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A Review of the Genus *Chironomus*

(Diptera, Chironomidae)

II. Added Descriptions of *Chironomus cloacalis*

Atchley and Martin from Australia

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Addendum:

After "Genitalia etc" on p. 5. Insert: The inferior appendage with strong apical bristles, some of these bristles bifid or trifid apically.

ABSTRACT

Material previously considered to be *Chironomus alternans* Walker has proved to include four different species. Although readily distinguished by cytology, ecology, and morphology of the immature stages, the adults are virtually indistinguishable. Therefore, it has proved impossible to allocate the existing names. *Chironomus alternans* Walker, *Chironomus egregius* Skuse, *Chironomus pervagatus* Skuse, *Chironomus subdolos* Skuse, *Chironomus januarius* Skuse, *Chironomus imberbis* Kieffer, *Chironomus tenuiventris* Kieffer, and *Chironomus arcuatus* Kieffer are being regarded as *nomen dubia*, and the present species has been described as *Chironomus cloacalis* Atchley and Martin. Further descriptions of larva, pupa, adult, and cytology are given.

A Review of the Genus *Chironomus* (Diptera, Chironomidae)

II. Added Descriptions of

Chironomus cloacalis

Atchley and Martin from Australia¹

by

Jon Martin²

This species is one of four closely related species which would be included in *C. alternans* Walker according to Freeman's (1961) revision of the Australian species. Although the immature stages, cytology, and ecology serve to separate these species, the adults are virtually indistinguishable. Therefore, since it has been described only from the adult, it is impossible to tell to which form the name *C. alternans* should be applied. It seems that this name, along with *C. egregius* Skuse, *C. pervagatus* Skuse, *C. subdolos* Skuse, *C. januarius* Skuse, *C. imberbis* Kieffer, *C. tenuiventris* Kieffer, and *C. arcuatus* Kieffer, should be regarded as a *nomen dubium* unless future work should provide some means of separating the adults. The remaining synonym listed by Freeman, *C. oppositus* Walker, has been applied to a species of this group characterized cytologically by Martin (1969 a).

The present species has, therefore, been treated as a new species, since no previous name could be unequivocally applied to it. Two other species remain to be named, and it seems at present that they will also need to be treated as new species.

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Due to unforeseen circumstances a paper by Atchley and Martin (1971) dealing with the morphometrics of larvae of *C. cloacalis* was published before the adult descriptions. Expert opinion has been given that the few details given by Atchley and Martin constitute a valid description of the species. The purpose of this paper is, therefore, to describe the other life history stages and to designate a lectotype.

CHIRONOMUS CLOACALIS ATCHLEY AND MARTIN

Chironomus (Chironomus) alternans Type I; Edward (1964)

Description of larva and egg mass, ecology.

C. (C.) cloacalis Martin (1967). Meiosis (*Nomen nudum*)

C. cloacalis Martin (1969 b). Inversions (*Nomen nudum*)

C. cloacalis Atchley and Martin (1971). Description of

larva.

Larva. The fourth instar larvae vary in length from 9.6-17.9 mm. Female larvae are generally larger than males (mean length 14.68 mm compared to 13.08 mm). The ventral tubules are of moderate length, and the anterior and posterior pair are of approximately equal length. The posterior pair are coiled. The anal papillae are fingerlike and lateral projections, of average length 0.28 mm, are regularly present on the postero-lateral margin of the tenth segment. Average measurements for some of these characters in a number of populations are given in Table 1.

The head is brown with the gular region and the fronto-clypeus generally darkened, but in some specimens these may be no darker than the rest of the head. The variability in coloration of the fronto-clypeus is shown in Table 2. Ventral head length averages 0.370 mm (range 0.350 - 0.450 mm) in females and 0.356 mm (range 0.345 - 0.420 mm) in males. The width of the fronto-clypeus, measured across the middle pair of bristles, is 0.199 mm (range 0.160 - 0.240 mm) in females and 0.191 mm (range 0.160 - 0.215 mm) in males.

Variations in the labial plate are shown in Fig. 1 to 5. The first lateral teeth are not well separated from the central tooth, often being little more than notches on its side. The second laterals are above the fifth laterals, and the most lateral teeth are below the level of the other teeth.

The paralaial plate is similar to most other members of this genus with a smooth anterior margin. The medial apex is slightly downturned and sharp tipped.

The number of pecten epipharyngeal teeth averages 16 but ranges from 12 to 21. The teeth are generally fairly even in width and length as shown in Fig. 7.

The mandibles are about 0.263 mm long in females (range 0.218 - 0.310 mm) and 0.259 mm in males (range 0.245 - 0.285 mm). There are three dark teeth and a fourth distinct pale tooth as shown in Fig. 6. This was one of the characters used by Edwards (1964) in distinguishing two larval types of *C. alternans*.

The antenna is shown in Fig. 8. The antennal proportions (microns) are 144: 30: 12: 14: 6. Where it could be measured the blade was about 0.051 mm, reaching to about halfway up the fourth segment. Width of the basal antennal segment is about 0.035 mm at the level of the ring organ which is usually about 0.37 of the distance from the base of the segment but varies from 0.27 to 0.59.

The difference in 17 larval characters between males and females is discussed by Atchley and Martin (1971).

Pupa. This description is based on 34 pupal exuviae from reared specimens (17 of each sex). The general coloration is dark on the cephalothorax and the abdomen. The total length of the exuvia is 9.75 mm (range 7.56 - 10.84 mm) in the females and 9.17 mm (range 7.64 - 10.43 mm) in males. The lectotype exuvia is 10.43 mm long.

Frontal tubercles are short and conical; subterminal seta about 0.039 mm in females, 0.044 mm in males. Dorsal apex of mesonotum papillose becoming progressively smoother posteriorly. Four *Oth* bristles on each side of the thorax, two on the pronotum, and two immediately in front of the base of the respiratory organ. On the pronotum, one bristle was dorsal, the other just above the level of the respiratory organ. Four *Mth* bristles on each side, the first and fourth being "schlauchborsten". The third bristle is closer to the fourth than the second is to the first. Posterior to the fourth bristle are two small clear patches which appear to be sensilla since no bristles have been observed in them.

Base of respiratory organ 0.155 x 0.075 mm. Anterior to the base of the respiratory organ is a small elevated patch of wartlike tubercles; dorsal to the base is a larger, more elongate patch of smaller tubercles.

~~Shagreen~~ **Chagrin** pattern and chaetotaxy of abdomen as in Fig. 12.

The number of recurved spines of the second tergum is about 95 in females (range 81-108) and 84 in males (range 70-106). The pupal exuvia of the lectotype male has 106 spines.

The spur of the eighth segment has an average of 3.4 spines with a range from 1-6. Some of these variants are shown in Fig. 9 to 11. The lectotype exuvia has three spines on each spur (Fig. 10).

The swim fin is heavily beset with a long, flattened hair fringe. The number is difficult to determine but seems to be about 131 in females (range 81-173) and 116 in males (range 98-154). The lectotype exuvia has about 125 hairs.

Adults. Lectotype male: Melbourne and Metropolitan Board of Works Metropolitan Farm, Werribee, Victoria, AV 3.46, ♂ 33, 23-VI-1970 Jon Martin and D. L. Porter, (A. N. I. C. No. 5937).

Head, antennae, and mouth parts brown; thorax greenish grey; stripes, postnotum, sternopleuron, and pedicel of antennae dark brown; abdomen mostly black with a white posterior margin on the segments two to six; segments seven to nine almost entirely dark. Legs yellowish brown without definite markings; tarsal segments darkened.

Antennal ratio, 3.82; palpal proportions (microns); 60: 230: 265: 365. Length of frontal tubercles 0.22 mm. Eyes glabrous; dorsal extensions long and parallel-sided about six facets wide near apex. Clypeus moderately broad, 0.75 times the width of the antennal pedicel; 23 clypeal bristles. Antennal flagellum fully haired to near the tip, with a rosette of short hair. Postocular bristles in a rough double row, reaching medial to the dorsal apex of the eyes.

Pronotum broad, apically tapered then abruptly widened at the apex, anteriorly with a broad notch. Mesonotum with a scarcely discernible median tubercle. About 14 dorso-lateral bristles in roughly two rows. About four pre-alar bristles, two supra-alar bristles. Scutellum with a straight posterior row of about 19 bristles in a strewn pattern, anteriorly with 14 bristles, mostly in a row but with a second row near the center.

Wing with anterior veins hardly darker than posterior, r-m crossvein slightly darkened. R_{4+5} ends slightly proximal to M. R_{2+3} evanescent at tip ending 0.32 of the distance between the apex of R_1 and R_{4+5} . Anal ends distal to f-Cu, at 0.88 of the distance between f-Cu and Cu_2 . Anal lobe well developed. Venarum ratio, 1.02. Wing length 4.35 mm, wing width, 0.93 mm. Squama fully fringed. Three bristles on stem vein. Haltere pale, length 0.475 mm, width 0.175 mm.

Foretarsus with short hairs only, length of the hairs 1.8 times the tarsal diameter. Foretibia with a low, rounded scale. Middle and hind tibial combs fused, each fused pair with two spurs of unequal length. Pulvilli present. Claws strongly curved, sharp tipped. Leg proportions (mm):

	F	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	Leg Ratio
fore	1.51	1.33	2.09	1.00	0.85	0.69	0.31	1.57
mid	1.60	1.49	0.85	0.44	0.33	0.24	0.18	0.57
hind	1.82	1.86	1.29	0.71	0.58	0.31	0.20	0.69

Genitalia, Fig. 17, superior appendage as in Fig. 13.

Paralectotype female. The following description is from a female taken at the Melbourne and Metropolitan Board of Works Metropolitan Farm, Werribee, Victoria, AV. 3.46, ♀ 34, 23-VI-1970 Jon Martin and D. L. Porter.

General coloration as lectotype male but with dark markings more extensive.

Antennal proportions (microns); 190: 135: 155: 140: 225. Palpal proportions (microns); 75: 225: 265: 395. Length of frontal tubercles, 0.029 mm. Eyes glabrous; dorsal extensions long and parallel sided, about eight facets wide near apex. Clypeus broad, 1.5 times the width of the antennal pedicel; 29 clypeal bristles. Postocular bristles in a rough double row, reaching a point medial to the dorsal apex of the eye.

Pronotum broad, apically tapered, then abruptly widened at the apex, anteriorly with a broad notch. Mesonotum with a very slight median tubercle. About 18 dorsolateral bristles in roughly two rows, becoming single posteriorly. Dorsomedial bristles long and decumbent. About five pre-alar bristles, one supra-alar bristle. Scutellum with 19 bristles in the posterior row, 10 in the anterior row.

Wing with anterior veins slightly darker than posterior veins, r-m crossvein slightly darkened. R_{4+5} ends slightly proximal to M. R_{2+3} evanescent at tip, ending 0.28 of the distance between the apex of R_1 and R_{4+5} . Anal ends distal to f-Cu, at 0.67 of the distance between f-Cu and Cu_2 . Anal lobe well developed. Venarum ratio 1.05. Wing length 4.17 mm, wing width 1.15 mm. Squama fully fringed. Four bristles on the stem vein. Haltere pale; length 0.445 mm, width 0.220 mm.

Legs as lectotype male. Leg proportions (mm):

	F	Ti	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅	Leg Ratio
fore	1.47	1.22	1.88	0.85	0.78	0.74	0.33	1.55
mid	1.55	1.42	0.76	0.40	0.31	0.22	0.18	0.52
hind	1.73	1.69	1.15	0.60	0.49	0.31	0.20	0.68

Abdominal fasciae much broader than in male, segments two to nine dark with a light posterior border. Genital lamellae as in other members of the genus.

From an examination of other members of the type series, the following variability was noted:

Males: - Wing length 3.76 mm, range 2.66-4.40 (64); wing width 0.91 mm, range 0.76-1.10 (16); frontal tubercles 0.029 mm, range 0.018-0.044 (16); clypeal bristles 23.5, range 11-38 (16); antennal ratio 3.56, range 3.24-4.24 (16); scutellar bristles 24.4, range 15-40 (15); bristles on stem vein 3.2, range 2-5 (58); anterior L. R. 1.59, range 1.44-1.78 (56); mid L. R. 0.57, range 0.55-0.58 (16); hind L. R. 0.71, range 0.67-0.75 (16). Variations of the superior appendage of the

hypopygium are shown in Fig. 13-16. Some specimens show more green and brown on the thorax and more green on the abdomen, the dark band being reduced sometimes to a saddle spot in the center of the tergum of the anterior segments.

Females: - Wing length 3.95 mm, range 2.76-5.05 (69); wing width 1.14 mm, range 0.88-1.33 (12); frontal tubercles 0.026 mm, range 0.015-0.032 (12); clypeal bristles 31.2, range 25-43 (12); scutellar bristles 24.8, range 18-32 (12); bristles on stem vein 3.5, range 2-6 (58); anterior L. R. 1.62, range 1.45-1.88 (86); mid L. R. 0.53, range 0.51-0.59 (12); hind L. R. 0.68, range 0.65-0.70 (12). Some specimens show more green and brown on the thorax.

Cytology. There are four salivary gland chromosomes as is usual in this genus. The arm combination is of the *C. pseudo-thummi* type, i. e., AE, BF, CD, G. (see Keyl, 1962). The chromosomes are shown in Fig. 18.

Chromosome I with arms B and F has a single bulb in arm B near the centromere with a group of dark bands immediately distal to the bulb. An inversion is known to occur in arm B in some populations, particularly in New South Wales.

Chromosome II is composed of arms C and D and is 88% of the length of chromosome I. Two inversions are known in arm C, a larger one with a wide distribution, and a small inversion which has only been recorded once in a population at Dandenong, Victoria.

Chromosome III is composed of arms A and E. The group of bands in 15D of arm A, which is so typical of this arm (see Martin, 1969), is not always obvious, but it occurs near the middle of this arm as indicated in Fig. 18. The banding sequence in this arm appears identical to that of the European species *C. holomelas* and *C. melanescens* (Keyl, 1962). An inversion which occurs in this arm seems to be quite widely distributed although at low frequency.

Chromosome IV (arm G) has a large virtually terminal nucleolus, a Balbiani ring about halfway along its length, and a further bulb between the Balbiani ring and the other end of the chromosome. This chromosome often shows heterozygosity of a number of kinds. Heterozygosity for development of the nucleolus, for an extra piece of chromosome distal to the nucleolus, or for a small inversion near the Balbiani ring, have been seen in specimens from various localities.

Ecology and distribution. *Chironomus cloacalis* apparently occurs all around the coast of mainland Australia from southwestern Western Australia to at least Townsville in Queensland. It also occurs inland for some distance, at least in eastern Australia, since it has been collected at Broken Hill, N. S. W., and Roma, Queensland, both about 250 miles from the coast. The species has not been recorded from Tasmania.

Larvae of this species are generally found in permanent or semi-permanent pools and particularly in pools containing sewage effluent. Thus, large populations have been found in the final stages of the sewage treatment plants at Dandenong, Braeside, Werribee, and Mildura in Victoria and at Bolivar in South Australia.

In populations around Melbourne in Victoria, particularly the Werribee population, larvae are relatively numerous throughout the year with a peak abundance in late summer and early autumn.

Type Series: The following specimens were all available to Atchley and Martin and should, therefore, be considered as constituting the paralectotype series.

New South Wales: 5 miles S Broken Hill, AN. 71.1, 15-IV-1970 (J. M. and W. R. Atchley), 1 pupa and ♂ (associated), 58 larvae; Clifton, 16-XII-1963 (J. M.), 3 ♀; Goulburn, 15-II-1963 (J. M.), 6 ♂, 8 ♀.

Queensland: Balonne River, 1.4 miles S Bindle, from egg masses 3, 5, 6, and 7, AQ. 7.1, 23-X-1967 (J. M.), 4 pupae and ♂ (associated), 8 pupae and ♀ (associated), 4 squashes with larval head capsules associated; 12 miles SW Bell, AQ. 16.1, 28-X-1967 (J. M.), 4 pupae and adult ♂ (associated), 3 squashes with larval head capsules associated; Calliope, from egg mass 4, AQ. 48.1, 21-I-1969 (J. M.), 1 squash with larval head capsule associated; Lotus Creek, from egg mass 21, 20-I-1969 (J. M. and D. L. Porter), 2 pupae and ♀ (associated); St. Lucia, 8-XI-1963 (I. A. E. Bayly), 1 ♂, 3 ♀; Woodridge, from egg mass 9, AQ. 9.7, 6-VI-1968 (J. M.), 1 squash with larval head capsule associated.

South Australia: Bolivar Sewage Works, ASA. 9.1, 18-VIII-1969 (J. M., D. L. Porter, B. H. Proctor, and W. R. Atchley), 10 squashes; Naracoorte, 8-VIII-1961 (M. J. and P. G. Littlejohn), 3 ♂, 4 ♀; Oratunga Creek, Parachilna, 9-VIII-1965 (G. L. Bush), 1 squash with larval head capsule associated.

Victoria: Altona, May 1959 - February 1960 (J. M.), 15 ♂, 20 ♀; Bacchus Marsh, AV. 29.1, 3-VI-1968 (D. L. Porter and B. H. Proctor), 1 squash with larval head capsule; Dandenong, July - November 1961 (J. M.), 24 ♂, 20 ♀; 25-VII-1962 (J. M.), 2 squashes with larval head capsule associated; Lara, AV. 51.7, from egg mass 8, 2-X-1969 (J. M.), 1 squash with larval head capsule associated; Leslie Manor, AV. 24.8, from egg mass 3, 7-III-1968 (J. M.), 1 squash with larval head capsule associated; Lilydale, 5-VII-1962 (M. J. Littlejohn and J. M.), 16 ♂, 6 ♀; Lower Templestowe, AV. 13.1, from egg mass 2, 12-XI-1967 (J. M.), 1 squash with larval head capsule associated; Meredith, 6-IX-1962 (J. M.), 1 ♀; Mildura, AV. 44.10, from egg mass b, 21-VIII-1969

(J. M. and W. R. Atchley), 2 squashes with larval head capsules associated; Nar Nar Goon, 14-VII-1961 (J. M.), 1 ♂; Noble Park, January - April 1960 (J. M.), 11 ♂, 17 ♀; North Balwyn, AV. 14.2, from egg masses 1 and 2, 10-XII-1967 (J. M.), 2 squashes with larval head capsules associated; Spout Creek, 1-IV-1961 (H. L. Carson), 4 ♂, 8 ♀; M.M.B.W. Metropolitan Farm, Werribee, 30-I-1961 (J. M.), 22 ♂, 21 ♀; AV. 3.46, 23-VI-1970 (J. M. and D. L. Porter), 2 larvae, pupae, and adult ♂ (associated), 5 pupae and adult ♂ (associated), 5 larvae, pupae, and adult ♀ (associated), 3 pupae and adult ♀ (associated), 20 squashes with larval head capsules associated.

Western Australia: Armadale, from egg mass 64/4, October 1964 (D. H. D. Edward), 2 ♂; Lake Gwellup, from egg mass 64/10, October 1964 (D. H. D. Edward), 2 ♂, 1 ♀.

Lectotype and most of the paralectotypes will be lodged in the Australian National Insect Collection, C. S. I. R. O., Canberra. Other paralectotypes will be lodged in the British Museum (Natural History), the National Museum of Victoria, and the United States National Museum. The specimens from Western Australia were returned to Dr. D. H. D. Edward.

The cytology of this species has also been studied from numerous other localities, but in general only temporary preparations were made which were later discarded.

Diagnosis. A medium sized, brownish grey species with the anterior tarsus of the male not bearded. Not readily distinguishable from adults of related species; although they generally show more green on the thorax and abdomen, the dark banding on the abdomen generally being somewhat reduced. Pupal exuvia dark, with about 84 hooks on the second tergum of the male, 95 on the female; spurs on the eighth segment with about four spines. Larva with lateral projections on the tenth segment; ventral tubules of approximately equal length. The head capsule is darkened on the gular region and the fronto-clypeus of most specimens; mandibles with three dark teeth and a fourth distinct tooth; central tooth of labial plate rounded, the first laterals often little more than notches on its side. The related species show less darkening of the head capsule, the fourth tooth of the mandible is not so completely formed, and the first laterals of the labial plate are generally more separated from the central tooth. *Chironomus oppositus* and one of the other species lack lateral projections on the tenth segment.

Polytene chromosomes comprised of four elements with the arm combination of the *C. pseudothummi* type (AE, BF, CD, G); chromosome I has a single bulb near the center with a group of dark bands next to it on the shorter side, as compared to *C. oppositus* which has a nucleolus region in arm F as well. Of the other two

species, one is similar to *C. oppositus*, and the other has the bulb in arm B nearer the end, with the dark bands towards the centromere. Chromosome IV has a large virtually terminal nucleolus, a central Balbiani ring, and a further bulb at the other end of the chromosome. Only one other species has a terminal nucleolus, and it has an additional bulb between the Balbiani ring and the nucleolus. Generally there is little inversion polymorphism.

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Average length measurements (mm) of larvae of *Chironomus cloacalis* Atchley and Martin

Locality and date of collection	Number of specimens	Body length	FEMALE		
			Anterior Ventral Tubule	Posterior Ventral Tubule	Lateral Projection
<u>Western Australia</u>					
<u>Armadale</u>					
Egg mass 64/4	1	15.7	2.34	2.59	0.36
<u>Lake Gwellup</u>					
Egg mass 64/10	1	16.7	2.51	2.17	0.36
<u>Lake Monger</u>					
20-XI-62	5	13.53	1.67	1.67	-
<u>South Australia</u>					
<u>Middle Gorge,</u>					
<u>Flinders Range</u>					
21-IV-65	10	13.33	1.47	1.50	0.23
<u>Parachilna</u>					
<u>Flinders Range</u>					
9-VIII-65	10	14.50	1.39	1.27	0.23
<u>Victoria</u>					
<u>Dandenong</u>					
25-VII-62	20	15.73	2.07	2.15	0.30
<u>Lilydale</u>					
5-VII-62	10	15.36	1.90	2.00	0.28
<u>Melbourne Botanic Gardens</u>					
9-IV-63	10	14.43	2.07	2.10	0.38
30-VII-63	6	15.41	1.94	1.94	0.31

Table 1, cont.

Locality and date of collection	Number of specimens	Body length	FEMALE		
			Anterior Ventral Tubule	Posterior Ventral Tubule	Lateral Projection
<u>North Kew</u>					
24-IV-63	8	13.03	1.97	2.02	0.35
<u>Ocean Grove</u>					
15-VIII-61	14	14.81	1.72	1.75	0.28
<u>Werribee</u>					
7-III-63	10	15.23	2.39	2.74	0.41
<u>New South Wales</u>					
<u>Broken Hill</u>					
15-IV-70	37	14.24	1.91	2.03	0.33
<u>Goulburn</u>					
15-II-63	3	14.75	2.29	2.64	0.34
<u>Queensland</u>					
<u>St. Lucia</u>					
13-X-63	1	12.2	2.25	3.34	0.46
<u>MALE</u>					
<u>Western Australia</u>					
<u>Lake Gwellup</u>					
Egg mass 64/10	1	14.0	1.92	1.84	0.32
<u>Lake Monger</u>					
20-XI-62	1	11.0	1.34	1.17	-
<u>South Australia</u>					
<u>Middle Gorge,</u>					
<u>Flinders Range</u>					
21-IV-65	12	12.07	1.42	1.47	0.22

Table 1, cont.

Locality and date of collection	Number of specimens	Body length	MALE		
			Anterior Ventral Tubule	Posterior Ventral Tubule	Lateral Projection
Parachilna, Flinders Range Victoria	4	11.02	1.19	1.19	0.19
Dandenong 25-VII-62	20	14.50	1.88	1.97	0.25
Lilydale 5-VII-62	10	14.08	1.70	1.80	0.28
Melbourne Botanic Gardens 9-IV-63	10	12.98	2.05	2.09	0.38
30-VII-63	5	13.53	1.74	1.62	0.24
North Kew 24-IV-63	6	11.77	1.72	1.87	0.31
Ocean Grove 15-VIII-61	13	13.39	1.52	1.55	0.27
Werribee 7-III-63	21	13.34	2.05	2.35	0.37
New South Wales Broken Hill 15-IV-70	21	12.39	1.64	1.76	0.30
Goulburn 15-II-63	9	11.97	2.07	2.25	0.31

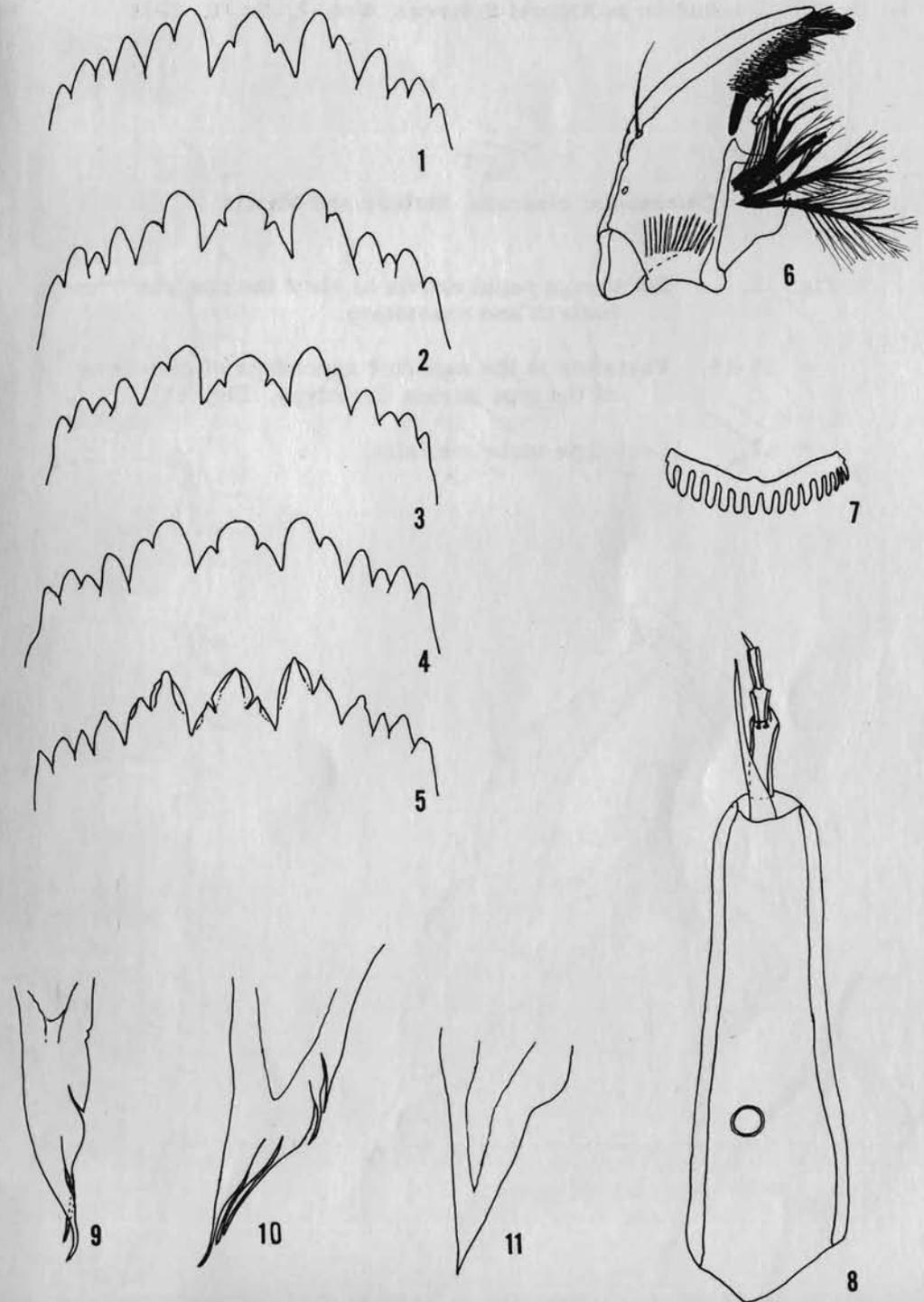
TABLE 2.

Variation in the coloration of the fronto-clypeus of larvae of
Chironomus cloacalis Atchley and Martin.

	Pale	Very slightly dark	Slightly dark	Dark	Very dark	Total
Number of Larvae	15	32	264	1,151	177	1,639
Percentage	0.92	1.95	16.11	70.23	10.80	

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- Fig. 1 - 5. Variation in the labial plate in larvae from Werribee, Victoria.
6. Mandible of lectotype larval exuvia.
7. Pecten epipharyngis of lectotype larval exuvia.
8. Antenna from paralectotype larva.
- 9 - 11. Variation in the posterolateral spurs of the pupae, including the lectotype exuvia (Fig. 9).

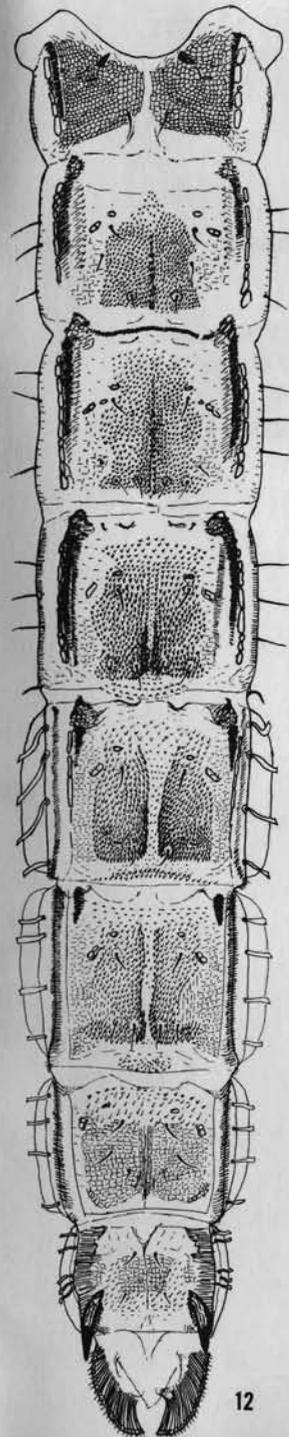


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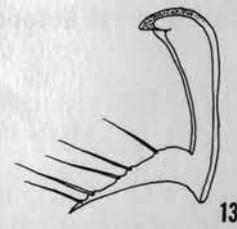
Fig. 12. Dorsum of pupal exuvia to show the chagrin pattern and chaetotaxy.

13-16. Variation in the superior appendage of members of the type series (lectotype, Fig. 13).

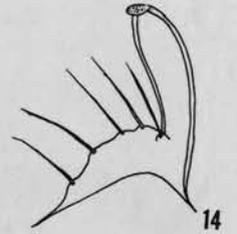
17. Lectotype male genitalia.



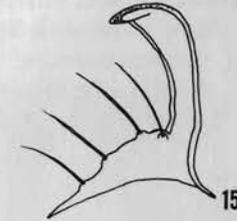
12



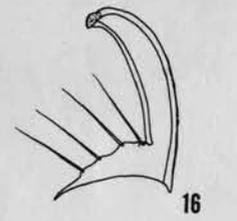
13



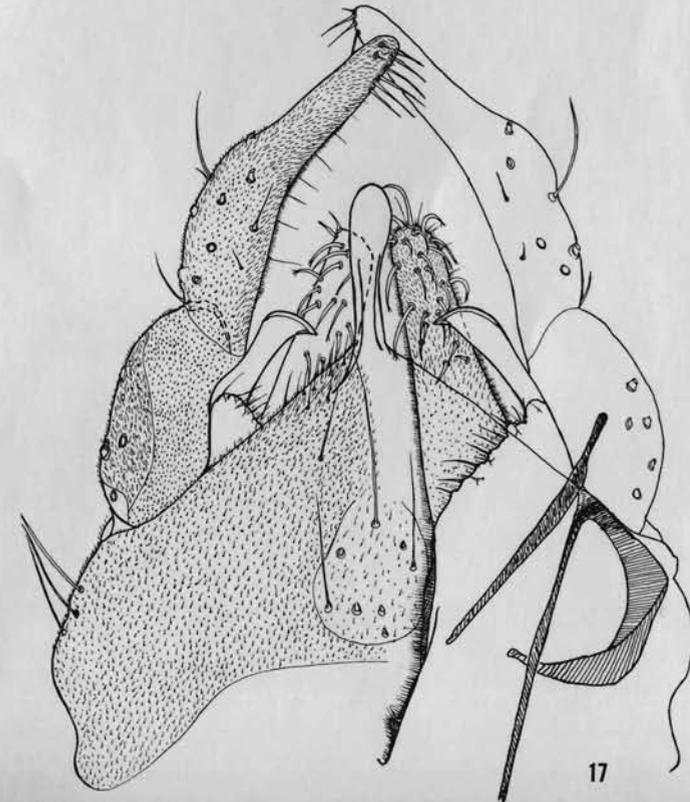
14



15



16



17

Chironomus cloacalis Atchley and Martin

Fig. 18 Salivary gland chromosomes. Centromeres are indicated by arrows on the three long chromosomes. N. - nucleolus, B. - bulb, B. R. - Balbiani Ring, 15 - region 15 of arm A.

