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ON THE IMMATURE STAGES OF TWO MOSQUITOES (DIPTERA: CULICIDAE) ORIGINALLY DESCRIBED FROM RIO DE JANEIRO, BRAZIL

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The fourth-instar larva and pupa of Psorophora pseudomelanota *Barata & Cotrim, 1971 and* Phoniomyia deanei *Lourenço-de-Oliveira, 1983 are described and compared with those of related species.*

Key words: *Psorophora pseudomelanota* – *Phoniomyia deanei* – mosquitoes Culicidae – immature stages – Rio de Janeiro

During a mosquito survey performed in Rio de Janeiro (Lourenço-de-Oliveira, 1984; Lourenço-de-Oliveira et al., 1986) undescribed larvae and pupae of some species were collected. In this paper, we are describing the fourth-instar larva and the pupa of two mosquitoes originally reported in this city: *Psorophora (Janthinosoma) pseudomelanota* Barata & Cotrim, 1971 and *Phoniomyia deanei* Lourenço-de-Oliveira, 1983.

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

Psorophora pseudomelanota

LARVA: (Figs 1-3) – Chaetotaxy and general aspect as figured and in Table I. *Head* – Slightly pigmented; hypostomal suture incomplete not reaching the collar; collar strongly pigmented; dorsal apotome spiculose. Dorsomentum with 13 or 14 lateral teeth on each side of a medial developed tooth. Ventromentum formed by pectinate setae with aciculate branches. Setae 5-7,13 aciculate; seta 4 forked. *Antenna* – Elongated, almost the same length of the head, densely spiny. Seta 1 usually with 5 aciculate branches (4-7), setae 2-6 single. *Thorax* – Integument nude. Prothorax: seta 0 fanlike with 6-9 dendritic principal branches; setae 2,3 forked; setae 4-8, 10, 12 aciculate. Mesothorax: setae 5, 6, 8-10, 12 aciculate; setae 13, 14 fanlike with respectively 14-15 and 15-16 aciculate branches. Metathorax: setae 7, 9, 10, 12 aciculate. Setae 9-12-M, T inserted in common pigmented support plate with 6, 7 tooth-like processes. *Abdomen* – Integument nude, but segments II-VII with a distinct band, of usually 6 rows of tiny spicules, ventro-anteriorly. Setae 6, 7-I-IV and 6-V on pigmented support plate. Segment I: seta 4 fanlike with 21-24 branches; seta 6, 7 aciculate. Segment II: seta 3 pectinate; seta 13 fanlike with 13-17 branches; setae 6, 7 aciculate. Segment III: seta 3 pectinate; seta 6 aciculate. Segments IV, V: seta 6 aciculate; seta 1-V forked. Segment VI: seta 13 fanlike with about 28 branches. Segment VIII: setae 3-5 aciculate; seta 11 dendritic. Comb with 7 sclerotized scales disposed in a roughly semi-circular whole, most of them joinned in a sclerotized plate. *Siphon* – Pale brown pigmented, inflated mesialy; index around 2.5 (2.04-3.49); siphon acus present. Pecten with usualy 3, rarely 4 strongly pigmented spines on the basal third. Seta 1-S comprehending one pair of 4-9 branches, inserted beyond middle. Setae 2, 6, 7, 9-S single; seta 8-S 2-5(5) branched. Spiracular apodeme conspicuous and pigmented. Segment X. Saddle complete, with spicules on the distal margin; seta 4 comprehending 8 paired setae with 5-7 branches. Anal papile long and slender, twice as long as saddle.

PUPA: (Figs 4, 5) – General outline and chaetotaxy as figured and in Table II. *Trumpet* – Pigmented; index generally 7 (4.5-7.5). *Cephalothorax* – Seta 10 aciculate. *Abdomen* – Integument with spicules on segments II-VIII, but more conspicuous on segs II-VI. Segment I: seta 1 fanlike. Segment II: seta 5 aciculate.

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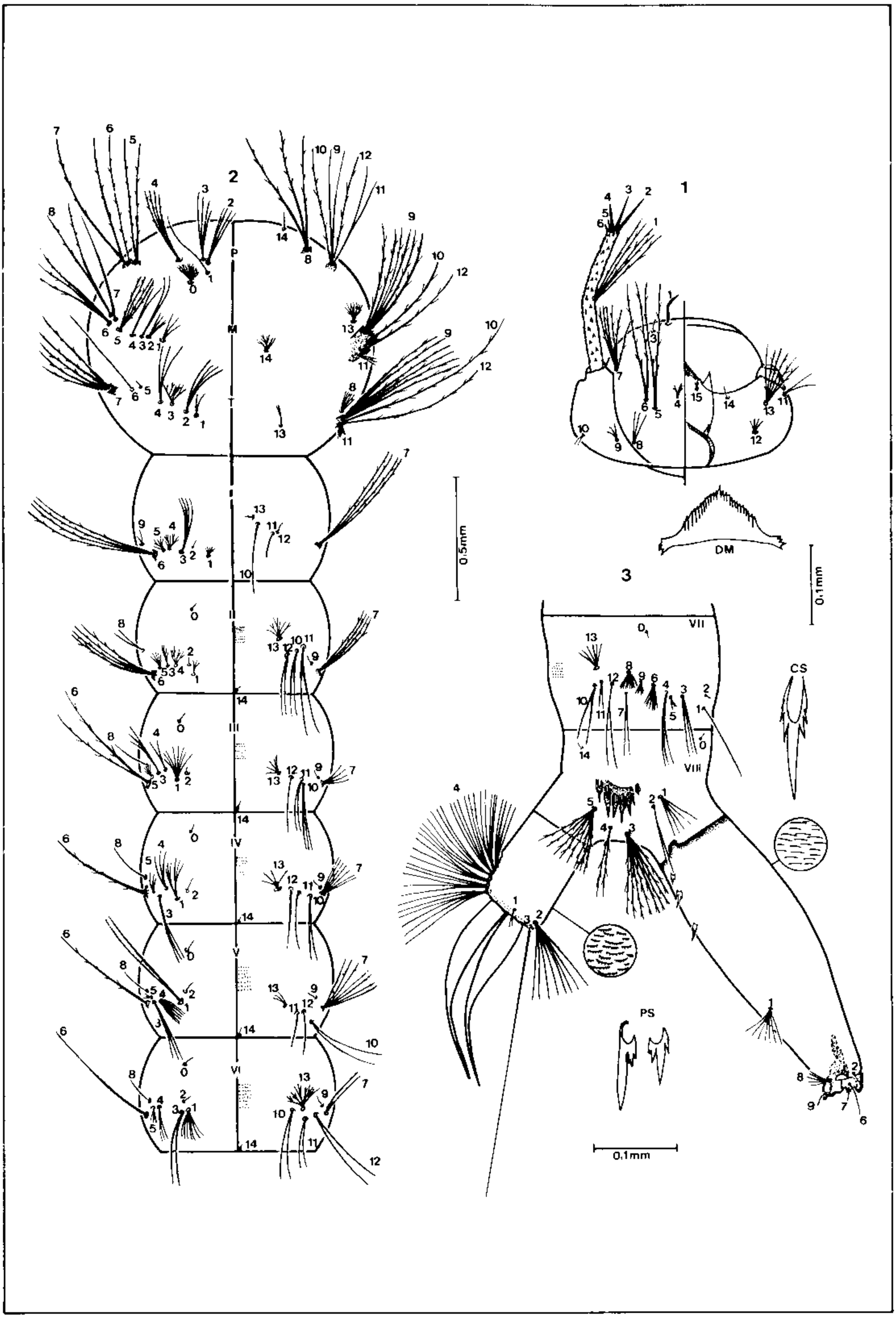
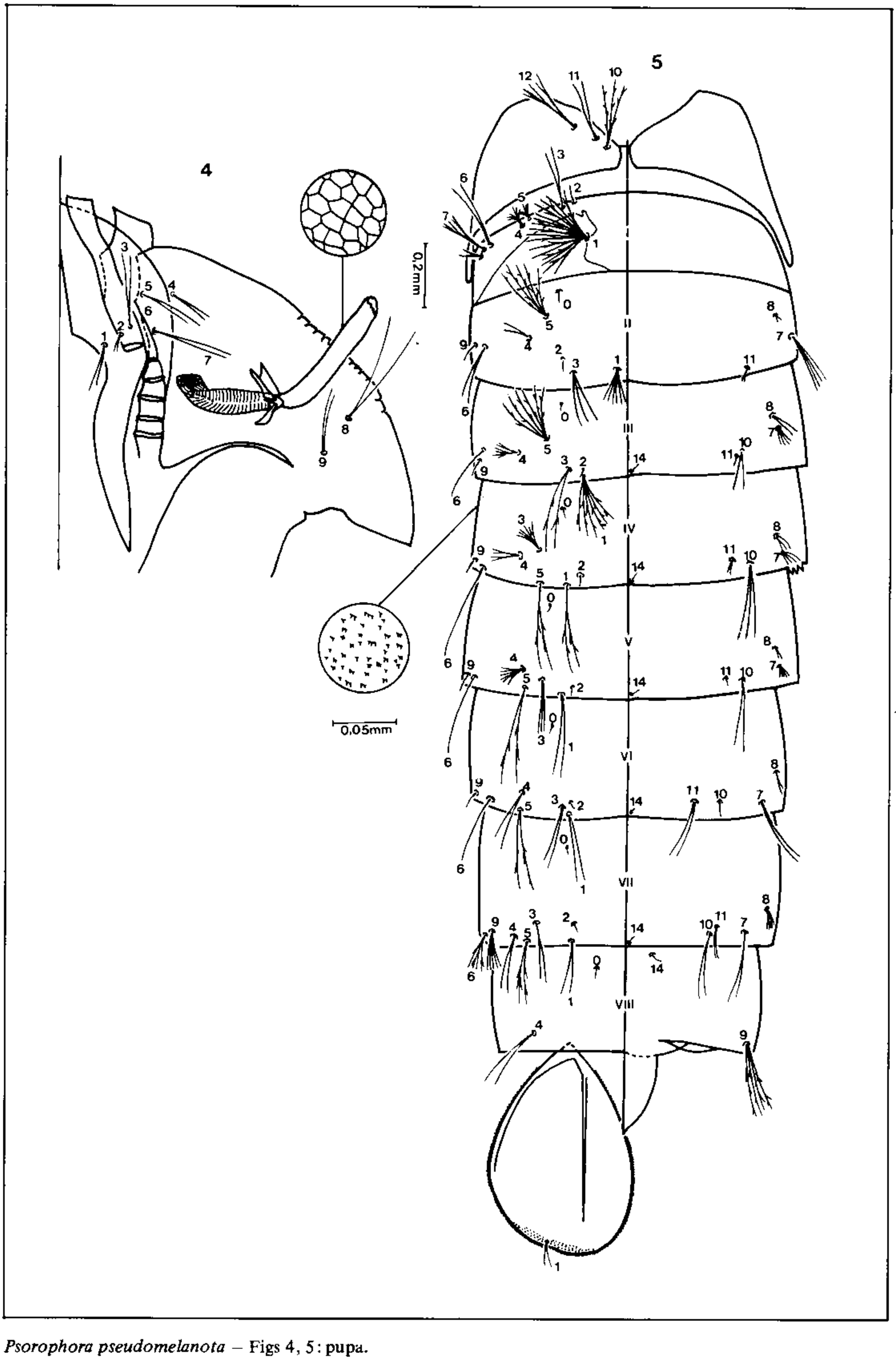


Psorophora pseudomelanota – Figs 1 – 3: larva. CS: comb scales; Dm: dorsomentum; Ps: pecten spine.



Psorophora pseudomelanota – Figs 4, 5: pupa.

TABLE I

Range of number of branches for setae of the fourth-instar larva of *Psorophora pseudomelanota*. Mode in parenthesis

Setae No.	Head	Thorax			Abdominal Segments								
		P	M	T	I	II	III	IV	V	VI	VII	VIII	IX
0	*a*	*b*	–	–	*a*	1	1	1	1	1	1	1	–
1	1	1,2(1)	2,3(3)	2,3(2)	5-8(6)	1-5(3)	6-10(8)	6-8(6)	2,1(2)	5-8(7)	1	5-8(5)	2-4(2)
2	*a*	1-4(4)	2-5(2,4)	2-6(4)	1,2(1)	1	1	1,2(1)	1	1	1	2,3(2)	8,9(8)
3	1	1-4(4)	2,3(2)	5-14(14)	3-5(3,4)	2-4(4)	2,3(3)	2,3(3)	2,3(3)	2-4(2)	3,4(3)	6-11(8)	1
4	*c*	1-5(4)	2-4(2)	3	*b*	7-15(11)	2-4(2)	2-4(3)	5-14(6)	3-6(3)	1-3(3)	2	*b*
5	2	1,2(2)	2-4(4)	1,2(1)	2-6(6)	4-6(5)	4-7(5)	3-5(3)	2-5(3)	2,3(3)	1-3(3)	4-8(8)	–
6	2	1,2(1)	2-5(3)	1,2(1)	2-5(4)	3,4(4)	2,3(2)	1	1,2(1)	1	8-20(13)	–	–
7	6-8(6)	2,3(2)	1	4-7(5)	2-4(4)	3,4(4)	4-7(4)	5-8(7)	7-10(7)	1-3(2)	2,3(2)	–	–
8	2,3(3)	3	1-5(2)	7-10(10)	*a*	1,2(2)	1	1	1	1	10-17(11)	–	–
9	3,4(3)	1,2(2)	4-8(6)	3-7(6)	1,2(2)	1	1	1	1,2(1)	1	3-5(5)	–	–
10	2,3(3)	1	1	1	1,2(2)	2,3(2)	2,3(3)	1,2(2)	1,2(2)	1,2(2)	1-3(2)	–	–
11	1,2(2)	1,2(2)	1-3(3)	1-6(6)	1	1,2(2)	1,2(2)	1	1,2(1)	2,3(2)	2	–	–
12	4-6(4)	1,2(1)	1	1	1	1,2(2)	1,2(1)	1	1,2(1)	2	2	–	–
13	5-7(6)	–	*b*	1-5(2)	1	*b*	3-6(5)	2-4(4)	2-5(3)	*b*	5-9(6)	–	–
14	1	1	*b*	–	*a*	1	1	1	1	1	1	1	–
15	3,4	–	–	–	–	–	–	–	–	–	–	–	–

a: not found; *b:* see in text; *c:* dendritic.

TABLE II

Range of number of branches for setae of pupa of *Psorophora pseudomelanota*. Mode in parenthesis

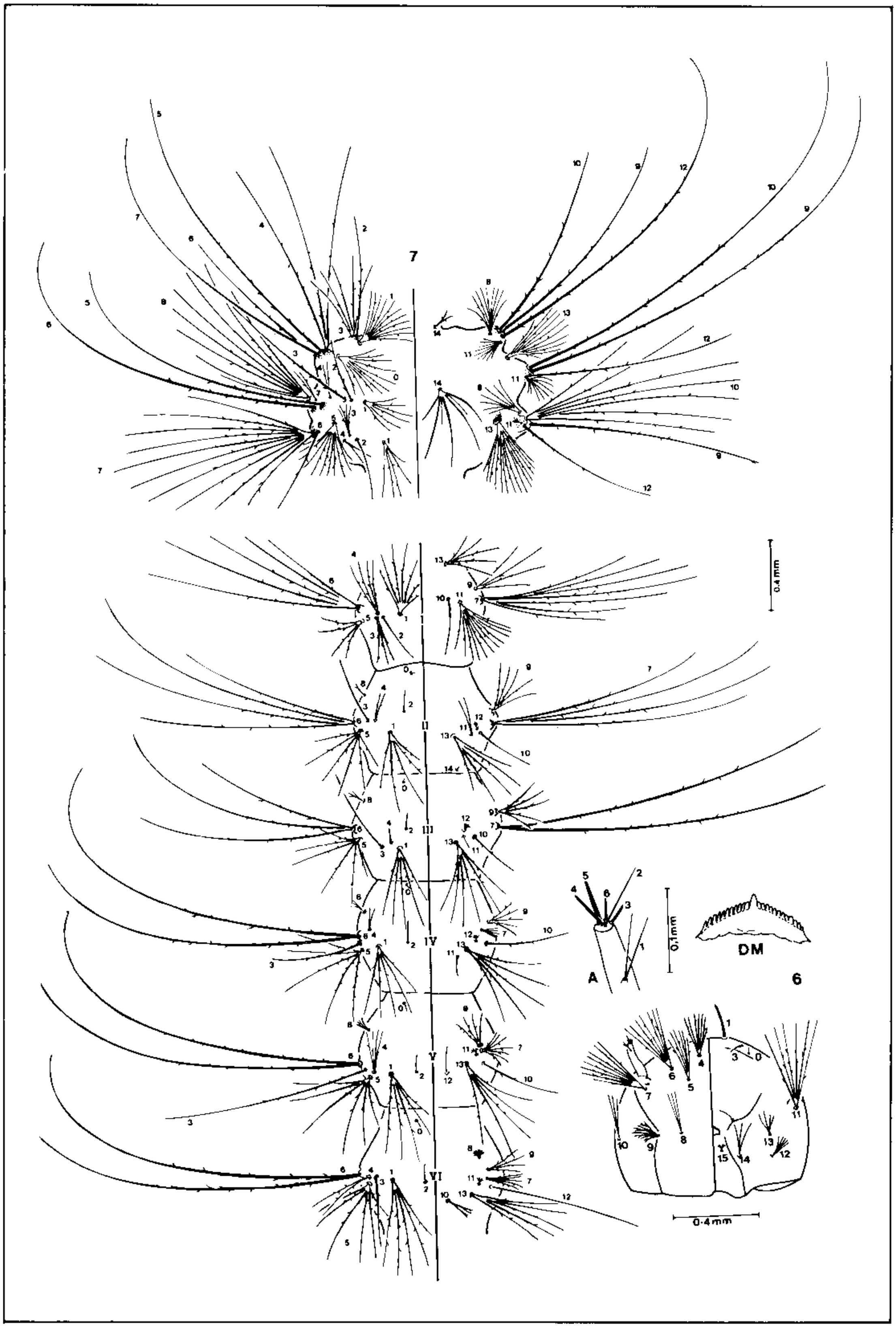
Setae No.	Cephalothorax	Abdominal Segments							
		I	II	III	IV	V	VI	VII	VIII
0	–	–	1	1	1	1	1	1	1
1	2	*b*	4-6(6)	4-9(6)	2	2	1-3(2)	2,3(2)	–
2	1,2(2)	1,2(1)	1	1	1	1	1	1	–
3	2-4(2)	1-4(2)	2,3	1-3(2)	4-7(7)	1-3(3)	2,3(2)	1-3(2)	–
4	2-4(2)	6-10(8)	2-4(2)	3-5	2-4(4)	5-8(6)	2-4(2)	1,2(2)	1-3(2)
5	2	4-10(5)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

a: not found; *b:* see in text.

Segment III: setae 1, 3, 5 aciculate; seta 4 forked. Segment IV: setae 1, 5 aciculate; setae 3, 4 forked; ventro-caudal margin with tooth-like processes. Segments V, VI: seta 5 aciculate. Segment VII: setae 5, 6 aciculate; seta 8 dendritic. Segment VIII: seta 9 aciculate. *Paddle* – Pale; about twice as long as segment VIII, with serrations on the margin; ovate, rounded at apex; buttress and middrib conspicuous; paddle index nearly 1.5; seta 1-P with 1-3(2) slender branches.

Phoniomyia deanei

LARVA: (Figs 6-8) – General outline and chaetotaxy as figured. Table III lists the range and modal number of branches for setae. *Head* – Hypostomal suture incomplete. Dorsomentum with 10 or 11 teeth on each side of a medial developed tooth. Setae 4-7, 11 aciculate; seta 9 fanlike with 6-10 slender branches. *Antenna* – Small, nude, almost one fourth of the length of the head. Seta 1 with 2-4(2) branches, rarely



Phoniomyia deanei – Figs 6, 7: larva. A: antenna; Dm: dorsomentum.

TABLE III

Range of number of branches for setae of the fourth-instar larva of *Phoniomyia deanei*. Mode in parenthesis

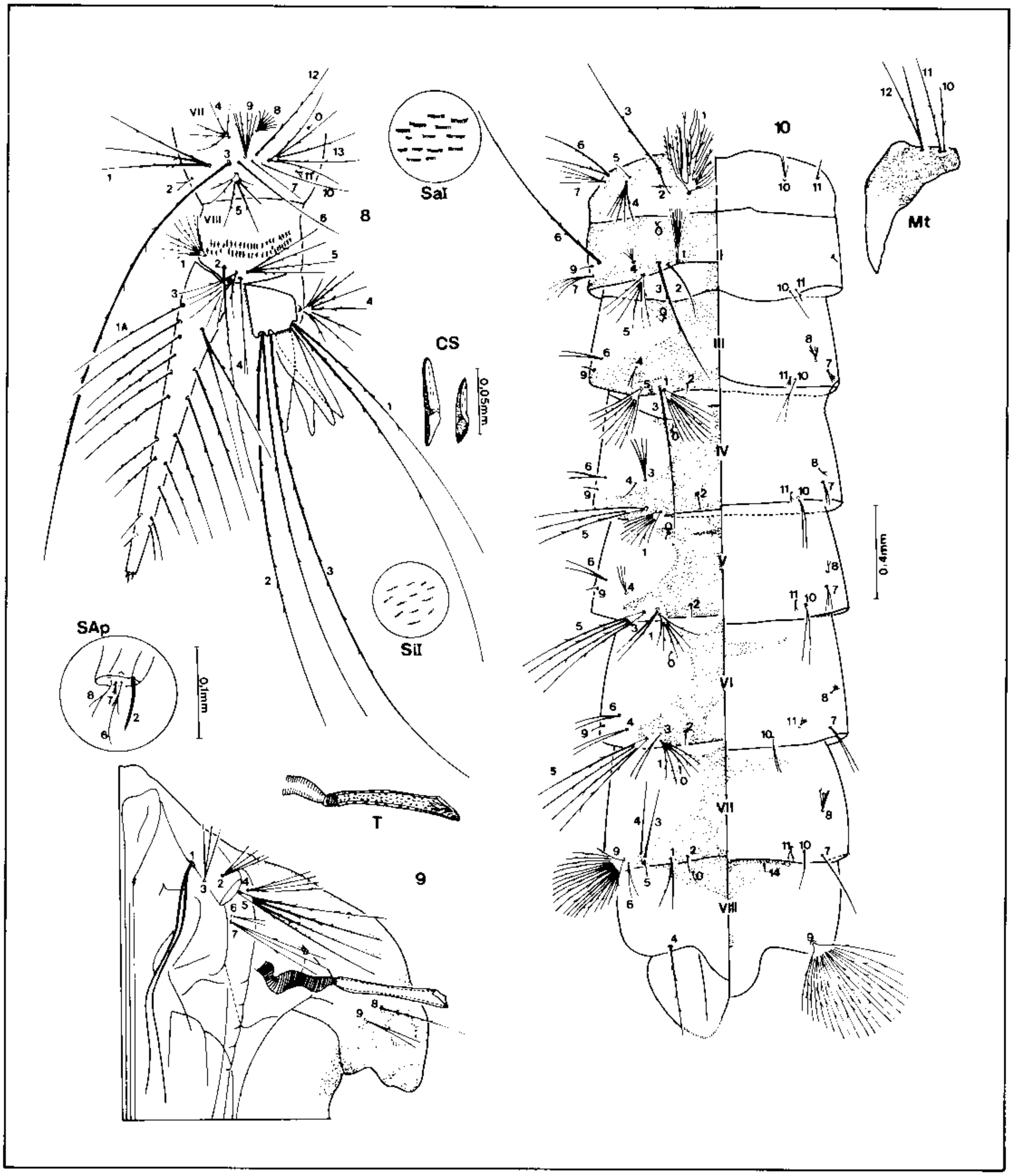
Setae No.	Head	Thorax			Abdominal Segments								
		P	M	T	I	II	III	IV	V	VI	VII	VIII	X
0	1	9-12(10)	–	–	–	1	1	1	1	1	1	–	–
1	1	6-11(11)	5-10(6,7)	4,5(5)	5-8(5,7)	5,6(5)	5-7(5)	4-6(5)	5,6(5)	3-6(5)	2,3(3)	8-14(8)	2,3(2)
2	1	1	1	1	1	1	1	1	1	1	2,3(2)	1	1,2(2)
3	1	4-6(5)	1	3-5(3,4)	2,3(3)	1	1	1	1	1	1	5-8(7)	1
4	5-11(7)	2-5(3)	2,3(2)	2,3(3)	2-4(4)	2,3(2)	1,2(2)	1,2(2)	3,4(4)	2	4-7(5)	2,3	6-8(7)
5	3-8(6)	1	1	11,12(11)	3-6(3,4)	5,6(6)	6,7(6)	5-8(6)	5-8(6)	5-7(6)	5-7(5,6)	4,5	–
6	4-7(7)	1	1	1	5-7(5)	3-5(3)	2,3(3)	2	2	2,3(2)	1	–	–
7	5-10(8)	1	1,2(2)	8-13(11)	5-8(8)	3-5(4)	2	4-9(5)	6-9(7)	2-6(5)	1	–	–
8	3,4(3)	8-12(9,10)	7-10(8)	7-10(7)	–	2-4(2)	3,4	3,4(4)	3,4(4)	10-14	9-11(11)	–	–
9	*a*	1	1	1,2(1)	4,5(4)	4-7(5)	3-7(5)	4-6(4)	3-6(4)	3-5(4)	5-8(5)	–	–
10	3,4 (3)	1	1	6-9(7)	1	1	1	1	1	3-5(4)	1	–	–
11	5-8(6)	6-11(9)	6-10(8)	3,4(4)	9-12(11)	1-3(2)	1	1,2(1)	4-6(6)	10-12(12)	5-7	–	–
12	3-7(4)	1	1	1	–	4,5	4-8	5,6(6)	1	1	1	–	–
13	3,4(4)	–	8-11(10)	11-17(16)	4-7(5)	5-7(5)	4-6(6)	4-6(5)	4,5(5)	4-6(5)	4,5(5)	–	–
14	2-4(2)	2-4(2)	6,7(6)	–	–	–	–	–	–	–	–	–	–
15	4-6(5,6)	–	–	–	–	–	–	–	–	–	–	–	–

a: dendritic.

aciculate on their basal third, setae 2-6 single. *Thorax* – Integument nude. Prothorax: setae 0-10, 12, 14 aciculate. Mesothorax: setae 1-10, 12 aciculate. Metathorax: setae 1, 5-7, 9, 10, 12, 13 aciculate; seta 3 slightly aciculate. Setae 5-7-P and 9-12-P, M, T inserted on common pigmented support plate. *Abdomen* – Integument as in *Ps. pseudomelanota*. Segment I: setae 1, 3-7, 9, 11, 13 aciculate. Segment II: setae 1, 4-7, 9, 13 aciculate; seta 12 dendritic. Segment III: setae 1, 5-7, 9, 13 aciculate, setae 4, 8 forked; seta 12 pectinate; setae 3, 10 slightly barbed. Segment IV: setae 1, 3, 5, 6, 9, 10, 13 aciculate; seta 12 pectinate. Segment V: setae 1, 3, 5, 6, 9, 13 aciculate; setae 4, 7, 10 slightly aciculate; seta 11 dendritic. Segment VI: setae 1, 3-7, 9, 12, 13 aciculate; seta 8 brush-like; seta 11 dendritic. Segment VII: setae 1, 3-5, 12, 13 aciculate; seta 9 slightly aciculate; seta 11 dendritic. Segment VIII. Setae 1-3, 5 aciculate; seta 4 forked. Comb with 51-79 scales disposed in 3 or 4 roughly parallel rows. Setae 6, 7-I-III inserted on common pigmented support plate and 6-IV-VI on individual pigmented supported plate. *Siphon* – Length nearly seven times as long as the basal width; siphon index generally 13 (11-14); pigmentation yellowish, slightly darkish at the base; acus absent; pecten absent. Seta 1-S, aciculate, comprehending of 10(9-12) dorsal and of 7(6-9) ventral pairs of single setae; seta 1a-S with 2-4(2) aciculate branches, inserted at the beginning of the second ventral sixth; seta 2 spiniform, single; setae 7-S with 2, 3 branches; 8-S with 2-4 and 9-S with 2, 3. Segment X. Saddle incomplete, without acus, spiculose on the dorso-caudolateral margin; seta 1-4 aciculate. Anal papilae lengthened, almost twice as long as saddle.

PUPA: (Figs 9, 10) – Chaetotaxy and general aspect as figured and in Table IV. Cephalothorax and abdomen with a pattern of pale and darkish areas as figured. *Trumpet* – Paler than the pigmented areas of cephalothorax trumpet index 10-14. *Cephalothorax* – Setae 5, 8 aciculate; seta 4, 10-12 slightly barbed. *Abdomen* – Segment I: seta 1 fanlike with aciculate dendritic branches; seta 6 aciculate; setae 3, 4 slightly aciculate; setae 5, 11 sometimes forked. Segment II: seta 1 pectinate with generally 12 aciculate branches; setae 3, 6 slightly barbed; seta 11 forked. Segment III: setae 1, 3 aciculate; seta 5 slightly aciculate; seta 8 dendritic; setae 11 forked. Segment IV: setae 1, 5 slightly aciculate; setae 8, 11 forked. Segment V: seta 1, 5 aciculate; setae 3, 10 slightly barbed; seta 8 forked (sometimes dendritic); seta 11 forked. Segment VI: seta 1 slightly aciculate; seta 5 aciculate; setae 8, 11 dendritic (sometimes forked). Segment VII: seta 1 slightly barbed; seta 8 dendritic; seta 9 aciculate; seta 11 forked (sometimes dendritic). Segment VIII: seta 4, 9 aciculate. *Paddle* – Pale, the same collor of segment VIII; oval, spiny at the slightly pointed apex; twice or more the length of the female genital lobe; paddle index 1.1-1.5; middrib weakly pigmented. Genital lobe more pigmented than paddle, mainly on male specimens.

Material examined: Ps. pseudomelanota – 4 pupal and 7 larval skins; Granjas Calábria, Jacarepaguá, Rio de Janeiro, Rio de Janeiro state,



Phoniomyia deanei – Fig. 8: larva. CS: comb scales; SAp: spiracular apparatus; SaI: saddle integument; SiI: siphon integument. Figs 9, 10: pupa. Mt: metathorax; T: trumpet.

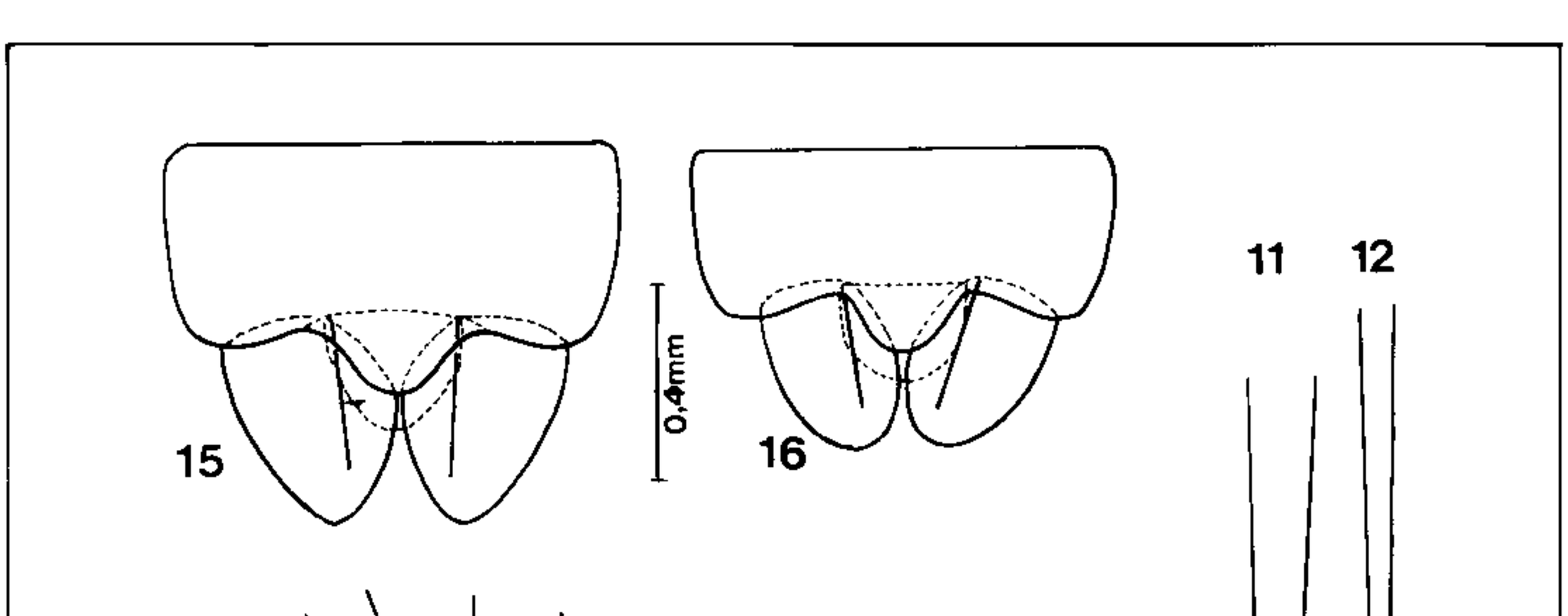
Brazil; January, 1982; 8 larvae, other data same as above; deposited at the Entomological Collection of Instituto Oswaldo Cruz (IOC), Rio de Janeiro, Brazil. *Ps. ferox* – 2 pupal and 2 larval skins; Angra dos Reis, Rio de Janeiro state, Brazil; January, 1938; deposited at IOC. *Ph. deanei* – 14 pupal and 14 larval skins, including the holotype and the allotype specimens; Granjas Calábria, Jacarepaguá, Rio de Janeiro; December, 1982; 4 larval skins, other data same as above, except January 1982; 7 larvae, same data as above, except September, 1982; deposited at IOC. *Ph. bonnei* – the pupal and larval skins of the holotype and of the allotype; Rio de Janeiro, Rio de Janeiro state, Brazil, 1940; deposited at IOC; 3 pupal and 2 larval skins; Iguape, São Paulo state, Brazil, 1955; deposited at the Entomological Collection of

TABLE IV

Range of number of branches for setae of pupa of *Phoniomyia deanei*. 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	2	*d*	*b*	9-15(12)	6-10(8)	4-9(6)	3-7(4,5)	1,4(2)	–
2	3-5(4)	1	1	1	1	1	1	1	–
3	2-4(3)	1	1	1	2-5(4)	1,2(2)	1,2(2)	1,2(1)	–
4	3-5(3,4)	4-8(5)	4,5(4)	1,2(2)	1,2(1)	2-5(3)	2	1	1,2(1)
5	3-5(4)	1-3(1)	6-9(6)	6-10(8)	3-5(3)	3-5(4)	3,5(5)	1,2(1)	–
6	2,3(2)	1-4(2)	1	2,3(2)	2,3(2)	2,3(2)	2,3(2)	1-4(2)	–
7	2-4(3)	3-6(4)	3-5(4)	4,5	2-4(2)	2-4(3)	2	1,2(1)	–
8	1,2(1)	–	–	4,6(6)	2-4(2,3)	2-6	*c*	5-7	–
9	2-3(2)	–	1	1	1	1	1	15-24	15-21(20)
10	1,2(2)	2-4	1	2,3(2)	2,3(2)	1,2(1)	1-3(2)	1	–
11	1	1,2(1)	1-3(2)	1-4(3)	2,3(2)	1,2	1,2	2	–
12	1-4(2)	–	–	–	–	–	–	–	–
14	–	*a*	*a*	*a*	*a*	*a*	*a*	*a*	1

a: not found; *b:* see in text; *c:* dendritic; *d:* fan-like.



Phoniomyia deanei – pupa. Fig. 11: seta 6-I. Fig. 13: seta 1-III. Fig. 15: paddle. *Ph. bonnei* – pupa. Fig. 12: seta 6-I. Fig. 14: seta 1-III. Fig. 16: paddle.

Superintendência de Controle de Endemias (SUCEN), São Paulo state, Brazil; 1 larval and 2 pupal skins; Santa Catarina state, Brazil, 1955; deposited at SUCEN.

Taxonomic discussion: the paucity of information available on the immature stages of *Psorophora (Janthinosoma)* mosquitoes is surprising considering their wide geographic distribution and abundance in the neotropical region. There is no up-to-date key available for their identification.

Psorophora ferox (Von Humboldt, 1819) is the sympatric mosquito species which has more ressemblances to *Ps. pseudomelanota*. Because of this we decided to compare their immature stages. The differences found are the followings. The larva of *Ps. pseudomelanota* has seta 9-I single or double and seta 7-II 3, 4-branched while *Ps. ferox* has 9-I 3-branched and 7-II 5, 6-branched. The pupa of *Ps. pseudomelanota* has seta 10-CT with 3-5(3) branches and *Ps. ferox* has this seta with 8-13 branches. Setae 8, 9-CT have, respectively, 2-4(2) and 1-2(2) bare branches in *Ps. pseudomelanota* and 4, 5 and 3 aciculate branches in *Ps. ferox*. Seta 5-II is 4-6(5) branched in *Ps. pseudomelanota* and 7, 8 in *Ps. ferox*. Seta 9-VIII is 4, 5(4) branched in *Ps. pseudomelanota* and 7-12 in *Ps. ferox*.

Phoniomyia deanei is very closely related to *Ph. bonnei* Lane & Cerqueira, 1942, another mosquito originally described from Rio de Janeiro, the adults being distinguished by the feature of the male genitalia (Lourenço-de-Oliveira, 1983). Regarding the immature stages of both species the only distinguishing characters are considered as follows. The pupa of *Ph. deanei* has seta 6-I double, the branches separating since its base (Fig. 11) while in *Ph. bonnei* this seta is forked, the branches separating far from its base (Fig. 12). Seta 10-I is never single in *Ph. deanei* (2 to 4 branches) but it is single to 3-branched in *Ph. bonnei*. Seta 1-III is strongly aciculate in *Ph. deanei* and slightly barbed in *Ph. bonnei* (Figs 13, 14). Seta 3-IV is slightly aciculate in *Ph. deanei* and bare in *Ph. bonnei*. Seta 6-V is never single in *Ph. deanei* (2, 3-branched) and single or double in *Ph. bonnei*. The paddle is more than twice as long as the female genital lobe in *Ph. deanei* (allotype, ratio = 2.25) while it is less than twice in *Ph. bonnei* (allotype, ratio = 1.83) (Figs 15, 16). The larva of *Ph. deanei* has seta 2-M aciculate and seta 3-T with 2 bare branches while *Ph. bonnei* has 2-M bare and 3-T with 3-5 slightly aciculate branches.

In *Ph. deanei* adult male and female the hind tarsi IV and V are not completely white-scaled on one side as it was stated in the original description. These tarsi are less than 8% dark-scaled apically.

With the available keys for larva and pupa of *Phoniomyia* (Corrêa & Ramalho, 1956) and taking into consideration the data presented here the immature stages of both *Ph. deanei* and *Ph. bonnei* can be easely identified.

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REFERENCES

CORRÊA, R. R. & RAMALHO, G. R., 1956. Revisão de *Phoniomyia* Theobald, 1903 (Diptera:Culicidae: Sabethini). *Folia Clínica et Biol., 25:* 1-176.

HARBACH, R. E. & KNIGHT, K. L., 1980. *Taxonomist's glossary of mosquito anatomy*. Plexus Publ., Inc. Marlton, New Jersey, 415 p.

LOURENÇO-DE-OLIVEIRA, R., 1983. Sobre uma nova espécie de *Phoniomyia* (Diptera: Culicidae) do Rio de Janeiro, Brasil. *Mem. Inst. Oswaldo Cruz, 78:* 501-505.

LOURENÇO-DE-OLIVEIRA, R., 1984. Alguns aspectos da ecologia dos mosquitos (Diptera: Culicidae) de uma área de planície (Granjas Calábria), em Jacarepaguá, Rio de Janeiro. I. Freqüência comparativa das espécies em diferentes ambientes e métodos de coleta. *Mem. Inst. Oswaldo Cruz, 79:* 479-490.

LOURENÇO-DE-OLIVEIRA, R.; HEYDEN, R. & SILVA, T. F., 1986. Alguns aspectos da ecologia dos mosquitos (Diptera: Culicidae) de uma área de planície (Granjas Calábria), em Jacarepaguá, Rio de Janeiro. V. Criadouros. *Mem. Inst. Oswaldo Cruz, 81:* 265-271.