkaido, Honshu).

*Remarks.* Among all the members belonging to the genus and having ten pairs of lateral setae, *Typhlodromus vulgaris* n. sp. is unique in the spatulate macrosetae on leg IV of both sexes and the remarkable shape of the ventrianal shield of female. The new species shows some resemblances to *Typhlodromus georgicus* Wainstein, 1958, from Georgian S.S.R., especially in the arrangement of dorsal pores, but
differs from the latter in the dorsal chaetotaxy, the macrosetae on leg IV, and structure of spermatophoral process. *Kampimodromus heveae* (Oudemans, 1930) from Sumatra and *Typhlodromus jackmickleyi* De Leon, 1958, from Florida, are similar to the new species in the macrosetae on leg IV, which are slightly expanded at tip, but they have longer setae on dorsum and three-paired preanal setae on ventrianal shield. The present mite is apparently common on apple leaves in northern Japan.

*Amblyseius longispinosus* (Evans)


This species was recently recorded by the author (1958) from Honshu, Japan. Further specimens have been available for the present study. This mite is new to the islands of Hokkaido and Kyushu, but is probably common in this country.

*Amblyseius rademacheri* Dosse (Fig. 6-11)


*Amblyseius rademacheri* Dosse, 1958, *Pflanzenschutz-Ber.*, 21 (3/4) : 44, Abb. i-Abb. 5. (original description.)

*Female.* Body from above elongate oval, 360 μ long and 190 μ wide in widest part, grayish white in colour. Fixed digit of chelicerae with at least eight teeth. Leg IV with macroseta on the genu, tibia and tarsus, that on tarsus the longest. Peritreme long, extending well between the setae D1; the posterior part curving around coxa IV, having terminal truncate portion, and ending in acute projection. Dorsal shield with rather longitudinal reticulations laterally, with irregularly polygonal reticulations medially, and bearing seventeen pairs of setae, of which nine are lateral. Setae L4, M3, and L9 very long (70, 76, and 150 μ respectively), M2 and L9 pectinate; D1 and L1 long, L4 a little longer; other setae on dorsum short or minute; M2 more or less paired with L7, the distance between M2 and L7 generally shorter than that between M3 and L9. Sternal shield with three pairs of setae. Ventrianal shield longer than wide and wider than genital shield, with lateral margins

1. Chant (1955) considers that the genus *Kampimodromus* is synonymous with the genus *Typhlodromus s. lat.*
2. The male remains unknown both in *K. heveae* and *T. jackmickleyi.*
slightly or moderately concave. The shield reticulate, with three pairs of preanal setae, with a pair of pores more or less in line laterally with the third preanal setae, and with a pair of paraanal setae. Four pairs of setae surrounding ventrianal shield, one (VL₁) long (50 μ), shorter than L₄ but longer than L₃. Spermatheca as in Fig. 9.

Male. Body elliptical in contour, 290 μ long and 180 μ wide in widest part. Similar to female. L₄ 69 μ long. Movable digit of chelicerae with spermatophoral process as shown in Fig. 10. Ventrianal shield broadly triangular, reticulate, with three pairs of preanal setae.


Distribution. First recorded from Japan (Hokkaido); Germany.

Remarks. The manuscript of the present description and figures was sent to Dr. G. DOSSE for the comparison with types of A. rademacheri, and this mite has been identified with A. rademacheri by him.

Judging from Oudemans’ drawings (NESBITT, 1951) of the male of Kampimodromus hevearum (OUDEMANS, 1930), the female of which is unknown, A. rademacheri is probably allied to K. hevearum. In the male of A. rademacheri seta L₄ is shorter.
and narrower than seta $M_2$, while, in the same sex of *K. hevearum* seta $L_4$ is similar to seta $M_2$ both in length and thickness.

At a glance the present species is characterized by very long, three-paired setae on dorsum.

**Amblyseius tsugawai** n. sp. (Fig. 12-13)

*Female.* Body from above oval, 410 μ long and 260 μ wide in widest part. Fixed digit of chelicerae with about seven teeth in addition to one subterminal process. Leg IV with a comparatively short macroseta on genu, tibia and tarsus; the genual seta 53 μ, the tibial one 50 μ, the tarsal one 81 μ. Peritreme long, reaching in front of the base of seta $D_4$ anteriorly; the posterior part curving around coxa IV and having terminal truncate portion. Dorsal shield reticulate, bearing seventeen pairs of setae, lateral setae nine-paired. Setae $L_4$, $M_2$, and $L_9$ very long (55, 55, and 130 μ respectively), $D_1$ and $L_1$ long, remaining setae on dorsum short or minute; $M_2$ closer to $L_7$ than to $L_8$, more or less paired with $L_7$. Sternal shield with three pairs of setae. Ventrianal shield longer than wide and wider than genital shield, slightly constricted laterally. The shield reticulate, with three pairs of preanal setae, with a pair of pores behind the level of the third preanal pair, and with a pair of paraanal setae. Four pairs of setae surrounding ventrianal shield, one ($VL_4$) long (52 μ), shorter than $L_4$ and $M_2$ but longer than $L_1$.

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**Fig. 12-13.** Amblyseius tsugawai n. sp. — 12. Dorsum of female. — 13. Ventrianal shield and surrounding setae of female.
**Male.** Unknown.

Holotype, ♀, Kuroishi, Aomori Pref., Honshu, 12-IX-1955 (on apple), C. Tsugawa leg.

The type is deposited in the Aomori Prefectural Apple Experiment Station.

**Distribution.** Japan (Honshu).

**Remarks.** *Amblyseius tsugawai* n. sp. resembles *Amblyseius andersoni* 1 (l. c. 1957) from Canada, but differs from the latter in length of a few setae on dorsum, and in shape of the ventrianal shield. Furthermore, the new species is different from *A. andersoni* in the macrosetae on leg IV. The tarsal macroseta of the species is much longer than genual seta which is slightly longer than tibial seta. According to a personal letter from Dr. Chant these setae of *A. andersoni* are all long but the tarsal one is slightly longer than the others. *A. tsugawai* n. sp. is somewhat like *A. potentillae* 2 (Garman, 1958), but is different in the anterior termination of peritremes and the macrosetae on leg IV. Dr. Baker kindly examined types of *A. potentillae* for the present author and pointed out:

1. The paratreme (trachea) of *potentillae* ends just before it reaches the position of the first pair of anterior setae.
2. The longest seta is probably that on the genu; this is only slightly longer than the tarsal seta; the tibial seta is not as long as or as strong as the other two.”

The new species is named in honour of Mr. Chikara Tsugawa who collected this interesting mite.

***Amblyseius orientalis*** n. sp. (Fig. 14-16)


**Female.** Body from above oval, 380 μ long; 260 μ wide in gravid mite and 210 μ wide in non-gravid mite; grayish white in colour. Fixed digit of chelicerae with at least ten teeth in addition to a few distal processes; movable digit with three or four teeth. Leg IV with a very long, whip-like macroseta on the genu, tibia and tarsus, that on genu the longest. Peritreme long, extending beyond the base of seta D1 and almost meeting in the midline; the posterior part curving around coxa IV, having terminal truncate portion, and ending in acute projection. Dorsal shield with seventeen pairs of setae, of which nine are lateral. Setae L4, M4, and L9 very long, whip-like (100, 110, and 240 μ respectively); setae D1 and L1 longer than remaining ones on dorsum, which are short or minute. Seta L4 longer than D1; L9 generally longer than L4; L7 generally shorter than L9 but sometimes as long as it. M4 closer to L7 than to L9, more or less paired with L7. Sternal shield with three pairs of setae, the posterior margin straight. Ventrianal shield considerably variable in shape by individuals. The shield longer than wide and wider than genital shield; the lateral margins weakly notched. A pair of pores occur slightly

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1. The male of *A. andersoni* is unknown.
2. The male of *A. potentillae* is unknown.
behind and between the third preanal setae; a pair of paraanal setae borne laterad of the anterior portion of anus. Four pairs of setae surrounding ventrianal shield, one (VL) long (81 μ), a little shorter than L and longer than L.


**Male.** Body from above elliptical, 280 μ long and 160 μ wide in widest part. Similar to female. Seta M2 stouter than L4; L3 longer than L2. Spermatophoral process shallowly bifurcate at distal end. Viewed from a certain direction the process is Y-shaped. Ventrianal shield triangular, reticulate, carrying three pairs of preanal setae.

Holotype. ♂, Sapporo, Hokkaido, 10-IX-1958 (on *Quercus crispula* Blume), S. EHARA leg.

Allotype. ♀, same data as holotype.


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

**Distribution.** Japan (Hokkaido).

**Remarks.** The new species can be distinguished from all known members of the genus by length of the setae L and L3 of both sexes, and also by shape of
the ventrianal shield of female. The types were collected together with some specimens of *Amblyseius finlandicus* (Oudemans) (Ehara, 1958).

*Amblyseius largoensis* (Muma) (Fig. 17-18)


**Female.** Body from above oval, 390 µ long and 280 µ wide in widest part, pinkish in colour. Fixed digit of chelicerae with many (at least eight) teeth. Tarsus IV with a very long, whip-like macroseta on the genu, tibia and tarsus, genual seta the longest. Peritreme long, extending forward to seta $D_4$; the posterior part curving around coxa IV, having terminal truncate portion, and ending in acute projection. Dorsal shield carrying seventeen pairs of setae, of which nine are lateral. Setae $L_4$, $M_2$, and $L_9$ very long, whip-like (100, 110, and 250 µ respectively); setae $D_1$ and $L_1$ longer than other ones on dorsum, which are of minute size. Seta $L_1$ longer than $D_1$; $L_2$, $L_3$, $L_5$, and $L_6$ are approximately equal.

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**Figure 17-18.** — *Amblyseius largoensis*. — 17. Dorsum of female. — 18. Ventrianal shield and surrounding setae of female.
in length. M₂ closer to L₇ than to L₈, more or less paired with L₇. Sternal shield with three pairs of setae. Ventrianal shield much longer than wide and narrower than genital shield; strongly constricted near the middle, widest at the level of anus, with anterior margin convex. The shield provided with three pairs of preanal setae, with a pair of pores close to the third preanal setae, and with a pair of paraanal setae. Four pairs of setae surrounding ventrianal shield, one (VL₂) long (63 μ), longer than L₁.

**Male.** Not available.

**Specimens examined.** Toyama, Toyama Pref., Honshu, 3♀♀, 2-IX-1958 (on chrysanthemum), R. Hayashi leg.

**Distribution.** First recorded from Japan (Honshu); U.S.A.

**Remarks.** The present specimens were compared with specimens from Florida, the latter being kindly sent by Dr. M. H. Mumma to the author. A. largoensis seems to be similar to one form ¹ of A. caudatus Berlese, 1914, only the female of which is known, in structure of the ventrianal shield (Chant, 1957 a), but they are different from each other in the following aspects. In A. largoensis the distance between the third preanal and paraanal setae is slightly longer than that between the first and third preanal setae, while, in A. caudatus the former distance is approximately twice as long as the latter. Furthermore, the anterior margin of the ventrianal shield is convex in A. largoensis but straight in A. caudatus.

**REFERENCES**


¹. It was reported by Chant (1957 a) that there are two forms in A. caudatus Berlese.


