



## Three new species of phytoseiid mites (Acari: Phytoseiidae) from Bahia State, Brazil

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### Abstract

During a survey of predatory mites on cocoa cropping areas in Bahia State, north-eastern Brazil, three undescribed species of Phytoseiidae were collected on natural vegetation associated with crops. *Typhlodromips baculiductus* n. sp., *Graminaseius bahiensis* n. sp. and *Typhlodromalus annulatus* n. sp. are described and diagnosed. Comments on the boundary between the genera *Amblydromalus* Chant & McMurtry and *Typhlodromalus* Muma are also included.

**Key words:** Predatory mites, taxonomy, *Typhlodromips*, *Graminaseius*, *Typhlodromalus*

### Introduction

In recent years, cocoa plants (*Theobroma cacao*) in North-West and North-East Brazil have been threatened by the cocoa bud mite *Aceria reyesi* (Nuzzaci) (Eriophyidae), which causes severe bud deformation (Soria *et al.* 1991; Oliveira & Navia, 2013). A study of the potential predatory mite communities occurring on cocoa plants and surrounding vegetation was conducted in 2015 in some cropping areas of Bahia State. Three undescribed phytoseiid mite species were collected from non-cultivated vegetation associated with crops. The proposed new species belonging to the genera *Typhlodromips* De Leon, *Graminaseius* Chant & McMurtry and *Typhlodromalus* Muma are described and illustrated in this paper.

### Material and Methods

Phytoseiid mites were collected between January and April 2015 from cocoa production areas located in the southern part of Bahia State. Leaves and buds were taken from plants and checked in the laboratory. Mites were collected with a fine brush under a stereomicroscope. Phytoseiid mites were mounted with Hoyer's medium and kept in an oven at 55°C until clarification.

The generic concepts used here are those proposed by Chant & McMurtry (2007). Setal nomenclature follows that of Lindquist & Evans (1965) as adapted by Rowell *et al.* (1978) for the dorsal surface and Chant & Yoshida-Shaul (1991) for the ventral surface of the idiosoma. Dorsal setal patterns are those proposed by Chant & Yoshida-Shaul (1989). Nomenclature used for dorsal solenostomes is that proposed by Athias-Henriot (1975). All measurements are given in micrometres (µm). In the description of the new species each female measurement corresponds to the value in the holotype, followed in parentheses by the average and the ranges for all specimens studied.

Type material of the new species is deposited in the Collection of Acari at the Laboratory of Entomology, Universidade Estadual de Santa Cruz, Ilhéus, Bahia, Brazil.

## Results and discussion

### Subfamily *Amblyseiinae* Muma

#### Tribe *Typhlodromipsini* Chant & McMurtry

#### Genus *Typhlodromips* De Leon

#### *Typhlodromips baculiductus* n. sp. Ferragut & Carvalho

**Diagnosis.** Female dorsal shield mostly striated or reticulated, with areolate areas between setae *z4*, *z5* and *s4*. Dorsal setal pattern 10A:9B. Seventeen pairs of dorsal smooth setae, except *Z4* and *Z5* serrated; setae *s4*, *Z4* and *Z5* with swollen and hyaline points. Six pairs of dorsal solenostomes, without gland *gd5*. Peritremes reaching *j1*. Sternal shield with three pairs of setae, almost quadrate. Ventrianal shield pentagonal, smooth, with three pairs of pre-anal setae and pre-anal pores *gv3* crescentic. Fixed digit of chelicera with nine teeth, movable digit with three teeth. Genu II with seven setae. Swollen macrosetae present on all legs. Complex spermatheca with an incomplete ring surrounding the major duct; major duct partially sclerotised and tubular; atrium well-developed; calyx funnel-shaped flaring distally.

FEMALE (Figs 1–5) (seven females measured)

**Dorsal surface.** Dorsal shield 310 (310, 303–321) long, 183 (191, 183–195) wide. Shield weakly sclerotised, laterally striated with slight reticulation between *j1* and *Z4* and areolate elements in the region enclosed by setae *z4*, *z5* and *s4*. Surface smooth behind *S4–Z4*. Seventeen pairs of smooth setae except *Z4* and *Z5*, which are serrated. All setae placed on tubercles and pointed, except *s4*, *Z4* and *Z5* with swollen and hyaline apex. Seta *j1* 22 (22, 21–24), *j3* 20 (20, 18–21), *j4* 12 (14, 12–15), *j5* 13 (14, 12–15), *j6* 17 (16, 15–18), *J2* 19 (21, 18–22), *J5* 12 (12, 12–14), *z2* 16 (17, 15–18), *z4* 18 (18, 16–18), *z5* 15 (16, 15–18), *Z1* 20 (21, 21–23), *Z4* 36 (36, 36–38), *Z5* 63 (67, 63–69), *s4* 26 (26, 24–27) *S2* 25 (26, 24–30), *S4* 19 (20, 18–21), *S5* 14 (15, 14–18), *r3* 13 (14, 12–15), *R1* 15 (16, 15–18). Six pairs of dorsal solenostomes, *gd1*, *gd2*, *gd4*, *gd6*, *gd8*, *gd9*. Pore *gd6* almost imperceptible, *gd9* anteromedial and next to *S5*. Peritremes reaching setae *j1*.

**Ventral surface.** Ventral shields weakly sclerotised. Sternal shield almost quadrate and smooth, with three pairs of setae and straight posterior margin. Distance *st1–st3* 54 (57, 54–60), distance *st2–st2* 58 (61, 58–63). Seta *st4* on metasternal platelets. Genital shield 70 (74, 70–75) wide. Ventrianal shield pentagonal, with irregular lateral margins, longer than wide, 99 (107, 99–113) long, 82 (90, 82–95) wide at level of *ZV2*. Surface smooth. Three pairs of pre-anal setae; pre-anal (*gv3*) pores well-developed and crescentic, distance between them 14 (15, 14–15). Four pairs of setae surrounding the shield, *JV5* smooth and with swollen tips, 41 (43, 39–47) long.

**Chelicerae.** Fixed digit 25 (24, 24–25), movable digit 25 (26, 24–27). Fixed digit with nine teeth, two subapical and smaller and seven larger in comb-like alignment; movable digit with three teeth.

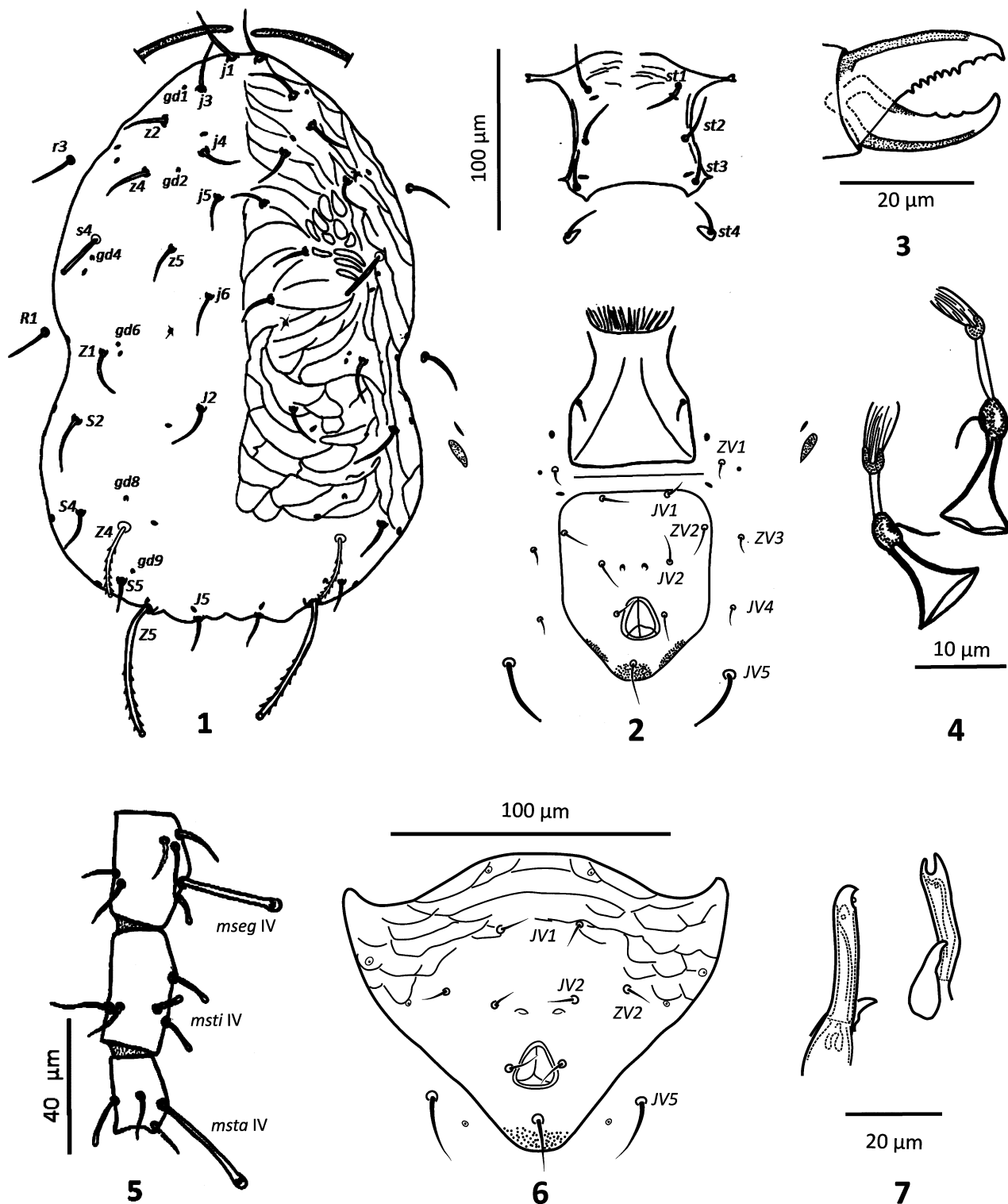
**Insemination apparatus.** Proximal part of major duct tubular, well sclerotised and apparently rigid, with an incomplete ring encircling the duct, which appears broad and membranous in the distal part. Atrium globular, well-developed. Calyx funnel-shaped, flaring distally, 9 (10, 9–10) long.

**Legs.** Tarsus of leg I tanned. Genu II with seven setae; 2 2/0 2/0 1. Swollen macrosetae present on all legs; Macrosetae on genu I 20 (21, 20–21), genu II 15 (16, 15–18), genu III 22 (22, 21–23). Leg IV with macrosetae on genu 34 (34, 33–36), tibia 13 (13, 12–15) (no longer than other setae) and basitarsus 39 (39, 34–42).

MALE (Figs 6–7) (one male measured)

**Dorsal surface.** Dorsal shield pattern as in female. Dorsal shield 240 long and 158 wide. Seventeen pairs of smooth setae except for *Z4* and *Z5*, which are serrated. Seta *j1* 15, *j3* 17, *j4* 14, *j5* 14, *j6* 12, *J2* 18, *J5* 9, *z2* 15, *z5* 12, *Z1* 20, *Z4* 24, *Z5* 54, *s4* 21, *S5* 12, *r3* 14, *R1* 15. Six pairs of solenostomes arranged as in female. Peritremes extending to level of setae *j1*.

**Ventral surface.** Ventrianal shield subtriangular, reticulate mainly anterior to pre-anal setae; 105 long and 147 wide at anterior corners. Three pairs of pre-anal setae; pre-anal (*gv3*) pores crescentic, distance between them 12. Seta *JV5* 27.



FIGURES 1–7. *Typhlodromips baculiductus* n. sp. 1. Female dorsal shield, 2. Female ventral surface, 3. Female chelicera, 4. Spermatheca (two examples), 5. Female leg IV, 6. Male ventrianal shield, 7. Spermatodactyl (two examples).

**Chelicerae.** Fixed digit with seven teeth, movable digit with one tooth. Spermatodactyl 26 long.

**Legs.** Swollen macrosetae present on all legs; Macrosetae on genua I, II and III, 15 long. Leg IV with macrosetae on genu 27, tibia 12 and basitarsus 30. Chaetotaxy of genua II and III as in female.

**Type Material:** Holotype female, six paratype females and one paratype male collected from *Piper dilatatum*

L.C Ricch (Piperaceae), Almadina, Bahia, Brazil, 14°47'47" S, 39°10'0" W, 14 January 2015, 1 October 2016, 172 m a.s.l. (above sea level). Holotype and paratypes deposited in the collection of Acari at Laboratory of Entomology, Universidade Estadual de Santa Cruz, Ilhéus - BA, Brazil.

**Etymology:** The specific name *baculiductus* is derived from the Latin *baculum* meaning rode, cane or stick and *ductus* or duct, referring to the rigid and bacillary part of major duct in the spermatheca.

**Remarks:** *Typhlodromips baculiductus* belongs to the *lugubris* species group defined by Chant & McMurtry (2005), characterised by having the spermatheca with calyx elongate, funnel-shaped or tubular. The new species resembles *T. amilus* De Leon, *T. furcus* Lofego, Demite & Feres, *T. gonzalezi* Moraes & Mesa and *T. paramilus* Nuvoloni & Lofego, in that they have a reticulated dorsal shield, calyx of spermatheca funnel-shaped and macrosetae of leg IV with knobbed tips. *Typhlodromips baculiductus* differs from *T. amilus*, *T. furcus*, and *T. gonzalezi* by having the dorsal shield partially reticulated instead of evenly reticulated; setae *s4*, *Z4*, and *Z5* have swollen and hyaline apices, whereas they are pointed in the others (not confirmed in *T. amilus*). The new species is most closely related to *T. paramilus*. It differs from the latter by having seta *S2* pointed, not swollen—and seven instead of ten setae on genu II. *Typhlodromips baculiductus* is distinctive and different from all the mentioned taxa in its spermathecal apparatus, by having the proximal part of the major duct tubular and rigid in appearance, with a sclerotised incomplete ring encircling the duct.

### Tribe *Amblyseïini* Muma

### Genus *Graminaseius* Chant & McMurtry

### *Graminaseius bahiensis* n. sp. Ferragut & Carvalho

**Diagnosis.** Female dorsal shield smooth with faint anterolateral striae. Dorsal setal pattern 10A:9B. Seventeen pairs of dorsal setae, *Z4* and *Z5* lightly serrated, the remainder smooth. Seven pairs of dorsal solenostomes. Peritremes extend to *j1*. Seta *r3* much longer than *R1*, which is minute. Sternal shield almost quadrate, with three pairs of setae. Ventrianal shield pentagonal, straight anteriorly, somewhat concave laterally; cuticle finely striated. Three pairs of pre-anal setae, pre-anal pores crescentic and mesad to *JV2*. Fixed digit of chelicerae with eight teeth and two subapical denticles, movable digit with three teeth. Genu II with seven setae. Macrosetae on all legs blunt or knobbed. Calyx short and saccular; atrium well-developed, tulip-like, incised laterally. Bifurcate juncture between atrium and major duct.

FEMALE (Figs 8–12) (five females measured)

**Dorsal surface.** Dorsal shield 344 (338, 322–353) long, 198 (206, 198–210) wide, mainly smooth with faintly anterolateral striae. Seventeen pairs of smooth and acute setae, *Z4* and *Z5* lightly serrated. Seta *j1* 25 (24, 21–26), *j3* 30 (29, 27–32), *j4* 6 (6, 6–7), *j5* 5 (4, 4–5), *j6* 5 (5, 5–6), *J2* 6 (6, 6–7), *J5* 8 (7, 7–8), *z2* 16 (16, 15–17), *z4* 32 (30, 28–32), *z5* 4 (4, 4–5), *Z1* 6 (6), *Z4* 57 (57, 55–60), *Z5* 76 (78, 76–80), *s4* 48 (47, 44–48), *S2* 16 (16, 15–16), *S4* 7 (6, 6–7), *S5* 7 (6, 6–7), *r3* 20 (20, 20–21), *R1* 7 (7, 6–8). Seven pairs of solenostomes. Pore *gd1* lateral to *j3*, *gd5* posteromedial to *z5*, *gd9* anteromedial to *S5*. Peritremes reaching setae *j1*.

**Ventral surface.** Sternal shield smooth and almost quadrate, with three pairs of setae and straight posterior margin. Distance *st1–st3* 63 (63, 62–64), distance *st2–st2* 68 (66, 65–68). Seta *st4* on metasternal platelets. Genital shield 63 (62, 58–64) wide. Ventrianal shield pentagonal, straight anteriorly, somewhat concave laterally, longer than wide, 116 (121, 114–133) long, 87 (86, 83–93) wide at level of *ZV2*. Cuticle evenly and finely striated. Three pairs of pre-anal setae; pre-anal (*gv3*) pores crescentic, distance between them 23 (24, 22–26). Four pairs of setae surrounding the shield, *JV5* smooth, pointed and placed on small platelets, 52 (51, 46–55) long.

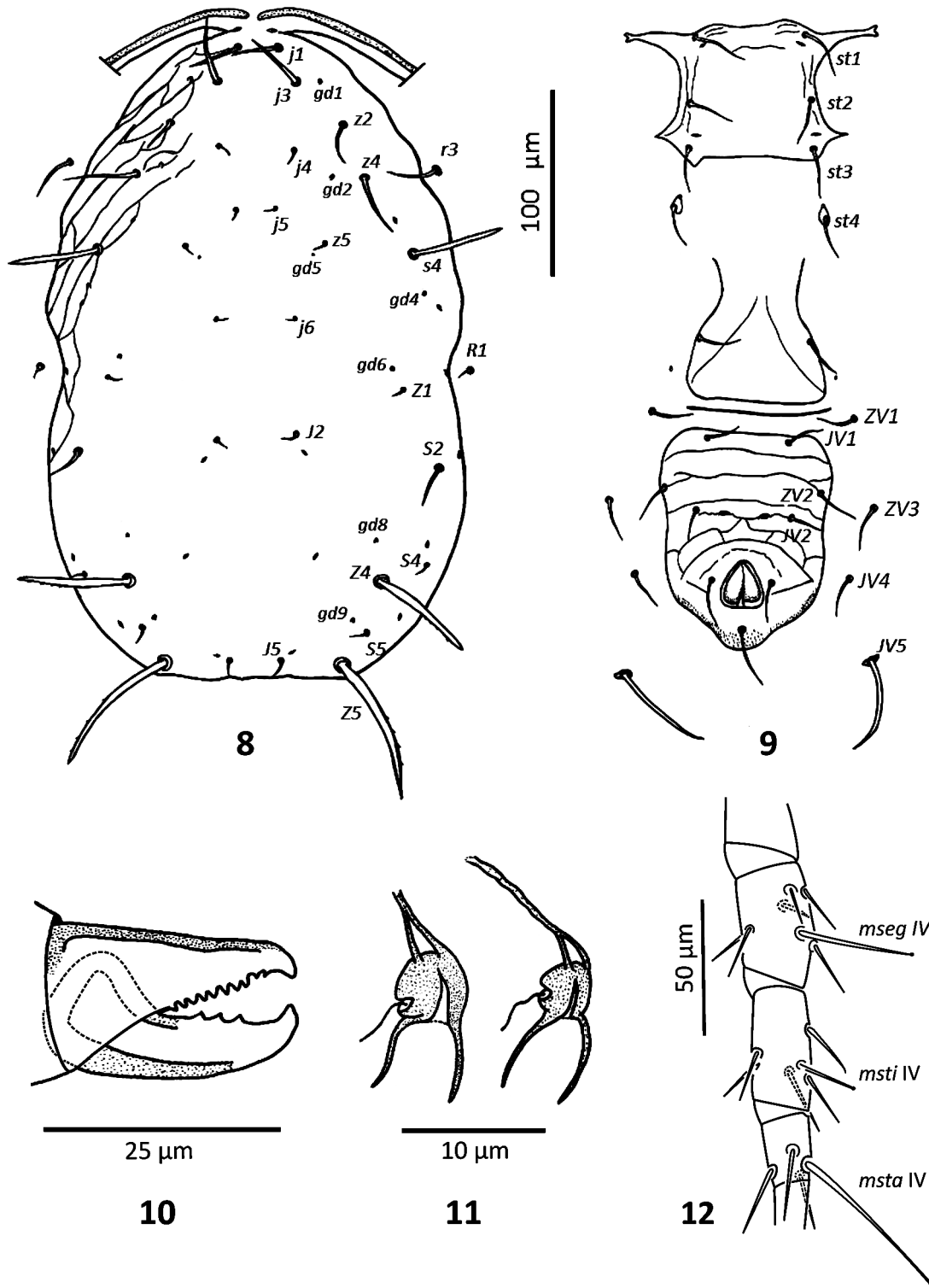
**Chelicerae.** Fixed digit 29 (26, 24–29), movable digit 29 (29 25–33). Fixed digit with ten teeth, two subapical denticles and eight aligned teeth; movable digit with three teeth.

**Insemination apparatus.** Major duct long, on one specimen it appears fusiform and membranous. Atrium well-developed, tulip-like, incised laterally. In the juncture between atrium and major duct there is a triangular bifurcation. Calyx short, saccular 6 (6, 6–7) long.

**Legs.** Genu II with seven setae; 1 2/0 2/0 2. Macrosetae on all legs blunt or knobbed. Macrosetae on genu I 26 (26, 24–26), genu II 23 (23, 22–24), genu III 26 (25, 24–26), genu IV 42 (40, 38–42), tibia IV 22 (21, 19–22), basitarsus IV 65 (62, 59–65).

MALE: Unknown.

**Type Material:** Holotype female and four paratype females from *Laportea aestuans* (L.) Chew (Urticaceae). Ilhéus (CEPLAC), Bahia, Brazil 14°45'35" S, 39°13'49" W, 7 April 2015, 32 m a.s.l. Holotype and paratypes deposited in the collection of Acari at Laboratory of Entomology, Universidade Estadual de Santa Cruz, Ilhéus - BA, Brazil.



**FIGURES 8–12.** *Graminaseius bahiensis* n. sp. 8. Female dorsal shield, 9. Female ventral surface, 10. Female chelicera, 11. Spermatheca (two examples), 12. Female leg IV.

**Etymology:** The specific name *bahiensis* refers to the State in Brazil where the mites were collected.

**Remarks:** *Graminaseius bahiensis* belongs to the *graminis* species group defined by Chant & McMurtry (2004), characterised by having seta *S2* longer than *Z1*. It is similar to *G. mastus* (Denmark & Muma) and *G. saltus* (Zack) from Florida and Missouri, respectively, in that all of them have relatively short dorsal setae, seven pairs of dorsal solenostomes and a saccular calyx with a well-developed atrium. The new species is larger and differs from *G. mastus* and *G. saltus* by the relative length of setae *S2*, *S4* and *S5* which are much longer in the latter (*S2* 42; *S4* 14; *S5* 14 in *G. mastus* and *S2* 31; *S4* 16; *S5* 15 in *G. saltus*, respectively). In *G. bahiensis* the calyx is short and almost similar in length to the atrium, whereas in *G. mastus* and *G. saltus* the calyx is much longer than atrium. In *G. saltus* the fixed digit of chelicera bears six or seven teeth instead of ten in *G. bahiensis*.

### Tribe *Euseiini* Chant and McMurtry

#### Genus *Typhlodromalus* Muma

##### *Typhlodromalus annulatus* n. sp. Ferragut & Carvalho

**Diagnosis.** Female dorsal shield mostly areolate. Dorsal setal pattern 10A:9B. Seventeen pairs of stout dorsal setae, all smooth except *Z4*, *Z5* and *J5* serrated. Most setae stout and blunt and arising from tubercles. Seta *Z1* short, less than 15 long. Ratio  $s4/Z1 > 7$ . Seven pairs of dorsal solenostomes. Peritremes extending to *j1*. Sternal shield with three pairs of setae, posterior margin indiscernible. Ventrianal shield smooth and vase-shaped, with anterior margin straight and lateral margins concave. Three pairs of pre-anal setae; pre-anal pores crescentic. Fixed digit with nine teeth, movable digit with three teeth. Major duct broad and membranous, surrounded by an incomplete sclerotised ring; atrium globular and tulip-like, incised laterally; calyx tubular flaring distally. Genu II with eight setae. Three stout and blunt macrosetae on leg IV.

FEMALE (Figs 13–17) (two females measured).

**Dorsal surface.** Dorsal shield 356 (354–356) long, 213 (213–225) wide, covered by areolate elements between setae *j1* and *Z4*; anterolateral margins striate; smooth surface behind *Z4*. Seventeen pairs of smooth setae, except *Z4*, *Z5* and *J5*, which are slightly serrated. All setae thick and strong, *j4*, *j5*, *j6*, *J5*, *Z1* and *z5* acute, the remainder blunt. Seta *j1* 32 (30–32), *j3* 46 (46–50), *j4* 8 (8–9), *j5* 8 (8–9), *j6* 9, *J2* 14 (14–15), *J5* 8, *z2* 24, *z4* 56 (56–58), *z5* 6, *Z1* 13 (13–15), *Z4* 65 (65–69), *Z5* 88 (84–88), *s4* 93, *S2* 45 (45–48), *S4* 33 (33–36), *S5* 15 (15–16), *r3* 32 (32–36), *R1* 16 (16–17). Seven pairs of solenostomes; *gd1*, *gd2*, *gd4* and *gd5* small and punctiform; *gd6*, *gd8*, *gd9* small and crateriform. Solenostome *gd2* close to *z4*, *gd8* anterolaterad to *Z4*, *gd9* anteromedial to *S5*. Peritremes extending to setae *j1*.

**Ventral surface.** Sternal shield smooth and weakly sclerotised, with three pairs of setae, posterior margin indiscernible, somewhat wider than long, distance *st2*–*st2* 79, distance *st1*–*st3* 70. Seta *st4* on striated integument. Genital shield 86 wide. Ventrianal shield vase-shaped, smooth and poorly sclerotised, with anterior margin straight and lateral margins concave, longer than wide, 123 long, 81 wide at level of *ZV2*, 69 wide at level of anus. Three pairs of pre-anal setae; pre-anal (*gv3*) pores crescentic, distance between them 34. Four pairs of setae surrounding the shield, *JV5* 43 (43–48). One pair of large pores associated with *JV5*.

**Chelicerae.** Fixed digit 31 (27–31) long, movable digit 28 (28–30) long. Fixed digit with nine teeth, two subapical denticles and seven larger and teeth in comb-like alignment. Movable digit with three well-separated teeth.

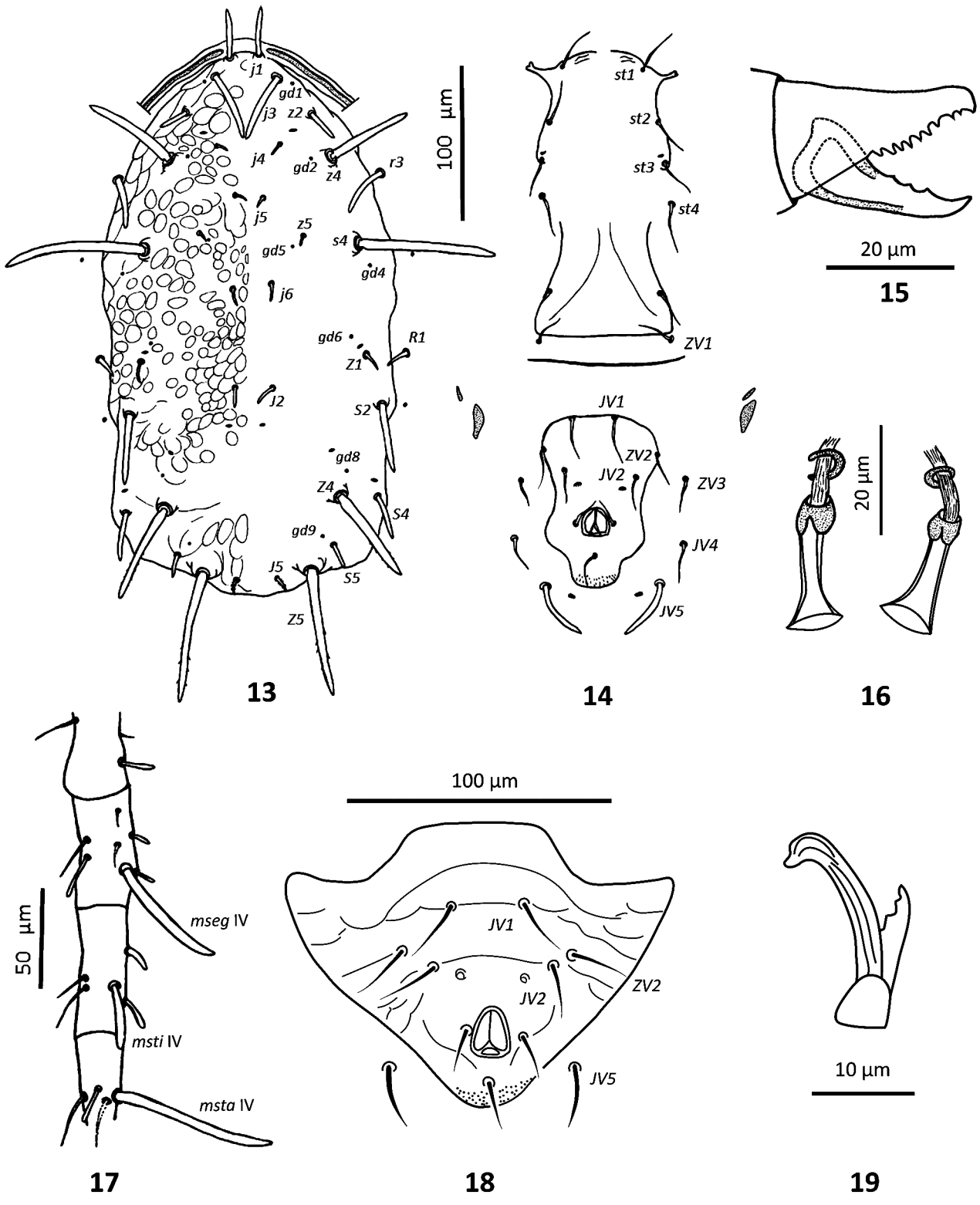
**Insemination apparatus.** Complex, major duct broad and membranous, an incomplete sclerotised ring encircling the duct; atrium globular and tulip-like, incised laterally; calyx tubular flaring distally, 15 long.

**Legs.** Genu II with eight setae; 2 2/1 2/0 1. Macrosetae present on all legs, on genu I 35 (31–35), genu II 31 (27–31), genu III 36 (33–36), tibia III 22 (21–22), tarsus III 18; on leg IV, genu 61 (57–61), tibia 33 (28–33) and basitarsus 83 (78–83). All macrosetae broad and blunt, some of the remainder setae in the segments are acute, while others are blunt.

MALE: (Figs 18–19) (one male measured)

**Dorsal surface.** Dorsal shield pattern as in female, 264 long, 174 wide. Seventeen pairs of smooth setae, except *Z4*, *Z5* and *J5*, which are slightly serrated. All setae thick and strong, *j4*, *j5*, *j6*, *J5*, *Z1* and *z5* acute, the

remainder blunt. Seta *j1* 24, *j3* 39, *j4* 6, *j5* 6, *j6* 8, *J2* 9, *J5* 6, *z2* 16, *z4* 42, *z5* 4, *Z1* 9, *Z4* 39, *Z5* 48, *s4* 60, *S2* 18, *S4* 15, *S5* 9, *r3* 27, *R1* 11. Seven pairs of solenostomes; *gd1*, *gd2*, *gd4* and *gd5* small and punctiform; *gd6*, *gd8*, *gd9* small and crateriform. Solenostome *gd2* close to *z4*, *gd8* anterolaterad to *Z4*, *gd9* anteromediad to *S5*. Peritremes extending to setae *j1*.



**FIGURES 13–19.** *Typhlodromalus annulatus* n. sp. 13. Female dorsal shield, 14. Female ventral surface, 15. Female chelicera, 16. Spermatheca (two examples), 17. Female leg IV, 18. Male ventrianal shield, 19. Spermatodactyl.

**Ventral surface.** Ventrianal shield subtriangular, reticulate mainly anteriorly to pre-anal setae; 105 long and 141 wide at anterior corners. Three pairs of pre-anal setae; pre-anal (*gv3*) pores crescentic, distance between them 24. Seta *JV5* 20.

**Chelicerae.** Fixed and movable digits 36 long. Fixed digit with seven teeth. Movable digit with one tooth. Spermatodactyl 18 long.

**Legs.** Genu II with eight setae; 2 2/1 2/0 1. Macrosetae on all legs, on genu I 27, genu II 18, genu III 23, tibia III 21, tarsus III 18; on leg IV, genu 36, tibia 24 and basitarsus 63. All macrosetae broad and blunt, some of the remaining setae in the segments are acute, while others are blunt.

**Type Material:** Holotype female, one paratype female and one paratype male from *Inga affinis* Benth (Fabaceae), Arataca, Bahia (Brazil) 14°47'50" S, 39°10'14" W, 20 January 2015, 26 October 2016, 92 m. a.s.l. Holotype and paratypes deposited in the collection of Acari at Laboratory of Entomology, Universidade Estadual de Santa Cruz, Ilhéus - BA, Brazil.

**Etymology:** The specific name *annulatus* derives from the Latin *annulus*, which means ring and refers to the incomplete ring encircling the major duct in the spermatheca.

**Remarks:** Chant & McMurtry (2005) proposed the genus *Amblydromalus*, which was distinguished from *Typhlodromalus* Muma by the ratio *s4/Z1*, being higher than 3 in *Amblydromalus* and lower than 3 in *Typhlodromalus*. According to this criterion, the new species keys to *Amblydromalus* by having ratio *s4/Z1* = 7.1, but its habitus and main taxonomic features are those of *Typhlodromalus*. *Typhlodromalus annulatus* has a strongly ornamented dorsal shield with areolae; the posterior margin of the shield is indented at level of seta *S5*; most of dorsal setae are stout and placed on tubercles, and macrosetae on leg IV are thick and blunt; all of these are usual characters of *Typhlodromalus* species. For this reason we consider this species belongs to *Typhlodromalus*, and we suggest that care should be used in the use of ratio *s4/Z1* as a unique criterion to distinguish these genera. More useful characters for separation include the sculpture of dorsal shield, smooth in *Amblydromalus* (except for *A. insolitus* Nuvoloni & Lofego) and reticulate and rugose in *Typhlodromalus*; the posterior margins of dorsal shield, which do not have indentation at level of seta *S5* in *Amblydromalus* but with a conspicuous indentation in *Typhlodromalus* (except for *T. longisetatus* Moraes, Zannou & Oliveira and *T. tenuicalyx* Moraes, Zannou & Oliveira) giving to this posterior part a trilobate appearance; dorsal setae are setiform and smooth (except for *Z5*) in *Amblydromalus* while are stout and sometimes serrated and placed on tubercles in *Typhlodromalus*; and the posterior margin of ventrianal shield, which shows a constriction below anal opening, giving a trilobate aspect in *Typhlodromalus*, which is absent in *Amblydromalus* (except in *A. macroatrium* Moraes, Barbosa & Castro).

It is interesting to note the presence of an incomplete ring around the major duct of the spermathecal apparatus. This structure has also been depicted in other Euseinii, such as *Quadromalus colombiensis* Moraes, Denmark & Guerrero, *Amblydromalus lailae* Schicha and *A. insolitus* Nuvoloni & Lofego, the latter showing intermediate characters between *Amblydromalus* and *Typhlodromalus*. However, to our knowledge, this structure has never been described in the literature.

*Typhlodromalus annulatus* belongs to the *peregrinus* species group according to Chant & McMurtry (2005), with seta *J1* absent and *S5* present. The new species can be separated from *T. rosayroi* Denmark & Muma, *T. marmoreus* El-Banhawy and *T. feresisimilis* Moraes, Barbosa & Castro by the shape of dorsal setae, lanceolate in *T. feresisimilis*, serrate in *T. marmoreus* and spatulate in *T. rosayroi*. Moreover, *T. rosayroi* has slightly reticulated dorsal shield with few areolas.

*Typhlodromalus annulatus* differs from *T. feresi* Lofego, Moraes & McMurty and *T. ingae* Moraes, Barbosa & Castro by its longer *z4* and *s4* and shorter *Z1* (respectively *z4* 30–32/ 32–37; *s4* 37–38/50–51; *Z1* 28–30/34–35). The new species has smooth dorsal setae, except *Z4*, *Z5* and *J5* which are barbed, whereas *T. feresi* has only *Z5* serrated and *T. ingae* has all setae smooth. Macrosetae on leg IV are broad and blunt in *T. annulatus*, while they are slightly capitate in *T. feresi* and knobbed in *T. ingae*. Furthermore, the calyx in the spermatheca of *T. feresi* and *T. ingae* is longer (28–32 and 18–19, respectively) than that of the new species.

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