NEW PHYTOSEIID MITES FROM SUCCESSIONAL AND CLIMAX PLANT COMMUNITIES IN NEW JERSEY\textsuperscript{1,2}

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ABSTRACT

During summer surveys of New Jersey plant communities for Phytoseiidae, 7 new species were found and described as follows: Proprioseiopsis involutus, Proprioseiopsis unicus, Amblyseius reflexus, Typhlodromips simplex, Neoseiulus boussi, Neoseiulus nodus, Amblydemella longus. Typhlodromus pyri Scheuten is redescribed and illustrated.

Mites of the family Phytoseiidae inhabit a wide variety of plants in all parts of the world. Phytoseiids are generally regarded as predators, and during recent years their importance in biological and integrated control of pest mites has been demonstrated. Much of the research on this group has dealt with feeding habits and life history phenomena in the laboratory and with population dynamics in agricultural ecosystems. Examples of this research would include McMurtry and Scriven (1964, 1965, 1966, 1966a, 1968) in their studies on Euseius hibisci (Chant). Hoyt (1969) found that Galendromus occidentalis (Nesbitt) suppressed populations of Tetranychus megaleni McGregor on apple leaves. Muma (1970) found that Galendromus floridanus (Muma) was effective in reducing the sixspotted mite, Eotetranychus sexmaculatus (Riley) on citrus in Florida. These are but a few of the many available references, and this interest in phytoseiids has resulted in the discovery of many new species during regional surveys. Descriptions of new species typically include very little habitat or other ecological information, often only an indication of the host plant on which the species was found. Thus, little information exists on the habitat characteristics of phytoseiids.

The new species described here were collected during an ecological survey of various successional and climax plant communities in New Jersey. The immediate objective of the study is to determine the extent to which the distribution of phytoseiid species are correlated with successional stage, plant species composition, and geographical location of plant communities. This information will be presented in a separate paper.

Taxonomic nomenclature used for the new species follows the system of Muma, Denmark, and De Leon (1970).

Type specimens are in the Florida State Collection of Arthropods (FSCA), Gainesville, Florida. Paratypes are deposited at Franklin College, Franklin, Indiana. Denmark takes senior authorship for the descriptions of new species, and Knisley conducted the surveys.

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Genus Proprioseiopsis Muma


Proprioseiopsis involutus Denmark and Knisley, NEW SPECIES
(Fig. 1-5)

Diagnosis: Proprioseiopsis involutus is similar to P. lindquisti (Schuster and Pritchard) new combination but differs in having L_r approximately one-half as long as L_r.

Female: Length 303μ; width at L_r 187μ. Dorsal scutum smooth with 5 pairs of pores and 16 pairs of dorsal setae. Measurements of setae; Verticals 30μ; D, 6μ; D, 4μ; D, 5μ; clunals 8μ; L, 35μ; L, 17μ; L, 24μ; L, 49μ; L, 9μ; L_r 9μ; L_r 102μ; M, 4μ; M, 7μ; M, 60μ; anterior sublateral 14μ; posterior sublateral 10μ. Sternal scutum with 2 pairs of pores, 3 pairs of setae, slightly creased anteriorly, longer than wide and truncate posteriorly; ventralan scutum smooth, with 3 pairs of preanal setae and 1 pair of small round pores. Peritreme extending forward to verticals. Chelicerae normal in relation to body size, fixed finger with 11 denticules and movable finger with 2 denticules. Leg formula 4123. Macrosetae on Sge II, III, and IV.

Fig. 1-5. Female Proprioseiopsis involutus Denmark & Knisley, new species. 1) dorsal and leg structure and setation; 2) ventral scuta and setation; 3) posterior peritremal and stigmatal development; 4) spermathecal structures; 5) cheliceral structure.
Length of macrosetae on leg IV as follows: Sge IV 46μ, Sti IV 28μ, St IV 61μ. Genu II 2, 2\frac{2}{10} \cdot 1; Genu III 2, 2\frac{2}{1}. Spermatheca fundibuliform.

**MALE:** Unknown.


**DISCUSSION:** The holotype was associated with *Typhlodromips sessor* (De Leon), *Neoseiulus interfolius* (De Leon), and a large population of tarsonomid mites in a 1-2 year-old field. The other specimens were collected from 2 different old field habitats. William J. Schiarappa has also collected this species in young fields on herbaceous plants in Darien, Connecticut; Staton, Delaware; Atlee, Virginia; and Latta, South Carolina.

*Proprioseiopsis unicus* Denmark and Knisley, NEW SPECIES
(Fig. 6-12)

**DIAGNOSIS:** *Proprioseiopsis unicus* is similar to *P. elongatus* (Garman) but differs in having the spermathecal atrium extending perpendicular to the cervix as opposed to a lateral indentation in *P. elongatus*. L, and M, are approximately one-fourth shorter in *P. unicus* than in *P. elongatus*.

**FEMALE:** Length 377μ; width at L, 259μ. Dorsal scutum smooth with 5 pairs of pores and 16 pairs of dorsal setae. Measurements of setae: Verticals 35μ; D, 4μ; D, 3μ, D, 3μ; clunals 9μ; L, 53μ, L, 13μ, L, 14μ, L, 79μ, L, 14μ, L, 12μ, L, 14μ, L, 184μ; M, 4μ, M, 8μ, M, 99μ; anterior sublateral 24μ; posterior sublateral 18μ. Sternal scutum lightly reticulated, wider than long, concave posteriorly and with 3 pairs of setae. Ventrianal scutum with 3 pairs of preanal setae, smooth, and 1 pair of small, round preanal pores. Peritreme extending forward beyond the verticil. Chelicerae normal, fixed finger with 8 denticles and movable finger with 2 denticles. Leg formula 4132. Macrosetae on Sge II, III, and IV. Length of macrosetae on leg IV as follows: Sge IV 90μ, Sti IV 66μ, St IV 82μ. Genu II 1, 2\frac{2}{1} \cdot 1; Genu III 1, 2\frac{2}{1} \cdot 1. Spermatheca pouliform.

**MALE:** Similar to female but smaller. Spermatodactyl has heel terminal, lateral process and toe small in relation to spermatodactyl. Ventrianal scutum lightly creased with a pair of pores posterior to ventral setae and 3 pairs of ventrianal setae.

**TYPES:** Female holotype collected at Turkey Swamp Park, Monmouth County, NEW JERSEY, 1 VII 1972, C. B. Knisley and W. J. Schiarappa, on *Quercus palustris* Muenchh. Two female paratypes were collected at the same time as the holotype, 1 on red maple, *Acer rubrum* Linnaeus and 1 on boneset, *Eupatorium perfoliatum* Linnaeus.

**DISCUSSION:** The holotype was associated with *Typhlodromips sessor*, *Typhlodromalus peregrinus* (Muma), *Galendromus pomi* (Parrott), and *Amblydromella nodosus* De Leon. The paratypes were associated with
Fig. 6-12. Female Proprioseiopsis unicus Denmark & Knisley, new species. 6) dorsal and leg structure and setation; 7) ventral seta and setation; 8) posterior peritremal and stigmatal development; 9) spermathecal structure; 10) cheliceral structure; 11) male spermatodactyl structure; 12) male ventrianal structure.

Typhlodromips sessor, Amblydromella nodosus, Phytoseiulus macropilis (Banks), Phytoseius bakeri Chant, Galendromus pomi, Galendromus ruralis De Leon, and Tetranychus sp.

The allotype was associated with Phytoseius macropilis (Banks) and Galendromus loculus Denmark and Muma on Pinus rigida Miller. All types were collected in a swamp forest.

Genus Amblyseius Berlese


Amblyseius reflexus Denmark and Knisley, New Species

(Fig. 13-16)

Diagnosis: Amblyseius reflexus is near A. schusteri Schuster and Pritchard, but M, is about one-third as long as in A. schusteri and L, is less than half as long as in A. schusteri. The spermatheca is about half as long and twice as wide in A. reflexus.
**Female**: Length 361\(\mu\); width at L, 188\(\mu\). Dorsal scutum smooth with 8 pairs of pores and 17 pairs of dorsal setae. Measurements of setae: Verticlales 29\(\mu\); D, 5\(\mu\), D, 5\(\mu\), D, 8\(\mu\), D, 8\(\mu\); clunals 6\(\mu\); L, 55\(\mu\), L, 55\(\mu\), L, 15\(\mu\), L, 15\(\mu\), L, 15\(\mu\), L, 15\(\mu\), L, 15\(\mu\), L, 15\(\mu\), L, 15\(\mu\), L, 15\(\mu\), L, 15\(\mu\); M, 6\(\mu\), M, 6\(\mu\), M, 6\(\mu\), M, 6\(\mu\); anterior sublaterals 27\(\mu\); posterior sublaterals 16\(\mu\). Sternal scutum with 2 pairs of pores and 3 pairs of setae, smooth, as long as wide, and truncate posteriorly with the 3rd pair of setae protruding. Ventrual scutum smooth with a pair of elliptical pores and 3 pairs of preanal setae. Peritreme extending forward to verticlales. Chelicerae normal. Leg formula 1423. Macrosetae on Sge I, II, III, and IV. Length of macrosetae on leg IV as follows: Sge IV 71\(\mu\), Sti 55\(\mu\), and St 66\(\mu\).

**Genus II 2, 1, 1, 1**; **Genus III 1, 1, 1, 1**.

**Male**: Unknown.

**Type**: Female holotype collected at Troy Hills, Morris County, New Jersey, 26 VI 1975, C. B. Knisley, on silver maple, *Acer saccharinum* Linnaeus.

**Discussion**: The holotype was associated with *Neoseiulus falcacis* (Gar-
man). *Galentromus ruralis, Typhlodromalus peregrinus, and Amblydromella nodosus* in a freshwater marsh.

**Genus Typhlodromips** De Leon

*Typhlodromopsis* De Leon, 1965:113 (in part, not typical species).
*Typhlodromips* De Leon, 1965:23; Muma, Denmark, and De Leon, 1970:78.

*Typhlodromips simplexus* Denmark and Knisley, *New Species*  
(Fig. 17-20)

**Diagnosis:** *Typhlodromips simplexus* is similar to *T. culmulus* (van der Merwe) new combination, but differs in that *L*, is approximately one-third shorter, the pores on the ventrianal scutum are not distinct, there are no macrosetae on legs I, II, and III, and the spermathecal atrium is about 3 times longer.

**Female:** Length 368μ; width at *L.* 196μ. Dorsal scutum reticulated with lunate areas, 7 pairs of pores, and 17 pairs of setae. Measurements of setae:

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Fig. 17-20. Female *Typhlodromips simplexus* Denmark & Knisley, new species. 17) dorsal and leg structure and setation; 18) ventral scuta and setation; 19) posterior peritremal and stigmatal development; 20) spermathecal structure.
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Verticals 11μ; D. 13μ, D. 11μ, D. 15μ, D. 16μ; clunals 9μ; L. 18μ, L. 17μ, L. 12μ, L. 22μ, L. 20μ, L. 20μ, L. 18μ, L. 52μ; M, 13μ, M. 19μ, M, 31μ; anterior sublaterals 19μ; posterior sublaterals 17μ. Sternal scutum creased anteriorly, longer than wide, with 2 pairs of pores, 3 pairs of setae, and truncate posteriorly. Ventrianal scutum creased, with a pair of indistinct pores and 3 pairs of preanal ventrianal setae. Peritreme extending forward to L. Peritremal scutum indistinguishably fused with stigmatal scutum and leg IV exopodal scutum. Chelicerae normal in relation to body size. Leg formula 4123. Macrosetae on leg IV as follows: Sge 29μ, Sti 26μ, and St 57μ. Genu II 0 2 2 1; Genu III 1 0 2 1. Spermatheca vesicular.

**Male:** Unknown

**Type:** Female holotype collected at Perrineville, Monmouth County, New Jersey, 14 VIII 1972, C. B. Knisley and W. J. Sciarappa, on bull thistle, Cirsium vulgare (Savi) Tenore.

**Discussion:** This mite was collected in a 1-2 year-old field associated with Typhlodromips eesus, as well as with aphids and thrips.

**Genus Neoseiulus Hughes**


*Typhlodromus (Typhlodromopsis)* De Leon, 1959:133 (in part).


*Neoseiulus byssus* Denmark and Knisley, New Species

(Fig. 21-27)

**Diagnosis:** *Neoseiulus byssus* is similar to *N. amicus* (Chant), but differs in that L approximates the length of the verticals as opposed to L, being approximately twice as long as the verticals in *N. amicus*. L. is approximately one-fourth longer in *N. amicus*, L. approximately one-third longer in *N. amicus*, and L. approximately one-half longer in *N. amicus*.

**Female:** Length 36μ; width at L, 176μ. Dorsal scutum reticulated with 5 pairs of pores, and 17 pairs of dorsal setae. Measurements of setae: Verticals 26μ; D. 11μ, D. 11μ, D. 13μ, D. 15μ; clunals 9μ; L. 27μ, L. 17μ, L. 16μ, L. 28μ, L. 18μ, L. 18μ, L. 18μ, L. 86μ; M, 8μ, M, 17μ, M, 60μ; posterior sublaterals 19μ. Sternal scutum slightly creased anteriorly, longer than wide, truncate posteriorly, and 3 pairs of setae. Ventrianal scutum slightly creased posteriorly, a pair of pores and 3 pairs of preanal ventrianal setae. Peritreme extending forward to the verticals. Chelicerae normal, fixed finger with 7 denticles, and movable finger with 2 denticles. Leg formula 4123. Macrosetae on leg IV as follows: Sge IV 29μ; Sti IV 33μ; St IV 60μ. Genu II 0 2 2 1; Genu III 1 0 2 1. Spermatheca pouliform.

**Male:** Similar to female but smaller. Spermatodactyl has heel terminal, lateral process obscure, and toe enlarged. Ventrianal scutum lightly creased with 3 pairs of setae and 1 pair of pores posterior to ventrianal setae.

**Types:** Female holotype collected at Ocean County, New Jersey, 16 VIII 1972, C. B. Knisley and W. J. Sciarappa, on common highbush blueberry, Vaccinium corymbosum Linnaeus. Paratypes (all New Jersey): 1 fe-
Fig. 21-27. Female *Neoseiulus byssus* Denmark & Krisley, new species. 21) dorsal and leg structure and setation; 22) ventral scuta and setation; 23) posterior peritremal and stigmatic development; 24) spermathecal structure; 25) cheliceral structure; 26) male spermadactyl structure; 27) male ventrianal structure.

male, Jackson Mills, Ocean Co., 10 VII 1972, C. B. Krisley and W. J. Sciarappa, on a fern in pine forest; Cheesquake State Park, Middlesex Co., 1 female, 8 VII 1975, C. B. Krisley, on coast pepperbush, *Clethra alnifolia* Linnaeus, in a mixed oak forest associated with *Fundiseius morgani* (Chant) and *Galeenitrus ruralis*; 20 female and male specimens, 8 VII 1975, on *Iva frutescens* Linnaeus, in a salt marsh habitat associated with *Typhlodromalus peregrinus*, tydeids, and tetranychids; 25 females, 8 VII 1975, on common reedgrass, *Phragmites communis* Trininius in a salt water marsh associated with *Typhlodromips sessor*, *Neoseiulus interfolius*, *Neoseiulus nodus* Denmark and Krisley, and *Proprioseiopsis mexicanus* (Garman); several females, Troy Hills, Morris Co., 26 VI 1975, C. B. Krisley, on *Cyperus strigosus* Linnaeus, in a fresh water marsh associated with *Fundiseius morgani*, *Neoseiulus fallacil*, and *Proprioseiopsis mexicanus*.

**Discussion:** The holotype was associated with *Typhlodromips arenillus* Denmark and Muma, *Typhlodromina conspicus* (Garman), and stigmaeid mites on a fern in a pine forest. This species was collected in a variety of habitats in both north and south New Jersey. It was most common on grasses and in habitats, such as marshes where grasses were abundant.

*Neoseiulus nodus* Denmark and Krisley, **New Species**

**(Fig. 28 34)**

**Diagnosis:** *Neoseiulus nodus* is similar to *N. umbraticus* (Chant) but *N. nodus* has 3 macrosetae on leg IV and *N. umbraticus* has 1. *N. nodus* has an enlarged atrium, and *N. umbraticus* does not.
FEMALE: Length 382μ; width at L, 190μ. Dorsal scutum reticulated with 7 pairs of pores, and 17 pairs of dorsal setae. Measurements of setae: Verticals 29μ; D, 21μ; D, 12μ; D, 17μ; D, 19μ; clunals 11μ; L, 31μ; L, 20μ; L, 21μ; L, 35μ; L, 36μ; L, 35μ; L, 31μ; L, 7μ; M, 12μ; M, 20μ; M, 45μ; anterior sublateral 20μ; posterior sublateral 19μ. Ectal scutum about as wide as long with 2 pairs of pores and 3 pairs of setae and slightly concave posteriorly. Ventrianal scutum with a pair of pores and 3 pairs of preanal ventrianal setae. Peritreme extending forward to the verticals. Chelicerae normal; fixed finger with 5 denticles and movable finger with no denticules. Leg formula 1423. Macrosetae on leg IV as follows: Sge IV 43μ; Sti IV 43μ; St 80μ. Genu II 1, 2/2, 2; Genu III 1, 2/2, 1.

MALE: Similar to female but smaller. Spermatodactyl with heel terminal, lateral process obscure, and toe modified.

Fig. 28-34. Female Neoseutulus nodus Denmark & Knisley, new species. 28) dorsal and leg structure and setation; 29) ventrual scuta and setation; 30) posterior peritreme and stigmatal development; 31) spermathecal structure; 32) cheliceral structure; 33) male spermatodactyl structure; 34) male ventrianal structure.

DISCUSSION: This species was collected only on grasses or grass-like vegetation in wetlands.

Genus Amblydromella Muma


Amblydromella longus Denmark and Knisley, New Species
(Fig. 35-38)

DIAGNOSIS: Amblydromella longus is similar to A. nodosus, but does not have L4 enlarged on the tip as in A. nodosus, and M1 is not serrated.

FEMALE: Length 380 µ; width at L1, 214 µ. Dorsal scutum rugose and 18 pairs of dorsal setae. Measurements of setae: Verticales 22 µ; D, 11 µ, D, 12 µ, D, 15 µ, D, 17 µ; clunals 8 µ; L1, 19 µ, L1, 16 µ, L1, 20 µ, L1, 16 µ, L1, 20 µ, L1, 21 µ, L1, 23 µ, L1, 20 µ, L1, 32 µ; M, 14 µ, M, 20 µ; anterior sublateral 25 µ; posterior sublateral 17 µ. Sternal scutum with 2 pairs of pores, 2 pairs of setae and slightly reticulated anteriorly and concaved posteriorly. Ventrianal scutum slightly creased, 1 pair of small round pores and 4 pairs of preanal setae. Peritreme extending forward to ventrals. Chelicerae normal. Leg formula 4123. Macrosetae on Sge II, III, and IV. Length of macrosetae on leg IV as follows: Sge IV 18 µ, Sti IV 21 µ, and St IV 27 µ. Spermatheca fundibuliform.

MALE: Unknown.


DISCUSSION: The holotype was found associated with Amblydromella bakeri (Garman), Typhlodromus pyri Scheuten, and unidentified species of tydeids in a north New Jersey bog community.

Genus Typhlodromus Scheuten

Typhlodromus Scheuten, 1857:111.

Type of the genus: Typhlodromus pyri Scheuten, 1857, by subsequent designation, Oudemans (1929); Chant, 1965:369.
Typhlodromus pyri Scheuten
(Fig. 39-45)

Diagnosis: Typhlodromus pyri is similar to T. athiasae Porath and Swirski but differs in having elliptical pores rather than round pores, \( M \), does not reach the base of \( L_n \), the chelicerae have 4 teeth on the fixed finger rather than 3 teeth in \( T. \) athiasae.

Female: Length 314\( \mu \); width at \( L_6 \), 165\( \mu \). Dorsal scutum reticulated with several lunate areas in the anterior middorsal area, 4 elliptical pores and 17 pairs of dorsal setae. Measurements of setae: ventrals 25\( \mu \); \( D_1 \) and \( D_2 \), 13\( \mu \), \( D_3 \), 16\( \mu \), \( D_4 \), 18\( \mu \); clunals 4\( \mu \); \( L_6 \), 25\( \mu \), \( L_7 \), 14\( \mu \), \( L_8 \), 17\( \mu \), \( L_9 \), 19\( \mu \), \( L_{10} \), 24\( \mu \), \( L_{11} \), 27\( \mu \), \( L_{12} \), 31\( \mu \), \( L_{13} \), 32\( \mu \), \( L_{14} \), 58\( \mu \); \( M_6 \), 61\( \mu \), \( M_7 \), 40\( \mu \); anterior sublaterals 25\( \mu \); posterior sublaterals 22\( \mu \). Sternal scutum creased, wider than long, 1 pair of pores, 2 pairs of setae, and trilobed posteriorly. Ventrianal scutum creased with 4 pairs of preanal ventrianal setae. Peritremes extending forward to the ventrals. Chelicerae normal in size, fixed finger with 4 denticules and
Fig. 39-45. Female Typhlodromus pyri Scheuten. 39) dorsal and leg structure and setation; 40) ventral scuta and setation; 41) posterior peritremal and stigmatal development; 42) spermathecal structure; 43) cheliceral structure; 44) male spermatodactyl structure; 45) male ventralian structure.

movable finger with 1 denticule. Leg formula 1432. Macrosetae on leg IV as follows. St 41µ, Genu II 2,2,2,1, Genu III 1,2,2,1. Spermatheca partially sclerotized fundibuliform cervix and nodular atrium.

MALE: Similar to but smaller than female. Spermatodactyl with toe terminal; ventralian scutum with 5 pairs of preanal setae.

TYP: Female holotype collected at Bonn, Germany, on pear leaves.

DISCUSSION: A female was collected at Oldwick, Hunterdon County, New Jersey, C. B. Kinsley, on Pinus sp. along the edge of a mixed oak forest associated with Proprioseutopsis dorsatus (Muma), Typhlodromips sessor, and Amblydromella nodosus. Two females and 1 nymph were collected at Stokes State Forest, Sussex County, New Jersey, 21 VIII 1972, C. B. Kinsley and W. J. Sciarappa, on eastern hemlock, Tsuga canadensis (Linnaeus) Carrier, in a hemlock-oak mixed forest associated with Proprioseutopsis dorsatus and Fundisius morgani.

LITERATURE CITED


