Phytoseiid Mites from Hokkaido
(Acarina: Mesostigmata)

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(With 71 Text·figures)

Seven mite species belonging to the family Phytoseiidae were recorded from Hokkaido prior to this study. In the present paper descriptions and records are given of the following twelve phytoseiid species, ten of which are new to science:

1. *Typhlodromus (Anthoseius) borealis* n. sp.² (p. 213)
2. *Amblyseius (Amblyseius) haimatus* n. sp. (p. 214)
3. *Amblyseius (Amblyseius) paraki* n. sp. (p. 216)
4. *Amblyseius (Amblyseius) ainu* n. sp. (p. 218)
5. *Amblyseius (Amblyseius) morii* n. sp. (p. 219)
6. *Amblyseius (Amblyseius) tsugawai* Ehara (p. 221)
7. *Amblyseius (Amblyseius) firmus* n. sp. (p. 222)
8. *Amblyseius (Amblyseius) ezonensis* n. sp. (p. 223)
9. *Amblyseius (Kampimodromus) maritimus* n. sp. (p. 224)
10. *Phytoseius (Phytoseius) nipponicus* Ehara (p. 227)
11. *Phytoseius (Phytoseius) kishii* n. sp. (p. 228)
12. *Phytoseius (Phytoseius) campestris* n. sp. (p. 229)

A key to the species of phytoseiids found in Hokkaido is added in final pages of this paper. The type specimens of the new species described here are retained in the Zoological Institute, Faculty of Science, Hokkaido University.

The major part of the materials on which this paper is based were collected by staff and students of the Department of Applied Zoology, Faculty of Agriculture, Hokkaido University.

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1) Contribution No. 785 from the Zoological Institute, Faculty of Science, Hokkaido University, Sapporo, Japan.
2) Since *Neoseiulus* Hughes, 1948, is a synonym of *Amblyseius* Berlese, 1915, the names of the four Japanese species so far referred to the subgenus *Neoseiulus* are changed (cf. Ehara, 1967, p. 69):

*Typhlodromus (Anthoseius) bambusae* Ehara
*Typhlodromus (Anthoseius) insularis* Ehara
*Typhlodromus (Anthoseius) vulgaris* Ehara
*Typhlodromus (Anthoseius) yasumatsui* Ehara

University, in Sapporo and its vicinity, Hidaka, and Sarobetsu. Other part of the materials were taken by members of the Zoological Institute, Faculty of Science, Hokkaido University, in Prov. Abashiri and at Mt. Muine. The writer is indebted to Dr. H. Mori and Mr. N. Kishi of the Department of Applied Zoology, and to Messrs. H. Fukuda, T. Matsumura, H. Tamura, and K. Yamauchi of the Zoological Institute, for their kindness in placing these materials at the writer's disposal. The writer is also very grateful to Dr. A.M. Hughes, Royal Free Hospital School of Medicine, London, for the loan of specimens of Amblyseius (A.) barkeri, to Dr. W. Karg, Biologische Zentralanstalt Berlin, Kleinmachnow, for the loan of specimens of A. (A.) reticulatus, and to Dr. M. H. Muma, University of Florida, Lake Alfred, for the loan of a specimen of A. (A.) bakeri. Finally, his thanks are due to Prof. M. Yamada and Dr. Sh. F. Sakagami, Zoological Institute, Hokkaido University, who kindly made profitable suggestions.

1. *Typhlodromus (Anthoseius) borealis* n. sp.  
(Jap. name: Kitami-kaburidani)  
(Figs. 1–7)

_Female._ Dorsal shield strongly sculptured; six pairs of dorsocentral setae; a small but distinct pore between setae D₂ and L₁. Setae on dorsal shield: L₁₀ stout, serrate, weakly capitate; remaining setae much smaller, practically nude. Setae S₁ and S₂ on interscutal membrane. Peritreme extending forward to seta D₁. Sternal shield with two pairs of setae; third pair of sternal setae set on weakly sclerotized platelets; metasternal platelets as illustrated. Ventrianal shield approximately pentagonal, longer than wide, wider than genital shield, with four pairs of preanal setae; a pair of minute pores in a transverse line with the posteriormost preanal pair. Four pairs of setae on membrane surrounding ventrianal shield. Two pairs of slender metapodal platelets, the anterior pair very slender. Spermatheca as figured. Leg IV with three capitate macrosetae, those on genu and tibia similar in length to other setae on these segments. Measurements in microns: idiosoma length 430, idiosoma width 280; lengths of setae: L₁ 18, L₂ 16, L₃ 19, L₄ 18, L₅ 21, L₆ 23, L₇ 23, L₈ 26, L₉ 24, L₁₀ 38, M₁ 17, M₂ 26, D₁ 19, D₂ 15, D₃ 16, D₄ 18, D₅ 20, D₆ 11, S₁ 19, S₂ 18, VL₁ 31, macrosetae of leg IV: genu 19, tibia 21, basitarsus 30.

_Male._ Not known.

_Type._ Holotype: ♀, Hamakoshimizu, Prov. Abashiri, 21-VI-1966 (T. Matsumura leg.), on gall of *Rosa rugosa* Thunb., produced by a cynipid wasp *Liebelia (Nipporhodites) fukudae* Shinji.¹

_Remarks._ *Typhlodromus (Anthoseius) borealis* n. sp. closely resembles *T. (A.) barkeri* (Garman, 1948), but differs from it in the spermatheca and chaetotaxy of leg IV. Genu IV, tibia IV, and basitarsus IV each has one capitate macroseta and pointed setae in *borealis*, while each of them has capitate, subcapitate and pointed setae in addition to one capitate macroseta in *bakeri*. (The writer has examined a female specimen of *bakeri* borrowed from Dr. M. H. Muma.) This new species is

¹) Identified by Dr. Sh. F. Sakagami.
also similar to *T. (A.) recki* Wainstein, 1958, and *T. (A.) nodosus* De Leon, 1962, but is distinguished from them by the shape of the spermatheca.

2. *Amblyseius (Amblyseius) haimatus* n. sp.
   
   (Jap. name: Miyama-kaburidani)
   
   (Figs. 8–12)

   **Female.** Body heavily sclerotized. Dorsal shield reticulate, with at least eight pairs of pores; six pairs of dorsocentral setae. Setae on dorsal shield: \( L_9 \) and \( M_2 \) stout, very weakly serrate; \( M_2 \) longer than distance between its base and that of \( L_7 \), reaching a pore near \( L_6 \); remaining setae small to minute, \( L_7 \) shorter than distance its base to that of \( M_2 \). Seta \( S_1 \) on interscutal membrane or on dorsal shield, seta \( S_2 \) on interscutal membrane. Peritreme extending forward to seta \( D_1 \). Sternal shield with three pairs of setae; metasternal platelets as figured. Ventrianal shield longer than wide, wider than genital shield, with three pairs of preanal setae; a pair
of pores between and behind the posterior pair of preanals. Four pairs of setae on membrane surrounding ventrianal shield. Two pairs of slender metapodal platelets, the posterior pair very long. Spermatheca as illustrated. Leg IV with three pointed macrosetae. Measurements in microns: idiosoma length 460, idiosoma width 350; lengths of setae: $L_1$ 27, $L_2$ 20, $L_3$ 27, $L_4$ 35, $L_5$ 29, $L_6$ 30, $L_7$ 25, $L_8$ 23, $L_9$ 52, $M_1$ 14, $M_2$ 42, $D_1$ 22, $D_2$ 19, $D_3$ 16, $D_4$ 21, $D_5$ 24, $D_6$ 10, $S_1$ 21, $S_2$ 21, $VL_1$ 35, macrosetae of leg IV: genu 35, tibia 39, basitarsus 53.

**Male.** Not known.


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**Remarks.** This new species closely resembles *Amblyseius* (*A*) *reticulatus* (Oudemans, 1930b) and *A. (A.) barkeri* (Hughes, 1948) in dorsal chaetotaxy, but it differs from them in the number of the macrosetae of leg IV and in the shape of the spermatheca. The writer has examined a female and a male German specimens of *reticulatus* borrowed from Dr. W. Karg, and a female and a male English specimens of *barkeri* borrowed from Dr. A. M. Hughes. Illustrations of leg IV and spermatheca of *reticulatus* are shown in Figs. 13–15 (See also Fig. 33 in Karg, 1962). *A. barkeri*
appears to have no macrosetae on genu IV and tibia IV, and its spermatheca is very slender.


3. *Amblyseius* (*Amblyseius*) *paraki* n. sp.1)

(Jap. name: Paraki-kaburidani)

(Figs. 16–20)

**Female.** Dorsal shield reticulate, with at least eight pairs of pores; six pairs of dorsocentral setae. Setae on dorsal shield: $L_4$ and $M_2$ stout, smooth; $L_9$ the stoutest, very sparsely barbed; other setae smaller, $L_7$ longer than distance between its base and that of $M_2$. Setae $S_1$ and $S_2$ on interscutal membrane. Peritreme extending forward to seta $D_1$. Sternal shield with three pairs of setae; metasternal platelets oval. Ventrianal shield longer than wide, wider than genital shield, with three pairs of preanal setae; a pair of very minute pores between and behind the third pair of preanals. Four pairs of setae on membrane surrounding ventrianal shield. Two pairs of slender metapodal platelets, the posterior pair broad. Spermatheca as figured. Fixed digit of chelicera with four teeth distally. Leg IV with three pointed macrosetae. Measurements in microns: idiosoma length 470, idiosoma width 310; lengths of setae: $L_1$ 33, $L_2$ 26, $L_3$ 31, $L_4$ 42, $L_5$ 28, $L_6$ 37, $L_7$ 36, $L_8$ 33, $L_9$ 68, $M_1$ 20, $M_2$ 45, $D_1$ 26, $D_2$ 18, $D_3$ 17, $D_4$ 22, $D_5$ 26, $D_6$ 12, $S_1$ 29.

1) "Paraki" is an Ainu noun meaning mite.

S. Ehara

218

4. Amblyseius (Amblyseius) ainu n. sp.

(Figs. 21-27)

Female. Dorsal shield reticulate, with at least seven pairs of pores; six pairs of dorsocentral setae. Setae on dorsal shield: Lg stout, serrate, much shorter than distance between bases of Lg; M2 stout, practically nude, approximately one half as long as Lg; L4 nude, about twice as long as Lg and L6; L1 more or less longer than D2; remaining setae much shorter, L6 only slightly longer than L5. Setae S1 and S2 on interscutal membrane. Peritreme extending beyond seta D1. Sternal shield with three pairs of setae; metasternal platelets slender. Ventrianal shield as long as wide, or slightly longer than wide, wider than genital shield. The elongate platelet near each anterolateral corner of the ventrianal shield is very often fused with the latter. Three pairs of preanal setae on ventrianal shield; a pair of transverse, conspicuous pores between and slightly before the posterior pair of preanals (the pores sometimes in a transverse line with the posterior preanals). Four pairs of setae on membrane surrounding ventrianal shield. Two pairs of metapodal platelets, the anterior pair very slender. Spermatheca as illustrated. Genu IV with a blunt-ended to subcapitate macroseta; tibia IV and basitarsus IV each with a pointed macroseta. Measurements in microns: idiosoma length 330, idiosoma width 230; lengths of setae: L1 22, L2 11, L3 12, L4 29, L5 10, L6 14, L7 12, L8 9, L9 65, M1 8, M2 35, D1 18, D2 8, D3 9, D4 10, D5 11, D6 6, S1 11, S2 9, VL 34, macrosetae of leg IV: genu 37, tibia 30, basitarsus 45.

Male. Setae S1 and S2 on dorsal shield. Ventrianal shield with three pairs of preanal setae, a pair of pores being slightly anterior to, or in a transverse line with inner pair of posterior preanal setae. Spermatophoral process of chelicera hammer-shaped. Measurements in microns: idiosoma length 250, idiosoma width 150; lengths of setae: L1 18, L2 7, L3 19, L4 48, M2 19, D1 17, macrosetae of leg IV: genu 22, tibia 23, basitarsus 38.

Types. Holotype: ♀, Mombetsu, Prov. Hidaka, 23-24-VII-1966 (N. Kishi leg.), on Cirsium kamtschaticum Ledeb. Allotype: ♂, on Cacalia hastata L. var. orientalis (Kitam.) Ohwi. Paratypes: 4 ♀ ♀, data same as for holotype; 3 ♀ ♀, data same as for allotype; 2 ♀ ♀ & 4 ♀ ♀, on sasa bamboo, 1 ♀, on Quercus dentata Thunb., 1 ♀, on Vitis coignetiae Pulliat, 1 ♀, on Onoclea sensibilis L., other data same as for holotype.
Remarks. *Amblyseius (A.) ainu* n. sp. is closely allied to *A. (A.) oguroi* Ehara, 1964, and *A. (A.) okinawanus* Ehara, 1967, but is distinguished from these species by having L₄ about twice as long as L₃ and L₆, and by having L₉ much shorter than distance between bases of L₉.


5. *Amblyseius (Amblyseius) morii* n. sp.
(Jap. name: Sarobetsu-kaburidani)
(Figs. 28–34)

Female. Dorsal shield faintly reticulate, with at least eight pairs of pores; six pairs of dorsocentral setae. Setae on dorsal shield practically smooth except for setae M₂ and L₉ which are provided sparsely with minute bars; L₉ noticeably longer than L₅; relative lengths: L₉>M₂>L₄>L₃>L₂>L₁; L₉>L₂. Setae S₁ and S₂ on interscutal membrane. Peritreme extending forward to seta D₁. Sternal shield with three pairs of setae; metasternal platelets slender. Ventrianal shield slightly longer than, or about as long as wide, wider than genital shield, with lateral margins slightly concave. Three pairs of preanal setae on ventrianal shield; a pair of conspicuous transverse pores just behind the posterior preanal setae. Four pairs
of setae surrounding ventrianal shield. Two pairs of slender metapodal platelets, the anterior pair much smaller. Spermatheca as illustrated. Chelicera with fixed digit multidentate. Leg IV with three tapering macrosetae, that on genu weakly blunt-ended. Measurements in microns: idiosoma length 350, idiosoma width 230; lengths of setae: L₁ 32, L₂ 14, L₃ 18, L₄ 39, L₅ 13, L₆ 27, L₇ 11, L₈ 10, L₉ 89, M₁ 9, M₂ 49, D₁ 22, D₂ 10, D₃ 9, D₄ 12, D₅ 12, D₆ 8, S₁ 15, S₂ 16, VL₁ 34, macrosetae of leg IV: genu 39, tibia 35, basitarsus 40.


Male. Setae S₁ and S₂ on dorsal shield. Ventrianal shield with three pairs of preanalar setae; a pair of pores just behind the innermost pair of preanal setae. Spermatophoral process of chelicera hammer-shaped. Measurements in microns: idiosoma length 270, idiosoma width 170; lengths of setae: L₁ 26, L₂ 10, L₃ 15, L₄ 32, L₅ 12, L₆ 20, L₇ 9, L₈ 8, L₉ 59, M₁ 9, M₂ 36, D₁ 19, D₂ 9, D₃ 9, D₄ 10, D₅ 10, D₆ 5, S₁ 14, S₂ 13, VL₁ 21, macrosetae of leg IV: genu 24, tibia 26, basitarsus 35.

Types. Holotype (♀) and allotype (♂): Toyotomi, Sarobetsu wasteland, 12–14-VII-1966 (H. Mori et al. leg.), on Salix hultenii Foderus var. angustifolia Kitamura. Paratypes: 7 ♀ & 2 ♀, on Kalopanax pictus (Thunb.), 1 ♀ & 1 ♂, on Rhus ambigua Lavallée, other data same as for holotype.
Remarks. Among a group of species bearing seta L₄ noticeably longer than L₅, this new species is distinctive in having the ventrianal pores conspicuous, just behind the posterior pair of preanals. This mite is named in honor of Dr. Hans Mori who have generously furnished many specimens of phytoseiids for this study.

6. *Amblyseius (Amblyseius) tsugawai* Ehara

(Ehara, 1959, p. 290, Figs. 12, 13; Ehara, 1964, p. 386, Figs. 24-27; Chant, 1959, p. 92; Ehara, 1966, p. 23.)

This mite was previously known only from Honshu, and it is new to Hokkaido. Measurements for female (in microns): idiosoma length 410, idiosoma width 280; lengths of setae: L₁ 35, L₄ 49, L₉ 116, M₄ 50, D₁ 26, V₁ 44, macrosetae of leg IV: genu 45, tibia 42, basitarsus 67. The measurements for the male were given in a previous paper (Ehara, 1964).

Specimens from Hokkaido. One ♀, Sapporo, 31-VII-1966 (N. Kishi leg.), on Magnolia kobus DC. var. borealis Sarg.; 2♀♀, on Filipendula kamtschatica (Pall.) Maxim., 2♀♀ & 2♂♂, on Salix hultenii Floderus var. angustifolia Kimura, 6♀♀ & 1♂, on Cirsium kamtschaticum Ledeb., Toyotomi, Sarobetsu wasteland, 12−14-VII-1966 (H. Mori et al. leg.).

7. *Amblyseius (Amblyseius) firmus* n. sp.

(Jap. name: Oni-kaburidani)

(Figs. 40−44)

*Female.* Body heavily sclerotized. Dorsal shield nearly smooth, with many minute pores which are partly shown in Fig. 40; six pairs of dorsocentral setae. Setae on dorsal shield smooth except for setae L₉ and M₉ which are weakly pectinate; L₄, I₉ and M₉ very long, whip-like; D₁ and L₁ smaller, subequal in length; remaining setae minute. Setae S₁ and S₂ on interscutal membrane. Peritremes extending between setae D₁. Sternal shield with three pairs of setae; metasternal platelets slender. Ventrianal shield triangular, longer than wide, slightly wider than genital shield; three pairs of preanal setae; a pair of minute pores between and slightly behind the posterior pair of preanals. Four pairs of setae surround-
ing ventrianal shield. Two pairs of metapodal platelets, the anterior pair very slender, the posterior pair much wider, approximately triangular. Spermatheca with cervix constricted medially. Chelicera with fixed digit multidentate. Leg IV with a whip-like macroseta on genu, tibia and basitarsus. Measurements in microns: idiosoma length 370, idiosoma width 300; lengths of setae: L₁ 31, L₂ 6, L₃ 6, L₄ 103, L₅ 9, L₆ 13, L₇ 11, L₈ 10, L₉ 236, M₁ 6, M₂ 157, D₁ 29, D₂ 6, D₃ 6, D₄ 7, D₅ 9, D₆ 6, S₁ 11, S₂ 9, VL₇ 58, macrosetae of leg IV: genu 101, tibia 75, basitarsus 63.

**Male.** Not known.


**Remarks.** *Amblyseius (A.) jirmus* n. sp. most closely resembles *A. (A.) saurus* De Leon, 1962, but differs from the latter in having the cervix of the spermatheca constricted medially, and in the position and size of the ventrianal pores. This new species is also similar to *A. (A.) krantzi* Chant, 1959, but is easily separable from it by the ventrianal shield, particularly by the position of the posterior preanal setae and of the pores.

8. *Amblyseius (Amblyseius) ezoensis* n. sp.

(Jap. name: Ezo-kaburidani)

(Figs. 45-49)

**Female.** Dorsal shield nearly smooth, with at least seven pairs of pores; six pairs of dorsocentral setae. Setae on dorsal shield: L₉ and M₂ stout, with minute barbs sparsely, L₉ less than twice as long as M₂; L₁ and L₄ stout, practically smooth, L₄ about as long as M₂; remaining setae short to minute. Setae S₁ and S₂ on interscutal membrane. Peritreme extending to seta D₁. Sternal shield with three pairs of setae; metasternal platelets as illustrated. Ventrianal shield slender, approximately vase-shaped, widest at level of anus, nearly as wide as genital shield; three pairs of preanal setae and a pair of pores on anterior one-third of preanal region, the pores crescent-shaped, just caudal from the posteriormost preanals. Four pairs of setae on membrane surrounding ventrianal shield. Two pairs of slender metapodal platelets. Spermatheca as figured. Chelicera with fixed digit multidentate. Leg IV with three tapering macrosetae. Measurements in microns: idiosoma length 360, idiosoma width 280; lengths of setae: L₁ 30, L₂ 10, L₃ 9, L₄ 40, L₅ 13, L₆ 10, L₇ 9, L₈ 9, L₉ 72, M₁ 10, M₂ 40, D₁ 20, D₂ 9, D₃ 9, D₄ 10, D₅ 14, D₆ 8, S₁ 12, S₂ 9, VL₇ 30, macrosetae of leg IV: genu 57, tibia 42, basitarsus 56.

**Male.** Not known.


**Remarks.** *Amblyseius (A.) ezoensis* n. sp. resembles *A. (A.) terminalis* Chant and Baker, 1965, and *A. (A.) estradai* Chant and Baker, 1965, both of which are known from Central America. But, this new species is distinguished from these
species by its characteristic ventrianal shield, and by having three macrosetae on leg IV.


9. *Amblyseius (Kampimodromus) maritimus* n. sp.
(Jap. name: Hamanasu-kaburidani)
(Figs. 50-57)

*Female.* Dorsal shield rugose, with five pairs of dorsocentral setae (seta D3 absent). Dorsal setae barbed except setae D2 to D5 and M1 which are nude; D2, D3, D4, and D6 very small, remaining setae more or less stout; L8 approximately in a transverse line with L9. Peritremes extending beyond setae D1. Sternal shield with three pairs of setae; metasternal platelets as figured. Ventrianal shield much longer than wide, slightly narrower than genital shield; three pairs of preanal setae
Phytoseiid Mites from Hokkaido

nearly in a longitudinal line; no pores. Four pairs of setae surrounding ventrianal shield, seta VL₁ stout, barbed. A pair of reduced, filamentous metapodal platelets. Spermatheca as illustrated. Fixed digit of chelicera with a few teeth. Genu IV, tibia IV, and basitarsus IV each with a capititate macroseta; distitarsus IV with a similar, weak macroseta; genu IV, tibia IV, and basitarsus IV each with one or more capititate to blunt setae. Measurements in microns: idiosoma length 400, idiosoma width 280; lengths of setae: L₁ 42, L₂ 39, L₃ 47, L₄ 52, L₅ 43, L₆ 53, L₇ 25, L₈ 79, M₁ 17, M₂ 57, D₁ 29, D₂ 12, D₃ 12, D₄ 29, D₅ 5, S₁ 47, S₂ 35, VL₁ 56, macrosetae of leg IV: genu 20, tibia 18, basitarsus 43, distitarsus 27.

Male. Setae S₁ and S₂ on dorsal shield. Ventrianal shield with three pairs of preanal setae. Spermatophoral process of chelicera as illustrated. Genu IV, tibia IV, and basitarsus IV each with two capititate setae including macroseta; distitarsus IV with a blunt macroseta. Measurements in microns: idiosoma length 280, idiosoma width 190; lengths of setae: L₁ 34, L₂ 30, L₃ 35, L₄ 40, L₅ 29, L₆ 36, L₇ 13, L₈ 58, M₁ 12, M₂ 40, D₁ 24, D₂ 9, D₃ 10, D₄ 21, D₅ 4, S₁ 38, S₂ 27, VL₁ 32, macrosetae of leg IV: genu 18, tibia 16, basitarsus 33, distitarsus 23.

Types. Holotype (♀) and allotype (♂): Hamakoshimizu, Prov. Abashiri, 29-VIII-1966 (H. Tamura leg.), on *Rosa rugosa* Thunb. Paratypes: 4 ♀♀ & 4 ♂♂, data same as for holotype; 1 ♀, 21-VI-1966 (T. Matsumura leg.), other data same as for holotype; 16 ♀♀ & 2 ♂♂, 14-IX-1966 (H. Fukuda leg.), other data same as for holotype. These type specimens were collected on leaves and galls of this plant. These galls were produced by a cynipid wasp *Liebelia (Nipporhodites) fukudae* Shinji.

In addition to these types a female specimen taken from Mombetsu (Prov. Hidaka), though in poor condition, is now referred to the present new species. Other data of this specimen are: July 23–24, 1966 (N. Kishi leg.), on *Athyrium brevifrons* Nakai.

Remarks. This new species can be separated from *Amblyseius (Kampimodromus) aberrans* (Oudemans, 1930a), *A. (K.) irregularis* (Evans, 1953), and *A. (K.) judaicus* Swirski and Amitai, 1961, by the absence of seta D₅, and by other many characters.

10. *Phytoseius (Phytoseius) nipponicus* Ehara

(Figs. 58-63)

*Phytoseius (Dubininellus) nipponicus* Ehara, 1962, p. 55, Figs. 7-11; Denmark, 1966, p. 90, Fig. 38.


*Phytoseius nipponicus* has been known only from Honshu, and it is new to Hokkaido. The macrosetae of leg IV of the female show much intraspecific variation in tip feature. Both sexes of the type specimens (type locality: Den-en-chōfu, Tokyo) have two capitate macrosetae on leg IV. These macrosetae, however, are tapering (more or less blunt-ended) in many female specimens from Hokkaido while they are capitate in females from Mombetsu, Prov. Hidaka. That the specimens of these two groups belong to the same species is acceptable from the following facts: 1) Intermediate female specimens regarding to macrosetae on leg IV were occasionally found; 2) A female with two capitate macrosetae on leg IV occurred within a population of specimens having tapering macrosetae. On the other hand, leg IV of the male is provided constantly with two capitate macrosetae in all populations herein studied. At any rate, it is concluded that for recognition of phytoseiid species, at least those of *Phytoseius*, the shape of macroseta tips should not be emphasized too much.

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Figs. 61–63. *Phytoseius (Phytoseius) nipponicus* Ehara. Leg IV (♀), showing variation of macrosetae.

Specimens from Hokkaido. Many specimens (♀ & ♂) collected in Sapporo and its vicinity by Mr. N. Kishi are from the following plants: Filipendula kamtschatica (Pall.) Maxim., Helianthus tuberosus L., Morus bombycis Koidz., Sambucus sieboldiana Blume var. miquelii (Nakai) Hara, Urtica platyphylla Wedd., and Vitis coignetiae Pulliat.

Materials from other localities: one female collected from mulberry at Toyotomi, Sarobetsu wasteland, by Dr. H. Mori et al.; a few specimens (♀ & ♂) collected at Mombetsu, Prov. Hidaka, by Mr. N. Kishi from Aralia cordata Thunb., Cirsium kamtschaticum Ledeb., and Quercus dentata Thunb.; two females taken from Rosa rugosa Thunb. (leaves or galls) at Hamakoshimizu, Prov. Abashiri, by Mr. T. Matsumura and Mr. H. Tamura.

11. Phytoseius (Phytoseius) kishii n. sp. (Jap. name: Hokkai-kaburidani) (Figs. 64–67)

Female. Dorsal shield rugose, with five pairs of dorsocentral setae (seta D₅ absent). Setae on dorsal shield anchored on tubercles; L₁, L₃, L₅, L₆, L₇, M₂, D₁, and S₁ stout, strongly serrate; L₁ and S₁ approximately equal-sized, larger than D₁ and L₃ which are about equal-sized; L₇ close to M₂; L₄ and L₅ practically smooth; D₂ to D₄, D₆, and M₁ minute. Peritremes not extending between setae D₁. Sternal shield with three pairs of setae; metasternal setae on small platelets. Ventrianal shield much longer than wide, and much narrower than genital shield; the lateral margins strongly concave; three pairs of preanal setae. Three pairs of setae surrounding ventrianal shield, seta VL₁ stout, strongly serrate. A pair of slender metapodal platelets. Spermatheca as illustrated. Fixed digit of chelicera with a few teeth. Tibia IV with a spatulate macroseta, the tip with a very narrow hyaline envelope; genu IV and basitarsus IV each with a more or less blunt-ended macroseta, distitarsus IV with a similar, weak macroseta. Measurements in microns: idiosoma length 350, idiosoma width 240; lengths of setae: L₁ 42, L₃ 18, L₄ 32, L₆ 18, L₇ 97, L₈ 66, L₉ 68, M₁ 5, M₂ 74, D₁ 31, D₂ 5, D₃ 4, D₄ 5, D₅ 6, S₁ 43, VL₁ 44, macrosetae of leg IV: genu 17, tibia 42, basitarsus 25, distitarsus 26.

Male. Not known.


Remarks. Phytoseius (P.) kishii n. sp. is closely allied to P. (P.) corniger ¹

¹) Produced by a cynipid wasp Liebelia (Nipporhodites) fukudae Shinji.
Wainstein, 1959, but is different from the latter in the relative lengths of setae L₁ and S₁, and of setae L₂ and L₄. *P. (P.) kishii* n. sp. is also similar to *P.(P.) horridus* Ribaga, 1902, but is distinctive from it in the relative lengths of the segments and macrosetae of leg IV and in the shape of the spermatheca (Chant and Athias-Henriot, 1960; Denmark, 1966). This new mite is named in honor of Mr. Nobuo Kishi who kindly submitted many specimens of mites for this study.


12. *Phytoseius (Phytoseius) campestris* n. sp.
(Jap. name: Sōya-kaburidani)
(Figs. 68-71)

**Female.** Dorsal shield rugose, with five pairs of dorsocentral setae (seta D₅ absent). Setae on dorsal shield arising from tubercles; L₁, L₂, L₅, L₆, L₇, M₂, D₁, and S₁ stout, strongly serrate, S₁ much longer than L₁, L₃, and D₁; L₇ close to M₂; L₅ and L₄ practically smooth; D₂ to D₄, D₆, and M₄ minute. Peritreme extending forward to seta D₁. Sternal shield with three pairs of setae; metasternal setae on
small platelets. Ventrianal shield slender, narrower than genital shield, concave laterally, with three pairs of preanal setae and a pair of minute pores. Three pairs of setae on membrane surrounding ventrianal shield, seta VL1 stout, strongly serrate. A pair of slender metapodal platelets. Cervix of spermatheca U-shaped, about 11μ wide; atrium and major duct, combined lengths, at least 18μ. Genu IV, tibia IV, and basitarsus IV each with a blunt-ended macroseta; distitarsus IV with

Figs. 68–71. Phytoseius (Phytoseius) campestris n. sp. 68, dorsum of idiosoma (♀). 69, ventrianal shield (♀). 70, genu, tibia and tarsus of leg IV (♀). 71, metapodal platelet (♀) (A, anterior direction; L, lateral direction).

a similar macroseta. Measurements in microns: idiosoma length 400, idiosoma width 240; lengths of setae: L1 31, L2 12, L3 32, L4 14, L5 107, L6 70, L7 84, M1 8, M2 82, D1 29, D2 7, D3 7, D4 8, D5 6, S1 46, VL1 58, macrosetae of leg IV: genu 19, tibia 56, basitarsus 29, distitarsus 29.

Male. Not known.

Type. Holotype: ♀, Toyotomi, Sarobetsu wasteland, 12~14-VII-1966 (H. Mori et al. leg.), on Kalopanax pictus (Thunb.).

Remarks. Phytoseius (P.) campestris n. sp. is closely allied to P. (P.) corniger
Wainstein, 1959, and *P. (P.) horridus* Ribaga, 1902, but is distinct from these species in the relative lengths of setae $S_1$, $L_1$, $L_3$, and $D_1$.

**Key to species of Phytoseiidae found in Hokkaido (females)**

1. Setae $S_1$ and $S_2$ on interscutal membrane.......................... 2
   - Seta $S_1$ on dorsal shield, seta $S_2$ absent.......................... 16
2. Prosctum with 6 pairs of lateral setae ........................................ 3
   - Prosctum with 4 pairs of lateral setae ........................................ 4
3. Seta $M_2$ longer than $L_6$................................ *Typhlodromus (Anthoseius) vulgaris* Eh.
   - Seta $M_2$ subequal in length to $L_6$................................ *Typhlodromus (Anthoseius) borealis* Eh.
4. Seta $M_2$ more or less in a transverse line with $L_7$ .................... 5
   - Seta $M_2$ not in a transverse line with any lateral setae..............
   - ..............................................................................................
   - ..............................................................................................
   - ..............................................................................................
5. Setae $D_2$ to $D_5$ shorter than distances between their bases .......... 6
   - Setae $D_2$ to $D_5$ longer than distances between their bases ...........
   - ..............................................................................................
   - ..............................................................................................
6. Three pairs of preanal setae not in a transverse line; peritreme long,
   extending more or less near seta $D_1$........................................... 7
   - Three pairs of preanal setae more or less in a transverse line; peritreme short,
   reaching only to coxa II. *Amblyseius (Amblyseius) finlandicus* (Oudemans)
7. None of the prolateral setae three times as long as $D_2$ and $D_3$........ 8
   - One or more of the prolateral setae at least three times as long as $D_2$ and $D_3$.
   - ..............................................................................................
   - ..............................................................................................
8. Seta $L_4$ less than twice as long as $L_3$ and $L_6$ ......................... 9
   - Seta $L_4$ about twice as long as $L_3$ and $L_6$............................
   - ..............................................................................................
   - ..............................................................................................
9. Seta $M_3$ shorter than distance between its base and that of $L_6$ ....... 10
   - Seta $M_3$ longer than distance between its base and that of $L_6$ .......
   - ..............................................................................................
   - ..............................................................................................
10. Seta $L_7$ approximately half as long as $M_2$ ............................
    - ..............................................................................................
    - ..............................................................................................
   - ..............................................................................................
11. Seta $L_7$ slightly shorter than $M_2$............................................
    - ..............................................................................................
    - ..............................................................................................
12. Ventrianal shield with the posteriormost pair of preanal setae and pores
    on anterior one-third of preanal region............................... *Amblyseius (Amblyseius) ezoensis* Eh.
   - Ventrianal shield with the posteriormost preanal setae and pores not on
   anterior one-third of preanal region............................................. 13
13. Seta $L_9$ greatly longer than $M_2$............................................ 14
   - Seta $L_9$ only slightly longer than $M_2$ .................................
   - ..............................................................................................
Summary

1. This paper deals with descriptions and records of twelve species belonging to the family Phytoseiidae from Hokkaido.

2. The following ten species are described as new: *Typhlodromus (Anthoseius) borealis*, *Amblyseius (Amblyseius) haimatus*, *A. (A.) paraki*, *A. (A.) ainu*, *A. (A.) morii*, *A. (A.) firmus*, *A. (A.) ezoensis*, *Amblyseius (Kampimodromus) maritimus*, *Phytoseius (Phytoseius) kishii*, *P. (P.) campestris*.

3. *Amblyseius (Amblyseius) tsugawai* Ehara, and *Phytoseius (Phytoseius) nipponicus* Ehara are first recorded from Hokkaido.

4. The macrosetae of female leg IV of *P. (P.) nipponicus* show much intraspecific variation in tip feature.

5. A key to the species of phytoseiids of Hokkaido is given.

References


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1) In a previous paper (Ehara, 1959) the length of female seta *L*₄ of *A. rademacheri* was erroneously described. The length measurements of main dorsal setae of female *rademacheri* are: *L*₄ 62μ, *L*₉ 98μ, and *M*₂ 87μ.

Phytoseiid Mites from Hokkaido