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BRAZILIAN STREPSIPTERA (Insecta) PARASITIZING  
VESPIDAE, WITH THE DESCRIPTION OF THREE NEW  
SPECIES OF *XENOS* ROSSIUS, 1793 (Stylopidae)\*

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(With 30 text-figures)

Through the kindness of Dr. R. L. Araujo, S. Paulo, Brazil, we received 10 stylopized wasps of the following species, identified by him: *Polistes canadensis canadensis* (L., 1758) (1 specimen); *Polistes melanostoma* Saussure, 1854 (1 specimen); *Polistes versicolor versicolor* (Oliv., 1791) (5 specimens); *Polistes versicolor vulgaris* Bequaert, 1934 (1 specimen); *Polistes* sp. (1 specimen) and *Apoica pallens* (F., 1804) (1 specimen).

These wasps showed variable degree of stylopization. The parasites studied are representative of 5 species of the genus *Xenos* Rossius, 1793, family *Stylopidae* Kirby, 1813, 3 of them are described as new and 2 others are, for the first time, recorded in Brazil.

***Xenos bohlsi* Hoffmann, 1914**

(Figs. 1, 7-8)

*Xenos bohlsi* Hoffmann, 1914: 100, figs. 1-3

*Xenos bohlsi* Pierce, 1918: 461

*Xenos bohlsi* Hofeneder & Fulmek, 1943: 162

*Female* (fig. 7) — Cephalothorax constricted at base, with a broad basal band; cephalic portion, mid region limited by the head and its lateral branches, pale brown; remaining portions of the ventral side, blackish; general shape sub-oval. Mandibles (fig. 8) one-toothed, the tooth rounded at tip and hooked outwards. Clypeus slightly prominent

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and rounded. Mouth-opening elongated transversally. Cephalothoracic membrane narrow, not reaching the lateral borders of the cephalothorax. Thoracic spiracles placed a little dorsally.

Principal proportions (specimen n.º 26): length of cephalothorax 1,83 mm; width at base of cephalothorax 1,27 mm; width between spiracles 1,53 mm; greatest width 1,53 mm; distance between mandibles 0,51 mm; width of the head through the cephalothoracic membrane 0,80 mm; length of the head on the median line 0,29 mm; length of the head laterally 0,60 mm.

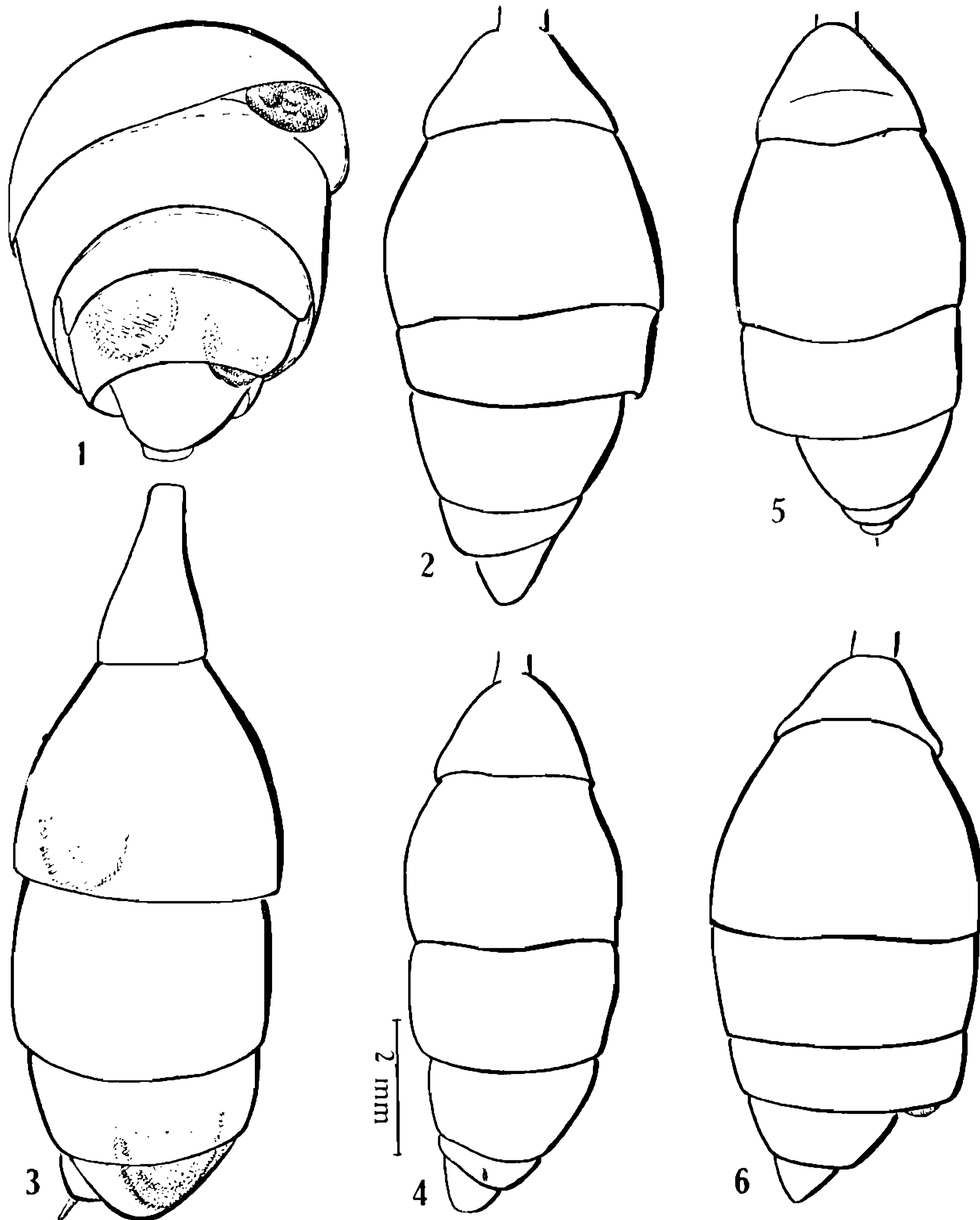


Fig. 1 — *Polistes canadensis canadensis* (L.), abdomen stylopedicized by *Xenos bohlsi* Hoffmann, 1914; fig. 2 — *Polistes versicolor versicolor* (Oliv.), abdomen stylopedicized by *Xenos bonairensis* Brèthes, 1922; fig. 3 — *Apoica pallens* (Fabricius), abdomen stylopedicized by *Xenos araujo* sp. n.; fig. 4 — *Polistes versicolor vulgaris* Bequaert, abdomen stylopedicized by *Xenos hospitus* sp. n.; fig. 5 — *Polistes* sp., abdomen stylopedicized by *Xenos indespectus* sp. n.; fig. 6 — *Polistes melanosoma* Saussure, abdomen stylopedicized by *Xenos* sp.

*Host* — *Polistes canadensis canadensis* (L., 1758).

*Material studied* — 2 females ns. 25 and 26; one male puparium n.º 27A; male withdrawn from puparium n.º 27B, in the collection of Strepsiptera of the Section of Entomology of the Instituto Oswaldo Cruz. One female in M. Kogan's collection. All these on one male host from S. Paulo, S.P., Brazil, VII. 1936, R.L. Araujo coll. The parasites distributed in the following manner: one male puparium between 3rd and 4th urotergites, right side; two female cephalothoraces between 6th and 7th urotergites, one on each side; one female cephalothorax not emerged from the abdomen of host.

*Discussion* — Our female specimens are smaller than Hoffmann's female allotype but they have the general features and relative proportions of this species.

*Distribution* — Paraguay; S. Paulo, Estado de S. Paulo, Brazil.

### ***Xenos bonairensis* Brèthes, 1922**

(Figs. 2, 9-16)

*Xenos bonairensis* Brèthes, 1922: 44

*Xenos bonairensis* Hofeneder & Fulmek, 1943: 162

*Male* (fig. 9) (Withdrawn from puparium) — Completely developed, but the head and the prothorax missing. Dark.

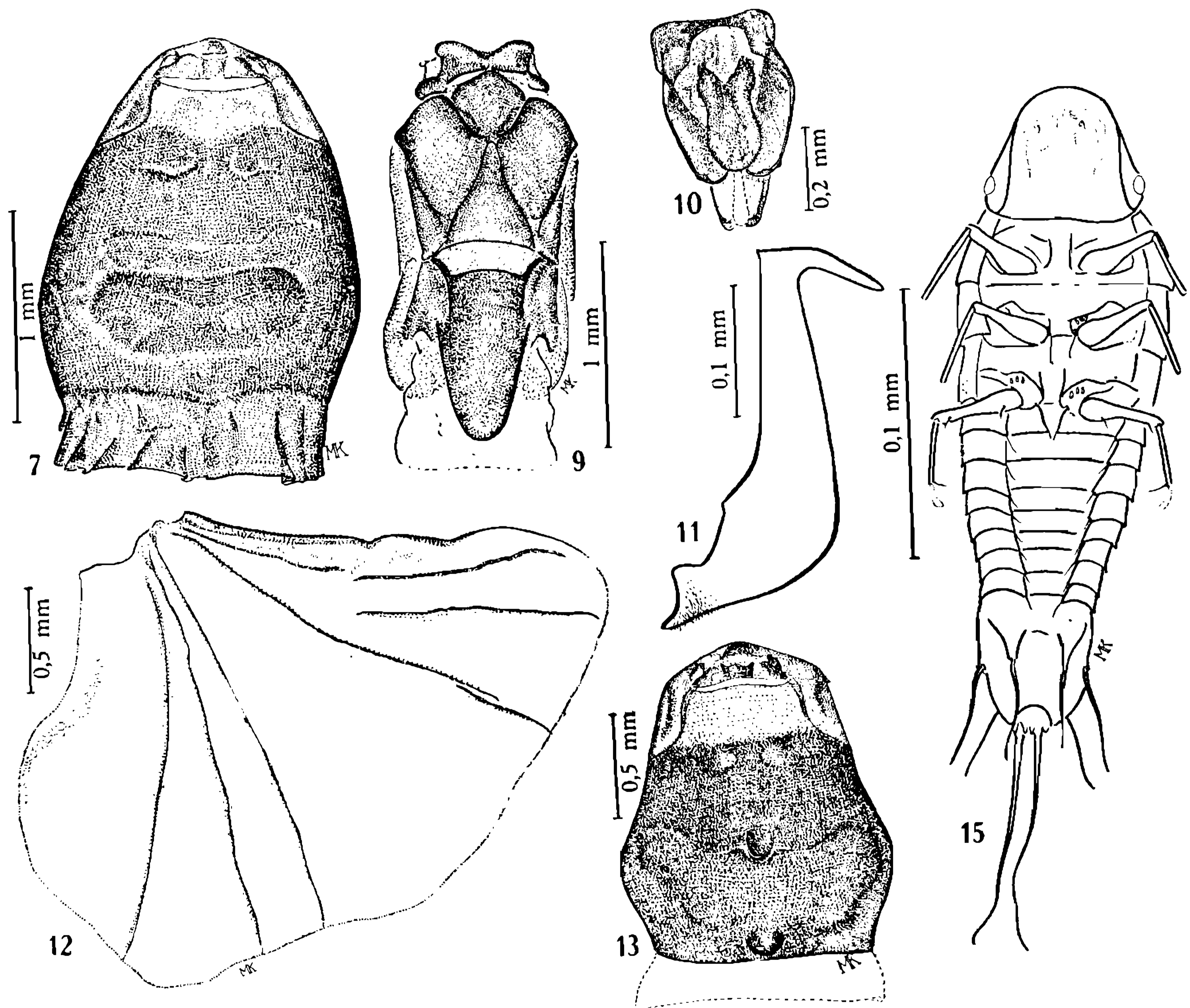
*Thorax*: Mesothorax reduced, much narrower than metathorax, this latter region with the praescutum slightly angular shaped anteriorly. Lobes of the scutum much longer than praescutum, with an acute expansion laterally, corresponding to the paraptera. Scutellum triangular, sharp-angled anteriorly. Postlumbium transverse with both anterior and posterior margins rounded cephalad. Length of metathoracic sclerites: praescutum + scutellum 0,81 mm, post-scutellum 0,83 mm; total length of the metanotum 1,78 mm; greatest width at the paraptera 0,64 mm (According to BRÈTHES the total length of the species is about 3 mm).

*Abdomen*: Proctiger (fig. 10) elongated, slightly pubescent. Aedeagus (fig. 11) with the outer margin of the vertical branch broadly angled at base, the horizontal branch very acute, and with the former branch resulting in an almost 45.º angle.

*Wings* (fig. 12): Second pair with 8 main veins. Median vein interrupted and leaving a long proximal and a short distal section; two sub-equal inter-radio-median veins.

*Female* (fig. 13) — Cephalothorax constricted at base, with a broad basal band; cephalic portion and mid thoracic region limited by the head and its lateral branches, pale brown; the posterior margin of this pale area in a straight line; remaining portions of the ventral side, dark; general shape sub-rectangular, slightly angled on the anterior

margin, expanded laterally behind the middle. Mandibles (fig. 14) one-toothed, the tooth rounded at tip and hooked outwards. Clypeus very slightly prominent. Mouth-opening elongated transversally. Cephalothoracic membrane almost reduced to a sinuous line, not reaching the lateral borders of the cephalothorax. Thoracic spiracles placed a little dorsally. Principal proportions (specimen n.º 31): length of cephalothorax 1,56 mm; width at base of cephalothorax 1,04 mm; width between spiracles 1,20 mm; greatest width 1,28 mm; distance between mandibles 0,41 mm; width of the head through the cephalothoracic membrane 0,75 mm; length of the head on the median line 0,23 mm; length of the head laterally 0,59 mm.



*Xenos bohlsi* Hoffmann — Fig. 7: Female n.º 26, cephalothorax, ventral view. *Xenos bonairensis* Brèthes — Fig. 9: Male n.º 44, meso and metathorax, dorsal view; fig. 10: male n.º 44, terminalia, 9th segment and proctiger, dorsal view; fig. 11: male n.º 44, aedeagus; fig. 12: male n.º 44, right wing; fig. 13: female n.º 32, cephalothorax, ventral view; fig. 15: triungulinid n.º 34, ventral view.

*Triungulinid* (fig. 15) — Body elongated. General colour pale brown. Total length without the apical stylets: 0,26 mm; greatest width 0,09 mm.

Head: Length 0,05 mm; width at base 0,06 mm. Bearing ventrally one ommatidium on each ocular area, and a pair of very reduced setae (the mandibular vestiges?). Tentorium (fig. 16) with the posterior expansions of the inner branch twisted outwards.

Thorax: Segments sub-equal, without visible hairs or bristles on the inter-segmental sutures.

Abdomen: First segments with the same width as the metathorax, narrowing posteriorly. Latero-posterior angles of the tergites bearing a small seta. Urosternites without visible hairs on the inter-segmental sutures. 9th urosternite much longer than the former segments, with 2 pairs of long bristles: a ventral pair arising from two lobed processes and a lateral pair (one on each side). 10th segment with a pair of long apical stylets.

Legs: Coxae broad, each with 3 minute, leaf-like spines on the inner edge, and a bristle inclined towards the caudal end. Fore and mid tarsi not observed, hind tarsi one-segmented, setiform.

*Host: Polistes versicolor versicolor* (Oliv., 1791).

*Material studied:* 4 females ns. 32, 33A, 33B and 48; two male puparia ns. 35 and 47; one triungulinid n.º 34 (collection I.O.C.); 2 females and one male puparium (M. Kogan's collection). All these on 2 hosts from S. Paulo, S.P., Brazil, VI-1948, R. L. Araujo coll. The parasites distributed as follows: On one male host: one male puparium (imago hatched), between 4th and 5th sternites; one female, between 4th and 5th tergites, right side; one female between 5th and 6th tergites, right side; 2 females, between 6th and 7th tergites, both sides. On a worker host: one male puparium (imago hatched), between 3rd and 4th tergites, right side; 2 females, between 6th and 7th tergites, both sides; one male puparium (imago hatched), not produced externally. One female n.º 45, one male and one male puparium n.º 44 (collection I.O.C.) on one worker host from Curitiba, Paraná, Brazil, II-1939, J. Moure coll. (R. L. Araujo det.). The parasites distributed in the following manner: one male puparium (imago completely developed), between 4th and 5th tergites, right side; female, between 6th and 7th tergites left side.

One female n.º 43 and one male puparium n.º 42 (collection I.O.C.) on one male host from S. Paulo, S. Paulo, Brazil, 28-V-1948, W. Maluf coll. The parasites distributed as follows: male puparium (imago hatched), between 4th and 5th tergites, left side; female, between 6th and 7th tergites, right side.

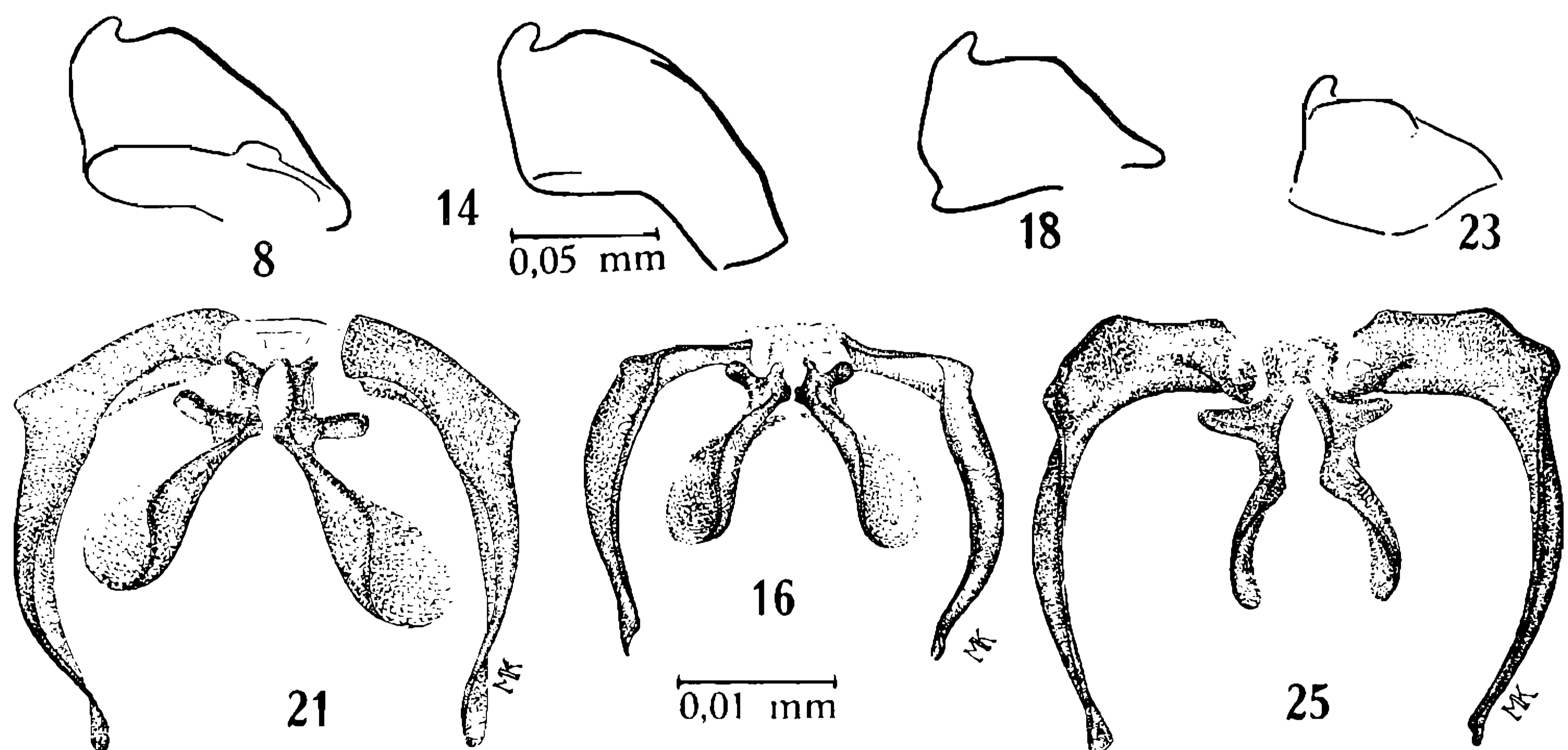
*Discussion* — Our female specimens seem to be larger than Brèthes' female allotype, but the distance between the mandibles is different. The lateral expansions of the cephalothorax arising after the middle, together with the distribution of the pale areas and the dark colour of the cephalothorax, seem to be striking characters of the species. The original description of the male does not characterize this species.

*Distribution* — La Rioja, Argentina; S. Paulo, Estado de S. Paulo, and Curitiba, Estado do Paraná, Brazil.

***Xenos araujoi* sp. n.**

(Figs. 3, 17-21)

*Female* (fig. 17) — Cephalothorax slightly constricted at base, entirely pale brown, basal band not typical, general shape sub-oval. Mandibles (fig. 18) one-toothed, the tooth slightly pointed at tip and hooked outwards. Clypeus faintly prominent. Mouth-opening nearly rounded. Cephalothoracic membrane almost reduced to a faintly distinguishable straight line, almost reaching the borders of the cephalothorax.



Right mandible, ventral view — Fig. 8: *Xenos bohlsi* Hoffmann, female n.º 26; fig. 14: *Xenos bonairensis* Brèthes, female n.º 32; fig. 18: *Xenos araujoi* sp. n., holotype; fig. 23: *Xenos hospitus* sp. n., holotype. Tentorium, ventral view — Fig. 16: *Xenos bonairensis* Brèthes, triungulinid n.º 34; fig. 21: *Xenos araujoi* sp. n., triungulinid paratype; fig. 25: *Xenos hospitus* sp. n., triungulinid paratype n.º 39.

Principal proportions: length of cephalothorax 1,08 mm; width at base of cephalothorax 0,96 mm; width between spiracles 1,10 mm; greatest width 1,10 mm; distance between mandibles 0,33 mm; width of the head through the cephalothoracic membrane 0,75 mm; length of the head on the median line 0,18 mm.

*Triungulinid* (figs. 19-20) — Body elongated. General colour pale brown. Total length without apical stylets (mean dimension of 10 specimens): 0,249 mm; greatest width 0,081 mm.

Head: Length 0,052 mm. Ocular area seemingly with 5 ommatidia, one of them partially ventral. Contiguous to the ocular areas there are 2 pairs of very small bristles. With a pair of ventral bristles directed backwards, arising from small tubercles (mandibles). Tentorium (fig.

21) with the posterior expansions of the inner branch twisted outwards; outer branch almost arched.

**Thorax:** Width of the segments sub-equal. Pronotum with 3 pairs of very small setae: a discal pair, another near the pro-mesonotal suture in the same direction as the first one, and the last pair laterally placed. Mesonotum and metanotum with only 2 pairs of such setulae, one being lateral and the other sutural. Sternites without visible hairs or bristles.

**Abdomen:** Segments progressively narrowed posteriorly. 8th tergite with a pair of stout bristles. Tergites 1-8 with latero-posterior setae; sternites 1-8 with a row of very fine hairs on the inter-segmental sutures. 9th sternite long, almost as long as the 3 preceding segments together, with 3 pairs of long bristles: 2 lateral pairs, and a ventral one arising from 2 tubular processes. 10th segment reduced, with a pair of long apical stylets.

**Legs:** Coxae broad, each bearing on the inner edge, 3 minute, leaf-like spines, and a bristle oriented towards the caudal end. Fore femora with a short basal spine; all femora with apical spurs. Tibiae with 2 or 3 spines distributed along their length. Fore and mid tarsi one-segmented, discoid; hind tarsi one-segmented, setiform.

*Host:* *Apoica pallens* (F., 1804).

*Holotype:* Female n.º 28. *Paratypes:* About 70 triungulinids in the slides ns. 29A and 29B (collection I.O.C.). *Paratype* female (M. Kogan's collection). All these on one worker host from Manaus, Amazonas, Brazil, VI-1941, Parko coll.

*Male:* Unknown.

The parasites were distributed as follows: one female, between 3rd and 4th tergites, left side; one female, between 6th and 7th tergites, right side. Both were completely filled by fully developed triungulinids.

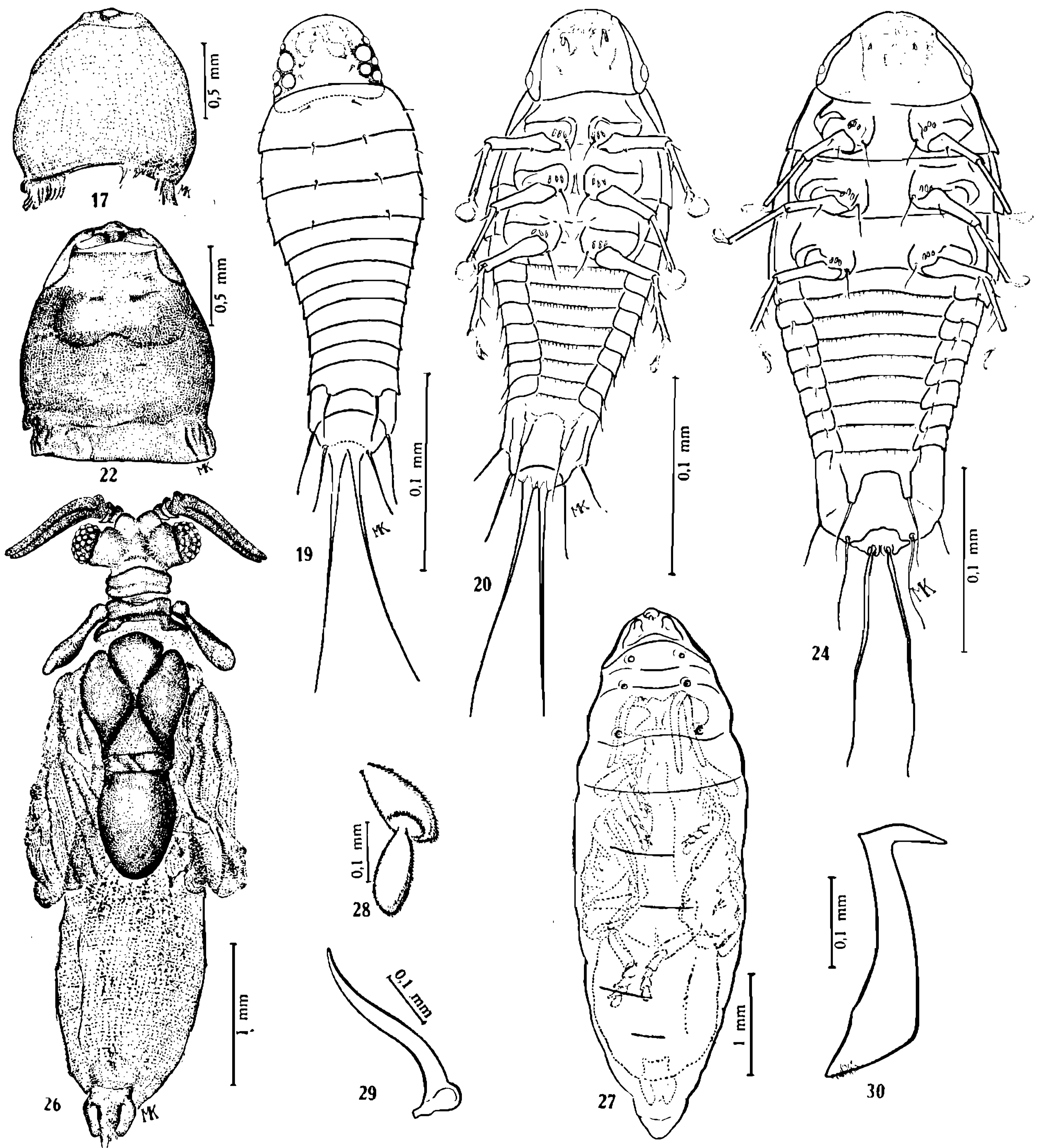
*Discussion:* *Xenos araujo* sp. n. can be distinguished from other neotropical species of *Xenos* by the following features: absence of dark colour and pale areas on the female cephalothorax; atypical basal-band; extremely reduced inter-cephalothoracic membrane; shape of the mandible, etc. The triungulinid is bigger than that of *Xenos bonairensis* and is distinguished from other species we know of by the shape of the tentorium. This species is dedicated to our good friend Dr. R. L. Araujo of the Instituto Biológico de S. Paulo, who kindly delivered the material discussed in this paper.

### ***Xenos hospitus* sp. n.**

(Figs. 4, 22-25)

*Female* (fig. 22) — Cephalothorax constricted at base, with a typical broad basal band. Cephalic portion and its contiguous areas, and the thoracic discal posterior areas, pale brown; marginal regions brown;

general shape elongated sub-oval. Mandibles (fig. 23) small, one-toothed, the tooth rounded at tip and very faintly hooked outwards. Clypeus prominent; mouth-opening elongated transversally. Cephalothoracic membrane narrow, rounded anteriorly, almost right-lined posteriorly not reaching the lateral borders of the cephalothorax. Thoracic spiracles placed a little dorsally.



*Xenos araujo* sp. n. — Fig. 17: Holotype, female cephalothorax, ventral view; fig. 19: triungulinid paratype, dorsal view; fig. 20: triungulinid paratype, ventral view. *Xenos hospitus* — Fig. 22: Holotype, female cephalothorax, ventral view; fig. 24: triungulinid paratype n.º 39, ventral view. *Xenos indespectus* sp. n., male holotype — Fig. 26: Dorsal view; fig. 27: puparium; fig. 28: maxillary palpus, right side; fig. 29: mandible, right side; fig. 30: aedeagus.



Principal proportions: length of cephalothorax 1,41 mm; width at base of cephalothorax 1,29 mm; width between spiracles 1,33 mm; greatest width 1,38 mm; distance between mandibles 0,32 mm; width of the head through the cephalothoracic membrane 0,76 mm; width of the head at base 1,05 mm; length of the head on the median line 0,23 mm; length of the head laterally 0,59 mm.

*Triungulinids* (fig. 24) — Body elongated and relatively broad. General colour brown. Total length without apical stylets: 0,315 mm; greatest width: 0,135 mm.

Head: Wider than long, length 0,053 mm; width 0,097 mm. Ocular area seemingly with 5 ommatidia, one of them partially ventral. Ventrally with a pair of bristles directed backwards, arising from small tubercles (mandibles). Tentorium (fig. 25) with the posterior expansions of the inner branch twisted inwards.

Thorax: Width of the segments increases from pro to metathorax. Coxal cavities greatly separated. Sternites without visible hairs or bristles.

Abdomen: Segments progressively narrowed to the caudal end. 8th tergite with a pair of stout bristles. Tergites 1-8 with latero-posterior setae; sternites 1-8 with a row of very fine hairs on the intersegmental sutures. 9th sternite a little broader than long, with 3 pairs of long bristles: 2 lateral pairs and a ventral one arising from 2 tubular processes. 10th segment reduced, with a pair of long apical stylets.

Legs: Coxae broad each bearing on the inner edge 3 minute, leaf-like spines, and a bristle oriented towards the caudal end. Femora and tibiae with 2 or 3 short setae distributed along their length. Fore and mid tarsi one-segmented, discoid; hind tarsi one-segmented, setiform.

*Host* — *Polistes versicolor vulgaris* Bequaert, 1934.

*Holotype*: Female n.º 38. *Paratypes*: Triungulinids ns. 39, 40 and 41. Other material: 2 male puparia ns. 37A and 37B (Collection I.O.C.). Other triungulinids in M. Kogan's collection. All these on one worker host from Blumenau, Santa Catarina, Brazil, I-III-1931, Werner coll.

*Male*: Unknown.

The parasites were distributed as follows: 2 male puparia (imagini hatched) between 4th and 5th tergites, both sides; 1 female cephalothorax filled by fully developed triungulinids, between 6th and 7th tergites, right side; 1 triungulinid attached to 7th tergite.

*Discussion*: *Xenos hospitus* sp. n. can be distinguished by its specially small mandibles; the general proportions also distinguish it. The most striking differences from *Xenos bonairensis* are found, however, in the triungulinid which is much larger and greatly different in the structure of the tentorium.

**Xenos indespectus** sp. n.

(Figs. 5, 26-30)

*Male* (figs. 26-29) (Withdrawn from puparium) — General colour of the mounted specimen, pale brown.

**Head:** Greatest width 0,92 mm; width between the eyes 0,53 mm. Eyes with seemingly 21 facets on dorsal view. 1st and 2nd antennal segments short, without noticeable sensorial organs; 3rd segment flabellate; 4th elongated, reaching the same length as 3rd segment taken with the flabellum; 3rd and 4th segments entirely covered with minute sensorial organs; length of the antennal segments: I-II together, 0,09 mm; III (with flabellum), 0,78 mm; IV, 0,78 mm.

**Thorax:** Pro and mesothorax reduced; metathorax broader than the former thoracic segments and about 4 times longer. Praescutum in a broad rounded angle anteriorly. Lobes of the scutum much longer than praescutum, broadly rounded laterally. Scutellum triangular, sharp-angled anteriorly, slightly shorter than praescutum. Postlumbium transverse with both anterior and posterior margins straight. Length of metathoracic sclerites: praescutum + scutellum 0,87 mm; post-scutellum 0,75 mm; total length of the metanotum 1,75 mm.

**Abdomen:** Proctiger elongated, slightly pubescent. Aedeagus (fig. 30) with the outer margins of the vertical branch in obtuse angle, with rounded vertex, the horizontal branch very acute, and with the former branch resulting in an almost 90° angle.

**Wings and legs:** Not observed.

*Host* — *Polistes* sp.

*Holotype:* Male n.º 31 (withdrawn from puparium) (collection I.O.C.). On one worker host from Junqueira, S. Paulo, Brazil, 2-IV-1940, E. Varoli coll. (R. L. Araujo det.).

*Female and triungulinid:* Unknown.

The parasite was placed between 4th and 5th tergites, left side.

*Discussion:* *Xenos indespectus* sp. n., can be distinguished from the related neotropical species by the shape of the head, and the extremely long praescutum; from *Xenos banaiensis* Brèthes, 1922, can also be distinguished by the rounded margins of the scutum.

**Xenos** sp.

(Fig. 6)

*Male* puparium (imago hatched) n.º 30 (collection I.O.C.).

*Host* — *Polistes melanosoma* Saussure, 1854.

On one worker host from Amparo, S. Paulo, Brazil, 1929, R. L. Araujo coll. (Araujo det.), n.º 22099 (collection of the Departamento de Zoologia do Estado de S. Paulo).

The parasite was placed between 5th and 6th tergites, right side.

## RESUMO

Num lote de 10 vespas estilopizadas, gentilmente cedidas para estudo pelo Dr. R. L. Araujo, de S. Paulo, os A. A., identificaram 5 espécies do gênero *Xenos* Rossius (Família Stylopidae): *Xenos bohlsi* Hoffmann, descrita do Paraguai e *Xenos bonairensis* Brèthes, descrita da Argentina, e 3 consideradas novas, que são aqui descritas.

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