

CULEX SIPHANULATUS, A NEW SPECIES OF MOSQUITO FROM THE COAST OF RIO DE JANEIRO STATE, BRAZIL (DIPTERA: CULICIDAE)

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Culex siphantulatus, sp. n. is described from specimens collected in bromeliads of the coast of Rio de Janeiro State, Brazil. The description includes illustrations of female, male genitalia and chaetotaxy of pupa and larva. This species is easily distinguished from the others of subgenus *Microculex* and does not belong to any of the four series proposed for the grouping of its species.

Key words: *Culex (Microculex) siphantulatus* n. sp. – mosquito – Culicidae – Brazil

During a study on mosquito ecology performed in a coastal lowland area in Rio de Janeiro (Loureço-de-Oliveira, 1984) at least eight species of *Culex (Microculex)* were collected and among them there were two provisionally identified as *Culex (Mcx.)* sp₁ and *Culex (Mcx.)* sp₂, which we now regard as new species. In this paper we are describing the first of them.

The terminology utilized is that of Harbach & Knight (1980).

Culex (Microculex) siphantulatus sp.n. (> *L. siphonatus* + *anulus*)

Culex (Mcx.) sp₁ : Loureço-de-Oliveira (1984); Loureço-de-Oliveira, Heyden & Silva (1986)

FEMALE: (Figs. 1-9). *Head.* Vertex with darkish integument with narrow falcate pale scales; side of eyes with white spatulate ones; forked scales numerous, pale yellowish; orbital and interorbital setae lengthy, chestnut brown. Proboscis darkish brown, as long as antenna; labellum clear; basal bristles brown. Maxillary palpus coated with dark scales, about 0.21 of the proboscis length. *Cibarial armature.* Cibarial ridge concave, with about 12 large, columnar, lanceolate cibarial teeth, not serrulated at apex. *Thorax.* Integument pale brown. Scutum covered by narrow falcate yellowish scales, except for bare stripes or areas besides the acrostical line of scales, on the prescutellar area and on the supraalar area lateral to the lateral prescutellar scales. Few scales on the prescutal suture. Scutal setae, such as those on the median anterior promontory, the anterior and posterior scutal fossal ones, the supraalar and prescutellar ones, brown, almost all strong, long and curved. Acrostichal setae smaller. Scutellar scales like the scutal ones; median and lateral scutellar lobes, respectively, usually with six and three strong brown setae,

besides few very small ones. Anteprenotum with brown setae and few small spatulate transparent and shining scales. Postpronotum with few narrow falcate scales, like the scutal ones, situated on its upper margin; postpronotal setae about three or four, brown; integument brown, having a darkish area bordering its upper limit with the scutum, except near the scutal angle. Pleural sclerites with clear integument. There are distinct darkish areas on pleuron: on upper proepisternum (above the base of the forecoxa), on postspiracular area, one spot on the anteromedial region of mesokatepisternum and one on the inferior region of mesanepimeron. Pleural setae brown and yellowish; lower mesokatepisternal setae generally six or seven, disposed in a row on the posterior region and upper ones three; prealar setae about three; lower mesepimerals generally one, occasionally two, always in the dark area; upper mesepimerals about five or six. Pleural scales small, spatulate, transparent and shining, situated on the posteroinferior margin of mesokatepisternum and few on the upper mesanepimeron. They are not presented in the figure for being hardly perceptible. Metepisternal integument pale. Mesopostnotum from yellowish to darkish brown. *Wing.* Upper calypter with a complete fringe of long pale setae. Scales moderately dense, from dark (mainly the apressed ones) to pale brown; linear plume scales on dorsal R₅, R₂₊₃, R₂, R₃ and M and on ventral R₁, R₄₊₅, M₁, M₂ and M₃₊₄; CuA (ventral) and 1A (ventral and dorsal) with inclined, narrow spatulate scales; remigium with spatulate scales and one curved brown seta. *Halter.* Scabellum and pedicel pale, capitellum with dark scales. *Legs.* Coxae and trochanters pale; coxae with patches of pale brown and gold shining scales and trochanters with clear ones; coxae setae brown. Other leg segments dark, except for the whitish scaling on ventral surface of femora and a very few scattered scales on the same surface of tibia. *Abdomen.* Tergites I-VII dark-scaled with distinct basal transverse pale bands of variable

width, continuous with basolateral pale spots laterad, except on segments I and II. Sterna largely covered by pale scales and distally by dark ones (more perceptible on segments V-VII). Segment VIII covered only by clear scales. *Genitalia*: Tergum IX spiculate with two lateral lobes with one or two setae. Postgenital lobe short roughly triangular shaped, with about three setae on each side of the midline of the ventral surface. Cercus broad, spiculate on dorsal surface and on the distal border of the ventral surface, with about eight strong setae.

MALE: In general, as described for female, except for the sexual differences. Antenna strongly plumose, little shorter than proboscis. Maxillary palpus dark, little paler ventrally near the base, exceeding the proboscis tip through almost all length of palpomere 5; with strong setae from the apex of palpomere 3 to

apex of palpomere 5. *Genitalia*. (Figs. 10-16). *Segment VIII*. Tergite VIII full of spatulate scales and setae. *Segment IX*. Tergite IX with interlobar area almost plane, lobes elongate, widely separated, with one to three fine setae. *Gonocoxite* short, ovoid; scales absent; lateral tergal surface spiculate with strong and long setae, except near the dorsomesal region corresponding to the level of the subapical lobe where there are no spicules; inner tergal surface spiculate with some minute setae. Subapical lobe clearly divided, divisions separated; proximal division undivided, lengthened, dorsal side of its base with some slender hairlike setae and ventral side bare, bearing two strong and desigual setae which rise from different points; distal division shorter, with a hairlike seta at base and bearing two rodlike, apically bent setae and one oval shaped, not fimbriated leaf. *Gonostylus* slender, curved, slightly rugose at apex, having

TABLE I

Range of number of branches for setae of pupa of *Culex siphonulatus* sp. n. Mode in parenthesis

Setae no.	Cephalothorax	Abdominal Segments							
		I	II	III	IV	V	VI	VII	VIII
0	—	*	1	1	1	1	1	1	1
1	1,2	d	d	2-4 (4)	2-4 (2)	2-4 (2)	1-3 (2)	2-4 (3)	—
2	3,2	1,2 (2)	1	1	1	1	1	1,2 (1)	—
3	1	1	2,3 (2)	2,3 (2)	5-8 (5)	2-4 (2)	2-4 (3)	2-4 (3)	—
4	2	3-6 (4)	1-4 (3)	2	2-4 (2)	4-8 (5)	3-6 (4)	2-4 (2)	2,3 (2)
5	2,3 (2)	2,3	1,2	2	2,3 (2)	2,3 (2)	2,3 (2)	2	—
6	2,3 (2)	1,2 (1)	1	1	1	1,3 (1)	1,2 (1)	3-6 (4)	—
7	2,3 (2)	1,2 (1)	1,2 (1)	2-4 (3)	2,3 (2)	3-6 (4)	1	1	—
8	1,2 (1)	—	*	2,3	2,3 (2)	2-4 (3)	2,3 (3)	2-4 (3)	—
9	1,2 (2)	1,2 (1)	1	1	1	1	1	3-5 (4)	4-7 (6)
10	2-4 (2)	1	*	2,3 (2)	1-3 (2)	1,2 (1)	1,2 (1)	2,3 (2)	—
11	1,2 (1)	*	2	1	1,2 (1)	1,2 (2)	1,2 (2)	2,3 (2)	—
12	2	—	—	—	—	—	—	—	—
14	—	—	1	1	1	1	1	1	1

* = Not found; d = Dendritic.

TABLE II

Range of number of branches for setae of the fourth-instar larva of *Culex siphonulatus* sp. n. Mode in parenthesis

Setae no.	Head	Abdominal Segments											
		P	M	T	I	II	III	IV	V	VI	VII	VIII	X
0	1	d	—	—	—	*	*	*	*	*	*	*	—
1	1	1	4,5 (4)	4,5 (4)	2-4 (2)	3,4 (3)	3,4 (3)	2-4 (3)	3	2,3 (2)	2,3 (2)	4,6 (4)	1,3 (2)
2	*	1	2,3 (3)	3,4	1,2 (1)	1	1	1	1	1	1	1	1
3	*	2,3 (2)	1	4,5 (4)	2-5 (4)	3	2	2,3 (3)	1	1	5-8 (8)	6-9 (7)	1
4	1,2 (1)	2	4-6 (5)	2,3 (2)	6-8 (8)	4-6 (4)	1	1	4-8	3-5 (4)	1,2 (2)	1	+
5	4-6 (5)	1	1	1,2 (1)	1,2 (2)	2,3 (3)	1,2 (2)	2-4 (3)	2,3 (2)	2,3	3,4	1	—
6	2	1	1	1-3 (2)	2	2	2	2	2	2	d	—	—
7	8-10 (8)	1	1	5-8 (8)	1	2-5 (5)	6-8 (8)	5-8	6-9 (7)	4,5	3-5	—	—
8	2-4 (3)	1	5	d	—	2,3 (2)	2,3 (3)	2,3 (2)	2-4 (3)	4-7 (5)	6,7	—	—
9	5-9 (8)	1	1	4,5 (4)	2	1,2 (1)	1,2 (1)	1	1	1	2,3	—	—
10	2,3	1	4,5 (4)	1	2,3 (2)	1	1	1,2 (1)	1	1	2	—	—
11	3-6 (5)	2-4	2	2	2,3 (2)	1-3 (2)	2,3 (2)	1-3 (2)	2,3 (2)	2-4 (2)	2	—	—
12	5-8 (7)	3,4 (4)	1	1	2-4 (2)	4-7	1,2 (1)	1	1	1	1	—	—
13	6-9 (8)	—	d	4-6 (4)	1,2 (1)	d	3	3,4 (3)	3,4 (3)	d	3-5	—	—
14	1,2 (1)	1,2 (2)	d	—	—	*	*	*	*	*	*	—	—
15	4,5	—	—	—	—	—	—	—	—	—	—	—	—

* = Not found; d = Dendritic; + = See in text.

two small setae on the distal third of the inner surface; gonostylus claw small, folded leaf-like. *Phallosome*. Lateral plates quitinized with T-inclined appearance in lateral aspect; aedeagal sclerite curved in lateral view and with dorsal end expanded, connected with the other by a quitinized dorsal aedeagal bridge and by a less quitinized and smaller ventral aedeagal bridge. Basal plate and paramere roughly triangular shaped and with a rounded end. *Proctiger* elongate; crown composed of 10 - 12 apically pointed spicules; cercal setae two, tergum X roughly triangular shaped and with blunt mesal apex.

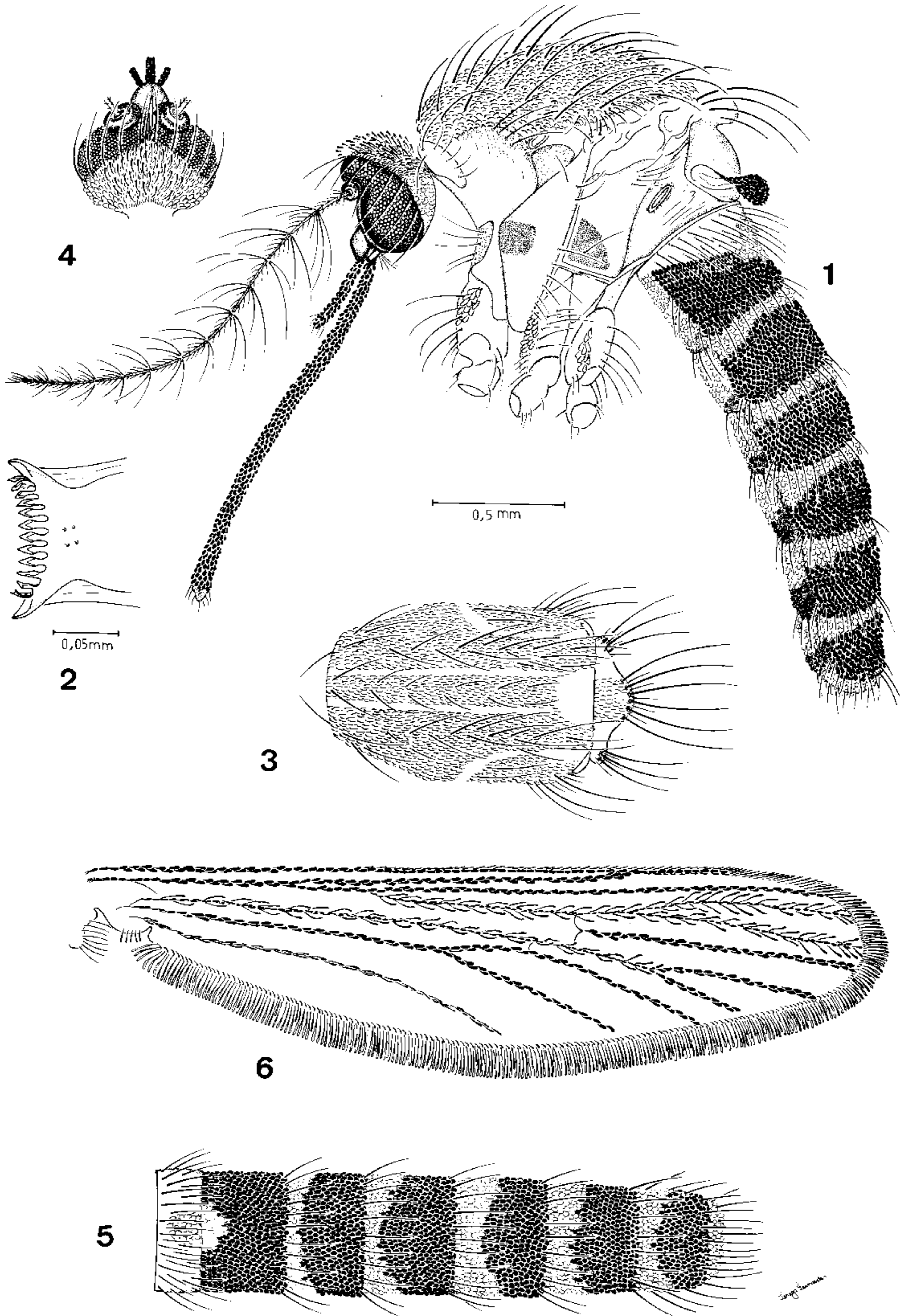
PUPA: (Figs. 17 - 18) General outline and chaetotaxy as figured. Table I lists the range and modal number of branches for setae. Pigmentation of cephalothorax and abdomen (tergum I to V) dark, with a distinct pattern as figured. The dark pigmentation gives to the whole a Y appearance in dorsal view - being narrowed by the end of tergum V, widening gradually from there up to tergum I, becoming separated as a fork by a central pale area on metanotum (where setae 10,11-CT are placed) and extending on the cephalothorax as a strip on each side of the limit between the post-scutal area and the mesothoracic wing up to the trumpet's basis. *Trumpet*. Heavily dark pigmented, tube-shaped; base narrowed almost half width of pinna; trumpet index about 4.0 - 4.5. *Cephalothorax*, Setae 1,5,8,10,11, 12 barbed, setae 4, 9 slightly barbed. *Abdomen*. Segment I: seta 1 multi-branched, dendritic; setae 3, 6, 7 barbed, Segment II: seta 1 dendritic with about six branches; setae 3, 5, 6, 7 barbed. Segment III: seta 3 developed and barbed; seta 8-III-VI dendritic with two or three branches. Segment IV: setae 1, 3, 5, 6 barbed. Segment V: setae 1, 5, 6 barbed; 7, 8 dendritic with respectively 3 - 6 (4) and 2 - 4 (3) delicate branches. Segment VI: setae 1, 5, 6 barbed. Segment VII: setae 5, 9 barbed. Segment VIII: seta 9 barbed. *Paddle*. Nearly twice as long as segment VIII: with slight serrations from the base until near the middle of the lateral margin; ovate, rounded at apex, pale; middrib and buttress little developed, with almost the same general tone of paddle; paddle index about 2.0; seta 1 - P with two slender branches. Genital lobe much more pigmented than paddle.

LARVA: (Figs. 19 - 22). Chaetotaxy and general aspect as figured and in Table II. *Head*. Almost pale except for two defined pigmented areas, symmetrically situated - lateralia and "black-spot area"; anterior tentorial arm complete; hypostomal suture incomplete not reaching the colar; colar strongly pigmented. Dorsomentum with nine or ten lateral teeth on each side of a medial developed tooth. Setae 5,

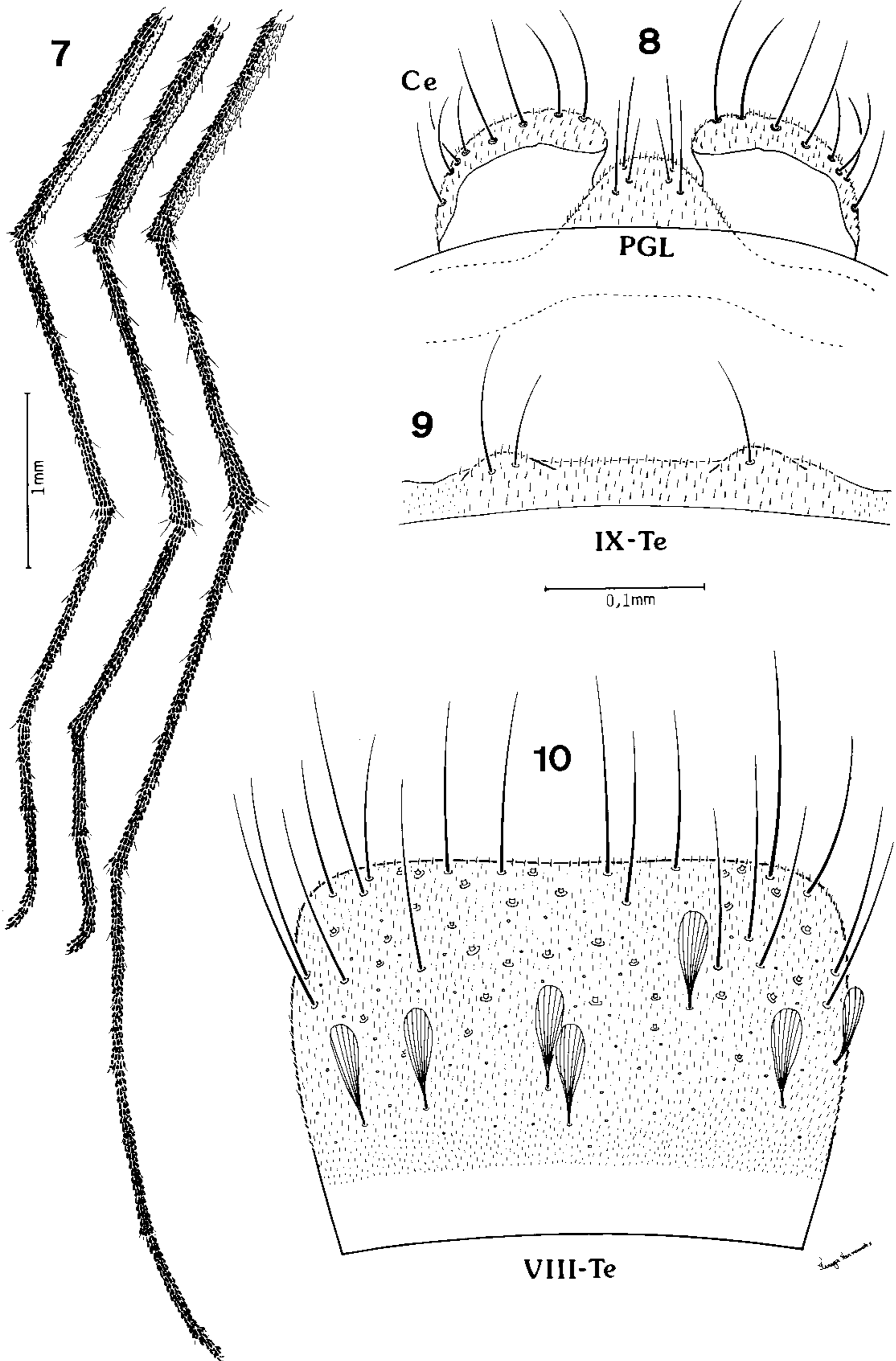
6, 7, 11, 13 barbed. *Antenna*. Lengthened, heavily pigmented, more densely spiny on the proximal two thirds. Seta 1 branched, usually with 20 barbed branches (17 - 22), setae 2 - 6 single.

When the larva is alive its thorax (meso and metathorax) and abdomen (mainly segments I, II, VI, VIII) present some strongly dark tergal pigmented areas which disappear when it is mounted in balsam through the common method (Forattini, 1962). We were able to preserve this pigmentation, in larvae, although during a short time after killing them, by using the method suggested by Correa & Ramalho (1956) to mount pupal exuvia of *Phoniomya*. Unfortunately these pigmented areas are not present on the larval exuviae of the type material, except those two defined rings on the siphon. So we are describing this larva as it can be examined when mounted in balsam, as usual.

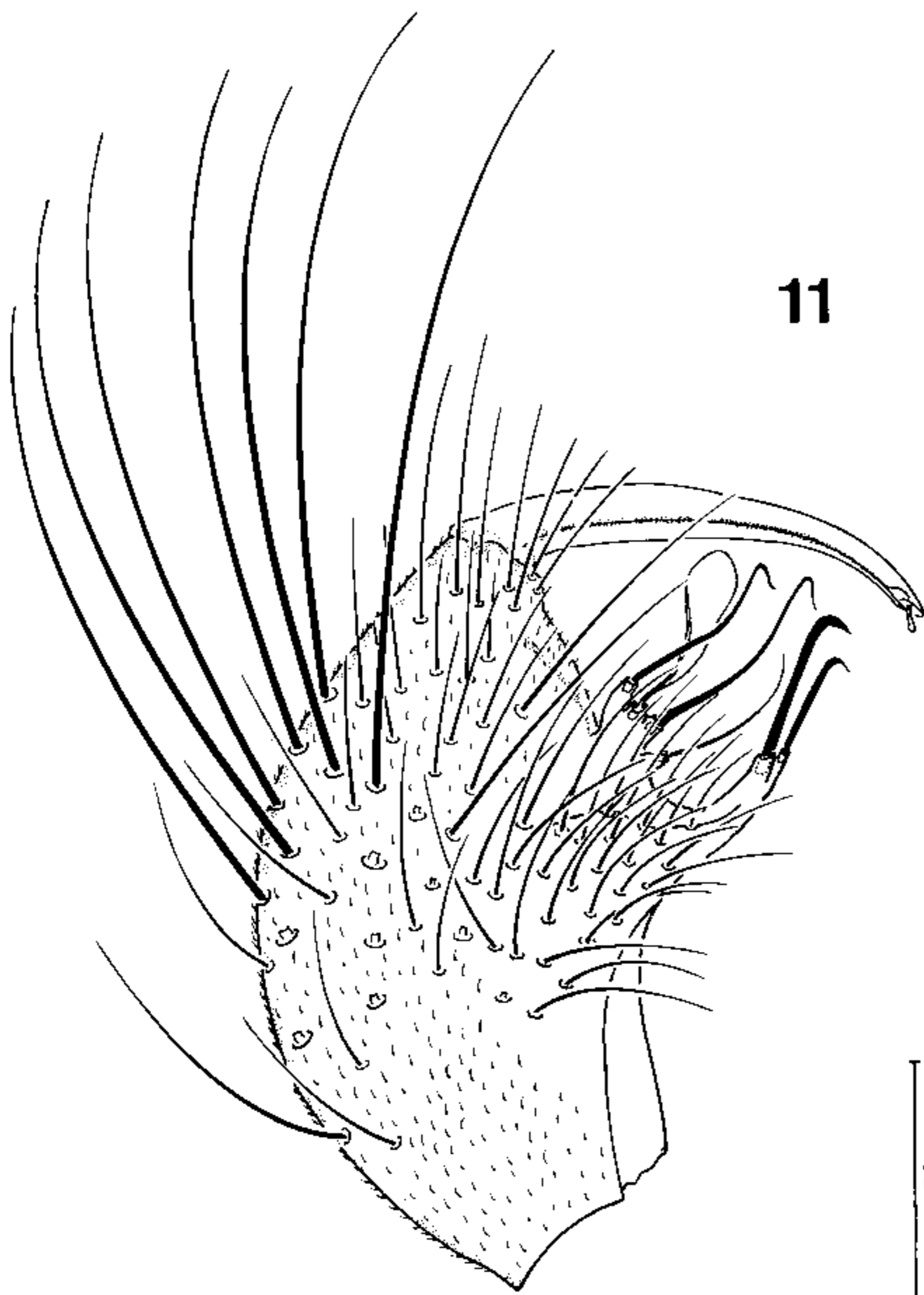
Thorax. Nude. Prothorax: seta 0 dendritic with 8 - 10 principal branches, setae 1 - 8 barbed; seta 9 slightly barbed. Mesothorax: seta 3 slightly barbed; setae 5 - 10 and 12 barbed; setae 13, 14 dendritic with five and three or four principal branches respectively. Metathorax: setae 7, 9, 10, 12 barbed; seta 8 dendritic with six or seven branches. Setae 1-3-P and 9-12-P, M, T inserted on common pigmented tubercle. *Abdomen*. Integument with tiny spicules sometimes hardly perceptible. Setae 6, 7 - I and 6 - II inserted on pigmented tubercle. Segment I: setae 4, 6, 7 barbed. Segment II: setae 6, 7 barbed; seta 13 pectinate with dendritic branches. Segments III - V: seta 6 barbed. Segment VI: setae 3, 6, 12 barbed. Segment VII: setae 1, 12 barbed. Segment VIII: setae 1 - 5 barbed. Comb with 42-58 little sclerotized scales disposed in a roughly triangular whole. There are three irregular rows of scales which have a fringe of fine spicules. *Siphon* index nearly 12; pigmentation yellowish, except for two dark rings, one before middle and another near apex; acus present and weakly pigmented. Pecten of 10 - 12 hyaline spines, distal ones larger and spaced, having a series of small teeth on the ventral margin. Seta 1-S comprehending six pairs of branched setae disposed beyond the pecten, although sometimes we were able to detect only five pairs. The first pair of 1-S is the largest and with at least one of the setae inserted at the beginning of the proximal dark pigmented ring or in it, having usually three branches (3,4), the other pairs are usually three branched (2 - 4) the last ones being generally two branched. The last pair of 1-S is always in the distal dark pigmented ring. Setae 2, 6-9-S single. Segment X. Saddle complete, without acus, yellowish, little more pigmented than siphon, with several marginal spicules on the



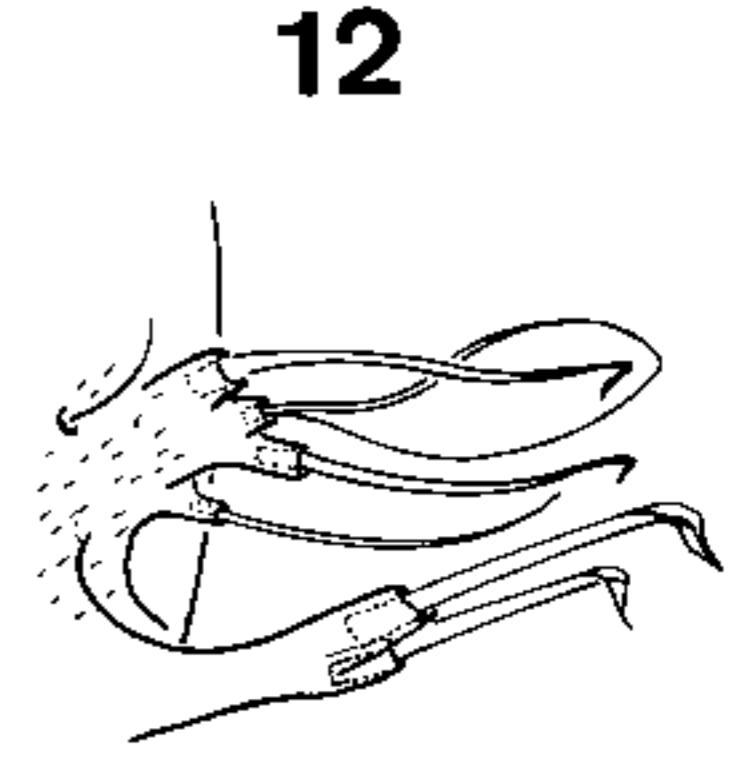
Culex siphanulatus sp.n. – Female. Fig. 1: general aspect of lateral position. Fig. 2: dorsal aspect of cibarial armature. Fig. 3: aspect of mesonotum. Figs. 4, 5 and 6: dorsal aspect of head, abdomen and wing.



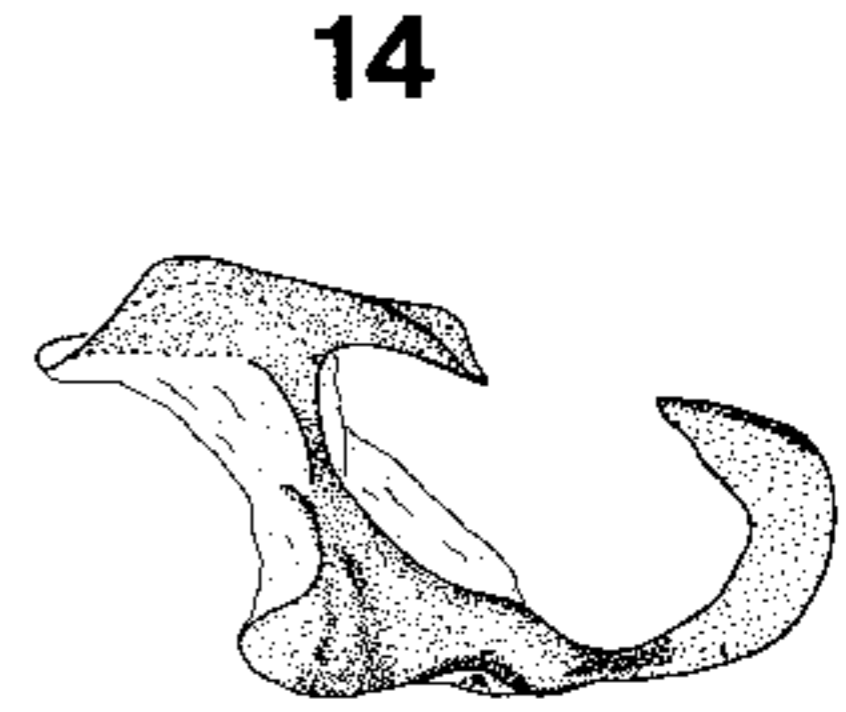
Culex siphanulatus sp.n. – Female. Fig. 7: legs. Fig. 8: cercus (Ce) and postgenital lobe (PGL). Fig. 9: tergum IX. Male – Fig. 10: tergum VIII.



11



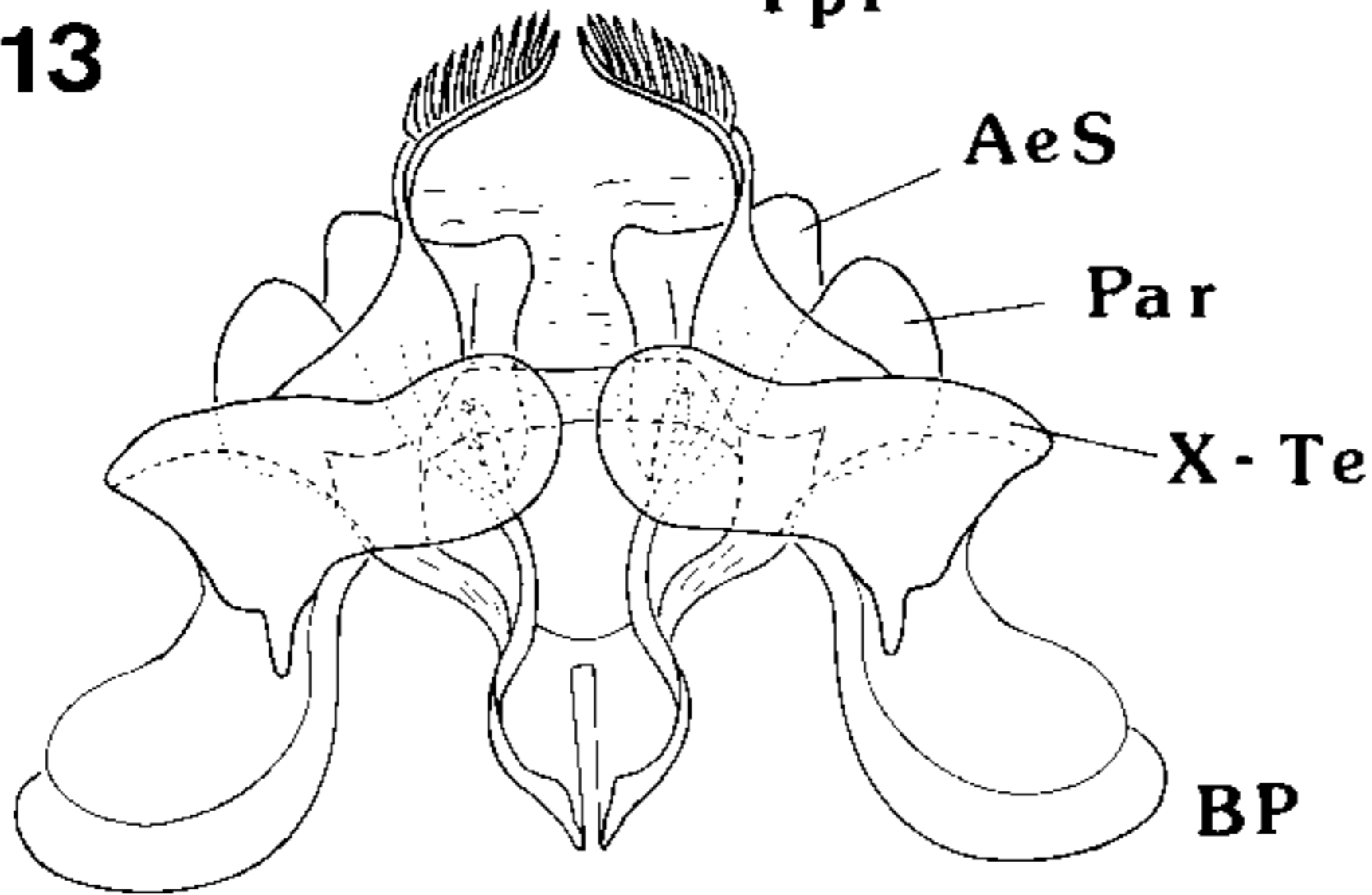
12



14

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13



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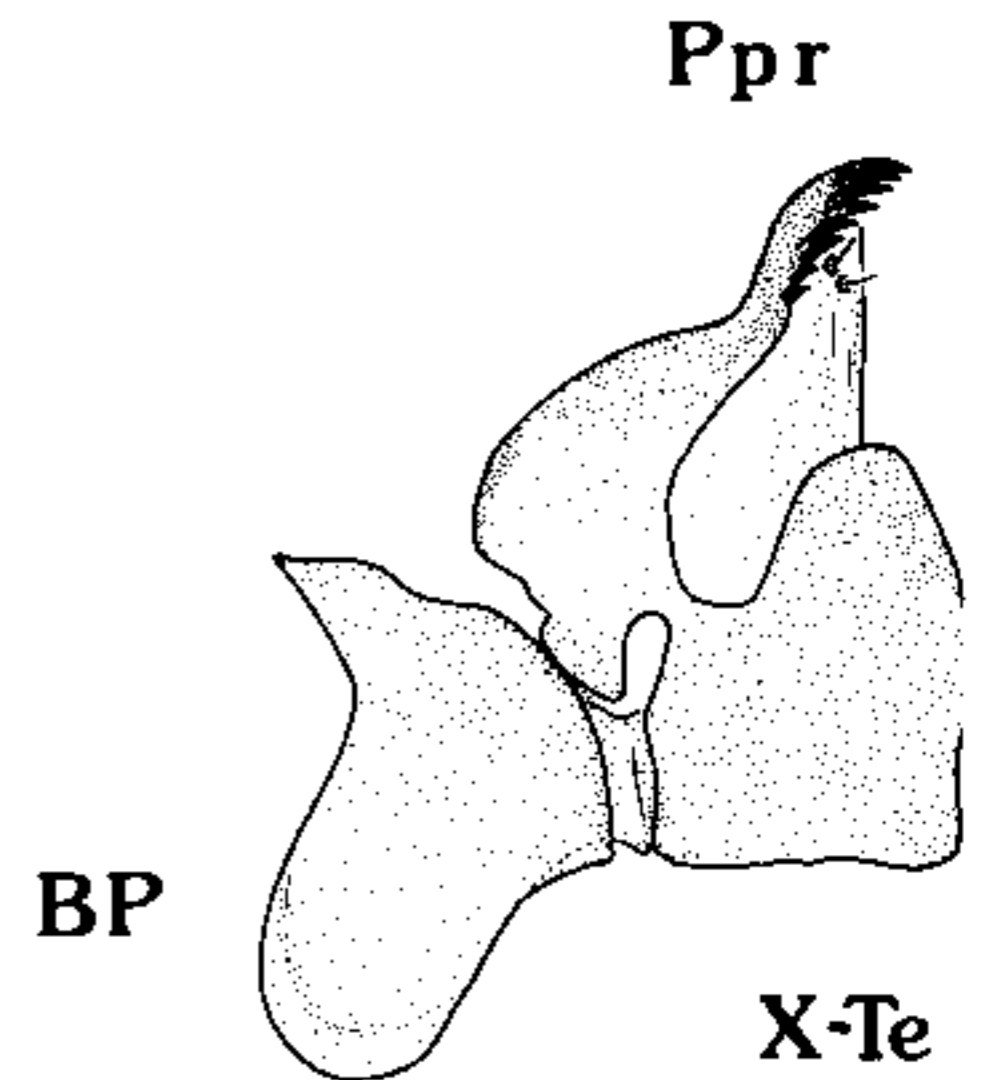
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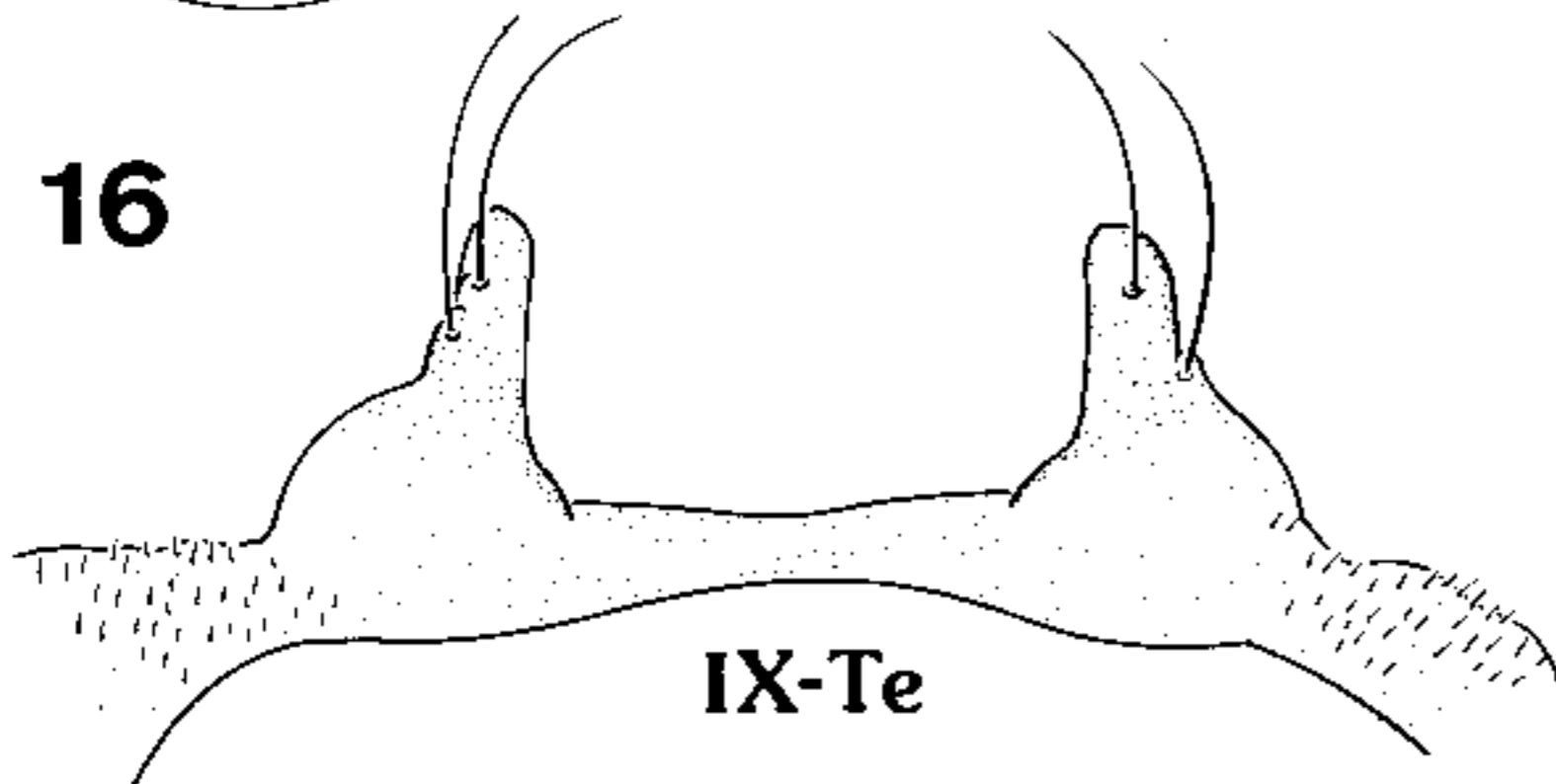


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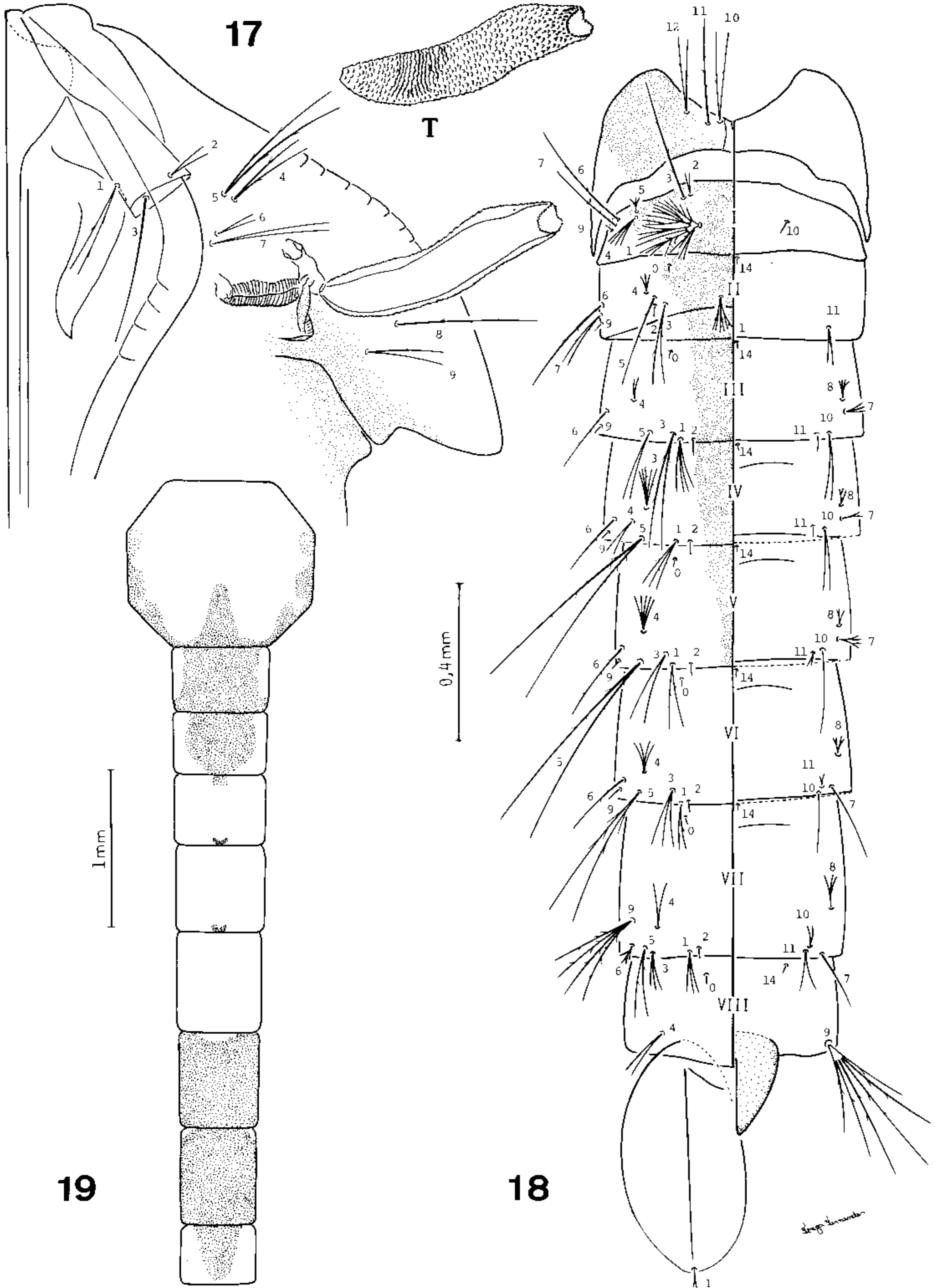
X-Te

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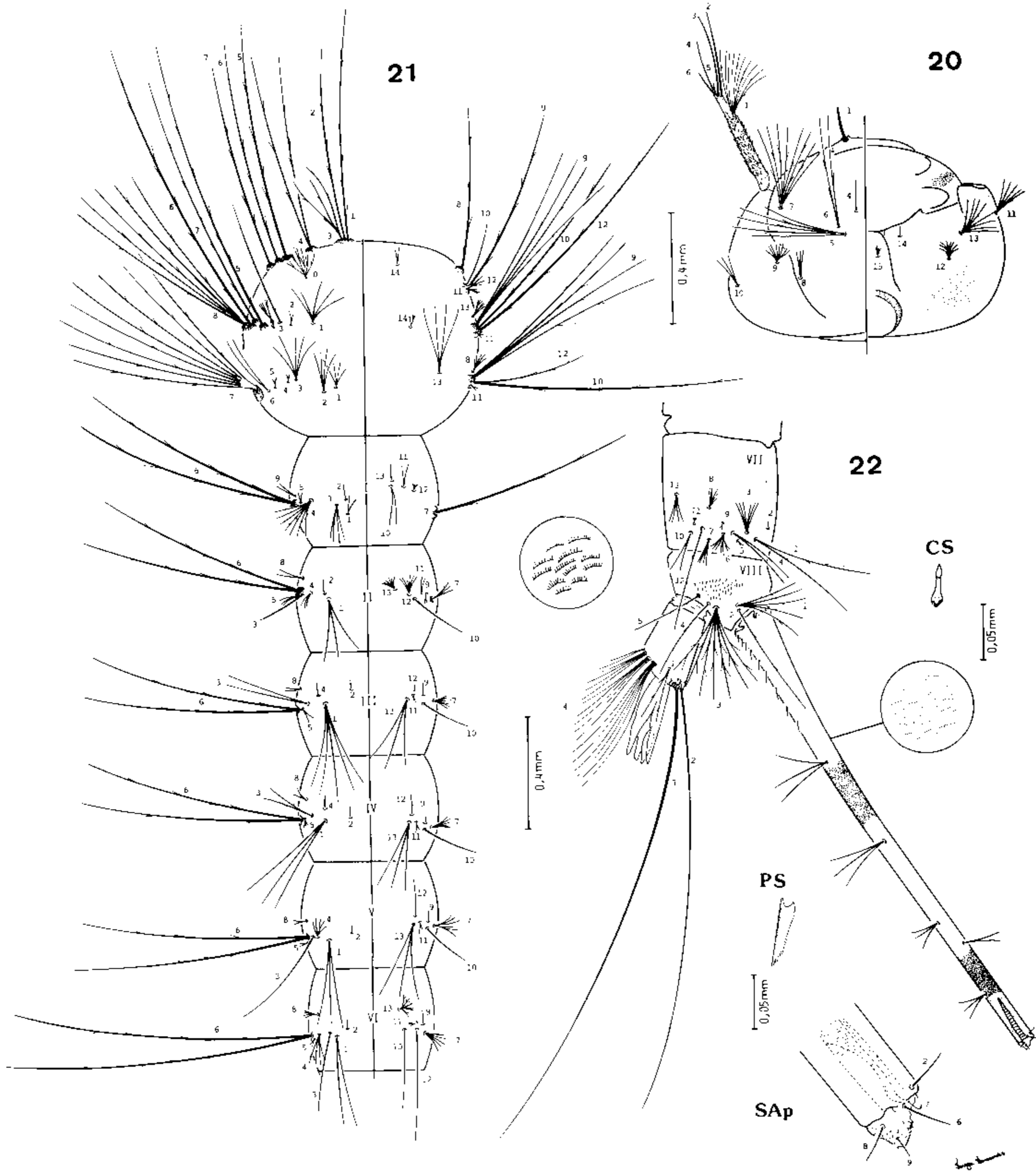


IX-Te

Culex siphanulatus sp.n. – Male genitalia. Fig. 11: gonocoxite and gonostylus. Fig. 12: inner tergal aspect of the subapical lobe of gonocoxite. Fig. 13: dorsal aspect (prerotation sense) of phallosome and proctiger (AeS – aedeagal sclerite; BP – basal plate; Par – paramere; Ppr – paraproct; X-Te – tergum X) Fig. 14: lateral aspect of aedeagal sclerite. Fig. 15: ventral aspect of basal plate, paraproct and tergum X. Fig. 16: tergum IX.



Culex siphanulatus sp.n. – Pupa. Figs. 17 and 18: cephalothorax and abdomen (T-trumpet). Fig. 19: scheme showing the dorsal dark pigmentation of living larva (thorax and abdomen segments I-VIII).



Culex siphonulatus sp.n. – Larva. Fig. 20: head. Fig. 21: thorax and abdomen (segments I – VI). Fig. 22: segments VII, VIII, siphon and segment X (CS – comb scales); PS – pecten spine; SAp – spiracular apparatus).

dorso-caudolateral margin; seta 1 with two branches (1-3) slightly barbed; setae 2, 3 single, seta 4 with four paired setae. Anal papillae long and slender, longer than saddle.

Type data: Holotype ♂ with genitalia and associated pupal and larval skins; Granjas Calábria, Jacarepaguá, Rio de Janeiro, Rio de Janeiro State, Brazil; sea level, 20 December, 1982, coll. R. Lourenço-de-Oliveira, as a larva from a large and sunlit bromeliad on rock, deposited in the Entomological Collection of Instituto Oswaldo Cruz (Costa Lima Collection n^o 6.128), Rio de Janeiro, Brazil (IOC). Allotype ♀ with associated pupal and larval skins; other data and depository, same as holotype. Paratypes: two males and two females, same data as holotype and allotype except 13 July 1982 from large and shady bromeliads on the ground (IOC); one female with associated pupal skin, other data same as allotype, except 22 November 1982 (IOC); two males, with associated pupal skins, other data same as holotype, one of them coll. R. Heyden (IOC); one male with associated pupal and larval skins, other data same as holotype (IOC), one female with associated pupal skin, other data same as holotype (IOC), one female, same data as allotype, deposited in the Entomological Collection of the Department of Epidemiology, Faculdade de Saúde Pública, Universidade de São Paulo, Brazil (FSP); one female, same data as allotype, except 13 July 1982, from a large and shady bromeliad on the ground (FSP), one male, same data as holotype, except 13 July 1982, from a large and shady bromeliad on the ground (FSP); one male, same data as holotype, except 22 November 1982 (FSP).

Distribution: known from the coastal areas of city of Rio de Janeiro (Morro do Urubu, Granjas Calábria, Jacarepaguá 23°00'S and 43° 26'W) and Mangaratiba (close to Km 55 of BR 101 highway – 23°00'S and 44°06'W). Rio de Janeiro State.

Material examined: *Culex siphonulatus* sp.n. – 15 males, 20 females, 13 male genitalia, 21 larvae, 19 pupal and 15 larval skins.

Taxonomic discussion: *Culex siphonulatus* sp.n. is easily distinguished from all known species of the subgenus *Microculex* (Lane, 1953; Floch & Fauran, 1955; Forattini & Toda, 1966; Cova Garcia & Pulido, 1974; Cova Garcia & Sutil, 1974; Cotrim & Galati, 1977) and does not belong to any of the four series suggested by Lane & Whitman (1951). However it seems to be more related to the *inimitabilis* series because of the general aspect of the male genitalia and adult, but its larva and the cibarial armature resemble those of the *consolator* series (Sirivanakarn, 1978).

Although *Culex inimitabilis fuscatus*, also described from Rio de Janeiro by Lane & Whitman (1951), has some resemblances to *Culex siphonulatus* sp.n. they are clearly different as presented above and according to Dr. Oswaldo P. Forattini and Maria Anice M. Sallum's observations, who kindly compared our material of *Culex siphonulatus* sp.n. with the paratype of *Cx. inimitabilis fuscatus*. *Cx. inimitabilis fuscatus* does not have a dark pigmented pattern on its pupa cephalothorax and metathorax; the trumpet has a different shape and is thinner than in *Culex siphonulatus* sp.n. (see Lane & Whitman, 1951, fig. 20); abdominal segments I-IV with a dorsal pattern of darkish pigmentation, presenting one pair of pale areas in the pigmented areas of tergites I-III; seta 3-III less developed and single; seta 5-VI shorter, with about six strongly barbed branches. The larva of *Cx. inimitabilis fuscatus* has the general characteristics of the *inimitabilis* series such as seta 8-P very small and saddle of segment X smooth; besides, its antenna is pale; seta 1-X is small and multibranching; tufts of seta 1-S are smaller than in *Culex siphonulatus* sp.n. and its siphon does not have the dark rings.

RESUMO

Culex siphonulatus sp.n. é descrito de espécimes coletados em bromélias do Estado do Rio de Janeiro. A descrição inclui ilustrações do adulto fêmea, da genitália masculina e da quetotaxia da pupa e da larva. Esta espécie é facilmente distinguida das demais do subgênero *Microculex* e não pertence a qualquer das quatro séries propostas para agrupar as espécies deste subgênero.

ACKNOWLEDGEMENTS

We would like to thank Dr. Leonidas M. Deane for critically reviewing the manuscript and illustrations; Dr. Oswaldo P. Forattini and Maria Anice M. Sallum (Faculdade de Saúde Pública da Universidade de São Paulo) for examining our material and for taxonomic orientation, Dr. W. Lobato Paraense for suggesting this species name.

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