Research on the Mosquitoes of Angola (Diptera: Culicidae)

XII - Description of *Culex (Culex) pajoti* sp. nov.

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ABSTRACT. The adults of both sexes, pupa and fourth instar larva of *Culex (Culex) pajoti,* a new species, are described and illustrated. The diagnoses of the female, male, larva and pupa of the new taxon are given, as well as its known distribution. Lastly, the systematics of *Cx. pajoti* sp. n. are discussed, its affinity to *Cx. ingrami* Edwards and related species being examined.

INTRODUCTION

The present paper is based on the examination of Angolan *ingrami*-like material already dealt with in a previous paper by the present writers (Ribeiro & Ramos 1980:82-84). Although being closely allied to *Culex ingrami* Edwards (Edwards 1916; Macfie & Ingram 1916, 1923; Hopkins 1931; Galliard 1932; Peters 1956; Service 1959) it is thought that it belongs in fact to a distinct, undescribed species, mainly on account of the presence of a small tergal plate on larval abdominal segment VIII and of some terminalic characters (ibidem:83).

Worth & Paterson (1961) recorded the only occurrence of *Cx. ingrami* in Angola, from Caxito, based on four adults considered by Ribeiro & Ramos (1980) to have been females. Whether this record in fact refers to *Cx. ingrami* or to the present species is not known.

The terminology adopted for larval and pupal setae in the description that follows is based on the system developed by Belkin (1962).

Culex (Culex) pajoti sp. nov.

(Figs. 1 and 2)

TYPE-DATA. Type-series consisting of 2 ♀ 2 ♂, 4 associated pupal exuviae and 10 fourth instar larvae, all from the same breeding place, collected in

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Mumbondo, at about 10°10' S, 14°09' E and 1,150 meters altitude, the 8 May 1970. *Holotype* male nr. E 21535, with genitalia mounted on slide; *allotype* female nr. E 21536; one female *paratype* nr. E 21537 and one male *paratype* nr. E 21538; 4 pupal exuviae *paratypes*, nrs. E 17798 to E 17801 mounted on slide; 10 larvae *paratypes* nrs. E 17812 to E 17820 and nr. E 17823 also mounted on slide. All type-material is deposited in the Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa, Lisboa.

The new taxon is named in honor of Dr. F. -X. Pajot, medical entomologist of the Office de la Recherche Scientifique et Technique Outre-Mer (O.R.S.T.O.M.), now at Cayenne (French Guiana), who has much contributed to the study of *ingrami*-like culicine forms with a tergal plate on eighth larval abdominal segment.

FEMALE. Head with erect scales all dark, decumbent scales all narrow and whitish. Antennae sub-plumose, dark, including the torus; first flagellar segment lengthened, about 1.5-2 times as long as second segment; second, third, fourth and fifth segments with about the same length; last flagellar segment very long, two times or more the length of the penultimate one. Proboscis with creamy scales on median two-thirds; palpi dark, very short, about one-sixth as long as proboscis. Thorax with mesonotal scales all pale; integument with two darker paramedian stripes, paler on shoulders and pre-scutellar area. Pleurae with two longitudinal darker stripes: one upper one, along the upper part of the posterior pronotal lobe, post-spiracular and pre-alar areas and upper part of the mesepimeron, and a lower longitudinal dark stripe along the lower part of the mesepimeron and sternopleuron; pleural scales few, all pale and narrow; two sternopleural patches widely separated and a small but distinct patch of pale scales in middle of the mesepimeron; propleura also with a few scales; post-spiracular and pre-alar scales absent; lower mesepimeral bristle single. Abdomen dark above with white basal lateral patches on tergites 4-7, the first ones quite small and then increasing distally. Sternites with dark apical bands. Legs mainly dark in front; hind femur, however, mostly pale in front and behind but dark at apex and dorsally on distal 1/3-2/3; front and middle legs largely pale behind along whole length; middle femur with a darker dorsal stripe along the whole length; hind tibiae all dark. Wings with fork cells of moderate length, the upper one about 2-2.5 times as long as its stem; cross-viens separated by about the length of the posterior one. Halteres all pale.

Females of the new taxon can be separated from those of *Cx. ingrami* by having the median 2/3 of the proboscis clothed with creamy scales beneath.

MALE. General external morphology similar to that of the adult female, apparently without any obvious distinctive feature. Palpi wholly dark, exceeding proboscis by slightly more than the last segment, hairy as usual.

MALE TERMINALIA. As illustrated in Fig. 1 C, D, E. Sidepiece: coxite of the usual form, conical, tergal and lateral surfaces with bristles; apical lobe undivided, bearing three rod-like setae (*a*, b and c) on its basal half:

c slightly longer than b, both with recurved apices, and b stouter and longer than a, this one straight; without seta d; seta e with a few fine serrations on one edge, f a slightly expanded foliole, striated; h straight; a prominent leaf, longer than f and striated. Clasper moderately broad, narrowed at tip. Paraproct with a large dark crown of modified hairs at the tip and a well developed basal arm. Phallosome with the inner division poorly developed, but the outer division with a large process.

Males of *Cx. pajoti* sp. n. can be easily separated from those of *Cx. ingrami* by the absence of seta d on the apical lobe of coxite of the new taxon.

LARVA. General morphology and chaetotaxy of the fourth instar larva as depicted in Fig. 2 and recorded in Table 1.

Head (Fig. 2A) wider than long, cephalic index 0.75 ± 0.054 (range 0.68 - 0.83; n = 26). Antenna long, 0.78 ± 0.04 of the head length (range 0.68 - 0.84; n = 31), strongly spiculate and infuscated at base and beyond tuft. Mentum (Fig. 2B) with about 6 teeth each side the median tooth: 5.70 ± 0.66 (range 5 - 7; n = 56). Thorax and abdomen as in Fig. 2 C - I and Table 1. Comb of segment VIII (Fig. 2 D, F) with 41.62 ± 4.88 scales (CS) (range 34 - 50; n = 45). A small moderately sclerotized plate (Fig. 2 D, E) occupying the middle third of the dorsal aspect of the segment. Siphon index (mounted specimens) high, 10.40 ± 0.95 (range 8.70 - 11.60; n = 32). Pecten (Fig. 2 D, G-I) reaching to about 1/3 - 2/5 length of siphon tube, with 10.59 ± 1.10 (range 8 - 12; n = 63) pairs of barbed (1 - 2 denticles) spines (PT) of which, sometimes, the last 2 pairs are wider spaced, followed by 7.68 ± 2.93 (range 2 - 13; n = 34) usually unpaired and simple mid-ventral spines which are very widely spaced, and, lastly, a ventro-lateral group of 5.53 ± 7.13 (range 2 - 7; n = 32) simple appressed spines a little before apex of siphon. Total number of spines on siphon amount to 33.19 ± 2.92 (range 29 - 41; n = 31). With 7.25 ± 1.14 paired or unpaired minute subventral tufts (range 5 - 7; n = 32), at most as long as but usually smaller than siphon breadth at base, each with 1.91 ± 0.54 (range 1 - 3; n = 232) simple branches. Anal segment (Fig. 2 D) with complete saddle; lateral seta (1X) about 1/3 - 1/2 length of saddle, with 2.70 ± 0.56 branches (range 2 - 4; n = 43). Upper caudal seta (2X) trifid or with 4 branches of different and somewhat variable lengths, though one of them is always the longest and strongest one; lower caudal seta singe. Ventral brush composed of 11.57 ± 0.89 (range 9 - 13; n = 23) pairs of multiple tufts, all of them inserted in the barred area. Anal papillae narrow and lanceolate, about 1.5 - 2.5 times as long as saddle, dorsal pair slightly longer than ventral pair.

Larvae of *Cx. pajoti* sp. n. can be easily separated from those of *Cx. ingrami* by the presence of the chitinous plate on the abdominal segment VIII of the new taxon.

PUPA. Pupal morphology and chaetotaxy as illustrated in Fig. 1A and B. Chaetotaxy and measurements based only in four damaged pupal pelts, this being the reason why they are not studied from a statistical viewpoint. On the cephalothorax (Fig. 1A) setae 1, 2 and 3 CT could be observed only once and have

4, 3 and 5 branches, respectively. Setae 4 and 5 CT with 2 or 3 branches (n = 2); 6 CT with 3-5 branches (n = 3); 7 CT single or bifid (n = 2); 8 CT with 3-5 branches (n = 4); 9 CT single or bifid (n = 5). Trumpet index 7.45 ± 0.658 (range 6.43 - 8.36; n = 9); pinna ratio 0.13 ± 0.005 (range 0.12 - 0.14; n = 9); meatus ratio 0.87 ± 0.005 (range 0.86 - 0.88; n = 9). On the metathorax (Fig. 1B), setae 10 MT with 5-7 branches (n = 4); 11 MT bifid (n = 4) and 12 MT trifid (n = 1). Abdomen (Fig. 1B). Seta 1 I dendritic (n = 4); 2 and 6 I single (n = 1); 3, 5 and 9 I bifid (n = 1); 4 I 5-branched (n = 1); 1 II dendritic (n = 4); 2 and 9 II single (n = 2); 3 II bifid (n = 1); 4 II with 4 branches (n = 1); 5 II 5-branched (n = 1); setae 6, 7, 8, 10 and 11 II always missing; 1 III with 11-13 branches (n = 3); 2 III single (n = 3); 3 III trifid (n = 2); 4 III with 7-8 branches (n = 2); 5 III 6-branched (n = 2); 6 III 5-branched (n = 1); 7 III 6- or 7-branched (n = 2); 8 III 6-branched (n = 1); 9 III single (n = 1); 10 III single or bifid (n = 2); 11 III single (n = 2); setae 2, 9 and 11 IV single (n = 2); 1 IV 9-branched (n = 3); 3 IV 5-branched (n = 1); 4 IV trifid (n = 3); 5 IV 5-branched (n = 2); 6 IV with 4-6 branches (n = 3); 7 IV 4-branched (n = 2); 8 IV bifid (n = 1); setae 2 and 9 V single (n = 2); 1 V with 7-9 branches (n = 4); 3 V 4-branched (n = 1); 4 V with six branches (n = 1); 5 V single or with 2-4 branches (n = 4); 6 V 5- or 6-branched (n = 3); 8 V bifid (n = 3); 11 V single (n = 4); setae 2, 9 and 11 VI single (n = 3); 4 VI with 2 or 3 branches (n = 2); 5 VI single or bifid (n = 3); 6 VI 5- or 6-branched (n = 2); 8 VI 3- or 4-branched (n = 3); setae 2, 7 and 10 VII single (n = 1); 1 VII with 5 branches (n = 1); 4 VII bifid (n = 1); 5 VII single or bifid (n = 2); 6 VII 4- or 5-branched (n = 2); 9 VII with 4 branches (n = 2); 11 VII single, bifid or trifid (n = 3); 4 VIII bifid (n = 2); 9 VIII 6-branched (n = 1). Paddle (Fig. 1B) oval, midrib well developed, reaching to the hind margin; seta 1 P single, with a small, single accessory seta. Paddle index 1.61 ± 0.096, with an observed range 1.50 - 1.79 (n = 8).

The only differences found between pupae of *Cx. pajoti* sp. n. and those of *Cx. ingrami* are that abdominal seta 9 VIII of the new taxon has only six branches instead of eight or nine and a trumpet index of 6.4 - 8.4 instead of 6.3.

Paddle index (ratio of length of paddle to width), pinna ratio (ratio of length of pinna to total length of trumpet) and meatus ratio (ratio of length of meatus to total trumpet length), as well as the usual trumpet index, measured as in Belkin, op. cit.

DIAGNOSIS

So far as we know, *Culex pajoti* sp. n. is the only described and named species of genus *Culex* L. which larvae have a tergal abdominal plate.

The larval key to genera of Ethiopian mosquitoes by Hopkins (1952) has to be amended as follows, in order to include the new taxon:

1 - Siphon absent . . . . *Anopheles*

- Siphon present 2

2 - With chitinous plates on eighth abdominal segment 2a

- Without chitinous plates on eighth abdominal segment 6

2a - Chitinous plates on eighth abdominal segment lateral in position 3

- Chitinous plates on eighth abdominal segment dorsal, extending or not to lateral aspects of the segment 5

3 - Mouth brushes modified (predacity) into strong curved spines; comb absent . . . . *Toxorhynchites*

- Mouth brushes not so modified, slender; comb present, set on the edge of the plate 4

4 - Antenna very large, much flattened; a pair of strong curved spines at apex of siphon . . . . *Aedeomyia*

- Antenna not very large nor flattened; no such spines at apex of siphon . . . . *Uranotaenia*

5 - Plate on eighth abdominal segment large, embracing the segment; a similar smaller plate on seventh abdominal segment . . . . *Orthopodomyia*

- Plate on eighth abdominal segment small, confined to the dorsal aspect of the segment; without chitinous plate on seventh segment . . . . *Culex pajoti* sp. n.

A correction should also be made in the larval key to genus *Culex* L. by Hopkins (op. cit.). The amended key should read as follows:

6 - Siphon with a marked bend towards the dorsal side near apex . . . . *toroensis*

- Siphon straight 6a

6a - Siphon with a dorsal chitinous plate on eighth abdominal segment . . . . *pajoti* sp. n.

- No such plate present 7

7 - These spines in a ventral group only; siphonal index 8-14 . . . . *ingrami*

- Spines normally both dorsal and ventral; index about 6 8

For the same reason, also the larval key to Angolan mosquitoes by Ribeiro & Ramos (1980) has to be amended, as follows:

3 - Siphon with a bend towards the dorsal side near apex; 2 pairs of single or bifid subventral tufts. . . . . *toroensis*

- Siphon straight; 3 or 4 pairs of subventral tufts near always with 2 or more branches 3a

3a - A dorsal chitinous plate present on eighth abdominal segment. . . . . *pajoti* sp. n.

- Without plates on abdominal segments. 4

4 - Spines near apex in ventral group only; siphon index 8-14 . . . . *ingrami*

- These spines in a dorsal group only or both dorsal and ventral; index 6-8 . . . . *chorleyi*

Adults of *Cx. pajoti* sp. n. are very similar to those of *Cx. ingrami* Edwards, as regards general external morphology, though the pale scaling of proboscis in the new taxon is useful to distinguish between the two species.

Edwards (1941) key to adults of Ethiopian species of subgenus *Culex* has to be amended as follows, in order to include the species:

62 - Scutal scales mostly dark . . . . *guiarti*

- Scutal scales mostly or all pale 62a

62a - Proboscis dark beneath . . . . *ingrami*

- Proboscis paler beneath on median 2/3 . . . . *pajoti* sp. n.

Also to include the new Angolan *Culex* in the adult key by Ribeiro & Ramos (op. cit.), the following corrections are proposed:

50 - Venter pale, unbanded (a few dark scales may be present on distal margins of sternites) . . . . *weschei gediensis*

- Venter with dark apical bands 51

51 - Propleura with numerous scales; sternopleural scales more numerous, the two patches almost joined; proboscis all dark . . . . *guiarti sudanicus*

- Propleura with few scales: the two sternopleural scale-patches smaller and well separated; proboscis all dark or with some pale scales 52

52 - Proboscis all dark . . . . *ingrami*

- Proboscis paler beneath on median 2/3 . . . . *pajoti* sp. n.

The male terminalia of *Cx. pajoti* sp. n. (Fig. 1 C, D, E) can be separated from *Cx. ingrami* Edwards and allied forms, including those described but not named by Pajot (1964), by the absence in the new species of appendix d on the subapical lobe of coxite.

Pupae of *Cx. pajoti* sp. n. cannot be distinguished with certainty from those of *Cx. ingrami*.

DISTRIBUTION

In addition to the type-series, material of the new species from other breeding places at Mumbondo and from a few other localities was also examined: CABINDA, 2 larvae, 19 August 1970; CABUTA, 1 larva, 12 June 1970; CARLAONGO, 1 ♂ 1 larva, 5 November 1969; LUCALA RIVER, 6 larvae, 28 August 1969; MUMBONDO, 26 larvae, 7/8 May 1970; MUXIMA, 17 larvae, 30 April 1970.

The following are the approximate coordinates and altitudes of all the localities, including the type-locality, from which *Culex pajoti* sp. n. is known:

	S LAT.	E LONG.	ALT. (meters)
1. CABINDA	5° 33'	12° 11'	sea coast
2. CABUTA	9° 50'	14° 52'	750
3. CARLAONGO	10° 45'	14° 15'	200
4. LUCALA RIVER	9° 27'	14° 45'	850
5. MUMBONDO (T.-L.)	10° 10'	14° 09'	1,150
6. MUXIMA	9° 32'	13° 57'	20

SYSTEMATICS

The presence of tergal plates on pre-anal segments of the abdomen in mosquito larvae seems to be a primitive character, as it occurs on all the three anopheline genera, on *Orthopodomyia* Theobald and a few Australian species of *Tripteroides* Giles, and on *Uranotaenia* L.-A. (Edwards 1932; Lee 1944; Knight & Stone 1977; Knight 1978).

The only previous records of such tergal plates on *Culex* larvae are those by Rageau & Adam (1953) and Pajot (1964). These records concern two unnamed, quite distinct species from Cameroun, an area known to be a refuge for many species in West Africa. That a third species of *Culex* with larva bearing a tergal plate has been found in northwestern Angola is not altogether surprising, as clear faunal affinities exist between both areas.

Culex pajoti sp. n. is closely related to Pajot's material, both species being, in turn, obviously near to *Cx. ingrami* Edwards. On a purely speculative ground, it would seem that some branch of the *guiarti* group of Edwards (1941) had retained the primitive condition of a tergal plate on larval abdominal segment VIII, giving birth to closely allied though distinct species in the Cameroun and northwestern Angola.

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REFERENCES

Belkin, J. N. 1962. The mosquitoes of the South Pacific (Diptera: Culicidae). University of California Press, Berkeley, 2 vol., 608 pp. and 412 ph.

Edwards, F. W. 1915-16. Eight new mosquitoes in the British Museum Collection. Bull. Ent. Res. VI:357-364.

________. 1932. Diptera Fam. Culicidae, in P. Wytsman "Genera Insectorum," 194ème Fasc. Diptera, Bruxelles.

________. 1941. Mosquitoes of the Ethipian Region, III - Culicine Adults and Pupae. British Museum (Nat. Hist.), London.

Galliard, H. 1932. Culicides du Gabon. III. Anophelinés. Ann. Parasit. Hum. et Comp. 10(1):85-95.

Hopkins, G. H. E. 1931. Larvae of Ethiopian mosquitoes. Bull. Ent. Res. 22: 89-104.

________. 1952. Mosquitoes of the Ethiopian Region. I - Larval Bionomics of Mosquitoes and Taxonomy of Culicine Larvae. 2nd Ed. British Museum (Nat. Hist.), London.

Knight, L. K. 1978. Supplement to a Catalog of the Mosquitoes of the World (Diptera: Culicidae). The Thomas Say Foundation.

Knight, L. and A. Stone. 1977. A Catalog of the Mosquitoes of the World (Diptera, Culicidae). 2nd Edition. Thomas Say Found., Entomol. Soc. Amer. 6:1-611.

Macfie, J. W. S. and A. Ingram. 1916. New culicine larvae from the Gold Coast. Bull. Ent. Res. 7:1-19.

__________. 1922-23. The early stages of West African mosquitoes. VI. Bull. Ent. Res. 13:409-422.

Pajot, F. -X. 1964. Note sur deux formes larvaires nouvelles chez *Culex ingrami* Edwards, 1916, au Cameroun. Bull. Soc. Pat. Exot. 57(6):1307-1313.

Peters, W. 1956. The mosquitoes of Liberia (Diptera: Culicidae), a general survey. Bull. Ent. Res. 47:525-551.

Rageau, J. and J. P. Adam. 1953. Note complémentaire sur les culicinae du Cameroun. Ann. Parasit. Hum. et Comp. 28(5-6):412-424.

Ribeiro, H. and H. C. Ramos. 1980. Research on the mosquitoes of Angola (Diptera, Culicidae). X - The genus *Culex* L., 1958. Check-list with new records, keys to females and larvae, distribution, and taxonomic and bioecological notes. Estudos, Ensaios e Documentos, n° 134. Junta de Investigações Científicas do Ultramar, Lisboa.

Service, M. E. 1959. The morphology of some new culicine larvae from the southern Camerouns, with notes on *Culex (Culex) ingrami* Edwards and *Culex (Culex) toroensis* Edwards. Proc. R. Ent. Soc. Lond. (B) 28, Prs. 1-2:1-6.

Worth, C. B. and H. E. Paterson. 1961. Culicine mosquitoes in Southern Africa. Rev. Ent. Moc. 4(1):65-70.

LEGENDS

Table 1. Larval chaetotaxy of *Culex (Culex) pajoti* sp. nov.

Fig. 1. *Culex (Culex) pajoti* sp. nov. Pupa and male terminalia.

A. Pupa, cephalothorax

B. Pupa, abdomen

C. Male terminalia, coxite

D. Male terminalia, enlarged setae e and f

E. Male terminalia, phallosome (sternal aspect)

Fig. 2. *Culex (Culex) pajoti* sp. nov. Fourth instar larva.

A. Head

B. Mentum plate

C. Thorax and abdomen

D. Abdominal segments VIII, X and siphon

E. Tergal plate of segment VIII

F. Comb scales

G. Proximal pecten spines

H. Intermediary pecten spine

I. Siphon apex

Table 1. Chaetotaxy of the fourth instar larva of *Culex (Culex) pajoti* sp. n.

		Seta nr.	n	Observed range	Mean (X)	95% Confidence interval	Standard deviation (s)	Mayr's Coefficient of variability (CV)
Head		4	62	1 - 2	1.032	0.987 - 1.077	0.178	17.248
		5	58	1 - 2	1.966	1.918 - 2.014	0.184	9.359
		6	58	2	2	2 - 2	0	0
		7	32	6 -10	7.406	6.968 - 7.844	1.214	16.392
		8	31	5 - 8	6.226	5.916 - 6.536	0.844	13.556
		9	17	4 - 7	5.238	4.843 - 5.633	0.768	14.662
		10	46	2 - 3	2.457	2.307 - 2.607	0.504	20.513
		11	47	2 - 4	2.340	2.187 - 2.493	0.522	22.308
		12	44	4 - 7	5.409	5.136 - 5.682	0.897	16.583
		13	51	3 - 5	4.000	3.851 - 4.149	0.529	13.225
		14	47	2 - 3	2.191	2.044 - 2.388	0.499	22.775
		15	36	5 - 9	6.694	6.341 - 7.047	1.037	15.491
Thorax	Prothorax	1	19	1	1	1 - 1	0	0
		2	17	1	1	1 - 1	0	0
		3	29	1	1	1 - 1	0	0
		4	41	1 - 2	1.146	1.013 - 1.279	0.422	36.824
		5	32	1	1	1 - 1	0	0
		6	47	1	1	1 - 1	0	0
		7	47	2 - 4	3.021	2.924 - 3.118	0.329	10.890
		8	52	2 - 3	2.096	2.013 - 2.179	0.298	14.218
		9	45	1	1	1 - 1	0	0
		10	46	1	1	1 - 1	0	0
		11	35	4 - 7	5.286	5.002 - 5.570	0.825	15.607
		12	49	1	1	1 - 1	0	0
		14	57	1 - 2	1.825	1.723 - 1.927	0.384	21.041
	Mesothorax	1	39	1 - 2	1.821	1.657 - 1.985	0.506	27.787
		2	38	2 - 6	3.471	3.055 - 3.887	1.268	36.531
		3	48	1 - 2	1.021	1.168 - 1.252	0.144	11.901
		4	53	2	2	2 - 2	0	0
		5	51	1	1	1 - 1	0	0
		6	41	1	1	1 - 1	0	0
		7	52	1	1	1 - 1	0	0
		8	30	3 - 6	4.467	4.213 - 4.721	0.681	15.245
		9	30	2 - 5	4.333	4.068 - 4.598	0.711	16.409
		10	43	1	1	1 - 1	0	0
		11	21	2 - 4	3.143	2.812 - 3.474	0.727	23.131
		12	44	1	1	1 - 1	0	0
		13	56			dendritic		
		14	54			dendritic		
	Metathorax	1	44	1 - 2	1.682	1.219 - 2.145	1.522	90.448
		2	49	2 - 3	2.204	2.087 - 2.321	0.407	18.466
		3	40	4 - 7	4.825	4.575 - 5.075	0.781	16.187
		4	37	3 - 7	4.324	4.041 - 4.607	0.852	19.704
		5	59	1	1	1 - 1	0	0
		6	56	1	1	1 - 1	0	0
		7	29	5 - 8	6.103	5.792 - 6.414	0.817	13.387
		8	62			dendritic		
		9	32	5 - 7	5.906	5.657 - 6.155	0.689	11.666
		10	54	1	1	1 - 1	0	0
		11	31	1 - 4	2.387	2.092 - 2.682	0.803	33.641
		12	51	1 - 3	1.843	1.690 - 1.996	0.543	29.463
		13	53	6 -11	7.887	7.580 - 8.224	1.219	15.456

Table 1 cont. Abdomen

Segment I	1	36	2 - 5	3.333	3.011 - 3.655	0.956	28.683
	2	52	1	1	1 - 1	0	0
	3	46	1 - 3	2.413	2.252 - 2.574	0.541	22.420
	4	22	10 -16	13.273	12.343 -14.203	2.097	15.799
	5	31	3 - 8	5.290	4.886 - 5.694	1.101	20.813
	6	50	3	3	3 - 3	0	0
	7	54	-	1	1 - 1	0	0
	9	35	2 - 4	3.200	2.969 - 3.431	0.677	21.156
	10	42	1	1	1 - 1	0	0
	11	33	3 - 6	4.697	4.359 - 5.035	0.951	20.247
	12	43	2 - 4	2.860	2.675 - 3.045	0.601	21.014
	13	32	2 - 4	2.406	2.204 - 2.608	0.560	23.275
Segment II	1	25	1 - 2	1.480	1.269 - 1.691	0.510	34.459
	2	42	1	1	1 - 1	0	0
	3	25	2	2	2 - 2	0	0
	4	31	4 -11	5.516	4.973 - 6.059	1.480	26.831
	5	23	1 - 3	1.913	1.655 - 2.171	0.596	31.155
	6	51	3 - 4	3.020	2.980 - 3.060	0.140	4.636
	7	39	3 - 8	5.000	4.636 - 5.364	1.124	22.480
	8	43	1	1	1 - 1	0	0
	9	39	1	1	1 - 1	0	0
	10	40	1	1	1 - 1	0	0
	11	31	1 - 4	2.226	2.021 - 2.431	0.560	25.157
	12	30	2 - 3	2.033	1.965 - 2.101	0.183	9.001
	13	40		d e n d r i t i c			
Segment III	1	30	4 - 5	4.567	4.379 - 4.755	0.504	11.036
	2	30	1	1	1 - 1	0	0
	3	19	2	2	2 - 2	0	0
	4	25	2 - 4	2.560	2.320 - 2.800	0.583	22.773
	5	16	1 - 3	1.750	1.443 - 2.057	0.577	32.971
	6	29	2 - 3	2.241	2.076 - 2.406	0.435	19.411
	7	13	7 -11	8.538	7.814 - 9.262	1.198	14.031
	8	20	1 - 2	1.600	1.365 - 1.835	0.503	31.438
	9	17	1	1	1 - 1	0	0
	10	19	1 - 2	1.211	1.009 - 1.413	0.419	34.600
	11	20	1 - 4	2.150	1.800 - 2.500	0.745	34.791
	12	19	2 - 3	2.105	1.953 - 2.257	0.315	14.964
	13	19	2 - 5	3.526	3.121 - 3.931	0.841	23.851
Segment IV	1	25	4 - 6	4.880	4.632 - 5.128	0.600	12.295
	2	37	1	1	1 - 1	0	0
	3	22	2 - 3	2.182	2.007 - 2.357	0.395	18.103
	4	22	1 - 3	1.773	1.539 - 2.007	0.528	29.780
	5	15	1 - 3	1.867	1.405 - 2.329	0.834	44.671
	6	36	2 - 4	2.556	2.367 - 2.745	0.558	21.831
	7	18	8 -13	9.500	8.812 -10.188	1.383	14.588
	8	26	2 - 3	2.077	1.967 - 2.187	0.272	13.096
	9	23	1 - 2	1.043	0.953 - 1.133	0.209	20.038
	10	29	1	1	1 - 1	0	0
	11	24	2 - 4	2.583	2.307 - 2.859	0.654	25.319
	12	24	1 - 3	1.958	1.806 - 2.110	0.359	18.335
	13	26	3 - 6	4.500	4.172 - 4.828	0.812	18.044

Table 1 cont. Abdomen

Segment V	1	26	5 - 6	5.500	5.298 - 5.702	0.500	9.091
	2	34	1	1	1 - 1	0	0
	3	27	1	1	1 - 1	0	0
	4	30	4 - 7	5.833	5.554 - 6.112	0.747	12.806
	5	24	1 - 4	2.125	1.898 - 2.352	0.537	25.271
	6	31	2 - 4	2.645	2.443 - 2.847	0.551	20.832
	7	18	7 -10	7.833	7.373 - 8.293	0.924	11.796
	8	18	2	2	2 - 2	0	0
	9	26	1	1	1 - 1	0	0
	10	25	1	1	1 - 1	0	0
	11	25	2 - 4	2.600	2.362 - 2.838	0.577	22.192
	12	27	1	1	1 - 1	0	0
	13	22	4 - 7	5.227	4.894 - 5.560	0.752	14.387
Segment VI	1	13	5 - 9	6.462	5.827 - 7.097	1.050	16.249
	2	33	1	1	1 - 1	0	0
	3	26	1	1	1 - 1	0	0
	4	18	2 - 3	2.056	1.939 - 2.173	0.236	11.479
	5	19	3 - 7	3.947	3.382 - 4.512	1.177	29.820
	6	12	2 - 4	2.583	2.079 - 3.087	0.793	30.701
	7	12	1	1	1 - 1	0	0
	8	16	2 - 4	3.188	2.898 - 3.478	0.544	17.064
	9	21	1 - 2	1.095	0.958 - 1.232	0.301	27.489
	10	20	1	1	1 - 1	0	0
	11	20	2 - 4	2.700	2.393 - 3.007	0.657	24.333
	12	13	1	1	1 - 1	0	0
	13	30			dendritic		
Segment VII	1	29	7 -10	8.690	8.336 - 9.044	0.930	10.702
	2	36	1	1	1 - 1	0	0
	3	27	3 - 6	4.148	3.789 - 4.507	0.907	21.866
	4	30	1	1	1 - 1	0	0
	5	20	3 - 5	4.100	3.731 - 4.469	0.788	19.220
	6	33	13 -29	18.697	17.138 -20.256	4.391	23.485
	7	34	1	1	1 - 1	0	0
	8	29	4 - 8	5.621	5.209 - 6.033	1.083	19.267
	9	26	2 - 5	3.423	3.059 - 3.787	0.902	26.351
	10	34	1 - 2	1.029	0.969 - 1.089	0.171	16.618
	11	32	2 - 4	2.281	2.092 - 2.470	0.523	22.929
	12	34	1	1	1 - 1	0	0
	13	27	3 - 6	4.519	4.198 - 4.840	0.812	17.969
Seg.VIII	1	51	4 - 8	5.980	5.751 - 6.209	0.812	13.579
	2	54	1	1	1 - 1	0	0
	3	57	7 -12	9.754	9.717 - 9.791	0.138	1.415
	4	49	1	1	1 - 1	0	0
	5	37	3 - 5	4.135	3.912 - 4.358	0.673	16.276
Seg.X	1	43	2 - 4	2.698	2.526 - 2.870	0.558	20.682
	2	46	3 - 4	3.304	3.152 - 3.456	0.511	15.466
	3	49	1	1	1 - 1	0	0

Fig. 1

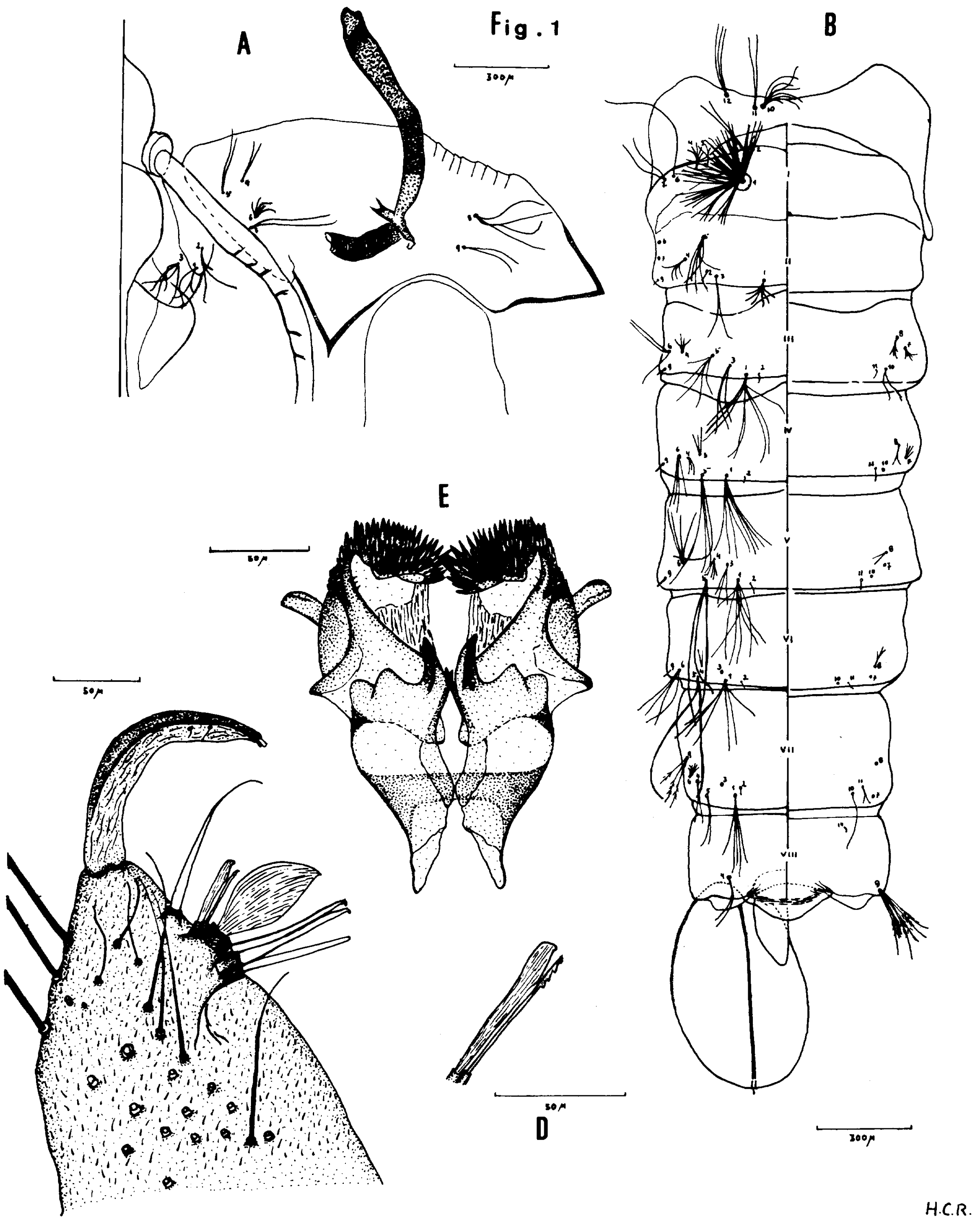

Fig. 2