

SOME PHYTOSEIID MITES OF PARAGUAY (PHYTOSEIIDAE: ACARINA)¹

H. A. DENMARK AND MARTIN H. MUMA
Division of Plant Industry,
Florida Department of Agriculture and Consumer Services,
Gainesville, Florida 32601, and
University of Florida Citrus Experiment Station,
Lake Alfred, Florida 33850, respectively.

ABSTRACT

A summary of the phytoseiids of South America is presented and 5 species are reported for the first time from Paraguay. These include *Proprioseiopsis citri* (Muma), *Euseius citrifolius* n. sp., *Euseius flechtmanni* n. sp., *Euseius paraguayensis* n. sp., and *Galendromus* sp. A key is constructed for the 3 new species of *Euseius*.

Dosse (1958) described *Neoseiulus* (= *Typhlodromus*) *chilenensis* (Dosse) and *Phytoseiulus riegeli* Dosse from Chile and discussed their biology. Chant (1959) reported the following species from South America: *Typhlodromina* (= *Typhlodromus* (T.)) *tropica* (Chant) from Ecuador, *Euseius* (= *Typhlodromus* (A.)) *concordis* (Chant) from Argentina, *Neoseiulus* (= *Typhlodromus* (A.)) *ornatus* (Athias-Henriot) from Chile, *Amblyseius* (= *Typhlodromus* (A.)) *fraterculus* Berlese from Argentina, *Amblyseius* (= *Typhlodromus* (A.)) *perlongisetus* Berlese from Argentina, *Proprioseiopsis* (= *Typhlodromus* (A.)) *ovatus* (Garman) from Ecuador, *Amblyscutus* (= *Typhlodromus* (A.)) *grandis* (Berlese) from Argentina, and *Phytoseiulus persimilis* Athias-Henriot from Chile. Gonzalez and Schuster (1962) reported the following species from South America: *Chiloseiulus camposi* Gonzalez and Schuster from Chile, *Proprioseiopsis* (= *Amblyseius*) *globosus* (Gonzalez and Schuster) from Chile and Argentina, *Neoseiulus* (= *Amblyseius*) *chilenensis* (Dosse) from Chile, *Euseius* (= *Amblyseius*) *fructicolus* (Gonzalez and Schuster) from Chile, *Amblyseius intermedius* Gonzalez and Schuster from Chile, *Amblyseius perlongisetus* Berlese from Chile and Argentina, *Amblyseius valpoensis* Gonzalez and Schuster from Chile, *Phytoseiulus riegeli* Dosse from Chile, *Meso-seiulus longipes* (Evans) from Chile, *Galendromus* (= *Metaseiulus*) *brevicollis* (Gonzalez and Schuster) from Chile, and *Phytoseius* (*Pennaseius*) *decoratus* Gonzalez and Schuster from Chile. Sheals (1962) reported *Neoseiulus* (= *Amblyseius*) *chascomensis* (Sheals), and *Athiasia* (= *Amblyseius*) *tucamanensis* (Sheals) from Argentina. Ehara (1966) reported the following 8 species from the State of Sao Paulo, Brazil: *Euseius* (= *Amblyseius*) *sakagami* (Ehara), *Euseius* (= *Amblyseius*) *hibisci* (Chant), *Amblyseius largoensis* (Muma), *Proprioseiopsis* (= *Amblyseius*) *neotropicus* (Ehara), *Typhlodromips* (= *Amblyseius*) *akahirai* (Ehara), *Phytoseiulus chanti* Ehara, *Phytoseius* (*Pennaseius*) *mumai* Ehara, and *Iphiseiodes* (= *Iphiseius*) *quadripilis* (Banks). He also listed *Amblyseius hexagonus* Berlese and *Euseius* (= *Amblyseius*) *finlandicus* (Oudemans)

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from Argentina. De Leon (1966) reported the following 21 species from British Guyana: *Proprioiseiopsis* (= *Amblyseiulus*) *cannaensis* (Muma), *Iphiseiodes quadripilis* (Banks), *Iphiseiodes kamahorae* De Leon, *Paraamblyseius ogdeni* De Leon, *Euseius alatus* De Leon, *Typhlodromalus arawak* De Leon, *Amblyseius segregans* De Leon, *Amblyseius largoensis* (Muma), *Amblyseius circumflexus* De Leon, *Amblyseius aeralis* (Muma), *Amblyseius martus* De Leon, *Amblyseius guianensis* De Leon, *Typhlodromips daviesi* De Leon, *Typhlodromips arcus* De Leon, *Typhlodromips scleroticus* De Leon, *Typhlodromips auratus* De Leon, *Phytoseius* (*Phytoseius*) *rex* De Leon, *Phytoseius* (*Pennaseius*) *averrhoae* De Leon, *Phytoseius* (*Pennaseius*) *guianensis* De Leon, *Typhloseiopsis funiculatus* De Leon, and *Diadromus regularis* (De Leon). Athias-Henriot (1967) reported the following 10 species from South America: *Proprioiseiopsis* (= *Amblyseius*) *edbakeri* (A.-H.) from Argentina, *Proprioiseiopsis* (= *Amblyseius*) *donchanti* (A.-H.) from Argentina, *Proprioiseiopsis mumaellus* (A.-H.) from Argentina, *Chelaseius* (= *Amblyseius*) *austrellus* (A.-H.) from Argentina, *Chelaseius* (= *Amblyseius*) *schusterellus* (A.-H.) from Argentina, *Athiasia* (= *Amblyseius*) *gonzalezi* (A.-H.) from Uruguay, *Amblyseius deleonellus* A.-H. from Argentina, *Amblyseius prichardellus* A.-H. from Argentina, *Amblyseius franzellus* A.-H. from Argentina, *Amblyseius sobrinulus* A.-H. from Argentina. Denmark and Muma (1970) redescribed *Ricoseius loxocheles* (De Leon) from Sao Paulo, Brazil.

Recently a small collection of phytoseiid mites collected in Paraguay by Braulio Ramon Aranda Centurion was received from Dr. Carlos Flechtmann. The 3 genera and 5 species included in this collection add to the known distribution of this family of mites in South America. The collection contained 3 undescribed species of the genus *Euseius*. Although this family is generally considered predaceous, no observations were made on the species reported in this paper.

Genus *Proprioiseiopsis* Muma (1961)

Proprioiseiopsis Muma 1961:277 (Type only); Muma and Denmark 1968:231.

Type: *Typhlodromus* (*Amblyseius*) *terrestris* Chant 1959, by original designation (Muma 1961).

DIAGNOSIS: Females are characterized by 3 pairs of dorsal setae, 3 pairs of median setae, 8 pairs of lateral setae (some elongate and weakly plumose), 2 pairs of sublateral setae on the interscutal membrane, 3 pairs of sternal setae, and 3 pairs of preanal setae.

Dorsal scutum well sclerotized, usually smooth with indistinct lunate areas on most species. Sternal scutum as wide or wider than long with straight or concave posterior margin; sternum creased to reticulated or smooth. Ventrianal scutum shield-shaped to pentagonal and creased to reticulated with preanal pores. Peritreme long, extending to or between L_1 and verticals. Peritremal scutum with an ectal strip that extends posteriorly to leg IV exopodal scutum. Chelicerae normal with 6 to 14 denticles on fixed finger and 0 to 4 on movable finger. Leg formula usually 1423, usually with no macrosetae on leg I. Macrosetae on Sge II and Sge III of some species. All species have macrosetae on Sge IV, Sti IV, and St IV.

Males smaller than females but otherwise similar. Spermatodactyl with foot usually terminal, but with exceptions. Ventrianal scutum with 3 or 4 pairs of preanal setae and a pair of pores.

DISCUSSION: There are about 40 species in this genus, of which most species are found in or near ground litter. The arboreal *dorsatus* group is an exception. The genus is well represented in the Caribbean area and is worldwide in distribution.

Proprioseiopsis citri (Muma)

Amblyseiulus citri Muma 1962:1.

DIAGNOSIS: This species is closely related to *P. detritus* (Muma), but *citri* has a smooth dorsal scutum, longer M_3 , L_1 , L_4 , and L_8 , a small but distinctly swollen spermathecal atrium, and a differently shaped spermathecal cervix.

TYPE: Female holotype, allotype, and paratypes from citrus litter at Sebring, Florida, in USNM, Washington, D. C.

This species has been collected at Asuncion, Paraguay, 15 July 1968 (Braulio Ramon Aranda Centurion), on *Citrus* sp. It has been taken previously only on bark or in litter beneath citrus trees in Florida.

Euseius Wainstein 1962

Type: *Seiulus finlandicus* Oudemans 1915 (by original designation.)

Amblyseiulus (*Amblyseiulus*) section *Euseius* Wainstein 1962:15.

Euseius, De Leon, 1966:86; Muma and Denmark (in press).

DIAGNOSIS: Females are characterized by 4 pairs of dorsal setae, 3 pairs of median setae of which M_3 is setiform and usually approximates M_1 and M_2 in length, 8 pairs of lateral setae which are usually setiform except L_8 is sometimes weakly plumose, 2 pairs of sublateral setae on the interscutal membrane (some species have S_1 on posterior projections of dorsal scutum), 3 pairs of sternal setae and 3 pairs of preanal ventrianal setae.

Chelicerae small with fixed finger edentate or with only 1 or 2 denticles usually distal to the medially located *pilus dentilis*. Sternum longer than wide and on newly mounted specimens distinctly to indistinctly lobate posteriorly. Peritreme short, extending anteriorly no further than L_2 or L_1 . Peritremal scutum indistinguishable, fused with stigmatal scutum and leg IV exopodal scutum. Ventrianal scutum elongate, frequently vase-shaped; the preanal setae more or less aligned in 2 transverse curved rows with median setae removed from anterior margin of scutum. Macrosetae sometimes present on the genu of legs II and III; Sge IV, Sti IV, and St IV are always present with the latter usually the longest.

Males are smaller but similar to females except the sublateral setae are on the dorsal scutum. Ventrianal scutum with 3 pairs of preanal setae. Spermatodactyl usually terminal with heel distinct and with a lateral process; toe frequently bent forward.

DISCUSSION: There are about 40 described species in this genus and many known undescribed species. It is worldwide in distribution and is a tree or shrub inhabiting genus. Although food habits are not well known for most species, several are known to be pollenophagus as well as predatory on Tetranychidae.

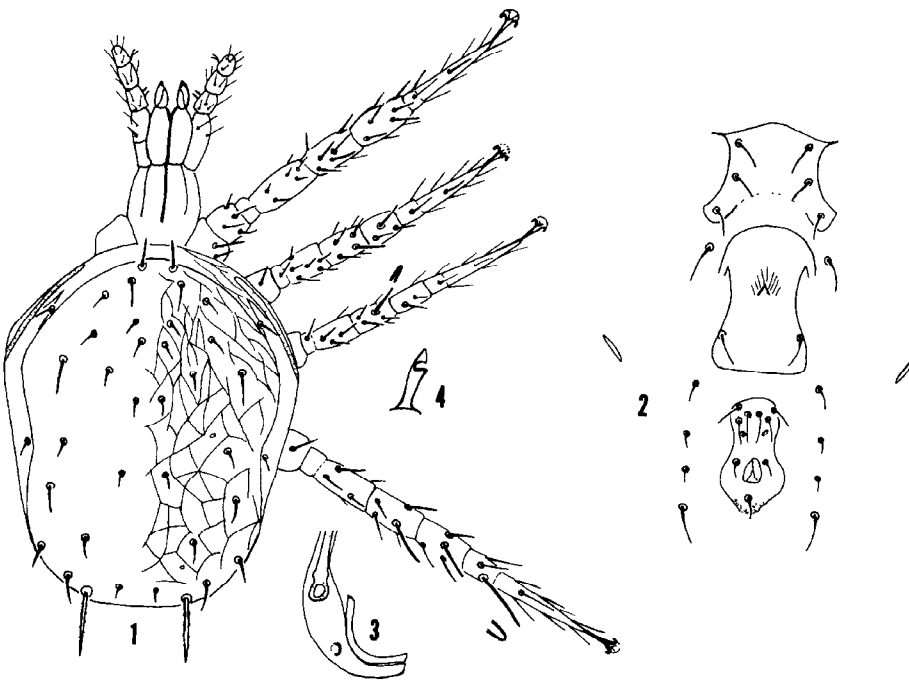


Fig. 1 to 4. Female *Euseius citrifolius* Denmark and Muma n. sp. 1. Dorsal and leg setation. 2. Ventral scuta and setation. 3. Posterior peritremal stigmatal development. 4. Spermathecal structures.

KEY TO THE PARAGUAYAN SPECIES OF *Euseius* WAINSTEIN
(BASED ON FEMALES)

1. L_4 not more than one-half as long as L_3 , dorsal scutum reticulate
..... *Euseius paraguayensis* Denmark & Muma n. sp.
- 1' L_4 more than one-half as long as L_3 , dorsal scutum smooth
or reticulate 2
2. Sge III with macroseta knobbed bacillate; Sge, Sti and St IV macro-
setae knobbed bacillate; dorsal scutum smooth
..... *Euseius flechtmanni* Denmark & Muma n. sp.
- 2' Sge III with macroseta blunt setaceous; Sge, Sti and St IV blunt se-
taceous; dorsal scutum reticulate
..... *Euseius citrifolius* Denmark & Muma n. sp.

Euseius citrifolius Denmark & Muma n. sp.

Fig. 1 to 4

DIAGNOSIS: *Euseius citrifolius* is distinguished from the closely related *Euseius vivax* (Chant and Baker) by having the macrosetae blunt setaceous, not knobbed setaceous as in *vivax*. *E. citrifolius* has anterior laterals much shorter than in *vivax*.

FEMALE: Length 315μ ; width at L_4 223μ . Dorsal scutum smooth with at least 3 small pores and 17 pairs of setae. Measurements of setae: verticals 28μ ; D_1 7μ , D_2 , D_3 and D_4 8μ ; clunals 5μ ; L_1 30μ , L_2 20μ , L_3 21μ ,

L_4 39 μ , L_5 19 μ , L_6 20 μ , L_7 27 μ , L_8 64 μ ; M_1 and M_2 13 μ , M_3 17 μ ; anterior sublaterals 11 μ ; posterior sublaterals 8 μ . Sternal scutum smooth and about as wide as long. Ventrianal scutum shield-shaped with three pairs of preanal setae and a pair of pores. Peritreme extends forward to between L_1 and L_2 . Chelicerae normal, but number of denticules cannot be seen. Leg formula 4123. Macrosetae present on Sge II, Sge III and Sge IV. Length of macrosetae on leg IV as follows: Sge IV 47 μ , Sti IV 34 μ , St IV 58 μ . Genu II 2, $\frac{2,2}{0}$, 1; Genu III 1, $\frac{2,2}{1}$, 0. Spermatheca tubular.

MALE: Unknown.

TYPE: Female holotype from Asuncion, Paraguay, 12 July 1968, on *Citrus* sp., in Florida State Collection of Arthropods (FSCA), Gainesville, Florida. Paratypes: 1 female with holotype; 1 female at Cecilio Baez, Paraguay, 6 January 1969, on *Psidium guajava*; 1 female at Coronel Oviedo, Paraguay, 11 January 1969, on *Psidium guajava*; 1 nymph at Carandayty, Paraguay, 13 January 1969, on *Prunus persica*. All collections were made by Braulio Ramon Aranda Centurion.

Euseius flechtmanni Denmark & Muma n. sp.

Fig. 5 to 10

DIAGNOSIS: This species is distinguished from *Euseius caseariae* De Leon by the longer L_4 , macrosetae Sge III is knobbed setaceous while *caseariae* is setaceous, and the spermatheca is not as constricted as in *caseariae*.

FEMALE: Length 322 μ ; width at L_4 213 μ . Dorsal scutum smooth with several small pores and 17 pairs of setae. Measurements of setae: verticals 32 μ ; D_1 and D_2 10 μ , D_3 14 μ , D_4 11 μ ; clunals 5 μ ; L_1 41 μ , L_2 17 μ , L_3 31 μ , L_4 50 μ , L_5 15 μ , L_6 16 μ , L_7 18 μ , L_8 63 μ ; M_1 8 μ , M_2 11 μ , M_3 12 μ ; anterior sublaterals 14 μ ; posterior sublaterals 11 μ . Sternal scutum smooth and about as wide as long. Ventrianal scutum shield-shaped with 3 pairs of preanal setae. Peritreme extends forward to between L_1 and L_2 . Chelicerae normal, but number of denticules cannot be seen. Leg formula 4123. Macrosetae present on Sge II, Sge III, and Sge IV. Length of macrosetae on leg IV as follows: Sge IV 39 μ , Sti IV 30 μ , and St IV 52 μ . Genu II 2, $\frac{2,2}{0}$, 1; Genu III 1, $\frac{2,2}{1}$, 1. Spermatheca tubular.

MALE: Smaller than female and the sublateral setae on the dorsal scutum. Ventrianal scutum with 3 pairs of preanal setae and a pair of pores. The spermatodactyl has terminal heel (foot usually terminal in this genus).

TYPE: Female holotype from San Lorenzo, Paraguay, July 1968 (Braulio Ramon Aranda Centurion), on *Citrus* sp., in FSCA, Gainesville, Florida.

Male allotype from Carandayty, Paraguay, 13 January 1969 (Braulio Ramon Aranda Centurion), on *Citrus* sp. Paratypes: 1 female taken with the holotype; 2 females and 1 male at Coronel Oviedo, Paraguay, 11 January 1969, on *Zea mays*; 1 female at Lambare, Paraguay, 12 July 1968, on

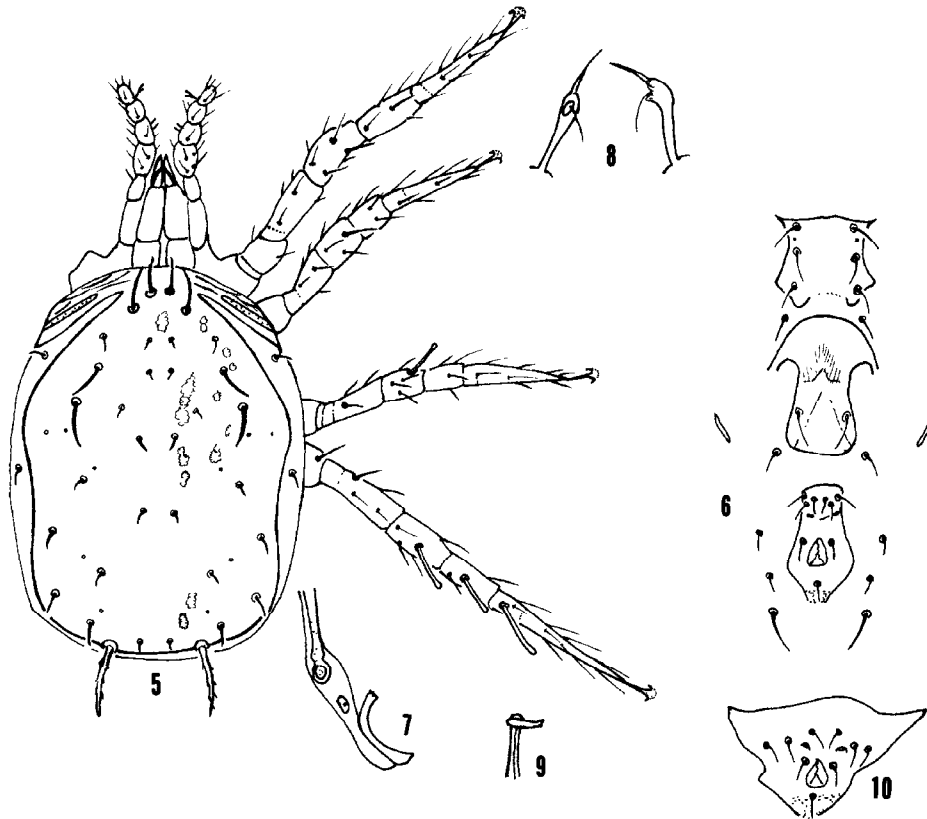


Fig. 5 to 10. Female *Euseius flechtmanni* Denmark and Muma n. sp. 5. Dorsal and leg structure and setation. 6. Ventral scuta and setation. 7. Posterior peritremal and stigmatal development. 8. Spermathecal structures (two views). 9. Male spermatodactyl structure. 10. Ventrianal scutum.

Manihot esculenta Crantz.; Coronel Oviedo, Paraguay, 11 January 1969, on *Manihot esculenta* Crantz.; Cecilio Baez, Paraguay, 8 January 1969, on *Citrus* sp.; Carandayty, Paraguay, 13 January 1969, on *Psidium guajava*; Cecilio Baez, Paraguay, 6 January 1969, on *Campomanesia rhombea* Berg. All collections were made by Braulio Ramon Aranda Centurion.

DISCUSSION: Nothing is known about the food habits of this species.

Euseius paraguayensis Denmark & Muma n. sp.

Fig. 11 to 16

DIAGNOSIS: Distinguished from all other known species of the *sibelius* group by comparative lengths of dorsal scutal setae and length of the spermatheca which is short and distinct.

FEMALE: Length 319μ ; width at L_4 227μ . Dorsal scutum reticulate with several small pores and 17 pairs of setae. Measurements of setae: verticals 26μ ; D_1 and D_2 13μ , D_3 15μ , D_4 15μ ; clunals 5μ ; L_1 20μ , L_2 17μ , L_3 19μ , L_4 24μ , L_5 20μ , L_6 24μ , L_7 22μ , L_8 63μ ; M_1 15μ , M_2 17μ , M_3 19μ ; anterior sublaterals 14μ ; posterior sublaterals 11μ . Sternal scutum smooth and slight-

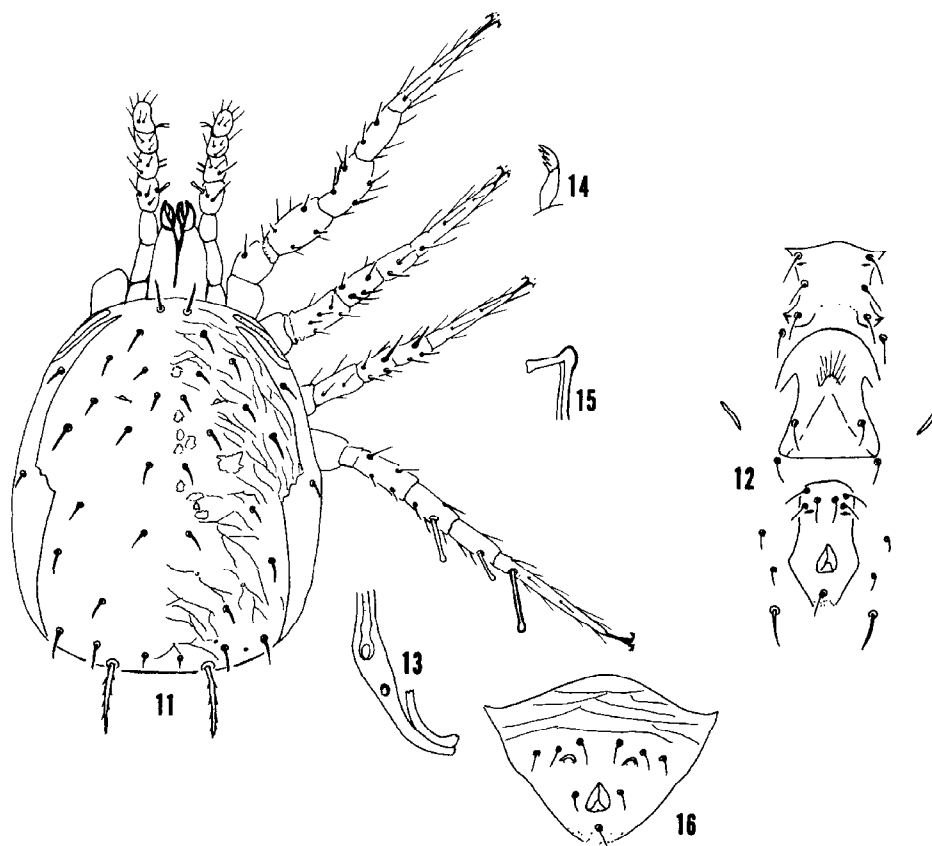


Fig. 11 to 16. Female *Euseius paraguayensis* Denmark and Muma n. sp. 11. Dorsal and leg structure and setation. 12. Ventral scuta and setation. 13. Posterior peritremal and stigmatal development. 14. Spermathecal structures. 15. Male spermatodactyl structure. 16. Male ventrianal scutum.

ly longer than wide. Ventrianal scutum elongate shield-shaped with 3 pairs of preanal setae and a pair of preanal pores. Peritreme extends between L_1 and L_2 . Chelicerae normal, but denticules indistinct. Leg formula 4123. Macrosetae present on Sge II, Sge III, and Sge IV. Length of macrosetae on leg IV as follows: Sge IV 41μ , Sti IV 24μ , and St IV 50μ . Genu II $2, \frac{2,2}{0}, 1$; Genu III $1, \frac{2,2}{0}, 1$. Spermatheca tubular.

MALE: Smaller than female, sublateral setae on the dorsal scutum. Ventrianal scutum with 3 pairs of preanal setae and a pair of pores. The spermatodactyl has terminal heel (foot usually terminal in this genus).

TYPE: Female holotype from Cecilio Baez, Paraguay, 1 January 1969, on *Citrus* sp. Male allotype from San Lorenzo, Paraguay, July 1968, on *Cycas revoluta* Thunb. in FSCA, Gainesville, Florida. Paratype female from Carandaty, Paraguay, 13 January 1969, on *Citrus* sp. All collections were made by Braulio Ramon Aranda Centurion.

Genus *Galendromus* Muma 1961

Galendromus Muma 1961:68.

Type: *Typhlodromus floridanus* Muma 1955, by original designation.

DIAGNOSIS: Females characterized by a reticulate dorsal scutum with 4 pairs of dorsal setae, 2 pairs of median setae, 9 pairs of simple or plumose lateral setae, 1 pair of anterior sublateral setae, 2 pairs of sternal setae, 4 pairs of preanal ventrianal setae, 1 or 2 pairs of ventrolateral setae, and a pair of caudal setae; 0 or 1 macroseta on St IV; legs I, II, and III without macrosetae or modified setae; leg formulae 1423 or 4123; peritreme variable in length from a point between L_3 and L_4 to the verticals, peritremal and stigmatal scuta indistinguishably fused; spermatheca with a tubular, vesicular, or fundibuliform cervix and a nodular or undifferentiated atrium; chelicerae normal; movable cheliceral finger with 0 or 1 denticule and fixed cheliceral finger with 1 to 3 denticules.

Males are similar to females, but smaller. Setation of the ventral scuta of both sexes is highly variable (Muma 1963).

DISCUSSION: This genus is found from Canada to Chile. It is usually taken on trees, shrubs, and vines.

One very poorly preserved specimen belonging to this genus was collected at Carandayty, Paraguay, 13 January 1969 (Braulio Ramon Aranda Centurion), on *Ilex paraguariensis*. It is recorded here for extension of the known distribution of the genus. The specimen is a male so a sub-generic placement cannot be made with certainty.

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