

# PHYTOSEIIDAE OF THE GALÁPAGOS ISLANDS (Acarina : Mesostigmata)

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*Abstract* : This group was previously unrecorded from the Galápagos. Seventeen species are recorded, including 11 new species. A key to all the species is presented.

Phytoseiid mites were not known to be present in the Galápagos Archipelago, although a single species was recorded from the mainland of Ecuador, prior to the University of California's 1964 Galápagos International Scientific Project.<sup>1</sup> Seventeen species were collected on this expedition, although most of the collecting was concentrated within a small area in the vicinity of the Darwin Research Station. Considering that there were no collections made from the greater part of Isla Santa Cruz, or from most of the other islands, including Isla Isabella, which is the largest, it may be supposed that a much larger number of species undoubtedly occurs in the Galápagos.

Although many plant species have been introduced, especially to Isla Santa Cruz, only a few of the phytoseiids appear to be described species. However, the Central American fauna is not well known, and essentially nothing is known of the fauna of northern South America. Considerable collecting on the continent will be required before an endemic status can be accepted for any of the Galápagos species.

The specimens were collected by me unless otherwise noted. The material, including types, is deposited in the Acarina Collection of the Department of Entomology, University of California, Davis.

The classification of species, and the terminology of anatomical features, is that discussed either in Schuster & Pritchard (1963)<sup>2</sup> or González & Schuster (1962). Previously known species that recently have not been redescribed are emended to include the same characters as described for the proposed species.

## KEY TO FEMALES OF GALÁPAGOS PHYTOSEIIDS

1. Six prolateral setae present between vertical seta and postsubmarginal seta ..... 2  
Four prolateral setae present between vertical seta and postsubmarginal  
seta ..... 6

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1. Supported in part by National Science Foundation grant GE 2370 to the University of California.  
2. Except for the correction of *Neoseiulus* Hughes to *Mumaseius* De Leon,

- 2 (1). Prolateral seta II similar in length to other prolateral setae; 2 or more postlateral setae present ..... 3  
 Prolateral seta II much shorter than I or III, only 1 postlateral seta (Pl. V) present..... 17. *Pennaseius rhabdifer*
- 3 (2). Two or 3 pairs postlateral setae present..... 4  
 Four pairs postlateral setae present ..... 5
- 4 (3). Two pairs postlateral setae present ..... 3. *Typhloseiopsis conspicua*  
 Three pairs postlateral setae present ..... 4. *Metaseiulus longipilus*
- 5 (3). Three pairs preanal setae..... 1. *Mumaseius foraminosus*\*  
 Four pairs preanal setae ..... 2. *Mumaseius evectus*\*
- 6 (1). Genu II with 8 setae; spermatheca with short, cup-shaped cervix..... 7  
 Genu II with 7 setae; spermatheca with elongate cervix ..... 10
- 7 (6). No lateral seta more than 3× length of another..... 8  
 Some lateral setae over 5× length of another..... 9
- 8 (7). Postsubmarginal seta on membrane; preanal pores directly behind 3rd pair of preanal setae ..... 7. *Amblyseius cavagnaroi*\*  
 Postsubmarginal seta on dorsal shield; preanal pores directly between 3rd pair preanal setae ..... 5. *Iphiseius papenfussi*\*
- 9 (7). Ventrianal pores directly between 3rd pair of preanal setae; ventrianal plate wider than long ..... 6. *Iphiseius exitus*\*  
 Ventrianal pores obliquely behind 3rd pair of preanal setae; ventrianal plate longer than wide..... 8. *Amblyseius asetus*
- 10 (6). Dorsal setae mostly thick with bluntly rounded apices..... 11  
 Dorsal setae slender, acuminate ..... 12
- 11 (10). Dorsal setae of subequal length..... 10. *Amblyseius pegasus*\*  
 Dorsal setae of diverse lengths..... 15. *Amblyseius tubus*\*
- 12 (10). Major duct of spermatheca distended, sclerotized..... 9. *Amblyseius corycus*\*  
 Major duct of spermatheca cylindrical, of uniform diameter..... 13
- 13 (12). Prolateral setae II and III both longer than 10μ; 1 pair of metapodal platelets present..... 14  
 Prolateral seta II, or II and III shorter than 10μ; 2 pairs of metapodal platelets present ..... 15
- 14 (13). One pair of metapodal platelets present; prolateral setae II and III shorter than I and IV ..... 14. *Amblyseius incognitus*\*  
 Two pairs of metapodal platelets present; prolateral setae I-IV subequal in length..... 16. *Amblyseius spinigerus*
- 15 (13). Vertical setae at least 70% length of prolateral seta I; basitarsus of leg IV with 1 ventral seta 1/3 length of other..... 13. *Amblyseius lassus*\*  
 Vertical seta less than 70% length of prolateral seta I; basitarsus IV with 1 ventral seta at least 2/3 length of other ..... 16
- 16 (15). Prolateral seta III longer than II; atrium of spermatheca conspicuous, campaniform, oriented at right angles to cervix..... 11. *Amblyseius invictus*\*  
 Prolateral seta III not longer than II, usually distinctly shorter; atrium of spermatheca wider than cervix but oriented along axis of cervix 12. *Amblyseius aeralis*

\* Described as new

1. *Mumaseius foraminosus* Schuster, n. sp. Pl. I, Figs. 1-6.

♀. Chelicera probably relatively simple. Dorsal shield 320  $\mu$  long, 210  $\mu$  wide. Vertical setae 25  $\mu$ ; dorsocentral I 34  $\mu$ , II 40  $\mu$ , III 52  $\mu$ , IV 55  $\mu$ ; clunal 9  $\mu$ ; prolateral I 47  $\mu$ , II 25  $\mu$ , III 50  $\mu$ , IV 55  $\mu$ , V and VI 60  $\mu$ ; postlateral I 60  $\mu$ , II 50  $\mu$ , III 45  $\mu$ , IV 60  $\mu$ ; promediolateral 40  $\mu$ ; postmediolateral 60  $\mu$ ; sublaterals 40  $\mu$ ; all setae minutely barbed. Pores present anterior to postlateral setae, mesad to prolateral IV, posteromesad to prolateral VI. Dorsal shield entirely micropunctate (micropunctures discernible with difficulty unless observed by phase contrast). Peritreme extends near to base of prolateral I. Third pair of sternal setae separate from sternal plate. Metasternal platelets small, each one about 4 $\times$  area of setal insertion. Genital plate 70  $\mu$  wide. Ventrianal plate 100  $\mu$  long, 75  $\mu$  wide, with 3 pairs of preanal setae, without pores. Metapodal platelet 22  $\mu$  long. Sclerotic cervix of spermatheca 8  $\mu$  long. Leg II with 7 setae on genu. Leg IV with distally enlarged macrosetae on basitarsus 50  $\mu$ , tibia 25  $\mu$ , genu 38  $\mu$ .

♂. Ventrianal plate with 3 pairs of preanal seta, without pores. Chelicera with fixed member distally tridentate, the apical and basal teeth longer and pointed, the middle tooth rounded, shorter; movable member with single sharp, somewhat recurved tooth.

Holotype ♀, 2♀ and 4♂ paratopotypes, Isla Santa Cruz, Darwin Research Station near seismic station, 29.I.1964, in a lichen, *Roccella babingtonii* Mont.

This species is most closely related to *transvaalensis* (Nesbitt), differing mainly in the longer 4th postlateral seta, and in the presence of a specialized macroseta on leg IV. The micropunctate condition of the dorsal shield has been noted previously for *Amblyseius ornatus* Athias-Henriot.

2. *Mumaseius evectus* Schuster, n. sp. Pl. I, Figs. 7-14.

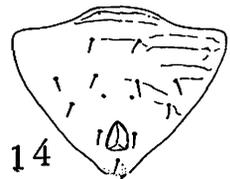
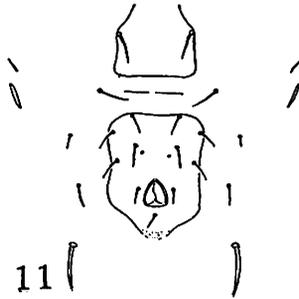
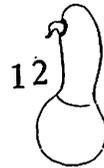
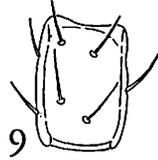
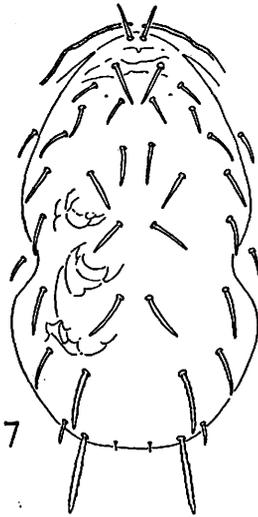
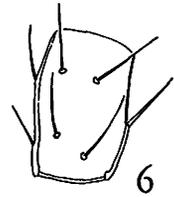
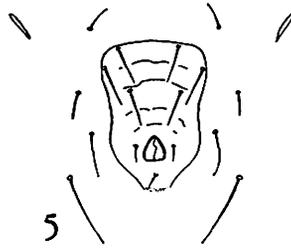
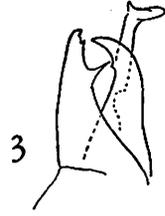
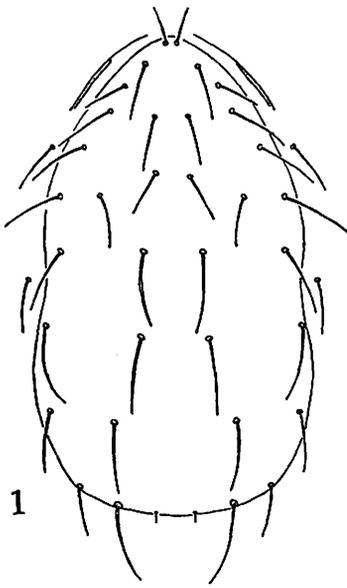
♀. Chelicera with apex of fixed member tridentate, movable member with 2 small teeth distad to middle. Dorsal shield 275  $\mu$  long, 170  $\mu$  wide. Vertical setae 23  $\mu$ ; dorsocentral I 20  $\mu$ , II 22  $\mu$ , III 28  $\mu$ , IV 34  $\mu$ ; clunal 8  $\mu$ ; prolateral I 28  $\mu$ , II 18  $\mu$ , III 28  $\mu$ , IV 30  $\mu$ , V 31  $\mu$ , VI 34  $\mu$ , postlateral I 34  $\mu$ , II 31  $\mu$ , III 29  $\mu$ , IV 52  $\mu$ ; promediolateral 25  $\mu$ ; postmediolateral 45  $\mu$ ; sublaterals 25  $\mu$ ; postmediolateral and postlateral V serrate. Peritreme extends to vertical setae. Third pair of sternal setae separate from sternal plate. Metasternal platelets obscure or absent. Genital plate 60  $\mu$  wide. Ventrianal plate 93  $\mu$  long, 75  $\mu$  wide, with 4 pairs of preanal setae, with pores posteromesad to 4th pair of setae. Primary metapodal platelet 21  $\mu$  long, 3  $\mu$  wide, secondary 12  $\mu$  long, 1  $\mu$  wide. Many very small platelets (not illustrated) present on membrane around ventrianal plate. Cervix of spermatheca 17  $\mu$  long, with atrium subapical. Leg II with 7 setae on genu. Leg IV without macrosetae.

♂. Ventrianal plate with 4 pairs of preanal setae and a pair of pores. Spermatodactyl essentially monaxial with convoluted apex.

Holotype ♀, 17 ♀ and 8♂ paratopotypes, Isla Santa Cruz, Darwin Research Station, 27. I.1964, on leaves of *Cordeia lutea* at rear of laboratory building, and 2 paratype ♀♀ on *Hibiscus tiliaceus* growing near the tortoise enclosure, same date.

This species is related to *M. bakeri* (Garman) from which it differs by lacking a macroseta on basitarsus IV, and by the shape of the spermatheca. It is similar also to *kuzini*

Pl. I



Wainstein, but *kuzini* has shorter setae and the postmediolateral, and 4th postlateral setae are simple.

3. *Typhloseiopsis conspicua* (Garman) Pl. II, Figs. 1-4.

This species is found throughout North America and is well defined in literature. A closely related species, *tropicus* (Chant), has been recorded from Guailabamba, Ecuador, and from Central America. It differs from *conspicua* in that the 2 postlateral setae are subequal in length.

A single specimen was collected from lichen near the top of Isla Wolf, 31.I.1964, on *Croton* stems, by D. Q. Cavagnaro.

4. *Metaseiulus longipilus* (Nesbitt) Pl. IX, Figs. 4-9.

♀. Chelicera not positioned laterally, relatively simple. Dorsal shield 320  $\mu$  long, 150  $\mu$  wide. Vertical setae 22  $\mu$ ; dorsocentral I 35  $\mu$ , II 48  $\mu$ , III 58  $\mu$ , IV 58  $\mu$ ; clunal 8  $\mu$ ; prolateral I 48  $\mu$ , II 52  $\mu$ , III 42  $\mu$ , IV 52  $\mu$ , V 58  $\mu$ , VI 61  $\mu$ ; postlateral I 63  $\mu$ , II 54  $\mu$ , III 57  $\mu$ ; promediolateral 51  $\mu$ ; postmediolateral 60  $\mu$ ; prosublateral 42  $\mu$ ; all longer setae weakly but distinctly serrate on exterior side. Peritreme 82  $\mu$  long, extends to level of sublateral seta. Third pair of sternal setae separate from sternal plate. Metasternal platelets small, each one about 4 $\times$  area of setal insertion. Genital plate 57  $\mu$  wide. Ventrianal plate 108  $\mu$  long  $\times$  64  $\mu$  wide, with 4 pairs of preanal setae and a pair of preanal pores. Primary metapodal platelet 17-20  $\mu$  long, 4-6  $\mu$  wide; secondary approximately 7  $\mu$   $\times$  3  $\mu$ . Cervix and atrium of spermatheca 34  $\mu$  long, the major duct shorter, nearly as wide. Leg II with 8 setae on genu. Leg IV with longest seta of basitarsus 25  $\mu$ .

♂. Dorsal shield 250  $\mu$  long  $\times$  130  $\mu$  wide. Peritrematal plate continuous with dorsal shield forward from rear margin of coxa II, and bears the sublateral seta. Ventrianal plate with 4 pairs of preanal setae and a pair of pores. Chelicera, as illustrated.

3♀♀ and 1♂, Isla Santa Cruz, 4.II.1964, on ?*Arum*, at the 120 m level of the new trail to Bella Vista, E. G. Linsley.

These specimens were determined to be conspecific with specimens of *longipilus* from North Carolina and Indiana. Chant (1965) lists localities in Central America. The presence of 8 setae on genu II allows easy distinction between the similar appearing species *longipilus* and *floridanus* (Muma) which have 7 setae on the genu. The longer peritreme separates *longipilus* from *occidentalis* (Nesbitt), the common species in western North America.

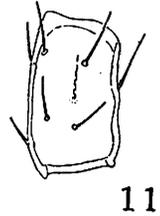
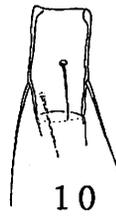
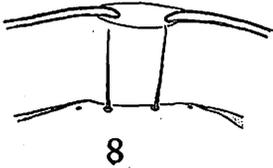
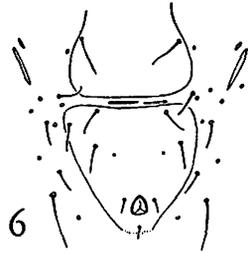
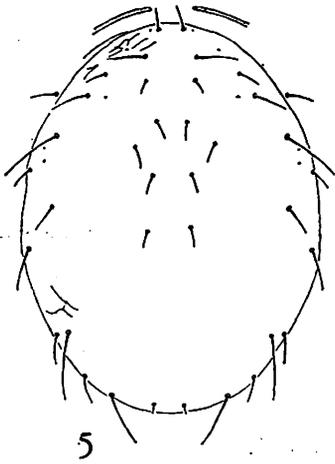
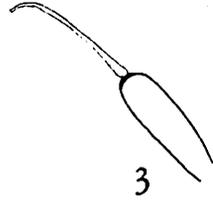
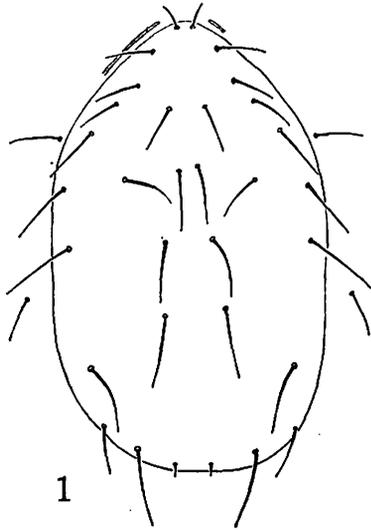
5. *Iphiseius papenfussi* Schuster, n. sp. Pl. II, Figs. 5-11.

♀. Chelicera with 2 large, subapical teeth on fixed member, 1 small tooth on movable member. Dorsal shield 350  $\mu$  long, 240  $\mu$  wide, anterolateral angles reticulate. Vertical setae 19  $\mu$ ; dorsocentral I, II, III 14  $\mu$ , IV 19  $\mu$ ; clunal 11  $\mu$ ; prolateral I 25  $\mu$ , II?, III

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Plate I. Figs. 1-6. *Mumaseius foraminosus* n. sp.: 1, ♀ dorsum; 2, spermatheca; 3, ♂ chelicera; 4, ♂ ventrianal plate; 5, ♀ ventrianal plate; 6, genu II dorsal. Figs. 7-14. *Mumaseius evectus* n. sp.: 7, ♀ dorsum; 8, ♀ chelicera; 9, genu II dorsal; 10, ♀ ventrianal plate (aberrant); 11, ♀ ventrianal plate; 12, spermatheca; 13, ♂ chelicera; 14, ♂ ventrianal plate.

Pl. II



32  $\mu$ , IV 59  $\mu$ ; postlateral I 23  $\mu$ , II 39  $\mu$ , III 25  $\mu$ , IV 25  $\mu$ , V 50  $\mu$ ; promediolateral 14  $\mu$ ; postmediolateral 63  $\mu$ ; prosublateral 21  $\mu$ ; postsublateral (on dorsal shield) 13  $\mu$ ; all setae smooth. Peritreme extends to vertical setae. Metasternal platelets rounded, 13  $\mu$  long, 11  $\mu$  wide. Genital plate 100  $\mu$  wide. Ventrianal plate 110  $\mu$  long  $\times$  115  $\mu$  wide, with 3 pairs of preanal setae and a pair of pores mesad and slightly posterior to 3rd setae. Thin, transverse platelet present between genital and ventrianal plates. Primary metapodal platelet 34  $\mu$  long, very thin; secondary platelet 6  $\mu$  long. Seven or 8 pairs of minute platelets present on venter. Cervix and atrium of spermatheca with combined length of 14  $\mu$ . Leg II with 8 setae on genu. Macroseta on basitarsus IV 31  $\mu$ .

♂ unknown.

Holotype ♀, Isla Santa Cruz, 12.II.1964, along old trail to Bella Vista, in *Furcraea cubensis* litter at about 20 m. 1 ♀ paratype with a slightly longer (41  $\mu$ ) macroseta on basitarsus IV was collected on Plazas I. (near the E. coast of Isla Santa Cruz), 7.II.1964, by T. Papenfuss.

The peritrematal plate is very wide and heavily sclerotized and, unless the animal is quite flattened, there appears to be no lateral membrane anterior to legs IV. The prosublateral seta does, however, occur on membrane. The postsublateral seta is on the dorsal shield.

This species is unlike the other American *Iphiseius* in which most of the lateral setae are minute.

#### 6. *Iphiseius exitus* Schuster, n. sp. Pl. III, Figs. 1-5, 8.

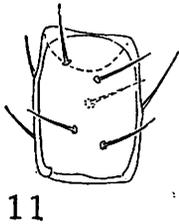
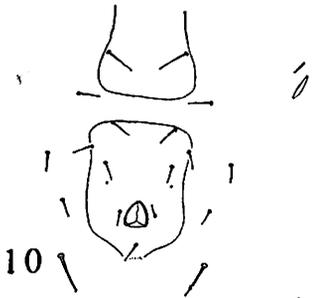
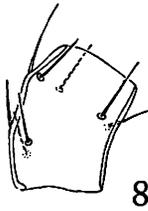
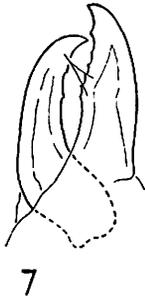
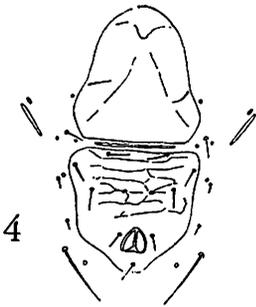
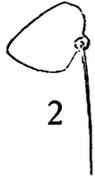
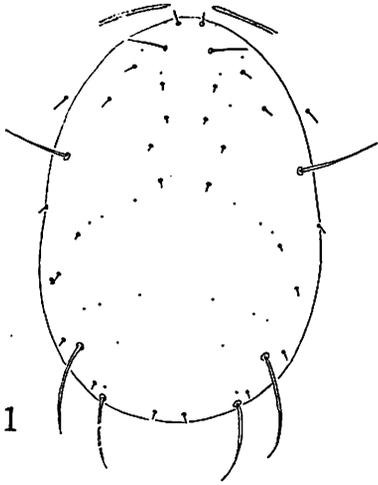
♀. Chelicera with 3 or 4 teeth between apex and pilus dentilis of fixed member, movable member with 2 teeth in distal half. Dorsum 350  $\mu$  long, 250  $\mu$  wide. Vertical setae 22  $\mu$ ; dorsocentral I, II, III 7-8  $\mu$ , (IV absent); clunal 8  $\mu$ ; prolateral I 39  $\mu$ , II, III, 11  $\mu$ , IV 72  $\mu$ ; postlateral I? 8  $\mu$ , II, III, IV 8  $\mu$ , V 75  $\mu$ ; promediolateral 7  $\mu$ ; postmediolateral 100  $\mu$ ; prosublateral 17  $\mu$ , postsublateral 10  $\mu$ , all setae smooth. Peritreme extends to vertical setae. Sternal plate bears 3 pairs of setae, metasternal platelets large. Genital plate 105  $\mu$  wide. Thin transverse platelet present between genital and ventrianal plates. Ventrianal plate 110  $\mu$  long, 115  $\mu$  wide, with 3 pairs of preanal setae and a pair of pores between 3rd pair of setae. Primary metapodal platelet 30  $\mu$  long, secondary 5  $\mu$ . Cervix of spermatheca 10  $\mu$ , atrium 8  $\mu$ . Leg II with 8 setae on genu. Leg IV with macrosetae on basitarsus 37  $\mu$ , tibia 23  $\mu$ , genu 37  $\mu$ .

♂ unknown.

Holotype ♀, Isla Santa Cruz, Darwin Research Station, 29.I.1964, extracted from grass with roots and soil. The occurrence of the prosublateral setae on membrane is not characteristic of the genus *Iphiseius*, and the presence of the postsublateral setae on the dorsal shield distinguishes this species from many species in the genus *Amblyseius* which have, otherwise, very similar setal patterns.

Plate II. Figs. 1-4. *Typhloseiopsis conspicua*, ♀ : 1, dorsum; 2, chelicera; 3, spermatheca; 4, ventrianal plate. Figs. 5-11. *Iphiseius papenfussi* n. sp., ♀ : 5, dorsum; 6, ventrianal plate; 7, chelicera; 8, extent of peritrematal plate and membrane with vertical setae as reference; 9, spermatheca; 10, basitarsus IV; 11, genu II dorsal.

Pl. III



7. *Amblyseius cavagnaroi* Schuster, n. sp. Pl. III, Figs. 6, 7, 9-12.

♀. Chelicera with 3 teeth between apex and pilus dentilis of fixed member, 2 teeth in distal half of movable member. Dorsal shield 300  $\mu$  long, 200  $\mu$  wide. Vertical setae 24  $\mu$ ; dorsocentral I-IV 13  $\mu$ ; clunal 8  $\mu$ ; prolateral I 24  $\mu$ , II 22  $\mu$ , III 16  $\mu$ , IV 14  $\mu$ , V 38  $\mu$ ; promedialateral 13  $\mu$ ; postmedialateral 28  $\mu$ ; pro- and postsublateral 16  $\mu$ ; all setae smooth. Peritreme extends to vertical setae. Sternal seta III on posterolateral extension of sternal plate. Metasternal setae on oblong platelets, each about 4 $\times$  area of setal insertion. Genital plate 70  $\mu$  wide, with 3 pairs of preanal setae, with a pair of pores directly behind 3rd setae. Primary metapodal platelets 17  $\mu$  long, secondary 13  $\mu$ . Cervix and atrium of spermatheca with combined length of 20  $\mu$ . Leg II with 8 setae on genu. Leg IV with macrosetae on basitarsus 42  $\mu$ , genu 30  $\mu$ .

♂ unknown.

Holotype ♀ and 3 paratopotypes, Isla Pinzon, 7.II.1964, lichen on summit area, D. Q. Cavagnaro.

The setal pattern of this species approximates that of *A. aequisetus* Wainstein. The chelicera of *aequisetus* is figured with 2 or 3 teeth grouped subapically on the fixed member and a single tooth on the movable, whereas, in this species, the teeth of the fixed member are not grouped and the movable member has 2 teeth.

8. *Amblyseius asetus* (Chant) Pl. IV, Figs. 1-7.

♀. Chelicera with large subapical tooth and 4-5 obscure, low, rounded denticles on fixed member. Dorsal shield 350  $\mu$  long, 245  $\mu$  wide. Vertical setae 27  $\mu$ ; dorsocentral I, II, III 5-6  $\mu$ ; clunal 8  $\mu$ , V 75  $\mu$ ; promedialateral 5  $\mu$ , postmedialateral 71  $\mu$ ; prosubmarginal 16  $\mu$ ; postsubmarginal 10  $\mu$ ; all setae smooth. Peritreme extends to vertical seta. Sternal shield bears 3 pairs of sternal setae. Metasternal platelets narrow at anterior pore, expanding to greatest width opposite seta, total area 7 or 8  $\times$  that of setal insertion. Genital plate 83  $\mu$  wide. A very thin, inconspicuous transverse platelet present between genital and ventrianal plates. Ventrianal plate 118  $\mu$  long, 100  $\mu$  wide, with 3 pairs of preanal setae, with a pair of pores widely spaced obliquely behind 3rd setae or more closely spaced and between setae. Primary metapodal platelet 21  $\mu$  long, secondary 10  $\mu$ . Spermatheca with combined length of cervix and atrium 13  $\mu$ . Leg II with 8 setae on genu. Leg IV with macrosetae on basitarsus 59  $\mu$ , tibia 28  $\mu$ , genu 44  $\mu$ .

♂. Ventrianal plate with 3 pairs of preanal setae and a pair of pores obliquely behind 3rd setae.

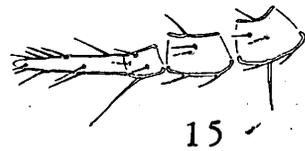
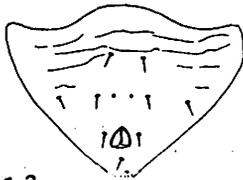
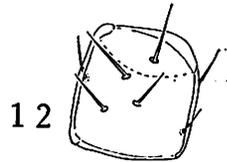
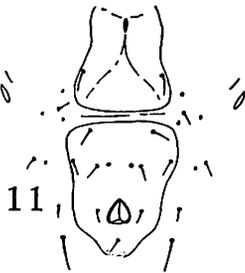
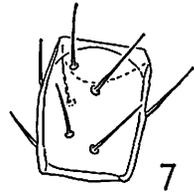
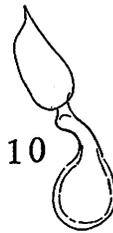
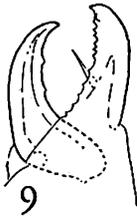
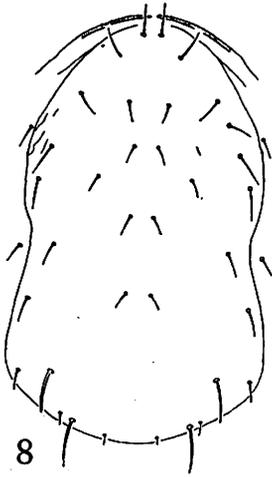
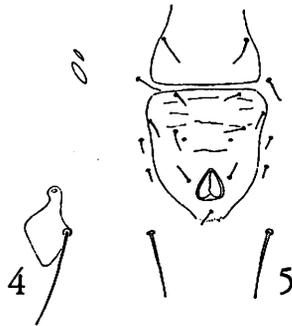
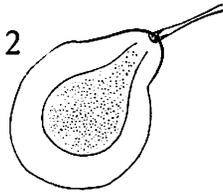
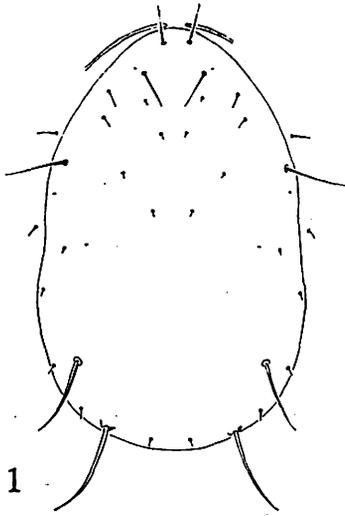
2♀♀, 1♂, Isla Santa Cruz, Darwin Research Station, 29.I.1964, removed by Berlese Funnel from grass including the roots and soil.

These specimens differ from the type, mainly with respect to setal lengths. For example, the macroseta of genu II is somewhat shorter, and postlateral V is much shorter. Presently the Galápagos specimens are arbitrarily assigned to *asetus*, but their status should be

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Plate III. Figs. 1-5, 8. *Iphiseius exitus* n. sp. ♀ : 1, dorsum; 2, metasternal platelet; 3, leg IV; 4, ventrianal and genital plates; 5, spermatheca; 8, genu II. Figs. 6-7, 9-12. *Amblyseius cavagnaroi* n. sp. ♀ : 6, dorsum; 7, chelicera; 9, spermatheca; 10, ventrianal plate; 11, genu II; 12, leg IV.

PL. IV



re-examined when adequate series become available, either from North America or from the Galápagos.

9. *Amblyseius corycus* Schuster, n. sp. Pl. IV, Figs. 8-15; Pl. V, Figs. 1, 2.

♀. Chelicera appearing a little too large for the size of animal with both members about 50  $\mu$  long; 10 teeth on ramus of fixed member, 2 teeth on movable member. Dorsal shield 290  $\mu$  long, 155  $\mu$  wide. Vertical setae 17  $\mu$ ; dorsocentral I-IV 13  $\mu$ -14  $\mu$ ; clunal 7  $\mu$ ; prolateral I 18  $\mu$ , II 14  $\mu$ , III 17  $\mu$ , IV 22  $\mu$ ; postlateral I 18  $\mu$ , II 19  $\mu$ , III 13  $\mu$ , IV 7  $\mu$ , V 34  $\mu$ ; promedialateral 13  $\mu$ ; postmedialateral 29  $\mu$ , pro- and postsubmarginals 12  $\mu$ ; all setae smooth. Peritreme extends to vertical setae. Sternal plate bears 3 pairs of setae. Metasternal platelets 11  $\mu$  long, slightly wider posteriorly, each about 10 $\times$  area of setal insertion. Genital plate 65  $\mu$  wide. Ventrianal plate 85  $\mu$  long, 80  $\mu$  wide, with 3 pairs of preanal setae and a pair of pores between 3rd setae. Primary and secondary metapodal platelets 12  $\mu$  long, secondary narrower than primary. Spermatheca with cervix 22  $\mu$  long, atrium set at right angles, major duct swollen 28  $\mu$  long. Leg II with 7 setae on genu. Leg IV with macrosetae on basitarsus 34  $\mu$ , genu 25  $\mu$ .

♂. Ventrianal plate with 3 pairs of preanal setae, with a pair of pores directly in front of anus and in line with last central pair of setae.

Holotype ♀ and 2 paratypes, Isla Santa Maria, 6.II.1964, in moss, ca 250 m, C. B. Koford; 2 paratypes, Isla Pinzon, 7.II.1964, summit area, in mixture of *Pseudocypbellaria aurata* (Ach.) Vain, *Teloschistes flavicans* (SW.) Norm., *Usnea* sp., and *Frullania* sp., D. Q. Cavagnaro. 11 paratypes, Isla Santa Cruz, 17.II.1964, Miconia zone, 400 m, in mixture of *Sticta weigellii* (Ach.) Vain., and *Cladonia ceratophylla* (SW.) Spreng.

A single larva from the Isla Pinzon collection is of the simplest type in that the dorsum has only a single pair of setae in the posterior region.

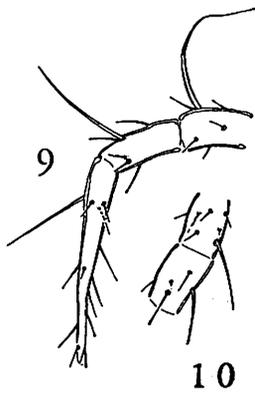
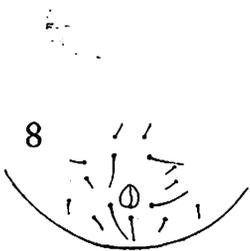
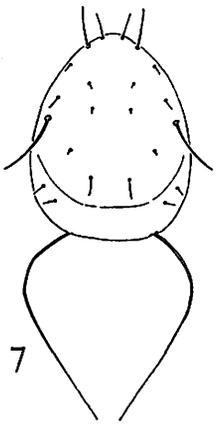
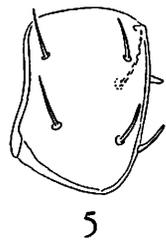
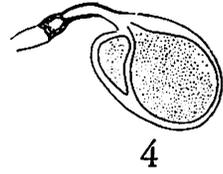
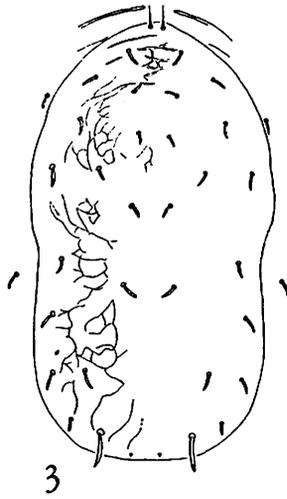
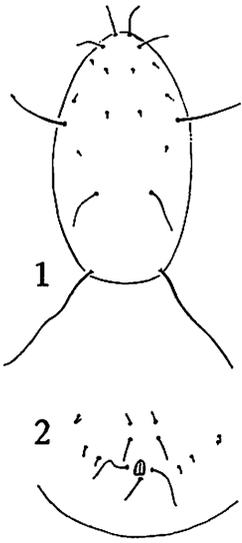
10. *Amblyseius pegasus* Schuster, n. sp. Pl. V, Figs. 3-6.

♀. Cheliceral dentation apparently with 6 teeth on fixed member, and at least 1 tooth on ramus of movable member. Dorsal shield 370  $\mu$  long, 220  $\mu$  wide. Vertical setae 23  $\mu$ ; dorsocentral I, II 8  $\mu$ , III 10  $\mu$ , IV 12  $\mu$ ; clunal 4  $\mu$ , prolateral I-IV 14  $\mu$ ; postlateral I 10  $\mu$ , II, III 14  $\mu$ ; IV 10  $\mu$ , V 30  $\mu$ ; promedialateral 8  $\mu$ ; postmedialateral 17  $\mu$ ; prosublateral 12  $\mu$ ; postsublateral 14  $\mu$ ; postlateral V minutely serrate. Peritreme extends to vertical setae. Sternal plate apparently bears setae III; metasternal setae apparently arise from membrane. Genital plate 100  $\mu$  wide. Ventrianal plate 90  $\mu$  long, 70  $\mu$  wide, with 3 pairs of preanal setae and a pair of pores located between, or very slightly behind 3rd setae. Primary metapodal platelet 21  $\mu$  long, secondary 6  $\mu$ . Cervix and atrium of spermatheca with combined length of 17  $\mu$ . Leg II with 7 setae on genu, one of these minute, peg-like. Leg IV without macrosetae.

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Plate IV. Figs. 1-7. *Amblyseius aetus*: 1, ♀ dorsum; 2, spermatheca; 3, ♂ ventrianal plate; 4, ♀ metapodal platelet; 5, ♀ ventrianal plate; 6, leg IV; 7, genu II. Figs. 8-15. *Amblyseius corycus* n. sp.: 8, ♀, dorsum; 9, chelicera; 10, spermatheca; 11, ♀ ventrianal plate; 12, genu II; 13, ♂ ventrianal plate; 14, ♂ chelicera; 15, leg IV.

Pl. V



♂ unknown, but mated condition of ♀ indicates a bisexual species. Holotype ♀, Isla Santa Cruz, 28.I.1964, Horneman Farm, 240 m, from corn roots and soil.

Genus II has 1 seta developed as a papillate sensory structure, and only 6 typical setae. This condition has not been described for any other species of *Amblyseius*, and serves to distinguish this species.

11. *Amblyseius invictus* Schuster, n. sp. Pl. V, Figs. 7-12; Pl. VI, Figs. 1-5.

♀. Chelicera with 10 teeth on ramus of fixed member, 2 teeth on movable member. Dorsal shield 365  $\mu$  long, 255  $\mu$  wide. Vertical setae 25  $\mu$ ; dorsocentral setae I-IV 6  $\mu$ ; clunal 8  $\mu$ ; prolateral I 50  $\mu$ , II 8  $\mu$ , III 10  $\mu$ , IV 100  $\mu$ ; postlateral I 6  $\mu$ , II-IV 8  $\mu$ , V 250  $\mu$ ; promediolateral 6  $\mu$ ; postmediolateral 120  $\mu$ ; prosubmarginal 16  $\mu$ ; postsubmarginal 6  $\mu$ ; all setae smooth. Peritreme extends to vertical setae. Sternal plate bears 3 pairs of setae. Metasternal platelet subrectangular, about 12 $\times$  area of setal insertion, with seta inserted about in center. Genital plate 80  $\mu$  wide. Ventrianal plate 115  $\mu$  long, 95  $\mu$  wide, with 3 pairs of preanal setae and a pair of slightly elliptical pores mesad and slightly posterior to 3rd setae. Primary metapodal platelet 24  $\mu$  long, 5  $\mu$  wide; secondary 9  $\mu$  long, 1  $\mu$  wide. Cervix and atrium of spermatheca with combined length of 22  $\mu$ ; atrium crescent-shaped with flared ends, somewhat subapical in position, oriented at right angles to axis of cervix. Tarsus I with 2 setae, each 54  $\mu$  long. Leg II with 7 setae on genu, one of the dorsal being longer (39  $\mu$ ). Leg III with macroseta on basitarsus 33  $\mu$ , tibia 40  $\mu$ , genu 54  $\mu$ . Leg IV with macrosetae on basitarsus 67  $\mu$ , tibia 87  $\mu$ , genu 100  $\mu$ .

♂ unknown.

Holotype ♀, Isla Santa Cruz, Darwin Research Station 31.I.1964, near dock, on mangrove leaves. 5 paratopotype ♀♀, 3.II.1964.

A larva, probably belonging to this species has the following characteristics: Dorsum 185  $\mu$  long. Vertical setae 25  $\mu$ ; prolateral I 36  $\mu$ , IV 63  $\mu$ , posterior seta 190  $\mu$ , all shorter setae 6-8  $\mu$ . Legs with distinct macroseta on genu I, tibia and genu II, and tibia and genu III, with that of genu III 50  $\mu$  long.

*A. invictus* has these distinctive features: Prolateral II is shorter than prolateral III, the cervix of the spermatheca is elongate and the atrium campaniform.

The three species, *Amblyseius lassus*, *invictus* and *aerialis* are closely related. *Amblyseius lassus* is the easiest to recognize because of its relatively narrow ventrianal plate, similar lengths of the dorsocentral and 1st prolateral setae, and by the dissimilar lengths of the ventral setae of basitarsus IV.

*Amblyseius invictus* and *aerialis* differ slightly in a number of characters, some of which are tabulated as follows:

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Plate V. Figs. 1-2. *Amblyseius corycus* n. sp. larva: 1, dorsum; 2, anal area. Figs. 3-6. *Amblyseius pegasus* n. sp. ♀: 3, dorsum; 4, spermatheca; 5, genu II; 6, ventrianal plate. Figs. 7-12. *Amblyseius invictus* n. sp.: 7, larva, dorsum; 8, larva, anal area; 9, ♀ leg IV; 10, ♀ leg III; 11, ♂ chelicera, 12, ♂ ventrianal plate.

	<i>invictus</i>	<i>aerialis</i>
Prolateral II	6-8 $\mu$	7-8 $\mu$
Prolateral III	10-13 $\mu$	5-7 $\mu$
Prolateral IV	100-117 $\mu$	100-135 $\mu$
Postlateral V	227-265 $\mu$	295-330 $\mu$
Postmediolateral	114-120 $\mu$	135-165 $\mu$
Macroseta genu II	50-53 $\mu$	59-65 $\mu$
Macroseta genu leg IV	110-132 $\mu$	130-150 $\mu$
Shortest ventral seta basitarsus IV	16-21 $\mu$	10-13 $\mu$
Peritrematal pore (opposite coxa IV)	lunate	circular

The setae of *invictus* are generally shorter. Exceptions are the prolateral setae II, and the ventral basitarsal seta. The peritreme of *invictus* is 28-40% the width of the peritrematal plate at a level between the vertical setae and prolateral setae I. For *aerialis* this figure is 22-25%. The cuticle of *aerialis* is more heavily sclerotized, and specimens were recovered in an arid zone. The less sclerotic *invictus* was recovered only in the moist, cool mangroves.

## 12. *Amblyseius aerialis* (Muma) Pl. VIII, Figs. 1-5.

♀. Chelicera with 2 subapical teeth and 9 large teeth spaced along inner ramus of fixed member, movable member with 4 teeth. Dorsum approximately 360  $\mu$  long, 290  $\mu$  wide. Vertical setae 34  $\mu$ ; dorsocentrals I-IV about 6  $\mu$ ; clunal 6  $\mu$ ; prolateral I 51  $\mu$ , II, III about 8  $\mu$ , IV 125  $\mu$ ; postlateral I 6  $\mu$ , II-IV 8  $\mu$ , V 335  $\mu$ ; promediolateral 6  $\mu$ ; postmediolateral 170  $\mu$ ; all setae simple. Sternal plate with 3 pairs of setae. Metasternal platelets 14  $\mu$  long, 8  $\mu$  wide, 8-10 $\times$  area of setal insertion. Genital plate 93  $\mu$  wide. Ventrianal plate 122  $\mu$  long, 96  $\mu$  wide, with 3 pairs of preanal setae and a pair of pores slightly behind 3rd setae. Primary metapodal platelet 29  $\mu$  long, 5  $\mu$  wide; secondary 13  $\mu$  or longer. Cervix and atrium of spermatheca with combined length of 35  $\mu$ , the atrium slightly swollen and opening more or less distally. Leg I with 2 setae near base of tarsus 48  $\mu$ . Leg II with macroseta on genu 42  $\mu$ ; leg III with macrosetae on tibia 37  $\mu$ , genu 63  $\mu$ . Leg IV with macrosetae on tarsus 75  $\mu$ , tibia 104  $\mu$ , genu 155  $\mu$ .

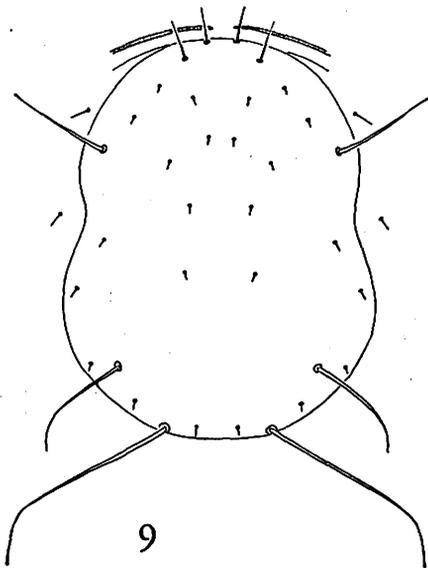
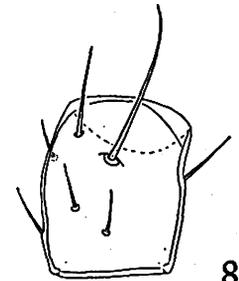
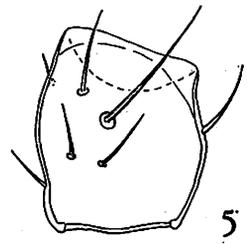
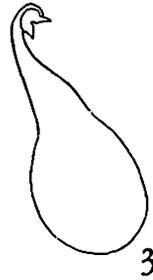
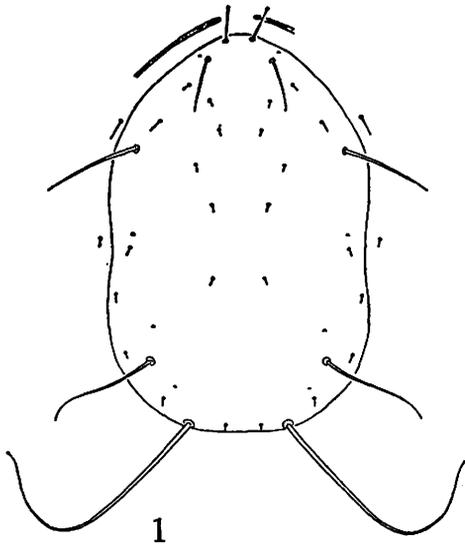
Three collections were obtained from Isla Santa Cruz, Darwin Research Station; east of dock, 3.II.1964, on mangrove leaves; at the station 25.I.1964, on rotting *Opuntia* at baranca below seismic station; and at the station, 24.I.1964, in alga on dead shrubs near shore of Academy Bay.

These specimens compare well with *aerialis* Muma except for a slight difference in the length of the macroseta on basitarsus IV. Characteristics of the spermatheca separates *aerialis* from *coffae* De Leon and *chiapensis* De Leon, both of which have a similar dorsal chaetotaxy.

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Plate VI. Figs. 1-5. *Amblyseius invictus* n. sp. ♀: 1, dorsum; 2, ventrianal plate; 3, spermatheca; 4, chelicera; 5, genu II. Figs. 6-11. *Amblyseius lassus* n. sp.: 6, ♂ ventrianal plate; 7, ♂ chelicera; 8, genu II; 9, ♀ dorsum; 10, spermatheca; 11, ventrianal and genital plates.

Pl. VI



13. *Amblyseius lassus* Schuster, n. sp. Pl. VI, Figs. 6-11; Pl. VII, Figs. 1-6.

♀. Chelicera with 10-11 large teeth on ramus of fixed member, possibly 2 small teeth on movable member. Dorsal shield 336  $\mu$  long, 270  $\mu$  wide. Vertical setae 30  $\mu$ ; dorso-central I-IV 6  $\mu$ ; clunal 8  $\mu$ ; prolateral I 41  $\mu$ , II-III 8  $\mu$ , IV 85  $\mu$ ; postlateral I 6  $\mu$ , II-IV 8  $\mu$ , V 222  $\mu$ ; promediolateral 6  $\mu$ ; postmediolateral 95  $\mu$ ; prosubmarginal 13  $\mu$ ; post-submarginal 8  $\mu$ ; all setae simple. Peritreme extends to vertical setae. Sternal plate bears 3 pairs of sternal setae. Metasternal platelet subrectangular, 8-9 $\times$  area of setal insertion, with 2/3 total area posterior to seta. Genital plate 80  $\mu$  wide, ventrianal plate 117  $\mu$  long 75  $\mu$  wide, with 3 pairs of preanal setae and a pair of pores obliquely behind 3rd setae. Primary metapodal platelet 22  $\mu$  long, secondary 16  $\mu$ . Spermatheca with combined length of cervix and atrium approximately 30  $\mu$ , with cervix and vesicle not distinctly differentiated. Leg I tarsus with 2 40  $\mu$  long setae near base. Leg II with 7 setae on genu, the longest dorsal seta 39  $\mu$ . Leg III with macrosetae on tibia 32  $\mu$ , genu 50  $\mu$ . Leg IV with macroseta on basitarsus 55  $\mu$ , tibia 60  $\mu$ , genu 90  $\mu$ .

♂. Ventrianal plate with 3 pairs of preanal setae, with a pair of pores separated by distance equal to that between one pore and its closest seta.

*Larva*. Chelicera with about 8 teeth on ramus of fixed member 3 on movable member. Dorsum 215  $\mu$  long. Vertical setae 30  $\mu$ ; prolateral I 32  $\mu$ , IV 65  $\mu$ ; posterior seta 200  $\mu$ ; obvious macroseta on genu II 38  $\mu$ , tibia III 50  $\mu$ , and genu III 55  $\mu$ .

*Protonymph*. Dorsum 215  $\mu$  long. Vertical setae 22  $\mu$ ; prolateral I 37  $\mu$ , IV 55  $\mu$ ; post-lateral V 32  $\mu$ ; postmediolateral 50  $\mu$ ; macrosetae on genu I 33  $\mu$ , genu II 33  $\mu$ , genu III 43  $\mu$ ; leg IV tarsus 80  $\mu$ , tibia 85  $\mu$ , genu 70  $\mu$ .

*Deutonymph*. Chelicera with same number of teeth as larva. Dorsum 255  $\mu$  long. Vertical setae 25  $\mu$ ; prolateral I 42  $\mu$ , IV 70  $\mu$ ; postlateral V 80  $\mu$ ; postmediolateral 70  $\mu$ . Macrosetae on leg IV tarsus 80  $\mu$ , tibia 75  $\mu$ ; genu 73  $\mu$ , similar to protonymph.

Holotype ♀, 2♀♀, 2♂♂, 1 deutonymph, 3 protonymph, and 1 larva paratype, Isla Santa Cruz, Darwin Research Station 24.I.1964, *Valesia glabra*, I. Wiggins.

The characteristics allowing recognition of this species are discussed under the description of *A. invictus*.

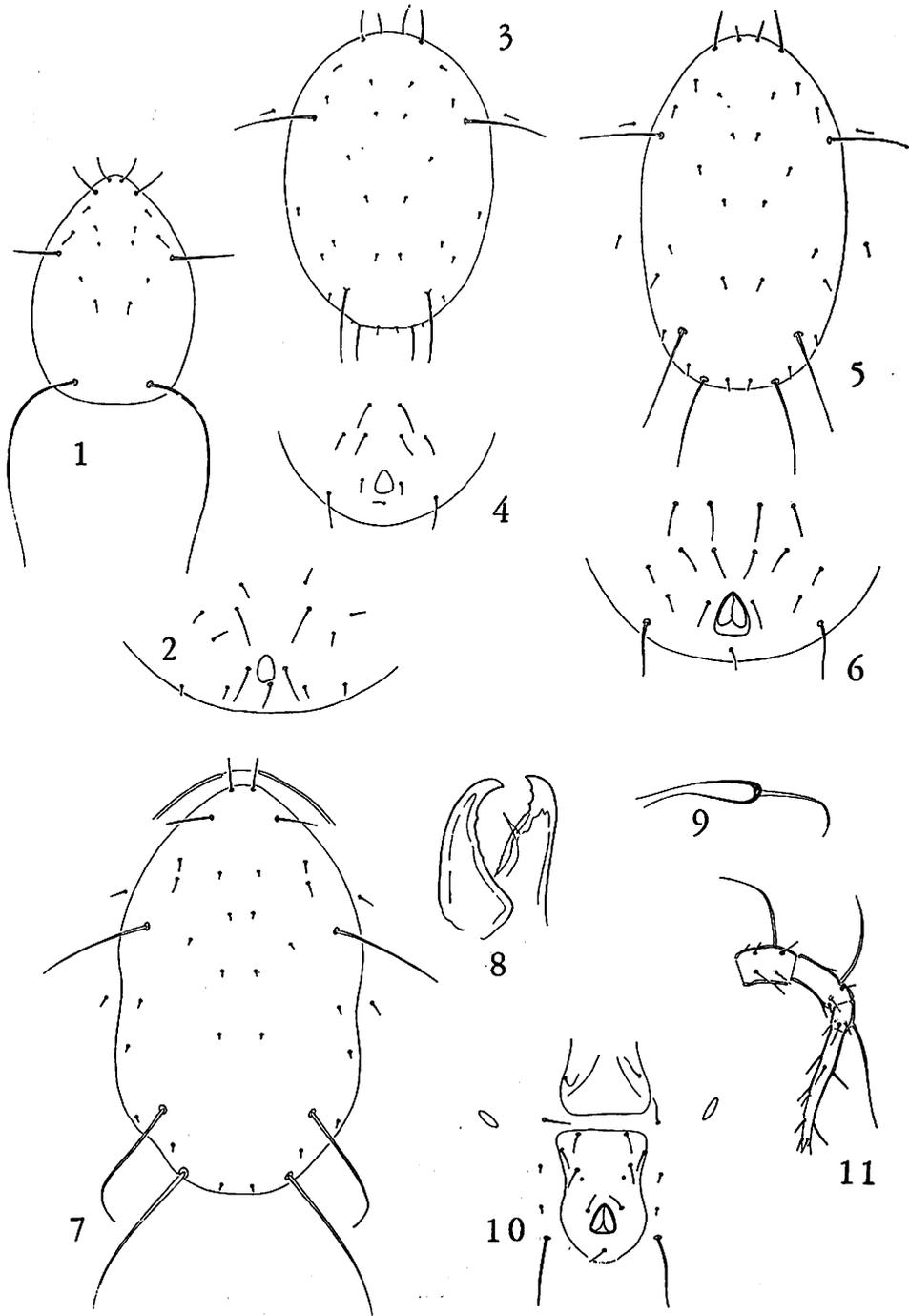
14. *Amblyseius incognitus* Schuster, n. sp. Pl. VII, Figs. 7-11.

♀. Chelicera with 2 large subapical teeth and 18-20 small dentations on a thin lamella on ramus of fixed member, 3 teeth on movable member. Dorsal shield 325  $\mu$  long, 240  $\mu$  wide. Vertical setae 30  $\mu$ ; dorso-central I-IV approximately 4-6  $\mu$  with III and IV a little longer than I and II; clunals 8  $\mu$ ; prolateral I 45  $\mu$ , II 14  $\mu$ , III 17  $\mu$ , IV 110  $\mu$ ; postlateral I 6  $\mu$ , II-III 8  $\mu$ , IV 6  $\mu$ , V 160  $\mu$ ; promediolateral 6  $\mu$ ; postmediolateral 130  $\mu$ ; all setae simple. Peritreme extends to vertical setae. Sternal plate bears 3 pairs of setae. Metasternal platelets roughly triangular, 7 or 8 $\times$  area of setal insertion. Genital plate 76  $\mu$  wide. Ventrianal plate 112  $\mu$  long, 85  $\mu$  wide, with 3 pairs of preanal setae and a pair

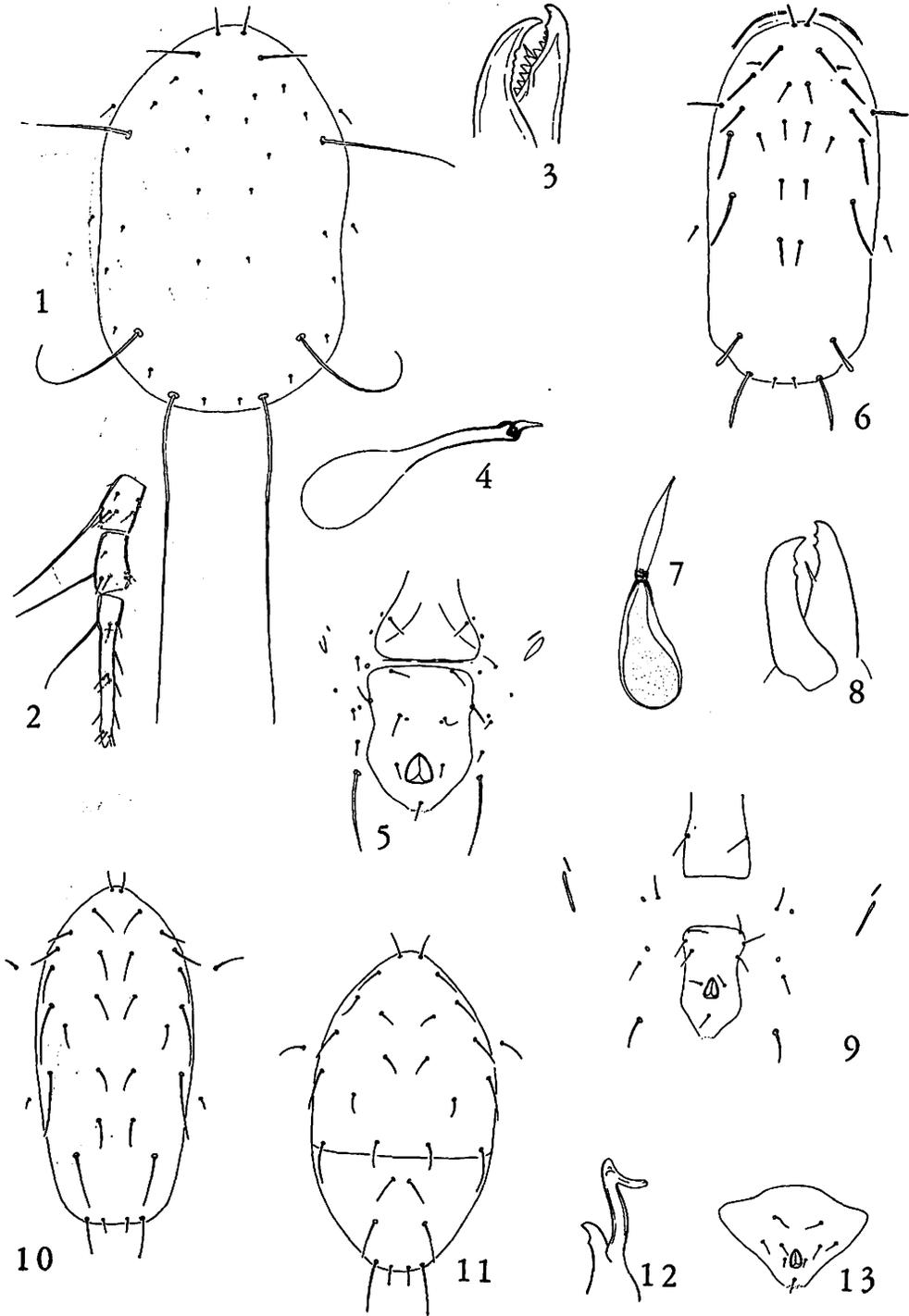
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Plate VII. Figs. 1-6. *Amblyseius lassus* n. sp.: 1 & 2, larva, dorsum and venter; 3 & 4, protonymph, dorsum and venter; 5 & 6, deutonymph, dorsum and venter. Figs. 7-11. *Amblyseius incognitus* n. sp. ♀: 7, dorsum; 8, chelicera; 9, spermatheca; 10, ventrianal plate; 11, leg IV.

PL. VII



Pl. VIII



of widely spaced pores slightly mesad and behind 3rd setae. A single metapodal plate present,  $23 \mu$  long,  $6 \mu$  wide. Spermatheca with cervix approximately  $30 \mu$  long, sclerotized only distally; atrium not differentiated as independent structure. Leg I tarsus with 2 basal setae  $34 \mu$  long. Leg II genu with longest dorsal seta  $34 \mu$ . Leg III with macroseta on tibia  $34 \mu$ , genu  $42 \mu$ . Leg IV with macroseta on basitarsus  $100 \mu$ , tibia  $85 \mu$ , genu  $100 \mu$ .

♂ unknown.

Holotype ♀, Isla Pinzon, 300 m, 7.II.1964, lichen on lava and *Croton* stems, D. Q. Cava-gnaro; paratype ♀, Isla Santa Cruz, Darwin Research Station, in *Ramalina* sp. at bar-ranca below seismic station.

The reduced atrium of the spermatheca, and the single metapodal plate, distinguish this species from others with similar dorsal chaetotaxy.

15. *Amblyseius tubus* Schuster, n. sp. Pl. IX, Figs. 10-14.

♀. Chelicera apparently with 8 large blunt teeth on fixed member, movable member with at least 2 small teeth. Dorsum  $285 \mu$  long,  $185 \mu$  wide. Vertical setae  $20 \mu$ ; dorsocentral I  $9 \mu$ , II,  $12 \mu$ , III  $17 \mu$ ; clunal  $9 \mu$ ; prolateral I  $34 \mu$ , II  $24 \mu$ , III  $34 \mu$ , IV  $46 \mu$ ; postlateral I  $25 \mu$ , II  $46 \mu$ , III  $18 \mu$ , IV  $14 \mu$ , V  $73 \mu$ ; promedialateral  $9 \mu$ ; postmedialateral  $61 \mu$ ; pro-sublateral  $18 \mu$ , postsublateral  $9 \mu$ ; postlateral V and postmedialateral seta distinctly serrate, other dorsal setae tubular, the larger setae with bluntly rounded apices. Peritreme extends to vertical setae. Sternal plate bears 3 pairs of setae; metasternal platelets  $12 \mu$  long, only slightly wider than setal insertion. Genital plate  $73 \mu$  wide. Ventrianal plate  $100 \mu$  long,  $87 \mu$  wide, with 3 pairs of preanal setae and a pair of pores mesad and slightly posterior to 3rd pair of setae. Primary metapodal platelet  $21 \mu$  long,  $13 \mu$  wide, secondary  $14 \mu$  long. Cervix and atrium of spermatheca  $13 \mu$ . Leg II with 7 setae on genu. Leg IV with macroseta on basitarsus  $42 \mu$ , on genu  $26 \mu$ .

♂ unknown.

Holotype ♀, and 2 paratypes, Isla Santa Cruz, Darwin Research Station, 31.I.1964, on *Tournefortia* sp.

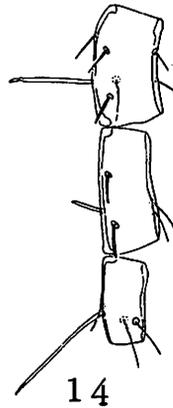
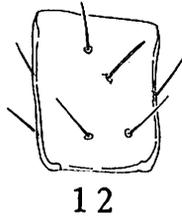
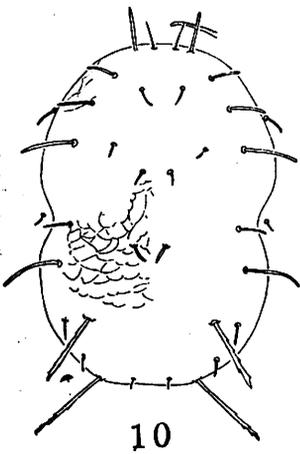
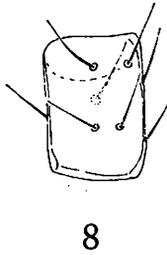
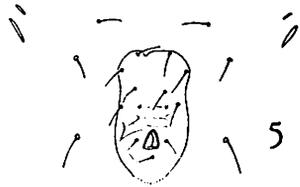
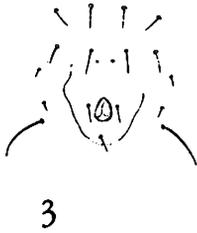
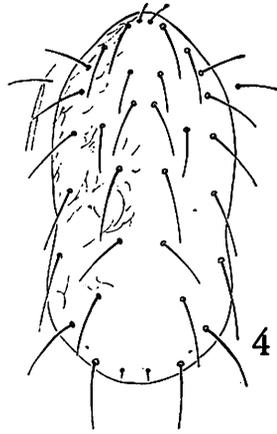
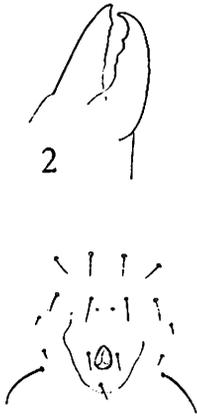
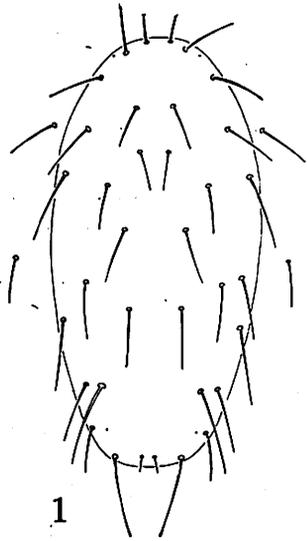
This species related to *A. evansi* (Chant) which is known from numerous localities in Central America. Genu II of *evansi* has 8 setae, and postlateral seta III is much longer than IV. *A. tubus* has only 7 setae on genu II and the postlateral setae III and IV are subequal in length.

16. *Amblyseius spinigerus* Chant Pl. IX, Figs. 1-3.

A single badly damaged specimen is either a deutonymph or a ♀, and the species determination is not positive. The shortest setae on the dorsal shield are the verticals ( $25 \mu$ ), and the longest ( $60 \mu$ ) are prolateral IV, postlaterals II and V, and the postmedialaterals. It was found in debris of a penguin's nest at Punta Espinosa, Isla Fernandina, 4.I.1964, R. L. Usinger.

Plate VIII. Figs. 1-5. *Amblyseius aerialis* ♀: 1, dorsum; 2, leg IV; 3, chelicera; 4, spermatheca; 5, ventrianal plate. Figs. 6-13. *Pennaseius rhabdifer*: 6, ♀ dorsum; 7, spermatheca; 8, chelicera; 9, ventrianal plate; 10, deutonymph, dorsum; 11, protonymph, dorsum; 12, ♂ chelicera; 13, ♂ ventrianal plate.

PL IX



17. *Pennaseius rhabdifer* (De Leon) Pl. VIII, Figs. 6-13.

♀. Chelicera with 2 subapical teeth, and a large tooth at base of pilus dentilis, on fixed member, 2 teeth on ramus of movable member. Dorsal shield 250  $\mu$  long, 125  $\mu$  wide. Vertical setae 15  $\mu$ ; dorsocentral I 15  $\mu$ , II 14  $\mu$ , III 15  $\mu$ , IV 17  $\mu$ ; clunal 8  $\mu$ ; prolateral I 19  $\mu$ , II 14  $\mu$ , III 25  $\mu$ , IV 22  $\mu$ , V 34  $\mu$ , VI 40  $\mu$ ; postlateral 42  $\mu$ ; promediolateral 13  $\mu$ ; postmediolateral 25  $\mu$ ; prosublateral 25  $\mu$ ; postsublateral 13  $\mu$ ; postlateral setae distinctly serrate, postmediolateral smooth with rounded apex. Peritreme extends to base of vertical seta. Sternal plate bears 3 pairs of sternal setae. Metasternal platelets minute or absent. Genital plate 46  $\mu$  wide. Ventrianal plate 75  $\mu$  long, 42  $\mu$  wide, with 3 pairs of preanal setae. Primary metapodal platelet 21  $\mu$  long, secondary about 1/2 as long and very thin. Conspicuously sclerotized structures of spermatheca about 5  $\mu$  long. Legs without macrosetae.

♂. Ventrianal plate with 3 pairs of preanal setae.

*Protonymph* (possibly small deutonymph). Dorsum 178  $\mu$  long; prolateral setae V and VI 25  $\mu$ , postmediolateral and postlateral 21  $\mu$ .

*Deutonymph*. Dorsum 190  $\mu$  long. Vertical seta 13  $\mu$ ; dorsocentral I-III 14; IV 17  $\mu$ ; clunal 8  $\mu$ ; prolateral I 15  $\mu$ , II 14  $\mu$ , III 17  $\mu$ , IV 19  $\mu$ , V-VI 36  $\mu$ ; postlateral 23  $\mu$ , promediolateral 14  $\mu$ ; postmediolateral 26  $\mu$ ; prosubmarginal 21  $\mu$ ; postsubmarginal 8  $\mu$ . Venter with 3 anal setae, and 3 pairs of preanal setae, with triangular disposition, 1 anterior and 2 posterior, and with ventrocaudal. Length of peritreme less than length of prolateral seta VI.

Previously known from 3♀♀ collected at St. Augustine, Trinidad. This species was abundant on Isla Santa Cruz, with collections from: Darwin Research Station, 31.I.1964, *Cordia lutea*; 27.I.1964, *Hibiscus tiliaceus*; and Bella Vista Trail, 20 m, 11.II.1964 on *Castela* sp.

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Plate IX. Figs. 1-3 *Amblyseius spinigerus* ?♀: 1, dorsum; 2, chelicera; 3, fragment of ventrianal plate. Figs. 4-9. *Metaseiulus longipilus*: 4, dorsum; 5, ventrianal plate; 6, ♂ ventrianal plate; 7, spermatodactyl; 8, genu II; 9, spermatheca. Figs. 10-14. *Amblyseius tubus* n. sp.: 10, dorsum; 11, spermatheca; 12, genu II; 13, ventrianal plate; 14, basitarsus, tibia and genu IV,