2013. The Journal of Arachnology 41:291–305

# On the enigmatic genus *Philora*: familial assignment and taxonomic revision (Opiliones: Laniatores: Stygnopsidae)

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**Abstract.** The harvestman genus *Philora* Goodnight & Goodnight 1954 and the type species *P. tuxtlae* are redescribed, and *Philora quetzalzin* new species is described. The genus is newly assigned to the family Stygnopsidae Sørensen 1932 based on external morphology and male genitalia, which are described herein for the first time. The genus is compared with the morphologically similar genera *Paramitraceras* Pickard-Cambridge 1905, *Sbordonia* Šilhavý 1977, and *Troglostygnopsis* Šilhavý 1974 sensu stricto. *Philora* is unique within the family in having a scutum completum. The presence of a scutum completum in *Philora* and others laniatoreans is discussed. The male genitalia of the genera *Paramitraceras*, *Philora*, *Troglostygnopsis* and presumably the genus *Sbordonia*, are very similar and share a morphological pattern described here as the Paramitraceras-pattern.

**Keywords:** Mexico, Stygnopsidae, new species, scutum completum, male genitalia

There are 66 genera and 92 species without familial assignment (incertae sedis) within the harvestman suborder Laniatores Thorell 1876, representing 4.8% and 2.2% of the total diversity of the suborder (Kury 2011). Recently, some genera listed as incertae sedis or with predetermined familial assignment have been transferred to different families, based on morphological characters (particularly male genitalia) or based on cladistic analyses (Pinto-da-Rocha & Hara 2009; Pérez-González 2011; Kury 2012; Villareal & Kury 2012). The monotypic genus *Philora* Goodnight & Goodnight 1954 and its type species *P. tuxtlae* was described from material collected near the San Martin Volcano, Los Tuxtlas, Veracruz in Mexico. The authors indicated that this genus is related to *Paramitraceras* Pickard-Cambridge 1905, differing only by a lower tarsal count of 2(1):2(1):4:4 in *Philora* versus 3(2):4(2):5:5 in *Paramitraceras*. Initially, this genus was assigned to the subfamily Phalangodinae Simon 1879 of the family Phalangodidae Simon 1879, a familial assignment based on few, poorly understood external morphological characters, and the genus was later regarded as incertae sedis until adequately reviewed in a modern context (Kury & Cokendolpher 2000; Kury 2003).

Recently we made several collecting trips to the rainforests of the Los Tuxtlas region, and have collected adult specimens of *P. tuxtlae* from the type locality. In addition, specimens of a second species of the genus, described herein, were collected in the western region of the state of Veracruz. The male genitalia of the two species assigned to *Philora* have an internal capsule forming a follis on the ventral side in dorsal view of the pars distalis, with a few distal espiniform projections and with several setae on the pars distalis; this morphology corresponds to the general pattern of the family Stygnopsidae Sørensen 1932, and also shows great similarity to the male genitalia of the genus *Paramitraceras* (Pérez-González 2006; Cruz-López & Francke 2012, 2013).

Using the external morphology and male genitalia of the two species, we revise the diagnosis of the genus, newly transfer the genus to the family Stygnopsidae, and discuss and describe the Paramitraceras-pattern of the male genitalia, present in the genera *Paramitraceras*, *Philora*, the type species of the genus *Troglostygnopsis* Šilhavý 1974, and probably in the genus *Sbordonia* Šilhavý 1977.

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## METHODS

The material examined is deposited in the Colección Nacional de Arácnidos (CNAN), Instituto de Biología, Universidad Nacional de México (UNAM), Mexico. We made photos using a Hitachi SU1510 Scanning Electronic Microscope (SEM) and a Nikon Coolpix S10 VR camera. Photographs were edited using PhotoShop CS5 software. Male genitalia nomenclature follows Cruz-López & Francke (2013).

## TAXONOMY

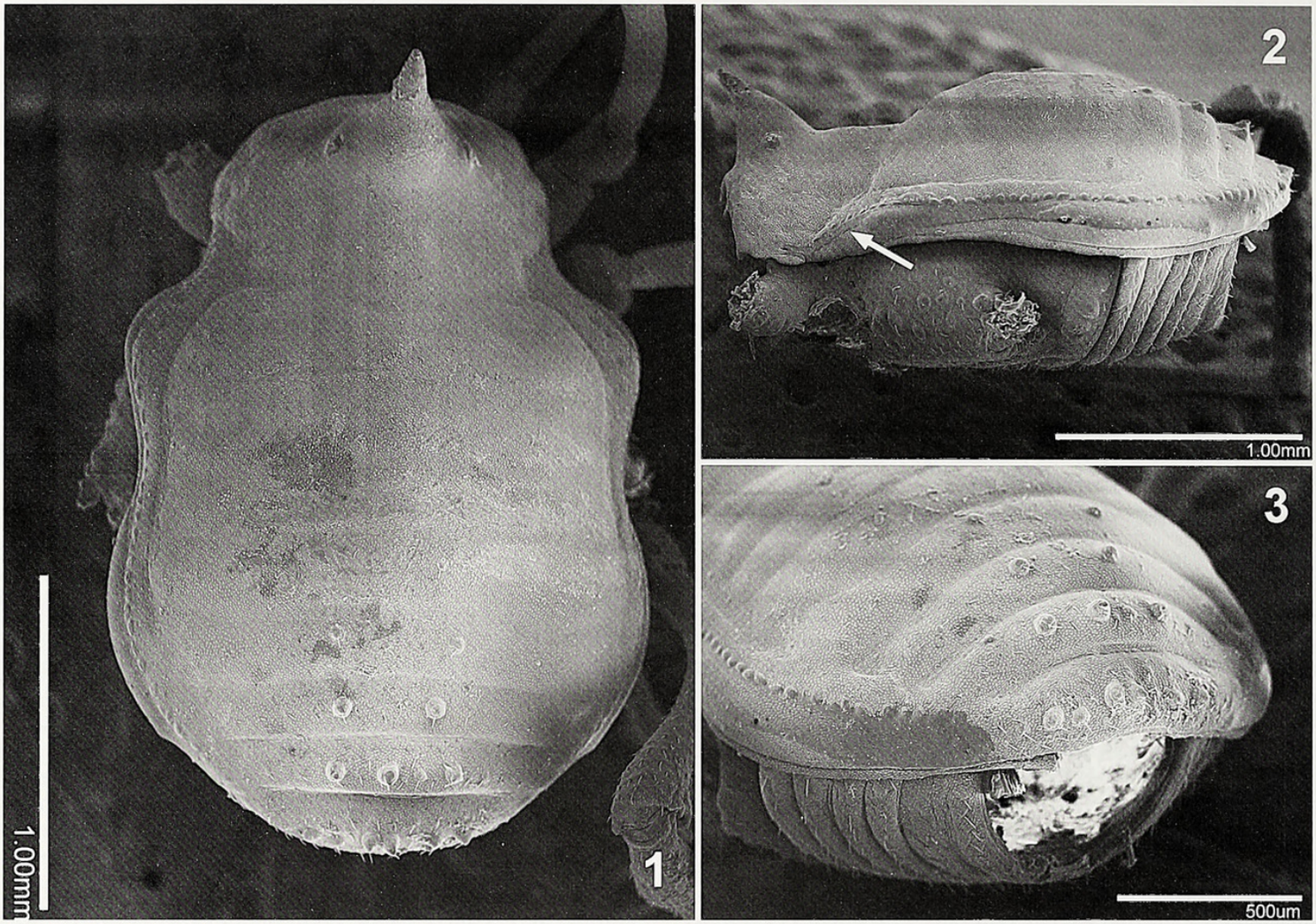
### Family Stygnopsidae Sørensen 1932

### Genus *Philora* Goodnight & Goodnight 1954

*Philora* Goodnight & Goodnight 1954:345; Kury & Cokendolpher 2000:154; Kury 2003:27.

**Type species.**—*Philora tuxtlae* Goodnight & Goodnight 1954, by original designation

**Emended diagnosis.**—Small stygnopsids, 3 mm maximum length. Scutum completum with numerous light-colored areas on sides (Figs. 1, 17, 33–36). Setiferous tubercles on pedipalps with bases conical, setae inserted basally (Figs. 8, 9, 43). Metatarsus IV dorsally with one prominent setiferous tubercle distally, with one or two apical setae (Figs. 44, 46). Pars distalis with Paramitraceras-pattern (as defined herein), with 6 to 10 pairs of lateral setae, arranged in two groups; these setae originating basally or laterally to follis. Pars distalis ventroapically with two pairs of setae, paramedian pair are represented by two microsetae close to each other; lateral pair large, pointing basally. Lobes of the dorsal bilobular projection wing-shaped, apex points basally; ventroapical margin of pars distalis with two lateral spiniform projections (Figs. 12–14, 28–32). Tarsal count low, 2:2:4:4, distitarsi I and II with one subarticle only. Males with four light-colored, pointed areas in the stigmatic region (Figs. 37–40).




Figures 1–3.—*Philora tuxtlae* Goodnight & Goodnight 1954, male. 1. Habitus dorsal view; 2. Habitus lateral view (arrow points to anterior lateral light-colored areas); 3. Habitus dorso-posterior view.

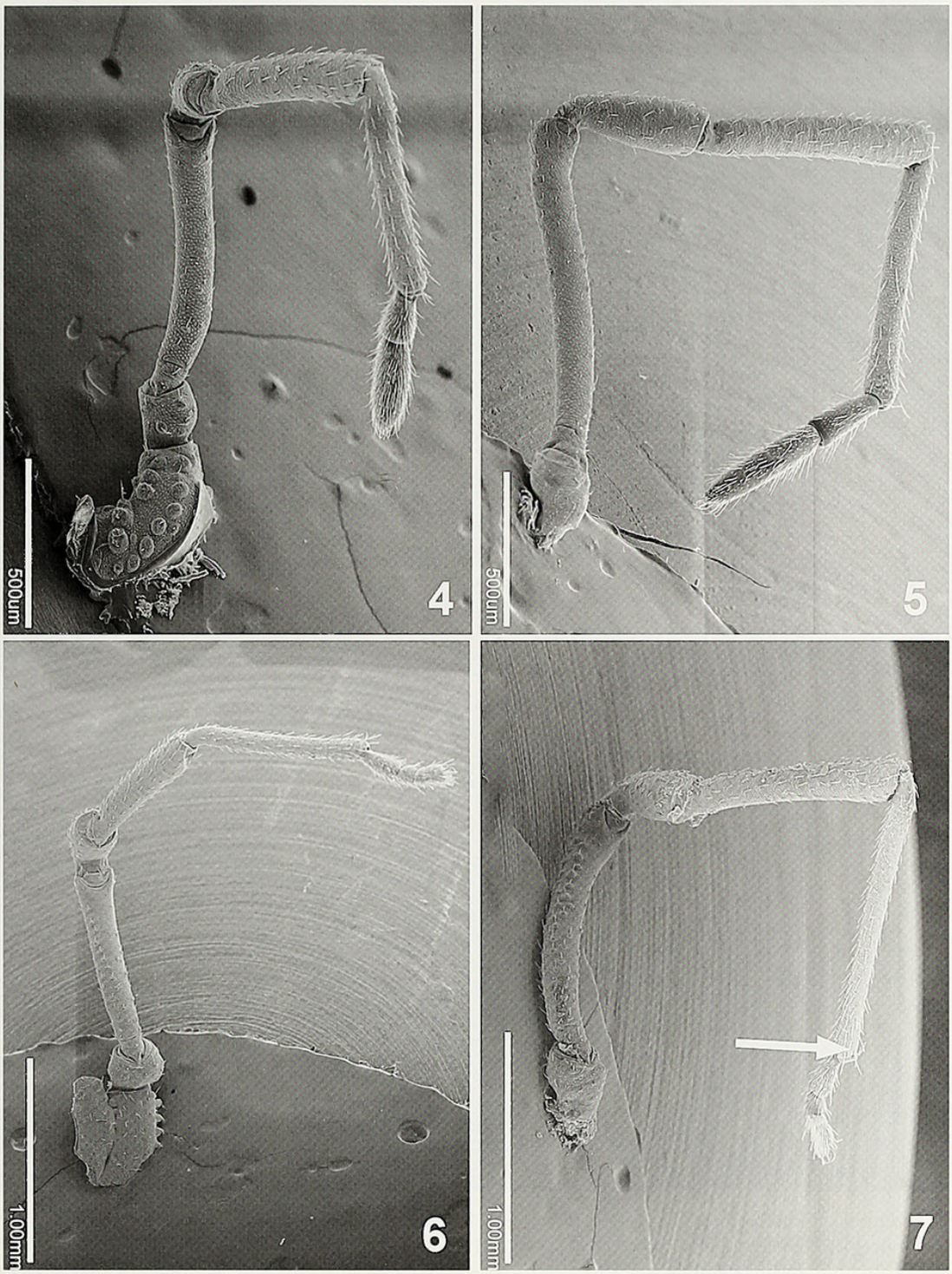
*Philora tuxtlae* Goodnight & Goodnight 1954
(Figs. 1–16, 33, 36–38, 41–44)

*Philora tuxtlae* Goodnight & Goodnight 1954:346, Figs. 1, 2; Kury & Cokendolpher 2000:154; Kury 2003:27.

**Type data.**—MEXICO: *Veracruz*, Holotype male?, and paratypes males or females? (see Remarks), San Martín volcano, 1050 m, 12 km N of San Andrés Tuxtla, Municipio San Andrés Tuxtla (deposited in American Museum of Natural History, New York; not examined).

**Material examined.**—MEXICO: *Veracruz*, 1 ♀, Estación Biológica Tropical de "Los Tuxtlas", UNAM, Municipio San Andrés Tuxtla (18°34′47.399″N, 95°04′53.399″W, 429 m.), 27 August 2005, O. Francke, A. Valdez, H. Montaño, M. Córdoba, A. Jaimes (CNAN); 1 ♂, same data, 11 January 2012, O. Francke, G. Montiel, J. Cruz, R. Monjaraz (CNAN); 8 ♂, 9 ♀, 6 juveniles, same data, 10 November 2012, O. Francke, G. Montiel, A. Valdez, J. Cruz, R. Monjaraz (CNAN); 5 ♂, 10 ♀, 5 juveniles, 1 km SE. of Díaz Ordaz, Municipio San Andrés Tuxtla (18°31′39.899″N, 95°05′12.875″W, 480 m), 10 November 2012, O. Francke, G. Montiel, A. Valdez, J. Cruz, R. Monjaraz (CNAN); 3 ♀, 2 juveniles, 1.5 km E of Ejido "La Perla de San Martín", Municipio Catemaco (18°33′19.800″N, 95°07′16.103″W, 749m), 11 November 2012, O. Francke, G. Montiel, A. Valdez, J. Cruz, R. Monjaraz (CNAN); 2 ♀, 1 juvenile, 3 km W of Ejido Ruíz Cortines, Municipio Catemaco (18°31′24.852″N, 95°08′27.780″W, 1,152 m), 11 November 2012, O. Francke, G. Montiel, A. Valdez, J. Cruz, R. Monjaraz (CNAN).

**Diagnosis.**—*Philora tuxtlae* differs from *P. quetzalzin* in having a narrow ocularium, with a noticeably pointed apex. The dorsal ornamentation is composed of minute tubercles in *P. tuxtlae* (Fig. 1), but has larger tubercles in *P. quetzalzin* (Fig. 17); the posterior tergites with the medial spiniform tubercles markedly larger than the rest of the dorsum in *P. tuxtlae* (Figs. 1–3), whereas they are uniform in size in *P. quetzalzin* (Fig. 17–19). The sexual dimorphism in *P. tuxtlae* is only in the coloration and shape of the stigmatic region (Figs. 37, 38); whereas in *P. quetzalzin*, the sexual dimorphism is in the coloration and the shape of stigmatic region and the cheliceral size (scutum/cheliceral hand ratio: 2.8 in males, vs. scutum/cheliceral hand ratio: 3.1 in females), and the shape of ocularium (Figs. 33, 34, 39, 40). Males of *P. tuxtlae* have a small dorsodistal tubercle on metatarsus IV (Figs. 7, 44), which is larger and mesally in *P. quetzalzin* (Figs. 23, 46). The 12 setae of the pars distalis originate lateral to the follis, and are in two distinctive groups of three setae (basal and lateral) on each side in *P. tuxtlae* (Figs. 12–14); whereas they number 20, with 10



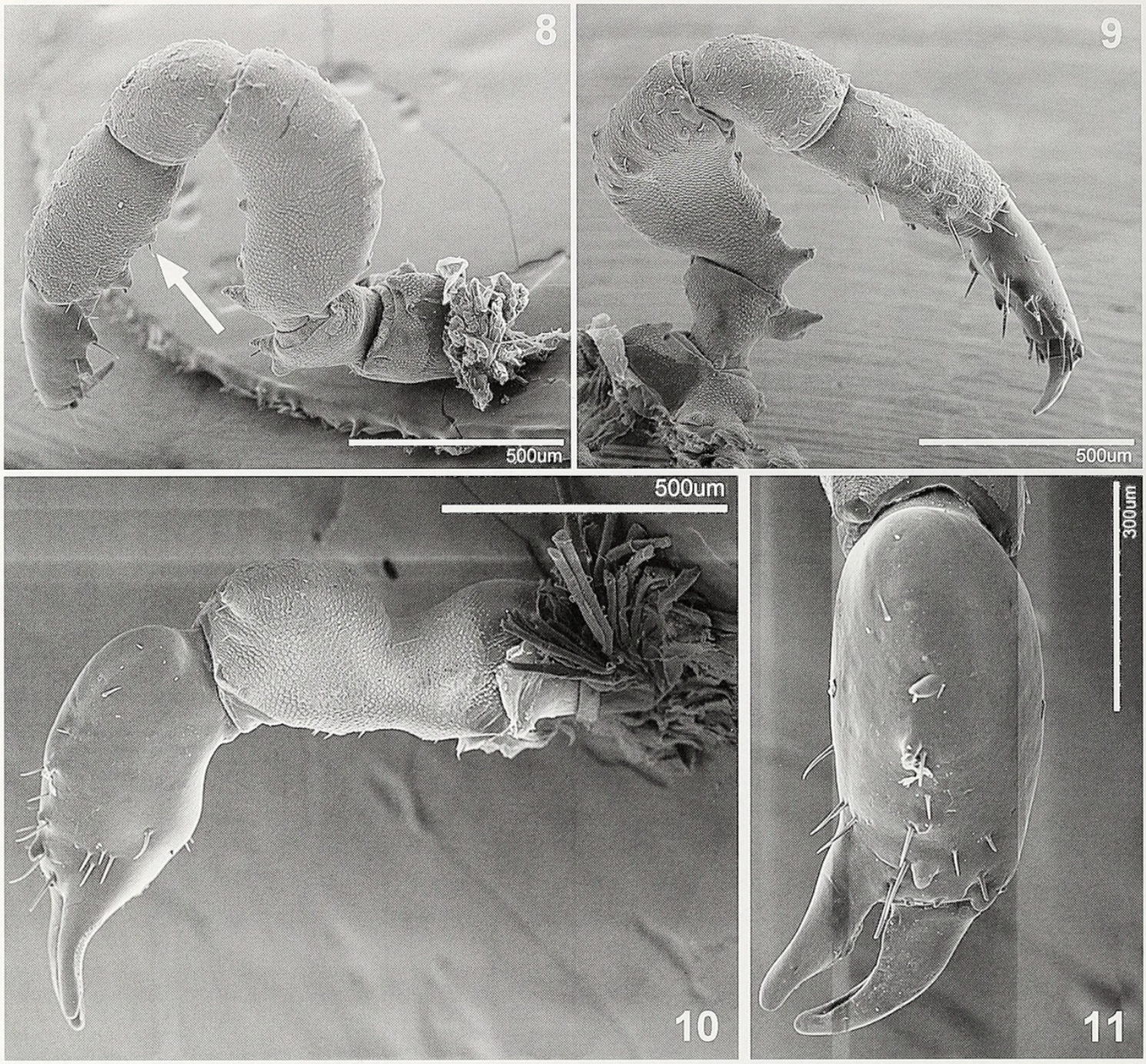

Figures 4–7.—*Philora tuxtlae* Goodnight & Goodnight 1954, male. 4. Leg I mesal view; 5. Leg II mesal view; 6. Leg III mesal view; 7. Leg IV mesal view (arrow points to dorsodistal setiferous tubercle).

scattered setae on each side in *P. quetzalzin* (Figs. 28–32). The ventroapical macrosetae of the pars distalis is stouter in *P. quetzalzin* (Figs. 31, 32), than in *P. tuxtlae* (Figs. 14, 15).

**Redescription.**—*Male:* Measurements (based on a male from Estación Biológica Tropical "Los Tuxtlas"): Scutum length: 2.3, scutum width: 1.3. Dorsum: Scutum covered by very small tubercles, equally sized on all dorsum, with few setae. Posterior tergites with medial tubercles noticeably developed, rounded. Ocularium conical, basal area small, pointed distally, without posterior bulge (Figs. 1–3).

*Venter:* Densely covered by spiniform setae. Coxa I with 1 median, irregular row of small, setiferous tubercles. Free sternites with setae similar to the rest of ventral region, but more densely covered. Stigmatic area with 4 differentiated light-colored areas, 2 posterior areas slightly closer to each other than anterior pair (Fig. 37). Anal plate with some rounded tubercles.

*Chelicera:* Scutum/cheliceral hand ratio: 4, with 3 to 4 setiferous spiniform tubercles on the frontal side, slightly developed. Cheliceral teeth present only on fixed finger,



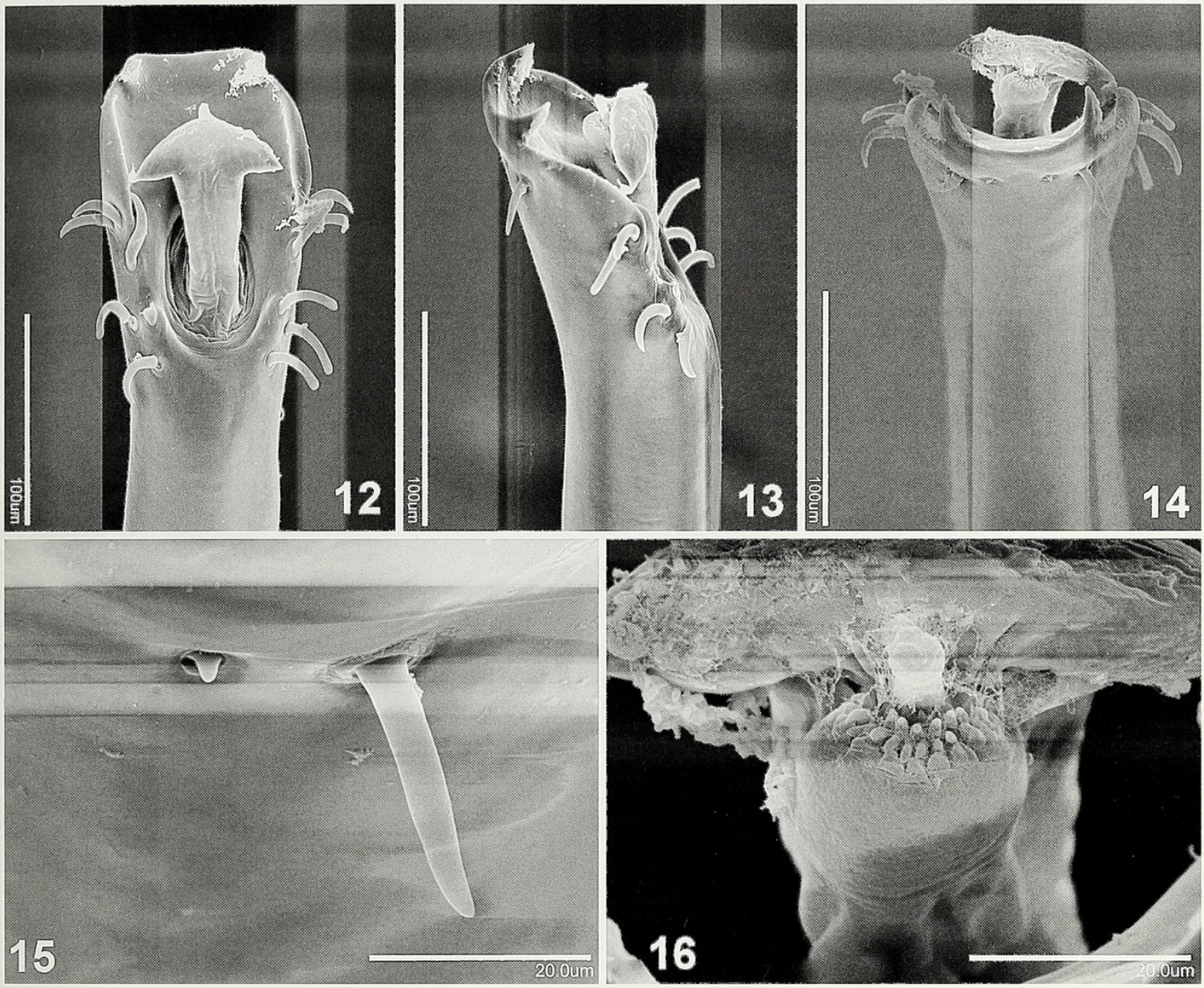

Figures 8–11.—*Philora tuxtlae* Goodnight & Goodnight 1954, male. 8. Pedipalp ectal view (arrow points to setiferous tubercle on pedipalpal tibia); 9. Pedipalp mesal view; 10. Chelicera ectal view; 11. Chelicera frontal view.

composed by 2 low and contiguous teeth; movable finger with medial concavity (Figs. 10, 11).

*Pedipalp:* Coxa with median irregular row of tubercles. Trochanter globular, with 2 prominent spiniform tubercles ventrally. Femur slightly concave mesally, with few spiniform tubercles dorsally; ventrally with 3 noticeable, spiniform tubercles, 2 basal, the basalmost larger than the others; the third one distally displaced. Patella unarmed, covered only by setae. Tibia and tarsus with 3 spiniform tubercles on both sides, the bases of theses tubercles are conical, with the setae displaced basally (Figs. 8, 9).

*Legs:* Measurements: I: 0.35/0.20/0.70/0.55, II: 1.00/0.36/0.85/0.85, III: 0.45/0.25/0.69/0.80, IV: 1.00/0.35/0.70/1.00. All legs similar in ornamentation, covered by small setae, denser distally; posterior legs without remarkable sexual dimorphism, covered by small setae, denser distally. Metatarsus IV with dorsodistal tubercle, small and inconspicuous, with a small, curved apical seta (Figs. 4–7, 44).

*Genitalia:* Setae of pars distalis filiform, rounded apically, without grooves; grouped into 2 distinct sets, 1 basal and 1 mesal, of 3 setae each. Ventroapical region of pars distalis with 2 submedial microsetae and 2 lateral macrosetae pointing basally, similar to the others setae of pars distalis; ventroapical margin with 2 pointed apices. Base of follis excavated; bilobular dorsal projections of the follis contiguous with it, apices robust, pointed distally. Stylus short and hidden within




Figures 12–16.—*Philora tuxtlae* Goodnight & Goodnight 1954, male genitalia. 12. Dorsal view; 13. Lateral view; 14. Dorso-ventral view; 15. Detail of one ventroapical microsetae and one ventroapical macrosetae on pars distalis; 16. Dorsal view of bilobular projection of follis.

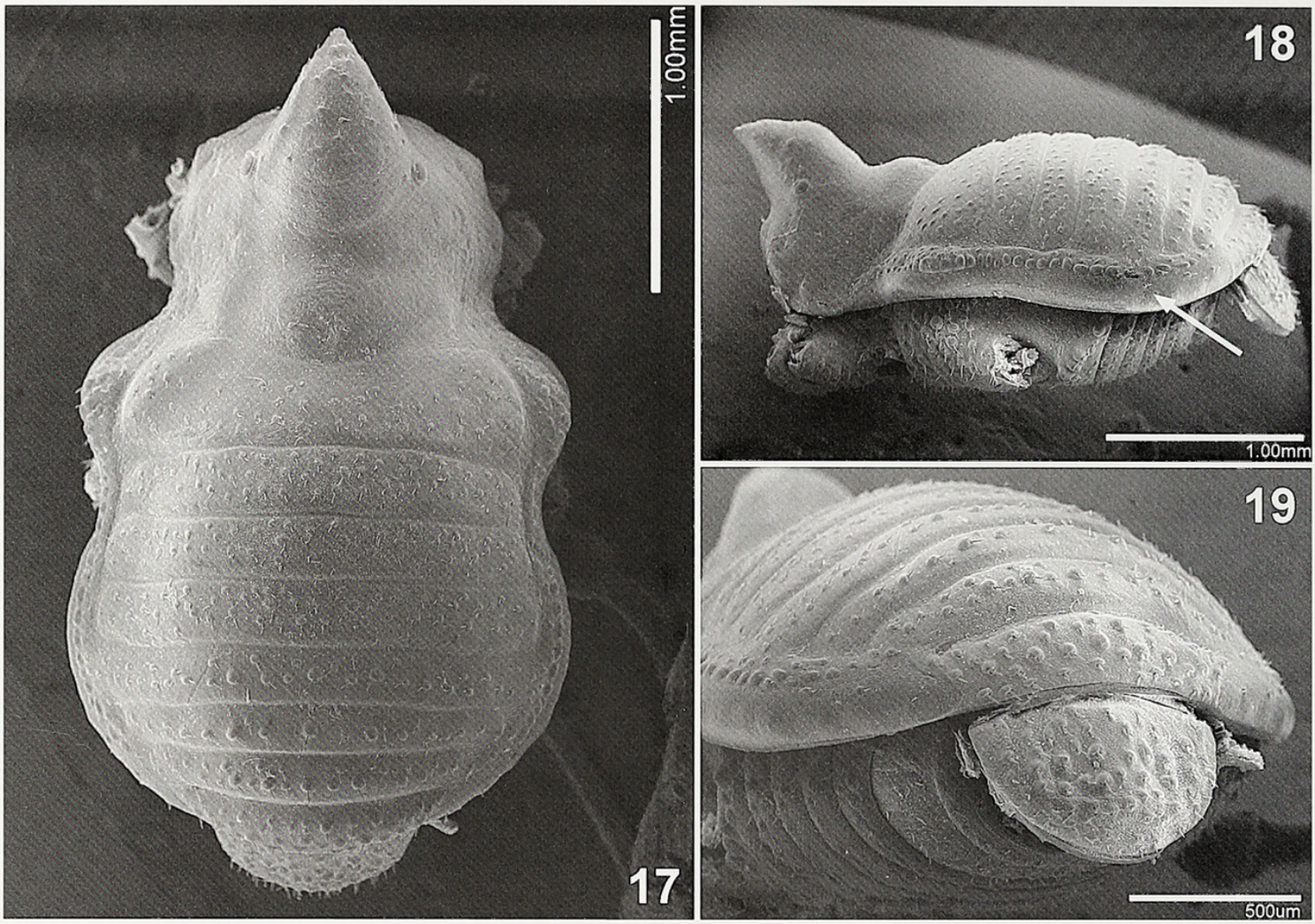
the apical portion of follis, spiniform projections only visible on the ventral side of glans. (Figs. 12–16).

*Color:* Scutum and venter dark brown, boundaries between dorsal areas lighter. Lateral margins of scutum and anterior portion of dorsal areas slightly darker. Ocularium and prosoma reticulated, background color brown, with black grid. Chelicera and pedipalps are very similar in coloration to ocularium, but lighter. Legs light brown, distal articles dark yellow. Stigmatic area with four light-colored pointed areas, almost white (Figs. 35, 36).

*Female:* Very similar to male, differing only in slightly larger size, and the shape and coloration of the stigmatic region. Females with lateral margins of stigmatic area shorter than on males, without 4 light-colored areas ventrally (Figs. 37, 38).

*Variation:* There is minimal morphological variation among males and females; the following variation in size was observed [ranges in mm (males/females) $n$ = 10]: scutum length 2.3–2.5/2.5–2.7, pedipalpal femur length 0.6–0.7/0.7–0.8, femur II length 1.0–1.1/1.1–1.2, femur IV length 1.2–1.4/1.2–1.3.

**Remarks.**—The type material of this species was not studied, but we consider that the material examined corresponds to *P. tuxtlae* because in the original description the authors mentioned the following characters: small size, low tarsal count, dorsal ornamentation; which match the specimens redescribed here. Further, the material examined comes from localities within the "Reserva Especial de la Biosfera del Volcán San Martín", which includes the type locality (Fig. 53). We question the sex of the types, as indicated by the original authors, because males and females are very similar and we have examined some stygnopsids of the genera *Hoplobunus* Banks 1900, *Karos* Goodnight & Goodnight 1944 and *Paramitraceras*, which were identified and labeled by Goodnight and Goodnight, and in most of them the sexual and life-stages (adult vs. juvenile) determinations are erroneous. These errors in determining the sex by the Goodnights




Figures 17–19.—*Philora quetzalzin* new species, male. 17. Habitus dorsal view; 18. Habitus lateral view (arrow points to posterior lateral light-colored areas); 19. Habitus dorso-posterior view.

have been corroborated by other authors (e. g., Vázquez & Cokendolpher 1997; Cokendolpher 2004; Shear, 2010; Cruz-López & Francke 2013), and thus we do not trust their determinations without examining the types.

**Distribution.**—*Philora tuxtlae* is only known from the tropical rainforest of the Reserva Especial de la Biósfera, Volcan San Martín, Los Tuxtlas, Veracruz (Fig. 53).

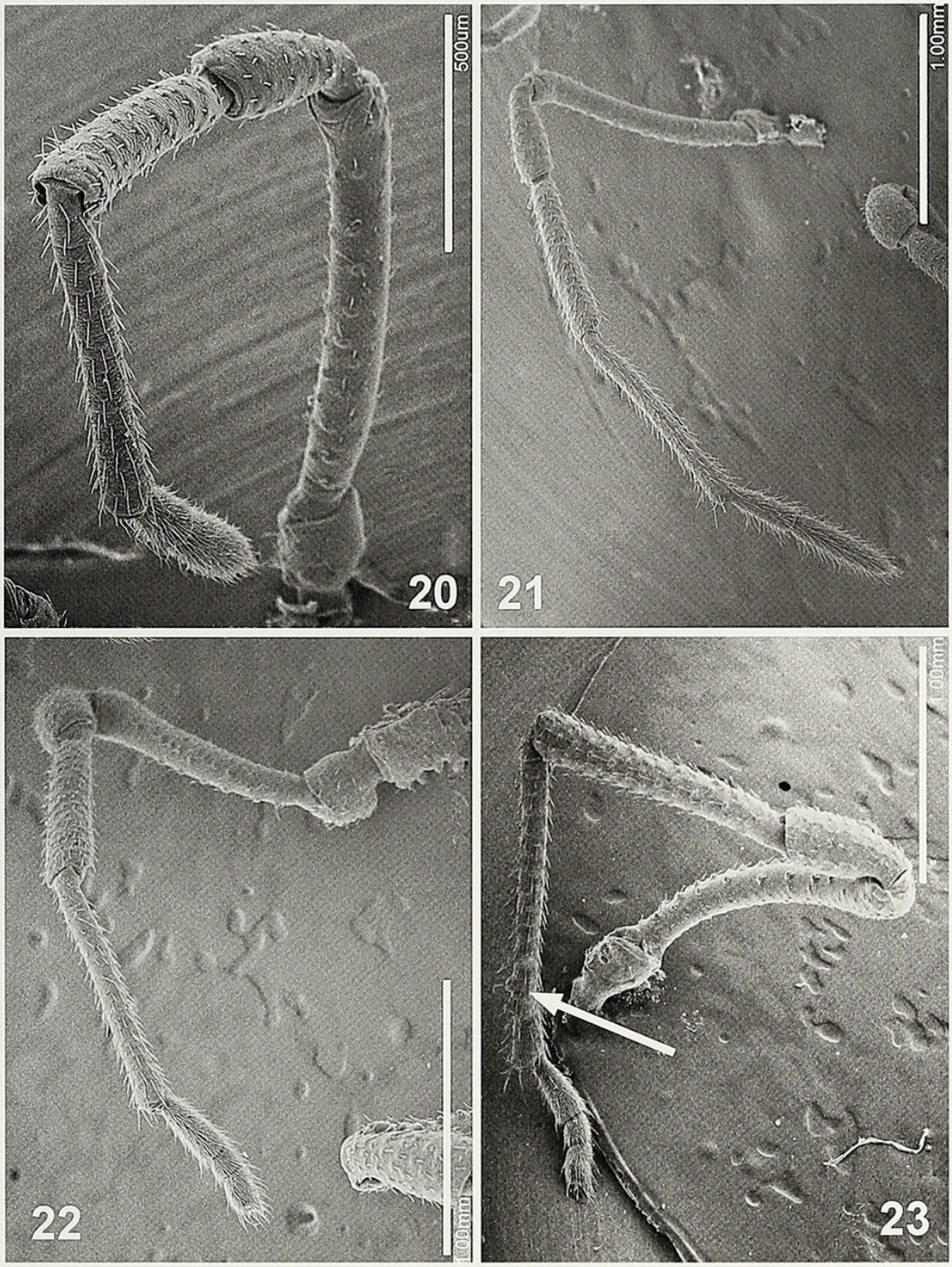
**Natural history.**—The specimens collected in August 2005 and January 2012 were located by actively searching in appropiate microhabitats and were found inside decomposing tree stumps. Using this collecting method we also found many laniatorean specimens of the genera *Flaccus* Goodnight & Goodnight 1947 of the family Biantidae Thorell 1889 [we decided not to follow the synonymy of *Flaccus* under *Stygnomma* Roewer 1912, proposed by Goodnight & Goodnight (1951), according to unpublished data of Pérez-González (2006)]; *"Cynorta"* Koch 1839 (Kury et al. 2007), *Erginulus* Roewer 1912, *Eucynortula* Roewer 1912, and *Paecilaema* Koch 1839 of the family Cosmetidae Koch 1839; *Hoplobunus*, *Paramitraceras*, and an undetermined genus of the family Stygnopsidae; and *Pachylicus* Roewer 1923 of the family Zalmoxidae Sørensen 1886. However, active searching was a poor method to collect *Philora* specimens. In November 2012, we collected by sifting leaf litter over a white sheet, obtaining contrasting results, and many more specimens of *Philora* were collected. This species showed thanatosic behavior, remaining stationary for several minutes, and resembling small pieces of dirt on the white sheet (making visual search difficult). However, after a few minutes, they started crawling away and their identification and capture became much easier. *Philora tuxtlae* was found in both well-preserved and disturbed rainforest (mostly cleared to make pastures for cattle) where there was leaf-litter accumulation.

***Philora quetzalzin*** new species
(Figs. 17–32, 33, 35, 39, 40, 45, 46)

**Type material.**—MEXICO: *Veracruz*, holotype male, 5 km E of Tlaquilpa, Municipio Tlaquilpa (18°38′30.228″N, 97°06′26.495″W, 2,233 m), 22 January 2010, O. Francke, A. Valdez, C. Santibañez, J. Cruz (CNAN-T0743). Paratypes: 1 male, same data as holotype (CNAN-T0744); 1 male, 1 female, same locality, 23 March 2007, O. Francke, A. Valdez, C. Santibañez, A. Ballesteros, H. Montaño (CNAN-T0745).

**Etymology.**—The specific name is derived from "quetzalzin", which in Nahuatl means "small beauty". The name is used as a noun in apposition.

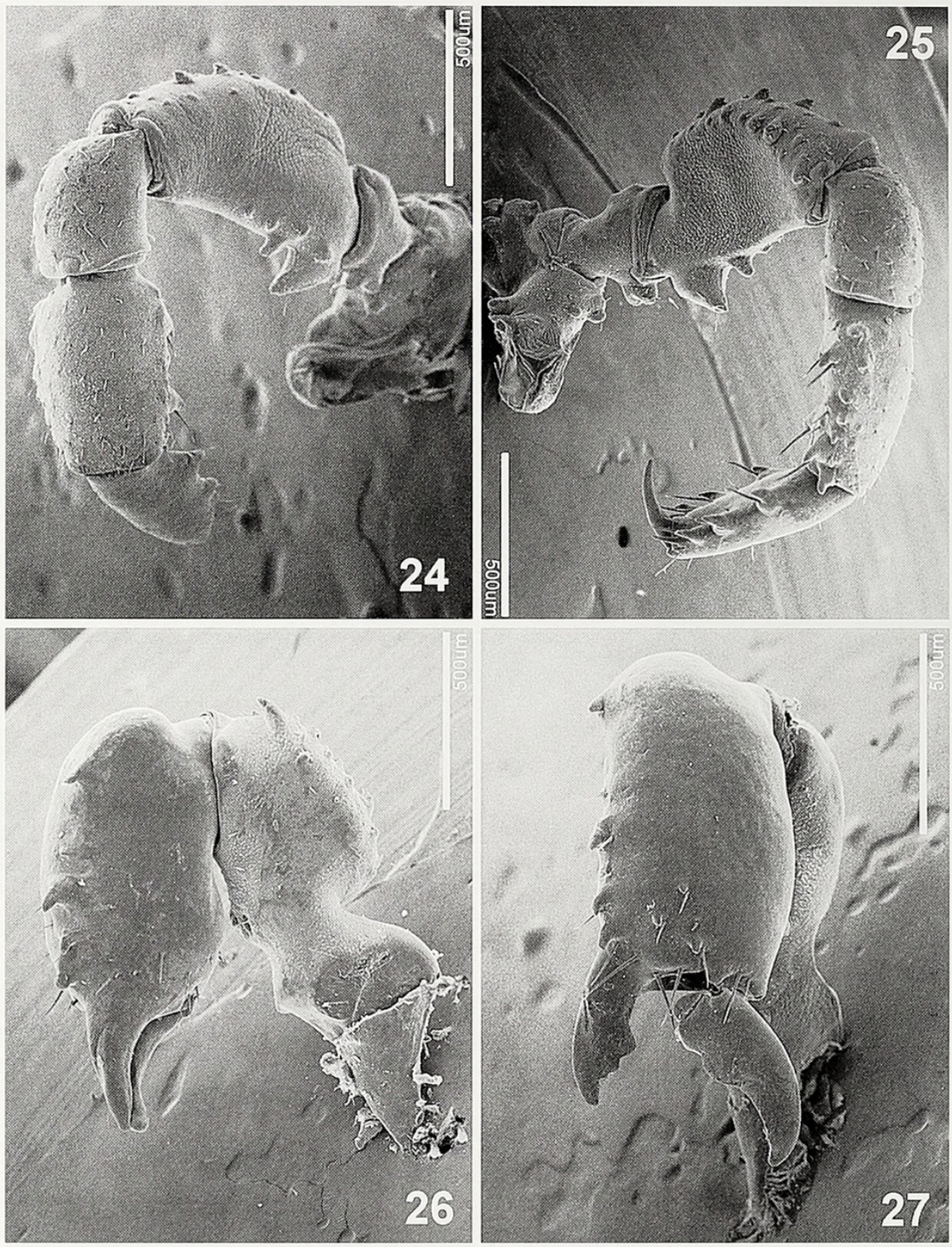
**Diagnosis.**—*Philora quetzalzin* differs from *P. tuxtlae* in having a moderately dense, noticeable dorsal ornamentation; a




Figures 20–23.—*Philora quetzalzin* new species, male. 20. Leg I frontal mesal view; 21. Leg II mesal view; 22. Leg III mesal view; 23. Leg IV mesal view (arrow points to dorsodistal setiferous tubercle).

strong ocularium with a marked posterior bulge; and tubercles of posterior tergites similar in size and shape to those on the dorsum (Figs. 17–19, 33, 34). It exhibits notable sexual dimorphism, with males having a strongly developed cheliceral hand (scutum/cheliceral hand ratio: 2.8 in males, vs. scutum/cheliceral hand ratio: 3.1 in females), and the base of the ocularium is wider in males than in females; whereas in *P. tuxtlae* there is almost no sexual dimorphism. The two species also differ in cheliceral dentition: the fixed finger has 2 teeth in *P. tuxtlae* and 3 teeth in *P. quetzalzin*; the movable finger has no teeth in *P. tuxtlae* and 2 teeth in *P. quetzalzin* (Figs. 10, 11, 26, 27). The dorsal tubercle on metatarsus IV is distinctive and meso-distal (Figs. 23, 46), whereas on *P. tuxtlae* it is inconspicuous and distal. The setae of the pars distalis number 10 pairs, are disorganized in the basal portion, originating basally to the follis, with medial grooves, and are distally pointed rather than rounded. The ventroapical macrosetae are considerably swollen and quite distinctive (Figs. 28–32).

**Description.**—*Male (holotype):* Measurements: Scutum length: 2.9, scutum width: 1.9. Dorsum: scutum densely covered with small, rounded setiferous tubercles, slightly larger posteriorly. Prosoma rugose. Base of ocularium broad,



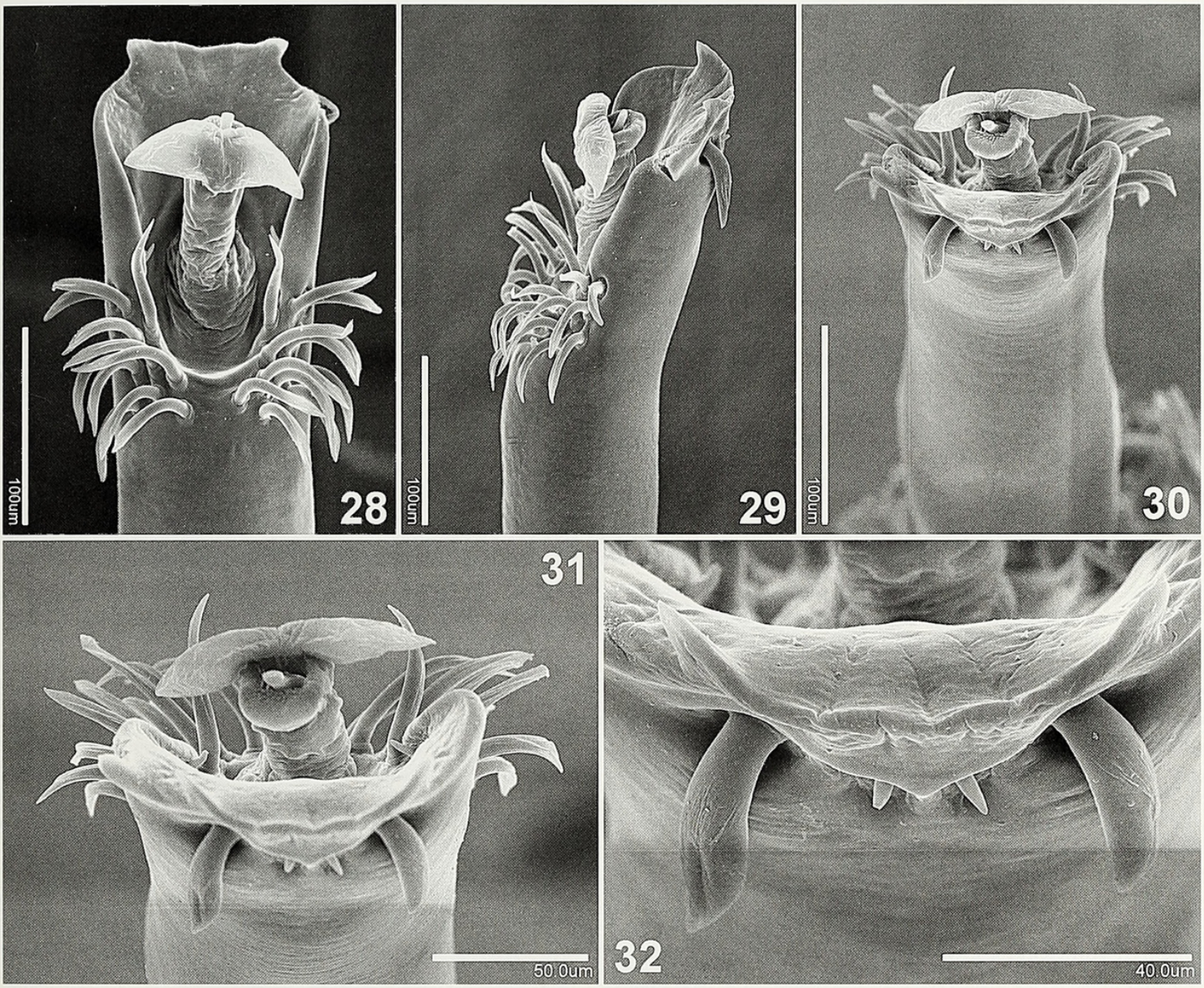

Figures 24–27.—*Philora quetzalzin* new species, male. 24. Pedipalp frontal ectal view; 25. Pedipalp mesal view; 26. Chelicera ectal view; 27. Chelicera frontal view.

occupying over half of prosoma, dorsally covered with anteriorly directed small tubercles, apex of ocularium robust, ocularium with prominent posterior bulge (Figs. 17–19).

*Venter:* Uniformly ornate with small setiferous tubercles, smaller than on dorsum, except in coxa I where the tubercles are spiniform and slightly developed. Stigmatic area with lateral margins straight, short. Posterior light-colored pointed areas somewhat fused (Fig. 39). Free sternites covered by small setiferous tubercles.

*Chelicera:* Cheliceral hand swollen (scutum/cheliceral hand ratio: 2.8). Basichelicerite covered dorsally by spiniform tubercles, the largest on meso-distal face. Cheliceral hand inserted dorsally on the basichelicerite; in frontal view covered with 3 spiniform tubercles distally pointed. Cheliceral dentition heterogeneous: fixed finger with 3 teeth, the basal most slightly larger; movable finger with 2 teeth, bulge-shaped, rounded (Figs. 26, 27).

*Pedipalp:* Coxa with median irregular row of setiferous tubercles. Trochanter globular with two blunt, larger spiniform tubercles. Femur concave on mesal side, with 2 irregular rows of spiniform setiferous tubercles ventrally; mesal row with 2 large tubercles, basal most largest; ectal row with 4




Figures 28–32.—*Philora quetzalzin* new species, male genitalia. 28. Dorsal view; 29. Lateral view; 30. Dorso-ventral view; 31. Dorsal view of bilobular projection of glans; 32. Details of ventroapical pairs of micro- and macrosetae on pars distalis.

smaller ones. Femur covered dorsally by 2 rows of small spiniform tubercles, increasing in size distally. Patella unarmed, covered only by setae. Tibia with 3 setiferous spiniform tubercles on each margin. Tarsal armature similar to tibia, setiferous tubercles with the setae at the base (Figs. 24, 25).

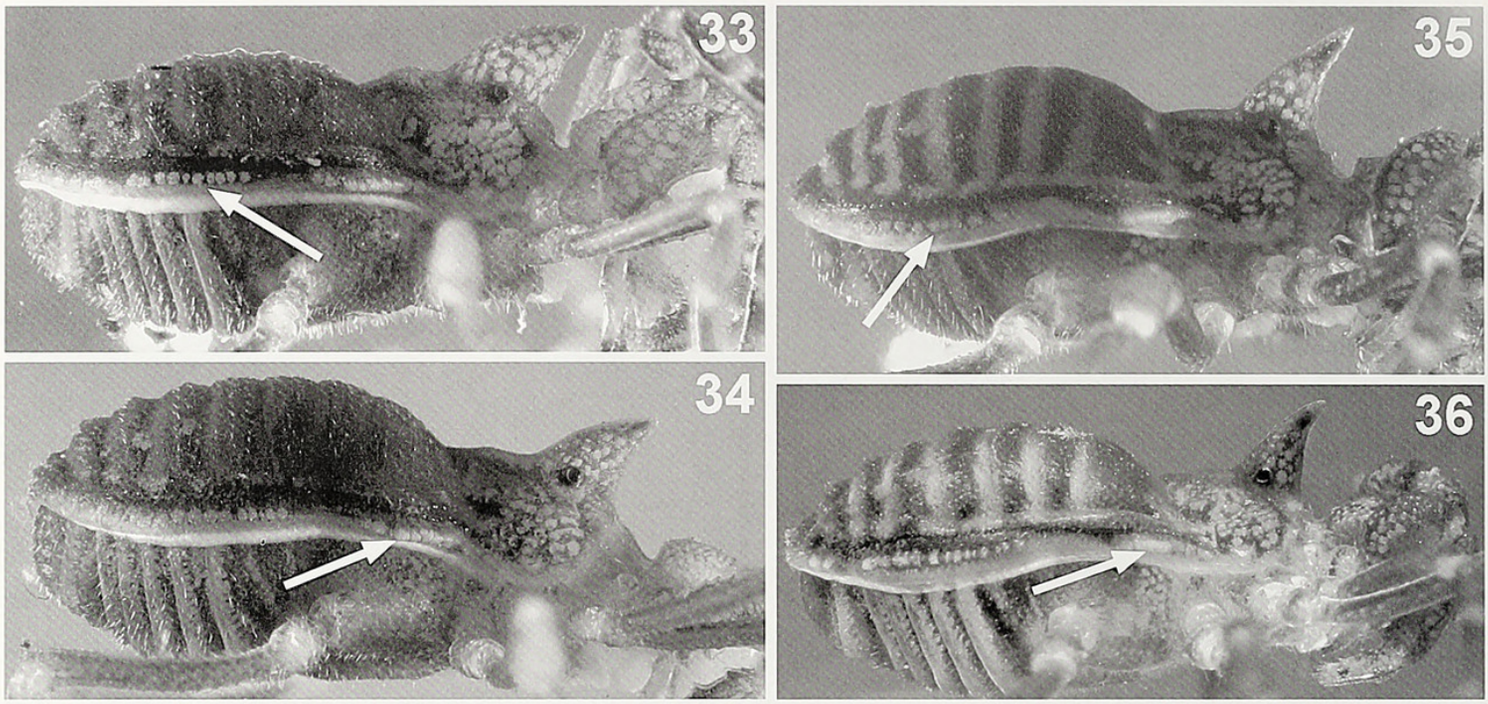
*Legs:* Measurements: I: 0.55/0.40/0.95/0.75, II: 1.40/0.55/1.05/1.00, III: 0.65/0.40/0.80/1.00, IV: 1.25/0.45/0.90/1.25. All legs similar in ornamentation, covered by numerous small setae. Femora III and IV curved. Leg IV without sexually dimorphic ornamentation. Metatarsus IV with strong spiniform setiferous tubercle mesodistally, with 1 or 2 apical setae (Figs. 20–23, 46).

*Genitalia:* Pars distalis with 10 pairs of setae, basal to follis, without distinct groupings, all setae with distal median groove. Lateral margins of pars distalis in dorsal view curved towards the follis, with a pair of minute setae on the lateral margins hidden by curls. Apex of distal ventroapical margin with two small lateral projections. Two pairs of ventroapical setae, the middle pair formed by two microsetae, very close between them; the lateral setae slightly spoon-shaped distally, with an apical median groove. Follis narrower than the maximum width of pars distalis, base of follis excavate; bilobular dorsal projection widespread, apices rounded distally; stylus short and hidden within the apical portion of follis. Spiniform projections small and only present in the ventral side of apical follis (Figs. 28–32).

*Color:* Similar to *P. tuxtlae*, but the boundaries between dorsal areas of scutum almost as dark as the rest of dorsum (Figs. 33, 34).

*Female (paratype):* Differs from the male in having a narrower ocularium, chelicera noticeably smaller (scutum/cheliceral hand ratio: 3.1), setiferous tubercles of pedipalps less developed and having lateral margins of stigmatic area shorter than the males (Figs. 33, 34, 39, 40).

**Distribution.**—This species is known only from the type locality (Fig. 53).



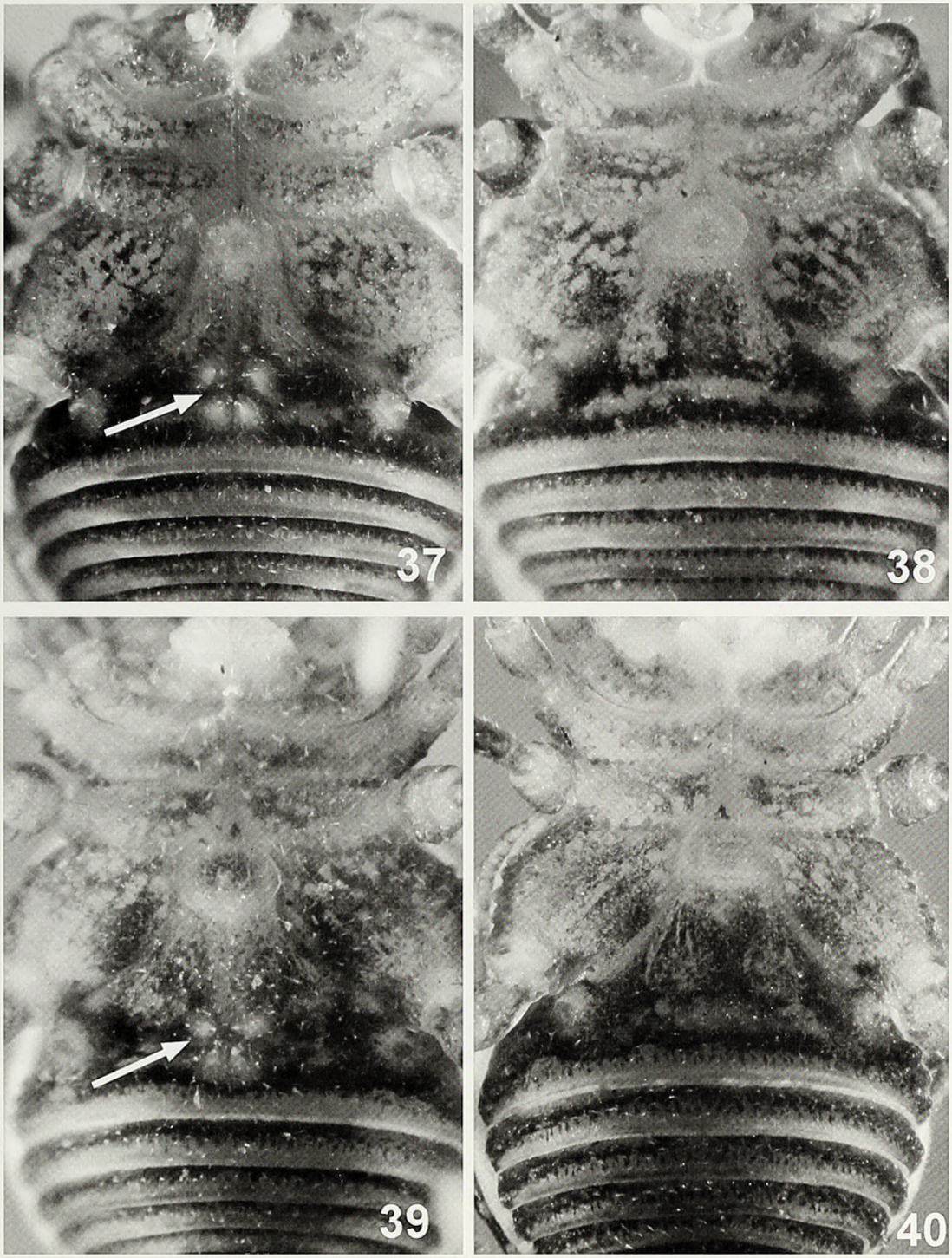

Figures 33–36.—*Philora* species, male and female lateral view. 33. *Philora quetzalzin* new species, male; 34. *P. quetzalzin*, female; 35. *P. tuxtlae* Goodnight & Goodnight 1954, male; 36. *P. tuxtlae* female. Arrows indicate anterior (females, lower illustrations) and posterior (males, upper illustrations) light-colored areas.

**Natural history.**—Similar to *P. tuxtlae*, the specimens collected in 2010 showed thanatosic behavior, and were found among the roots of decomposing tree stumps, forming a small aggregation with specimens of *Flaccus* sp. *Philora quetzalzin* inhabits a pine-oak forest, above 2,000 m, unlike *P. tuxtlae* which lives in the rainforest of Los Tuxtlas region at a lower altitude of less than 1,200 m.

## DISCUSSION

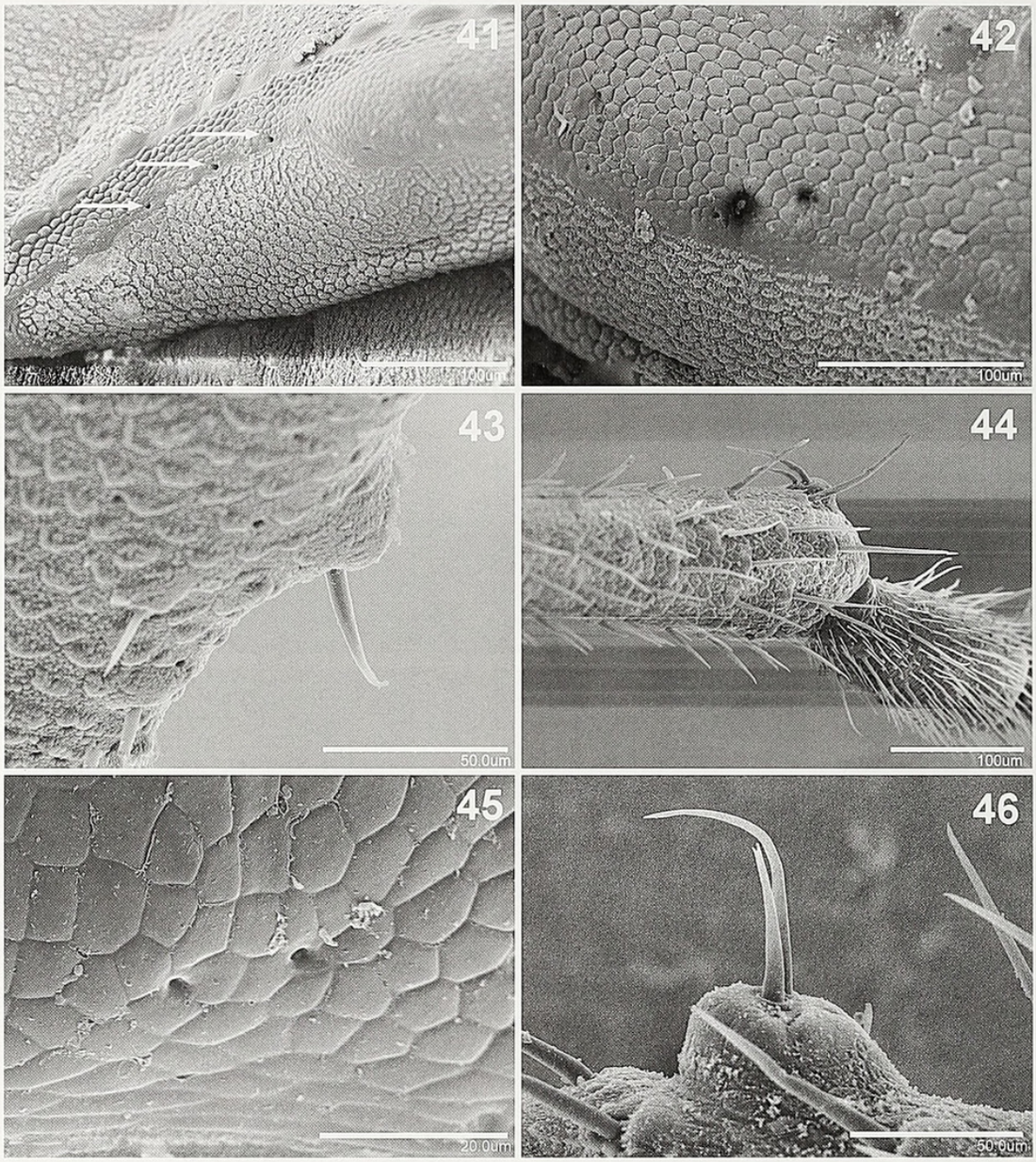
Goodnight & Goodnight (1954) argued that tarsal counts alone were sufficient to differentiate the genus *Philora* from its close relative *Paramitraceras*. It is surprising that those authors did not mention the presence of a scutum completum in the generic diagnosis of *Philora*, because this character is quite distinctive. The fusion of all dorsal tergites forming a scutum completum was previously known only in the suborder Cyphophthalmi Simon 1879; in the families Dicranolasmatidae Simon 1879, Nemastomatidae Simon 1872 and Trogulidae Sundevall 1833 within the suborder Dyspnoi Hansen & Sørensen 1904 (Shear 2006; Sharma & Giribet 2011). Regarding the suborder Laniatores, the scutum completum is present in the family Sandokanidae Özdikmen & Kury 2007 (formerly Oncopodidae Thorell 1876), in the males of *Heteropachylus inexpectabilis* (Soares & Soares 1946) of the family Gonyleptidae Sundevall 1833, and presumably in *Paralola buresi* Kratochvíl 1951 of the family Phalangodidae Simon 1879 (Schwendinger 2007; Ubick 2007; Mendes 2011). This morphological condition was considered plesiomorphic in the order, but this hypothesis is inconsistent with recent outgroup comparison and with the retention of primitive dorsal longitudinal muscles in higher Opiliones (Shultz & Pinto-da-Rocha 2007); and the scutum completum appears to have evolved convergently in several Opiliones lineages (Sharma & Giribet 2009). Moreover, reciprocally in Cyphophthalmi, Sandokanidae and *Philora*, this character is matched by low tarsal counts and could reflect adaptations to similar ecological niches, but this hypothesis has not been tested (Sharma & Giribet 2009, 2011). The recent hypothesis of phylogenetic relationships, using molecular data, of the families with all or one member with scutum completum is: the family Sandokanidae is considered the sister group of the non-phalangodid Grassatores Kury 2002, whereas the family Stygnopsidae is considered the sister group of the superfamily Gonyleptoidea; and finally, the family Gonyleptidae is within the Gonyleptoidea (Giribet et al. 2010; Sharma & Giribet 2011).

The phylogenetic and taxonomic status of Gonyleptidae and Sandokanidae has been well studied, wherein the external morphology and the male genitalia of the majority of the genera and species of the family are well known (e.g., Schwendinger & Martens 2002; Schwendinger 2006, 2007; DaSilva & Gnaspini 2009; Yamaguti & Pinto-da-Rocha 2009; DaSilva & Pinto-da-Rocha 2010; Mendes 2011). In contrast, within the family Stygnopsidae, external morphology and male genitalia are well known for the genera *Chinquipellobunus* Goodnight & Goodnight 1944 (Cokendolpher 2004) and five of six species of *Paramitraceras* (Cruz-López & Francke 2012, 2013). There are published drawings of the male genitalia of the *Hoplobunus boneti* (Goodnight & Goodnight 1942), *H. queretarius* Šilhavý 1974, *Karos rugosus* Goodnight & Goodnight 1971, *Mexotroglinus sbordonii* Šilhavý 1977, *Sbordonia armigera*, both known species of the genus *Stygnopsis* Sørensen 1902, both known species of the genus *Troglostygnopsis* Šilhavý 1974, and SEM photos of *Karos* sp. and *Stygnopsis valida* (Sørensen 1884) (Šilhavý 1974, 1977; Mendes & Kury 2007). Mendes & Kury (2007) described the male genitalia of the family Stygnopsidae, but in the majority of species the male genitalia are unknown.




Figures 37–40.—*Philora* species, male and female ventral views. 37. *Philora tuxtlae* Goodnight & Goodnight 1954, male; 38. *P. tuxtlae* female; 39. *Philora quetzalzin* new species, male; 40. *P. quetzalzin* female. Arrows indicate the four ventral light-colored pointed areas on the males of *Philora* species.

We have observed the male genitalia of some stygnopsids using a scanning electronic microscope and have noted that the male genitalia of the type species of *Troglostygnopsis*, along with the known male genitalia of the genera *Paramitraceras*, *Philora*, and presumably the genus *Sbordonia* (based on the drawing by Šilhavý 1977), share a similar and unique genital pattern, herein called the Paramitraceras-pattern. This pattern is recognizable by having 1) setae of pars distalis generally forming two rows or groups, one dorsolaterally or mesal, and the other, laterobasal and ventrally; 2) numerous pairs of setae in these two rows, from three to fourteen pairs; 3) pars distalis very wide, follis narrow compared with it; 4) presence of a bilobular dorsal projection of the follis; and 5) presence of a unique pair of micro-ventral setae in the meso or meso-distal region of ventral plate (Figs. 47–52). Regarding the other described species of *Troglostygnopsis*, *T. inops* (Goodnight & Goodnight 1971), we have observed that it does not share this male genitalic pattern, and possibly this species should be transferred out of the genus. A phylogenetic analysis of these and other stygnopsid genera would clarify



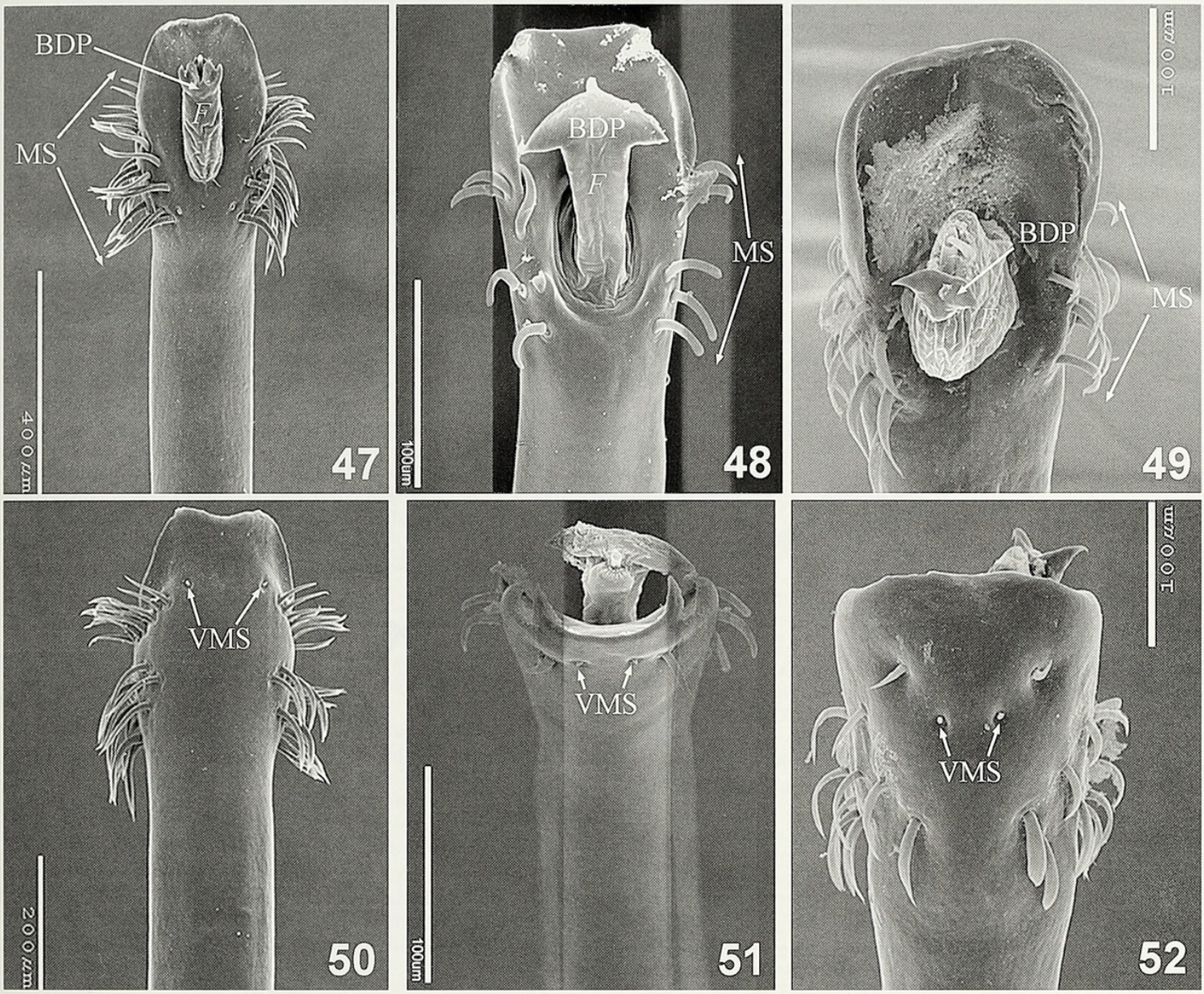

Figures 41–46.—*Philora* species, details of lateral pores, setiferous tubercle of pedipalp and dorsal distal tubercles of femur IV; 41. *Philora tuxtlae* Goodnight & Goodnight 1954, male, antero-lateral pores (arrows, see also arrow in Figure 2); 42. *P. tuxtlae* male, detail of a pore; 43. *P. tuxtlae* male, setiferous tubercle of pedipalpal tibia (see arrow in Figure 8); 44. *P. tuxtlae* male, detail of dorsal distal spiniform setiferous tubercle on metatarsus IV (see arrow in Figure 7); 45. *Philora quetzalzin* new species, details of latero-posterior pores (arrow in Figure 18); 46. *P. quetzalzin*, detail of dorso meso-distal spiniform setiferous tubercle on metatarsus IV (see arrow in Figure 23).

whether this pattern is due to common ancestry or due to homoplasy. Those three genera can be differentiated by combinations of external and genital characters (Table 1).

The "lateral projections" (Šilhavý 1974, 1977) are present in both species of the genus *Philora*; these structures and the light-colored lateral areas on the sides of the scutum were observed under SEM, and there are numerous micropores in those areas (Figs. 33–36, 41, 42, 45). Šilhavý (1974) proposed that these lateral projections, present in the stygnopsid genera *Karos*, *Paramitraceras*, *Sbordonia* and *Troglostygnopsis* could be glandular openings similar to those reported on other Laniatores (Eisner et al. 2004; Machado et al. 2005; Willemart et al. 2010). A detailed examination using SEM of these light-colored areas on those other genera will contribute to a better knowledge about glandular openings in the family Stygnopsidae.

## ACKNOWLEDGMENTS

We thank Lorenzo Prendini (AMNH) for making available many stygnopsid specimens of the genera *Paramitraceras* and *Troglostygnopsis* for examination. Thanks to Berenit Mendoza Garfias (IBUNAM) for her help and assistance with the SEM photographs. We thank the members of the Colección Nacional de Aracnidos (CNAN) for their help in the field, especially G. Montiel, R. Monjaraz, C. Santibañez and A. Valdez. Virginia León Reganon, leader of the Proyecto Biotas Tropicales, Red Temática Código de Barras, CONACYT provided financial support for the field trips to Los Tuxtlas. The first author thanks the Consejo Nacional de Ciencia y Tecnología (CONACYT) and the Posgrado en Ciencias Biológicas, the Instituto de Biología, UNAM (IBUNAM) for financial support.




Figures 47–52.—Male genitalia of the genera having the Paramitraceras-pattern. 47 & 50. *Paramitraceras granulatum* Pickard-Cambridge 1905; 47. Dorsal view; 50. Ventral view. 48 & 51. *Philora tuxtlae* Goodnight & Goodnight 1954; 48. Dorsal view; 51. Ventral view. 49 & 52. *Troglostygnopsis anophthalma* Šilhavý 1974; 49. Dorsal view; 52. Ventral view. Abbreviations: BDP = bilobular dorsal projection, *F* = follis, MS = macrosetae, VMS = ventral microsetae.

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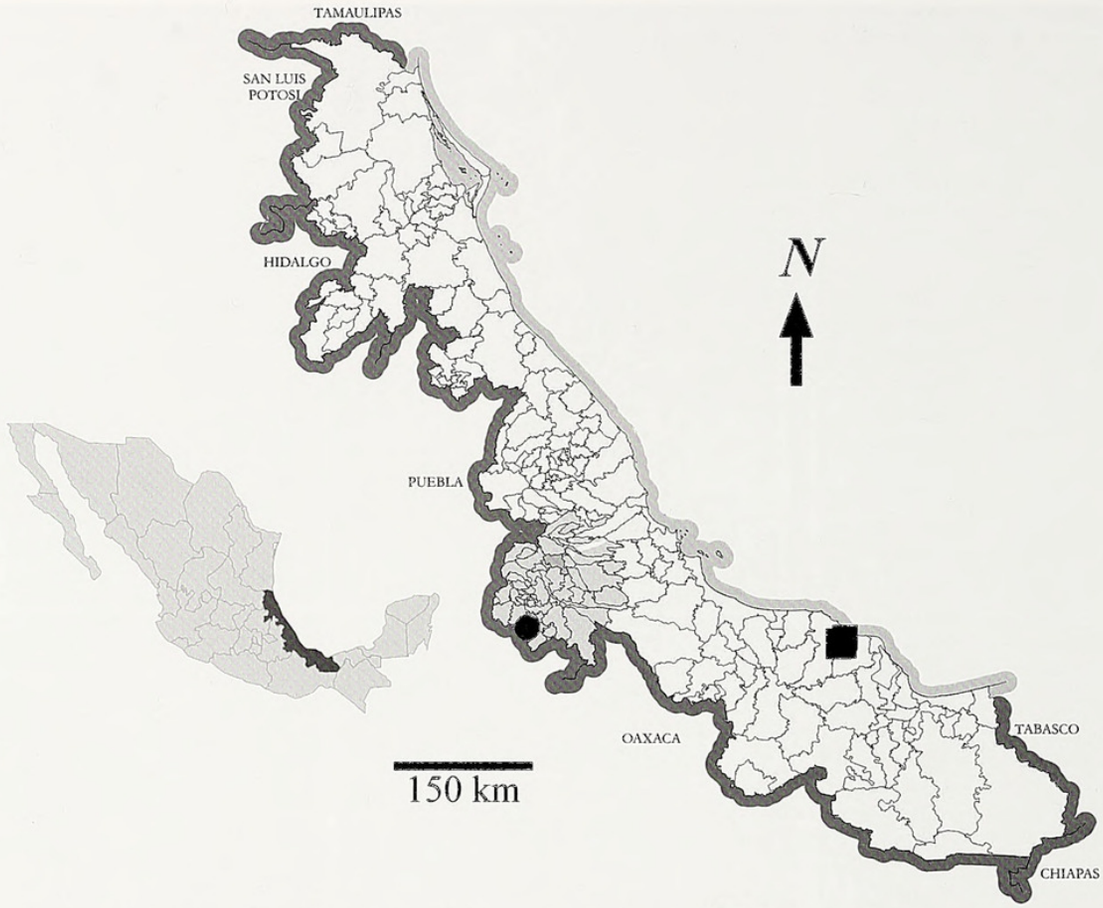


Figure 53.—Distribution of the species of *Philora*. State of Veracruz enlarged. Circle: *Philora quetzalzin* new species. Squares: *Philora tuxtlae* Goodnight & Goodnight 1945, including the type locality.

Table 1.—Differences in morphological characters between the stygnopsid genera *Paramitraceras* Pickard-Cambridge 1905, *Philora* Goodnight & Goodnight 1954, *Sbordonia* Šilhavý 1977, and *Troglostygnopsis anophthalma* Šilhavý 1974.

| | *Paramitraceras* | *Philora* | *Sbordonia* | *T. anophthalma* |
|---|---|---|---|---|
| Scutum | *magnum* | *completum* | *magnum* | *magnum* |
| Eyes | Present | Present | Present | Absent |
| Body, lateral view | Opisthosoma convex | Opisthosoma convex | Opisthosoma convex | Opisthosoma flattened |
| Pedipalpal armature | Absent | Present | Present | Present |
| Pedipalpal armature on the tibia | - | Entire length | Distally only | Entire length |
| Setae and base of setiferous tubercles of the pedipalpi | - | Not contiguous | Contiguous | Contiguous |
| Length of the setiferous tubercles of pedipalpi | - | Not greater than respective segments | Not greater than respective segments | Greater than respective segments |
| Ventral armature of the femur IV | *P. femorale* only with a basal ventro-distal bulge | Absent | With conspicuous spiniform tubercles | Absent |
| Lenght of femur IV | Less than or equal to scutum | Less than or equal to scutum | Less than or equal to scutum | Longer than scutum |
| Distitarsus I and II | 2/2–3 | 1/1 | 2/2 | 3/3 |
| Origin of lateral setaes of pars distalis | Lateral to follis | Basal and lateral to follis | unknown | Lateral to follis |
| Ventral microsetae | Distant from each other | Close between them | unknown | Close between them |
| Position of the ventral microsetae respect to apical pair of dorsal lateral setae row | At the same level or slightly apical | Basal to them | unknown | Basal to them |
| Apical pair of the dorsal lateral setae row | Contiguous with the rest | Separated from the rest, close to ventral microsetae | unknown | Separated from the rest, close to ventral microsetae |

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*Manuscript received 19 February 2013, revised 24 July 2013.*