PAN-PACIFIC ENTOMOLOGIST
July 1980, Vol. 56, No. 3, pp. 221–237

YAMA TAHITIENSIS N. GEN., N. SP. FROM TAHITI (DIPTERA: CHIRONOMIDAE)

JAMES E. SUBLETTE

Natural History Museum, Eastern New Mexico Univ.,
Portales, 88130

AND

JON MARTIN

Department of Genetics, Univ. of Melbourne,
Parkville, Victoria, Australia

The chironomids of Tahiti are known only from a brief report by Edwards (1933). In collecting on Tahiti the junior author reared several examples of a heretofore undescribed genus and species, closely related to *Chironomus,* from the buttress pools of the tahitian chestnut, *Inocarpus edulis.* In company with the undescribed chironomid were two mosquitoes, *Aedes polynesiensis* Marks and *Culex roseni* Belkin. There was also an unidentified ostracod present.

Mature larvae were isolated in shell vials to which a small amount of aquarium water was added. The capped vials were allowed to stand until the fourth instar larva transformed or died. Several, as indicated under paratypes, completed metamorphosis.

Several mature larvae were fixed in a 3:1 solution of ethyl alcohol-acetic acid and subsequently examined cytologically. Chromosome squash preparations were made following the procedure outlined by Wülker et al. (1971).

Material for scanning electron microscopy was chemically dehydrated through a series of ethyl alcohol and toluene mixtures. Specimens were positioned on examination stubs with double sticky tape and subsequently vacuum coated with gold-palladium.

Scanning electron microscopy was done with an ETEC Stereoscan microscope at 10 KV accelerating voltage.

Morphological terminology follows Hirvenoja (1973) and Hansen and Cook (1976), except that we have used dorsomedial for acrostical setae and dorsolateral for dorsocentral setae. The ocular ratio is the ratio of the width between the dorsal eye extensions divided by the greatest head width.

Cytological nomenclature follows Keyl and Keyl (1959).

We should like to thank Dr. Robert E. Waterman, Department of Anatomy, University of New Mexico School of Medicine, for making the scanning electron microscopy facilities available to us and for assisting with technical problems in machine operation. We are also indebted to Mary Sublette for assistance in preparation of illustrations and the manuscript. The senior author was supported by a faculty research grant from Eastern New Mexico University, and the junior author by a travel grant from the University of Melbourne.

Yama, new genus

Etymology.—Word formed as an arbitrary combination of letters.

Gender.—Feminine.

Type-species.—*Yama tahitiensis* n. sp. monotypic.

Imago.—*Head.*—Antenna of male with 12 flagellomeres, female with 5. Palpi long and slender, only slightly shorter than the male flagellum (palpus length, 0.097, flagellum length, 1.02 mm). Small frontal tubercles present. Dorsal extension of eye broad and parallel-sided. Clypeus almost square, not projecting. Temporal setae in a complete series from behind the eye to above the dorsal apex of the eye.

Thorax.—Antepronotum anteriorly with a broad, gaping notch. Mesoscutum with a median hump.

Wing.—Membrane with coarse microtrichia. R_{4+5} ends about over M. R_{2+3} closely parallels R_1 for most of its length then diverges slightly near the apex. Fork of the cubitus ends slightly distal to r-m. Anal lobe right-angled. Squama fully fringed.

Legs.—Fore tibia with a low rounded scale. Middle and hind tibial combs slightly overlapping, each pair with two spurs subequal in length. Pulvilli over half as long as the claws. Foreleg ratio greater than 1.0.

→

Fig. 1. a, Head in lateral view showing frontal tubercles (arrow) and temporal setae. SEM, 330×. b, Frontal tubercle showing apparent trichoid sensilla at the apex. SEM, 3000×. c, Antepronotum. Note the postpronotal scar immediately posterior to the antepronotum. SEM, 200×. d, Wing margin. The fluted marginal setae are in two series and the coarse microtrichia cover the wing surface. SEM, 2000×. e, Postpronotal scar. SEM, 800×. f, Postpronotal scar. SEM, 1200×.

Fig. 2. a, Foretibial apex. SEM, 500×. b, Mesotibial spurs, apical view. SEM, 625×. c, Pulvillus and claw, lateral view. SEM, 1640×. d, Base of pulvillus and ungitractor (arrow). Note overlapping plates at base of pulvillus. SEM, 3200×. e, Male genitalia, dorsal view. SEM, 150×. f, Male genitalia, ventral view. Note apical lobe of gonocoxite devoid of microtrichia. SEM, 150×.

Fig. 3. a, Superior appendage of male genitalia, dorsal view. SEM, 570×. b, Larval head capsule, dorsal view. SEM, 100×. c, Larval antenna. SEM, 1625×. d, Larval antenna. Note campaniform sensilla at tip of accessory blade (arrow). SEM, 2000×. e, Lauterborn organ. SEM, 4800×. f, Apex of labial plate. SEM, 860×.

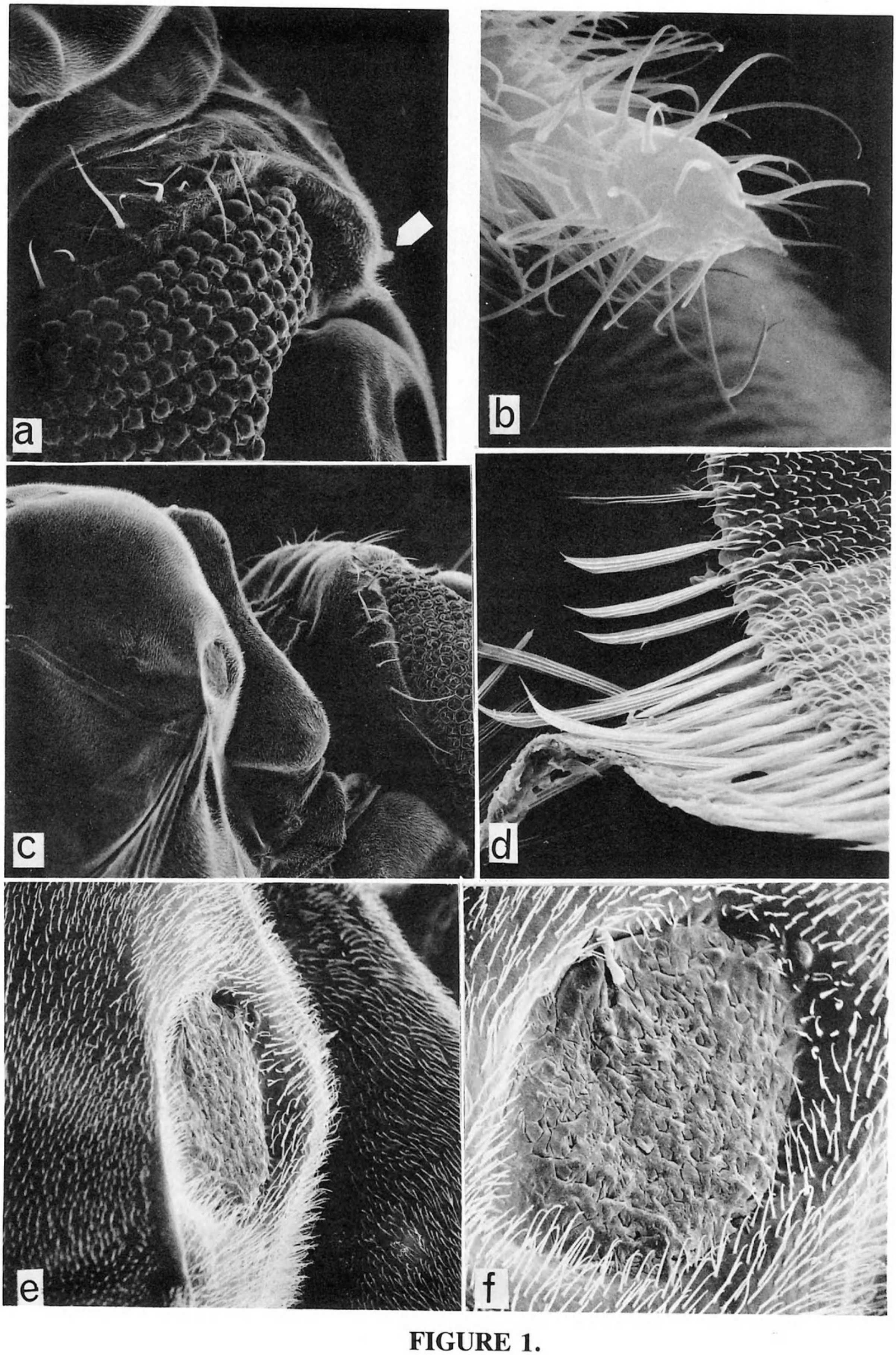


FIGURE 1.

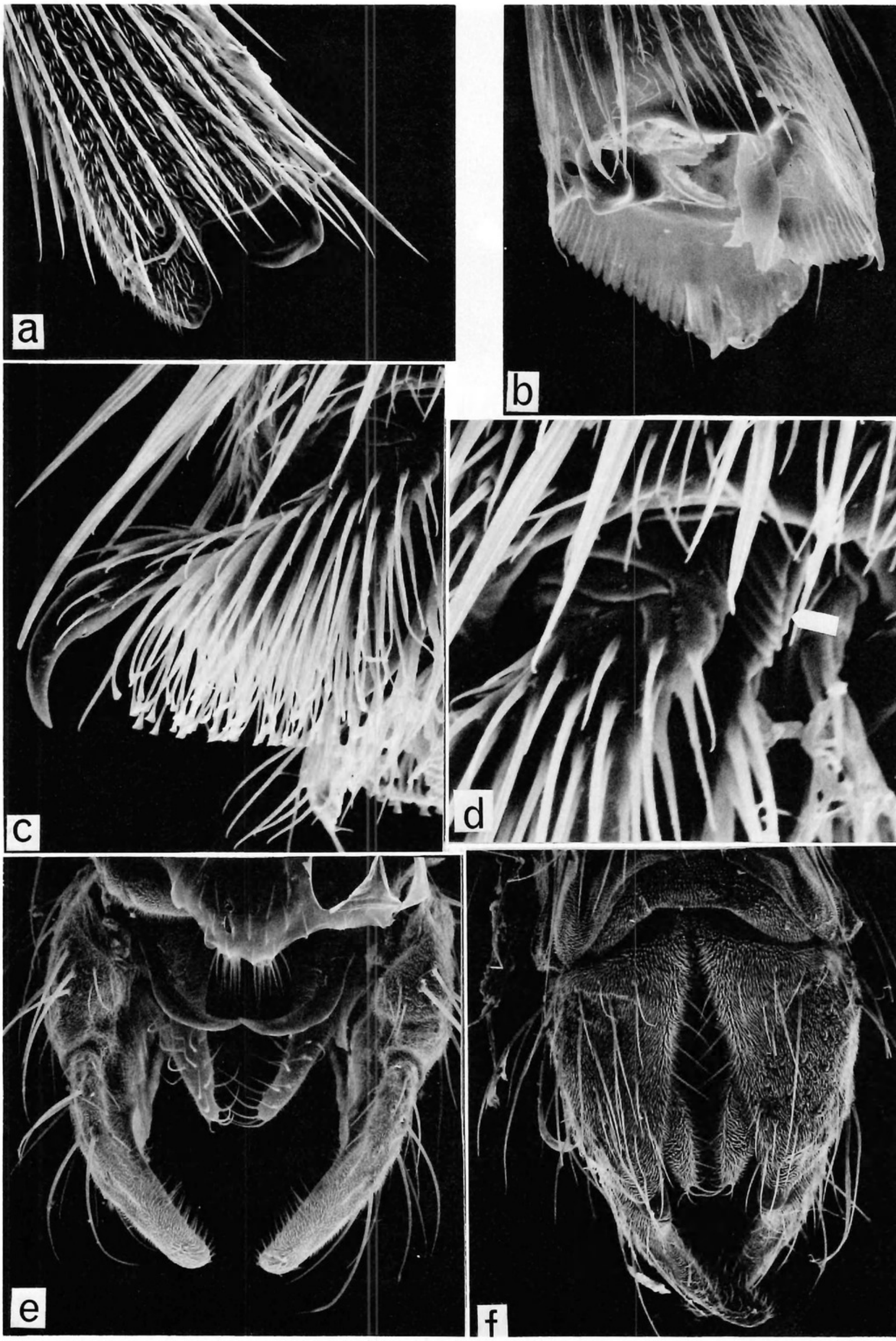


FIGURE 2.

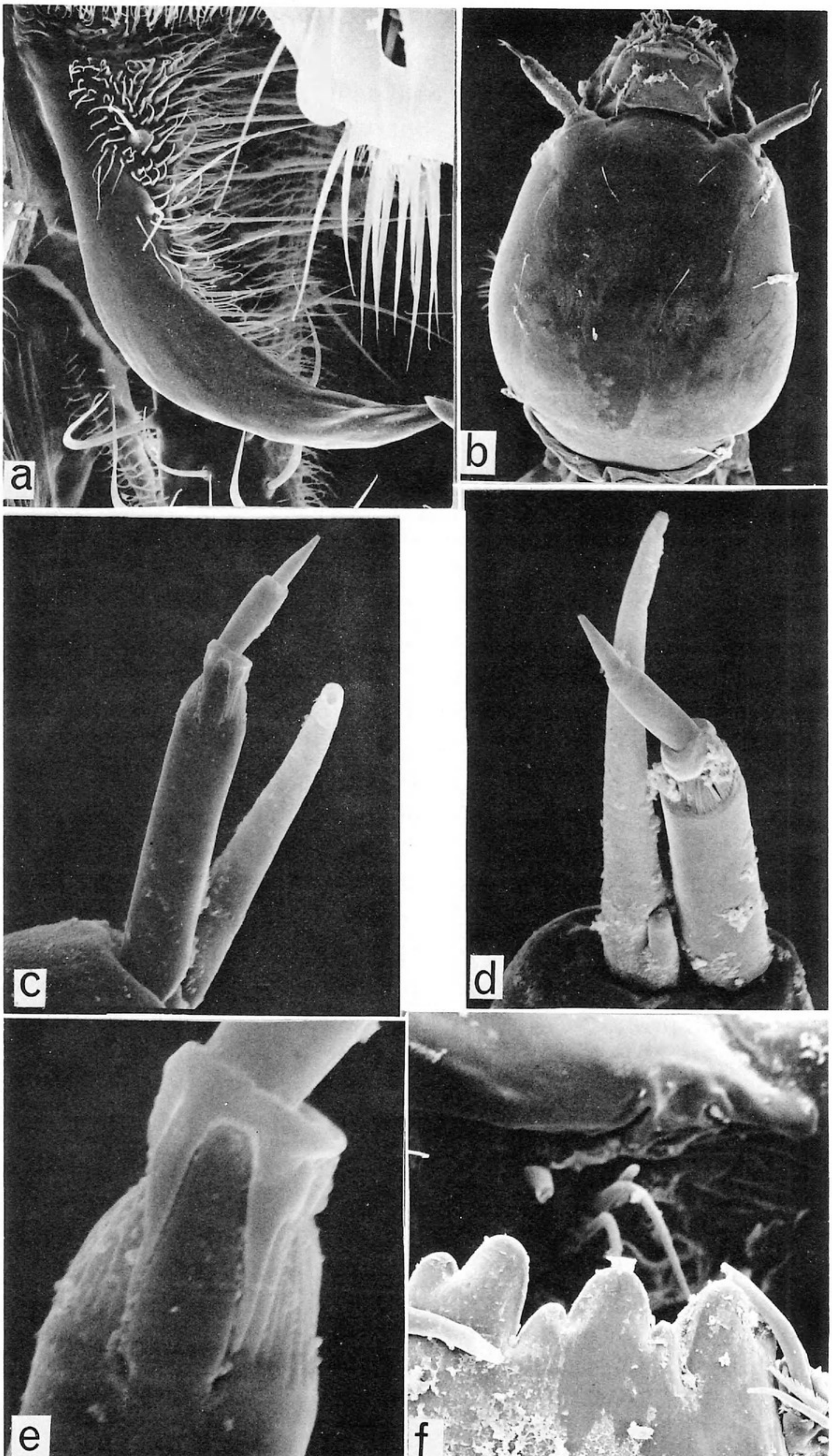


FIGURE 3.

Genitalia.—Anal point lacking; ninth tergum with two setose tubercles, one on each side of the midline. Superior appendage (SA) elongate and hooked, without a basal lobe, and with several setae beyond the base.

Larva.—Similar to *Chironomus* but without ventral tubuli. Other features, see description which follows.

Pupa.—Also similar to *Chironomus* but with the recurved hook row at the apex of tergum II interrupted at the midline.

Diagnosis.—Among the Chironomini relatively few genera lack an anal point. The presence of a low rounded fore tibial scale, the lack of ventral appendages on the male genitalia, and the slender, hooked superior appendage with several setae beyond the base, are distinctive for this genus.

Yama tahitiensis n. sp.

In the collection of the U.S. National Museum. Papeari, Tahiti Botanical Gardens, male reared from pupa collected in buttress root pools of *Inocarpus edulis,* 21-XI-1974, Jon Martin.

Holotype male.—Coloration. Ground color of head, thorax, and abdomen yellowish-green; mesoscutal vittae blackish brown, apex of scutellum and venter of preepisternum dark brown; legs marked with blackish brown as follows: narrow apex of all femora, broad base of fore tibia, narrow base of middle and hind tibiae, narrow apices of all tibiae, apex of all basal tarsomeres, tarsomeres 2–5 on all legs; 8th tergum and genitalia infuscate.

Head.—Antennal ratio 1.65. Palpal proportions 0.051:0.255:0.235:0.331 mm. Length of frontal tubercles 0.02 mm; apex with the tip attenuate, Figs. 1a, b. Dorsal extension of eye broad and parallel-sided, 6 facets wide near apex. Ocular ratio 0.17. Clypeus almost square, 0.80 the width of the antennal pedicel; with 16 setae. Temporal setae 18, in a single staggered row, reaching distal to the dorsal apex of the eye, Figs. 1a, c. Tentorium Fig. 7b.

Thorax.—Antepronotum Fig. 1c, anteriorly with a broad gaping notch; laterally with 2 setae. Postpronotal scar, Figs. 1e and 1f. The structure is interpreted as the scar of the point of attachment of the pupal respiratory organ. Dorsolateral setae 10, in a partially doubled row. In some of the paratypes the most anterior seta is far forward and separated from the remainder by a distinct gap. Dorsomedial setae 14, in a single row which is staggered posteriorly; near the posterior end of the row is a distinct hump in the mesoscutum; at least one of the setae on the hump is slightly inflated and bent (Fig. 7c). Prealar setae 6; supra-alar seta 1. Scutellum with a staggered posterior row of 12, mostly coarse setae; anteriorly with a staggered row of 7 finer setae.

Wing.—Membrane with coarse microtrichia visible at 100×, Fig. 1d. Wing margin with fluted setae (Fig. 1d). R with 34 setae along entire length, R_1 with 26 setae along entire length, R_{4+5} with 34 setae on the apical two-thirds.

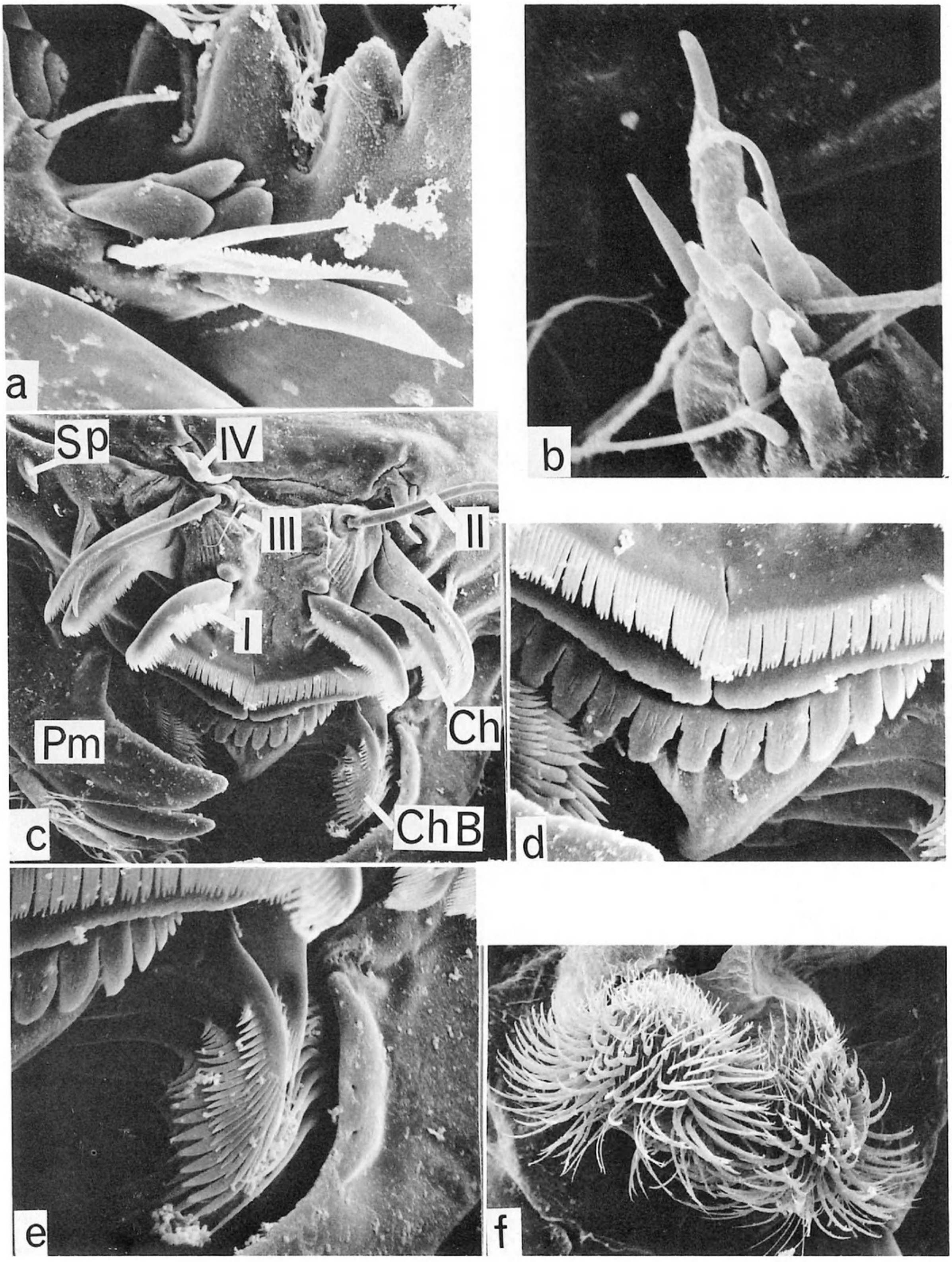


Fig. 4. a, Lacinia of maxilla. Note smooth margin of paralabial plate below. SEM, 1550×. b, Maxillary palpus. At least 10 sensilla are visible on the palpus apex. SEM, 3000×. c, Ventral labral structures. S I–IV, sensilla I–IV; Pm, premandible (torma); Ch, Chaetae; Sp, spinulae; ChB, Chaetulae basales. SEM, 840×. d, Pecten labralis (above) and pecten epipharyngis (below). SEM, 2240×. e, Chaetulae basales. SEM, 2240×. f, Anterior prolegs. SEM, 200×.

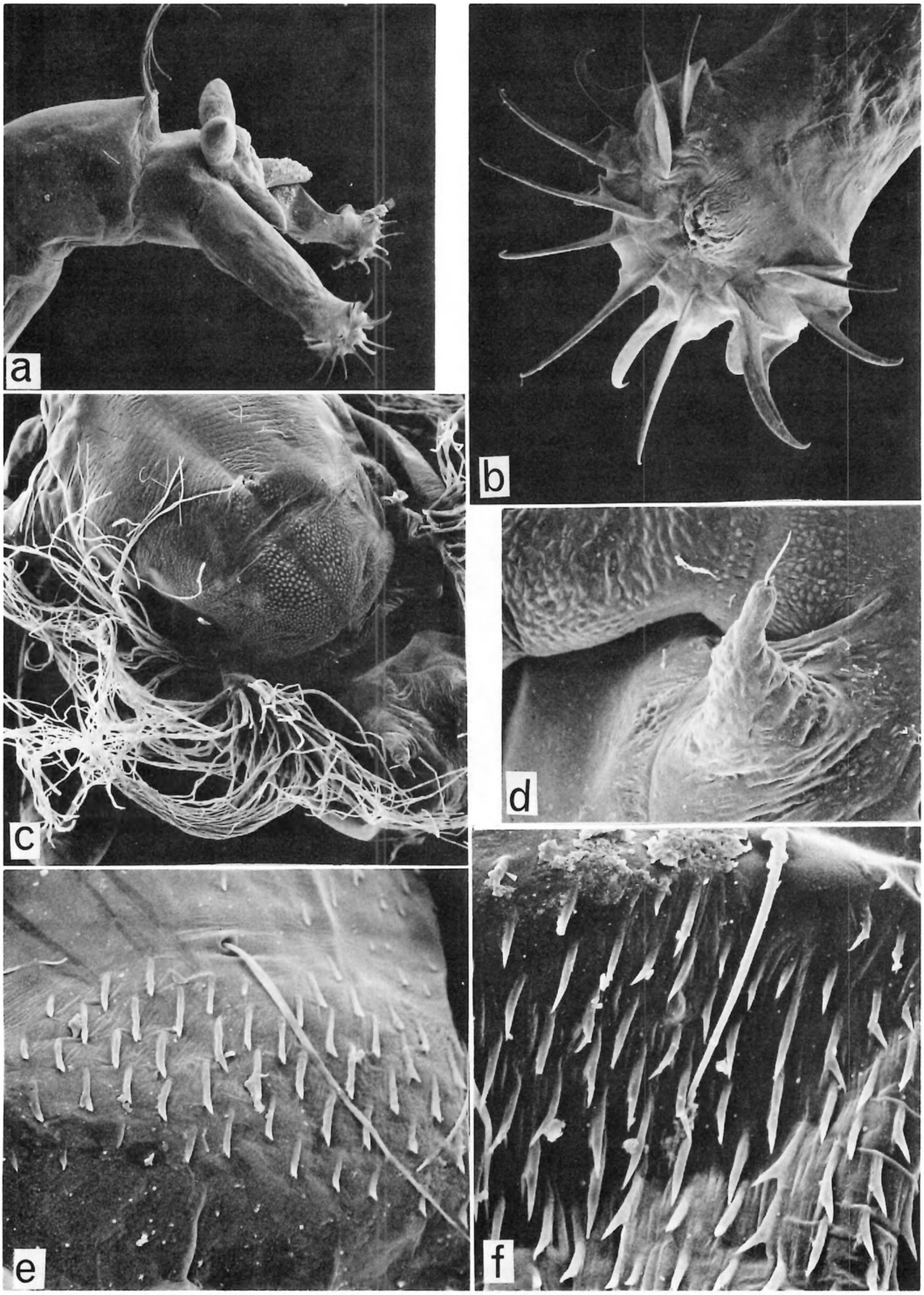


Fig. 5. a, Anal prolegs and anal tubuli. SEM, 60×. b, Posterior proleg. SEM, 260×. c, Pupal cephalothorax showing respiratory organs. SEM, 40×. d, Cephalic tubercle of pupa. SEM, 240×. e, Apical chagrin of tergum IV. SEM, 400×. f, Apical chagrin of tergum VI. SEM, 400×.

R_{4+5} ends over the apex of M. R_{2+3} closely parallels R_1 for most of its length then diverges slightly near the tip. Anal ends at 0.20 of the distance between f-Cu and the apex of Cu_2. Anal lobe right angled. Venarum ratio, 1.07. Wing length, 2.50 mm. Squama with 10 marginal setae.

Legs.—Foretibia with a low rounded apical scale, Fig. 2a. Middle and hind tibial combs slightly overlapping, each comb with a short spur of about equal length (Fig. 2b). Pulvilli over half as long as the claws, Fig. 2c. Base of pulvillus with a series of overlapping plates, Fig. 2d. Leg proportions:

	F	Ti	Ta_1	Ta_2	Ta_3	Ta_4	Ta_5	Leg Ratio	Beard Ratio
Fore	85	65	103	52	43	40	17	1.58	1.56
Middle	84	75	40	22	17	10	6	0.53	1.76
Hind	90	86	53	28	23	14	7	0.62	2.22

Genitalia.—Figs. 2e, 2f, and 7a. Ventral apex of gonocoxite produced as a lobe devoid of microtrichia (Fig. 2f); gonostylus short, with short, heavy, medial setae (Fig. 2e). Superior appendage elongate, without a basal lobe; with several setae beyond base (Fig. 3a). Inferior appendage apically attenuate (Figs. 2e, f). Hypopygial ratio, 1.09.

Diagnosis.—The genitalia with the bituberculate ninth tergum lacking an anal point are distinctive among the Chironominae.

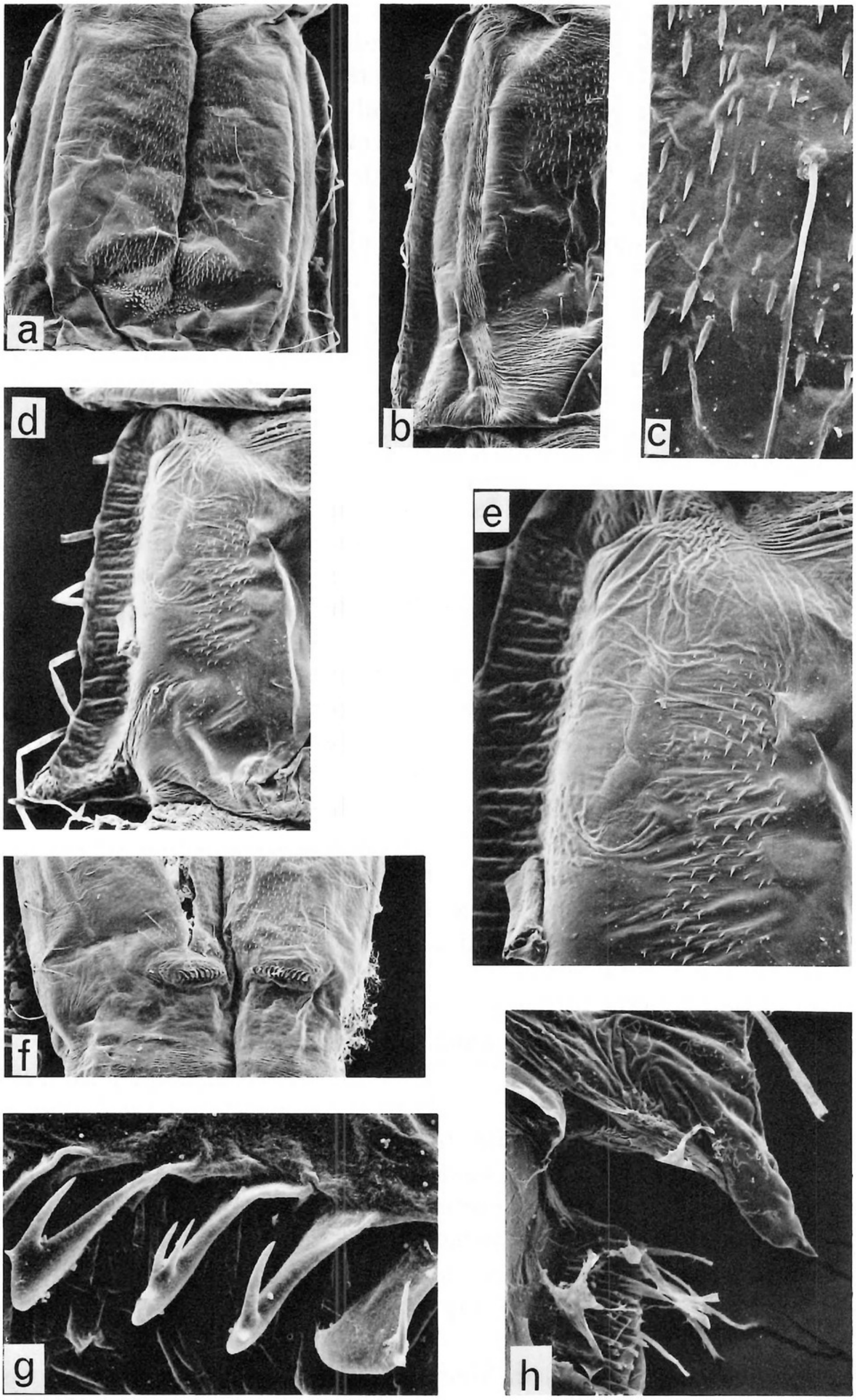
Allotype female.—Reared from a pupa collected with that of the holotype male. In the collection of the U.S. National Museum.

Coloration.—More darkly colored than the male, with the basal half of each abdominal tergum covered with a dark vitta; entire abdomen tinged with dark green (faded in slide mount); fore and middle tibiae almost entirely dark; basal tarsomere of the fore and middle tarsi with only the basal one-third pale; basal tarsomere of hind tarsus with the basal half pale.

Head.—Antennal proportions, 0.20:0.11:0.12:0.12:0.25 mm; length of antenna, 0.816 mm. Ocular ratio 0.13. Clypeus with 29 setae. Temporal setae 14, mostly in a single row becoming doubled above the dorsal apex of the eye. Palpal proportions, 0.56:.275:.275:.459 mm. Length of frontal tubercles, 0.018 mm.

Thorax.—Antepronotum similar to the male; laterally with 1 seta. Mesoscutum with a distinct median hump. Dorsolateral setae 15, in a partially doubled row near the center; anteriorly the row extends to the level of the pupal respiratory scar. Dorsomedial setae 12, long and erect, mostly in a single row. Prealar setae 6; supra-alar seta 1. Scutellum with a staggered posterior row of 11 setae; anteriorly with 9 finer setae in a secondary, staggered row.

Wing.—Similar to the male. Membrane with coarse microtrichia visible at 100×. R with 36 setae along entire length. R_1 with 31 setae along entire


a
b
c
d
e
f
g
h

length; R_{4+5} with 4 setae on the distal four-fifths. Anal ends at 0.34 of the distance between f-Cu and the apex of Cu_2. Anal lobe obsolete, only slightly less than right-angled. Venarum ratio, 1.09. Wing length, 2.51 mm. Squama with 11 marginal setae.

Legs.—Similar to the male except for color differences. Leg proportions:

	F	Ti	Ta_1	Ta_2	Ta_3	Ta_4	Ta_5	Leg Ratio
Fore	88	65	104	55	45	42	16	1.60
Middle	85	78	40	21	16	10	7	0.51
Hind	92	90	56	30	25	14	8	0.62

Genitalia.—Fig. 8a.

Paratypes.—16 males with associated pupal exuviae, 3 females with associated pupal exuviae, 2 males with associated larval and pupal exuviae, 3 pupae (female), 3 pupae (male), 1 female, 7 pupal exuviae, 6 larvae, 2 larvae with associated squash preparations, collected with holotype; 2 males with associated larval and pupal exuviae, 3 larvae with associated squash preparations from the same locality, 20-II-1971, Jon Martin (paratypes deposited in the collections of the California Academy of Science, Bishop Museum and the senior author).

Paratype males.—Antennal ratio 1.37–1.71 (5); temporal setae 10–16 (5); ocular ratio 0.15–0.21 (4); ratio of clypeus width to width of antennal pedicel 0.73–0.76 (3); clypeal setae 14–25 (5).

Wing.—Length, 2.31–2.40 mm (3); venarum ratio 1.05–1.08 (4); squamal setae 6–9 (3); R setae 33–39 (3); R_1 setae 23–31 (3); R_{4+5} setae 26–28 (3).

Leg ratios.—Fore 1.48–1.53 (5); middle 0.49–0.53 (5); hind 0.60–0.64 (5).

Antepronotal setae 0–1 (5); dorsomedial setae 10–14 (5); dorsolateral setae 9–11 (5); prealar setae 4–5 (5); scutellar setae 12–18 (5).

Larva.—Head capsule, Fig. 3b, pale except for a narrow occipital margin and the hypostomial plate. Ventral head length, 0.27–0.31 mm (4). Antenna, Figs. 3c, d, e. Antennal length, 0.16 mm (1); proportions: 100:20:3:5:4. Apex of labial plate, Fig. 3f, with 12 teeth on each side lateral to the central trifid tooth. Paralabial plate with smooth free margin, Fig. 4a; internally with about 24 coarse striae. Lacinia of maxilla, Fig. 4a; palpus, Fig. 4b. Ventral

←

Fig. 6. a, Tergum VI showing chagrin pattern characteristic of terga III–VI. SEM, 60×. b, Tergum VII showing chagrin pattern. SEM, 80×. c, Basal chagrin of tergum VII. SEM, 480×. d, Tergum VIII showing restricted chagrin. SEM, 100×. e, Basal chagrin of tergum VIII. SEM, 200×. f, Tergum II, posterior end, showing interrupted posterior hook row. SEM, 60×. g, Hooks of posterior row on tergum II. SEM, 1000×. h, Posteriolateral spur of segment VIII. SEM, 200×.

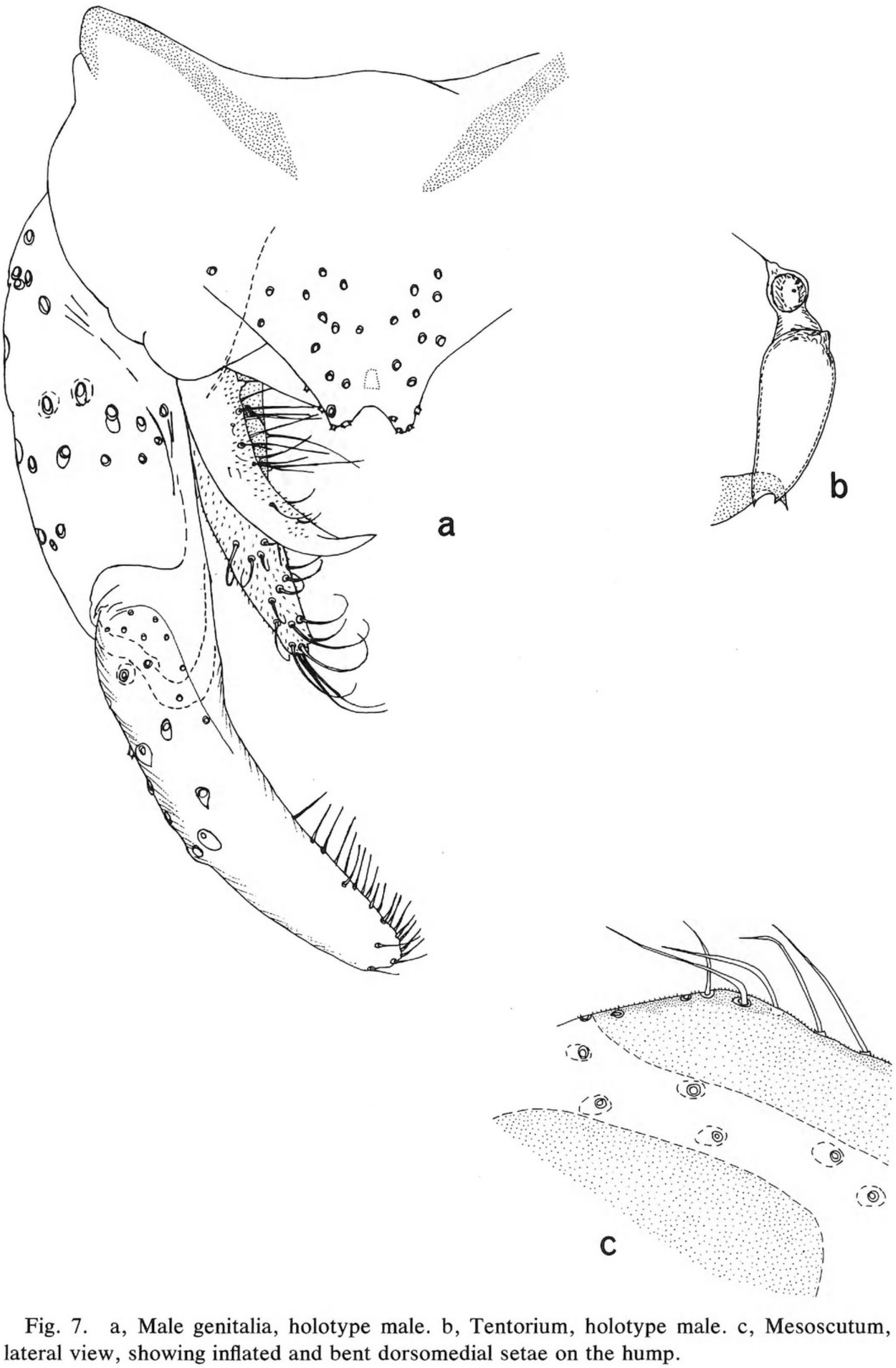


Fig. 7. a, Male genitalia, holotype male. b, Tentorium, holotype male. c, Mesoscutum, lateral view, showing inflated and bent dorsomedial setae on the hump.

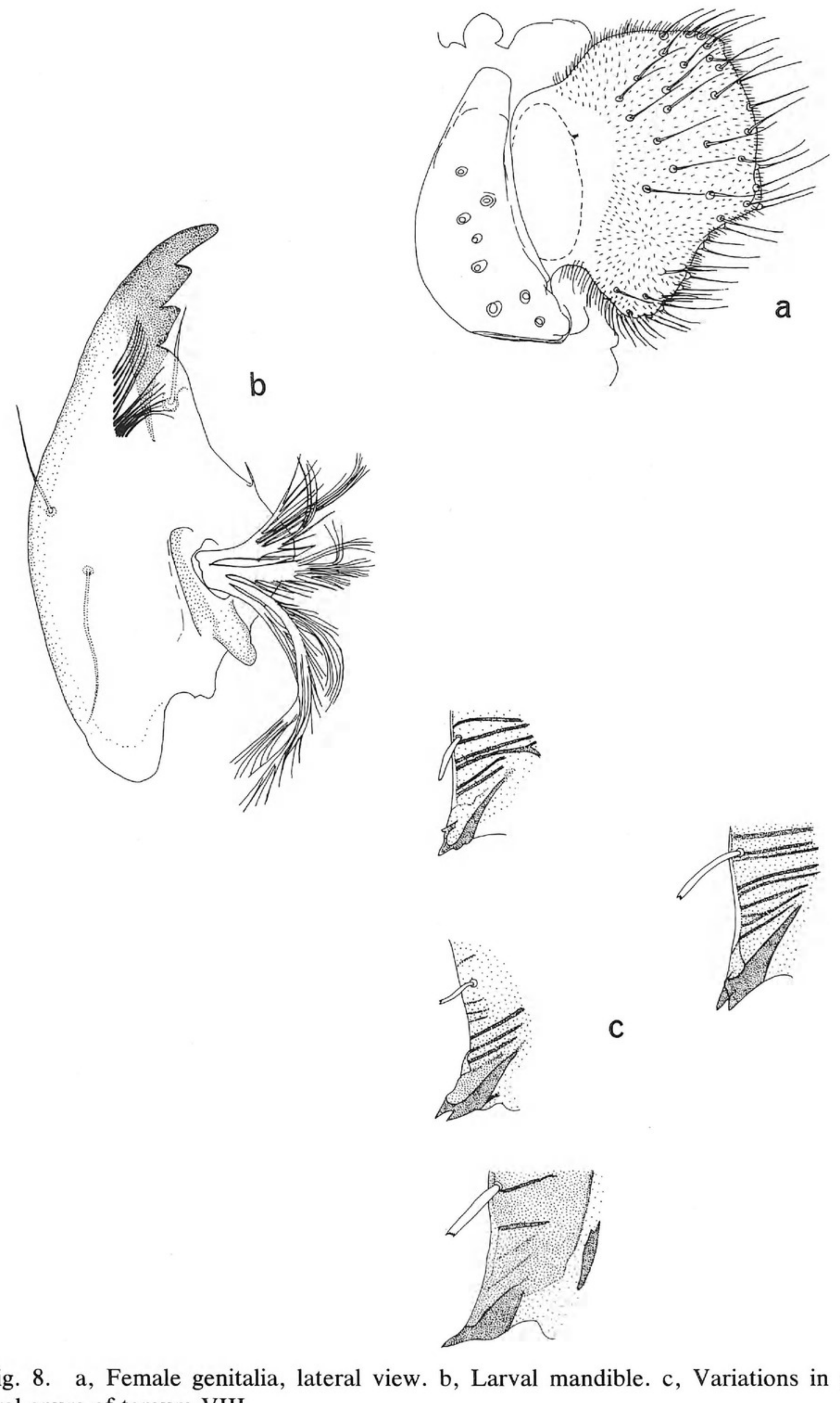


Fig. 8. a, Female genitalia, lateral view. b, Larval mandible. c, Variations in posterio-lateral spurs of tergum VIII.

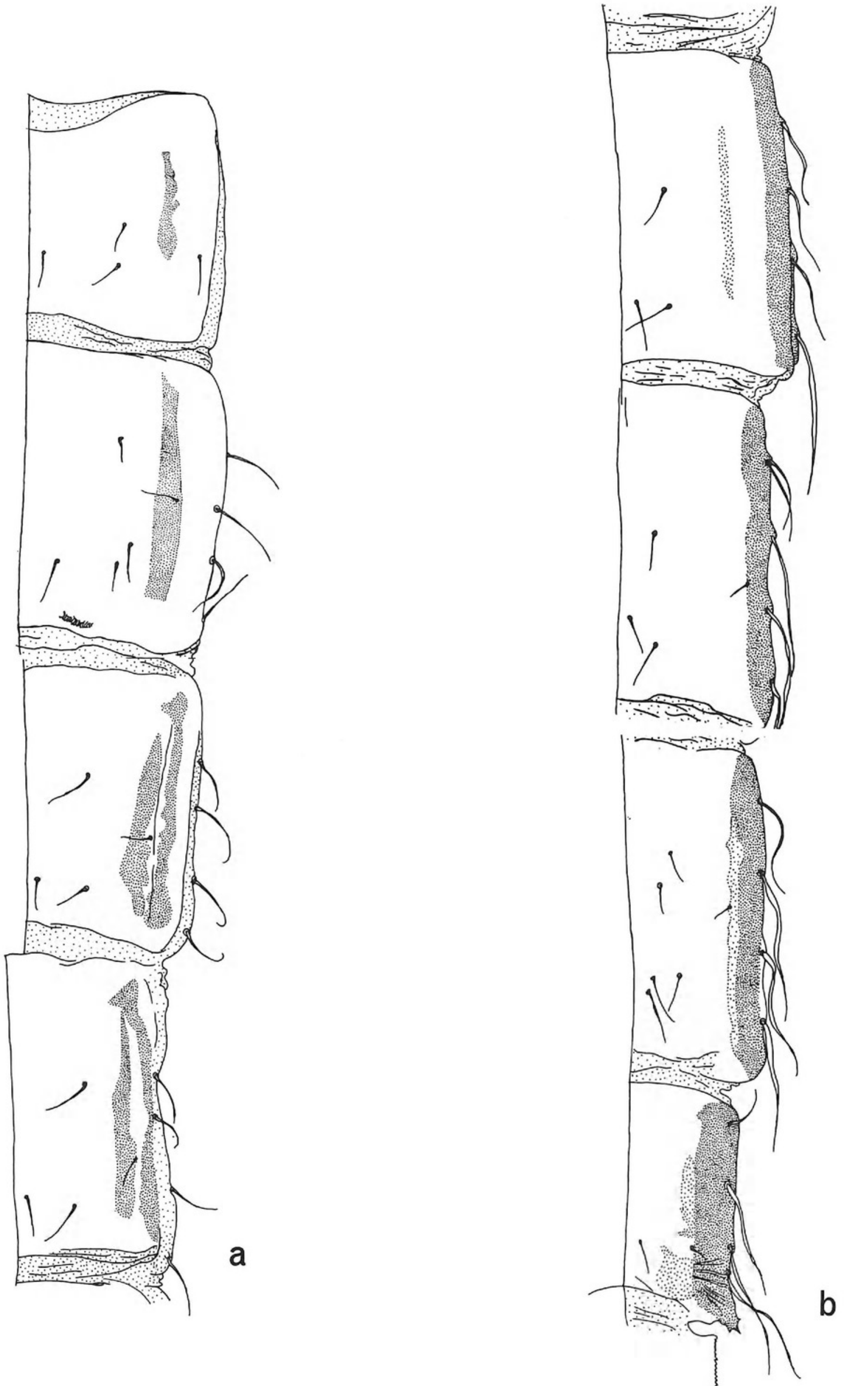


Fig. 9. a, Chaetotaxy and color pattern of terga I–IV. b, Chaetotaxy and color pattern of terga V–VIII.

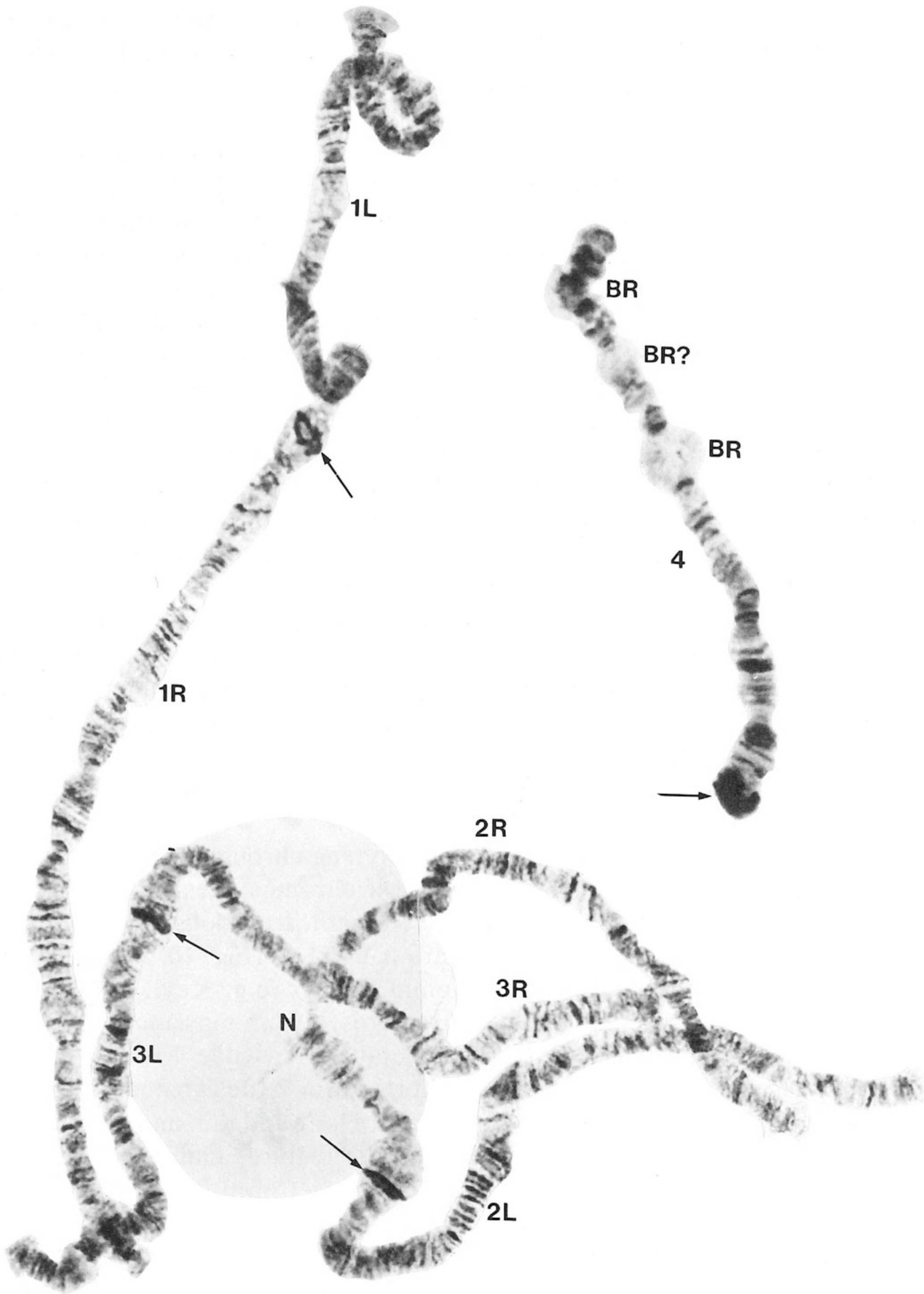


Fig. 10. Salivary gland chromosomes. Presumptive centromeres are indicated by an arrow; N, Nucleolus; BR, Balbiani ring.

labral structures, Figs. 4c, d, e. Mandible, Fig. 8b. Anterior prolegs, Fig. 4f. Ventral tubuli lacking. Anal tubuli almost half as long as the posterior prolegs, Fig. 5a, posterior prolegs each with 14–15 curved hooks, Fig. 5b. Preanal papillae with 6–8 long setae.

Pupa.—Color of exuviae largely pale with a lateral dark band from terga II–VIII which becomes progressively broader posteriorly, Fig. 9a, b. Swim fin largely dark. Total length, 5.42–5.99 mm (5♂); 6.66–7.68 mm (3♀). Respiratory organ with 2–3 basal branches (Fig. 5c). Cephalic tubercle dark, with very small apical spine and a subterminal seta (Fig. 5d). Cephalothorax papillose anteriorly (Fig. 5c). Abdomen with weak chagrin. Terga III–VI with similar patterns of chagrin; on each basally is a broad, weak patch of chagrin which tapers posteriorly joining the heavier transversely oriented posterior band (Figs. 5e, f, 6a); on tergum VI the bands are usually narrowly separated, Fig. 6a. Terga VII and VIII with weak chagrin near the base, Figs. 6b–e. Chaetotaxy, Figs. 9a, b. Tergum II with the posterior hook row interrupted across the middle (Fig. 6f); each half with about 12 hooks, Fig. 6g. Posteriolateral margin of tergum VIII with a simple to bifurcate spur (Figs. 6h, 8c). Anal fin with 94–102 flattened setae.

The 4th instar larva can be distinguished from most species of *Chironomus* by the smaller size (less than 10 mm) and lack of ventral tubuli. The labral structures, hypostomial plate and mandible are indistinguishable from *Chironomus*. The pupa is also extremely similar to *Chironomus* but differs most noticeably in the interrupted hook row of tergum II. The chagrin seems to be lighter than most members of the genus and the posteriolateral spur with 1–2 points also differs from most species.

Cytology.—*Yama tahitiensis* has four polytene chromosome elements, as is typical of most Chironomini species. These chromosomes have been numbered from 1 to 4 on the basis of relative length, from longest to shortest. Each chromosome has a thick heterochromatic band (Fig. 10) which, on the basis of observations on other chironomid species (e.g. Keyl, 1962), probably indicate the position of the centromeres. On this assumption, chromosomes 1 to 3 are metacentric or submetacentric, while 4 is acrocentric. In submetacentric chromosomes the shorter arm is designated as the left arm. In general the polytene chromosomes are long and thin and of relatively poor quality. In the better preparations some features can be recognized.

Chromosome 1 is almost metacentric but the left arm is slightly shorter. There are few obvious markers on this chromosome other than two constrictions near the center of the right arm.

Chromosome 2 is almost the same length as chromosome 1 and is metacentric. It is readily recognized by a nucleolus about one quarter of the arm length from the centromere in the right arm. There is an extensive group of even bands about a similar distance from the centromere in the left arm.

Chromosome 3 is about two thirds of the length of chromosome 1 or 2.

It is definitely submetacentric with with the left arm only three quarters the length of the right arm. The left arm shows a distinct puff near the end and a group of three dark bands near the center. The right arm shows numerous bands near the centromere but the distal half is relatively pale with few distinct bands.

Chromosome 4, which is about one third the length of chromosome 1, is presumably acrocentric since a heterochromatic band, assumed to be the centromere, occurs at one end (Fig. 10). At least two, and possibly three, Balbiani rings are present about equally spaced from each other at the other end of the arm. A number of dark bands or band groups occur along the length of the arm.

No inversion polymorphism was found in any of the ten specimens examined.

Literature Cited

Edwards, F. W. 1933. Some Tahitian Mycetophilidae and Chironomidae. Bull. Bishop Mus., 113:85–86.

Hansen, Dean Cyrus, and Edwin F. Cook. 1976. The Systematics and Morphology of the Nearctic Species of *Diamesa* Meigen 1835 (Diptera: Chironomidae). Mem. Amer. Entomol. Soc. No., 30:1–203.

Hirvenoja, M. 1973. Revision der Gattung *Cricotopus* van der Wulp und ihrer Verwandten (Diptera, Chironomidae). Ann. Zool. Fennici, 10:1–363.

Keyl, H. G. 1962. Chromosomenevolution bei *Chironomus*. II. Chromosomenumbauten und phylogenetische Beziehungen der Arten. Chromosoma, 13:464–514.

Keyl, H. G., and I. Keyl. 1959. Die cytologische Diagnostik der Chironomiden. I. Bestimmungstabelle für die Gattung *Chironomus* auf Grund der Speicheldrüsen-Chromosomen. Arch. Hydrobiol., 56:43–57.

Wülker, W. F., J. E. Sublette, M. F. Sublette, and J. Martin. 1971. A review of the genus *Chironomus* (Diptera, Chironomidae) I. The *staegeri* group. Stud. Nat. Sci. (Portales, N.M.), 1(1):1–89.