

# Papéis Avulsos de Zoologia

Museu de Zoologia da Universidade de São Paulo

Volume 53(13):163-185, 2013

www.mz.usp.br/publicacoes  
http://portal.revistasusp.sibi.usp.br  
www.scielo.br/paz

ISSN impresso: 0031-1049  
ISSN on-line: 1807-0205

## DISCOVERY OF A SECOND GEOPHILOMORPH SPECIES (MYRIAPODA: CHILOPODA) HAVING TWENTY-SEVEN LEG-BEARING SEGMENTS, THE LOWEST NUMBER RECORDED UP TO THE PRESENT IN THE CENTIPEDE ORDER GEOPHILOMORPHA

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### ABSTRACT

*Schendylops ramirezi* sp. nov. (Myriapoda: Chilopoda), a tiny schendylid centipede (from Rio de Janeiro State, Brazil), is hereby described and illustrated based on the female holotype, male and female paratypes, and additional non-type specimens. This discovery represents the second geophilomorph species characterized by having twenty-seven leg-bearing segments, the lowest number recorded up to the present in the chilopod order Geophilomorpha. So far, this number of pairs of legs (27) had only been found in a single (male) specimen of *Schendylops oligopus* (Pereira, Minelli & Barbieri, 1995), collected in the vicinity of Manaus, Central Amazon (Brazil). New distribution records for *S. oligopus* (with which the new species is herein compared in detail), together with complementary descriptive notes and new illustrations are also given. Undiluted 2-Phenoxyethanol (CAS No. 122-99-6) has been used as an effective clearing agent and mounting medium for the preparation of temporary mounts of the examined specimens.

KEY-WORDS: *Schendylops*; Diminutive new species; Brazil; Chilopoda; Geophilomorpha; Segment number.

### INTRODUCTION

Of the five major lineages in the class Chilopoda, the number of leg-bearing segments is fixed in the adults at 15 in the orders Scutigermorpha, Lithobiomorpha, and Craterostigmomorpha, and this is strongly supported as being the primitive number in centipedes (see Shear & Bonamo, 1988; Borucki, 1996; Giribet *et al.*, 1999; Edgecombe, 2007; Edgecombe & Giribet, 2007; Minelli *et al.*, 2009; Edgecombe, 2011). The majority of species in the Scolopendromorpha have 21 leg-bearing segments and the remainder have 23 with the only exception of a *Scolopendropsis* species, which has 39 or 43 (Chagas-Junior *et al.*, 2008). Finally, the number of leg pairs in the

Geophilomorpha ranges between 27 and 191, but is limited to odd numbers in this interval.

Up to the present the lowest number of leg-bearing segments (27) in the Geophilomorpha was only recorded from a unique male specimen of *Schendylops oligopus* (Pereira, Minelli & Barbieri, 1995) from the vicinity of Manaus, Central Amazon. Among the numerous specimens recorded of this tiny Brazilian schendylid, all males but one have 29 leg-bearing segments and all females 31 (see Minelli *et al.*, 2000).

In this contribution a new dwarf species of the genus *Schendylops*, in which all the males have 27 leg-bearing segments and all the females 29, is described from specimens collected in Brazil (Rio de Janeiro State) by the arachnologist Martín J. Ramírez of the

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Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (Buenos Aires, Argentina). *Schendylops ramirezi* sp. nov. is therefore the second representative of the order Geophilomorpha characterized by having 27 pairs of legs (and also one of the smallest members in this group of centipedes). Minelli *et al.* (2000, 2009) suggested that the geophilomorph species with a very low number of leg-bearing segments (*e.g.*, 27 or 29) do not represent transitional steps in a morphocline from scolopendromorph-level to geophilomorph-level segmentation, but instead are individual (and parallel) instances of secondary reduction in segment number.

The new *Schendylops* species described below possesses ventral pore-fields on the anterior region of the body only. Among the other Neotropical members of the genus sharing the same trait, it is particularly similar to *S. oligopus* with which it shares very low (27 and 29) numbers of leg-bearing segments, and very small body size, being herein compared with it in detail for a confident identification.

The opportunity to examine additional specimens of *S. oligopus* from Central Amazon (currently deposited at the Museo de La Plata, but never cited in previous publications) permits the addition of new distribution records and supplementary descriptive notes for the species.

The genus *Schendylops* Cook, 1899 is the most species-rich and widespread of the schendylid genera in the Neotropics. Of the 66 species currently recognized in this taxon, five occur in Madagascar and seven in mainland Africa. The remaining fifty-four (in addition to the new species described below) are distributed in the Neotropical Region, in which the genus is known from the Caribbean Islands (British Virgin Islands, French Antilles (Guadeloupe, Martinique) and Puerto Rico); South American mainland (Colombia, Venezuela, Guyana, Surinam, French Guiana, continental Ecuador, Brazil, Peru, Bolivia, Paraguay and Argentina); and the Galapagos Islands.

Members of *Schendylops* can be found in a wide variety of habitats, at altitudes ranging from sea level (*e.g.*, the new species herein described, and those inhabiting the Caribbean area), up to *ca.* 4500 m a.s.l. (high altitude species living in the Andes). A detailed account of the geographic distribution of the New World species of *Schendylops* can be found in Morrone & Pereira (1999).

## MATERIALS AND METHODS

The new material of *Schendylops oligopus* herein reported is housed at the Museo de La Plata (MLP); the type and non-type specimens of the new species

herein described are deposited at the Museu de Zoologia da Universidade de São Paulo (MZUSP).

The specimens were dissected using a stereomicroscope, and examined in detail through a compound microscope equipped with a drawing tube attachment, which was used to delineate the figures, and also measured directly in mm with a micrometer objective. Temporary mounts were prepared by direct transfer of the specimens from the preservation liquid (70 per cent ethanol) onto microscope slides, using undiluted 2-Phenoxyethanol (CAS No. 122-99-6) as a clearing agent and mounting medium. No additional steps were carried out before mounting. These slides were temporarily stored in hermetic acrylic boxes to avoid evaporation of this fluid. A permanent mount was made by direct mounting of the pieces on temporary slides (previously cleared and dehydrated *in situ* by the action of the 2-Phenoxyethanol) into Canada balsam not diluted with xylene, but with a little vegetable creosote (refined from beech tar). Details on the preparation of microscope slides and dissection procedures are described in Pereira (2000) and Foddai *et al.* (2002). All measurements are given in mm. Terminology for external anatomy follows Bonato *et al.* (2010). The following abbreviations were used in the text and legends of the figures: a.a., antennal article/articles; l.-b.s., leg-bearing segment/segments; b.l., body length.

## RESULTS

### Family Schendylidae Genus *Schendylops* Cook, 1899

*Diagnosis:* This taxon can be distinguished from all other genera currently recognized in the family Schendylidae by the following unique combination of features. Second maxillae: pleurites not fused to the posterior internal border of the coxosternite; apical claw of telopodites of second maxillae pectinate on both dorsal and ventral edges. Sternites of leg-bearing segments with pore-fields. Ultimate leg-bearing segment: ultimate legs with seven articles; pretarsus in form of a small hairy tubercle or replaced by a small spine or altogether absent; each coxopleuron with two internal coxal organs of simple structure ("homogeneous coxal glands" *sensu* Brölemann & Ribaut (1912)).

*Type species of the genus:* *Schendyla grandidieri* Saussure & Zehnter, 1897, by original designation.

*Remarks:* Most of the Neotropical species of *Schendylops* are listed in Minelli (2006). Besides the new

species described below, the following three taxa can be added to that list: *Schendylops achalensis* Pereira, 2008 (from Argentina: Córdoba Province: Pampa de Achala); *Schendylops inquilinus* Pereira, Uliana & Minelli, 2007 (from Brazil: Mato Grosso State: Pantanal de Poconé); and *Schendylops jeekeli* Pereira, 2009 (from Brazil: São Paulo State: Santo André Município: Paranapiacaba [Alto da Serra]).

## DESCRIPTION

### *Schendylops ramirezi* sp. nov. (Figs. 1-60)

*Diagnosis:* A Neotropical species of *Schendylops* without pore-field on sternite of the first leg-bearing segment; pore-fields present on anterior region of the body only; all pore-fields undivided; a.a. IV similar in length to the contiguous a.a.; medial edge of forcipular trochanteropofemur unarmed.

Among the Neotropical species of the genus, these five combined traits are also present in *S. anamariae* (Pereira, 1981); *S. interfluvius* (Pereira, 1984); *S. janauarius* (Pereira, Minelli & Barbieri, 1995); *S. jeekeli* Pereira, 2009; *S. lomanus* (Chamberlin, 1957), *S. nealotus* (Chamberlin, 1950); *S. oligopus* (Pereira, Minelli & Barbieri, 1995); *S. pallidus* (Kraus, 1955); *S. paolettii* (Pereira & Minelli, 1993); *S. perditus* (Chamberlin, 1914) and *S. virginjordae* (Crabill, 1960).

For a confident identification of the present new species it may be compared in detail with *S. oligopus* with which it shares the lowest segment numbers in the genus *Schendylops*, and a very small body size. *S. ramirezi* sp. nov. can be differentiated from *S. oligopus* by means of the following selected traits (those for the latter are given in parentheses): male with 27 leg-bearing segments, female with 29 (male with 27 or 29 leg-bearing segments, female with 31); body length up to 7 mm (body length up to 10 mm); clypeus without a clypeal area, Fig. 47 (clypeus with an anterior middle area with areolation smaller than the remaining clypeal surface, Fig. 62); coxosternite of first maxillae with 1+1 setae, Fig. 51 (coxosternite of first maxillae devoid of setae, Fig. 65); coxosternite of second maxillae bearing a large seta on the middle, Fig. 51: a (coxosternite of second maxillae without a seta on the middle, Fig. 65); single pore-fields accompanied at the anterior sides by a few additional pores, Figs. 28-41 (pore-fields not accompanied at the anterior sides by additional pores, Figs. 67-73); pretarsus of ultimate legs as a very small tubercle with a single

apical spine, Figs. 44, 45 (pretarsus as a very small tubercle with two apical spines, Fig. 75).

Other morphological traits included in Table 1 differentiate *S. ramirezi* from *S. oligopus*.

Among the other species mentioned above, those having a range of leg-bearing segments roughly similar to *S. ramirezi* are *S. interfluvius*; *S. janauarius*; *S. jeekeli*; *S. lomanus*; *S. paolettii* and *S. perditus*. (For characters differentiating *S. ramirezi* from these latter species, see Discussion below).

*Type material examined:* All specimens from Brazil: RJ: Ilha Grande, Praia Grande das Palmas, 19-21 January 1999, M.J. Ramírez leg.: holotype female, 29 l.-b.s., b.l. 7 mm; paratype A (male), 27 l.-b.s., b.l. 5 mm; paratype B (male), 27 l.-b.s., b.l. 6 mm; paratype C (female), 29 l.-b.s., b.l. 6.5 mm; paratype D (female), 29 l.-b.s., b.l. 7 mm; paratype E (male), 27 l.-b.s., b.l. 5 mm.

*Remarks:* Mandibles of paratype "D" in a permanent microscope slide (remaining body parts in alcohol); holotype and other paratypes in alcohol.

*Depository of types:* MZUSP.

*Other material examined:* All specimens from the same locality, date and collector as the type series: 3 males (sub-adult), 27 l.-b.s., b.l. 4.5, 4.5, and 4.5 mm; 2 females (subadult), 29 l.-b.s., b.l. 4.5, 4.5 mm; 13 juvenile females (with 1+1 coxal organs only), 29 l.-b.s., b.l. 3, 3, 3, 3, 3, 3.5, 3.5, 3.5, 3.5, 3.5, 4, 4, and 4 mm; 1 juvenile male (with 1+1 coxal organs only), 27 l.-b.s., b.l. 3 mm (MZUSP).

*Remarks:* The adult condition of all females in the type series is indicated by the two spermathecae full of spermatozoa (Fig. 27: a). As for the three male paratypes, no mature spermatozoa have been detected in their tubula seminifera, nevertheless (except for the ultimate leg-bearing segment and postpedal segments) all other morphological traits are similar to those of the female holotype and female paratypes; the penis has a fully developed aspect (Fig. 60), and the coxal organs are completely developed, all these elements being indications of their adult condition.

Male paratypes A and E (5 mm long) have the same morphological attributes as the male paratype B (6 mm long).

Among the juveniles provided with 1+1 coxal organs only, it is possible to distinguish the male from the females on the basis of the different position and shape of the tiny immature gonopods.

**TABLE 1:** Comparative matrix of morphological traits for *Schendyllops ramirezi* sp. nov. and *Schendyllops oligopus* (Pereira, Minelli & Barbieri, 1995). (Data for *S. ramirezi* taken from the holotype female, paratypes male and female, and non-type specimens hereby examined; traits of *S. oligopus* come from the original description, additional information given in Minelli *et al.* (2000), and new male and female specimens hereby examined).

	<i>S. ramirezi</i>	<i>S. oligopus</i>
Number of leg-bearing segments	Male: 27 Female: 29	Male: mostly 29 (very rarely 27) Female: 31
Body length	6 mm (male) 7 mm (female)	8 mm (male) 10 mm (female)
Clypeus with an anterior middle area with areolation smaller than the remaining clypeal surface	No (Fig. 47)	Yes (Fig. 62)
Clypeus bearing 1+1 lateral setae	Yes (Fig. 13: a, Fig. 47)	No (Fig. 61)
Lateral pieces of labrum	Frequently with <i>ca.</i> 2+2 teeth with shape as in Figs. 14, 48	Frequently with <i>ca.</i> 4+4 teeth with shape as in Fig. 63
Dentate lamella of mandibles	Apparently undivided (Figs. 49, 50)	Divided in three blocks (Fig. 64)
Setae on coxosternite of first maxillae	With 1+1 setae (Fig. 51)	Setae absent (Fig. 65)
Coxosternite of second maxillae bearing a seta on the middle	Yes (Fig. 51: a)	No (Fig. 65)
Shape of ventral internal edge of forcipular tarsungulum	As in Figs. 16, 18	As in Fig. 66
Single pore-fields accompanied at the anterior sides by a few additional pores	Yes (Figs. 28-41)	No (Figs. 67-73)
Shape of pore-fields	As in Figs. 28-41	As in Figs. 67-73
Pilosity of sternite of male ultimate leg-bearing segment	With a few large setae distributed as in Fig. 57	With numerous setae placed on the posterior half (Fig. 78)
Pilosity of sternite of female ultimate leg-bearing segment	With a few large setae distributed as in Fig. 43	With numerous setae placed on the posterior third (Fig. 74)
Posterior edge of sternite of female ultimate leg-bearing segment	Slightly concave (Fig. 43)	Slightly convex (Fig. 74)
Coxopleura of male ultimate leg-bearing segment with numerous setae on the distal internal ventral area	No (with a few large setae, Fig. 57)	Yes (Fig. 78)
Shape and pilosity of male ultimate legs	As in Figs. 56, 57	As in Fig. 78
Ratio of width of tibia/width of tarsus I of male and female ultimate legs	<i>ca.</i> 1.14: 1	<i>ca.</i> 1.33: 1
Male and female ultimate legs with tarsus II longer than tarsus I	No (ratio of length of tarsus II/length of tarsus I, <i>ca.</i> 1.0: 1)	Yes (ratio of length of tarsus II/length of tarsus I, <i>ca.</i> 1.34: 1)
Shape of pretarsus of ultimate legs	As a very small tubercle with a single apical spine (Figs. 44, 45)	As a very small tubercle with two apical spines (Fig. 75)
Shape of male postpedal segments	As in Fig. 58	As in Fig. 80
Shape of male gonopods	As in Figs. 58, 59	As in Fig. 80
Setae on basal article of male gonopods	With a single seta (Fig. 59)	With <i>ca.</i> 6-8 setae (Fig. 79)
Setae on apical article of male gonopods	Absent (Fig. 59)	With <i>ca.</i> 5-6 setae (Fig. 79)
Setae on apical dorsal part of penis	Absent (Fig. 60)	With <i>ca.</i> 0+1, 1+1 (Fig. 81), 2+1 setae

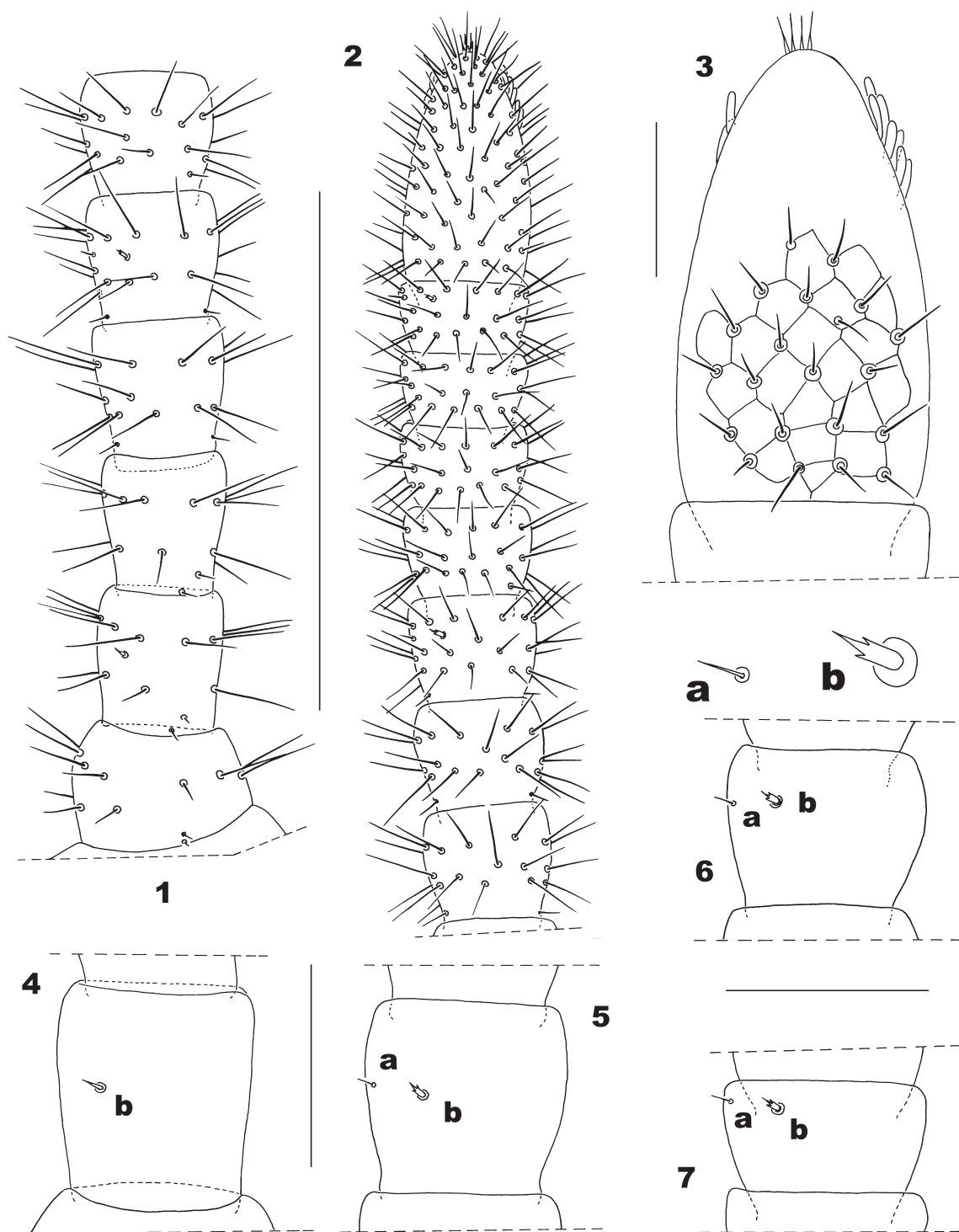
*Female holotype:* twenty nine leg-bearing segments, body length 7 mm, maximum body width 0.37 mm; *cephalic plate:* length 0.27 mm, maximum width 0.22 mm; maximum width of forcipular coxosternite 0.24 mm. Ground color (of preserved specimen in alcohol) pale yellowish.

*Antennae:* relatively short, *ca.* 2.40 times as long as the cephalic plate, distally not attenuate. Length/width ratio of left a.a. I-XIV as follows: I (0.76: 1); II (1.13: 1); III (1.08: 1); IV (1.10: 1); V (0.99: 1); VI (1.0: 1); VII (0.94: 1); VIII (0.87: 1); IX (0.87: 1); X (0.88: 1); XI (0.81: 1); XII (0.68: 1); XIII (0.62: 1); XIV (1.91: 1). Ratio of width of a.a. II/width of a.a. XIV (1.0: 1). Ventral chaetotaxy: setae on a.a. I to V of different lengths and few in number, those of remaining articles progressively shorter and more numerous

towards the tip of the appendage (Figs. 1, 2). Apical a.a. with 7 claviform sensilla on the external border and two on the internal border (Fig. 3); distal end of this a.a. with *ca.* 4 small hyaline specialized sensilla apparently not split apically (Fig. 3). Ventral and dorsal surface of a.a. II (Figs. 4, 8), V (Figs. 5, 9), IX (Figs. 6, 10) and XIII (Figs. 7, 11) with very small specialized sensilla. Ventral sensilla of two types (*a* and *b*). Type *a* sensilla very thin and not split apically (Figs. 5-7: a), type *b* sensilla very similar to those of the apex of the terminal a.a., not split apically on a.a. II (Fig. 4: b) but are divided in two tiny apical branches on a.a. V, IX and XIII (Figs. 5-7: b). Specialized sensilla on dorsal side represented by three different types: *a* and *b* similar to *a* and *b* of ventral side and type *c* sensilla, bigger, not divided apically and darker (ochreous in color) (Fig. 11: a, b, c). Relative position

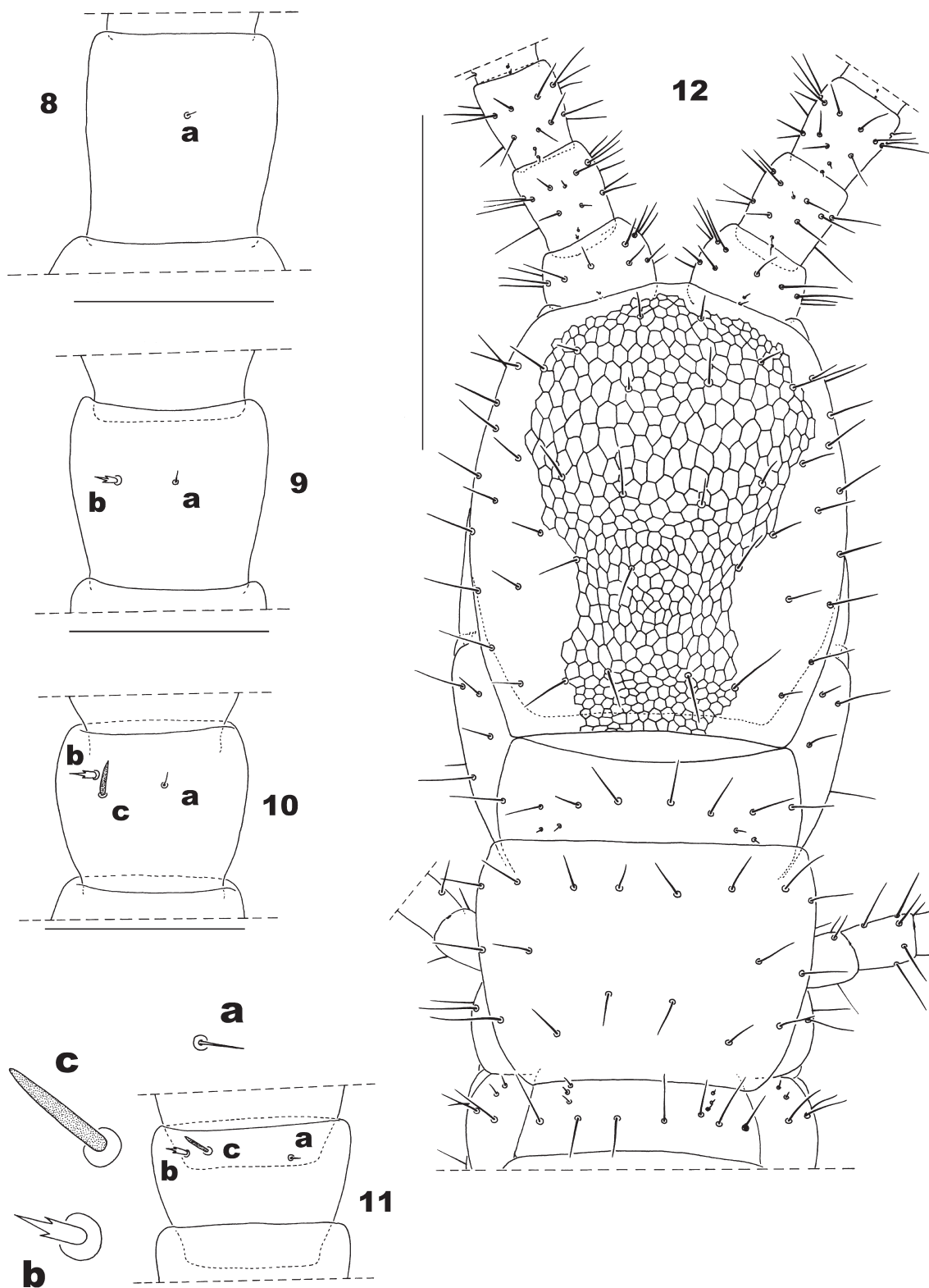
of specialized sensilla on ventral and dorsal surfaces of the specified a.a. as in Figs. 4-7 and 8-11 respectively. Distribution of type *a*, *b*, and *c* sensilla as in Table 2.

*Cephalic plate*: slightly longer than wide (ratio 1.19: 1), anterior border convex, posterior border concave, lateral margins curved. Shape, areolation, and chaetotaxy

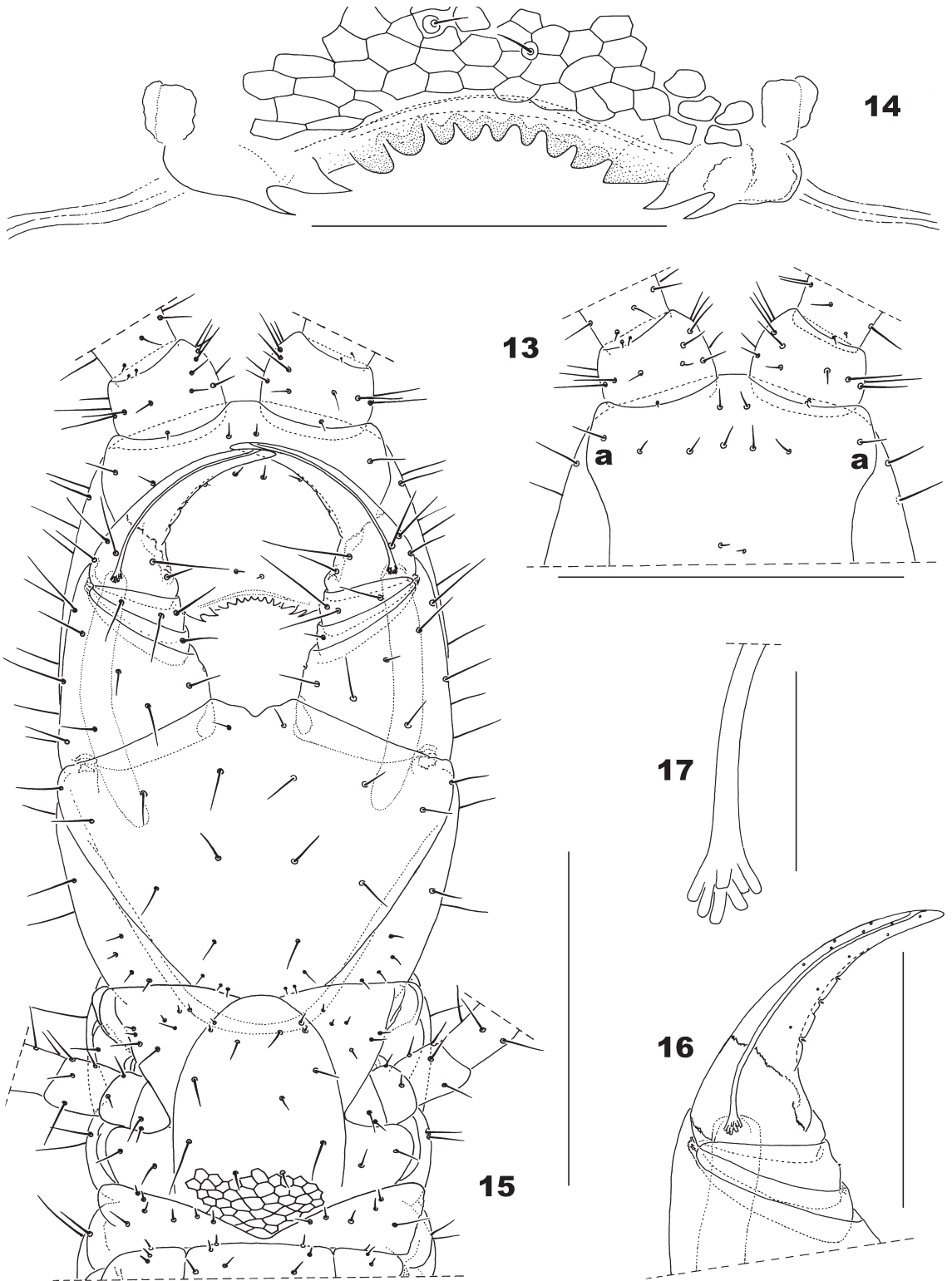


**FIGURES 1-7:** *Schendyllops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): (1) Left a.a. I-VI, ventral; (2) Left a.a. VII-XIV, ventral; (3) Left a.a. XIV, ventral; (4) Left a.a. II, ventral (*b*: *b* type sensilla); (5) Left a.a. V, ventral (*a*, *b*: *a*, *b* type sensilla); (6) Left a.a. IX, ventral (*a*, *b*: *a*, *b* type sensilla); (7) Left a.a. XIII, ventral (*a*, *b*: *a*, *b* type sensilla). Scale bars: 0.03 mm (3); 0.05 mm (4-7); 0.2 mm (1, 2).





**FIGURES 8-12:** *Schendylops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): (8) Left a.a. II, dorsal (a: a type sensilla); (9) Left a.a. V, dorsal (a, b: a, b type sensilla); (10) Left a.a. IX, dorsal (a, b, c: a, b, c type sensilla); (11) Left a.a. XIII, dorsal (a, b, c: a, b, c type sensilla); (12) Dorsal view of anterior region of the body, showing cephalic shield, bases of antennae, forcipular segment, leg-bearing segment 1, and small anterior portion of leg-bearing segment 2. Scale bars: 0.05 mm (8-11); 0.2 mm (12).



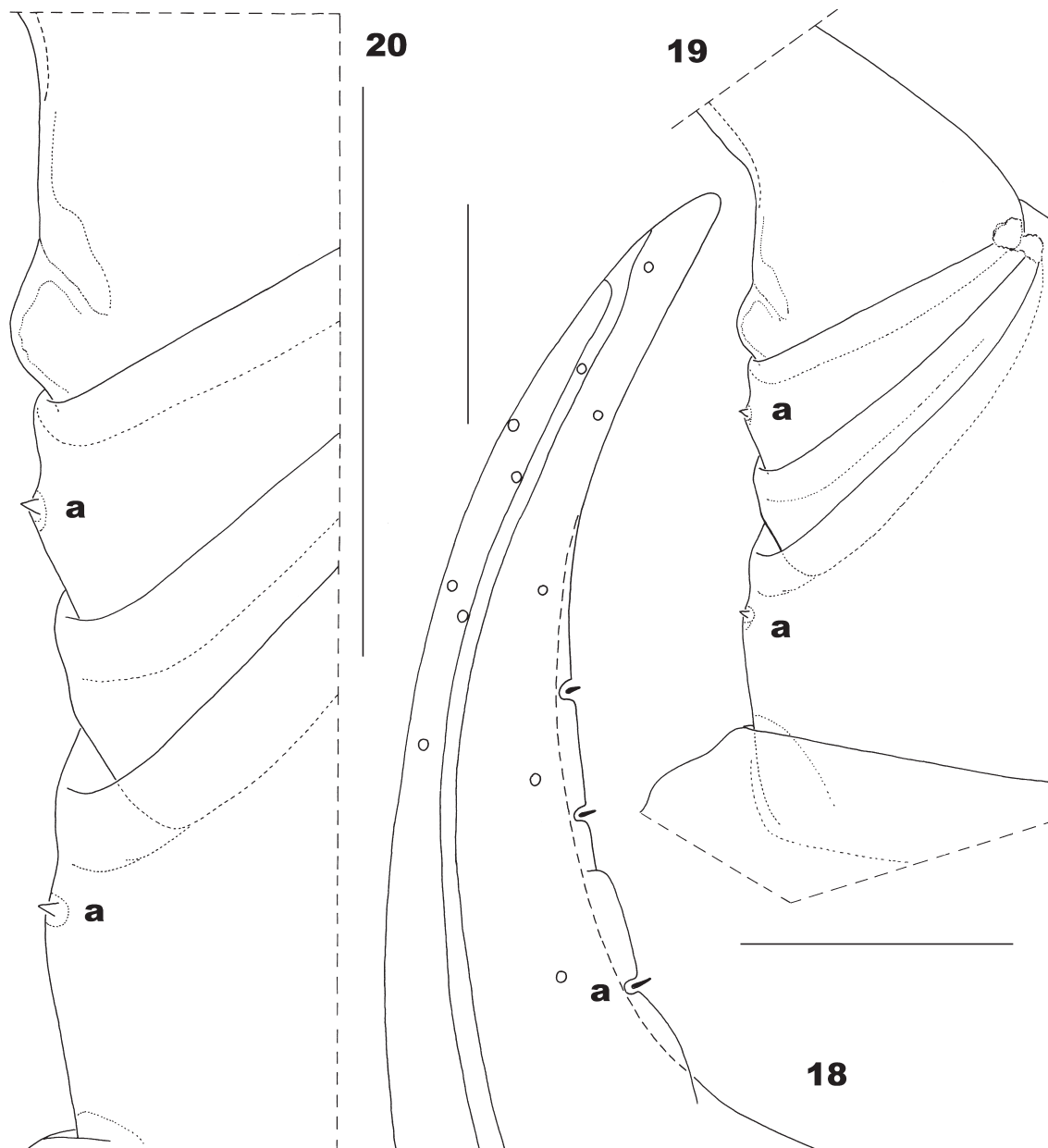
**FIGURES 13-17:** *Schendylops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): **(13)** Clypeus and bases of antennae (a: lateral setae of clypeus); **(14)** Labrum; **(15)** Ventral view of anterior region of the body, showing clypeus, labrum, bases of antennae, forcipular segment, leg-bearing segment 1, and small anterior portion of leg-bearing segment 2 (first and second maxillae not drawn); **(16)** Duct and calyx of poison gland in right forcipular telopodite, ventral; **(17)** Detail of calyx of right poison gland, ventral. Scale bars: 0.02 mm (17); 0.05 mm (14); 0.1 mm (16); 0.2 mm (13, 15).

as in Fig. 12. Ratio of maximum width of cephalic plate/maximum width of forcipular tergite, 1.24: 1.

*Clypeus*: chaetotaxy represented by 1+1 postantennal setae, 4+3 setae distributed on a middle transversal band (of which 1+1 are placed in a lateral position, Fig. 13: a), and 1+1 prelabral setae (Fig. 13). Surface of clypeus without a clypeal area (similar to female paratype D, Fig. 47).

**TABLE 2:** Number of type *a*, *b*, and *c* sensilla on antennal articles II, V, IX and XIII in the female holotype of *Schendylops ramirezi* sp. nov. from Brazil: RJ: Ilha Grande.

	Ventral		Dorsal			Figs.
	<i>a</i>	<i>b</i>	<i>a</i>	<i>b</i>	<i>c</i>	
II		1	1			4, 8
V	1	1	1	1		5, 9
IX	1	1	1	1	1	6, 10
XIII	1	1	1	1	1	7, 11



**FIGURES 18-20:** *Schendylops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): **(18)** Detail of ventral internal edge of right forcipular tarsungulum (a: sensilla); **(19)** Left forcipular telopodite, showing sensilla on medial edge of trochanteroprefemur and tibia (a: sensilla); **(20)** Detail of sensilla on trochanteroprefemur and tibia of left forcipular telopodite, ventral (a: sensilla). Scale bars: 0.02 mm (18); 0.05 mm (19, 20).



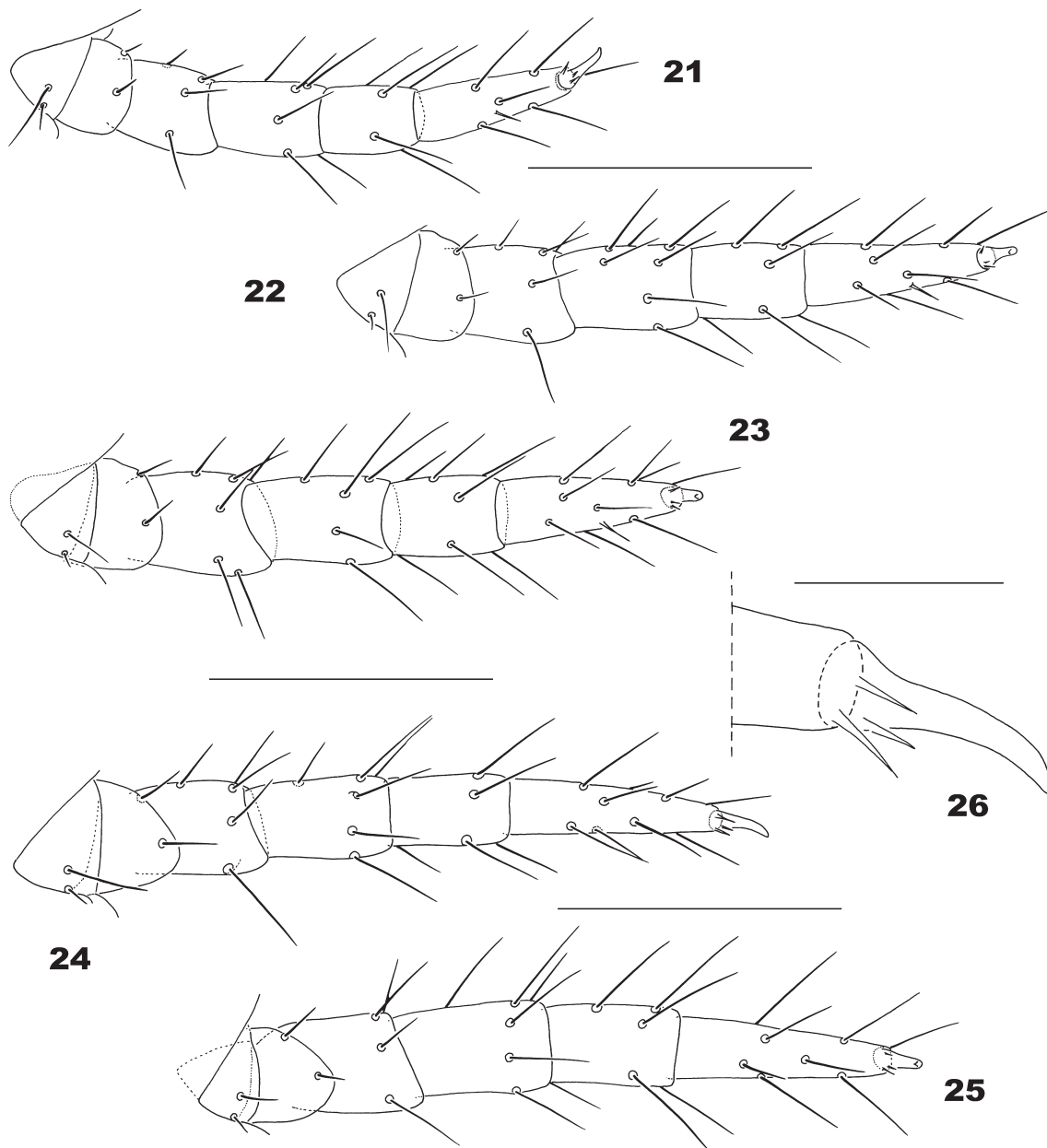
*Labrum*: with nine dark and short teeth on the central arc, lateral pieces with 2+2 less sclerotized teeth, each with a very sharp medial extension (Fig. 14).

*Mandible*: dentate lamella apparently not subdivided into blocks, with *ca.* 8-9 teeth (similar to female paratype D, Figs. 49, 50); pectinate lamella with *ca.* 11-12 teeth.

*First maxillae* (similar to female paratype D, Figs. 51, 52): with lappets on the coxosternite and telopodites, those

of coxosternite smaller than the latter. Coxosternite with 1+1 setae; coxal projections round-tipped and provided with 1+1 setae. Article II of telopodites with 1+1 setae on ventral side and 2+2 sensilla on dorsal side.

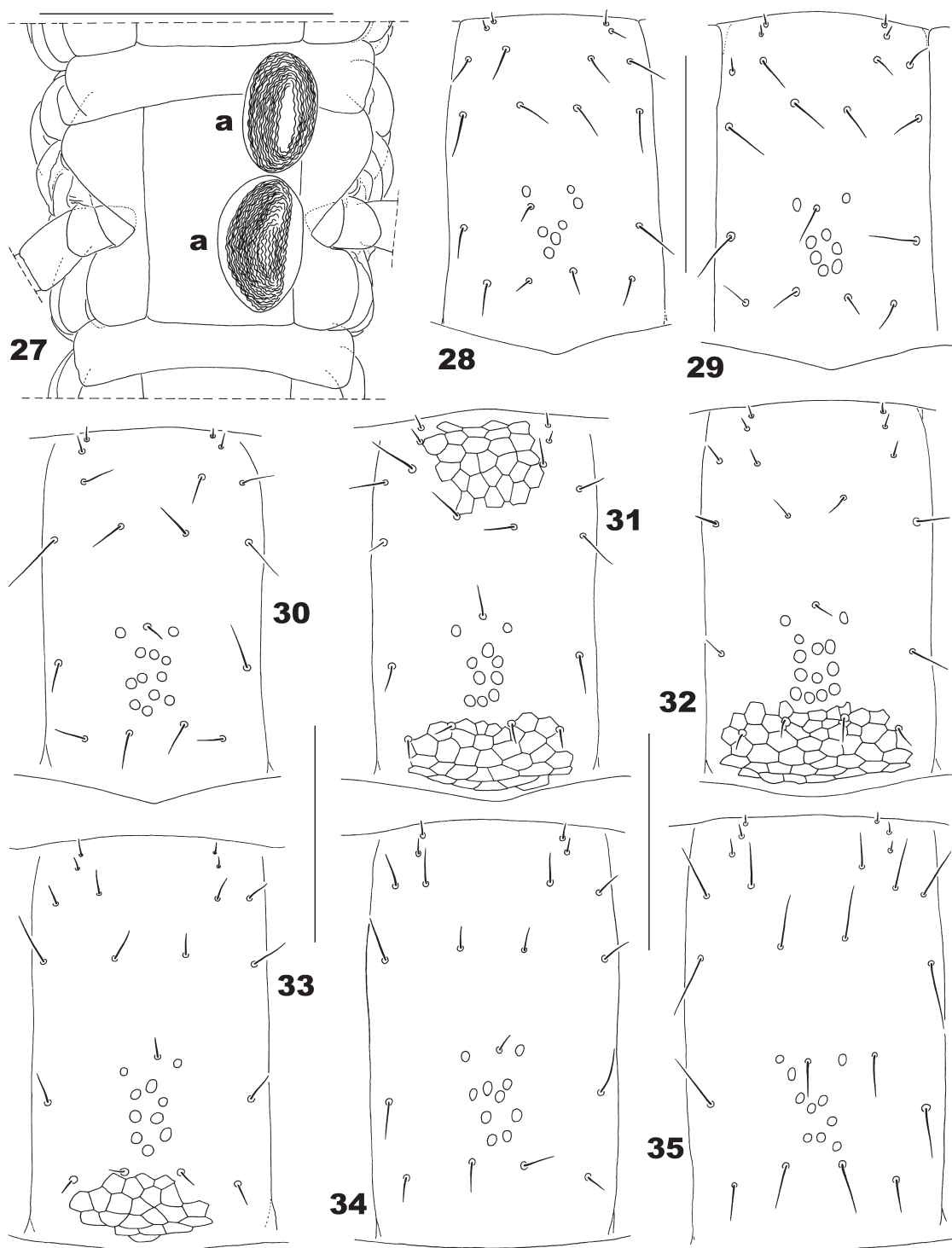
*Second maxillae* (similar to female paratype D, Figs. 51, 53-55): coxosternite with 1 large seta on the middle (Fig. 51: a) and 5+5 smaller lateral setae. Apical claw of telopodites well developed, bipectinate, ventral edge with 4 teeth, dorsal edge with 6 teeth.



**FIGURES 21-26:** *Schendylops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): (21) Left leg (pair 1), ventral; (22) Left leg (pair 2), ventral; (23) Left leg (pair 4), ventral; (24) Left leg (pair 14), ventral; (25) Left leg (pair 28), ventral; (26) Claw of left leg (pair 13), antero-ventral view. Scale bars: 0.02 mm (26); 0.1 mm (21-25).

*Forcipular segment*: when closed, the telopodites do not reach the anterior margin of the head (Fig. 15). Forcipular tergite with anterior margin concave, lateral

margins curved (Fig. 12); chaetotaxy represented by an irregular transverse median row of eight large setae, and 2+2 lateral much smaller setae distributed near the



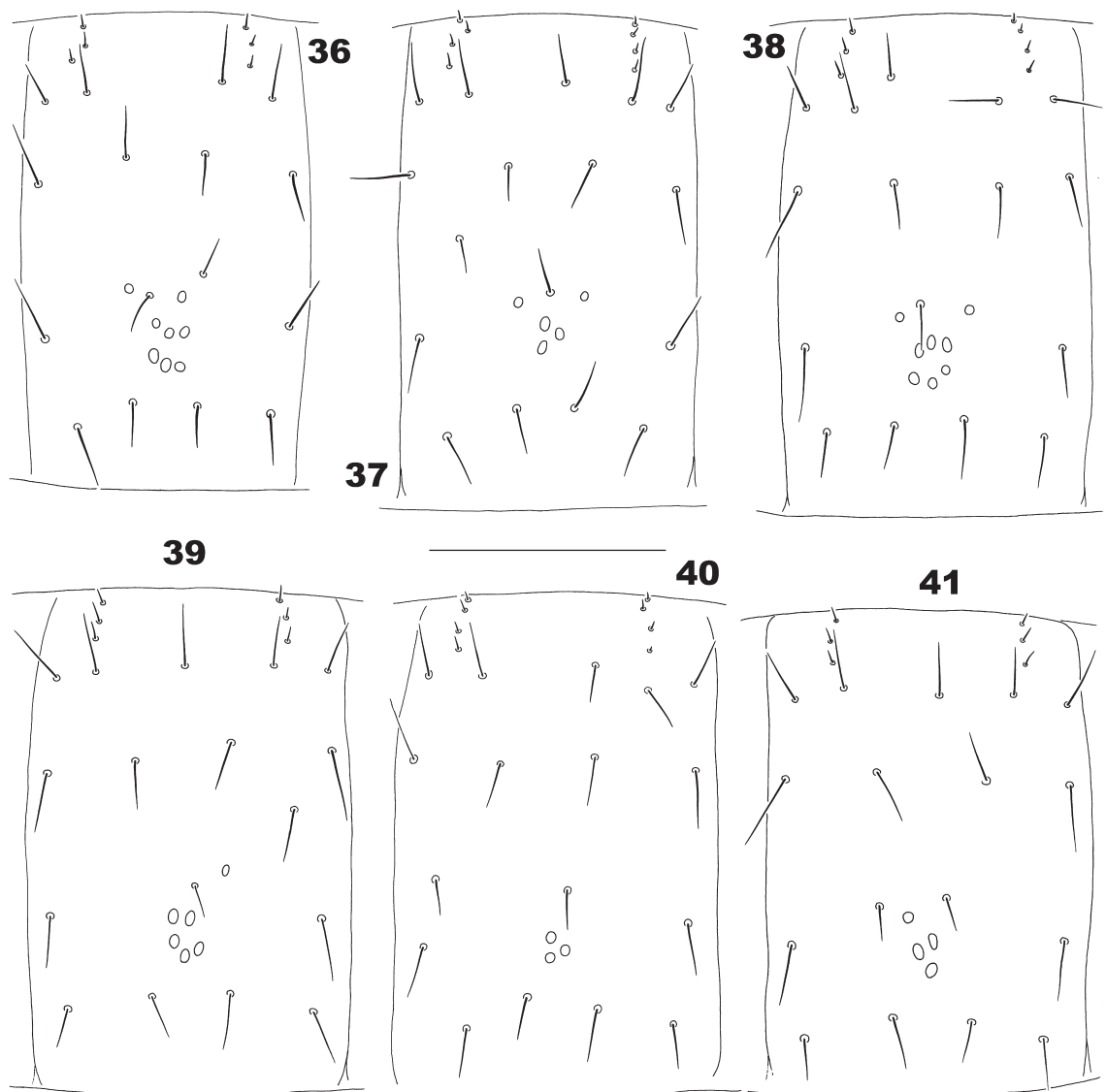
**FIGURES 27-35:** *Schendylops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): (27) Leg-bearing segments 25-26, ventral (a: spermathecae); (28) Sternite 2; (29) Sternite 3; (30) Sternite 4; (31) Sternite 5; (32) Sternite 6; (33) Sternite 7; (34) Sternite 8; (35) Sternite 9. Scale bars: 0.1 mm (28-35); 0.2 mm (27).

posterior margin (Fig. 12). All articles of the telopodites without sclerotized teeth (Fig. 15). Tarsungulum with a small pale round-tipped prominence on the basal internal edge. Medial edge of trochanteroprefemur and tibia with diminutive sensilla (Figs. 19, 20). Ventral internal edge of tarsungulum with shape as in Figs. 15, 16, 18. Poison glands unusually large (shape and relative size as in Fig. 15). Calyx of poison gland very small, shape as in Figs. 16, 17. Shape and chaetotaxy of coxosternite and telopodites as in Fig. 15.

*Legs (pair 1 to penultimate):* first pair shorter and narrower than the second pair, in the proportion of ca. 0.86: 1 (Figs. 21, 22). Chaetotaxy of legs similar

throughout the entire body length. Distribution, number, and relative size of setae as in Figs. 21-25. Claws ventrobasally with three thin and pale accessory spines (one anterior and two posterior), with relative size as in Fig. 26.

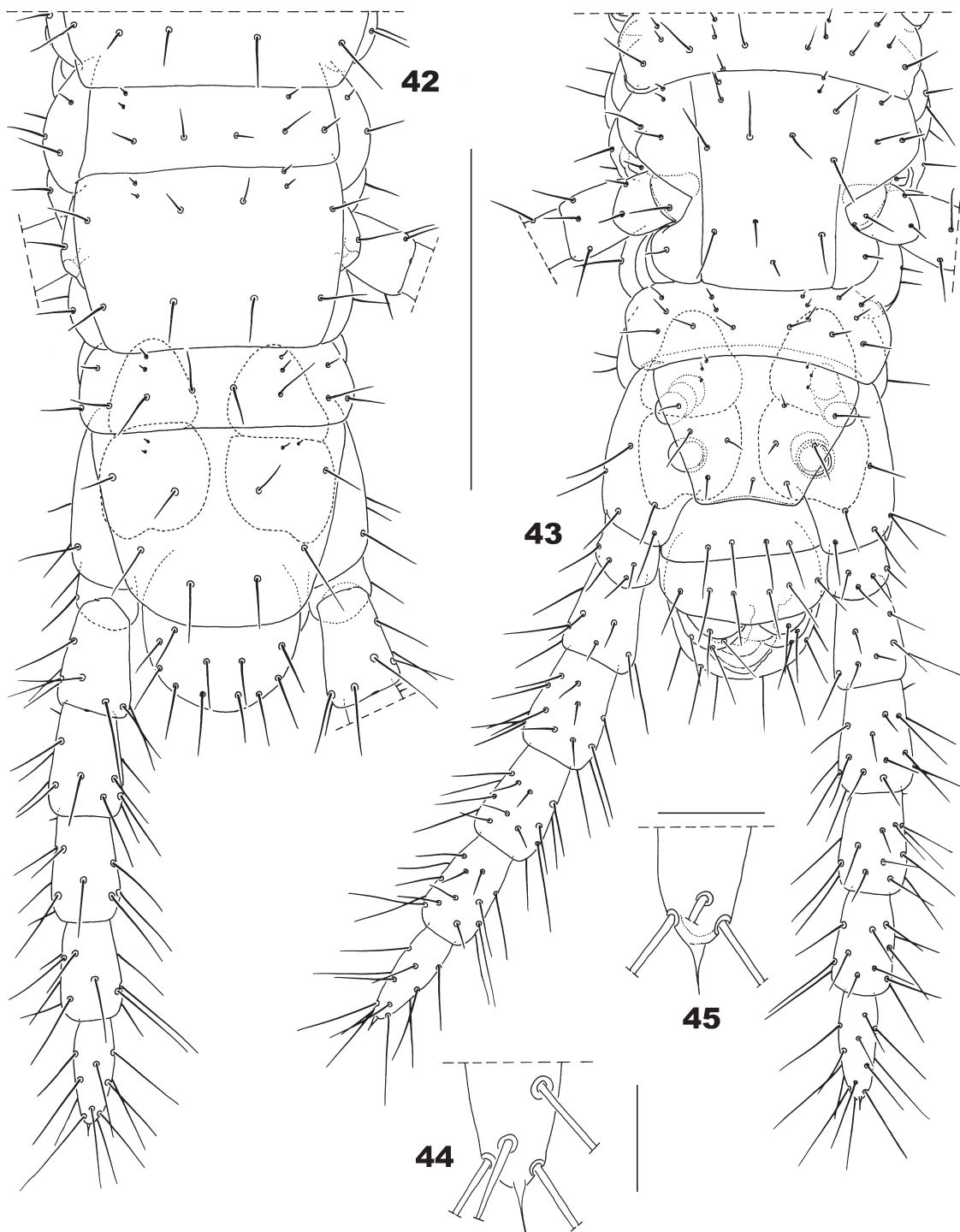
*Sternites of leg-bearing segments 1 to penultimate:* pore-fields present from sternite 2 to 15 inclusive (wholly absent on the remaining sternites). All pore-fields undivided. Fields accompanied by one-two additional pores at one or both sides of the anterior edge. Shape and relative size of fields changing along the trunk as in Figs. 28-41. Number of pores as follows: sternite 2 (1+4+2 pores); 3 (1+6+1); 4 (1+10+1); 5 (1+8+1);



**FIGURES 36-41:** *Schendylops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): (36) Sternite 10; (37) Sternite 11; (38) Sternite 12; (39) Sternite 13; (40) Sternite 14; (41) Sternite 15. Scale bar: 0.1 mm.

6 (1+11+1); 7 (1+8+1); 8 (1+8+1); 9 (2+7+1); 10 (1+6+1); 11 (1+3+1); 12 (1+6+1); 13 (0+5+1); 14 (1+3+0); 15 (1+3+0).

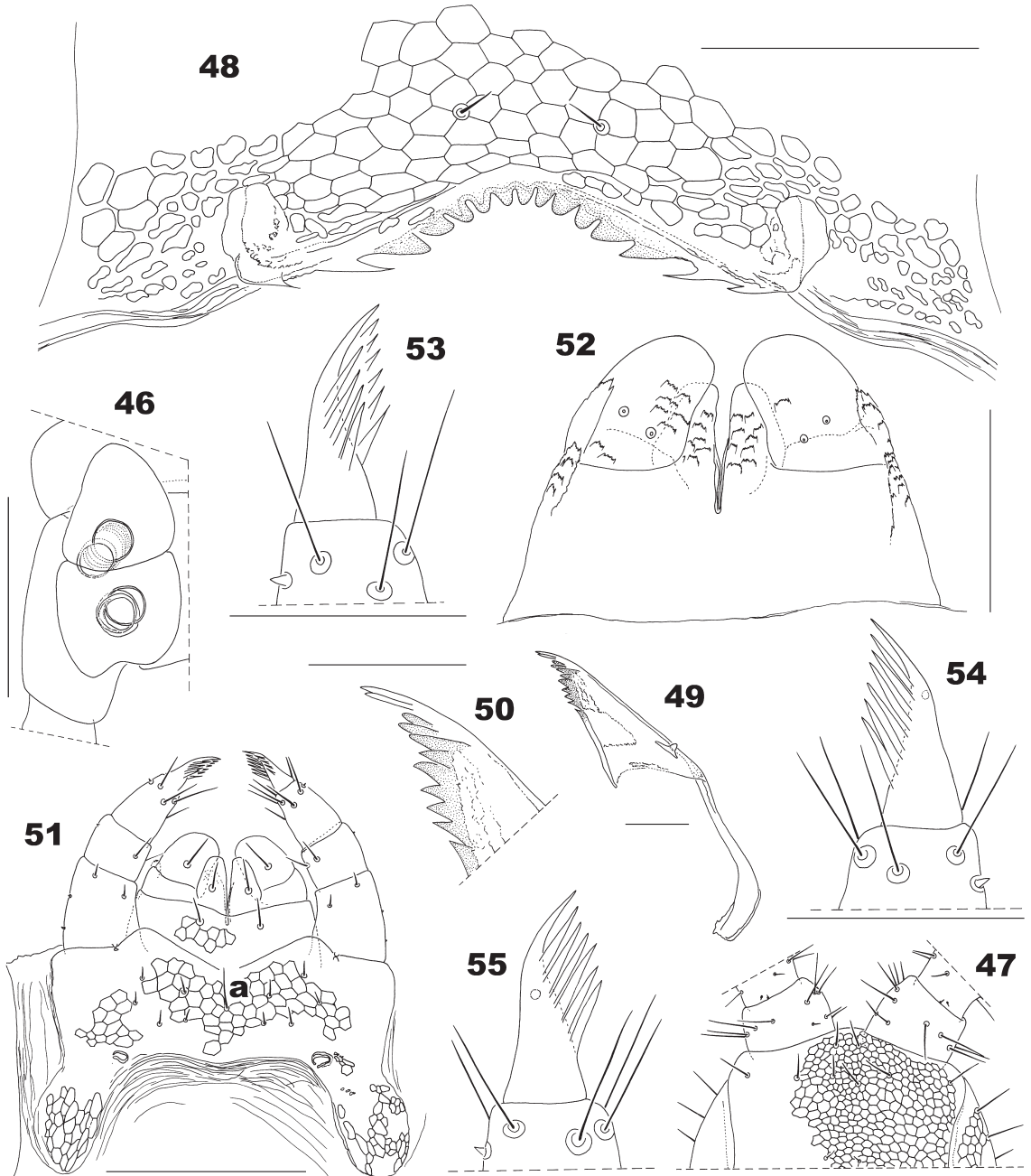
*Ultimate leg-bearing segment*: intercalary pleurites absent at both sides of the ultimate pretergite (Fig. 42).  
Ultimate presternite not divided along the sagittal



**FIGURES 42-45:** *Schendylops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): (42) Penultimate and ultimate leg-bearing segments, and postpedal segments, ventral; (43) Penultimate and ultimate leg-bearing segments, and postpedal segments, dorsal; (44) Detail of distal end of last podomere of left ultimate leg, ventral; (45) Detail of distal end of last podomere of right ultimate leg, ventral. Scale bars 0.02 mm (44, 45); 0.2 mm (42, 43).

plane; length/width ratio of the tergite, 0.80: 1; length/width ratio of the sternite 0.70: 1. Shape and chaetotaxy of tergite and sternite as in Figs. 42, 43. Coxopleura slightly protruding at their distal-internal ventral ends, chaetotaxy represented by a very few

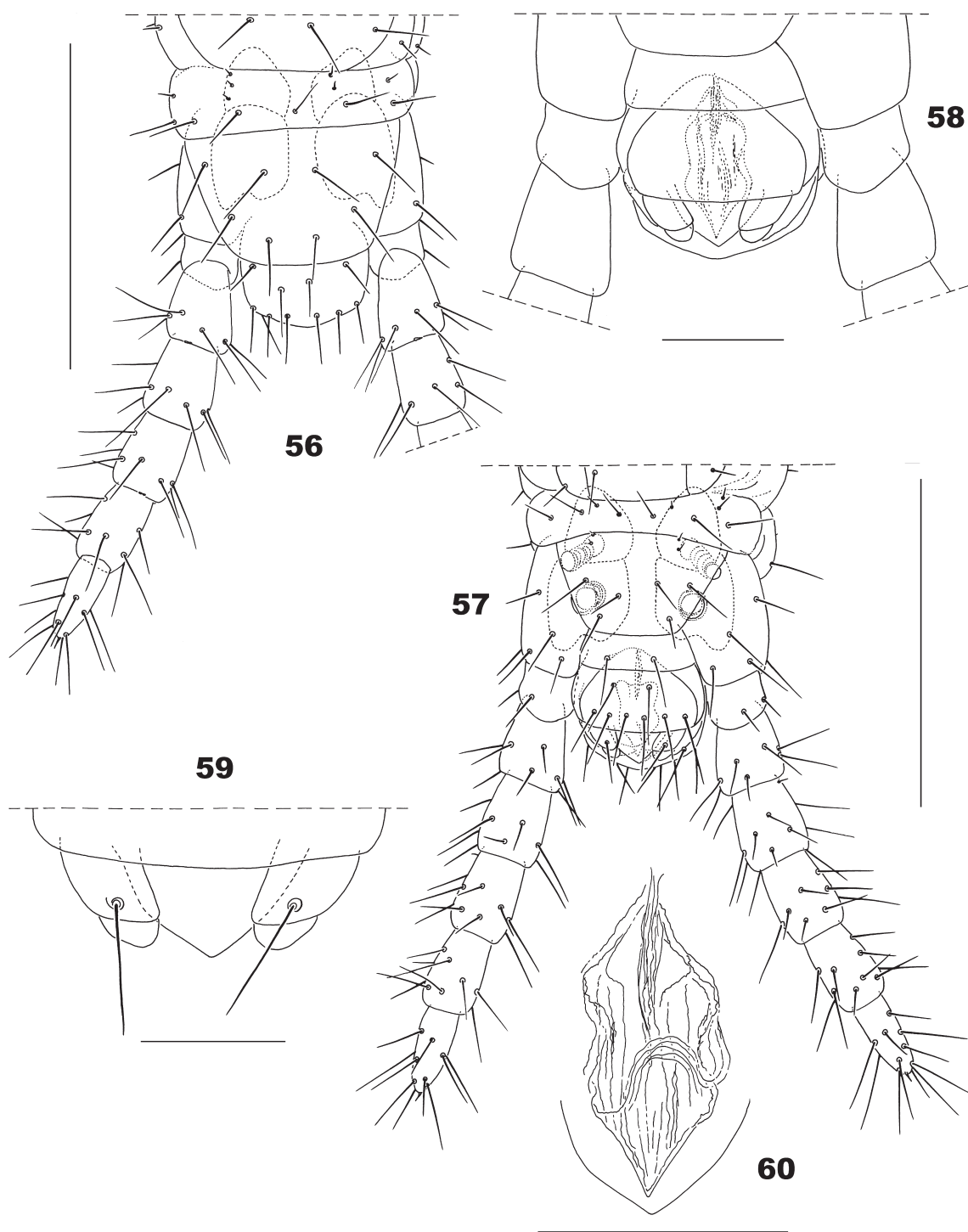
large setae distributed as in Figs. 42, 43. Two single ("homogeneous") coxal organs in each coxopleuron, both organs unlobed, anterior organ smaller than the posterior in the proportion shown in Figs. 42, 43, 46. Relative size of coxal organs in respect to the size of



**FIGURES 46-55:** (46): *Schendylops ramirezi* sp. nov., (female holotype; Brazil: RJ: Ilha Grande): Right coxal organs, ventral. (47-55): *Schendylops ramirezi* sp. nov., (female paratype D; Brazil: RJ: Ilha Grande): (47) Clypeus and bases of antennae; (48) Labrum; (49) Right mandible, dorsal; (50) Detail of dentate lamella of right mandible, dorsal; (51) First and second maxillae, ventral (a: large middle seta); (52) First maxillae, dorsal; (53) Claw of right telopodite of second maxillae, ventral; (54) Claw of right telopodite of second maxillae, dorsal; (55) Claw of left telopodite of second maxillae, dorsal. Scale bars: 0.02 mm (49, 50); 0.03 mm (53-55); 0.05 mm (48, 52); 0.1 mm (46, 51); 0.2 mm (47).

coxopleura and sternite as in Fig. 43. Coxal organs open on the membrane between coxopleuron and sternite, partially covered by the latter (Fig. 43).

Ultimate legs composed of seven articles. Ratio of width of tibia/width of tarsus I, *ca.* 1.14: 1; ratio of length of tarsus II/length of tarsus I, *ca.* 1.0: 1. Ratio



**FIGURES 56-60:** *Schendylops ramirezi* sp. nov., (male paratype A; Brazil: RJ: Ilha Grande): (56) Ultimate leg-bearing segment and postpedal segments, dorsal; (57) Ultimate leg-bearing segment and postpedal segments, ventral; (58) Detail of postpedal segments, ventral; (59) Gonopods, ventral; (60) Penis, dorsal. Scale bars: 0.03 mm (59); 0.05 mm (58, 60); 0.2 mm (56, 57).



of length of telopodites of ultimate legs/length of sternite, *ca.* 3.83: 1. Shape and chaetotaxy of ultimate legs as in Figs. 42, 43. Ultimate pretarsus represented by a rudimentary terminal tubercle with one diminutive apical spine (Figs. 44, 45).

*Postpedal segments:* intermediate tergite with posterior margin strongly convex (Fig. 42), intermediate sternite with posterior margin straight, curved on the sides; first genital sternite with posterior margin medially convex, laterally straight to very slightly concave (Fig. 43). Gonopods uniarticulate (Fig. 43).

*Male paratype A:* twenty-seven leg-bearing segments, body length 5 mm, maximum body width 0.30 mm. All features similar to those in the female except for the shape and chaetotaxy of the ultimate leg-bearing segment and postpedal segments.

*Ultimate leg-bearing segment:* tergite and sternite trapezoidal, length/width ratio of tergite 0.63: 1; length/width ratio of sternite 0.60: 1. Shape and chaetotaxy of tergite and sternite as in Figs. 56, 57. Coxopleura slightly protruding at their distal-internal ventral ends; chaetotaxy represented by a few large setae distributed as in Figs. 56, 57. Articles of ultimate legs moderately inflated, with shape and chaetotaxy as in Figs. 56, 57. Ratio of width of tibia/width of tarsus I, *ca.* 1.14: 1; ratio of length of tarsus II/length of tarsus I, *ca.* 1.0: 1. Ratio of length of telopodites of ultimate legs/length of sternite *ca.* 4.20: 1.

*Postpedal segments:* intermediate tergite with posterior margin convex (Fig. 56), intermediate sternite with posterior margin straight, laterally slightly curved, first genital sternite with posterior border slightly convex (Fig. 57). Gonopods biarticulate, basal article with a single seta, apical article without setae (Figs. 57-59), penis without apical setae, shape as in Fig. 60.

*Variation:* Antennal article XIV bearing *ca.* 2-3 claviform sensilla on the internal edge and *ca.* 7-8 sensilla on the external edge.

In all adult specimens examined, the pore-field series starts on sternite 2 but the posterior limit varies between sternites 13 and 15.

All females have 29 leg-bearing segments, all males 27.

*Post-embryonic variation of pilosity of coxosternite of first maxillae:* All juveniles having 1+1 coxal organs only, lacking setae on the coxosternite of the first maxillae; conversely, all specimens with 2+2 coxal organs

have setae on this coxosternite: 0+1 or 1+1 in the sub-adults, and 1+1 in all adults.

*Post-embryonic variation of pilosity of coxosternite of second maxillae:* All juvenile specimens having 1+1 coxal organs only, lacking a central seta on the coxosternite of the second maxillae; conversely, all specimens having 2+2 coxal organs (sub-adults and adults) bear that seta (Fig. 51: a).

*Remarks:* Pereira *et al.*, (1995) is the original source for the nomenclature of the three types of specialized sensilla (*a*, *b*, and *c*) present on a.a. II, V, IX and XIII.

Male paratypes A and E (5 mm long), having the same form and pilosity of gonopods, shape of penis, and shape and pilosity of ultimate leg-bearing segment and postpedal segments, as the male paratype B (which is 6 mm long).

*Etymology:* The species is respectfully dedicated to the collector of all type and non-type specimens herein described, Dr. Martín Javier Ramírez, researcher of CONICET, working at the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina.

*Ecology:* The locality in which all specimens herein described have been collected is part of the Atlantic Rainforest biome.

*Type locality:* Brazil: RJ: Ilha Grande, Praia Grande das Palmas.

*Known range:* Only known from the type locality.

***Schendyllops oligopus***  
**(Pereira, Minelli & Barbieri, 1995)**  
**(Figs. 61-81)**

*Schendylurus oligopus* Pereira, Minelli & Barbieri, 1995: 325, 345-347.

*Schendylurus oligopus:* Adis, Minelli, de Morais, Pereira, Barbieri & Rodrigues, 1996: 168, 169; Pereira, Ituarte & Tassara, 2004: 5; Foddai & Minelli, 1999: 277.

*Schendyllops oligopus:* Hoffman & Pereira 1997: 21; Morrone & Pereira 1999: 167, 170; Minelli, Foddai, Pereira & Lewis 2000: 104; Foddai, Pereira & Minelli, 2000: 142, 182; Pereira, Foddai & Minelli, 2002: 59; Foddai, Minelli & Pereira, 2002: 459, 463, 473; Adis, Foddai, Golovatch, Hoffman, Minelli, de Morais, Pereira, Scheller, Schileyco & Würmli, 2002: 18; Foddai, Bonato,

Pereira & Minelli, 2003: 1263; Foddai, Pereira & Minelli, 2004: 272, 279; Bonato & Minelli, 2008: 253; Pereira, 2009: 186, 205; 2011: 321.

*Diagnosis:* A Neotropical species of *Schendylops* without pore-field on sternite of the first leg-bearing segment; pore-fields present on anterior region of the body only; all pore-fields undivided; a.a. IV similar in length to the contiguous a.a.; medial edge of forcipular trochanteroprefemur unarmed.

Among the Neotropical species of the genus sharing these five combined traits, *S. oligopus* is morphologically very similar to *S. ramirezi* sp. nov. with which it shares the lowest segment numbers in the genus *Schendylops*, and a very small body size. *S. oligopus* can be differentiated from *S. ramirezi* by means of the following selected traits (those for the latter are given in parentheses): male with 27 or 29 leg-bearing segments, female with 31 (male with 27 leg-bearing segments, female with 29); body length up to 10 mm (body length up to 7 mm); clypeus with an anterior middle area with areolation smaller than the remaining clypeal surface, Fig. 62 (clypeus without a clypeal area, Fig. 47); coxosternite of first maxillae devoid of setae, Fig. 65 (coxosternite of first maxillae with 1+1 setae, Fig. 51); coxosternite of second maxillae without a seta on the middle, Fig. 65 (coxosternite of second maxillae bearing a large seta on the middle, Fig. 51: a); single pore-fields not accompanied at the anterior sides by additional pores, Figs. 67-73 (single pore-fields accompanied at the anterior sides by a few additional pores, Figs. 28-41); pretarsus of ultimate legs as a very small tubercle with two apical spines, Fig. 75 (pretarsus of ultimate legs as a very small tubercle with a single apical spine, Figs. 44, 45).

Other morphological traits included in Table 1 differentiate *S. oligopus* from *S. ramirezi*.

*New material examined:* Brazil: Amazonas: 02°30'S, 60°10'W (terra firme, campinarana, primary white-sand forest), 17 August 1988, J. Adis *et al.*, leg.: 2 males (with tubula seminifera full of mature spermatozoa), 29 l.-b.s., b.l. 8 mm; 1 juvenile female (with 2+2 coxal organs), 31 l.-b.s., b.l., 5 mm (specimen "A") (MLP). Brazil: Amazonas: 02°34'S, 60°06'W, capoeira, burned secondary upland forest, 06 October 1990, M.O. de A. Ribeiro leg.: 1 female with the two spermathecae full of spermatozoa and with mature ova, 31 l.-b.s., b.l. 8 mm; 1 male with tubula seminifera full of mature spermatozoa, 29 l.-b.s., b.l. 7.5 mm (MLP). Same locality and collector, 09 October 1990: 4 males with tubula seminifera full of mature spermatozoa, 29 l.-b.s., b.l. 7.5 mm (specimen "A"), 7.5, 8, and 8 mm; 3 females

with the two spermathecae full of spermatozoa and with mature ova, 31 l.-b.s., b.l. 8, 9 and 9 mm; 1 female with mature ova 31 l.-b.s., b.l. 7 mm; 1 female with the two spermathecae full of spermatozoa, 31 l.-b.s., b.l. 10 mm; 1 female subadult, 31 l.-b.s., b.l. 7 mm; 1 female juvenile, 31 l.-b.s., b.l. 6 mm; 4 juvenile females with 1+1 coxal organs only, 31 l.-b.s., b.l. 4, 4, 4 and 4 mm; 1 male juvenile with 1+1 coxal organs only, 29 l.-b.s., b.l. 4 mm (MLP). Same locality and collector, 03 January 1991: 1 male (with tubula seminifera full of mature spermatozoa), 29 l.-b.s., b.l., 8 mm (MLP).

*Remarks:* The localities of 02°30'S, 60°10'W (terra firme, campinarana white-sand forest), and 02°34'S, 60°06'W, capoeira, burned secondary upland forest (both in Brazil: Amazonas State), are new for the geographic distribution of *S. oligopus*.

The following additional morphological information can be given based on the female holotype (described by Pereira *et al.*, 1995), and the new specimens hereby examined.

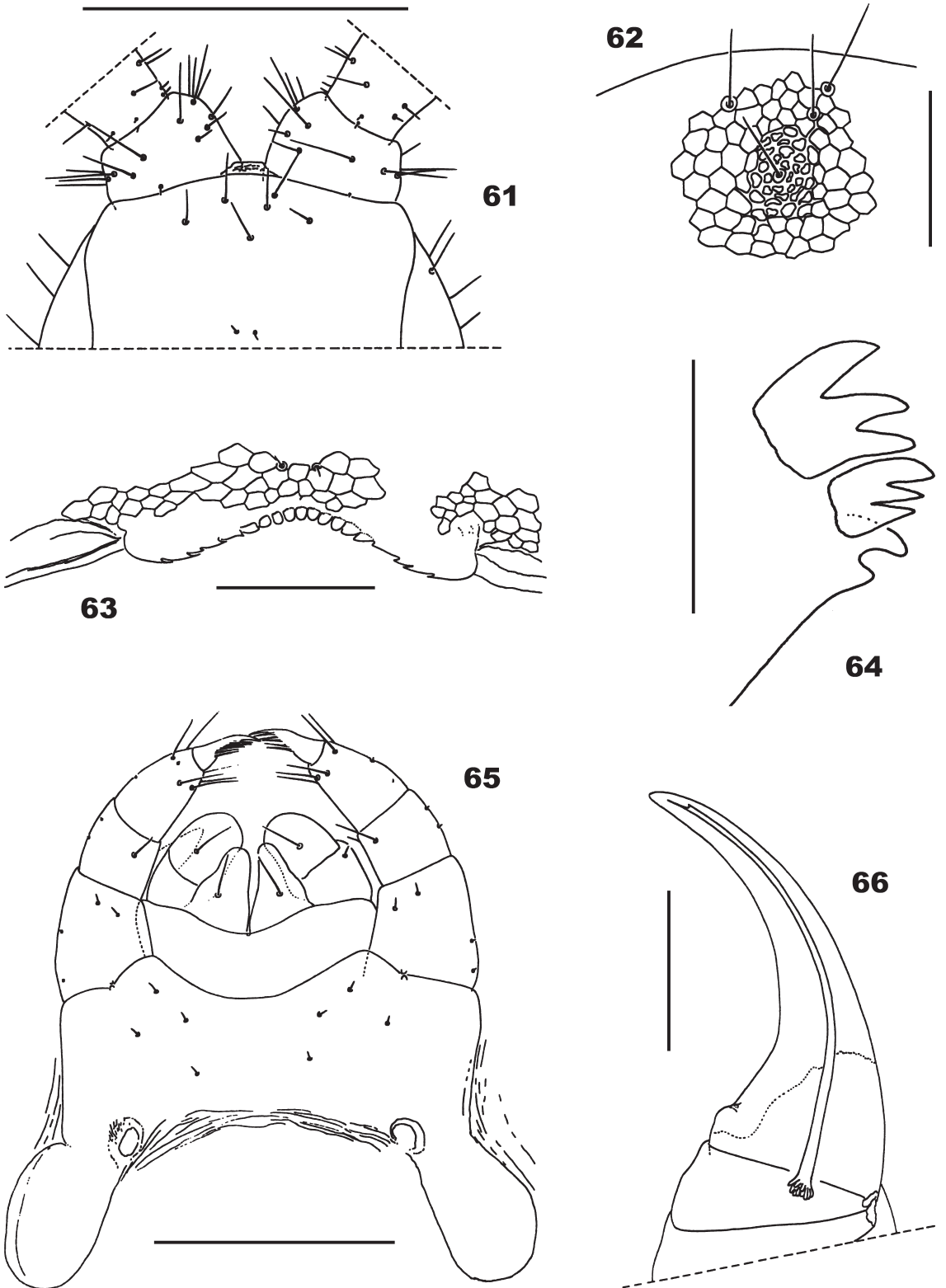
*Female holotype:* length of *Cephalic plate:* ca. 0.30 mm; width of forcipular coxosternite ca. 0.28 mm. *Antennae:* ratio of width of a.a. II/width of a.a. XIV, ca. 1.07: 1; ratio of length/width of a.a. XIV ca. 1.63: 1. Ultimate leg-bearing segment: ratio of length/width of sternite ca. 0.78: 1; ratio of length/width of tergite ca. 0.74: 1. Ultimate legs: ratio of length of telopodites/length of sternite ca. 3.72: 1; ratio of width of tibia/width of tarsus I ca. 1.33: 1; tarsus II longer than tarsus I in the proportion ca. 1.34: 1.

*Male (Specimen "A" cited above):* Ultimate leg-bearing segment: ratio of length/width of sternite ca. 0.68: 1; ratio of length/width of tergite ca. 0.65: 1. Ultimate legs: ratio of length of telopodites/length of sternite ca. 3.14: 1; ratio of width of tibia/width of tarsus I ca. 1.33: 1; tarsus II longer than tarsus I in the proportion ca. 1.34: 1.

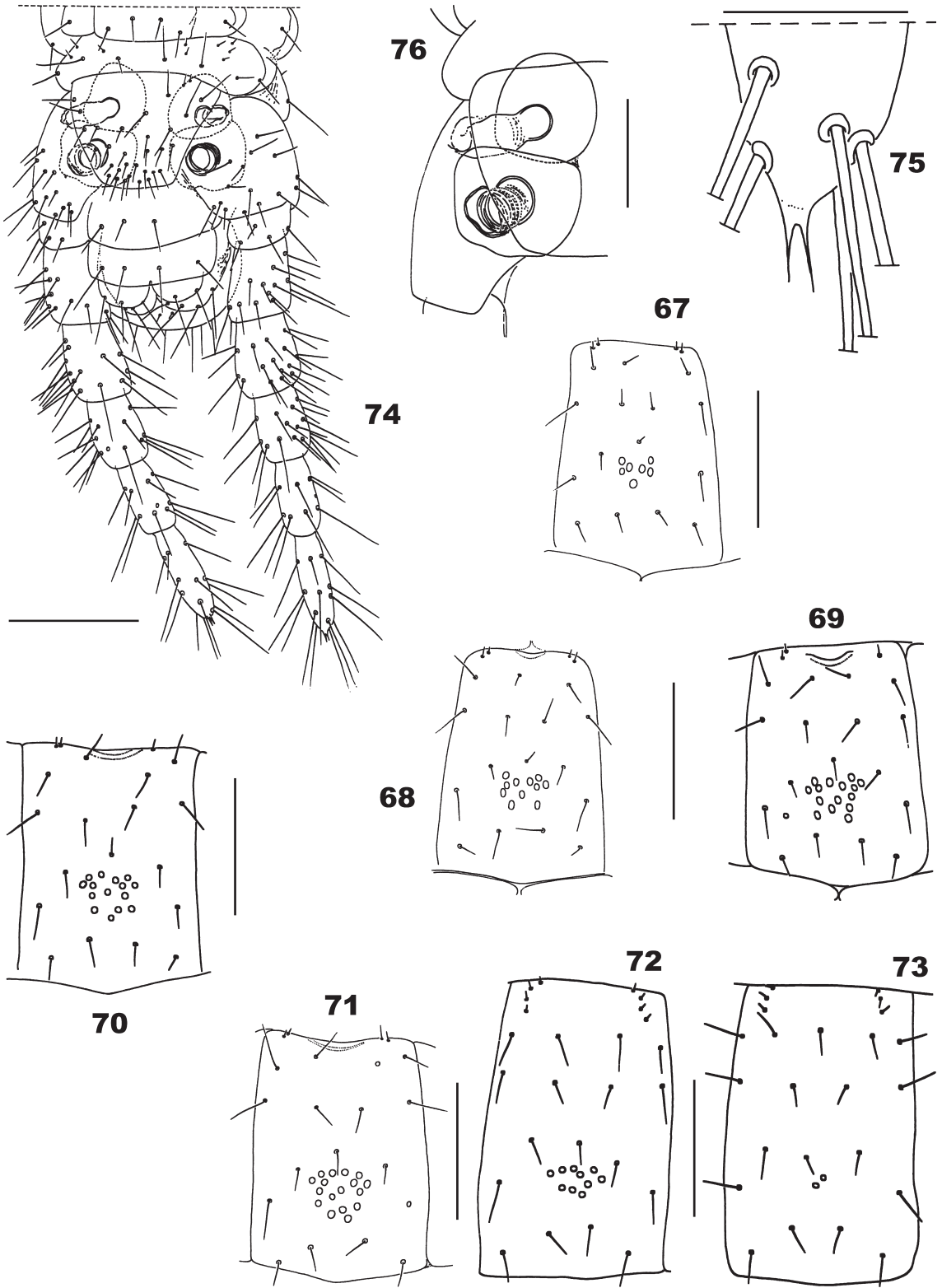
Postpedal segments: with shape as in Fig. 80. Penis dorsally with 1+1 apical setae (Fig. 81).

*Post embryonic variation of coxal organs:* the female juvenile individualized above as "Specimen A" has the anterior coxal organs incompletely developed, being much smaller than the posterior organs (Fig. 77: a). (Shape of coxal organs in adult specimens as shown in Fig. 76).

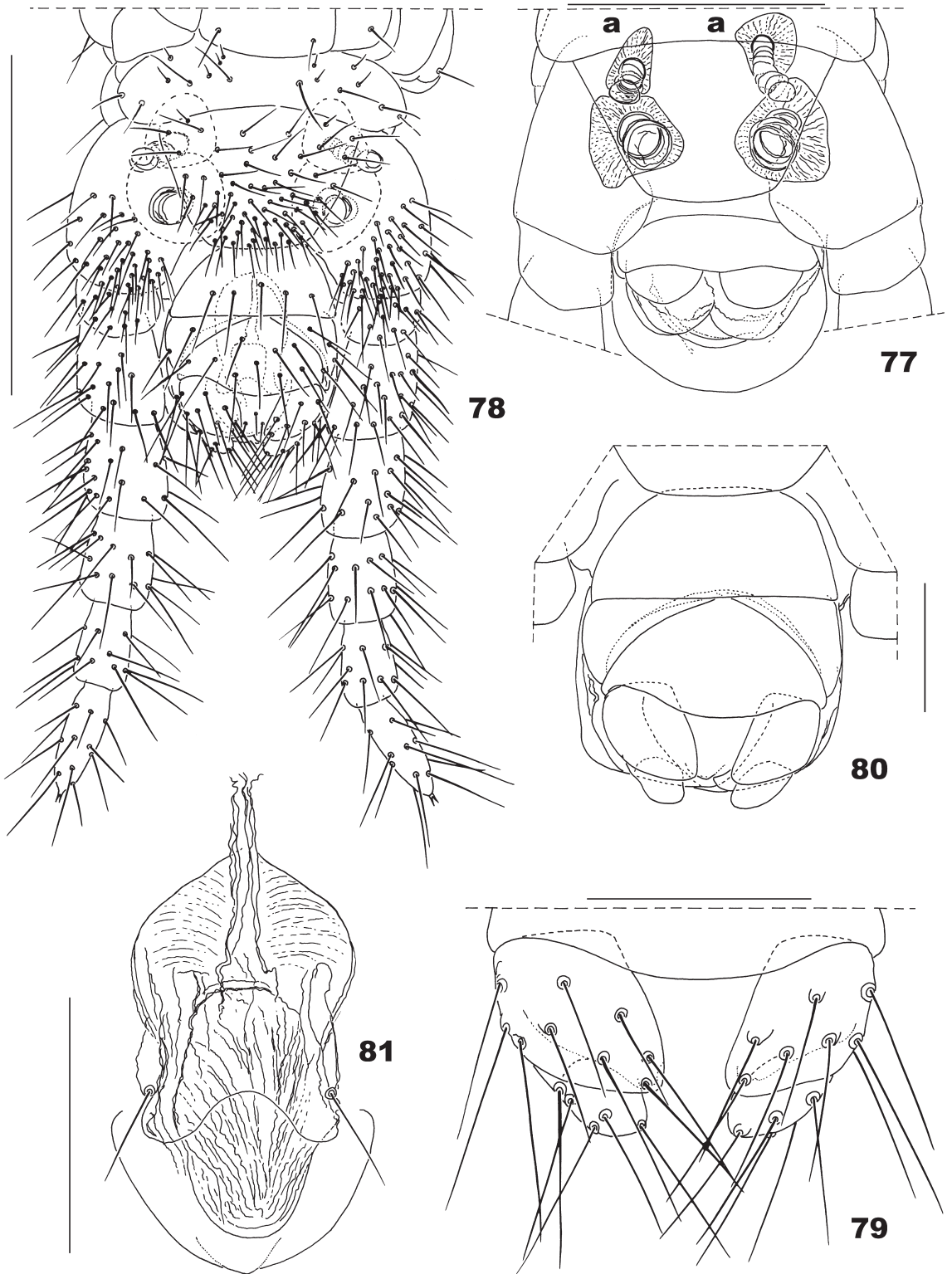
*Variation:* females with 31 leg-bearing segments, males with 27 or 29 leg-bearing segments. Penis with 0+1 or 1+1 apical setae.



**FIGURES 61-66:** *Schendyllops oligopus* (Pereira, Minelli & Barbieri, 1995) (female holotype; Brazil: Amazonas: Reserva Florestal A. Ducke): (61) Clypeus and bases of antennae; (62) Clypeal area; (63) Labrum; (64) Dentate lamella of mandible; (65) First and second maxillae, ventral; (66) Duct and calyx of poison gland in left forcipular telopodite, ventral. (After Pereira *et al.*, 1995). Scale bars: 0.02 mm (64); 0.05 mm (62, 63, 66); 0.1 mm (65); 0.2 mm (61).



**FIGURES 67-76:** *Schendylops oligopus* (Pereira, Minelli & Barbieri, 1995) (female holotype; Brazil: Amazonas: Reserva Florestal A. Ducke): (67) Sternite 2; (68) Sternite 3; (69) Sternite 5; (70) Sternite 7; (71) Sternite 9; (72) Sternite 12; (73) Sternite 13; (74) Ultimate leg-bearing segment and postpedal segments, ventral; (75) Detail of distal end of last podomere of left ultimate leg, ventral; (76) Right coxal organs, ventral. (After Pereira *et al.*, 1995). Scale bars: 0.02 mm (75); 0.05 mm (76); 0.1 mm (67-74).



**FIGURES 77-81:** (77): *Schendylops oligopus* (Pereira, Minelli & Barbieri, 1995) (female juvenile, specimen A; Brazil: Amazonas: 02°30'S, 60°10'W (campinarana)): Detail of coxal organs (a: anterior organs incompletely developed). (78-81): *Schendylops oligopus* (Pereira, Minelli & Barbieri, 1995) (male, specimen A; Brazil: Amazonas: 02°34'S, 60°06'W (capoeira)): (78) Ultimate leg-bearing segment and postpedal segments, ventral; (79) Gonopods, ventral; (80) Detail of postpedal segments, ventral; (81) Penis, dorsal. Scale bars: 0.05 mm (79-81); 0.1 mm (77); 0.2 mm (78).



The maximum body length recorded up to the present was 9.5 mm for the females and 7 mm for the males; from the new material cited above, it is now 10 mm and 8 mm respectively.

*Type locality:* Brazil: Amazonas: Reserva Florestal A. Ducke.

*Known range:* Brazil: Amazonas: Reserva Florestal A. Ducke (02°55'S, 59°59'W); Distrito Agropecuario Rio Suframa (J) (03°34'S, 60°60'W); 02°30'S, 60°10'W (terra firme, campinarana white-sand forest); 02°34'S, 60°06'W, capoeira, burned secondary upland forest.

## DISCUSSION

As stated above, *S. ramirezi* sp. nov., is morphologically very similar to *S. oligopus* (see Table 1 for differential characters between these two taxa). The new species can be also confidently differentiated from *S. interfluvius*; *S. janauarius*; *S. jeekeli*; *S. lomanus*; *S. paoletti* and *S. perditus* (with which it shares a roughly similar range of leg-bearing segments and the characters mentioned in the corresponding diagnosis above) by means of the following selected traits (features for *S. ramirezi* are given in parentheses):

*S. interfluvius*: male with 39 or 41 leg-bearing segments, female with 41 leg-bearing segments; body length 19 mm (female); dentate lamellae of mandibles divided in two blocks; anterior walking legs with second and third articles much wider than the remaining distal articles; ultimate leg-bearing segment with intercalary pleurites present at both sides of the ultimate pretergite; ratio of length of telopodites of male ultimate legs/length of sternite ca. 6.0: 1; second article of male gonopods with ca. 7 setae. (Male with 27 leg-bearing segments, female with 29 leg-bearing segments; body length 7 mm (female); dentate lamellae of mandibles apparently not divided in blocks; width of second and third articles of anterior walking legs similar to the width of the remaining distal articles; ultimate leg-bearing segment with intercalary pleurites absent at both sides of the ultimate pretergite; ratio of length of telopodites of male ultimate legs/length of sternite ca. 4.20: 1; second article of male gonopods without setae).

*S. janauarius*: male with 43 leg-bearing segments; body length 21 mm (male); ratio of length of antennae/length of cephalic shield 4.7: 1 (male); ratio of width of a.a. II/width of a.a. XIV (male antennae), 1.50: 1; dentate lamellae of mandibles divided in

three blocks; coxosternite of first maxillae without setae; single pore-fields not accompanied at the anterior sides by additional pores; prefemur, femur and tibia of male ultimate legs conspicuously inflated and covered by numerous setae; ratio of width of tibia/width of tarsus I of male ultimate legs ca. 2.40: 1; male ultimate leg-bearing segment with numerous setae on posterior third of sternite and distal internal ventral area of coxopleura; pretarsus of ultimate legs as a small tubercle with 3-4 apical spines; second article of male gonopods with ca. 4 setae. (Ratio of length of antennae/length of cephalic shield ca. 2.40: 1 (male); ratio of width of a.a. II/width of a.a. XIV (male antennae), ca. 1.0: 1; coxosternite of first maxillae with 1+1 setae; single pore-fields accompanied at the anterior sides by a few additional pores; prefemur, femur and tibia of male ultimate legs moderately inflated, not covered by numerous setae; ratio of width of tibia/width of tarsus I of male ultimate legs ca. 1.14: 1; ultimate leg-bearing segment with posterior third of sternite and distal internal ventral area of coxopleura provided with a very few setae; pretarsus of ultimate legs as a diminutive tubercle with one apical spine (other features already mentioned above)).

*S. jeekeli*: male with 39 leg-bearing segments; body length 13 mm (male); tip of specialized sensilla on apex of a.a. XIV, tripartite; ratio of width of a.a. II/width of a.a. XIV (male antennae), 1.50: 1; clypeus with ca. 13 middle setae; dentate lamellae of mandibles divided in three blocks; apical claws of telopodites of second maxillae with ca. 16 dorsal teeth; ultimate leg-bearing segment with numerous setae on posterior third of the sternite and distal internal ventral area of coxopleura; ratio of length of telopodites of male ultimate legs/length of sternite ca. 5.10-5.24: 1; second article of male gonopods with ca. 3 setae. (Tip of specialized sensilla on apex of a.a. XIV, undivided; ratio of width of a.a. II/width of a.a. XIV (male antennae), ca. 1.0: 1; clypeus with ca. 7 middle setae; apical claws of telopodites of second maxillae with ca. 6 dorsal teeth; (other features already mentioned above)).

*S. lomanus*: female with 43 leg-bearing segments; body length 17 mm (female); ratio of width of a.a. II/width of a.a. XIV (female antennae), 1.25: 1; dentate lamellae of mandibles divided in three blocks; coxosternite of first maxillae without setae; apical claws of telopodites of second maxillae with ca. 17-18 dorsal teeth; single pore-fields not accompanied at the anterior sides by additional pores; ratio of length of telopodites of female ultimate legs/length of sternite ca. 5.40: 1. (Ratio of length of telopodites of female



ultimate legs/length of sternite *ca.* 3.83: 1 (other features already mentioned above)).

*S. paolettii*: male with 35 or 37 leg-bearing segments, female with 37, 39 or 41 leg-bearing segments; body length 16 mm (female); dentate lamellae of mandibles divided in three blocks; coxosternite of first maxillae without setae; single pore-fields not accompanied at the anterior sides by additional pores; shape of sternite of ultimate leg-bearing segment conspicuously subtriangular (male), approximately subtriangular (female); apical article of male gonopods with *ca.* 9 setae. (Sternite of male and female ultimate leg-bearing segment trapezoidal in shape (other features already mentioned above)).

*S. perditus*: male with 35 leg-bearing segments, female with 37 leg-bearing segments; body length 17 mm (female); ratio of length of antennae/length of cephalic shield *ca.* 4.2: 1 (male); ratio of width of a.a. II/width of a.a. XIV (male antennae), *ca.* 1.74: 1; tip of specialized sensilla on apex of a.a. XIV, tripartite; antennae of male proportionally much longer than those of female; a.a. I-II and lateral margins of clypeus with numerous setae; dentate lamellae of mandibles divided in three blocks; apical claws of telopodites of second maxillae with *ca.* 17-18 dorsal teeth; single pore-fields without additional pores at the anterior sides; ultimate leg-bearing segment with intercalary pleurites present at both sides of the ultimate pretergite; ratio of length of telopodites of male ultimate legs/length of sternite *ca.* 5.46: 1; apical article of male gonopods with *ca.* 4 setae. (Male and female antennae proportionally similar in length; a.a. I-II and lateral margins of clypeus with few setae (other features already mentioned above)).

A key to the Neotropical species of *Schendylops* with ventral pore-fields present on anterior region of the body only, including *S. gracilis* (Attems, 1934) (which also has pore-fields on the proximal part of posterior region), can be found in Pereira (2009).

The potential interest of Chilopoda as a model group for the study of arthropod segmentation has been repeatedly stressed in recent years, *e.g.* by Minelli (2000, 2001), Minelli & Bortoletto (1988), Minelli & Fusco (1997), Fusco & Minelli (2000), Minelli *et al.*, (2000, 2009), Arthur (1999), Bonato *et al.* (2003).

At variance with the overall conservatism of segment number in large and morphologically diversified lineages of arthropods such as malacostracan crustaceans and insects, centipede evolution has thus been accompanied by conspicuous transitions in segment number. First is an increase from 15 trunk segments

to 21 or 23, apparently without any intermediate, followed by an increase toward the higher or much higher numbers found in geophilomorphs. This latter transition was likely more impressive than present segment number distribution would suggest, as the lowest numbers found in a few geophilomorph species (*e.g.*, 27 or 29) are very probably the result of a secondary reduction (Minelli *et al.*, 2009). Most geophilomorphs exhibit intraspecific variation and differences between the sexes in segment number. Only in one geophilomorph family (Mecistocephalidae) is the number of leg-bearing segments generally fixed within the species and identical between the sexes. Whenever sexual differences occur, females have more segments on average than the conspecific males.

The number of leg-bearing segments is often prone to oligomerization in the smallest representatives of the order Geophilomorpha (Minelli, 2003). An example is provided by the genus *Schendylops* that includes species in the 7-70 mm range of total body length and 27-87 leg-bearing segments. The lowest segment numbers (27 and 29) are found in the males (27) and females (29) of *S. ramirezi* sp. nov., (which is also the smallest species in the genus), and in the males of *S. oligopus*. Interestingly, oligomerization of very small geophilomorphs occurs in clades in which the numbers of segments is intraspecifically and interspecifically variable; but it does not occur in a clade (family Mecistocephalidae) in which intraspecific variability is virtually absent and interspecific differences are also very limited. In this group, a very small species, such as *Nannarrup hoffmani* Foddai, Bonato, Pereira & Minelli, 2003 (10 mm in length), has the same number (41) of leg-bearing segments as its closest relatives that are up to 50 mm long, such as *Arrup* sp. (Foddai *et al.*, 2003).

The low number (29) of leg-bearing segments found in the schendylids *Schendylops ramirezi* and *S. oligopus*, is only shared by three representatives of the Geophilidae: *Dinogeophilus oligopodus* Pereira, 1984 (from Argentina: Misiones province) with 29 in both males and females, *Geophilus persephones* Foddai & Minelli, 1999 (from France: Pyrénées-Atlantiques) with 29 in the single recorded male, and *Geophilus richardi* Brölemann, 1904 (Southern Europe) with 29 or 31 in the males and 33 in the females.

The discovery of a scolopendromorph species with duplicated segment number (*Scolopendropsis duplicata* Chagas-Junior, Edgecombe & Minelli, 2008, with 39 or 43 pairs of legs) is relevant to the changes in segment numbers associated with the origin of the Geophilomorpha (Minelli *et al.*, 2009). The geophilomorphs with the lowest segment numbers belong

to arguably “modern” families, Geophilidae and Schendylidae, and also represent highly derived clades within those families, and thus are most likely derived from ancestors with higher segment numbers (Minelli *et al.*, 2009). In the most basal representatives of the most basal geophilomorph clade, the Mecistocephalidae, segment numbers are mostly 41 or 43 (Bonato *et al.* 2003). Thus, the primitive segment number for geophilomorphs is likely 41 or 43, that is, a value virtually or precisely identical to the numbers in *Scolopendropsis duplicate*. As in the case of the latter species, the range of numbers (inferred as basal for Geophilomorpha), was very likely obtained in a saltatory way starting from 21 or 23 (the typical segment numbers in the sister group, Scolopendromorpha, one of which can parsimoniously be inferred to be the general condition for the scolopendromorph-geophilomorph clade, Epimorpha, as a whole), Minelli *et al.* (2009). Vahtera *et al.* (2012) suggest that ancestrally, blind scolopendromorphs had 21 trunk segments, and 23 segments is an apomorphic transformation in Scolopocryptopidae, unaffected by reversal.

To date, little attention has been devoted to the very reduced body size of diverse centipedes and to its possible interpretation as examples of miniaturization, although some considerations on this matter, particularly referred to *Nannarrup hoffmani*, can be found in Foddai *et al.* (2003).

As regards the extreme increase in adult body size, this evolved independently in different lineages within the Geophilomorpha (in Mecistocephalidae, Himantariidae, Gonibregmatidae and Oryidae), always coupled with the achievement of the highest number of segments found in the respective lineage (Foddai *et al.*, 2003). For instance, within mecistocephalids this is the case of *Mecistocephalus* Newport, 1843, where the largest species are those with the highest numbers of leg-bearing segments, 13 cm in both *M. microporus* Hasse, 1887 with *ca.* 100 leg-bearing segments and *M. mirandus* Pocock, 1895 with 65 leg-bearing segments (Bonato *et al.*, 2001; Foddai *et al.*, 2003). The highest number of leg-bearing segments (191) recorded thus far in the order Geophilomorpha, occurs in *Gonibregmatus plurimipes* Chamberlin, 1920 from the Fiji Islands (Minelli *et al.*, 2000; Foddai *et al.*, 2002).

## RESUMEN

*Schendylops ramirezi* sp. nov. (Myriapoda: Chilopoda), un diminuto ciempiés perteneciente a la familia Schendylidae (de Brasil, Estado de Río de Janeiro), se describe e ilustra sobre la base del holotipo hembra, paratipos macho

y hembra, y otros especímenes adicionales no tipo. Este descubrimiento representa la segunda especie de geofilomorfo caracterizada por tener veintisiete segmentos pedales, el número más bajo registrado hasta el presente en quílopodos del orden Geophilomorpha. Hasta ahora, este número de pares de patas (27) solamente había sido encontrado en un único ejemplar (macho) de *Schendylops oligopus* (Pereira, Minelli & Barbieri, 1995) colectado en proximidades de Manaus, Amazonia Central (Brasil). Nuevos registros de distribución geográfica para *S. oligopus* (con la cual la nueva especie es aquí comparada en detalle), junto con notas descriptivas complementarias y nuevas ilustraciones también son brindadas. Se ha utilizado 2-Phenoxyethanol (CAS No. 122-99-6) no diluido, como un efectivo agente de diafanización (y a la vez medio de montaje), para la realización de preparaciones microscópicas transitorias de los especímenes examinados.

**PALABRAS-CLAVE:** *Schendylops*; Nueva especie diminuta; Brasil; Chilopoda; Geophilomorpha; Número de segmentos.

## ACKNOWLEDGEMENTS

I am indebted to Martín Javier Ramírez of the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires, for access to relevant material collected by himself in Brazil. A permanent full-time position as a researcher of CONICET (National Council for Scientific and Technological Research, Argentina) that the author has held since 1983 has provided the best conditions to conduct this research. An anonymous referee contributed with a careful review which helped to improve the final version of the manuscript. Carlos José Einicker Lamas (Museu de Zoologia da Universidade de São Paulo) as well as Airton de Almeida Cruz (of the same institution) kindly assisted me during all steps of the review and publication process. Hernán Lucas Pereira and José Luis Pereira (La Plata) prepared the electronic versions of the figures.

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Aceito em: 27/03/2013

Impresso em: 30/06/2013

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