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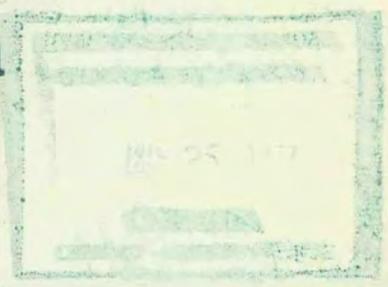
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Taxonomic studies on Chironomidae: *Nanocladius*, *Pseudochironomus*, and the *Harnischia* complex

Ole A. Sæther



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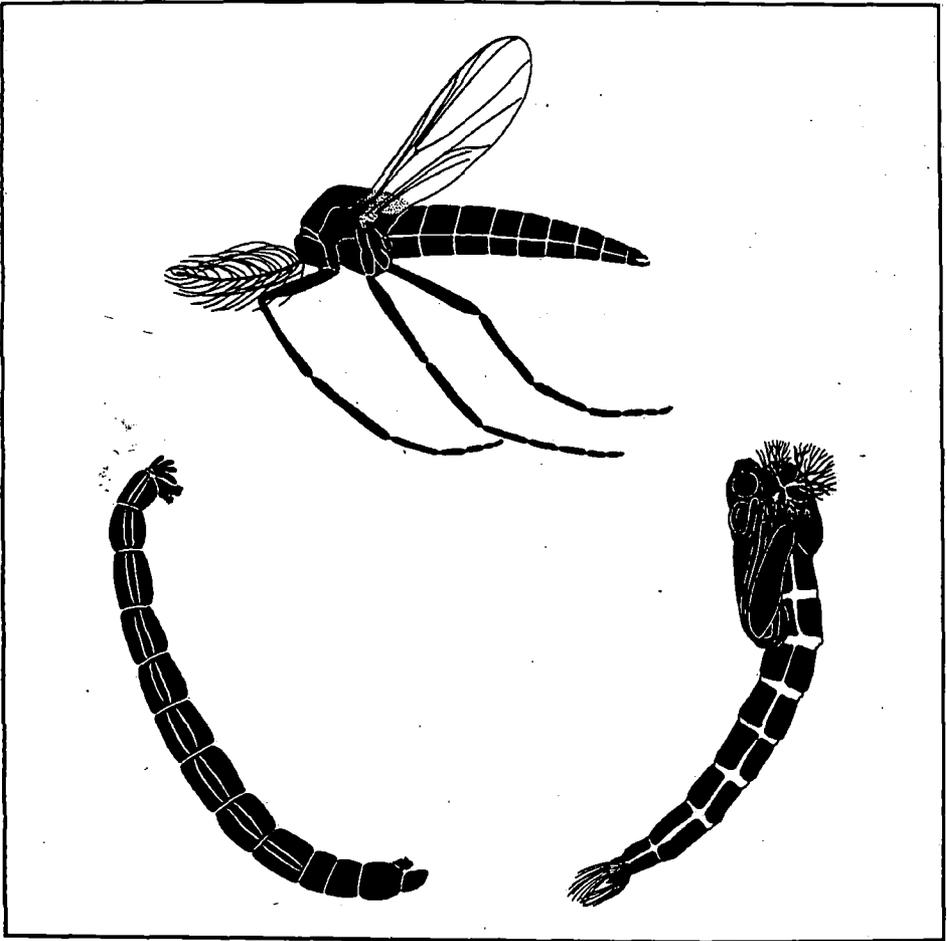
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**Taxonomic studies on Chironomidae:
Nanocladius, *Pseudochironomus*,
and the *Harnischia* complex**



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**Taxonomic studies on Chironomidae:
Nanocladius, *Pseudochironomus*,
and the *Harnischia* complex**

Ole A. Sæther

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ABSTRACT

SÆTHER, O. A. 1977. Taxonomic studies on Chironomidae: *Nanocladius*, *Pseudochironomus*, and the *Harnischia* complex. Bull. Fish. Res. Board Can. 196: 143 p.

Microcricotopus Thienemann and Harnisch, 1932 and *Plecopteracoluthus* Steffan are shown to be junior synonyms of *Nanocladius* Kieffer, but *Plecopteracoluthus*, whose members live in symphoretic association with immature Perlidae, is retained as a subgenus. Keys are given for imagines, pupae, and larvae of the genus.

Six new Nearctic species are described: *Nanocladius* (*Plecopteracoluthus*) *branchicolus* (female and immatures); *Nanocladius* (*Nanocladius*) *anderseni* and *Nanocladius* (*Nanocladius*) *minimus* (imagines and immatures); *Nanocladius* (*Nanocladius*) *spinipennis* (female, immatures, and tentatively associated males); *Nanocladius* (*Nanocladius*) *incompitus* (imagines and immatures); *Nanocladius* (*Nanocladius*) *crassicornus* (male and pupae). Ethiopian *Nanocladius* (*Nanocladius*) *niveiplumus* (Freem.) (male and female) and a female possibly representing *Nanocladius* *vitellinus* Kieff. are redescribed. *Nanocladius* (*Nanocladius*) *distinctus* (Mall.), immatures and the larva probably belonging to *Nanocladius* (*Nanocladius*) *balticus* (Palm.) n.comb. are described. Nearctic populations of six other species are described.

Diagnoses of male and female imagines, pupa, and larva of *Pseudochironomus* Malloch are given, and keys to known Nearctic and Palaearctic species presented. Descriptions of Nearctic *Pseudochironomus* *badius* n.sp. (from male imagines) and *Pseudochironomus* *articaudus* n.sp. (from male imagines, pupa, and larva) are given. The male imagines of *Pseudochironomus* *crassus* Town., *Pseudochironomus* *richardsoni* Mall., *Pseudochironomus* *rex* Haub., *Pseudochironomus* *middlekaufi* Town., *Pseudochironomus* *fulviventris* (Joh.), and *Pseudochironomus* *pseudoviridis* (Mall.) are redescribed. The immatures of *P. richardsoni*, and the female and immatures of *P. fulviventris* are redescribed, the pupa of *P. pseudoviridis* and a larva possibly belonging to *P. pseudoviridis* described, and the pupa of *Pseudochironomus* cf. *prasinatus* Staeg. illustrated.

Diagnoses and generic keys to imagines and immatures of the *Harnischia* complex are given. Four new genera *Cyphomella*, *Chernovskiiia*, *Beckiella*, and *Robackia*, are described and *Gillotia* Kieffer and *Demicryptochironomus* Lenz, redefined. Males of four new species, *Cryptotendipes* *pilicuspis*, *Cyphomella* *gibbera*, *Cyphomella* *cornea*, and *Robackia* *pilicauda* are described; all stages of four others, *Chernovskiiia* *orbicus* (Town.) n.comb., *Beckiella* *tethys* (Town.) n.comb., *Robackia* *claviger* (Town.) n.comb., and *Gillotia* *alboviridis* (Mall.) n.comb. and imagines and pupa of *Chernovskiiia* *amphitrite* (Town.) n.comb. described or redescribed; the immatures of *Cyphomella* sp. described; the larva and partly the pupa of *Robackia* *demeijerei* (Krus.) n.comb. described; and two larvae with uncertain affinities, "*Cryptochironomus*" cf. *rolli* Kirp. and "*Cryptochironomus*" near *rolli* Kirp. described. Keys to all stages of *Chernovskiiia* n.gen., to known males of *Cryptotendipes* Lenz, *Cyphomella* n.gen., *Demicryptochironomus* Lenz, *Gillotia* Kieff., and to males and larvae of *Beckiella* n.gen. and *Robackia* n.gen. are given. *Schadinia* Lipina is shown to be a senior synonym of *Demicryptochironomus* Lenz, but its suppression is proposed. *Cladopelma* Kieffer (sensu Lenz) is a synonym of *Microchironomus* Kieffer. Other possible synonyms are indicated and 24 new generic combinations given.

RÉSUMÉ

SÆTHER, O. A. 1977. Taxonomic studies on Chironomidae: *Nanocladius*, *Pseudochironomus*, and the *Harnischia* complex. Bull. Fish. Res. Board Can. 196: 143 p.

Nous démontrons que *Microcricotopus* Thienemann et Harnisch, 1932 et *Plecoptera-coluthus* Steffan sont des synonymes juniors de *Nanocladius* Kieffer, mais nous retenons comme sous-genre *Plecoptera-coluthus*, dont les membres vivent en association symphorétique avec des Perlidae immatures. On donne des clés pour les imagos, les pupes et les larves du genre.

Nous décrivons six espèces néarctiques nouvelles : *Nanocladius* (*Plecoptera-coluthus*) *branchicolus* (femelle et immatures); *Nanocladius* (*Nanocladius*) *anderseni* et *Nanocladius* (*Nanocladius*) *minimus* (imago et immatures); *Nanocladius* (*Nanocladius*) *spiniplenus* (femelle, immatures et mâles provisoirement associés); *Nanocladius* (*Nanocladius*) *incomp-tus* (imago et immatures); *Nanocladius* (*Nanocladius*) *crassicornus* (mâle et pupes). Nous redécrivons *Nanocladius* (*Nanocladius*) *niveiplumus* (Freem.) (mâle et femelle) d'Ethiopie et une femelle pouvant représenter *Nanocladius vitellinus* Kieff. Nous décrivons *Nanocladius* (*Nanocladius*) *distinctus* (Mall.), des immatures et la larve appartenant probablement à *Nanocladius* (*Nanocladius*) *balticus* (Palm.) n.comb. Nous décrivons les populations néarctiques de six autres espèces.

Nous donnons les diagnoses des imagos mâles et femelles, des pupes et des larves de *Pseudochironomus* Malloch, de même que des clés des espèces néarctiques et paléarctiques connues. Nous décrivons les espèces néarctiques nouvelles *Pseudochironomus badius* n.sp. (à partir d'imago mâle) et *Pseudochironomus articaudus* n.sp. (à partir d'imago mâle, d'une pupa et d'une larve). Nous donnons une nouvelle description des imago mâles de *Pseudochironomus crassus* Town., *Pseudochironomus middlekaufi* Town., *Pseudochironomus fulviventris* (Joh.) et *Pseudochironomus pseudoviridis* (Mall.). Nous redécrivons également les immatures de *P. richardsoni* et la femelle et les immatures de *P. fulviventris*; nous décrivons la pupa de *P. pseudoviridis* et une larve appartenant possiblement à *P. pseudoviridis*; et nous figurons la pupa de *Pseudochironomus* cf. *prasinatus* Staeg.

Nous donnons des diagnoses et des clés génériques des imagos et des immatures du complexe *Harnischia*. Nous décrivons quatre genres nouveaux: *Cyphomella*, *Chernovskiiia*, *Beckiella* et *Robackia*, et redéfinissons *Gillotia* Kieffer et *Demicryptochironomus* Lenz. Nous décrivons les mâles de quatre nouvelles espèces : *Cryptotendipes pillicuspis*, *Cyphomella gibbera*, *Cyphomella cornea* et *Robackia pillicauda*; nous décrivons ou redécrivons tous les stades de quatre autres : *Chernovskiiia orbicus* (Town.) n.comb., *Beckiella tethys* (Town.) n.comb., *Robackia claviger* (Town.) n.comb. et *Gillotia alboboviridis* (Mall.) n.comb. et les imagos de la pupa de *Chernovskiiia amphitrite* (Town.) n.comb.; nous décrivons les immatures de *Cyphomella* sp., la larve et en partie la pupa de *Robackia demejerei* (Krus.) n.comb. et deux larves d'affinités incertaines, «*Cryptochironomus*» cf. *rolli* Kirp. et «*Cryptochironomus*» proche de *rolli* Kirp. Nous donnons des clés pour tous les stades de *Chernovskiiia* n.gen., les mâles connus de *Cryptotendipes* Lenz, de *Cyphomella* n.gen., de *Demicryptochironomus* Lenz, de *Gillotia* Kieff. et pour les mâles et les larves de *Beckiella* n.gen. et de *Robackia* n.gen. Nous démontrons que *Schadinia* Lipina est synonyme senior de *Demicryptochironomus* Lenz, mais nous en proposons la suppression. *Cladopelma* Kieffer (sensu Lenz) est synonyme de *Microchironomus* Kieffer. Nous signalons d'autres synonymes possibles et donnons 24 nouvelles combinaisons génériques.

INTRODUCTION

My research on chironomids the last 8 years has centered on three main projects or long-range objectives. The first concerns the taxonomy and ecology of species or groups of species important as members of communities indicating trophic levels. (Sæther (1975c) is a summary of these findings.) The second is a comparative study of the morphology of the female genitalia to enable the identification of females and to arrange the subfamilies, tribes, and genera hierarchically (Sæther 1977). The third is a study of the taxonomy and ecology of the benthic invertebrates of Lake Winnipeg, Man. The three groups of chironomids treated here, although only distantly related to one another taxonomically, are connected with each main objective. Most species treated of the three groups are inhabitants of streams and rivers or of the sandy littoral zone primarily of mesotrophic to oligotrophic lakes. The female genitalia of all three groups are very characteristic and of eminent importance in the erection of a phylogenetic system. The three groups are well represented in Lake Winnipeg and each group contains at least one new species from the lake. Because the treatment of these groups is necessary to complete the study on the female genitalia and the Lake Winnipeg project, and is important in the continuing work on indicator communities, they have been combined into a single bulletin.

METHODS AND MORPHOLOGY

The mounting procedure is outlined by Sæther (1969 p. 1). In general the terminology follows Sæther (1971, 1974, 1975a, b). Characters not mentioned there, plus measurements and ratios, follow Schlee (1966) with the additions and modifications given by Sæther (1969, 1975a, b).

Terminology for the appendages of the gonocoxite and/or the gonapophysis is different for the three groups treated. The basal lobe of *Nanocladius* Kieff. almost certainly is no true endomere, while in *Pseudochironomus* Mall. at least some appendages are likely to be true endomeres, and in the *Harnischia* complex the two appendages probably incorporate parts of the gonapophyses. The neutral term basal lobe is retained for *Nanocladius*. In *Pseudochironomus* the terminology of Hirvenoja (1973) is used, except the term "paramere" (= endomere) is replaced by volsella (= appendage of gonapophysis IX and/or gonocoxite IX excluding the gonostylus). In the *Harnischia* complex the terms inferior and superior volsellae are used.

In the following descriptions the measurements are given as ranges followed by a mean when four or more measurements have been made and again followed by a number in parentheses giving the number measured (n).

Holotypes have been deposited in the Canadian National Collection (CNC) in Ottawa, Ont., or at Zoologisches Sammlung des Bayerischen Staates, München, Germany. Remaining paratypes are returned to lender or are retained in the collection of the Freshwater Institute, Winnipeg, Man.

In addition to the abbreviations and ratios outlined in Sæther (1969, 1975a) the following are used for pupae:

Dc ₁₋₄	anterior to posterior dorsocentrals (with Dc ₂ always regarded as the smaller seta even when situated posterior to Dc ₃)
LA	lateral antepnotal(s)
MA	median antepnotals
PcS ₁₋₃	anterior to posterior (smaller) precorneal seta(e)
Po	postorbital(s)
PSA	pedes spurii A
PSB	pedes spurii B
T	tergite(s) (used also for adults)
TH/AM	length of thoracic horn/length of anal macrosetae

NEARCTIC AND ETHIOPIAN *NANOCLADIUS* KIEFFER (SYN. *MICROCRICOTOPUS* THIENEMANN AND HARNISCH)

Freeman (1956 p. 338) mentioned several genera including *Microcricotopus* as synonyms of *Nanocladius* Kieffer, 1913. These synonyms were accepted by Sublette and Sublette (1965 p. 154), but Sublette (1967 p. 310, 1970 p. 67) restricted *Nanocladius* to a senior synonym of *Microcricotopus* only. As mentioned by Fittkau and Lehmann (1970 p. 391) the type species of *Nanocladius*, *Nanocladius vitellinus* Kieff., as well as *Nanocladius brunneus* Freeman, 1956 (p. 339–340) differs from other species by having setae on the anal point, an antennal ratio of less than 0.4, and femora of middle and hind legs without a broad proximal dark ring. The Nearctic species of the genus examined have very characteristic female genitalia which are easily separable from those of all other genera. It was felt, therefore, that an examination of the Ethiopian females might solve the question of whether *Nanocladius* was a senior synonym of *Microcricotopus*. Two males and four females determined as *Nanocladius vitellinus* Kieff. (two of them paratypes of *Eukiefferiella* (*Microcricotopus*) *niveipluma* Freeman, 1953) were examined. The male had an antennal ratio of 0.7, there were indications of broad proximal dark rings on the femora, and the females had genitalia nearly identical to one Nearctic species, *Nanocladius* (*Nanocladius*) *incomptus* n.sp., a close relative of *Nanocladius* (*Nanocladius*) *balticus* (Palm.) n.comb. There is thus no doubt that *Nanocladius* has to be regarded as a senior synonym of *Microcricotopus*, with the Ethiopian species together with *N. balticus* and *N. incomptus* forming an apomorphic species group within the genus.

The generic diagnosis given by Fittkau and Lehmann (1970 p. 393–394) for adults and pupa must be amended to include *Plecopteracoluthus* Steffan, 1965 as shown by a new species described below and to accommodate some new species. It is now also feasible to give a diagnosis for the female genitalia as well as for the larva.

Nanocladius Kieffer, 1913 emended

Nanocladius Kieffer, 1913: 31; Sublette 1967: 310, 1970: 67

Spaniotoma subgen. *Eukiefferiella*, Edwards 1929: 350 pro parte, nec Thienemann 1926: 325

Eukiefferiella, Goetghebuer 1932: 98 pro parte, nec Thienemann 1926: 325

Microcricotopus Thienemann and Harnisch, 1932: 137; Brundin 1956: 120; Fittkau and Lehmann 1970: 393

Eukiefferiella subgen. *Microcricotopus* Thien. et Harn. Goetghebuer 1940–50: 114; Freeman 1953: 203

Nanocladius, Freeman 1954: 175, 1956: 338; Sublette and Sublette 1965: 154, pro parte

Plecopteracoluthus Steffan, 1965: 1330 n.syn.

Fittkau and Lehmann's (1970) diagnosis for adults and pupae should be emended as follows (other characteristics in accordance with Fittkau and Lehmann (1970 p. 393–394)):

IMAGINES

Genae not, to strongly excavated; AR 1.3 or lower; scutellum with 2–13 setae; squama with 0–19 setae; pulvilli present or absent; sternite VIII of female sometimes forms a floor under anterior part of vagina; T IX of female with caudal square-cut emargination nearly dividing tergite into 2 setigerous protrusions, or faintly to more strongly divided into 2 setigerous protrusions; gonocoxite IX large, larger than T IX in lateral view; gonapophysis VIII divided into broadly triangular ventrolateral and narrow, usually distinct dorsomesal lobes, with weak apodeme lobe usually visible between principal lobes; 2 oblong seminal capsules with a few weak microtrichia

and spermathecal ducts placed on oral portion of mesal long side; spermathecal ducts with weak bend or loop and common opening; segment X normal; postgenital plate relatively well developed; cerci normal, small to medium in size.

PUPA

Total length 1.6–4.1 mm; pedes spurii B present or absent; row of hooklets caudomesally on T II either not on protuberance, or on strong protuberance; segments II–V with 1–3 nonfilamentous L-setae; segment VI with 1–4 L-setae, 0–3 filamentous; segment VII with 1–4 L-setae, 0–4 filamentous; segment VIII with 4–5 filamentous L-setae; median spine-patch absent, present on T IV–VII, on IV–VI, on V and VI, on VI and VII, or only on VII.

LARVA

Small larva (total length of fourth instar 1.5–5.0 mm); coloration whitish to yellowish, or brownish green with yellow to light brown head capsule with darker posterior margin; antenna 5-segmented, segments consecutively smaller, segment 5 hairlike and vestigial, AR 1.0–2.3; Lauterborn organs distinct; antennal blade shorter than flagellum; ringorgan in basal fourth, with relatively long seta at about same height; S I–III all weak and simple, labral spinulae and chaetae reduced or absent; pecten epipharyngis consists of 3 simple, sclerotized, smooth, sharply pointed spines; apparently only one pair of simple chaetulae basales, 6 or 7 pairs of chaetulae laterales, all simple, anterior ones much smaller than posterior ones; premandible with a simple or faintly divided apical tooth, or with 3–5 apical teeth; mandible with seta interna and relatively long and pointed seta subdentalis, apical tooth clearly longer than combined width of remaining teeth; maxilla with most chaetae and lamellae shortened, basal segment of maxillary palp about as high as wide; premento–hypopharyngeal complex without hypopharyngeal scales and with reduced number of chaetulae and lamellae; mentum with a broad to extremely broad, partially double, median tooth, and 3, 5, or 6 pairs of lateral teeth, normally 6 pairs, but first and second pairs sometimes fused, or first, second, and third lateral teeth fused with median tooth, lateral teeth occasionally very indistinct and minute, but usually distinct; ventromental plates large to extremely long, with a rounded or a straight caudolateral apex, without setae underneath, but occasionally with a brush of setae on small plates to each side of mentum; parapods well developed, anterior parapods with claws smooth, a few very weakly serrated, or most strongly serrated; procerci well developed, brownish to blackish sclerotized caudally, probably always with 2 or 3 small spines or tubercles, with 5 or 6 apical anal setae; supraanal setae inconspicuous or apparently absent; 4 digitiform anal tubules usually with basal and median constrictions, either all tubules of approximately same length and shorter than posterior parapods, or one pair longer than posterior parapods.

REMARKS

The subgenus *Nanocladius* appears to consist of three species groups: the *bicolor* group including *N. bicolor* (Zett.), *N. distinctus* (Mall.), *N. mallochi* (Subl.), *N. minimus* n.sp., and *N. anderseni* n.sp.; the *parvulus* group consisting of *N. parvulus* (Kieff.) n.comb., *N. rectinervis* (Kieff.) n.comb., *N. spiniplenus* n.sp., and probably *N. alternantherae* Dendy et Subl.; and the *balticus* group consisting of *N. balticus* (Palm.) n.comb., *N. incomptus* n.sp., *N. niveiplumus* (Freem.), *N. brunneus* Freem., *N. crassicornus*, n.sp., and probably *N. vitellinus* Kieff. Without knowing all stages of more members of the *balticus* group it is not clear whether the *bicolor* group is the plesiomorphic sister group of the *parvulus* and *balticus* groups combined, or if the *balticus* group is the apomorphic sister group of the two other groups combined. In the last case there might be justification for using the subgeneric name *Microcricotopus* for the *bicolor* plus *parvulus* groups and *Nanocladius* for the *balticus* group.

One key character used by Fittkau and Lehmann (1970) to separate the species of *Nanocladius* is the distribution of setae on the tergites (Fig. 1, 2). This character does not hold up, at least not for the Nearctic populations of *N. rectinervis*. Reared specimens of this species have either an irregular double row of setae or a single row (Fig. 1G, H). Nearctic specimens regarded here as *N. parvulus* have a double row of setae on the tergites (Fig. 2A), not a single row as found by Fittkau and Lehmann (1970 fig. 4b). No pupae of this species, however, have been found.

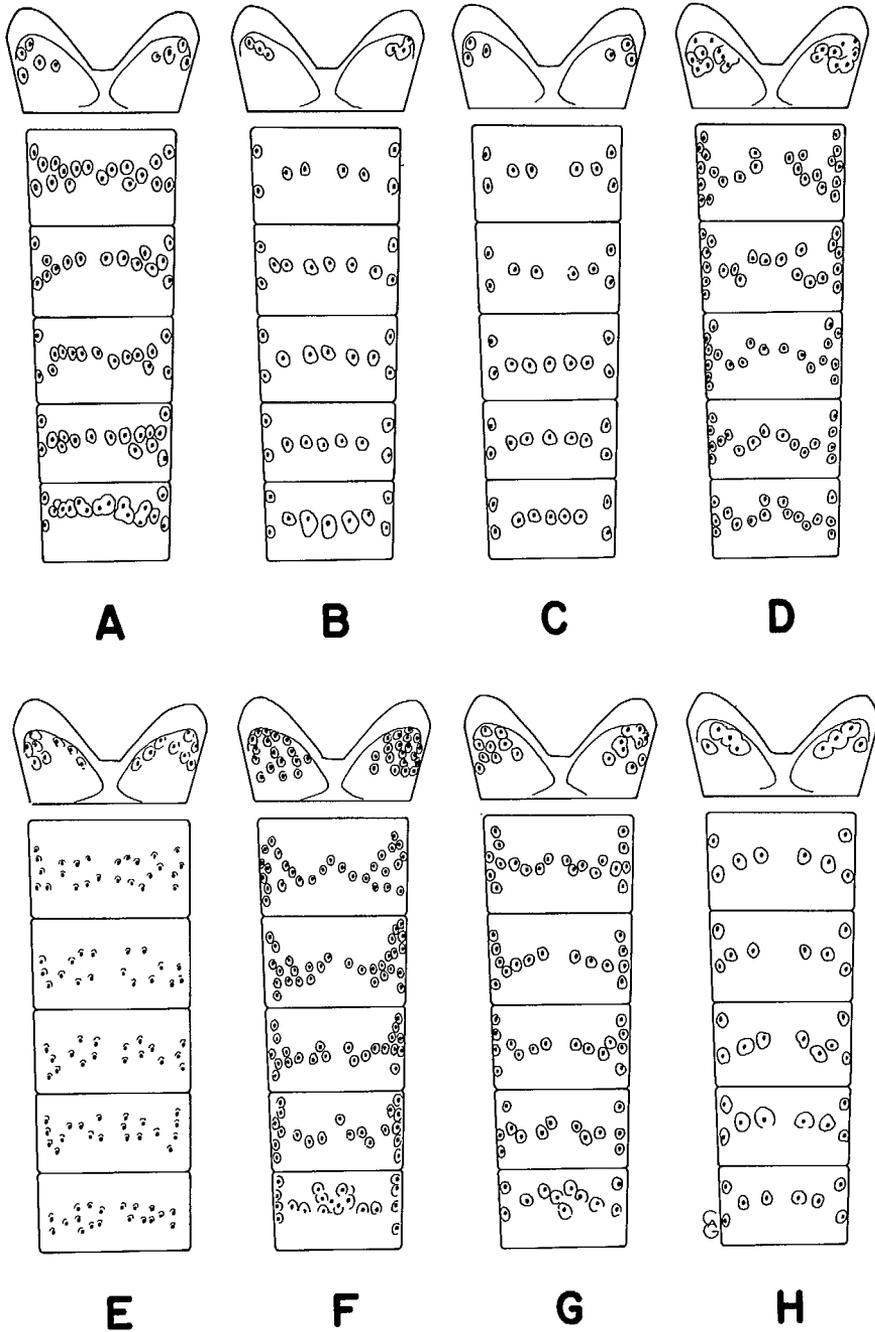


FIG. 1. *Nanocladius* (*Nanocladius*) spp., imagines tergites I, III-VII. A-B, *N. (N.) anderseni* n.sp., males. C, *N. (N.) minimus* n.sp., male. D, *N. (N.) distinctus* (Mall.), male. E, *N. (N.)* cf. *bicolor* (Zett.), female. F, *N. (N.)* cf. *alternantherae* Dendy et Subl., male. G-H, *N. (N.) rectinervis* (Kieff.) n.comb., males.

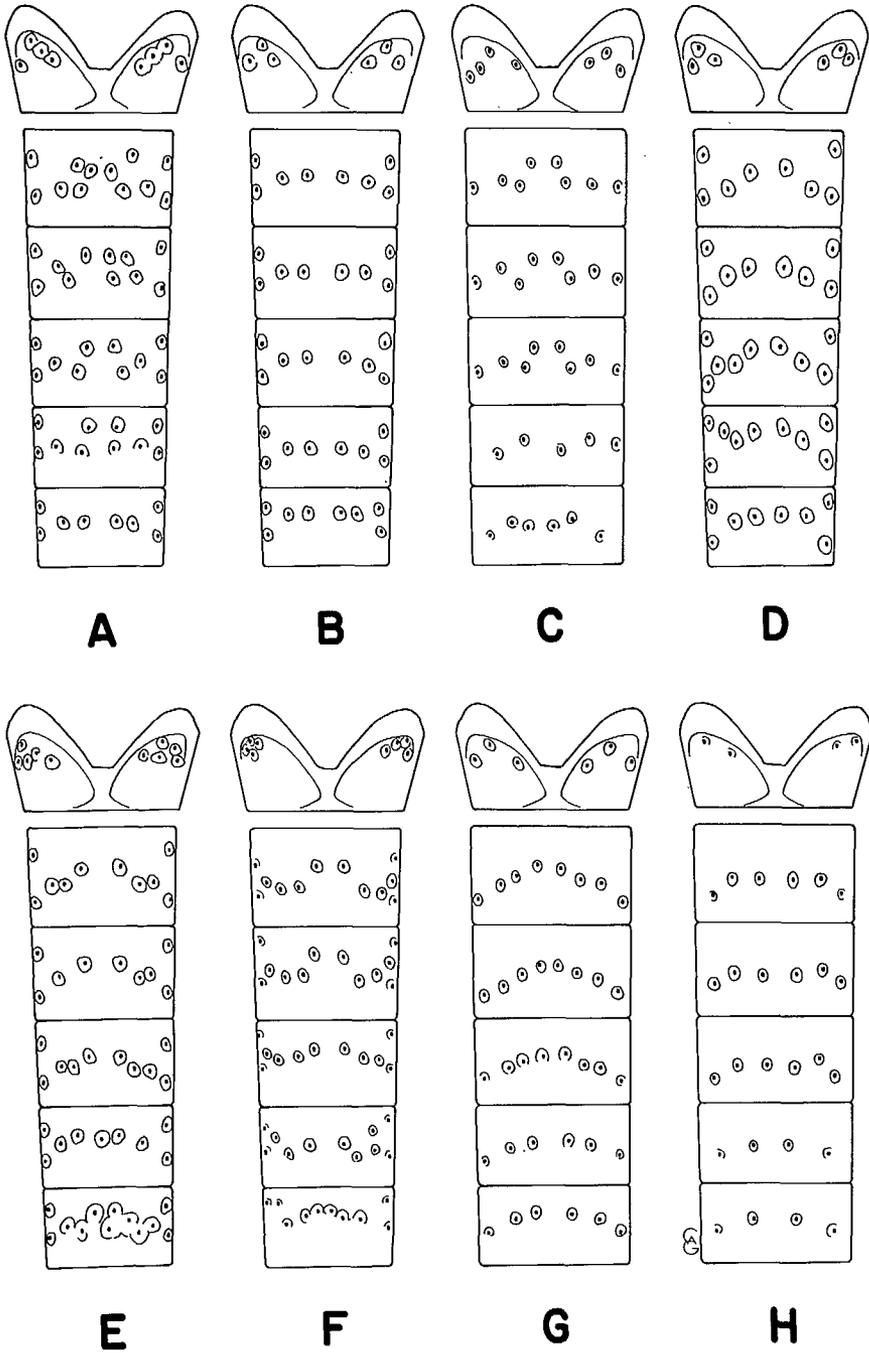


FIG. 2. *Nanocladus (Nanocladus)* spp., imagines, tergites I, III-VII. A, *N. (N.)* cf. *parvulus* (Kieff.) n.comb., male. B-C, *N. (N.) spinipennis* n.sp.: B) male, C) female. D, *N. (N.) incomptus* n.sp., male. E, *N. (N.)* cf. *balticus* (Palm.) n.comb., male. F-G, *N. (N.) niveiplumus* (Freem.): F) male, G) female. H, *N. (N.)* cf. *vitellinus* Kieff., female.

Similarly there is a Nearctic species which, according to AR and LR, apparently belongs to *N. balticus*, but it has a normal coloration. A larva in transition to pupa with the pupal characteristics of *N. balticus* has been found, so the adults are assumed to belong to a color variety of *N. balticus*. However, there appear to be two size varieties of larvae with slightly larger larvae west of the Rocky Mountains. A female from Ellesmere Island, N.W.T., is tentatively regarded as *N. bicolor*, but it has as many as 12–14 setae on the squama.

Because there are very few characters to separate the adults, an identification without associated pupae can only be regarded as tentative. The pupae, however, are easily distinguishable and two new species are described here primarily on the basis of their pupal exuvia. The differences between *N. distinctus*, *N. anderseni*, and *N. minimus* also are primarily based on differences in the pupae.

It appears that adults can be separated on a combination of AR, leg ratios, setae on squama and tergites, and shape of basal lobe of gonocoxite in the males; and presence or absence of a floor under the anterior part of vagina, shape of Gp VIII, size of cerci, and number of setae on T IX and gonocoxite IX in the females. Whether these differences really hold up can only be shown by rearing a large number of adults from pupae. Thus the following keys to adults are, at least in part, preliminary.

Key to known males of *Nanocladius* Kieff.

- | | | |
|---|---|----|
| 1 | Genae not or scarcely excavated; either pulvilli absent or scutellum with more than 6 setae | 2 |
| | Genae clearly excavated; pulvilli present and well developed; scutellum with 2–6, usually 2 setae | 3 |
| 2 | Pulvilli absent; prealars absent; scutellum with 4–6 setae | 4 |
| | Pulvilli present; prealars present; scutellum with about 13 setae ¹ | 5 |
| 3 | Anal point with a few very weak apical and preapical setae; basal lobe of gonocoxite triangular, pointed | 4 |
| | Anal point proper without setae or microtrichia; basal lobe of gonocoxite triangular and pointed or approximately square or rounded | 5 |
| 4 | Ultimate flagellomere with about 10–12 long curved apical setae, plume setae white | 6 |
| | Ultimate flagellomere with short apical setae only, plume setae dark | 7 |
| 5 | Basal lobe of gonocoxite approximately square or rounded | 6 |
| | Basal lobe of gonocoxite triangular, pointed | 10 |
| 6 | T I–III yellow; anal point slightly expanded at apex; squama with 1 or 2 setae; scutellum with 2 setae | 7 |
| | T I–III mostly dark; anal point tapering; squama with 0–10 setae; scutellum with 2–6 setae | 7 |

¹ This new species is known only from larvae and a female reared from pupa. However, as an eventual male easily will key out to this couplet it has been included in the key.

- 7 Tergite setae irregularly double on all tergites (Fig. 1E); AR 0.6–0.9
 *N. (N.) bicolor* (Zett.) (Holarctic ?, see p. 30)
- Tergite setae in single row at least on 3 tergites or at least on T VI and VII; AR
 0.9–1.3 or 0.5–0.7 8
- 8 AR 0.9–1.3; T I with 8–18, mean 13 setae; T II–VIII (Fig. 1D) with 11–30, mean 17
 setae; squama with 2–10, usually more than 3 setae; scutellum with 2–6, usually 4 setae
 *N. (N.) distinctus* (Mall.) (Nearctic, p. 25)
- AR 0.5–0.7; T I with 3–11, mean 4 or 9 setae; T II–VIII with 6–19, mean 8 or 12
 setae; squama with 0–3, usually 1 or 2 setae; scutellum always with 2 setae 9
- 9 T I (Fig. 1C) with 3–6, mean 4 setae; T II–VIII (Fig. 1C) with 6–10, mean 8 setae;
 AR 0.47–0.63, mean 0.54 *N. (N.) minimus* n.sp. (Nearctic, p. 21)
- T I (Fig. 1A, B) with 6–11, mean 9 setae; T II–VIII (Fig. 1A, B) with 8–19, mean
 12 setae; AR 0.52–0.66, mean 0.60 *N. (N.) anderseni* n.sp. (Nearctic, p. 16)
- 10 Anal point often slightly expanded preapically; squama with about 7–11 setae; AR
 0.9–1.2 *N. (N.)
 alternantherae* Dendy et Subl. (including *N. (N.) cf. alternantherae*) (Nearctic, p. 32)
- Anal point tapering; squama with 0–8 setae; AR 0.42–1.15 11
- 11 AR 0.46–0.52; LR₁ 0.54–0.56; LR₃ 0.45–0.49; squama with 0–2 setae
 *N. (N.) incomptus* n.sp. (Nearctic, p. 43)
- AR 0.42–0.95, when lower than 0.60 LR₁ higher than 0.57 and LR₃ higher than 0.48;
 squama with 1–8 setae 12
- 12 AR 0.42–0.63; LR₁ 0.58–0.67 13
- AR 0.66–1.15; LR₁ 0.63–0.69 or 0.55–0.63 14
- 13 AR 0.42–0.53; LR₁ 0.58–0.61; LR₃ 0.49–0.56; squama with 1 or 2, usually 2 setae
 *N. (N.) spiniplenus* n.sp. (Nearctic, p. 37)
- AR 0.56–0.63; LR₁ 0.62–0.69; LR₃ 0.53–0.57; squama with 1–4, usually 3 setae
 *N. (N.) parvulus* (Kieff.) n.comb. (including *N. (N.) cf. parvulus*) (Holarctic, p. 36)
- 14 AR 0.79–1.15; LR₁ 0.63–0.69; thorax and abdomen brown to blackish brown with
 setae on tergites in sharply delineated lighter spots 15
- AR 0.66–0.78; LR₁ 0.55–0.63; thorax and abdomen either brown to blackish brown
 with setae on tergites in sharply delineated spots or brownish yellow without delineated
 spots 16
- 15 AR 0.79–0.95, laterosternite IX with 2 or 3 setae; HV 2.7–3.0
 *N. (N.) rectinervis* (Kieff.) n.comb. (Holarctic, p. 33)
- AR about 1.15, laterosternite IX with about 5 setae; HV apparently about 3.6
 *N. (N.) crassicornus* n.sp. (Nearctic, p. 51)
- 16 Thorax and abdomen brownish yellow, with setae on tergites not in sharply delineated
 spots *N. (N.) balticus* (Palm.) n.comb. (Palearctic)
- Thorax and abdomen brown to blackish brown, with setae on tergites in sharply
 delineated lighter spots *N. (N.) cf. balticus* (Palm.) var.² (Nearctic, p. 45)

²The imagines examined were not associated with the immatures and were not from the same locality. However, a larva in transition to pupa shows the pupal characteristics of *N. balticus* and it seems very likely that *N. balticus* is represented in North America by this color variety.

Preliminary key to females of *Nanocladius* Kieff.

- 1 Pulvilli present or absent; if present squama, scutellum, and gonocoxite IX all with more than 11 setae *Nanocladius* subgen. *Plecopteracoluthus* Steff. n.stat. (Nearctic) 2
- Pulvilli present; squama at most with 14 setae; scutellum at most with 6 setae; gonocoxite IX at most with 11 setae *Nanocladius* subgen. *Nanocladius* Kieff. (Holarctic and Ethiopian) 3
- 2 Pulvilli absent; squama with about 5 setae; scutellum with 4–8 setae; gonocoxite IX with about 8 or 9 setae *N. (P.) downesi* (Steff.) n.comb.
- Pulvilli present; squama with about 19 setae; scutellum with about 13 setae; gonocoxite IX with about 18 setae *N. (P.) branchicolus* n.sp. (p. 12)
- 3 T IX with 11–19 setae; coronal suture usually absent, never complete 4
- T IX with 2–8 setae; coronal suture absent to complete 5
- 4 Sternite VIII does not form a floor under anterior part of vagina; lobes of gonapophyses VIII distinct and separate; notum about 146 μm ($n = 1$) long; T IX with about 19 ($n = 1$) setae *N. (N.)* cf. *bicolor* (Zett.) (Holarctic, see p. 30)
- Sternite VIII forms a floor under anterior part of vagina; lobes of gonapophyses VIII less distinct and partly overlapping; notum about 76–85 μm long; T IX with about 11 or 12 setae *N. (N.) spiniplenus* n.sp. (Nearctic, p. 38)
- 5 Sternite VIII does not form a floor under anterior part of vagina (or possibly with a small floor in *N. (N.) distinctus* (Mall.)); lobes of gonapophyses VIII distinct and separate; R_{4+5} with about 5 setae 6
- Sternite VIII forms a floor under anterior part of vagina; lobes of gonapophyses VIII less distinct and partly overlapping; R_{4+5} with 1–3 or with 6–10 setae 8
- 6 Notum about 1.8 times as long as seminal capsule, but only about 1.05 times as long as cercus *N. (N.) minimus* n.sp. (Nearctic, p. 21)
- Notum about 1.2–1.5 times as long as seminal capsule, and 1.4–2.0 times as long as cercus 7
- 7 Gonocoxite IX with about 10 or 11 setae; notum about 1.4 times as long as cercus *N. (N.) anderseni* n.sp. (Nearctic, p. 17)
- Gonocoxite IX with about 7 setae; notum nearly twice as long as cercus *N. (N.) distinctus* (Mall.) (Nearctic, p. 27)
- 8 R_{4+5} with 6–10 setae; R with 5–7 setae; notum about 101–108 μm long *N. (N.) niveiplumus* (Freem.) (Ethiopian, p. 54)
- R_{4+5} with 1–3 setae; R with 0–4 setae; notum 70–86 μm long 9
- 9 Four flagellomeres; R without setae; R_{4+5} with 1 seta; gonocoxite IX with about 3 setae; tentorium only $\frac{2}{3}$ as long as stipes *N. (N.)* sp. ? *vitellinus* Kieff. (Ethiopian, p. 56)
- Five flagellomeres; R with 2–4 setae; R_{4+5} with 2 or 3 setae gonocoxite IX with 5 or 6 setae; tentorium about as long as stipes *N. (N.) incomptus* n.sp. (Nearctic, p. 44)

Note: *N. (N.) rectinervis* (Kieff.) n.comb. and *N. (N.) parvulus* (Kieff.) n.comb. will probably key out near *N. (N.) spinipennis*; *N. (N.) alternantherae* Dendy et Subl. near *N. (N.) niveiplumus*; *N. (N.) mallochi* (Subl.) to couplet 7; and *N. (N.) balticus* (Palm.) n.comb. and *N. (N.) crassicornus* n.sp. to couplet 9.

Key to known pupae of *Nanocladius* Kieff.

- 1 PSB absent; row of hooklets on T II not on distinct protuberance; T IV–VII with distinct patches of spines or patches indicated only by shagreenation on IV, V, and VII; caudal spines indicated on T VII; frontal setae short (about 70 μm long) *Nanocladius* subgen. *Plecopteracoluthus* Steff. (Nearctic) 2
- PSB well developed; row of hooklets on T II on distinct protuberance; at most T IV–VI with median patches of spines or spinules; caudal spines usually not present on T VII; frontal setae usually much longer than 70 μm *Nanocladius* subgen. *Nanocladius* Kieff. (Holarctic and Ethiopian) 3
- 2 Segments V–VII with 1 nonfilamentous L-seta; median patches of spines well developed only on T V and VI; anal lobe with 15–20 setae in fringe *N. (N.) downesi* (Steff.) n.comb. (Nearctic)
- Segments V–VII with 3 or 4 L-setae, slightly broadened on VII; median patches of spines well developed on T IV–VII; anal lobe with about 49 ($n = 1$) setae in fringe *N. (P.) branchicolus* n.sp. (Nearctic, p. 12)
- 3 Thoracic horn short and broad, 1.8–2.8 times as long as wide 4
- Thoracic horn elongate, digitiform or tapering to a point, 3.2–11.5 times as long as wide 6
- 4 T IV–VII with median spine patch (reduced on IV); thoracic horn about 170–204 μm long *N. (N.) crassicornus* n.sp. (Nearctic, p. 52)
- At most T VI and VII with median spine patch; thoracic horn 54–81 μm or 100–150 μm long 5
- 5 T VI and/or VII with median spine patch; segment VIII with 5 filamentous L-setae; segment VII with 1 or 2 filamentous L-setae; thoracic horn 100–150 μm long *N. (N.) balticus* (Palm.) n.comb. (Holarctic, p. 49)
- No tergite with median spine patch; segment VIII with 4 filamentous L-setae; segment VII with 4 nonfilamentous L-setae; thoracic horn 54–81 μm long *N. (N.) incomptus* n.sp. (Nearctic, p. 44)
- 6 Segments VI and VII without filamentous L-setae; thoracic horn 3–4 times as long as wide (Fittkau and Lehmann 1970 fig. 3c, d); integuments III/IV and IV/V with complete rows of spinules (Fittkau and Lehmann 1970 fig. 6a) *N. (N.) parvulus* (Kieff.) n.comb. (Holarctic; however see p. 3, 37)
- Segment VI with 0–3, segment VII with 1–4 filamentous L-setae; thoracic horn 4.7–11.4 times as long as wide; integument III/IV usually with complete rows of spinules; integument IV/V without spinules, with interrupted rows of spinules, or occasionally with complete rows 7
- 7 Thoracic horn digitiform without apical spinules (Dendy and Sublette 1959 fig. 12); T VIII with weak caudal spines (Dendy and Sublette 1959 fig. 11) *N. (N.) alternantherae* Dendy et Subl. (Nearctic)
- Thoracic horn usually tapering, when digitiform with prominent apical spines or spinules; T VIII without caudal spines 8
- 9

- 8 Thoracic horn digitiform or very slightly tapering, with distinct apical spines; segment VI with 1–3 filamentous L-setae; T IV–VI and occasionally VII with median patches of spines; integuments IV/V with complete or medially interrupted rows of spinules 9
- Thoracic horn distinctly tapering to a point; segment VI without filamentous L-setae, or when with 1, median spine patches only on T V and VI and integument IV/V without distinct spinules 10
- 9 Thoracic horn 0.9–1.4 times as long as the thin and short (0.11–0.18 mm long) anal macrosetae; frontal setae 0.18–0.24 mm long; Dc_3 nearly always closer to Dc_4 than to Dc_1 ; caudal spines on T VI short (at most 16–26 μm long); integument IV/V with short interrupted or complete row of spinules
N. (N.) spiniplenus n.sp. (Nearctic, p. 38)
- Thoracic horn 0.6–0.8 times as long as the thick and long (0.26–0.35 mm long) anal macrosetae; frontal setae 0.07–0.12 mm long; Dc_3 nearly always distinctly closer to Dc_1 than to Dc_4 ; caudal spines on T VI long (36–49 μm); integument IV/V with rows of spinules distinctly interrupted medially
N. (N.) rectinervis (Kieff.) n.comb. (Holarctic, p. 33)
- 10 Segment VI with 4 L-setae, 1 filamentous; T IV without median patch of spines; integument IV/V without distinct spinules
N. (N.) bicolor (Zett.) (Holarctic ?, see p. 30)
- Segment VI with 4 nonfilamentous L-setae; T IV with or occasionally without median patch of spines; integument IV/V with complete to medially more or less broadly interrupted rows of spinules 10
- 11 Thoracic horn only slightly wider near base than at $\frac{1}{3}$ from base; anal macrosetae thick (about 2.5 μm) and only slightly shorter than thoracic horn; anal lobe with 20–44 setae in fringe
N. (N.) distinctus (Mall.) (Nearctic, p. 27)
- Thoracic horn 2.5–4.0 times wider near base than at $\frac{1}{3}$ from base; anal macrosetae thin (about 1.5 μm) and distinctly shorter than thoracic horn; anal lobe with 10–32 setae in fringe 12
- 12 Anal lobe with 27–32 setae in fringe; rows of spinules in integument IV/V not or very narrowly interrupted
N. (N.) anderseni n.sp. (Nearctic, p. 17)
- Anal lobe with 10–15 setae in fringe; rows of spinules in integument IV/V broadly interrupted
N. (N.) minimus n.sp. (Nearctic, p. 22)

Preliminary key to known larvae of *Nanocladius* Kieff.

- 1 Ventromental plates large, but not extremely elongate, straight at caudal apex; claws of anterior parapods often serrated; AR 1.5–2.3 2
- Ventromental plates extremely elongate, rounded at caudal apex; claws of anterior parapods mostly smooth, occasionally strongly serrated; AR 1.0–2.3 4
- 2 First 2 pairs of lateral mental teeth fused, making a mentum with 11 teeth (Steffan 1965 fig. 19); small plate to each side of mentum with fringe of setae (Steffan 1965 fig. 17); AR about 2.3; larvae in gelatinous cases woven in between setae of tibiae and cerci, or attached to surface of wing sheaths of immature Perlidae (Plecoptera)
N. (Plecopteracoluthus) downesi (Steff.) n.comb. (Nearctic)
- Mentum with 13 teeth; no apparent setose plate laterad of mentum; AR 1.5–2.0; either in silken cases among gills under wing sheaths of Perlidae, or freeliving 3

- 3 AR about 2.0; claws of anterior parapods probably weakly serrated; on higher vascular plants *N. (N.) alternantherae* Dendy et Subl. (Nearctic)
 AR about 1.5; claws of anterior parapods strongly serrated, among gills of immature Perlidae *N. (Plecopteracoluthus) branchicolus* n.sp. (Nearctic, p. 13)
- 4 Mentum with weak, very indistinct lateral teeth; premandible with 3–5 apical teeth; AR 1.00–1.30; basal antennal segment 16–28 μm long 5
 Mentum with strong distinct teeth; premandible with simple or faintly bifid apical tooth; AR 1.35–2.35; basal antennal segment 38–70 μm long 7
- 5 Basal antennal segment about 16–18 μm long; postmentum about 96–116 μm long; mentum as in Fig. 18D *N. (N.) incomptus* n.sp. (Nearctic, p. 44)
 Basal antennal segment 22–28 μm long; postmentum 140–182 μm long; mentum as in Fig. 19G 6
- 6 Postmentum about 140–154 μm long; head capsule length 0.22–0.28 mm
 *N. (N.) cf. balticus* (Palm.) n.comb., var. (p. 49) (Holarctic ? p. 7)
 Postmentum about 178–182 μm long; head capsule length about 0.30–0.31 mm
 *Nanocladius (N.)* sp. near *balticus* (Palm.) (Nearctic, p. 51)
- 7 AR 1.35–1.60; claws of anterior parapods strongly serrated 8
 AR 1.75–2.35; claws smooth or weakly serrated, except perhaps in *N. (N.) parvulus* (Kieff.) 9
- 8 Basal antennal segment 46–58 μm long (Lindegard-Petersen 1972 p. 487)
 *N. (N.) rectinervis* (Kieff.) n.comb. (Holarctic, p. 33)
 Basal antennal segment about 38 μm long *N. (N.) spiniplenus* n.sp. (Nearctic, p. 39)
- 9 AR about 2.35 (Albrecht 1924 p. 194)
 *N. (N.) parvulus* (Kieff.) (?) n.comb. (Holarctic, see however p. 37)
 AR 1.75–2.10 10
- 10 Head capsule length 0.32–0.38 mm; postmentum 160–186 μm long; basal antennal segment 56–60 μm long
 *N. (N.) distinctus* (Mall.) (Nearctic, p. 29) and *N. (N.) bicolor* (Zett.) (Holarctic ? p. 30)
 Head capsule length about 0.27–0.28 mm; postmentum 140–156 μm long; basal antennal segment about 46 μm long *N. (N.) anderseni* n.sp. (Canada and U.S. Midwest, p. 20) and *N. (N.) minimus* n.sp. (South Carolina, p. 22)

Nanocladius subgen. *Plecopteracoluthus* Steffan, 1965 n.stat. emended

DIAGNOSIS

Imagines with genae not or only weakly excavated, scutellum with 4–13 setae; squama with 4–19 setae, pulvilli present or absent. Pupa with short frontal setae, without PSB, without protuberance caudally on T II, occasionally with only one L-seta on segments II–VII. Larvae with caudolateral end of ventromental plates nearly straight, occasionally with setose plate laterad of mentum, with serrated claws on anterior parapods, with 4 anal tubules of subequal length and slightly shorter than posterior parapods.

REMARKS

In the adults only the nonexcavated or weakly excavated genae separate both species of the subgenus from all species of the subgenus *Nanocladius*. Other characters (such as absence of the pulvilli in *N. (P.) downesi* (Steff.) n.comb.) not only separate one species from all members of the subgenus *Nanocladius* but also from the other species of the subgenus *Plecopteracoluthus*. Similarly, only the absence of PSB and of a protuberance caudally on T II separate both pupae from all pupae of the other subgenus. In the larvae there are apparently no single characters that will separate both species from all members of the other subgenus. Since PSB may be present or absent within the same genus (see for instance Hirvenoja 1973; Sæther 1975b) this character alone cannot justify a separation into full genera. The genae appear to be very slightly excavated in *N. (P.) branchicolus* n.sp. and do not always appear to be very strongly excavated in the subgenus *Nanocladius* i.e. this is a gradual difference. All in all, the species of *Plecopteracoluthus* appear to be nothing more than forms of *Nanocladius* specialized for symphoretic (sensu Keiser and Stammer) association with immature Plecoptera. The separating characters, however, appear to be sufficient to maintain a separate subgenus.

Nanocladius (Plecopteracoluthus) branchicolus n.sp. (Fig. 3, 4)

Spaniotoma sp. *F* Johannsen 1937a: 5, n.syn.

The female imago is characterized by a wing length of about 1.8 mm; presence of pulvilli; about 13 setae on scutellum; 19 setae on squama; 20 setae on T IX; 18 setae on gonocoxite IX.

Pupa with 3 L-setae on segments II–VI; 4 slightly broadened L-setae on VII; distinct spine patches on T IV–VII; about 50 setae in fringe of anal lobe.

Larva apparently without setose plate laterad of mentum; mentum with 6 pairs of lateral teeth.

FEMALE IMAGO ($n = 1$)

Wing length about 1.8 mm. Wing length/length of profemur about 3.3.

Head (Fig. 3A) — AR = 0.53. Flagellomeres length (μm): 65, 50, 59, 63, 124. Outer verticals 2. Clypeus with 6 setae. Coronal suture about 80 μm long, nearly complete. Tentorium about 110 μm long. Stipes 112 μm long. Ocelli vestigial, 84 μm apart. Palp lengths (μm): 34, 44, 79, 90, 195.

Thorax — Anteprenotum with 4 setae. Dorsocentrals 15, prealars 3. Scutellum with 13 setae.

Wing — Brachiolum with 1 seta, R with 9 setae. Squama with 19 setae.

Legs — Spur of front tibia 35 μm long, spurs of middle tibia 23 μm and 28 μm , of hind tibia 52 μm and 27 μm long. Width at apex of front tibia 48 μm , of middle tibia 54 μm , at hind tibia 65 μm . Comb with 14, 22–40 μm long setae. Sensilla chaetica 2 in basal 0.2 of ta_1 of middle leg. Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	552	711	429	343	209	123	63	0.60	2.30	2.94	2.32
p_2	571	619	258	129	92	37	49	0.42	4.72	4.62	2.50
p_3	577	724	380	196	153	86	63	0.53	3.38	3.42	4.32

Abdomen — Number of setae on T II–VIII: 51, 45, 32, 30, 18, 14, 9. Distribution of setae on T V as in Fig. 3B.

Genitalia (Fig. 3C) — Gonocoxite IX with 18 setae. T IX with 20 setae. Cercus 110 μm long. Seminal capsule 120 μm long, 74 μm wide.

PUPA ($n = 1$)

Length 4.14 mm. TH/AM about 1.4.

Cephalothorax — Thoracic horn (Fig. 3E) 249 μm long, 40 μm wide, 6.23 times as long as wide. Frontal setae (Fig. 3D) 70 μm long; on 24 μm high, 20 μm wide tubercle. Thoracic setae not on strong tubercles (Fig. 1E); MA about 50 μm long, PcS_2 (Fig. 3E) 208 μm , Dc_1 80 μm , Dc_2 48 μm , Dc_3 91 μm , Dc_4 66 μm long; Dc_1 130 μm anterior of Dc_3 , Dc_3 170 μm anterior of Dc_4 .

Abdomen (Fig. 4A) — PSA present on sternites IV–VII, longest spinules 16 μm long on IV–VI, 11 μm long on VII. Segment I with one L-seta, II–VI with 3 (occasionally 4 on VI) L-setae, VII with 4 slightly broadened L-setae, VIII with 5 (or perhaps only 4 on one side) filamentous L-setae. T II with about 150 caudomesal hooklets, the longest about 9 μm . Caudal spines: T III with 40, up to 10 μm long; T IV with 112, to 22 μm long; T V with 121, to 30 μm long; T VI with 130 to 34 μm long; T VII with a mesally interrupted row of about 26, to 10 μm long. Integuments III/IV, IV/V, and V/VI with spinules; 3 complete rows on III/IV and IV/V, rows on V/VI interrupted medially for about 120 μm . Median spine patches present on (III) IV–VII, IV and VI with 50 spines each, V with 76 spines, VII with 20 spines. Anal macrosetae about 175 μm long, about 2 μm wide. Anal lobe with 49 setae in fringe.

SECOND (?) INSTAR LARVA ($n = 4$, EXCEPT WHEN OTHERWISE STATED)

Length 1.68–1.82, 1.74 mm. Head capsule length 0.16–0.19, 0.18 mm (6).

Head — Antenna as in Fig. 4B. Lengths of antennal segments (μm) ($n = 5$): 15–18, 17; 12–14, 13; 7–8, 7; 2; 1. AR = 0.68–0.82, 0.76 (5). Basal antennal segment 6–8, 7 μm wide; blade at apex 16–17 μm (3) long; accessory blade 16 μm (1) long. Premandible (Fig. 4C) 25–28, 26 μm (5) long. Maxilla as in Fig. 4D. Mandible (Fig. 4E) 48–58, 53 μm (5) long. Mentum as in Fig. 4F. Ventro-mental plates 12–14, 13 μm long (measured from base of second outermost tooth of mentum to caudolateral apex), width 6–8 μm (3). Postmentum (mentum + submentum) 90–106, 98 μm (6) long.

Abdomen (Fig. 4G) — Claws of anterior parapods strongly serrated, as in *N. (P.) downesi* (Steffan 1965 fig. 20). Procercus 11–14, 12 μm high; 9–10, 10 μm wide. Anal setae 114–126, 120 μm long. Anal tubules all 80 μm (1) long, constricted at base and medially, exactly as in *N. (P.) downesi* (Steffan 1965 fig. 15). Posterior parapods 120 μm (1) long.

REMARKS

Steffan (1965 p. 1331) synonymized *Spaniotoma* sp. *F* of Johannsen (1937a p. 75) with his *Plecopteracoluthus downesi*. He also discussed the differences (p. 1340–1343) between the two species and reached the conclusion that they were due to geographical variation or “differences in the manner of study.” The larvae of *N. (P.) branchicolus*, however, differ from *N. (P.) downesi* in exactly the same way as Johannsen’s sp. *F*. The larvae of *N. (P.) branchicolus* and sp. *F* build a silken case that looks like one of the gills underneath the wing pads of *Acroncuria* spp., whereas *N. (P.) downesi* lives on the upper surface of the wing covers. *N. (P.) branchicolus* and sp. *F* apparently have larger larvae and 13 mental teeth as opposed to 11 in *N. (P.) downesi*. The pupa of *Spaniotoma* sp. *F* (Johannsen 1937a p. 76) is said to have 22–24 setae in the fringe of the anal lobe and 3 filamentous and a few short setae on each side of segment VIII. *N. (P.) downesi* has 15–20 setae in the fringe and *N. (P.) branchicolus* about 49 setae and both have 5 filamentous L-setae on segment VIII. Johannsen’s pupa, however, was not yet mature and it is likely that he may have overlooked some setae. *Spaniotoma* sp. *F* is synonymized here with *N. (P.) branchicolus* n.sp. However, it is not entirely impossible that sp. *F* represents a third species living in symphoretic association with Plecoptera.

The larvae described belong to the second or the third instar. The fourth and third instar larvae of chironomids have a head capsule length or width which is nearly always about 60% larger than that of the third and second instar, respectively. Because the adult and pupa of *N. (P.) branchicolus* are decidedly larger than those of *N. (P.) downesi*, the fourth instar larva should of course also be larger. If the present larvae are regarded as third instars, the fourth instar larvae would, however, be slightly smaller than those of *N. (P.) downesi*. Accordingly, the larvae almost certainly belong to the second instar.

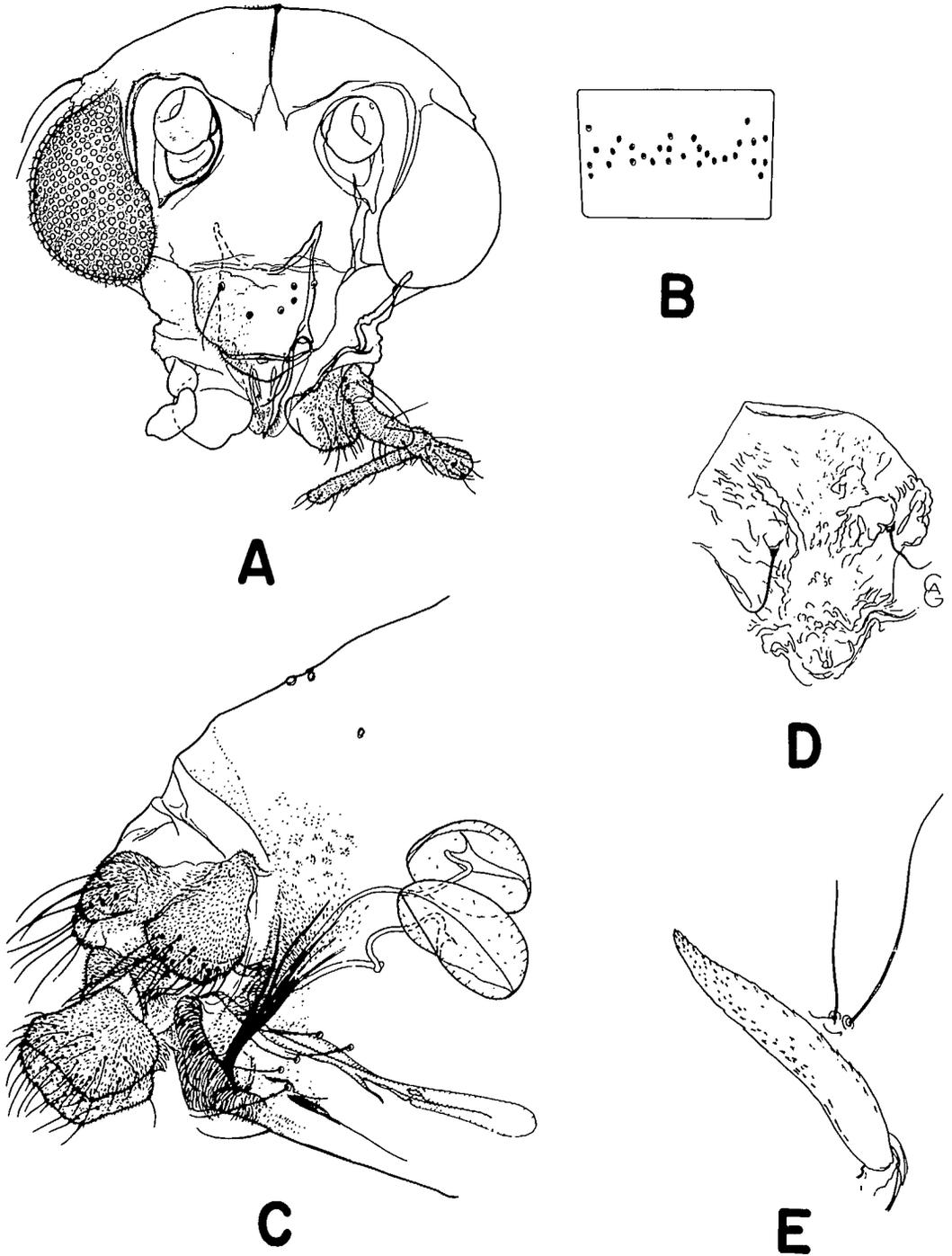


FIG. 3. *Nanocladius (Plecopteracoluthus) branchicolus* n.sp. A-C, female: A) head, B) tergite V, C) genitalia, lateral view. D-E, pupa: D) frontal plate, E) thoracic horn.

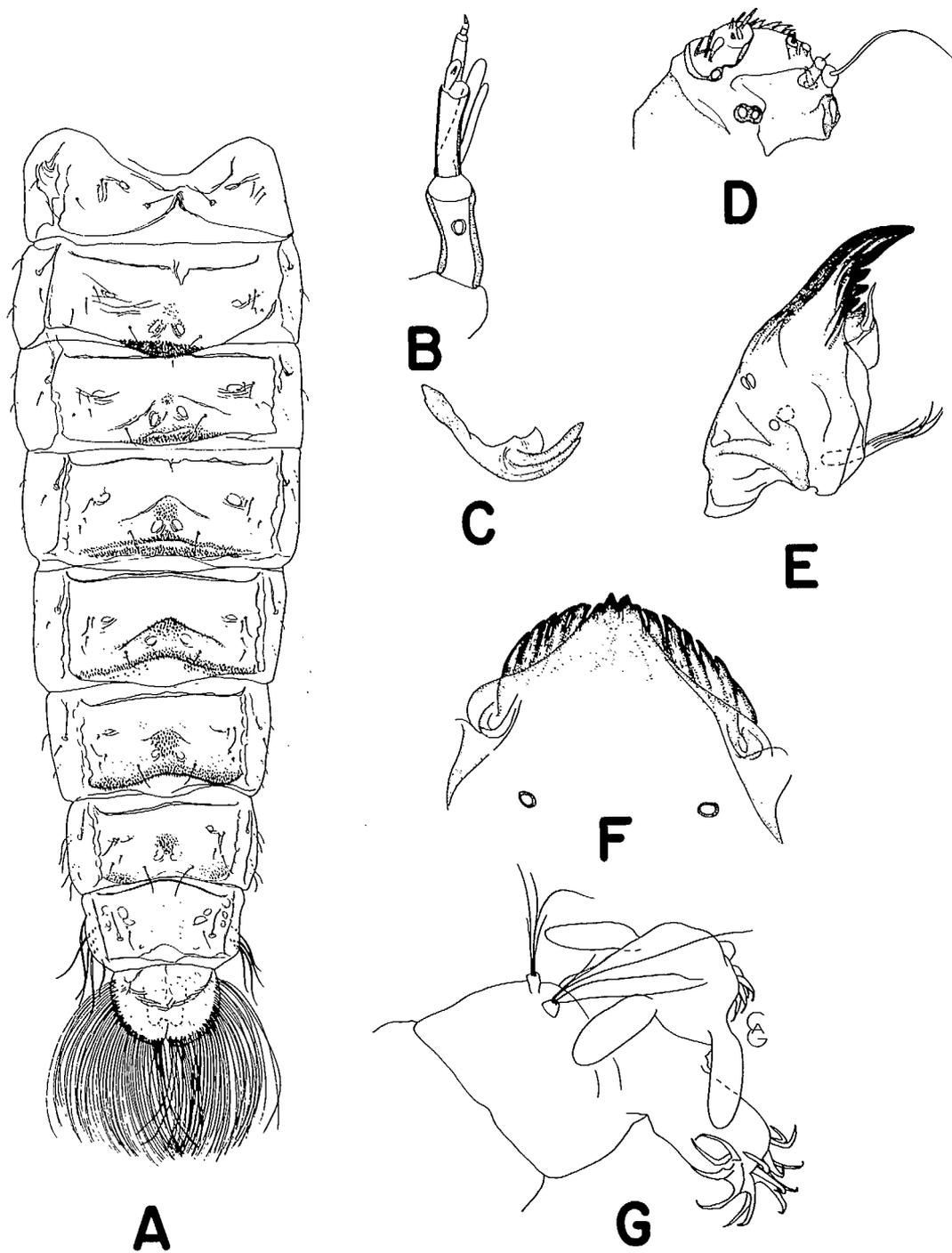


FIG. 4. *Nanocladius (Plecopteracoluthus) branchicolus* n.sp. A, pupa, tergites I-IX. B-G, larva: B) antenna, C) premandible, D) maxilla, E) mandible, F) mentum, G) caudal segments.

MATERIAL EXAMINED

Holotype: female reared from pupa, under wing pad of *Acroneuria lycorias* (Newm.), rapids in stream between MacDonald Lake and Lake 665, Experimental Lakes Area, Kenora, Ont. 49°38'N, 95°40'W, 6/7/68, J. F. Flannagan and A. P. Wiens (CNC No. 14058). Paratypes: six second (?) instar larvae, locality as for holotype, 10–22/5/68, A. L. Hamilton and J. F. Flannagan.

ECOLOGY AND DISTRIBUTION

The species lives in symphoretic association with *Acroneuria lycorias* (Newm.), *Acroneuria* sp., and probably other Perlidae (Plecoptera). The larvae are enclosed in silken cases among the gills. Emergence takes place at least in early July.

The species is known from northwestern Ontario and near Ithaca, N.Y.

Nanocladius subgen. *Nanocladius* Kieff.

Imagines with genae moderately to strongly excavated, scutellum with 2–6 setae, squama with 0–14 setae, pulvilli present. Pupa has short to very long frontal setae, with PSB and protuberance posteriad on T II, 3 L-setae on II–V, and 4 on VI and VII. Larva usually has extremely long ventromental plates with rounded caudolateral apex, occasionally shorter with nearly straight caudolateral apex; never with setose plate laterad of mentum; claws of anterior parapods smooth or occasionally serrated; one pair of anal tubules usually longer than posterior parapods, the other pair shorter.

bicolor group

Male gonocoxite with square to rounded basal lobe.

Female sternite VIII does not form a floor under anterior part of vagina or possibly with a small floor in *N. (N.) distinctus* examined only in lateral view; lobes of gonapophyses VIII well separated and distinct.

Pupal thoracic horn tapering to a point; T V, VI, and usually IV with median spine patch.

Larval AR 1.75–2.10; premandible with simple or slightly bifid apical tooth; mentum with 13 relatively distinct teeth; claws of anterior parapods smooth or with a few very weak serrations.

Nanocladius (Nanocladius) anderseni n sp.

(Fig. 1A, B, 5, 6)

The male imago is characterized by a wing length of 0.87–1.42 mm; LR₁ of 0.60–0.67; AR of 0.52–0.66; squama with 0–3 setae; T I with 6–11 setae; T II–VIII with 8–19 setae arranged in transverse mostly irregular uniserial row; and a square basal lobe of the gonocoxite. The female imago has similar squamal and tergite setae to the male, T IX with 5 or 6 setae, and gonocoxite IX with 10 or 11 setae.

The pupal thoracic horn is 0.16–0.22 mm long, tapers to a point, and is 2.5–4.0 times wider at base than at $\frac{1}{3}$ from base; T IV–VI with median spine patches which may be vestigial on IV; integument III/IV and IV/V with complete rows of spinules, or very narrowly interrupted on IV/V; segment VI with 4 nonfilamentous L-setae; anal macrosetae conspicuously thin; TH/AM about 1.6–1.8; anal lobe with 27–32 setae in fringe.

The larva ($n = 1$) has a head capsule length of 0.28 mm; postmentum length of 142 μ m; AR of 1.8; basal antennal segment 46 μ m; mentum with 13 distinct teeth; ventromental plates long and rounded at apex; claws of anterior parapods apparently smooth.

MALE IMAGO ($n = 12$, EXCEPT WHEN OTHERWISE STATED)

Length 1.54–2.29, 1.95 mm. Wing length 0.87–1.42, 1.10 (13) mm. Total length/wing length 1.48–1.86, 1.70. Wing length/length of profemur 3.01–3.33, 3.26.

Head — AR = 0.52–0.66, 0.60 (21). Outer verticals 0–2, 1. Clypeus with 6–10, 8 setae. Cibarial pump, tentorium, and stipes as in Fig. 5A. Tentorium 113–157, 139 μm long. Stipes 93–134, 112 μm long. Vestigial ocelli absent or present, occasionally as distinct frontal tubercles 15–22, 20 μm apart. Palp lengths (μm): 18–27, 22; 36–56, 42; 50–80, 63; 66–103, 82; 90–160, 132.

Thorax — Anteprenotum with 2 or 3, 2 setae. Dorsocentrals 4–9, 6; prealars 1–3, 2. Scutellum with 2 setae.

Wing — VR = 1.17–1.25, 1.21. Brachiolum with 1 seta; R with 0–3, 1 seta. Squama with 0–3, 1.5 (24) setae. Extended part of costa 47–57, 51 μm long.

Legs — Spur of front tibia 27–42, 35 μm long; spurs of middle tibia 13–25, 16 μm and 10–20, 13 μm long; of hind tibia 28–42, 37 μm and 12–18, 13 μm long. Width at apex of front tibia 20–33, 26 μm ; of middle tibia 23–39, 30 μm ; of hind tibia 30–46, 36 μm . Comb with 10–13, 11 setae; shortest seta 18–25, 22 μm ; longest seta 27–38, 31 μm . Sensilla chaetica 1 or 2, 2 in basal 0.2 of ta_1 of middle leg; none on hind leg. Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	294–454, 345	371–577, 457	245–356, 300	190–264, 226	129–172, 147	75–95, 83
p_2	306–485, 387	307–515, 392	150–233, 190	88–147, 111	54–110, 80	27–57, 38
p_3	313–503, 398	388–601, 483	218–337, 280	109–184, 151 [*]	82–135, 108	41–76, 61
	ta_5	LR	BV	SV	BR	
p_1	48–63, 52	0.60–0.67, 0.66	2.04–2.40, 2.20	2.69–2.86, 2.75	2.10–2.67, 2.48	
p_2	27–51, 35	0.45–0.52, 0.48	3.41–3.90, 3.71	3.85–4.29, 4.10	3.67–4.93, 4.12	
p_3	27–57, 44	0.54–0.61, 0.57	3.04–3.51, 3.19	3.01–3.40, 3.16	4.18–7.13, 5.52	

Abdomen (Fig. 1A, B) — T I with 6–11, 9 (14) setae; T II with 10–19, 14 (16) setae; T III–VIII each with 8–18, 12 (13–15) setae; transverse rows mostly uniserial.

Hypopygium (Fig. 5B) — T IX with 3–11, 6 setae; laterosternite IX with 3–5, 4 setae. Transverse sternapodeme 48–70, 56 μm long. Phallapodeme 50–85, 62 μm (8) long. Anal point 20–35, 27 μm (9) long. Gonocoxite 117–188, 145 μm long, with square basal lobe; gonostylus 50–80, 63 μm long. HR = 2.19–2.49, 2.31; HV = 3.01–3.52, 3.29.

FEMALE IMAGO ($n = 2$, EXCEPT WHEN OTHERWISE STATED, BASED ON MATURE FEMALE PUPAE)

Head — AR = 0.54–0.57. Flagellomeres length (μm): 53–54, 21–31, 30–32, 30–33, 77–84. Outer verticals one. Clypeus with 6 or 7 setae. Coronal suture absent. Tentorium 84 μm (1) long. Ocelli vestigial, 80 μm apart. Palp lengths (μm): 23 (1), 42 (1), 42–56, 64–84, 114–150.

Thorax — Anteprenotum with 2 (1) setae. Dorsocentrals 8 or 9, prealars 2 (1). Scutellum with 2 setae.

Wing — Brachiolum with 1 seta. R apparently with several setae, R_{4+5} with about 5 setae. Squama with 2 setae.

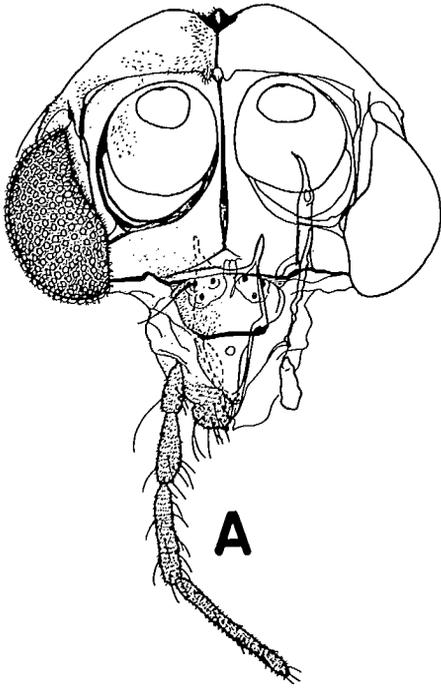
Legs — Sensilla chaetica 4 (1) in basal 0.25 of ta_1 of middle leg.

Abdomen — T I–VIII each with 8–12 setae in single transverse row and lateral groups.

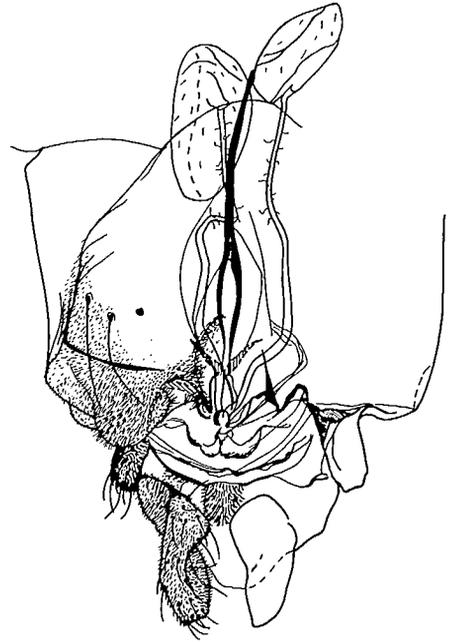
Genitalia (Fig. 5C, D) — Gonocoxite IX with 10 or 11 setae. T IX with 5 or 6 setae. Cercus 66–74 μm long. Seminal capsule 74–86 μm long, 48–54 μm wide. Notum 90–103 μm long.

PUPA ($n = 5$, EXCEPT WHEN OTHERWISE STATED)

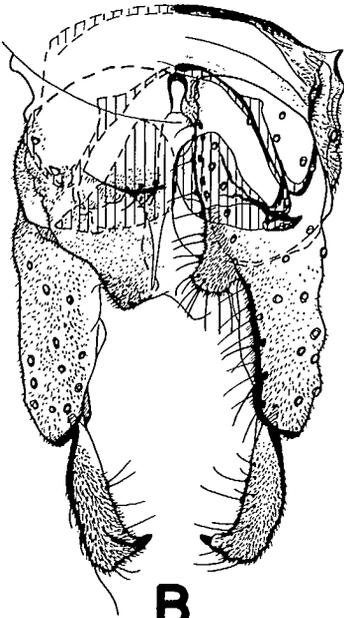
Length 1.87–2.73, 2.40 mm (4). TH/AM = 1.60–1.78 (2).



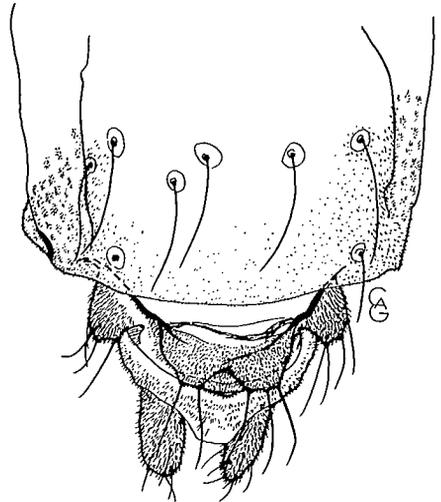
A



C



B



D

FIG. 5. *Nanocladius (Nanocladius) anderseni* n.sp., imagines. A-B, male: A) head, B) hypopygium. C-D, female genitalia: C) ventral view, D) dorsal view.

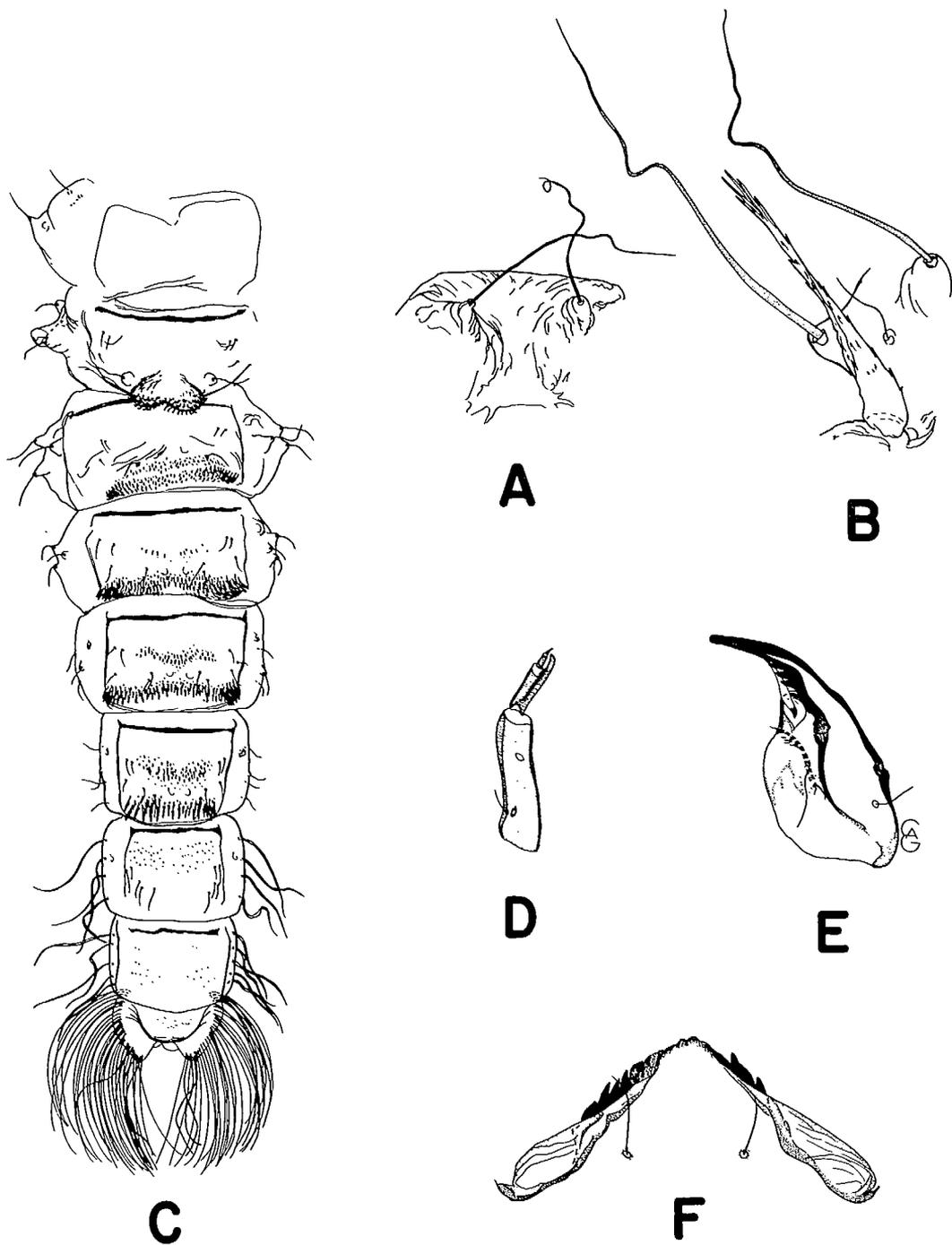


FIG. 6. *Nanocladius (Nanocladius) anderseni* n.sp., immatures. A-C, pupa: A) frontal plate, B) thoracic horn, C) tergites I-IX. D-F, larva: D) antenna, E) mandible, F) mentum.

Cephalothorax — Thoracic horn (Fig. 6B) 156–215, 190 μm (7) long; 17–33, 26 μm (7) wide 0.1 from base; 5–10, 8 μm (6) wide 0.3 from base; length/width 5.70–9.18, 7.54 (7). Frontal setae (Fig. 6A) 120–190, 161 μm (4) long; on 24–38, 30 μm high, 22–36, 27 μm wide tubercle. Po 106–118, 111 μm long; both MA 190–240, 211 μm ; LA 36–58 μm (3); PcS₁ 36–48, 40 μm ; PcS₂₋₃ 200–260, 231 μm ; Dc₁ and Dc₃ 69–104, 87 μm ; Dc₂ 29–56, 46 μm ; Dc₄ 40–74, 53 μm long. MA and PcS₂₋₃ on 32–40, 35 μm high, 26–30, 29 μm wide tubercles. Dc₁ 38–76, 62 μm anterior of Dc₃; Dc₃ 73–120, 98 μm anterior of Dc₄.

Abdomen (Fig. 6C) — PSA present on sternites IV–VII; longest spinules 18–26, 22 μm long on IV–VI; 6–15, 10 μm long on VII. L-setae nonfilamentous on VI, filamentous on VII; VIII with 5 filamentous L-setae. T II with 36–50, 41 (4) caudal hooklets, longest ones 16–22, 19 μm (4). Numbers and lengths of longest caudal spines of T III–VI: 20–44, 35 (10–14, 12 μm (4)); 42–81, 60 (18–22, 20 μm (4)); 43–76, 57 (24–33, 29 μm); 23–47, 32 (32–46, 38 μm). Integuments of III/IV and IV/V with rows of spinules, interrupted medially for 0–40, 16 μm on IV/V. Median spine patches present on IV–VI; IV with 1–11, 3 spines; V with 10–41, 21 spines; VI with 15–36, 23 spines. Anal macrosetae thin, about 1.5 μm thick, 128–130 μm (2) long. Anal lobe with 27–32, 29 (6) setae in fringe.

FOURTH INSTAR LARVA ($n = 1$)

Head capsule length 0.28 mm.

Head — Antenna as in Fig. 6D. Lengths of antennal segments (μm): 46, 16, 5, 2, 1. AR = 1.84. Basal antennal segment 13 μm wide, blade at apex 21 μm long, ringorgan 10 μm from base, seta 12 μm from base, apical setal mark 18 μm from base. Premandible 52 μm long. Mandible (Fig. 6E) 94 μm long. Mentum (Fig. 6F) with 13 distinct teeth. Ventromental plates 70 μm long (measured from base of second outermost tooth of mentum of caudolateral apex), width 18 μm . Postmentum 142 μm long.

Abdomen — Claws of anterior parapods apparently smooth.

REMARKS

As only the immatures of specimens from Missouri River, Neb., have been found, and as the imaginal characters of these are based on mature pupae, it is not fully certain that the adults from other localities in fact belong to the same species. In the adults there are overlapping characters between *N. (N.) anderseni* and *N. (N.) minimus* n.sp., and there may also be some overlap between the latter and *N. (N.) distinctus*.

MATERIAL EXAMINED

Holotype: mature male pupa, Missouri River, Brownville, Neb., 40°24'N, 95°40'W, 13/5/75, D. L. Andersen (CNC No. 14059). Allotype: mature female pupa, as holotype. Paratypes: mature male pupa, mature female pupa, 27/9/72, otherwise as holotype; mature male pupa, mature female pupa, pupa with larval exuvium attached, Fort Calhoun, Neb., 28/5/75, D. L. Andersen; 12 males, Missouri River, 2 miles east 6 miles south of Gayville, S.Dak., 29/5, 27/6 and 6/8/72, P. L. Hudson; 3 males, Missouri River, Clay County Park, Vermillion, S.Dak., 9/5 and 15/6/72, P. L. Hudson; male, Nelson's Pond, 5 miles north on Highway 81, Yankton, S.Dak., 26/8/72, P. L. Hudson; 1 pupa, Mississippi River on the Iowa side near Wapsipinnicon River, Cordova, Ill., 7/6/72, D. L. Andersen; 12 males, northern basin of Lake Winnipeg, Man., 15–31/7/69, 8/6/71 and 22–28/7/71, S. S. Chang, M. P. McLean, E. Johnson, R. Deda, B. Andrews, J. Rambally; male, Mackenzie River, N.W.T., 6/7/73, J. Robillard.

ECOLOGY AND DISTRIBUTION

The species has been found in large rivers, a pond, and in a large wind-exposed lake. There appear to be two emergence periods, one in May and June, and one in late July to September, but possibly only one emergence period in the Mackenzie River. Distribution: Nebraska, South Dakota, Iowa, Illinois, Manitoba, and Northwest Territories.

Nanocladius (Nanocladius) minimus n.sp.

(Fig. 1C, 7, 8)

The imagines are characterized by a wing length of 0.87–1.08 mm; LR₁ of 0.63–0.66 in male, 0.54 (*n* = 1) in female; male AR of 0.47–0.63; squama with 1 or 2 setae; T I with 3–6 setae; T II–VIII with 6–10 setae, transverse row always uniserial; basal lobe of male gonocoxite square; sternite VIII of female does not form a floor under vagina; T IX of female with 8 setae; gonocoxite IX of female with 5 setae.

The pupal thoracic horn is 0.14–0.19 mm long, tapers to a point, and is 2.0–3.5 times wider at base than at $\frac{1}{3}$ from base; T IV–VI with median spine patches which may be absent or vestigial on IV; integument III/IV and IV/V with spinules, broadly interrupted medially on IV/V; segment VI with 4 nonfilamentous L-setae; anal macrosetae conspicuously thin; TH/AM 1.3–2.0; anal lobe with 10–15 setae in fringe.

The larva (*n* = 1) is as in *N. (N.) anderseni*, but with an AR of 2.0.

MALE IMAGO (*n* = 10–11)

Length 1.54–1.77, 1.63 mm. Wing length 0.87–1.03, 0.90 mm. Total length/wing length 1.71–1.91, 1.81. Measurements inside the ranges of *N. (N.) anderseni* n.sp. with the following exceptions:

Head — AR = 0.47–0.63, 0.54. Tentorium 106–126, 114 μ m long. Stipes 70–108, 92 μ m long. Second palpal segment 27–36, 33 μ m long.

Thorax — Antepnotum with 1 or 2, 2 setae.

Wing — Extended part of costa 26–58, 38 μ m long.

Legs — Sensilla chaetica 0–2, 1 on basal 0.2 of ta₁ of middle leg, one specimen with 1 sensilla chaetica in center of ta₁ of hind leg. Lengths (μ m) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄
p ₁	264–319, 288	337–429, 370	221–270, 238	190–244, 204	122–151, 133	70–92, 80
p ₂	270–343, 297	282–356, 309	130–164, 149	70–100, 86	51–70, 60	26–34, 30
p ₃	294–362, 310	368–448, 387	196–245, 210	112–140, 120	78–104, 89	46–60, 53
	ta ₅	LR	BV	SV	BR	
p ₁	41–50, 45	0.63–0.66, 0.65	1.84–2.12, 1.94	2.69–2.84, 2.76	2.60–3.17, 2.88	
p ₂	24–34, 29	0.46–0.49, 0.48	3.43–3.85, 3.65	3.94–4.26, 4.08	3.29–5.00, 4.11	
p ₃	33–46, 39	0.53–0.56, 0.54	2.84–3.24, 3.01	3.20–3.40, 3.32	5.07–7.08, 5.45	

Abdomen (Fig. 1C) — T I with 3–6, 4 setae; T III–VIII each with 6–10, 8 setae.

Hypopygium (Fig. 7A) — T IX with 3–5, 4 setae.

FEMALE IMAGO (*n* = 1)

Length 1.50 mm. Wing length 1.08 mm. Total length/wing length 1.40. Wing length/length of profemur 4.00.

Head — AR = 0.61. Flagellomeres length (μ m): 47, 24, 25, 30, 73. Outer verticals 4. Clypeus with 4 setae. Coronal suture weak, 20 μ m long. Tentorium 85 μ m long. Stipes 86 μ m long. Palp lengths (μ m): 20, 26, 40, 42, 63.

Thorax — Antepnotum with 2 setae. Dorsocentrals 6, prealars 3. Scutellum with 2 setae.

Wing — Brachiolum with 1 seta, R with 4 setae, R₄₊₅ with 5 setae, extended part of costa with 1 seta. Squama at most with 1 seta.

Legs — Spur of front tibia 20 μm long, spurs of middle tibia 16 μm and 14 μm , of hind tibia 36 μm and broken. Width at apex of front tibia 22 μm , of middle tibia 24 μm , of hind tibia 30 μm . Comb with 11 setae 14–28 μm long. Sensilla chaetica 1 in basal 0.25 of ta₁ of middle leg. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
p ₁	274	370	200	140	88	50	42	0.54	2.64	3.22	2.86
p ₂	330	345	153	72	66	39	34	0.44	3.92	4.41	3.71
p ₃	332	406	206	96	101	46	40	0.51	3.34	3.58	4.48

Genitalia (Fig. 7B, C) — Sternite VIII does not form floor under vagina. Gonocoxite IX with 5 setae. T IX with 8 setae. Cercus 82 μm long. Seminal capsule 48 μm long, 30 μm wide. Notum 86 μm long.

PUPA ($n = 10$, EXCEPT WHEN OTHERWISE STATED)

Length 1.60–2.29, 1.96 mm (20). TH/AM 1.29–1.95, 1.64.

Cephalothorax — Thoracic horn (Fig. 8B) 138–192, 166 μm (20) long; 14–20, 17 μm wide 0.1 from base; 5–8, 6 μm wide 0.3 from base; length/width 7.78–11.43, 9.41. Frontal setae (Fig. 8A) 152–240, 189 μm long, on 28–36, 30 μm high, 22–40, 28 μm wide tubercle. Po 140–172, 151 μm long; both MA 206–280, 240 μm ; LA 40–75, 47 μm ; PcS₁ 22–40, 34 μm ; PcS₂₋₃ 180–320, 313 μm ; prelar 30–60, 48 μm ; Dc₁ and Dc₄ 52–90, 67 μm ; Dc₂ 35–62, 51 μm ; Dc₃ 71–102, 86 μm . MA and PcS₂₋₃ on 30–48, 39 μm high, 18–48, 36 μm wide tubercles. Dc₁ 34–56, 44 μm anterior of Dc₃; Dc₃ 58–80, 72 μm anterior of Dc₄.

Abdomen (Fig. 8C) — PSA present on sternites IV–VI or VII; longest spinules 10–20, 15 μm long on IV–VI; 0–12, 4 μm long on VII. L-setae nonfilamentous on VI, filamentous on VII, VIII with 5 filamentous L-setae. T II with 18–27, 23 caudal hooklets longest 18–27, 22 μm . Numbers and lengths of longest caudal spines of T III–VI: 12–26, 19 (16–24, 20 μm); 26–45, 36 (20–33, 26 μm); 26–40, 32 (30–48, 36 μm); 14–25, 20 (38–48, 43 μm). Integuments of III/IV with complete rows of spinules, of IV/V spinules interrupted medially for 88–120, 107 μm . Number of spines in median spine patches of IV–VI: 0–8, 2; 5–17, 11; 9–16, 13. Anal macrosetae thin; 96–130, 108 μm long. Anal lobe with 10–15, 12.6 (49) setae in fringe.

FOURTH INSTAR LARVA ($n = 1$)

Total length 1.87 mm. Head capsule length 0.27 mm. Characteristics and measurements essentially as in *N. (N.) anderseni* n.sp. with the following exceptions and additions:

Head — Antenna as in Fig. 8D. AR = 2.00. Mentum as in Fig. 8E. Postmentum 156 μm long.

Abdomen — Procercus 22 μm high, 14 μm wide. One pair of anal tubules about 225 μm long, the other about 150 μm long. Posterior parapods 130 μm long.

REMARKS

The pupa and the female of this species appear to be easily separable from *N. (N.) anderseni*. However, not all specimens of the male and probably none of the larvae can be separated. If new material shows a greater variation in pupae and females, it would not be unjustified to regard *N. (N.) minimus* merely as a subspecies of *N. (N.) anderseni*. However, the males of not only these two species, but all *Nanocladius* (*Nanocladius*) are hard to separate with certainty. The association of the female is not quite definite (see p. 45).

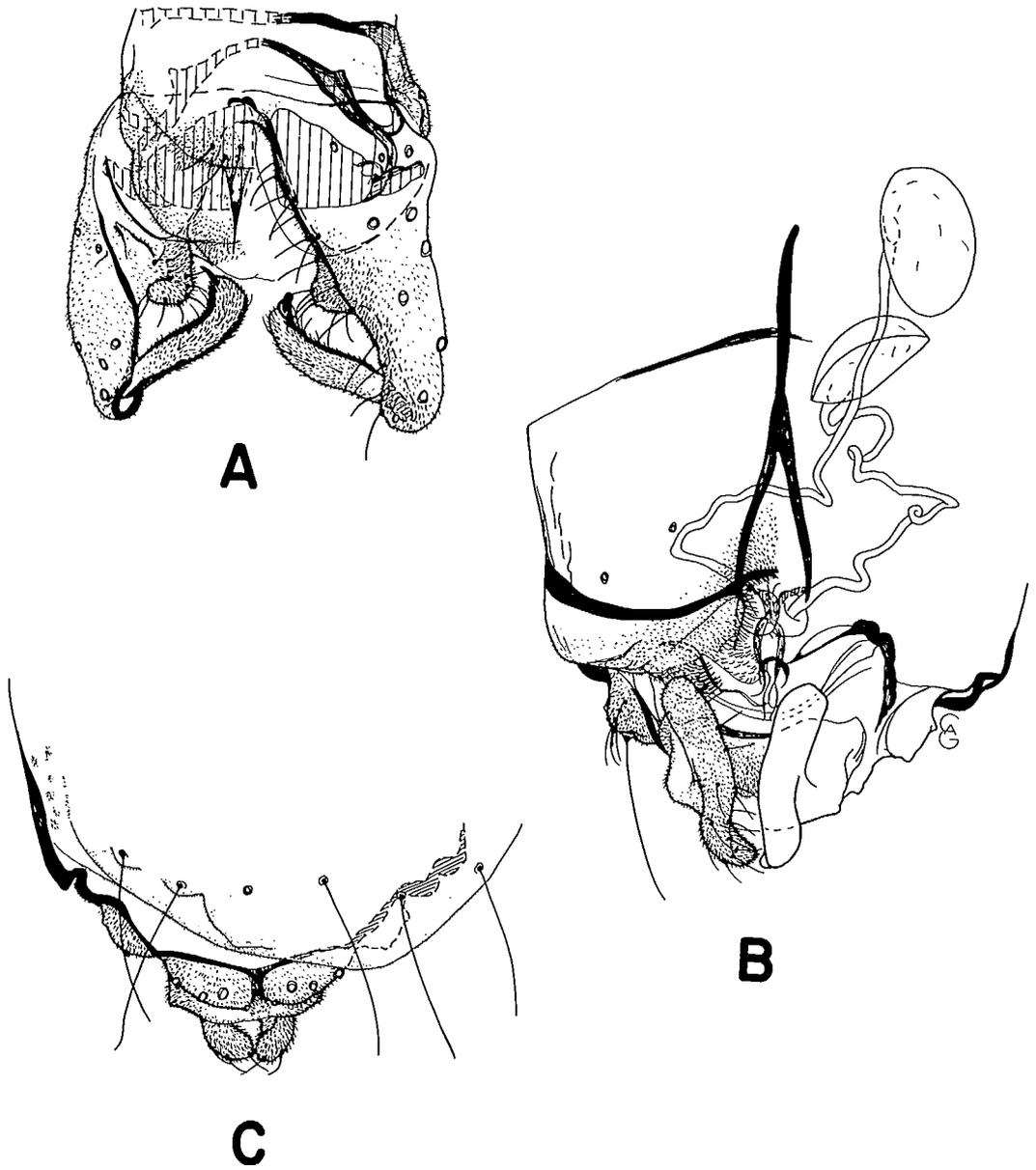


FIG. 7. *Nanocladius (Nanocladius) minimus* n.sp., imagines. A, male hypopygium. B-C, female genitalia: B) ventral view, C) dorsal view.

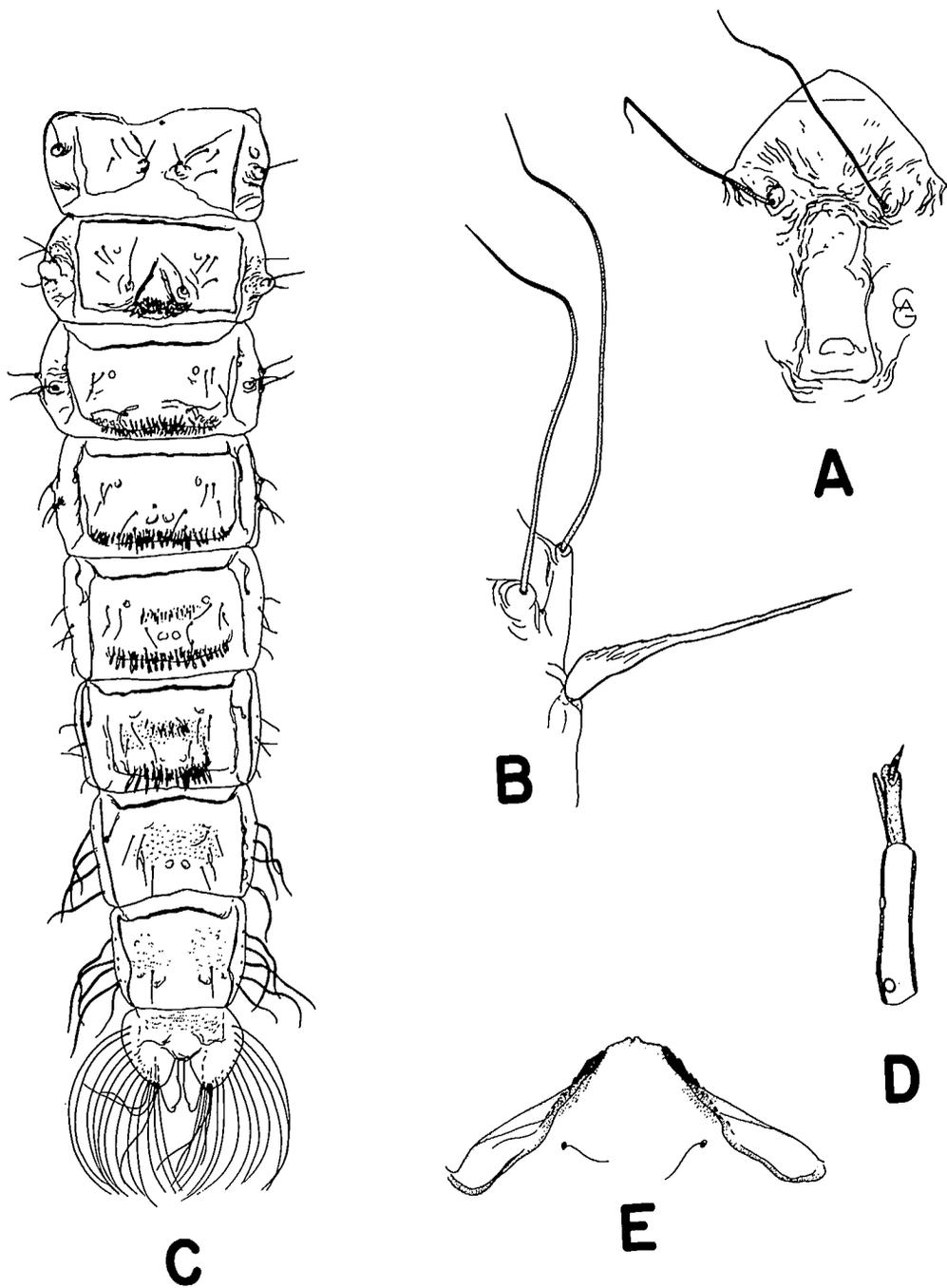


FIG. 8. *Nanocladius (Nanocladius) minimus* n.sp., immatures. A-C, pupa: A) frontal plate, B) thoracic horn, C) tergites I-IX. D-E, larva: D) antenna, E) mentum.

MATERIAL EXAMINED

Holotype: male with pupal exuvium, Warpath Area receiving heated water from Oconee Nuclear Station, Keowee Reservoir, Seneca, S.C., 34°45'N, 82°55'W, 28/4/75, P. L. Hudson (CNC No. 14060). Allotype: female, 7/2/75, otherwise as holotype. Paratypes: 13 males, 28 pupal exuvia, Little River Dam, Keowee Reservoir, Seneca, S.C., 28/4-22/8/75, P. L. Hudson; pupa, larva, depth 0.5 m, near discharge of Oconee Nuclear Station, Keowee Reservoir, Seneca, S.C., 24/10/74, P. L. Hudson; 7 pupal exuvia, Watergate Marina, Keowee Reservoir, Seneca, S.C., 30/5/74, P. L. Hudson; 16 pupal exuvia, Keowee Reservoir, Seneca, S.C., 14/6, 16/7, 27/9 and 17/10/74, P. L. Hudson.

ECOLOGY AND DISTRIBUTION

The species has been found only in Keowee Reservoir, S.C., together with *N. (N.) rectinervis*, *N. (N.) incomptus* n.sp., and a probable *N. (N.) spiniplenus* n.sp. Keowee Reservoir is a moderately oligotrophic probably mesohumic lake. There appear to be two emergence periods, one in May to July and one in September to October, as for *N. (N.) anderseni*.

Nanocladius (Nanocladius) distinctus (Mall.)

(Fig. 1D, 9, 10)

Orthocladius (Trichocladius) distinctus Malloch 1915: 518; Frison 1927: 174 (includes var. *basalis* Malloch 1915: 519)

Trichocladius distinctus (Mall.), Johannsen 1951: 25, 26; Sublette and Sublette 1965: 158

Hydrobaenus (Trichocladius) distinctus (Mall.), Johannsen 1952: 21, 22

Nanocladius distinctus (Mall.), Sublette 1967a: 310; Sublette 1970: 67

The imagines are characterized by a wing length of 0.97–1.48 mm; LR₁ of 0.59–0.65 in male, about 0.57 in female; AR of male 0.92–1.04; squama with 2–10 setae; T I with 8–18 setae; T II–VIII with 11–30 setae, transverse row uniserial on most tergites; basal lobe of male gonocoxite square; T IX of female with about 4 setae; gonocoxite IX of female with about 7 setae.

The pupa has a thoracic horn 0.17–0.24 mm long, tapers to a point, and is only slightly wider at base than at $\frac{1}{3}$ from base; T IV–VI with median spine patches; integuments III/IV and IV/V with rows of spinules narrowly to broadly interrupted medially on IV/V; segment VI with 4 non-filamentous L-setae; anal macrosetae long and strong (about 2.5 μ m thick); TH/AM 1.1–1.2 and anal lobe with 20–44 setae in fringe.

The larva has a head capsule length of 0.32–0.37 mm; postmentum length of 160–186 μ m; basal antennal segment of about 58–60 μ m; anterior parapods with a few very weakly serrated claws; otherwise as in *N. (N.) anderseni*.

MALE IMAGO ($n = 6-7$, EXCEPT WHEN OTHERWISE STATED)

Length 2.05–2.50, 2.28 mm. Wing length 1.11–1.48, 1.30 mm. Total length/wing length 1.67–1.87, 1.76. Wing length/length of profemur 2.81–3.08, 2.93.

Head — AR = 0.92–1.04, 0.99 (Sublette 1967a p. 314, 1970 p. 69, gives AR ranging from 0.82–1.32. However, his AR were measured on a mixture of slide specimens and dry specimens and thus not always reliable. Furthermore, the paralectotypes most likely contain additional species of *Nanocladius* (see below).) Outer verticals 1–4, 2. Clypeus with 7–13, 9 setae. Tentorium 140–180, 160 μ m long. Stipes 119–146, 131 μ m long. Ocelli absent, vestigial, or as distinct frontal tubercles; 10–18, 16 μ m apart. Palp lengths (μ m): 18–33, 27; 42–54, 50; 62–83, 74; 100–110, 106; 120–223, 166.

Thorax — Anteprenotum with 2–4, 3 setae. Dorsocentrals 7–9, 8 (up to 12 according to Sublette (1970 p. 67)); prealars 2. Scutellum with 2–5, 4 setae.

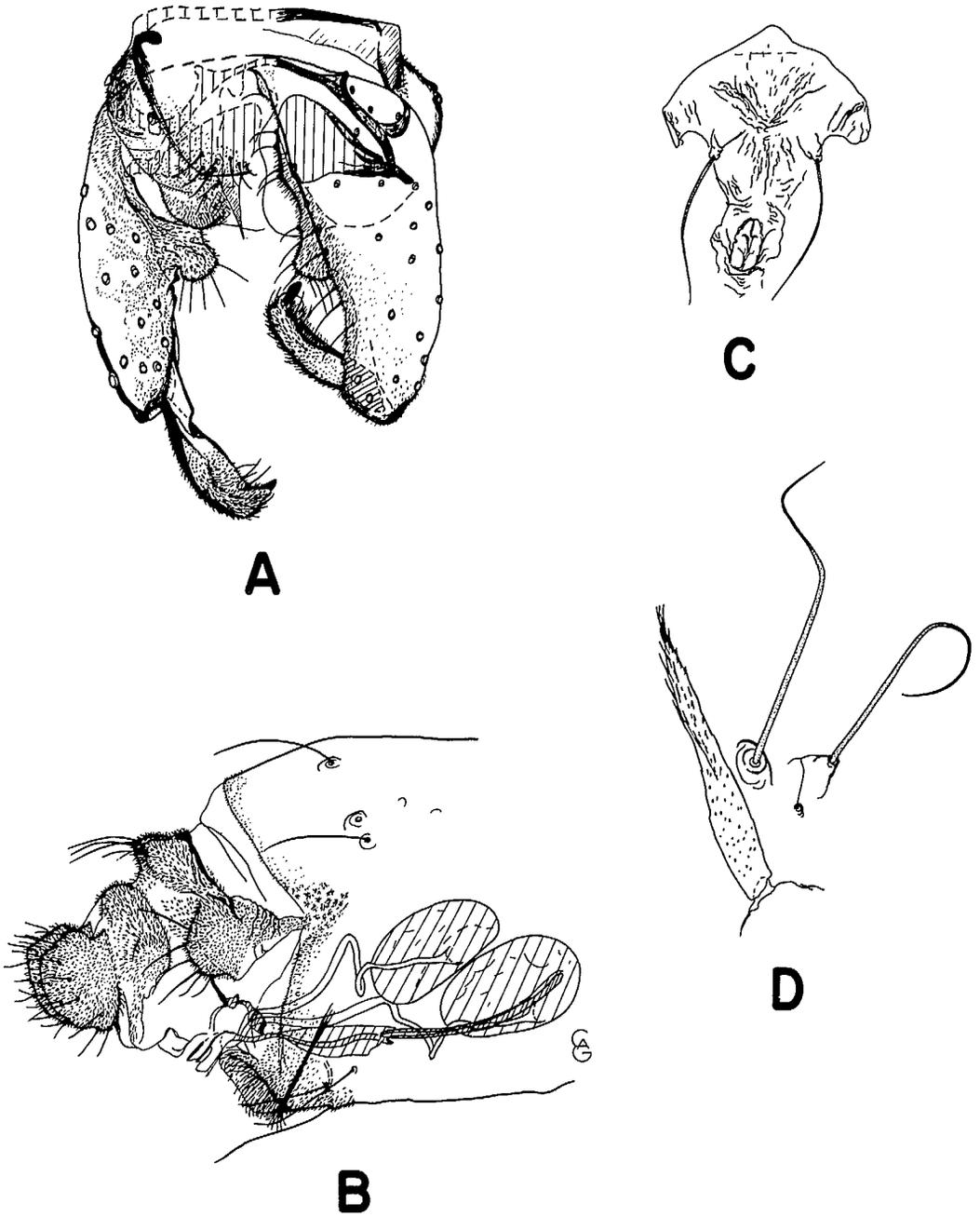


FIG. 9. *Nanocladius (Nanocladius) distinctus* (Mall.). A, male hypopygium. B, female genitalia, lateral view. C-D, pupa: C) frontal plate, D) thoracic horn.

Wing — VR = 1.14–1.27, 1.21. Brachiolum with 1 seta, R with 0–2, 1 seta. Squama with 2–10, 6 setae. Extended part of costa 50–60, 53 μm long.

Legs — Spur of front tibia 45–50, 47 μm long; spurs of middle tibia 18–24, 21 μm (5) and 15–18, 16 μm long; of hind tibia 41–48, 44 μm and 18–23, 21 μm long. Width at apex of front tibia 28–35, 31 μm ; of middle tibia 33–42, 37 μm ; of hind tibia 38–50, 45 μm . Comb with 11–13, 12 setae; shortest seta 20–28, 23 μm ; longest seta 32–42, 35 μm . Sensilla chaetica 1–3, 2 in basal 0.2 of ta_1 of middle leg. Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	368–524, 441	497–668, 576	325–423, 358	251–340, 283	153–231, 182	86–133, 105
p_2	380–510, 446	393–551, 478	196–276, 229	117–163, 138	86–113, 97	37–60, 45
p_3	368–558, 463	503–707, 594	264–381, 322	141–213, 178	104–170, 132	57–83, 71
	ta_5	LR	BV	SV	BR	
p_1	51–77, 64	0.59–0.65, 0.62	2.04–2.41, 2.19	2.66–3.01, 2.86	2.60–2.80, 2.70 (4)	
p_2	37–57, 41	0.45–0.50, 0.48	2.93–3.88, 3.51	3.58–4.31, 4.00	3.20–4.80, 4.07	
p_3	37–70, 52	0.52–0.56, 0.54	3.04–3.36, 3.19	3.19–3.35, 3.28	5.36–7.00, 6.02	

Abdomen (Fig. 1D) — T I with 8–18, 13 setae; T II and III each with 13–30, 19 setae; T IV–VIII 11–22, 16 setae, transverse row mostly uniserial.

Hypopygium (Fig. 9A) — T IX with 4–10, 8 setae, laterosternite IX with 3 or 4, 4 setae. Transverse sternopodeme 50–75, 63 μm long. Phallapodeme 50–80, 66 μm long. Anal point 30–53, 36 μm long. Gonocoxite 156–190, 170 μm long, with square basal lobe; gonostylus 75–87, 79 μm long. HR = 1.95–2.35, 2.16; HV = 2.75–3.10, 2.91.

FEMALE IMAGO ($n = 1$)

Length 1.68 mm. Wing length 0.97 mm. Total length/wing length 1.73. Wing length/length of profemur 3.30.

Head — Antenna broken. Outer verticals 3. Coronal suture weak, about 50 μm long. Tentorium 120 μm long. Stipes 110 μm long. Palp lengths (μm): 26, 40, 54, 70, 136.

Thorax — Antepnotum with 2 lateral and 1 additional median seta. Dorsocentrals 9, prealars 3. Scutellum with 4 setae.

Wing — Brachiolum with 1 seta, R with 6 setae, R_1 with 1 seta, R_{4+5} with 5 setae. Squama with 3 setae.

Legs — Spur of front tibia 18 μm long; spurs of middle tibia 20 μm and 14 μm long, of hind tibia 38 μm and 14 μm long. Width at apex of front tibia 28 μm , of middle tibia 33 μm , of hind tibia 39 μm . Comb with 12 setae, 20–32 μm long. Sensilla chaetica 4 in basal 0.2 of ta_1 of middle leg. Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	294	364	215	125	93	60	48	0.57	2.68	3.06	—
p_2	288	356	148	82	63	36	38	0.42	3.62	4.35	2.11
p_3	307	386	196	102	74	40	40	0.51	3.47	3.53	3.20

Genitalia (Fig. 9B) — Gonocoxite IX with 6 or 7 setae. T IX with 5 setae. Cercus 58 μm long. Seminal capsule 82 μm long, 50 μm wide. Notum 106 μm long.

PUPA ($n = 6-8$)

Length 2.00–3.15, 2.55 mm. TH/AM 1.07–1.21, 1.14.

Cephalothorax — Thoracic horn (Fig. 9D) 170–262, 220 μm long, 25–40, 32 μm wide 0.1 from base; 21–34, 27 μm wide 0.3 from base; length/width 6.55–9.52, 7.25. Frontal setae (Fig. 9C) 130–190, 161 μm long, on 31–44, 38 μm high, 26–34, 31 μm wide tubercles. Po 84–140, 109 μm

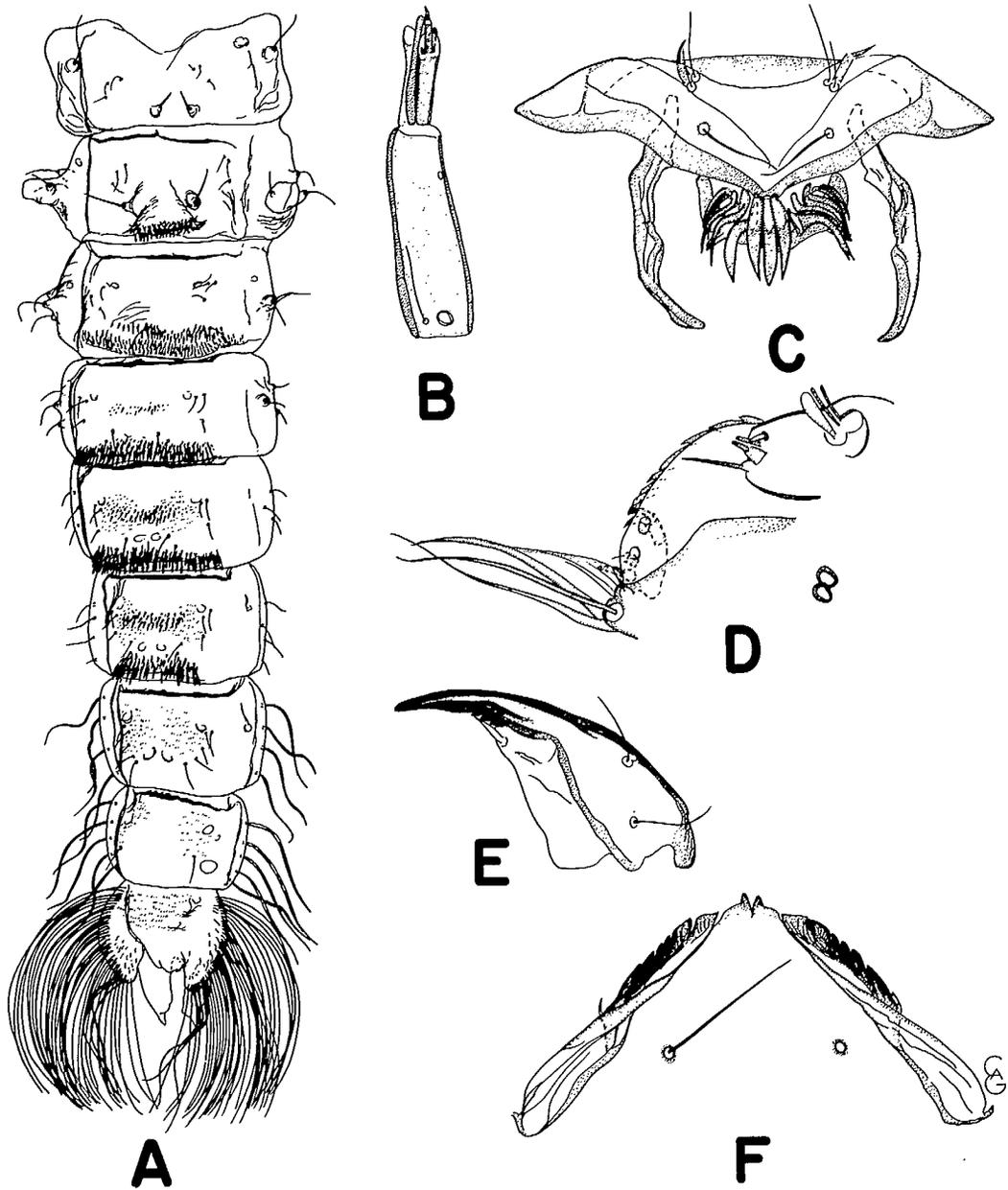


FIG. 10. *Nanocladius (Nanocladius) distinctus* (Mall.), immatures. A, pupa, tergites I-IX. B-F, larva: B) antenna, C) labrum, palatum and premandible, D) maxilla, E) mandible, F) mentum.

long; both MA 180–280, 226 μm ; LA 48–67, 60 μm ; PcS₁ 31–50, 40 μm ; PcS₂₋₃ 170–280, 219 μm ; Dc₁ and Dc₃ 70–114, 97 μm ; Dc₂ 41–70, 58 μm ; Dc₄ 60–78, 70 μm . MA and PcS₂₋₃ on 35–60, 40 μm high, 22–50, 37 μm wide tubercles. Dc₁ 50–82, 67 μm anterior of Dc₃; Dc₃ 98–128, 108 μm anterior of Dc₄.

Abdomen (Fig. 10A) — PSA present on sternites IV–VI or VII, longest spinules 12–24, 15 μm long. L-setae nonfilamentous on VI, filamentous on VII, VIII with 5 filamentous L-setae. T II with 30–53, 42 caudal hooklets; longest 22–28, 24 μm . Numbers and lengths of longest caudal spines on T III–VI: 28–70, 42 (18–28, 22 μm); 63–99, 75 (22–32, 28 μm); 60–93, 72 (28–39, 35 μm); 32–58, 46 (26–40, 41 μm). Integuments III/IV with complete rows of spinules, of IV/V interrupted medially for 33–160, 113 μm . Number of spines in median spine patches of IV–VI: 2–23, 12; 16–57, 30; 12–45, 26. Anal macrosetae thick (about 2.5 μm); 175–230, 200 μm (2) long. Anal lobe with 20–50, 35 setae in fringe.

FOURTH INSTAR LARVA ($n = 1-2$, EXCEPT WHEN OTHERWISE STATED)

Total length about 2.0 mm. Head capsule length 0.32–0.37 mm.

Head — Antenna as in Fig. 10B. Length of antennal segments (μm): 58–60, 20–21, 6–7, 2–4, 2–3. AR = 1.76–1.93. Basal antennal segment 16–17 μm wide; blade at apex 30 μm long; ringorgan 11 μm from base; seta 25 μm long, 14 μm from base; apical setal mark 34–40 μm from base. Apical style of second segment 8 μm long. Labrum and palatum as in Fig. 10C. Premandible (Fig. 10C) 50–54 μm long. Maxilla as in Fig. 10D. Mandible (Fig. 10E) 96–114 μm long. Mentum (Fig. 10F) with 13 distinct teeth. Ventromental plate 62–80, 68 μm (5) long (measured from base of second outermost tooth of mentum to candolateral apex); width 12–16, 14 μm (5). Postmentum 160–186, 171 μm (5) long.

Abdomen — Anterior parapods with a few very weakly serrated claws. Procercus 30 μm high, 19 μm wide. Anal setae 316 μm long.

REMARKS

It is quite conceivable that *N. (N.) distinctus* as defined here contains more than one species. The variation is large within both adults and immatures. The pupae from Missouri River have, for instance, 35–50 setae in the fringe of the anal lobe, and the spinules in integument IV/V are broadly interrupted medially. The spinules in integument IV/V are narrowly interrupted in one pupa from Lewis and Clark Lake. The pupa has 29 setae in the fringe of the anal lobe; integument IV/V is broadly interrupted in the other pupa containing 20–24 setae in the fringe. It is also likely that the paralectotypes of *N. (N.) distinctus* as redescribed by Sublette (1970 p. 69) contain specimens, for instance, of *N. (N.) anderseni* judging by the ranges given for leg and antennal ratios. However, the lectotypes of both *N. (N.) distinctus* and *N. (N.) distinctus* var. *basalis*, in all likelihood belong to the same species as described here.

MATERIAL EXAMINED

Male reared from larva, south shore, Lewis and Clark Lake, S.Dak., 31/5/72, P. L. Hudson; female reared from larva, periphyton, Lewis and Clark Lake, S.Dak., 1/6/71, P. L. Hudson; 2 males, Missouri River, 2 miles east 6 miles south of Gayville, S.Dak., 29/5 and 6/8/72, P. L. Hudson; male, Missouri River, Springfield, S.Dak., 18/7/72, P. L. Hudson; 6 pupae, Missouri River, Fort Calhoun, Neb., 28/5 and 15/7/75, D. L. Andersen; 2 males, McBeth Harbour and 2.5 miles offshore Horse Island, Lake Winnipeg, Man., 29–30/7/69, S. S. Chang; male, Long Lake, N.W.T., 23/7/73, D. M. McClymont; 2 larvae, Brunette River (tributary to Frazer River), B.C., 23/5/75, K. J. Hull; 4 larval head capsules, 89–164 cm core taken at depth of 22 m, Glenora, Bay of Quinte, Lake Ontario, 17/3/72, W. F. Warwick.

ECOLOGY AND DISTRIBUTION

N. (N.) distinctus appears common in lakes and rivers of the Midwest. The species has been taken only in the moderately oligotrophic to mesotrophic areas of Lake Winnipeg and in the oligotrophic layers of the core from Lake Ontario (W. F. Warwick personal communication). It appears to have two emergence periods, one in late May to July and one in August. Distribution: Northwest Territories, British Columbia, Manitoba, Ontario, South Dakota, Nebraska, Illinois.

Nanocladius (Nanocladius) cf. bicolor (Zett.)

(Fig. 1E, 11A, B)

A female from Hazen Camp on Ellesmere Island may belong to this species.

FEMALE IMAGO ($n = 1$)

Wing length 1.76 mm. Wing length/length of profemur 3.89.

Head — AR = 0.63. Flagellomeres length (μm): 66, 41, 32, 41, 113. Other head measurements within variation of males of *N. (N.) distinctus*.

Thorax — Antepnotum with 6 setae. Dorsocentrals 12, prealars 4. Scutellum with 4 setae.

Wing — About as in female *N. (N.) distinctus* except squama with 12–14 setae.

Legs — Sensilla chaetica 4 in basal 0.25 of ta_1 of middle leg, 1 basally on ta_1 of hind leg. Other measurements inside variation of male *N. (N.) distinctus* except ta_2 – ta_4 of front leg (190 μm , 117 μm , 76 μm) and fe (540 μm) and ti (577 μm) of middle leg. LR₁₋₃ as 0.60, 5.43, 0.48; BV₁₋₃ as 3.11, 3.83, 3.62; SV₁₋₃ as 3.00, 4.55, 3.82.

Abdomen (Fig. 1E) — Tergite setae in irregular double row on all tergites.

Genitalia (Fig. 11A, B) — Gonocoxite IX with 7 setae. T IX with 19 setae. One normal cercus 90 μm long, the other deformed without setae. Seminal capsule 80 μm long, 56 μm wide. Notum 146 μm long.

REMARKS

This female may be part of an arctic population of *N. (N.) bicolor*, or it may represent a new species. It is not identical with any of the other Nearctic species on the basis of the numerous squamal setae, the double row of setae on the tergites, etc. The descriptions of *N. (N.) bicolor* (Zetterstedt 1838 p. 813; Edwards 1929 p. 351; Goetghebuer 1932 p. 101, 1940–50 p. 114; Tokunaga 1938 p. 319; Brundin 1956 fig. 86; Fittkau and Lehmann 1970 p. 396) are all incomplete and do not allow for a comparison. The Palaearctic specimens, however, have only 2–4 setae on the squama according to Edwards (1929 p. 351).

MATERIAL EXAMINED

Female, Hazen Camp, Ellesmere Island, 24/7/61, D. R. Oliver.

ECOLOGY AND DISTRIBUTION

The species represented by this female, whether it is *N. (N.) bicolor* or not, is apparently restricted to the Arctic Islands in North America. *N. (N.) bicolor* is, however, widespread in the Palaearctic region in lakes and streams (Fittkau and Lehmann 1970 p. 396).

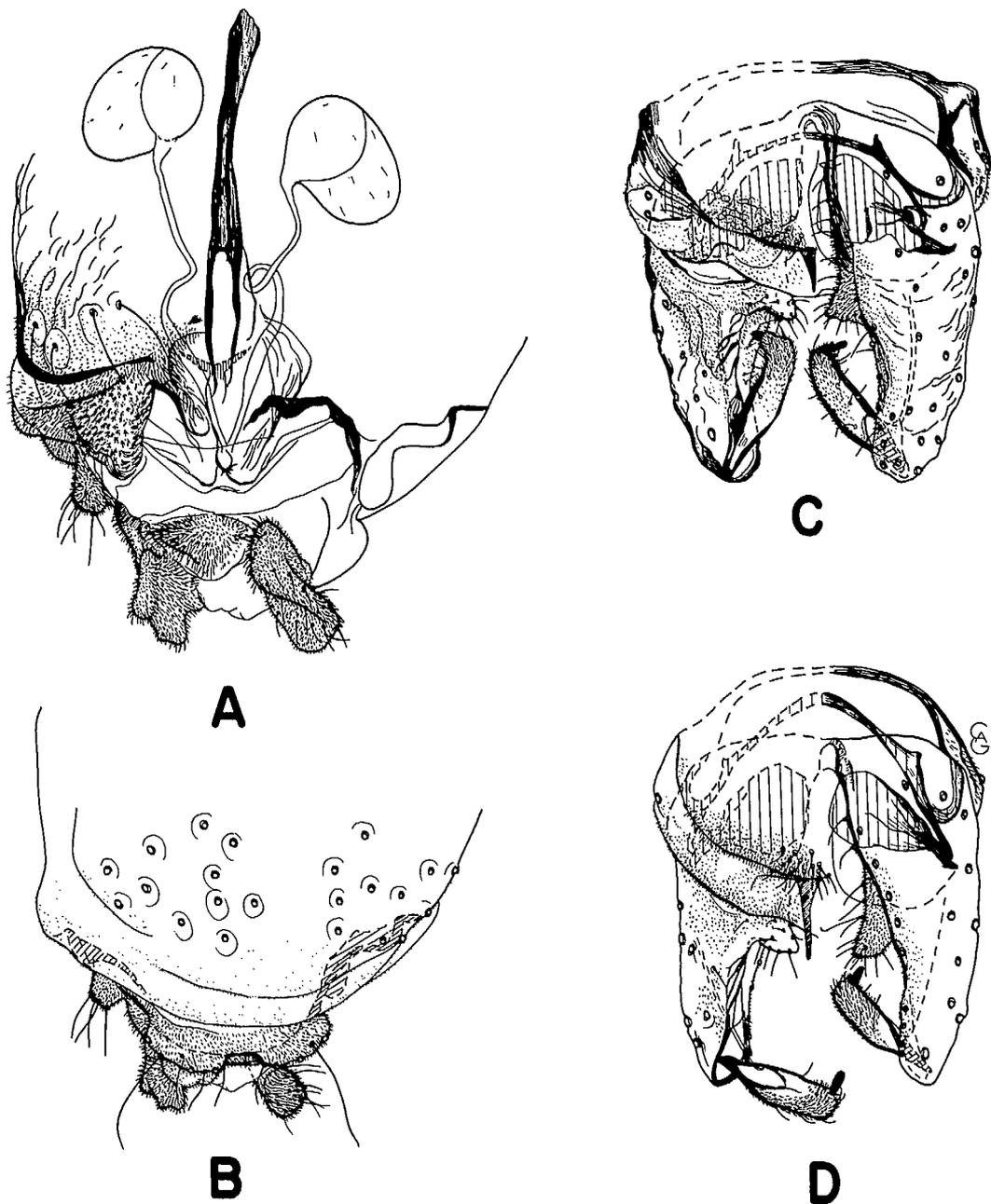


FIG. 11. *Nanocladus* (*Nanocladis*) spp., imagines. A–B, *N. (N.) cf. bicolor* (Zett.), female genitalia: A) ventral view, B) dorsal view. C, *N. (N.) cf. alternantherae* Dendy et Subl., male hypopygium. D, *N. (N.) cf. parvulus* (Kieff.) n.comb., male hypopygium.

parvulus group

Male gonocoxite with pointed, triangular basal lobe. Female sternite VIII forms a small floor under anteriormost part of vagina; lobes of gonapophyses VIII partly overlapping.

Pupal thoracic horn digitiform; T IV–VI with median spine patch.

Larval AR 1.35–2.35; premandible with simple or slightly bifid apical tooth; mentum with 13 relatively distinct teeth; claws of anterior parapods probably always serrated.

Nanocladius (*Nanocladius*) cf. *alternantherae* Dendy et Subl.
(Fig. 1F, 11C)

A male from Hartwell Reservoir, S.C., may belong to this species.

MALE IMAGO ($n = 1$)

Length 2.32 mm. Wing length 1.66 mm. Total length/wing length 1.40. Wing length/length of profemur 3.22. Coloration darker than in other species and even darker than mentioned by Dendy and Sublette (1959 p. 510), nearly fully black except for having the leg coloration of the genus. Measurements and ratios near the upper range of *N. (N.) distinctus* with the following exceptions:

Head — AR = 1.17. Clypeus with 6 setae. Tentorium 190 μm long. First and second palp segments 36 μm and 62 μm long.

Wing — R with 4 setae. Squama with 11 setae. Extended part of costa 84 μm long.

Legs — Width at apex of front tibia 40 μm , of middle tibia 48 μm , of hind tibia 64 μm . Comb with 18 setae, 28–46 μm long. Lengths of leg segments at most 3–8 μm longer than the longest in *N. (N.) distinctus* except for fe (527 μm), ti (570 μm), and ta₂ (178 μm) of middle leg. BR₁ 4.09.

Abdomen (Fig. 1F) — T I–IV each with 28–37 setae, T V–VIII each with 16–23 setae, in irregular uniserial to partly biserial transverse row as mentioned by Dendy and Sublette (1959 p. 510).

Hypopygium (Fig. 11C) — T IX with 17 setae. Transverse sternapodeme 76 μm long. Anal point tapering (not slightly expanded preapically as in the specimens described by Dendy and Sublette 1959). Gonocoxite 220 μm long, with pointed, triangular basal lobe; gonostylus 88 μm long. HR = 2.50, HV = 2.63.

REMARKS

Although this male is slightly darker than those originally described by Dendy and Sublette (1959 p. 510–513) and has a tapering, not preapically expanded, anal point, the combination of other characters fit only *N. (N.) alternantherae*. Without the immatures, however, the identification is uncertain.

MATERIAL EXAMINED

Male, Hartwell Reservoir, Clemson, S.C., 1/17/74, P. L. Hudson.

ECOLOGY AND DISTRIBUTION

Dendy and Sublette (1959 p. 512) reared *N. (N.) alternantherae* from larvae collected on alligator weed, *Alternanthera philoxeroides* (Mart.), from experimental ponds at Auburn, Ala. The present male from a reservoir in South Carolina suggests a wider distribution.

Nanocladius (Nanocladius) rectinervis (Kieff.) n.comb.
(Fig. 1G, H, 12, 13)

Cricotopus rectinervis Kieffer 1911: 199

Eukiefferiella lv. *rivularis* Zvereva 1950: 272, n.syn.

Microcricotopus sp. *parvulus* type, Sæther 1970: 99.

In addition to the diagnosis given by Fittkau and Lehmann (1970 p. 399–400) the male is characterized by having a LR_1 of 0.63–0.68; squama with 3–8 setae; T I with 8–21 setae; T II–VIII with 7–20 setae in transverse uniserial to irregular biserial row.

The pupa has a 0.16–0.26 mm long thoracic horn; TH/AM of 0.58–0.80; and strong anal macrosetae 260–344 μm long.

The larva has been described by Lindegaard-Petersen (1972 p. 485–488). A presumed larva of this species from Colorado has serrated claws on anterior parapods.

MALE IMAGO ($n = 6$, EXCEPT WHEN OTHERWISE STATED)

Measurements and ratios approximately within the variation of *N. (N.) anderseni* with the following exceptions:

Head — AR = 0.79–0.95, 0.87. Vestigial ocelli 8–16, 12 μm apart.

Thorax — Anteprenotum with 2–4, 4 setae. Scutellum with 2 or 3, 2 setae.

Wing — Squama with 3–8, 5 setae. Extended part of costa 52–85, 72 μm long.

Legs — LR_3 0.50–0.54, 0.53; BV_2 3.10–3.87, 3.54 (4); BV_3 2.86–3.29, 3.04; SV_3 3.22–3.50, 3.35.

Abdomen (Fig. 1G, H) — T I with 8–21, 16 setae. T II–VIII each with 8–20, 16 setae; transverse row varies between uniserial and biserial.

Hypopygium (Fig. 12A) — T IX with 6–17, 11 setae; laterosternite IX with 2 or 3, 3 setae. HV = 2.67–3.00, 2.83.

PUPA ($n = 10$, EXCEPT WHEN OTHERWISE STATED)

Measurements and ratios approximately within the variation of *N. (N.) anderseni* with the following exceptions and additions:

Length 2.40–3.25, 2.84 mm. TH/AM = 0.58–0.80, 0.64.

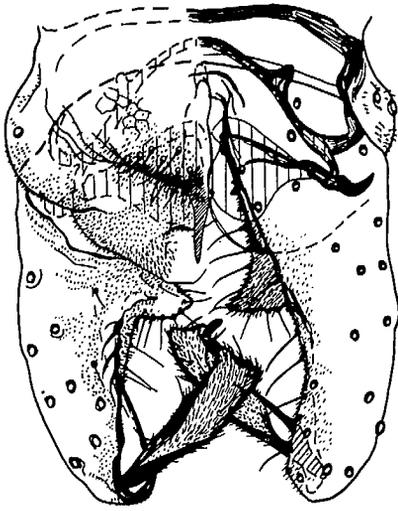
Cephalothorax — Thoracic horn (Fig. 12B) 164–260, 202 μm long, 20–38, 25 μm wide. Frontal setae (Fig. 13A) 72–121, 93 μm long, on 12–30, 18 μm (8) high and 14–26, 19 μm (8) wide tubercles. Po 70–108, 86 μm (6) long; longest MA 122–284, 208 μm on low tubercles; Dc_4 60–80, 72 μm .

Abdomen (Fig. 12C) — PSA present on sternites IV–VI or IV–VII. L-setae of V all non-filamentous or 1 filamentous, of VI and VII 1–4 filamentous. T II with 19–42, 33 caudal hooklets. Number of caudal spines of T V and VI: 19–66, 49 and 15–56, 26. Four specimens (from Ottawa River and 18 Mile Creek) with additional two groups of caudal spines on VII bearing total of 4–26, 13 spines. Row of spinules on integument IV/V interrupted medially for 136–200, 159 μm . Number of spines in median spine patches of IV–VI: 4–20, 11; 11–34, 19; 21–40, 25. Specimens from Ottawa River, 18 Mile Creek, and Horsepasture River with median spine patch of 20–33, 26(5) spines also on VII. Anal macrosetae strong 260–344, 316 μm long. Anal lobe with 17–27, 21 setae in fringe.

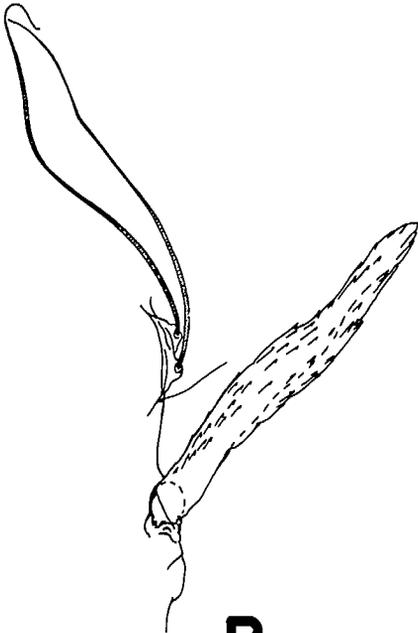
FOURTH INSTAR LARVA ($n = 1$, EXCEPT WHEN OTHERWISE STATED)

As described by Lindegaard-Petersen (1972 p. 485–488) with the following additions:

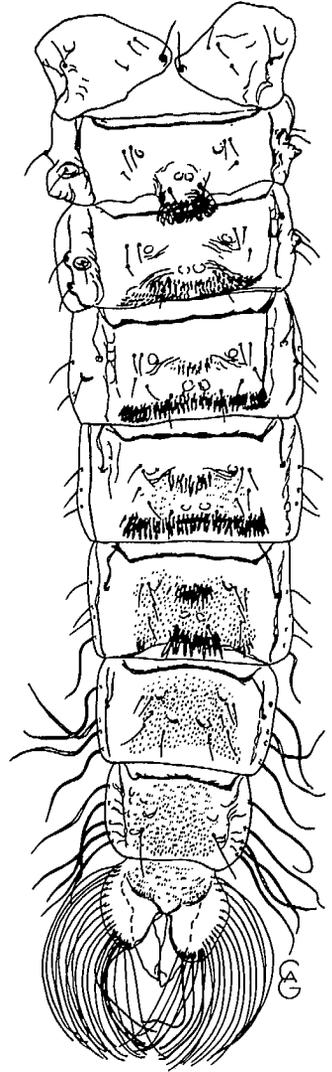
Head — Ventromental plates (Fig. 13F) 78 μm long (measured from base of second outermost tooth of mentum to caudolateral apex), 18 μm wide. Postmentum 176 μm long. Antenna as in Fig. 13B. Labrum and palatum as in Fig. 13C. Premandible (Fig. 13C) 44–46 μm (2) long. Maxilla as in Fig. 13D. Mandible (Fig. 13E) 94–96 μm (2) long.



A



B



C

FIG. 12. *Nanocladius (Nanocladius) rectinervis* (Kieff.) n.comb. A, male hypopygium. B-C, pupa: B) thoracic horn, C) tergites I-IX.

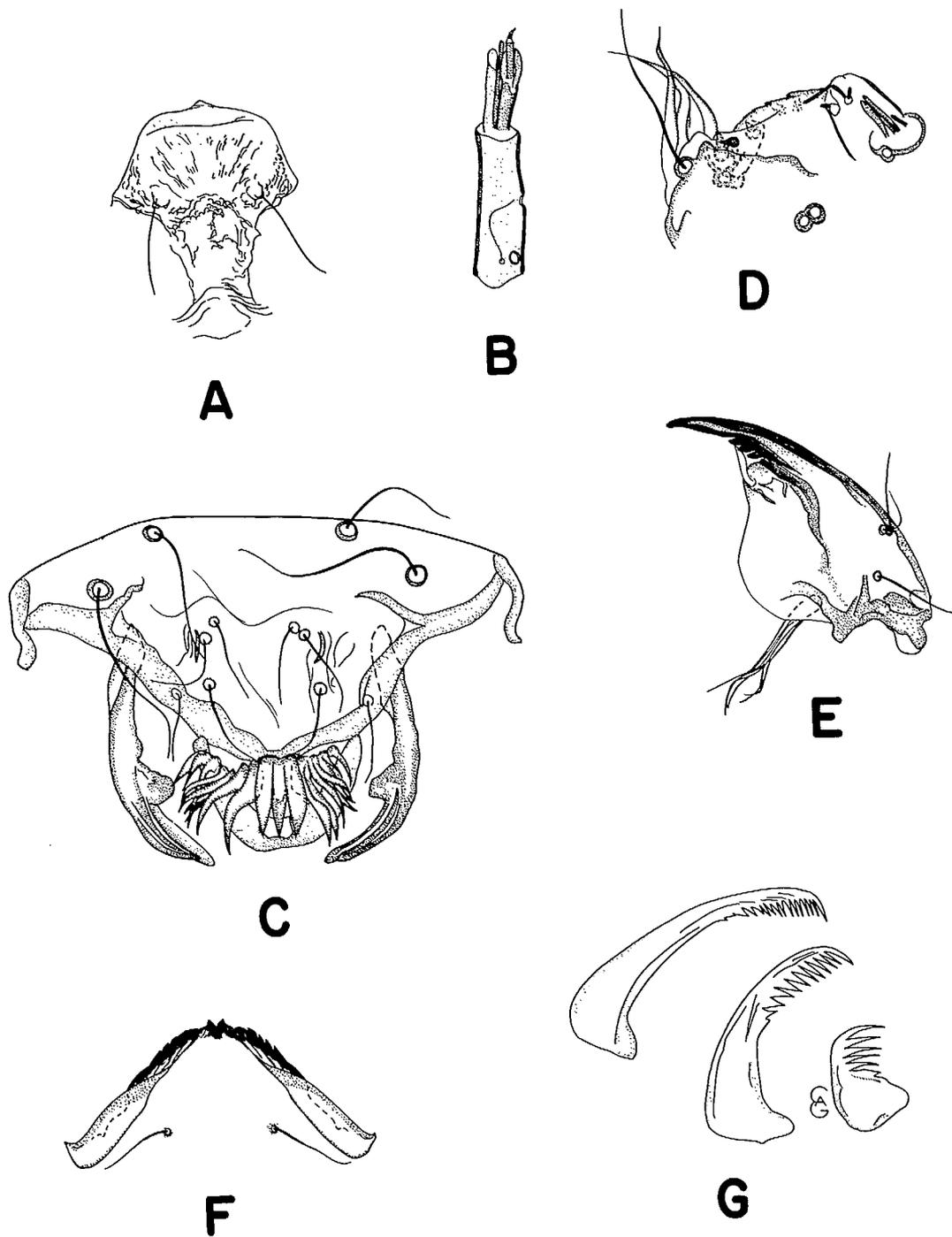


FIG. 13. *Nanocladius (Nanocladius) rectinervis* (Kieff.) n.comb., immatures. A, pupa, frontal plate. B-G, larva: B) antenna, C) labrum, palatum, and premandible, D) maxilla, E) mandible, F) mentum, G) claws of anterior parapods.

Abdomen — Claws of anterior parapods serrated (Fig. 13G).

REMARKS

The two larvae and the pupal fragment from Colorado may possibly not belong to *N. (N.) rectinervis* as details of segment VII of the damaged pupa were not visible. The two specimens from Ontario are much larger (wing length 1.27–1.52 mm compared to 0.98–1.17 mm) than the others, and the associated pupa has caudal spines and a median spine patch on T VII; as there are no other significant differences, however, they almost certainly belong to *N. (N.) rectinervis*. Also the pupae from Horsepasture River and 18 Mile Creek have a median spine patch on T VII, and the latter specimens also have caudal spines on T VII and only one filamentous seta on segment VII. Especially the pupae from 18 Mile Creek may belong to a different species but variation between generations may account for the difference.

MATERIAL EXAMINED

Male reared from pupa, Lake 132, Experimental Lakes Area, Kenora, Ont., 4/9/68, S. S. Chang; male reared from pupa, Ottawa River, Ont., 8/5/74, T. Clair; male, Grenadier Island, St. Lawrence Island National Park, Ont., 22/5/75, M. E. Rousset; male, near Beaver Creek, Lake Winnipeg, Man., 22/7/71, R. Andrews and M. Roberts; pupa, Missouri River, Fort Calhoun, Neb., 15/7/75, D. L. Andersen; pupal exuvium, Horsepasture River, Transylvania Co., Rosman, N.C., 20/2/76, P. L. Hudson; male reared from pupa, 2 males, 3 pupal exuvia, Little River Dam, Keowee Reservoir, Seneca, S.C., 14/4 and 2–19/5/75, P. L. Hudson; pupal exuvium, Jocassee Reservoir, Thompson River, Oconee Co., Salem, S.C., 16/8/74, P. L. Hudson; 4 pupal exuvia, 18 Mile Creek, Pickens Co., Clemson, S.C., 24/1–16/2/76, P. L. Hudson; pupa, 2 larvae, North Boulder Creek, Colo., 9/7/60, K. Elgmork (as *Microcricotopus* sp. *parvulus* type in Elgmork and Sæther 1970 p. 43, 99).

ECOLOGY AND DISTRIBUTION

According to Fittkau and Lehmann (1970 p. 400) the species is rheophilous and less cold-stenothermic than *N. (N.) parvulus*. The Nearctic material, however, includes lakes and reservoirs but in Europe the species is known only from running water.

In addition to the distribution records given by Fittkau and Lehmann the species has been recorded from Denmark (Lindgaard-Petersen 1972 p. 488) and almost certainly as *Eukiefferiella* lv. *rivularis* Zver. by Zvereva (1950 p. 273) from northern Russia. In North America the distribution records include Manitoba, Ontario, North and South Carolina, Nebraska, and almost certainly Colorado. The species mentioned by Roback (1957 p. 91) as *Psectrocladius* sp. 3 from Schuylkill River, Pa., most likely is *N. (N.) rectinervis*.

Nanocladius (Nanocladius) cf. parvulus (Kieff.) n.comb.

(Fig. 2A, 11D)

Cricotopus parvulus Kieffer 1909: 45

Microcricotopus balticus Albu nec Palm., Albu 1968: 459, n.syn.

Five males from Lake Winnipeg and three from Maine may belong to this species.

In addition to the characters given by Fittkau and Lehmann (1970 p. 398) these specimens are characterized by a LR_1 of 0.58–0.67; squama with 1–4 setae; T I with 5–10 setae; T II with 6–16 setae; transverse biserial row of setae on tergites.

MALE IMAGO ($n = 6-8$, EXCEPT WHEN OTHERWISE STATED)

All measurements and ratios completely inside the ranges of *N. (N.) anderseni* with the following exceptions and additions:

Wing length/length of profemur 2.93–3.15, 3.03.

Head — AR = 0.56–0.63, 0.60. Tentorium 100–130, 119 μm long. Vestigial ocelli apparently absent.

Thorax — Scutellum with 2 or 3, 2 setae.

Wing — R_{4+5} with 0 or 1 seta. Squama with 1–4, 3 setae.

Legs — Comb with 9–12, 11 setae. LR_1 0.62–69, 0.65; LR_3 0.53–0.57, 0.56.

Abdomen (Fig. 2A) — T II–VIII each with 6–16, 9 setae; specimens from Maine with 5–10 setae on all tergites, from Lake Winnipeg with 6–10 setae on T I and 8–16 on each of T II–VIII; transverse row, biserial.

Hypopygium (Fig. 11D) — T IX with 6–16, 10 setae. Phallapodeme 48–57, 53 μm (5) long. Gonostylus 47–56, 53 μm long. HR = 2.36–2.85, 2.60.

REMARKS

The species described here has not been associated with pupae and no Nearctic pupae which may represent *N. (N.) parvulus* have been found. Furthermore, the transverse rows of setae on the tergites are irregularly double, whereas *N. (N.) parvulus* is supposed to have uniserial transverse rows (Fittkau and Lehmann 1970 p. 398). This character, however, does not hold up for *N. (N.) rectinervis* and *N. (N.) anderseni* and is unlikely to do so for *N. (N.) parvulus*. Whether the specimens described above really represent Nearctic populations of *N. (N.) parvulus* can only be decided with the help of males associated with pupae. Some or all specimens may belong to *N. (N.) spiniplenus* n.sp., which appears to be closely related to *N. (N.) rectinervis* and *N. (N.) parvulus*.

MATERIAL EXAMINED

Two males, Government Dock, Victoria Beach, Lake Winnipeg, Man., 25/7/69, S. S. Chang; male, 2.5 miles offshore Horse Island, Lake Winnipeg, 29/7/69, S. S. Chang; male, Beaver Point, Lake Winnipeg, 30/6/71, S. Flam and E. Johnson; male, Old Fishing Dock, Lake Winnipeg, 18/8/71, S. Warwick and M. Roberts; 3 males, Nanagnagus River, Me., 28/6–1/9/73, T. M. Mingo.

ECOLOGY AND DISTRIBUTION

According to Fittkau and Lehmann (1970 p. 398) *N. (N.) parvulus* is a cold-stenothermous rheophilous chironomid of the rhithron of central European mountain streams. Ecology of the Nearctic specimens does not seem to fit this pattern although the specimens from Lake Winnipeg may actually have come from numerous nearby streams.

Nanocladius (Nanocladius) spiniplenus n.sp.

(Fig. 2B, C, 14, 15, 16)

The presumed male imago is characterized by AR of 0.42–0.53; wing length of 0.97–1.04 mm; LR_1 of 0.58–0.61, LR_3 of 0.49–0.56; squama with 1 or 2 setae; T I with 5–7 setae, T II–VIII with 6–10 setae in mostly uniserial transverse row; basal lobe of male gonocoxite triangular and pointed.

The female imago has sternite VIII that forms a floor under anterior part of vagina; T IX with 11 or 12 setae; gonocoxite IX with 6–8 setae; notum about 76–85 μm long; R with 6 setae, R_{4+5} with 3 or 4 setae, and squama with 4 or 5 setae.

The pupa has a digitiform thoracic horn 0.15–0.19 mm long; Dc_3 nearly always closer to Dc_4 than to Dc_1 ; T IV–VI with well-developed median spine patches; integuments III/IV and IV/V with complete rows of spinules or rows shortly interrupted on IV/V; caudal spines on tergites numerous, but conspicuously short; segment VI with 1 or 2 filamentous L-setae, segment VII and VIII with all L-setae filamentous; anal macrosetae thin; TH/AM of 0.9–1.4; and anal lobe with 14–19 setae in fringe.

The larva ($n = 1$) is about as in *N. (N.) rectinervis* but its basal antennal segment is only 38 μm long.

MALE IMAGO ($n = 5-6$, EXCEPT WHEN OTHERWISE STATED)

All measurements and ratios inside the ranges of *N. (N.) anderseni* with the following exceptions and additions:

Head — AR = 0.42–0.53, 0.48. Clypeus with 3–6, 5 setae. Tentorium 100–130, 117 μm long. Second palp segment 30–40, 34 μm long; third palpal segment 46–59, 54 μm long.

Thorax — Scutellum with 2 or 3, 2 setae.

Legs — Width at apex of front tibia 16–26, 23 μm . Longest seta of comb 22–36, 30 μm ; shortest 12–24, 20 μm . Leg measurements essentially as in *N. (N.) minimus*. Leg ratios:

	LR	BV	SV	BR
p_1	0.58–0.61, 0.59	1.92–2.40, 2.21	2.89–3.11, 3.00	2.86–3.38. (3)
p_2	0.42–0.51, 0.47	3.29–3.77, 3.55	3.81–4.75, 4.27	3.50–4.32, 3.80
p_3	0.49–0.56, 0.53	2.82–3.27, 3.04	3.23–3.68, 3.40	4.71–5.17, 4.95

Abdomen (Fig. 2B) — T I with 5–7, 6 setae; T II–VIII with 6–10, 9 setae mostly in transverse uniserial row.

Hypopygium (Fig. 14A) — Laterosternite IX with 1–3, 2 (4) setae. Transverse sternapodeme 38–62, 48 μm long. Phallapodeme 48–56, 51 μm (4) long. Gonocoxite with triangular, pointed basal lobe; gonostylus 48–64, 55 μm long. HR = 2.39–2.60, 2.48; HV = 2.83–3.19, 3.01.

FEMALE IMAGO ($n = 2$, MEASUREMENTS WITH AN ASTERISK BELONG TO HOLOTYPE)

Measurements and ratios very close to *N. (N.) distinctus* with the following exceptions and additions:

Total length/wing length 1.35–1.52*.

Head (Fig. 15A) — AR = 0.47–0.75*. Flagellomeres length (μm): 46*–52, 31–36*, 30–38*, 36–38*, 70–118*. Clypeus with 6*–10 setae. Tentorium 102* μm long. Coronal suture absent.

Thorax — Dorsocentrals 6* or 7. Scutellum with 2* setae.

Wing — VR = 1.16*–1.25. Squama with 4* or 5* setae.

Legs — BV_{1-3} as 3.12–3.41*, 3.94*–4.68, 3.36–4.12*, SV_2 4.58–4.64*.

Abdomen — as in Fig. 2C.

Genitalia (Fig. 15B; 14B, C) — Gonocoxite IX with 6*–8* setae. T IX with 11* or 12 setae. Cercus 48* μm long. Notum 76*–85 μm long.

PUPA ($n = 8$, EXCEPT WHEN OTHERWISE STATED)

Length 1.79–2.56, 2.12 mm. TH/AM 0.89–1.39, 1.18.

Cephalothorax — Thoracic horn (Fig. 15C) digitiform, 150–194, 165 μm long, 20–41, 29 μm wide; length/width 4.71/8.90, 6.03. Frontal setae (Fig. 15D) 180–242, 217 μm long; on 8–20,

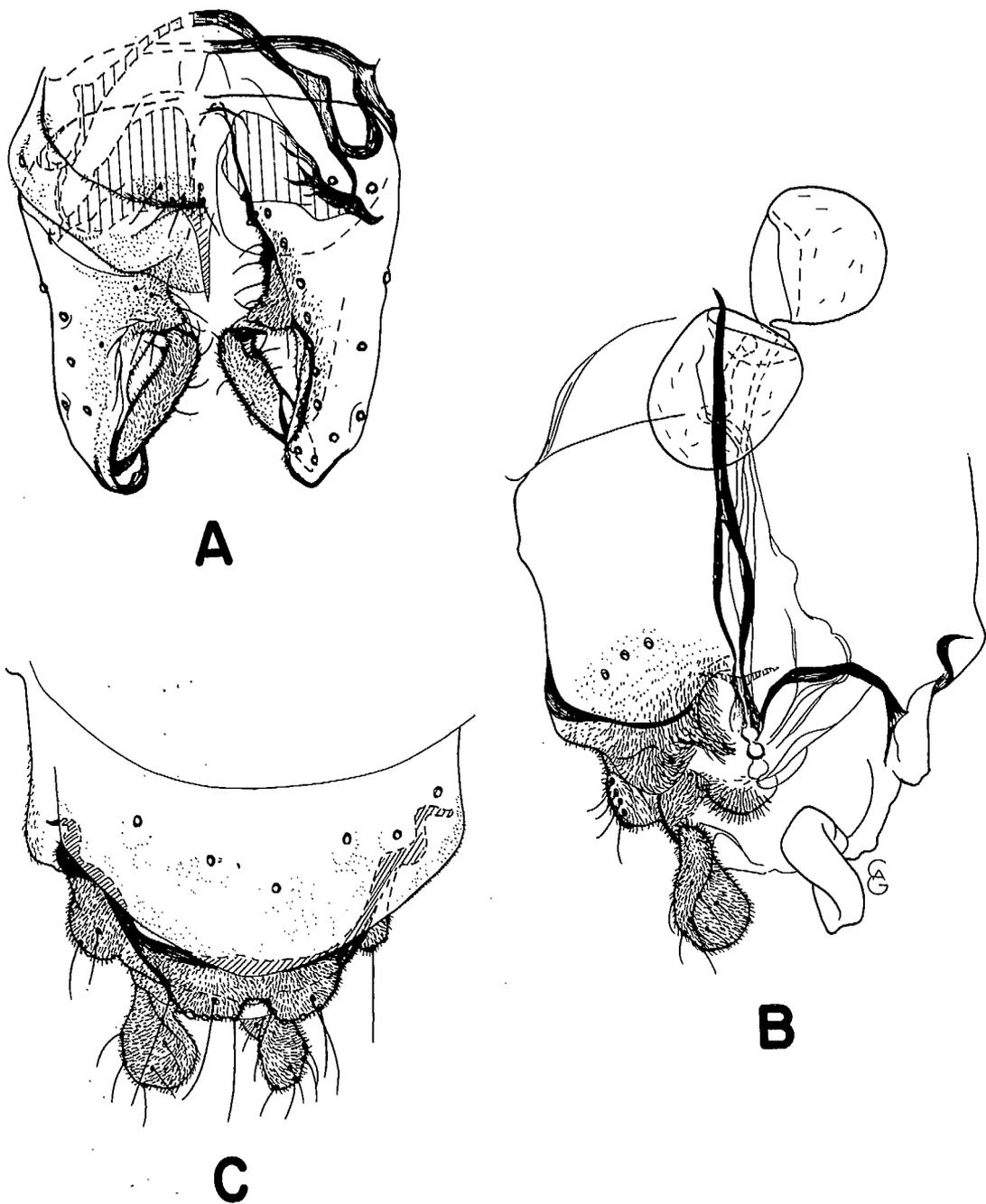


FIG. 14. *Nanocladius (Nanocladius) spiniplenus* n.sp., imagines. A, male hypopygium. B-C, female genitalia: B) ventral view, C) dorsal view.

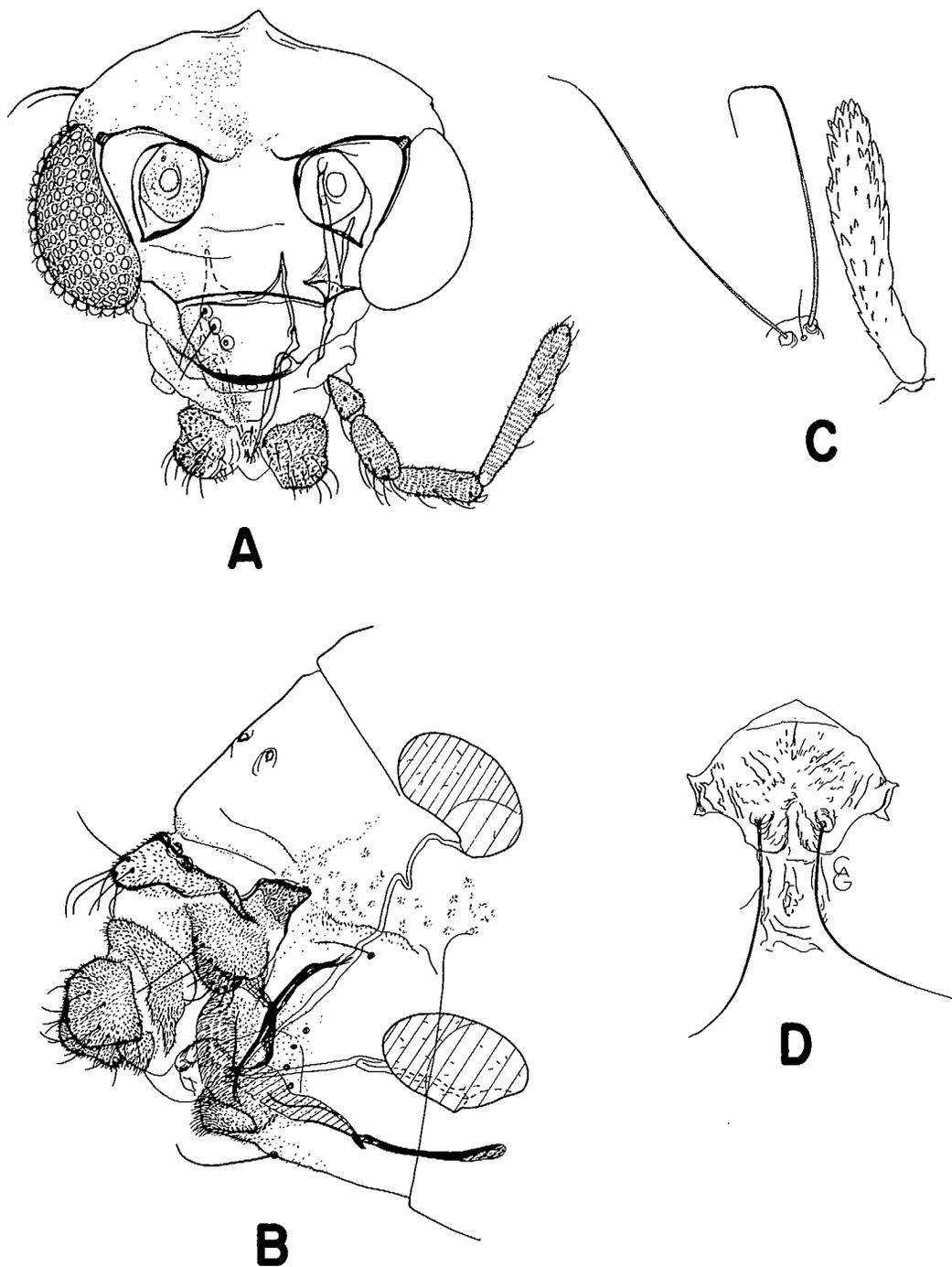


FIG. 15. *Nanocladius (Nanocladius) spiniplenus* n.sp. A-B, female holotype: A) head, B) genitalia, lateral view. C-D, pupa: C) thoracic horn, D) frontal plate.

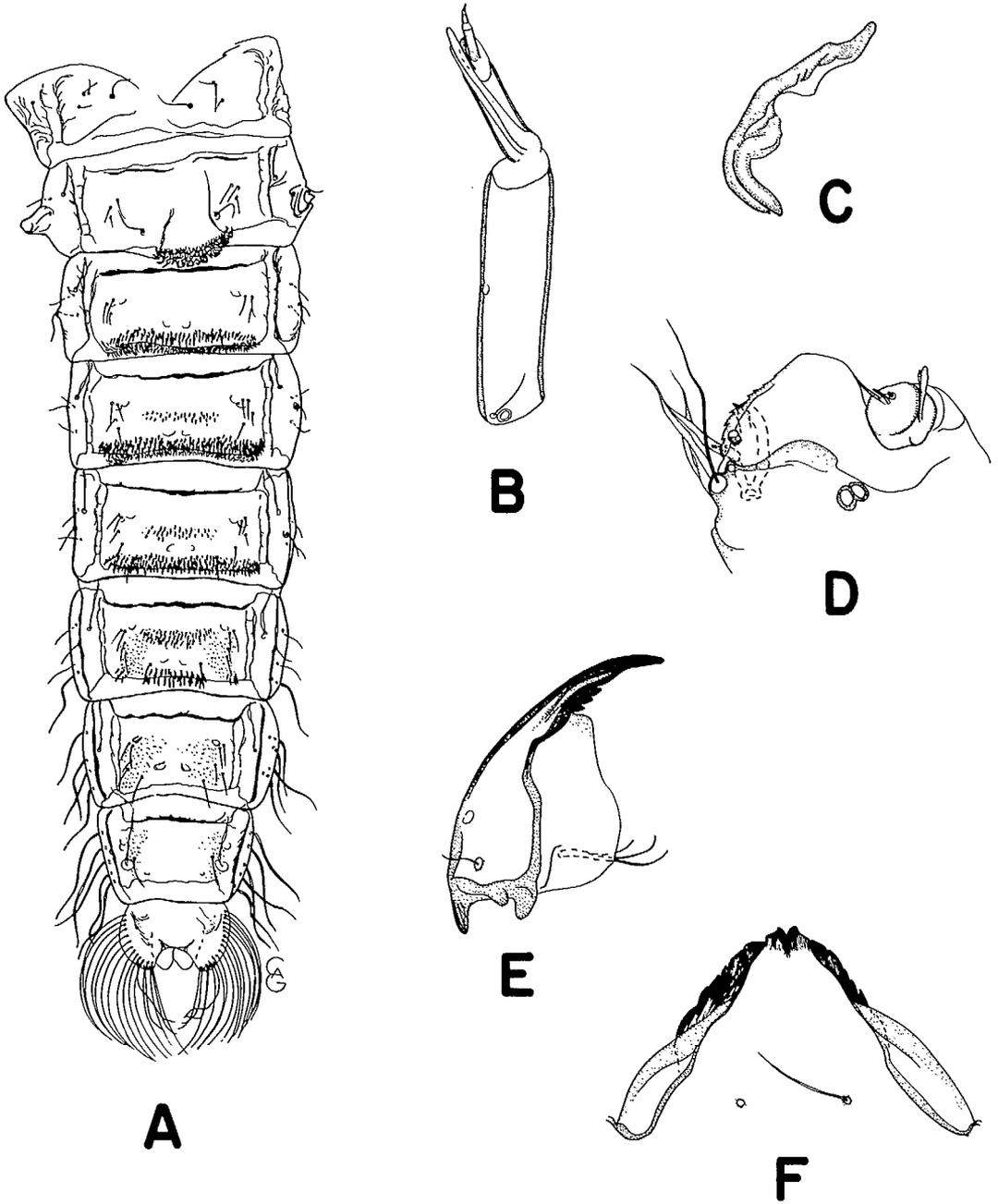


FIG. 16. *Nanocladius (Nanocladius) spinipennis* n.sp., immatures. A, pupa, tergites I-IX. B-F, larva: B) antenna, C) premandible, D) maxilla, E) mandible, F) mentum.

14 μm (5) high, 16–20, 17 μm (5) wide tubercles. Po 34–76, 57 μm (5) long; MA 170–219, 190 μm (7) and 190–230, 212 μm ; LA 54–85, 67 μm (4); Pcs₁ 20–41, 32 μm ; Pcs₂₋₃ 200–305, 238 μm ; Dc₁ and Dc₃ 60–102, 73 μm ; Dc₂ 40–56, 46 μm ; Dc₄ 40–86, 58 μm . Dc₁ 66–104, 81 μm anterior of Dc₃; Dc₃ 32–86, 53 μm anterior of Dc₄.

Abdomen (Fig. 16A) — PSA present on sternites IV–VII; longest spinules 12–17, 14 μm long on IV–VI; 8–16, 10 μm long on VII. Segment VI with 4 L-setae, 1 or 2 filamentous; L-setae of segments VII and VIII all filamentous; 5 L-setae on VIII. T II with 24–43, 34 caudal hooklets, longest 17–21, 20 μm . Numbers and lengths of longest caudal spines on T III–VI: 29–63, 42 (10–16, 13 μm); 43–81, 61 (12–19, 15 μm); 54–103, 70 (12–22, 16 μm); 20–49, 33 (16–26, 21 μm). Integuments III/IV and IV/V with complete rows of spinules or (in the holotype) interrupted medially for 50 μm on IV/V. Number of spines in median spine patches of IV–VI: 12–33, 23; 19–40, 30; 20–43, 32. Anal macrosetae thin; 110–180, 143 μm long. Anal lobe with 14–19, 15 setae in fringe.

FOURTH INSTAR LARVA ($n = 1$)

Head capsule length 0.28 mm.

Head — Antenna as in Fig. 16B. Lengths of antennal segments (μm): 38, 16, 7, 2, 2. AR = 1.36. Basal antennal segment 11 μm wide, blade at apex 26 μm long. Premandible (Fig. 16C) 40 μm long. Maxilla as in Fig. 16D. Mandible (Fig. 16E) 84 μm long. Mentum as in Fig. 16F, with 68 μm long (measured from base of second outermost tooth of mentum to caudolateral apex), 16 μm wide ventromental plates. Postmentum 158 μm long.

Abdomen — lost.

REMARKS

The reared female from Green Creek, Ont., is regarded as the holotype. Although a similar female with associated males were present in the material from New Brunswick, the males are so close to *N. (N.) cf. parvulus* that the separation is uncertain. As it is possible that the imagines of *N. (N.) spiniplenus* are not separable from those of *N. (N.) cf. parvulus*, the material from New Brunswick and the males from the Keowee Reservoir, S.C., are not included in the type material.

MATERIAL EXAMINED

Holotype: female reared from larva, Green Creek, Ont., 21/6/67, L. Haig-Smillie and R. MacDonald (CNC No. 14061). Paratypes: 4 pupal exuvia, Chatooga River, Walhalla, S.C., 2/9 and 14/10/74, P. L. Hudson; pupal exuvium, Jocassee Reservoir, Thompson River, Oconee Co., Salem, S.C., 16/8/74, P. L. Hudson; 2 pupal exuvia, 18 Mile Creek, Pickens Co., Clemson, S.C., 24/1 and 8/2/76, P. L. Hudson.

Other material: 3 males, Keowee Reservoir, Seneca, S.C., 20/3 and 17/10/74, P. L. Hudson; 3 males, 1 female, Narrows Mountain Brook, N.B., 30/6–5/7/72, Nashwaak Experimental Watershed Program.

ECOLOGY AND DISTRIBUTION

The species is probably rheophilous with two emergence periods. It is known from Ontario, New Brunswick, and South Carolina.

balticus group

Male gonocoxite with pointed triangular basal lobe, anal point occasionally with weak setae or microtrichia. Female sternite VIII forms a distinct floor under anterior part of vagina, lobes of gonapophyses VIII overlapping and indistinct.

Pupal thoracic horn short, broad, and rounded; tergites without median spine patches, patch present on VI and/or VII, or on IV–VII (reduced on IV).

Larval AR 1.00–1.30; premandible with 3–5 apical teeth; mentum with weak, very indistinct lateral teeth; claws of anterior parapods apparently smooth.

Nanocladius (Nanocladius) incomptus n.sp.

(Fig. 2D, 17, 18, 19)

The imagines are characterized by a wing length of 0.8–1.1 mm; LR₁ of 0.54–0.61; AR of male of 0.42–0.52; squama with 0–2 setae in male; T I–VIII each with 4–11 setae with transverse uniserial row; basal lobe of male pointed, triangular; sternite VIII of female forms floor under vagina; gonocoxite IX of female with 5 or 6 setae; T IX of female with 2–4 setae, and R and R₄₊₅ of female each with 2–4 setae.

The pupa has a 0.05–0.08 mm long, rounded thoracic horn; tergites without median spine patches; integuments III/IV, IV/V, and V/VI with rows of spinules; caudal spines few in number, but usually present also on T VII; segment VI without filamentous L-setae, VII with 0–2, and VIII with only 4 filamentous L-setae; anal macrosetae relatively strong and long; and anal lobe with 16–20 setae.

The larva has a head capsule length of about 0.19 mm, postmentum length of 96–116 μm; AR of 1.0–1.1; basal antennal segment 16–18 μm long; mentum with very broad median tooth and only indications of lateral teeth; claws of anterior parapods unserrated.

MALE IMAGO (*n* = 9–11, EXCEPT WHEN OTHERWISE STATED)

Length 1.48–1.75, 1.63 mm. Wing length 0.90–1.06, 0.98 mm. Total length/wing length 1.57–1.67, 1.64. Wing length/length of profemur 2.99–3.29, 3.12.

Head (Fig. 17A) — AR = 0.42–0.52, 0.48. Outer verticals 1–3, 1. Clypeus with 5 or 6, 6 setae. Tentorium 106–132, 118 μm (8) long. Stipes 82–106, 94 μm (8) long. Vestigial ocelli present or absent; 4–6, 6 μm (4) apart. Palp lengths (μm): 16–26, 21; 28–41, 34; 45–60, 54; 64–73, 67; 112–139, 121 (8).

Thorax — Anteprenotum with 2 setae. Dorsocentrals 3–5, 4; prealars 1–3, 2. Scutellum with 2 setae.

Wing — VR = 1.10–1.26, 1.16 (6). Brachiolum with 1 seta; R with 0 or 1, 0 seta. Squama with 0–2, 1 seta. Extended part of costa 42–68, 55 μm (8) long.

Legs — Spur of front tibia 28–36, 31 μm long; spurs of middle tibia 12–20, 15 μm and 8–12, 11 μm long; of hind tibia 24–32, 29 μm and 6–14, 12 μm long. Width at apex of front tibia 16–26, 23 μm; of middle tibia 25–35, 28 μm; of hind tibia 30–38, 33 μm. Comb with 9–13, 11 setae; shortest seta 12–21, 18 μm; longest seta 22–30, 28 μm. Sensilla chaetica 0–2, 1 in basal 0.25 of ta₁ of middle leg. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄
p ₁	258–356, 308	305–460, 400	190–251, 223	146–200, 170	96–120, 115	59–84, 70
p ₂	270–343, 310	282–380, 336	138–170, 155	74–88, 84	52–66, 62	24–32, 30
p ₃	276–368, 325	350–472, 413	165–215, 193	97–126, 113	70–100, 86	42–64, 54
	ta ₅	LR	BV	SV	BR	
p ₁	38–50, 45	0.54–0.59, 0.56	2.18–2.46, 2.34	3.05–3.32, 3.18	3.23–4.86, 3.78 (7)	
p ₂	28–38, 33	0.42–0.49, 0.46	3.29–4.02, 3.74	4.00–4.75, 4.25	3.60–5.00, 4.18 (7)	
p ₃	31–50, 42	0.45–0.56, 0.48	2.85–3.26, 3.10	3.29–3.97, 3.68	4.50–6.11, 5.08 (8)	

Abdomen (Fig. 2D) — T I with 4–6, 5 setae; T II–VIII each with 6–11, 8 setae; transverse uniserial row.

Hypopygium (Fig. 17B) — T IX with 5–9, 7 (7) setae; laterosternite IX with 2 or 3, 2 setae. Transverse sternapodeme 44–62, 51 μm (6) long. Phallapodeme 44–54, 50 μm (5) long. Anal point

20–28, 25 μm (4) long. Gonocoxite 125–163, 137 μm long, with pointed, triangular basal lobe; gonostylus 48–68, 57 μm long. HR = 2.20–2.66, 2.46; HV = 2.58–3.19, 2.85.

FEMALE IMAGO ($n = 10$ –12, EXCEPT WHEN OTHERWISE STATED)

Length 1.11–1.20, 1.14 mm (5). Wing length 0.77–0.85, 0.79 mm (14). Total length/wing length 1.42–1.54, 1.48 (4). Wing length/length of profemur 3.25–3.51, 3.40 (9).

Head — AR = 0.57–0.66, 0.62. Flagellomeres length (μm): 35–44, 39; 23–28, 25; 22–26, 23; 16–28, 25; 62–81, 69. Outer verticals 1 or 2, 1. Clypeus with 6–8, 7 setae. Coronal suture weak, 0–46, 7 μm long. Tentorium 55–94, 67 μm long. Stipes 70–90, 82 μm long. Vestigial ocelli 46–58, 52 μm (7) apart. Palp lengths (μm): 14–21, 18; 25–32, 29; 42–52, 46; 46–70, 59; 85–114, 99.

Thorax — Anteprepronotum with 2 setae. Dorsocentrals 6–8, 7; prealars 2. Scutellum with 2 setae.

Wing — VR = 1.14–1.23, 1.18 (13). Brachiolum with 1 seta; R with 2–4, 3 setae; R_{4+5} with 2 or 3, 3 setae. Squama with 1 or 2, 1 seta.

Legs — Spur of front tibia 12–16, 14 μm long; spurs of middle tibia 11–16, 15 μm and 8–12, 10 μm ; of hind tibia 25–31, 28 μm and 11–16, 13 μm . Width at apex of front tibia 19–24, 22 μm ; of middle tibia 22–27, 24 μm ; of hind tibia 28–33, 30 μm . Comb with 10 or 11, 11 setae; shortest seta 12–19, 16 μm ; longest 18–26, 22 μm . Sensilla chaetica 2–4, 2 in basal 0.25 of ta_1 of middle leg. Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	220–253, 234	300–340, 314	178–209, 187	98–120, 108	66–86, 75	40–50, 47
p_2	240–274, 255	266–293, 275	110–132, 120	58–65, 61	40–46, 45	22–26, 23
p_3	240–272, 253	300–340, 314	152–174, 162	74–84, 78	54–72, 61	34–40, 38
	ta_5	LR	BV	SV	BR	
p_1	32–40, 36	0.58–0.61, 0.60	2.60–2.98, 2.77	2.84–3.00, 2.92	2.14–2.94, 2.59 (8)	
p_2	22–32, 27	0.42–0.45, 0.44	3.89–4.39, 4.19	4.23–4.48, 4.38	2.31–3.38, 2.90	
p_3	30–36, 33	0.49–0.54, 0.52	3.38–3.68, 3.48	3.30–3.64, 3.50	3.33–4.38, 3.75	

Genitalia (Fig. 18A, B, C) — Gonocoxite IX with 5 or 6, 5 setae. T IX with 2–4, 4 setae. Cercus 44–51, 47 μm (5) long. Seminal capsule 52–72, 62 μm long; 37–42, 41 μm (9) wide. Notum 70–86, 79 μm (9) long.

PUPA ($n = 10$, EXCEPT WHEN OTHERWISE STATED)

Length 1.87–2.33, 2.10 mm (12). TH/AM 0.25–0.34, 0.29.

Cephalothorax — Thoracic horn (Fig. 17C) 54–81, 65 μm (13) long, 22–41, 30 μm (11) wide; length/width 1.75–2.82, 2.38 μm (11). Frontal setae (Fig. 17D) 33–90, 59 μm long; on 12–23, 19 μm high, 16–24, 19 μm wide tubercle. Po 20–40, 35 μm (7) and 30–75, 46 μm ; MA 36–85, 59 μm and 79–160, 115 μm on tubercles 6–8, 7 μm high, 7–10, 9 μm wide; LA 20–39, 30 μm (7); PcS_1 20–52, 29 μm ; PcS_{2-3} 141–280, 200 μm on tubercles 6–20, 11 μm (9) high, 8–30, 15 μm (9) wide. Dc_1 and Dc_3 48–100, 72 μm ; Dc_2 22–44, 34 μm ; Dc_4 39–52, 47 μm . Dc_1 28–60, 45 μm anterior of Dc_3 ; Dc_3 44–70, 58 μm anterior of Dc_4 .

Abdomen (Fig. 19A) — PSA present on IV–VI or VII; longest spinules on IV–VI 6–12, 10 μm ; on VII 0–4, 1 μm . L-setae nonfilamentous on VI, 0–2 filamentous on VII; VIII with only 4 filamentous L-setae. T II with 12–19, 14 caudal hooklets; longest 16–34, 23 μm . T III–VI each with 6–16, 11 caudal spines; 14–40, 26 μm long. T VII with 0–7, 4 caudal spines; 0–19, 12 μm long. Integuments III/IV, IV/V, and V/VI with complete rows of few, long, pale spinules. No tergites with median spine patch. Anal macrosetae moderately strong, 200–240, 222 μm long. Anal lobe with 16–20, 17 (12) setae in fringe.

FOURTH INSTAR LARVA ($n = 1$ –2)

Total length 1.83 mm. Head capsule length 0.19 mm.

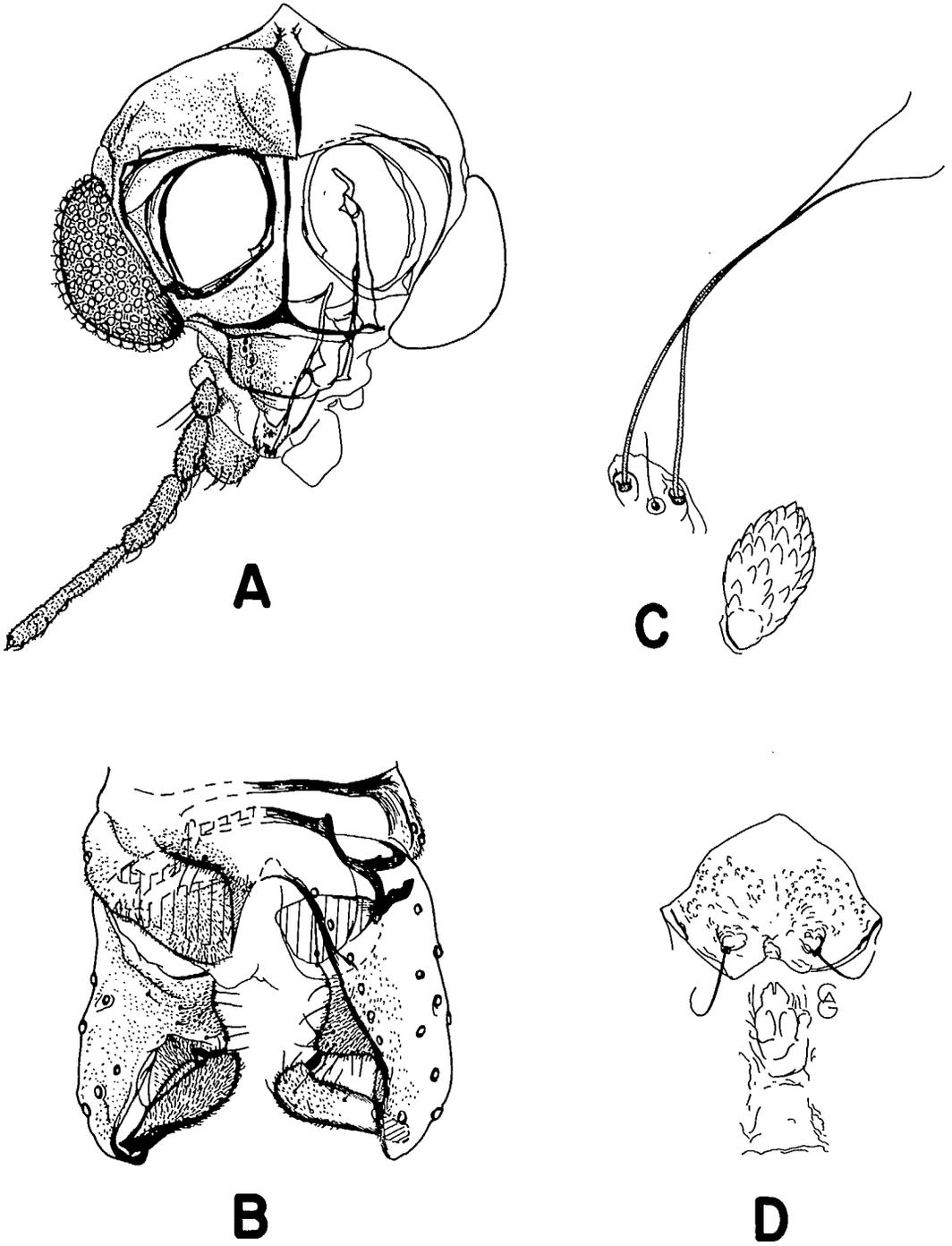
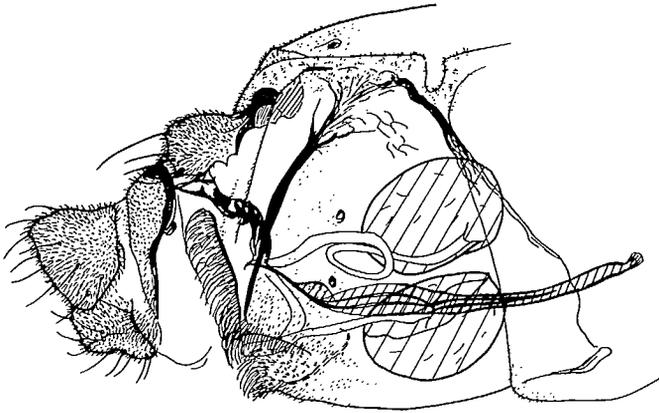
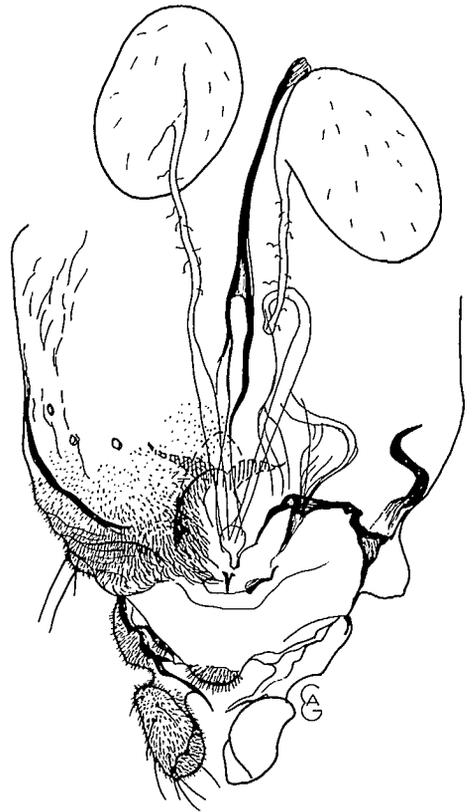


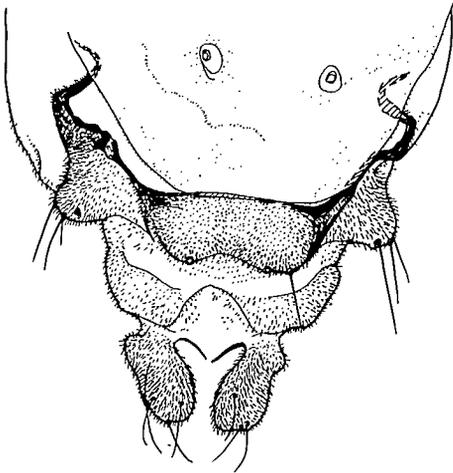
FIG. 17. *Nanocladius (Nanocladius) incomptus* n.sp. A-B, male: A) head, B) hypopygium. C-D, pupa: C) thoracic horn, D) frontal plate.



A



B



C

FIG. 18. *Nanocladius (Nanocladius) incomptus* n.sp., female genitalia. A, lateral view. B, ventral view of allotype. C, dorsal view of allotype.

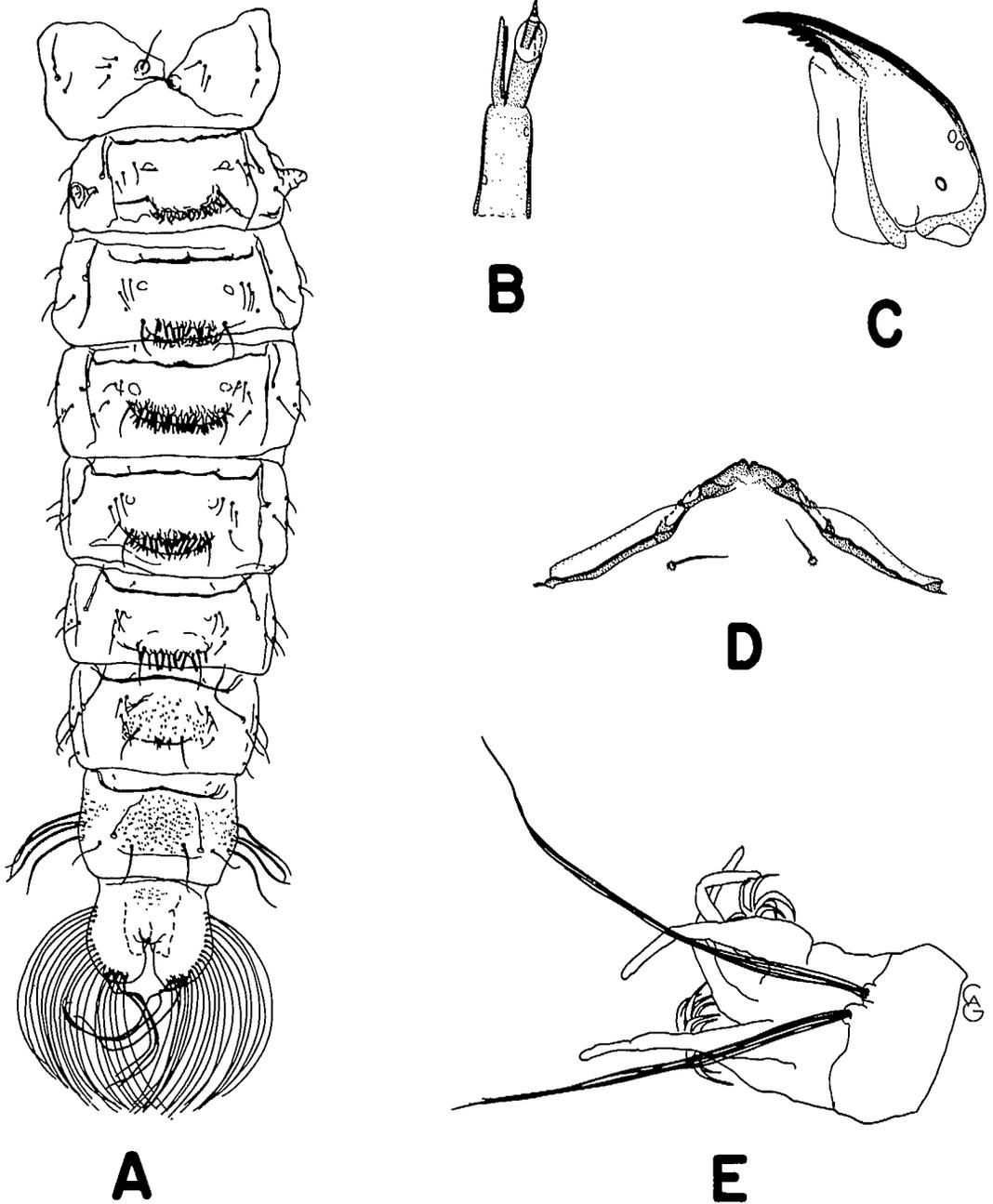


FIG. 19. *Nanocladius (Nanocladius) incomptus* n.sp., immatures. A, pupa, tergites I-IX. B-E, larva: B) antenna, C) mandible, D) mentum, E) caudal segments.

Head — Antenna as in Fig. 19B. Length of antennal segments (μm): 16–18, 8–9, 4–5, 1–2, 1. AR = 1.00–1.12. Basal antennal segment 7–8 μm wide; blade at apex 12–15 μm long. Apical style of second segment 4 μm long. Lauterborn organs 5 μm long. Premandible 22 μm long. Mandible (Fig. 19C) 60–69 μm long. Mentum (Fig. 19D) with a very broad median tooth and with 5 (only 3 relatively distinct) obscure lateral teeth not visible under low magnification. Ventromental plates more than 70 μm long, 14 μm wide. Postmentum 96–116 μm long.

Abdomen (Fig. 19E) — Anterior parapods with a few weakly serrated claws. Procercus 15–16 μm high, 10–12 μm wide. Anal setae 262–302 μm long. Anal tubules with one pair 82 μm long, the other 115–140 μm long.

REMARKS

Although the larva has not been definitely associated with the pupa there is little doubt about the association because a larva of *N. (N.)* cf. *balticus* var. with developing pupal characteristics has been found showing that the larval type represented by *N. (N.) incomptus* and *N. (N.)* cf. *balticus* var. belong to the pupal type of *N. (N.) incomptus* and *N. (N.) balticus*. The female association also is not definite as *N. (N.) minimus* and *N. (N.) incomptus* occur in the same samples. However, the female of *N. (N.) minimus* should be quite close to that of *N. (N.) anderseni*, and that of *N. (N.) incomptus* should resemble more *N. (N.) spiniplenus* and the Ethiopian species.

MATERIAL EXAMINED

Holotype: male with pupal exuvium, Little River Dam, Keowee Reservoir, Seneca, S.C., 34°42'N, 82°55'W, 16/4/75, P. L. Hudson (CNC No. 14062). Allotype: female, 19/5/75, otherwise as holotype. Paratypes: 7 males, 18 females, 15 pupal exuvia, 9–14/4 and 19/5/75, otherwise as holotype; male with pupal exuvium, male, Warpath Area receiving heated water from Oconee Nuclear Station, Keowee Reservoir, Seneca, S.C., 28/3 and 5/4/75, P. L. Hudson; 4 pupal exuvia, Keowee Reservoir, Seneca, S.C., 17/10/74, P. L. Hudson; 2 larvae, Crow Creek Area, Keowee Reservoir, Pickens Co., S.C., 1–2/8/74, P. L. Hudson and M. Forsyth. Other material: head capsule, 114–115 cm in core taken at depth of 22 m, Glenora, Bay of Quinte, Lake Ontario, 17/3/72, W. F. Warwick.

ECOLOGY AND DISTRIBUTION

The species appears to be quite common in the Keowee Reservoir, S.C. It is probably primarily a lake form. The head capsule in the core from Lake Ontario was taken in a layer representing an oligotrophic stage. In Lake Keowee there is an emergence period from February to April and another in October. Distribution: South Carolina, Ontario.

Nanocladius (Nanocladius) cf. *balticus* (Palm.) n.comb., var.
(Fig. 2E, 20)

Microcricotopus balticus Palmén 1959: 61

Two males from Lake Winnipeg, Man., and two from near Fort Simpson, N.W.T., may represent a color variety of *N. (N.) balticus*. Nine larvae, one with partly developed pupal characteristics, belong to *N. (N.) balticus* or to a species with a similar pupa.

The coloration of the males are of normal *Nanocladius* type, not of the lighter type described by Palmén (1959 p. 62). In addition to the characters given by Palmén these males are characterized by having 3 or 4 setae on squama and 6–15 setae on each of T I–VIII with transverse row irregularly uniserial.

The pupa appears to be as described by Palmén (1959 p. 62–63).

The larva has a head capsule length of 0.22–0.28 mm; postmentum length of 140–154 μm ; AR of 1.0–1.3; basal antennal segment 22–25 μm long; mentum with very broad median tooth and only weak indications of three lateral teeth; ventromental plates extremely long and caudo-laterally rounded; some claws of anterior parapods with serrations.

MALE IMAGO ($n = 4$, EXCEPT WHEN OTHERWISE STATED)

All measurements inside the ranges of *N. (N.) anderseni* with the following exceptions:

Head — AR = 0.66–0.76, 0.71. Clypeus with 4–6 (3) setae. Vestigial ocelli not observed.

Thorax — Anteprenotum with 3 or 4 (3) setae.

Wing — Squama with 3 or 4 (3) setae. Extended part of costa 68–81, 70 μm long.

Legs — LR₁₋₃ as 0.57–0.61, 0.59; 0.48–0.52, 0.50; 0.48–0.53, 0.51; SV₁ as 2.96–3.09, 3.04; BR₁ as 2.75–3.13, 2.92.

Abdomen (Fig. 2E) — T II–VIII with 9–16, 11 setae.

Hypopygium (Fig. 20A) — HV = 2.89 (1).

PUPA ($n = 1$, BASED ON PREPUPA)

Thoracic horn (Fig. 20B) 135 μm long, 60 μm wide, length/width 2.25. Median spine patch present on VI or VII or perhaps on both. Anal lobe with about 25 setae in fringe. Other characteristics apparently as described by Palmén (1959 p. 62–63).

FOURTH INSTAR LARVA ($n = 7$ –8, EXCEPT WHEN OTHERWISE STATED)

Total length 1.50–3.06, 2.25 mm. Head capsule length 0.22–0.28, 0.26 mm.

Head — Antenna as in Fig. 20C. Length of antennal segments (μm): 22–25, 23; 10–12, 11; 5–6, 6; 2; 1. AR = 1.00–1.26, 1.09. Basal antennal segment 8–10, 9 μm wide; blade at apex 15–20, 18 μm (6) long; ringorgan 3–6, 4 μm (5) from base. Premandible (Fig. 20D) 33–36 μm (3) long. Maxilla as in Fig. 20E. Mandible (Fig. 20F) 80–96, 87 μm long; apical tooth 18–22, 20 μm long. Mentum (Fig. 20G) with a very broad median tooth and 3 minute, indistinct lateral teeth. Ventromental plates 74–104, 88 μm (6) long (measured from base of second outermost tooth to caudo-lateral apex); 14–18, 17 μm (4) wide. Postmentum 140–154, 150 μm long.

Abdomen (Fig. 20I) — Some claws of anterior parapods strongly to finely serrated (Fig. 20H). Procercus 22–32, 27 μm high; 17–21, 19 μm wide. Anal setae 270–360, 320 μm long. Supraanal setae apparently lacking or minute. Anal tubules with shorter pair 160–220, 196 μm (5) long; longer pair 180–314, 253 μm (5). Posterior parapods 150 μm (1) long.

THIRD INSTAR LARVA ($n = 1$, BASED ON HEAD CAPSULE FROM CORE)

Head — Mandible 55 μm long. Ventromental plate 72 μm long, 112 μm wide. Postmentum 105 μm long.

REMARKS

The four males described may not belong to the same species as the immatures. However, of the known species of the genus, only *N. (N.) balticus* has the same combination of AR, LR₁, and pointed, triangular basal lobe of the gonocoxite. Similarly, the larva and pupa have to belong either to *N. (N.) balticus* or to an undescribed species whose pupa is the same type as *N. (N.) balticus*.

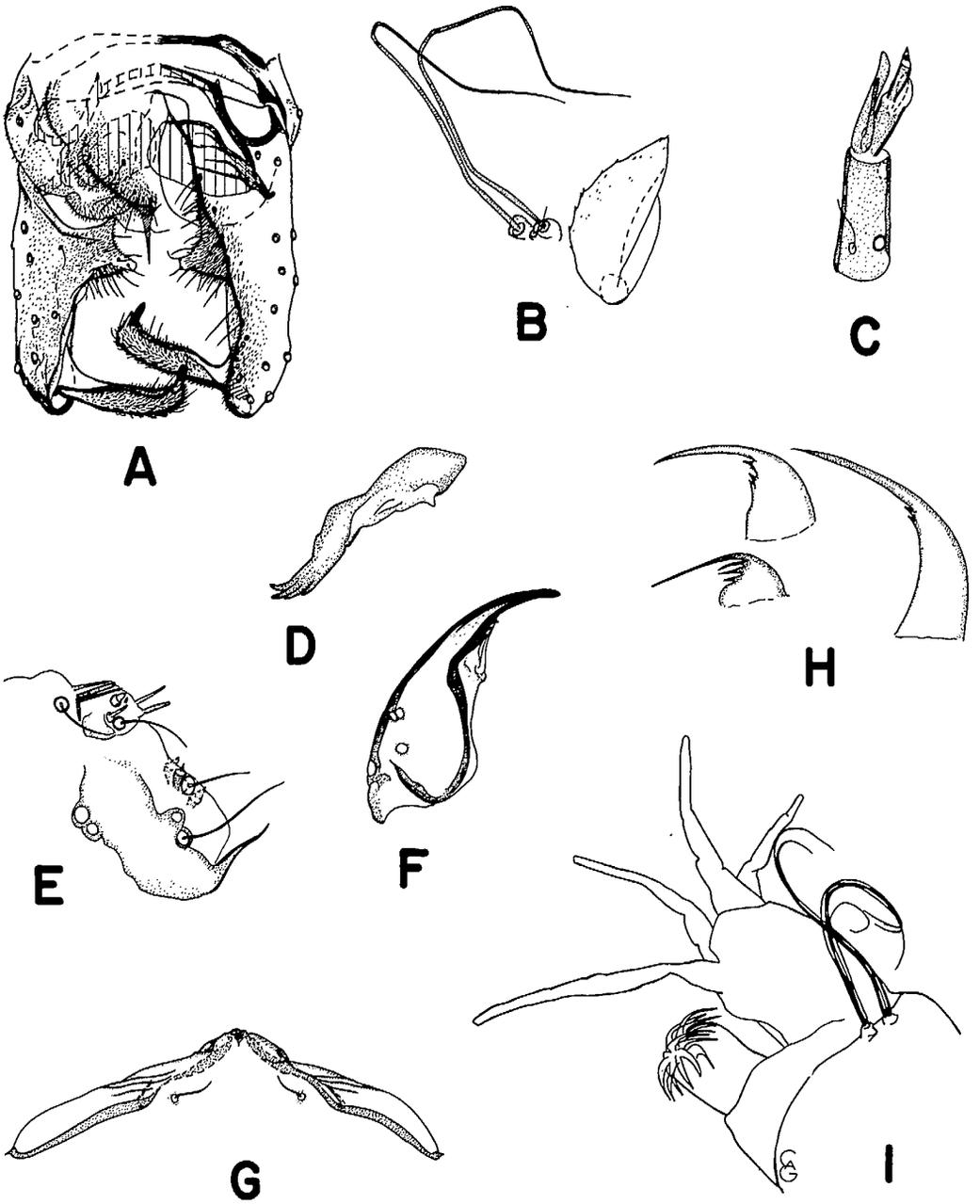


FIG. 20. *Nanocladius (Nanocladius) cf. balticus* (Palm.) n.comb., var. A, male hypopygium. B, pupal thoracic horn, C-I, larva: C) antenna, D) premandible, E) maxilla, F) mandible, G) mentum, H) claws of anterior parapods, I) caudal segments.

MATERIAL EXAMINED

Two males, 18 miles upstream Fort Simpson, N.W.T., 6/6/73, D. R. Oliver; male, Martin River, N.W.T., 4/6/73, D. R. Oliver; male, 1.2 miles off McCreary Island, Lake Winnipeg, Man., 15/7/69, S. S. Chang; male, Washow Bay, Lake Winnipeg, Man., 8/6/71, M. P. McLean and E. Johnson; 8 larvae including prepupa, deepwater area, Lewis and Clark Lake, Yankton, S. Dak., 3/5-4/6 and 16/8/71, P. L. Hudson; head capsule of third instar larva, 39-40 cm in core taken at depth of 22m, Glenora, Bay of Quinte, Lake Ontario, 17/3/72, W. F. Warwick.

ECOLOGY AND DISTRIBUTION

N. (N.) balticus is primarily a lake species. The head capsule from the Lake Ontario core occurs in a stratum which appears more eutrophic than the strata containing *N. (N.) distinctus* and *N. (N.) cf. incomptus*. The statement by Fittkau and Lehmann (1970 p. 397) that *N. (N.) balticus* is common also in eutrophic lakes is at least not contradicted by the present findings. Distribution: Europe (Fittkau and Lehmann 1970 p. 397), Northwest Territories, Manitoba, Ontario, South Dakota.

Nanocladius (Nanocladius) sp. near balticus (Palm.)

Parakiefferiella coronata, Hamilton 1965: 83 pro parte, nec Edwards
"Parakiefferiella coronata" Hamilton nec Edwards; Sæther and McLean 1972: 10

Two larvae from Kalamalka Lake, B.C. (Sæther and McLean 1972 p. 10) are separable from *N. (N.) cf. balticus* var. only by their larger size and perhaps darker labrum and palatum.

FOURTH INSTAR LARVA ($n = 2$)

Total length 3.35-3.65 μm . Head capsule length 178-182 μm .

Head — Lengths of antennal segments (μm): 25-28, 12-13, 6, 2, 1. AR = 1.17-1.25. Otherwise as in *N. (N.) cf. balticus* var.

Abdomen — Procercus 28-34 μm high, 20-26 μm wide. Otherwise as in *N. (N.) cf. balticus* var.

MATERIAL EXAMINED

Two larvae, Stations 7 and 8 (Sæther and McLean 1972 table 3), Kalamalka Lake, B.C., 11/5/71, J. F. Flannagan and O. A. Sæther.

ECOLOGY AND DISTRIBUTION

This species is known from Marion Lake, B.C. (Hamilton 1965 p. 83), an oligotrophic lake somewhat influenced by humic substances, and from mildly polluted stations in Kalamalka Lake, B.C. (Sæther and McLean 1972 p. 16), a typical oligotrophic lake relatively rich in calcium.

Nanocladius (Nanocladius) crassicornus n.sp.

(Fig. 21)

The male imago is characterized by an AR of about 1.15; squama with 4 or 5 setae; LR_1 of about 0.69, LR_3 of about 0.53; T I with about 11 setae, T II-VIII with 9-15 setae with transverse row double on T II and irregular double on T III-VIII; basal lobe of gonocoxite triangular.

The pupa is easily identifiable by means of its large thoracic horn of *N. balticus* type combined with the presence of median spine patches on T IV–VII (reduced on IV).

MALE IMAGO ($n = 1$, BASED ON MATURE MALE PUPA)

Length about 2.8 mm.

Head — AR = 1.15. Outer verticals 1. Clypeus with 5 setae. Tentorium 164 μm long. Stipes 110 μm long. Palp lengths (μm): 27, 36, 56, 91, 158.

Thorax — Antepronotum with 2 setae. Dorsocentrals 6, prealars 1. Scutellum with 2 setae.

Wing — Brachiolum with 1 seta. Squama with 4 or 5 setae.

Legs — Spur of front tibia 49 μm long, spurs of middle tibia 24 μm and 10 μm long; of hind tibia 44 μm and 20 μm long. Comb with 16 setae, shortest seta 24 μm , longest seta 46 μm . LR₁ about 0.69, LR₃ about 0.53. Leg measurements apparently within the range of *N. (N.) anderseni* n.sp.

Abdomen — T I with 11 setae; T II with 15 setae; T III–VIII each with 9–13 setae; transverse row double on T II, uniserial on T III–VIII.

Hypopygium (Fig. 21A, B) — T IX with 14 setae, laterosternite IX with 5 setae. Transverse sternapodeme 72 μm long. Phallapodeme 66 μm long. Anal point 40 μm long. Gonocoxite 184 μm long, with pointed, triangular basal lobe; gonostylus 76 μm long. HR = 2.42; HV apparently about 3.6.

PUPA ($n = 1-3$)

Length 2.40–2.89 mm. TH/AM 0.68–0.84.

Cephalothorax — Thoracic horn (Fig. 21C) 170–240 μm long, 82–109 μm wide, length/width 2.07–2.19. Frontal setae 80 μm long, on 11 μm high, 9 μm wide tubercle. PO 50 μm ; MA 80 μm , on low tubercles; LA 60 μm ; PcS₁ 24 μm ; PcS₂₋₃ 155–160 μm , on low tubercles. Dc₁, Dc₃, and Dc₄ 58–91 μm , Dc₂ 36–42 μm . Dc₁ 74–130 μm anterior of Dc₃; Dc₃ 38–114 μm anterior of Dc₄.

Abdomen (21D) — PSA present on IV–VII; longest spinules 11–22 μm long. L-setae non-filamentous on V, 1 filamentous on VI, 2–4 filamentous on VII, and all 5 filamentous on VIII. T II with 30–35 caudal hooklets, longest ones 14–18 μm long. Number and lengths of longest caudal spines on T III–VI: 18–21 (12–14 μm), 36–52 (19–26 μm), 38–52 (20–28 μm), 26–38 (26–32 μm). Integuments III/IV and IV/V with rows of spinules; complete row on III/IV, interrupted medially for 60–86 μm on IV/V. Number of spines in median spine patches of IV–VII: 1–7, 20–36, 20–29, 16–26. Anal macrosetae thick, 250–280 μm long. Anal lobe with 17–22 setae in fringe.

REMARKS

Although this pupa has a thoracic horn of the *N. balticus* type it is very similar to *N. rectinervis* in other details. Its placement in the *balticus* group thus is only tentative.

MATERIAL EXAMINED

Holotype: mature male pupa, Missouri River near Sioux City, Iowa, 42°29'N, 96°24'W, 27/4/76, J. Novotny (CNC No. 15204).

Paratypes: male pupa, Missouri River, 1 mile downstream of confluence of Missouri and Nemaha rivers, Nemaha Co., Neb., 16/10/75, D. L. Andersen; female pupa, Missouri River, Fort Calhoun, Neb., 15/7/75, D. L. Andersen.

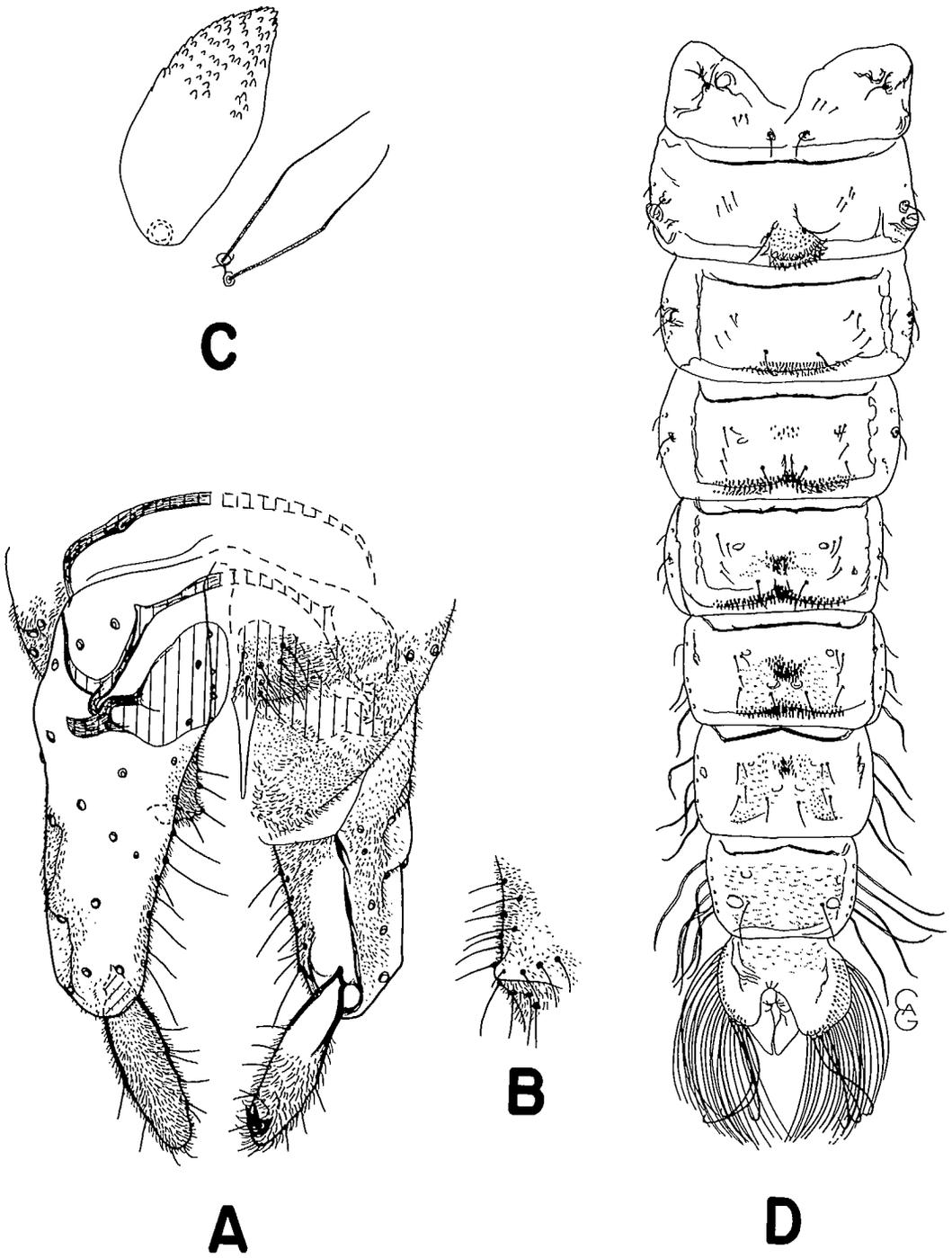


FIG. 21. *Nanocladius (Nanocladius) crassicornus* n.sp. A-B, male: A) hypopygium, B) basal lobe. C-D, pupa: C) thoracic horn, D) abdomen.

DISTRIBUTION

This pupa is known only from Missouri River, Nebraska and Iowa.

Nanocladius (Nanocladius) niveiplumus (Freem.)

(Fig. 2F, G; 22B, C; 23A, B)

Eukiefferiella (Microcricotopus) niveipluma Freeman, 1953: 203

Nanocladius niveipluma (Freem.), Freeman 1954: 175

Nanocladius vitellinus Freeman 1956: 339 pro parte nec? Kieffer 1913: 23 (The material examined from the Cape Province, Transvaal and Sudan contain at least 2, possibly 3 species, and it is not possible to know which, if any, is Kieffer's *N. vitellinus*)

The male imago examined is characterized by an AR of 0.7 (although Freeman (1956 p. 339) mentions 0.3–0.4); LR₁ of 0.59; T I with 8 setae, T II–VIII with 10–12 setae with transverse row mostly irregular uniserial; basal lobe of gonocoxite triangular and pointed; anal point with a few weak apical and preapical setae or microtrichia.

Female sternite VIII forms a distinct floor under anterior part of vagina; gonocoxite IX with 5 or 6 setae; T IX with 2–6 setae; R with 5–7 setae; R₄₊₅ with 6–10 setae; coronal suture complete or nearly complete.

MALE IMAGO ($n = 1$, EXCEPT WHEN OTHERWISE STATED)

Coloration as mentioned by Freeman (1956 p. 339) under *N. vitellinus* Kieff., although there are slightly darker broad proximal bands on the femora. All measurements and ratios completely inside the variation in *N. (N.) anderseni* with the following exceptions and additions:

Thorax — Complete specimens with 4 setae on scutellum, incomplete specimen from the Cape Province with 2 setae.

Wing — Extended part of costa 84 μm long.

Legs — LR₁₋₂ as 0.59, 0.44. SV₂ 4.21 (in specimen from Cape Province) –4.42. BR₁₋₂ as 2.80, 2.56–3.43. Sensilla chaetica 2 or 3 (3 on specimen from Cape Province).

Abdomen — As in Fig. 2F.

Hypopygium (Fig. 22C) — Basal lobe of gonocoxite triangular, pointed. HV = 2.96.

FEMALE IMAGO ($n = 2-3$, EXCEPT WHEN OTHERWISE STATED)

Length 1.28–1.44 mm. Wing length 1.02–1.18 mm. Total length/wing length 1.21–1.24. Wing length/length of profemur 3.46–3.71.

Head (Fig. 22B) — AR = 0.56 (1). Flagellomeres length (μm): 43–53, 32–34, 28–34, 28–30, 72 (1). Outer verticals 1 or 2. Clypeus with 6–8 setae. Coronal suture 55–100 μm long, complete or nearly complete. Tentorium 100–130 μm long. Stipes 100–144 μm long. Palp lengths (μm): 30–34, 34–42, 51–58, 70–85, 90–131.

Thorax — Anteprenotum with 3 setae. Dorsocentrals 6 or 7, prealars 1. Scutellum with 2–5 setae.

Wing — VR = 1.21–1.24. Brachiolum with 1 seta, R with 5–7 setae, R₁ with 1 or 2 setae, R₄₊₅ with 6–10 setae, extended part of costa with 1 or 2 setae. Squama with 2 or 3 setae.

Legs — Spur of front tibia 18–26 μm long, spurs in middle tibia 18 μm and 14–18 μm long, of hind tibia 36–46 μm and 17–23 μm long. Width at apex of front tibia 26–33 μm , of middle tibia 25–34 μm , of hind tibia 40–43 μm . Comb with 11 or 12 setae, shortest seta 16–20 μm long, longest seta 26–30 μm long. Sensilla chaetica 3–5 in basal 0.25 of ta₁ of middle leg. Lengths (μm) and proportions of legs:

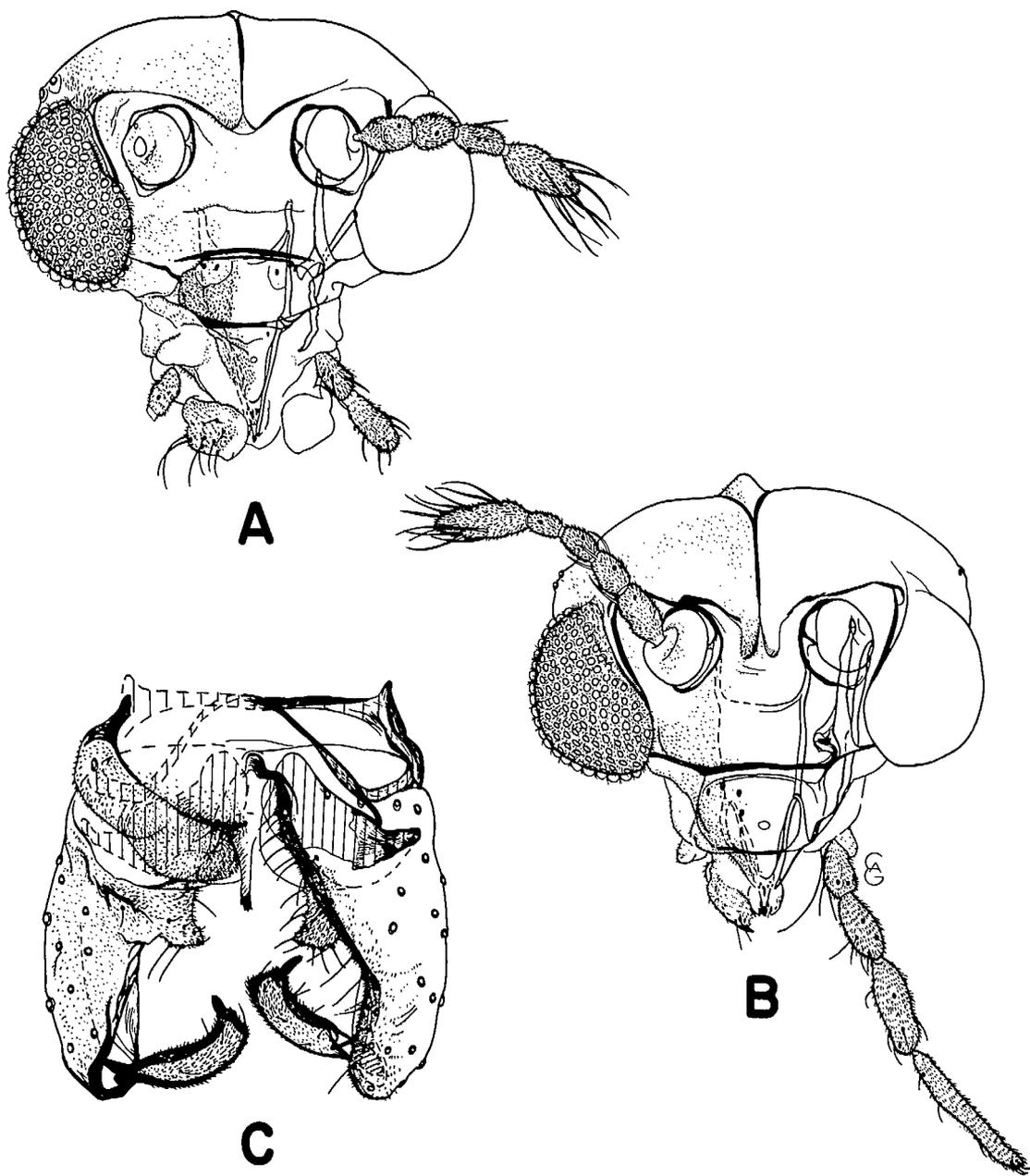


FIG. 22. *Nanocladius* (*Nanocladius*) spp., imagines. A, *N. (N.) cf. vitellinus* Kieff., female, head. B, *N. (N.) niveiplumus* (Freem.), female paratype, head. C, *N. (N.) cf. niveiplumus* (Freem.) male hypopygium.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	294-319	380-485	221-270	140-174	94-114	60-70	42-46
p ₂	307-374	362-423	150-178	90-104	62-70	40-46	35-40
p ₃	307-374	405-491	209-258	110-116	84	50-53	42

	LR	BV	SV	BR
p ₁	0.56-0.58	2.66	2.98-3.06	1.67-2.42
p ₂	0.41-0.42	3.58-3.75	4.46-4.55	1.83-2.26
p ₃	0.51-0.53	3.22-3.47	3.36-3.51	2.36-3.80

Abdomen (Fig. 2G) — T I with 6-8 setae, T II with 10-14 setae, T III-VIII with 4-11 setae.

Genitalia (Fig. 23A, B) — Sternite VIII forms a distinct floor under anterior part of vagina. Gonocoxite IX with 5 or 6 setae, T IX with 2-6 setae. Cercus 54-58 μm long. Seminal capsule 60-74 μm long, 41-45 μm wide. Notum 101-108 μm long.

REMARKS

The male examined from Transvaal, South Africa, has an AR of 0.69 but Freeman (1953 p. 203) mentions 0.3-0.4 for *N. niveiplumus*. Only an incomplete specimen from Cape Province, consisting of a thorax and part of the middle leg, has been examined. The thorax of the latter is, however, smaller and has only 2 setae on the scutellum as opposed to 4 in the Transvaal specimen. Although Freeman's measurement of the antennal ratio may be in error it is possible that the complete male described belongs to another species. The females described here are part of the type material or from the type locality and thus belong to *N. niveiplumus*. However, an additional female from Sudan was included in the material determined as *N. vitellinus* Kieff. by Freeman. That any of these species are identical with *N. vitellinus* can only be decided by comparing them with the holotype female of *N. vitellinus* in Muséum National d'Histoire Naturelle, Paris. Also, the remaining material mentioned by Freeman (1956 p. 340) should be mounted on slides and compared, as in all likelihood it contains several species.

MATERIAL EXAMINED

Paratypes: 2 females, Berg River, Cape Province, South Africa, 22/10/52, K. M. F. Scott. Other material; 1 female, 20/5/52, otherwise as paratypes; part of male, Ceres, Cape Province, South Africa, 6/12/52, K. M. F. Scott; male, Vaal River, Vereeniging, Transvaal, South Africa, 1957, A. D. Harrison and B. R. Allanson.

ECOLOGY AND DISTRIBUTION

The species is known with certainty only from Berg River, Cape Province, South Africa.

Nanocladius (*Nanocladius*) sp. ? *vitellinus* Kieff.
(Fig. 2H, 22A, 23C, D)

This female is characterized by having only 4 flagellomeres; no setae on R and R₁, and only 1 on R₄₊₅; tentorium only $\frac{3}{4}$ as long as stipes; sternite VIII forms a small floor under anterior part of vagina; gonocoxite IX with 3 setae; T IX with 4 setae.

FEMALE IMAGO ($n = 1$)

Length 1.40 mm. Wing length 0.87 mm. Total length/wing length 1.62. Wing length/length of profemur 3.28.

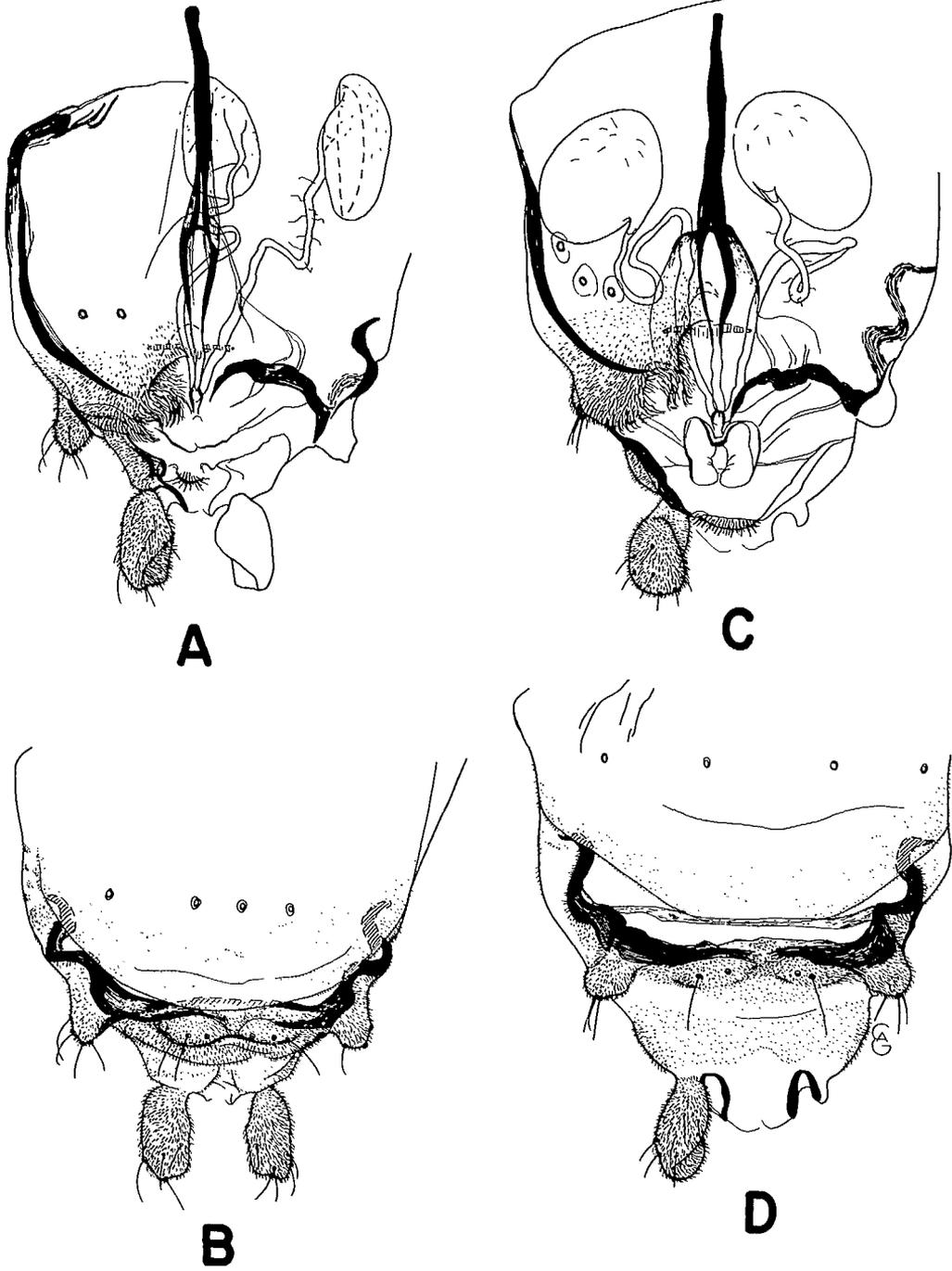


FIG. 23. *Nanocladius* (*Nanocladius*) spp., female genitalia. A-B, *N. (N.) niveiplumus* (Freem.), paratype: A) ventral view, B) dorsal view. C-D, *N. (N.)* sp. ? *vitellinus* Kieff.: C) ventral view, D) dorsal view.

Head (Fig. 22A) — AR = 0.57. Flagellomeres length (μm): 36, 20, 36, 58. Outer verticals 1. Clypeus with 4 setae. Coronal suture 62 μm long, nearly complete. Tentorium 62 μm long. Stipes 100 μm long. Lengths of palp segments 1–3 (μm): 22, 38, 49.

Thorax — Anteprenotum with 3 setae. Dorsocentrals 5, prealars 1. Scutellum with 2 setae.

Wing — VR = 1.35. Brachiolum with 1 seta, R and R₁ without setae, R₄₊₅ with 1 seta, extended part of costa with 1 seta. Squama with 2 setae.

Legs — Spur of front tibia 11 μm long, spurs of middle tibia 16 μm and 14 μm , of hind tibia 34 μm and 14 μm . Width at apex of front tibia 24 μm , of middle tibia 24 μm , of hind tibia 36 μm . Comb with 12 setae. Sensilla chaetica 2 in basal 0.25 of ta₁ of middle leg. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	LR	SV	BR
p ₁	264	343	184	116	78	50	0.54	3.30	2.00
p ₂	288	307	116	80	64	36	0.38	5.13	—
p ₃	288	362	178	88	—	—	0.49	3.66	2.56

Abdomen (Fig. 2H) — T I with 4 setae, T II–VIII each with 4–6 setae.

Genitalia (Fig. 23C, D) — Sternite VIII forms a small floor under anterior part of vagina. Gonocoxite IX with 3 setae. T IX with 4 setae. Cercus 46 μm long. Seminal capsule 64 μm long, 44 μm wide. Notum 84 μm long.

REMARKS

This female may possibly represent *N. vitellinus* Kieff.

MATERIAL EXAMINED

Female, at light, Khartoum, Sudan, 9/12/53, D. J. Lewis.

Summary of *Nanocladius* Ecology

The two species of the subgenus *Plecopteracoluthus* live in streams in symphoretic association with immature Perlidae (Plecoptera). *Nanocladius* (*Nanocladius*) *alternantherae*, *N. (N.) balticus*, and *N. (N.) incomptus* are known only from lakes and ponds. *N. (N.) bicolor* occurs in lakes, ponds, rivers, and streams; *N. (N.) distinctus* in rivers and lakes. *N. (N.) rectinervis*, *N. (N.) parvulus*, *N. (N.) spiniplenus*, *N. (N.) crassicornus* n.sp., and *N. (N.) niveiplumus* are all rheophilous, but can probably also be found littorally in lakes. All lake inhabitants apparently are present from the littoral zone to the upper profundal zone in oligotrophic to mesotrophic lakes, and occur sporadically also in moderately eutrophic lakes; *N. (N.) balticus* is common also in more eutrophic lakes. Although the genus as a whole is rather eurytopic, all species with the exception of *N. (N.) balticus* and possibly *N. (N.) alternantherae* are most common in oligotrophic lakes.

SOME PSEUDOCHIRONOMUS MALLOCH

The genus *Pseudochironomus* Mall. is a well-defined homogeneous genus in all stages. About 11 Nearctic species, 5 Neotropical, and 3 Palearctic species have been previously described. The genus belongs to the most plesiomorphous of the Chironominae and probably forms the sister group of *Manoa* Fittk. from Brazil plus *Riethia* Kieff. known from Australia, New Zealand, and South Chile (Sæther 1977).

The variation in the male genitalia, especially in the pars ventralis, is much larger than envisioned by Townes (1945 p. 15) in his key. The pars ventralis may be simple or completely divided within the same species. The general shape of the pars ventralis, however, appears to be more constant and probably only *Pseudochironomus netta* Town. will be reduced to a synonym (of *P. julia* (Curr.) (= *P. aix* Town.)).

Pseudochironomus crassus Town. and *P. richardsoni* Mall. each apparently occupy an isolated position, while *P. middlekaufi* Town., *P. rex* Haub., *P. badius* n.sp., *P. prasinatus* (Staeg.), *P. nigri-manus* (Kieff.), and *P. albimanus* (Kieff.) form one group, and the remaining species, all Nearctic, form another. However, the immatures of several species are unknown; thus, a phylogenetic treatment of the genus is not yet possible, and the above groupings are only tentative.

Species of the genus appear to be similar ecologically. All species live in the littoral zone of primarily meso-oligotrophic lakes or in larger, slow-flowing rivers. The larvae seem to prefer a sandy or gravelly substrate or other firm substrates overgrown by algae. Their food consists of detritus and periphyton. One generation per year seems to be the norm.

Pseudochironomus Malloch, 1915 (syn. *Proriethia* Kieffer, 1921)

MALE

Medium to moderately large species. Coloration greenish or yellowish to uniformly blackish. Flagellum with 13 segments. AR = 1.4–3.0. Temporals 25–56. Frontal tubercles absent. Eyes with short dorsal extensions, separated above by more than twice the diameter of pedicel and much more widely separated above than below. Clypeus with 8–28 setae. Antepnotum interrupted medially by a broad V-shaped notch, otherwise uniformly broad, projects as far forward as scutum, with 5–18 lateral setae. Dorsocentrals 9–60 in 1–6 rows, acrostichals absent, prealars 3–11, parascutellars 1 or 2. Scutellum with 8–26 setae in 1–3 rows. Wing membrane without microtrichia, VR = 1.05–1.14 R with 5–34 setae, R₁ with 0 or 1 seta (or to 28, see p. 79), R₄₊₅ with 0–3 setae (or to 45, see p. 79). Squama with 13–46 setae. FCu under or distad of RM, apices of R₁ and R₂₊₃ well separated, apex of R₄₊₅ far basal of wing apex, end of M₃₊₄ almost at apex of wing. Front tibia with ventral black apical spur with lateral denticles, middle and hind tibia each with 2 similar spurs. Pulvilli well developed. Sensilla chaetica 1–22 basally on ta₁ of middle leg, 0–12 basally on ta₁ of hind leg. LR₁ = 0.8–1.1, LR₃ = 0.5–0.7. T IX with 27–124 setae, without anal point proper, but with caudal projection. Pars ventralis very small to large, divided to undivided. Gonocoxite with well-developed intermedian and lateral volsellae and small median volsella. HR = 1.0–1.9, HV = 2.2–3.5.

FEMALE

Flagellum with 5 segments; other features as in male except for more numerous setae on R₁ and R₄₊₅, more numerous sensilla chaetica, slightly lower LR, and the following genital characters: gonocoxapodeme VIII relatively strong, rounded posteriorly, very weakly joined medially; sternite

VIII does not form floor under anterior part of vagina; gonapophysis VIII with large, rounded dorsomesal lobe and far lateral, weak indication of ventrolateral lobe; notum about as long as seminal capsules; gonocoxite IX moderately large, with a few setae; postgenital plate rounded; cerci large; seminal capsules ovoid, large, with funnel-shaped neck; spermathecal ducts with small loop or bend.

PUPA

Total length 4–8 mm; exuvium transparent to blackish brown; frontal plate rugulose, with ridges, or with both; cephalic tubercles and frontal setae usually absent; thorax weakly to strongly rugulose: thoracic horn with 2 branches, smooth; dorsocentrals short, 2 anterior ones close together and far anterior of the 2 posterior ones which also are situated close together; shagreenation extensive on T III–VI with stronger anterior spinules; T II with complete band of posterior hooklets; integuments III/IV and IV/V with spinules; sternite VIII not T VIII with 0–12 caudolateral spines; sternite I with 2 pairs of tubercles, one or both more or less covered with spinules; pedes spurii A (PSA) present on IV–VI, well developed only on IV where they grade over into spinules along lateral margin; segments V–VIII with broad filamentous L-setae as: 3, 3–4, 3–4, 5; anal lobe with 15–84 setae in single to double fringe, and with dorsal pair of setae.

LARVA

Total length 5–11 mm; coloration reddish; dorsal eyespot large, rounded or square; ventral eyespot smaller, elongate, partly divided; antenna 5-segmented on low tubercle with small spur or point; AR = 1.1–2.4; basal antennal segment with ringorgan about $\frac{1}{4}$ from base and first setal mark in about same height and second about $\frac{1}{2}$ – $\frac{2}{3}$ from base, blade at apex as long as segments 2–4 or occasionally slightly longer than 2–5; second antennal segment with moderate size Lauterborn organs; seta anteriores (S I), seta posteriores (S II) and chaetae of labrum plumose; labral lamella well developed with 15–30 apical teeth; spinulae smooth, long and pointed; pecten epipharyngis consists of three separate simple, sclerotized, blunt spines; 2 pairs of apically divided chaetulae basales, 7 or 8 pairs of smooth chaetulae laterales; premandible with broad blunt inner tooth, lighter, slender, and pointed outer tooth, and well-developed brush; mandible with apical tooth, 4 lateral teeth, long seta subdentalis, and seta interna consisting of 3 or 4 plumose main branches; basal segment of maxillary palp nearly twice as high as wide; pecten hypopharyngis with numerous scales; mentum dark colored with 9–13 teeth, median tooth simple, second lateral tooth (when 11–13 teeth) reduced, fifth and sixth lateral teeth often appearing as a wide bifid anteriolateral directed tooth; ventromental plates narrow and elongate, narrowly separated medially; parapods well developed, posterior parapods each with 15–55 dark claws arranged horseshoelike in 2 rows; procerci as high as wide to twice as high as wide, with 7–9 apical anal setae; supraanal seta about 0.2–0.4 times as long as anal setae; 4 short, blunt anal tubules.

Key to known males of Nearctic and Palaearctic *Pseudochironomus* Mall.

(*P. albimanus* (Kieff.) (Kieffer 1924b p. 34–35) cannot yet be placed in the key, but apparently it is close to, or even the senior synonym of *P. middlekauffi* Town. *P. aureus* (Joh.) (Johannsen 1908 p. 283) known only from a female is regarded by Sublette (1967b p. 545) as a synonym of *P. middlekauffi* because of the combination of uniserial dorsocentrals and black scutal vittae. However, there are now at least 3 species with the same combination of characters and the synonym has to be rejected for the moment.)

- 1 Thorax marked with black, or thorax and abdomen almost uniformly blackish 2
- Thorax not marked with black, sometimes marked with light brown 8

- 2 Gonostylus conspicuously large and broad, about as large as gonocoxite; thorax whitish, yellowish, or greenish with black markings; hypopygium brownish black; either all tarsi except ta_2 or ta_1 - ta_2 of p_2 and p_3 brownish black with most of femora and tibia lighter, or all legs brown except apex of ta_3 , ta_4 and base of ta_5 of p_1 , and p_2 ; AR higher than 2.0 3
- Gonostylus distinctly smaller and narrower than gonocoxite; thorax uniformly black or greenish with black markings; hypopygium light or dark; either tarsi light except apex of ta_5 completely dark, or all tarsi except ta_2 or ta_1 - ta_2 of p_2 and p_3 brownish black; AR mostly lower than 2.0 4
- 3 All tarsi except ta_2 or ta_1 - ta_2 of p_2 and p_3 brownish black; characters mentioned below unknown *P. nigrimanus* (Kieff.) (Palearctic)
- Legs brown with apex of ta_3 , ta_4 and base of ta_5 lighter on p_1 and p_2 ; dorsocentrals about 36 in 1-3 rows; sensilla chaetica about 22 on p_2 and about 12 on p_3 ; median volsella with 4 or 5 apical setae; pars ventralis divided to base *P. crassus* Town. (Nearctic, p. 63)
- 4 Median volsella with about 5 apical setae; pars ventralis long and very broad, divided nearly to base, fused with mesal margins of gonocoxites (Hirvenoja 1973 fig. 17) *P. prasinatus* (Staeg.) (Palearctic)
- Median volsella with 2 apical setae; pars ventralis smaller, divided or undivided, not fused with mesal margins of gonocoxites 5
- 5 About 60 dorsocentrals in 3-6 rows; p_3 with about 8 or 9 sensilla chaetica; pars ventralis completely divided; thorax, abdomen, and legs almost uniformly blackish or blackish brown *P. richardsoni* Mall. (Nearctic, p. 64)
- About 9-31 dorsocentrals in single to partly double row; p_3 with less than 8 sensilla chaetica; pars ventralis divided or undivided; thorax greenish to yellowish with black markings, abdomen greenish to brownish, legs at most with most of tarsi dark 6
- 6 T IX with narrow, elongate, parallel-sided caudal projection; sensilla chaetica 8-13 on p_2 ; pars ventralis, at most halfway divided; tarsi brownish black except ta_2 or ta_1 - ta_2 of p_2 and p_3 *P. rex* Haub. (Nearctic, p. 71)
- T IX with a rounded caudal projection, sometimes with a small apical point; sensilla chaetica less than 6 on p_2 ; pars ventralis undivided to completely divided; tarsi with only apical half of ta_5 dark 7
- 7 T IX without apical point; sensilla chaetica 3-5 on both p_2 and p_3 ; LR_1 0.90-0.94, LR_3 0.60-0.64 *P. badius* n.sp. (Nearctic, p. 69)
- T IX with apical point; sensilla chaetica about 5 on p_2 , about 0 or 1 on p_3 ; LR_1 about 0.83-0.86, LR_3 about 0.55-0.57 *P. middlekaufi* Town. (Nearctic, p. 72)
- 8 Distal outer margin of third palpal segment with a fingerlike lobe *P. fulviventris* (Joh.) (Nearctic, p. 73)
- Distal outer margin of third palpal segment without fingerlike lobe 9
- 9 T IX with narrow, elongate, caudal projection which is narrower in middle than at apex; AR 1.4-1.8; pars ventralis undivided *P. articaudus* n.sp. (Nearctic, p. 81)
- T IX with broader, rounded projection; AR 1.8-2.9; pars ventralis undivided to completely divided 10
- 10 BR_1 higher than 4.0; AR 2.2-2.9 *P. pseudoviridis* (Mall.) (Nearctic, p. 78)
- BR_1 lower than 3.0; AR 1.8-2.5 11

- 11 Pars ventralis completely or nearly completely divided 12
 Pars ventralis completely or nearly completely simple 13
- 12 Pars ventralis subtriangular, about 2.5 times as long as maximum width; lateral volsella not broad (Townes 1945 fig. 5, 1952 fig. 32) *P. anas* Town. (Nearctic)
 Pars ventralis lanceolate, about 6.0 times as long as maximum width; lateral volsella broad (Townes 1945 fig. 6, 1952 fig. 33)
 *P. banksi* Town. (Nearctic) (probably a junior synonym of *P. fulviventris* (Joh.))
- 13 Mediobasal angle of lateral volsella acute; intermedian volsella reaching as far caudad as lateral volsella (Townes 1945 fig. 8, 1952 fig. 35) *P. chen* Town. (Nearctic)
 Mediobasal angle of lateral volsella obtuse or apparently obtuse; intermedian volsella not reaching as far caudad as lateral volsella 14
- 14 T IX with relatively narrow, triangular caudal projection; LR₁ about 0.89–0.93; AR about 1.8–2.0 (Townes 1945 fig. 9, 1952 fig. 36; Sublette 1966 fig. 13, 14)
 *P. julia* (Curr.) (syn. *P. aix* Town.) (Nearctic)
 T IX with broader, more rounded caudal projection; LR₁ about 1.0; AR about 2.5 (Townes 1945 fig. 10, 1952 fig. 37) *P. netta* Town. (Nearctic)

Key to known pupae of Nearctic and Palaearctic *Pseudochironomus* Mall.

- 1 Segments V–VIII with 3, 3, 3, and 5 filamentous L-setae respectively (Sublette 1964 p. 122); anal lobe with about 37–40 setae in fringe; caudolateral corners of sternite VIII with about 10 or 11 small spines; exuvium yellowish brown
 *P. julia* Curr. (syn. *P. aix* and probably *P. netta* Town.) (Nearctic)
- Segments V–VIII with 3, 4, 4, and 5 filamentous L-setae respectively; anal lobe with either about 15, or 60–84 setae in fringe³; caudolateral corners of sternite VIII with 0–12 spines; exuvium clear, pale yellowish brown or dark brownish 2
- 2 Anal lobe with about 15 setae; only 1 pair of tubercles on sternite I covered with spinules 3
 Anal lobe with about 60–84 setae in fringe; both pairs of tubercles on sternite I covered with spinules 4
- 3 Exuvium dark, brownish; sternite VIII with 3–7 caudolateral spines (Fig. 24A)
 *P. richardsoni* (Mall.) (Nearctic, p. 67)
 Exuvium clear with pale yellowish cephalothorax; sternite VIII apparently without caudolateral spines or spinules (Fig. 24D) *P. articaudus* n.sp. (Nearctic, p. 82)
- 4 Lobes underneath gonopodal sheaths with distinct apical clawlike spines; anal lobe with nearly completely double row of setae in fringe; sternite VIII with 2, 3, or 4–10 caudolateral spines 5
 Lobes underneath gonopodal sheaths at most with indistinct apical rugulosity; anal lobe with setae double only caudally; sternite VIII with 10–12 caudolateral spines in compound spur (Fig. 24B)
 *P. prasinatus* (Staeg.) (Palaearctic, p. 69) and *P. nigrimanus* (Kieff.) (Palaearctic)

³According to Hauber (1947 p. 458) *P. fulviventris* has 30–35 filaments in fringe of anal lobe. Hauber probably overlooked that the row of filaments is completely double and each row has 30–35 filaments. He also mentions that cephalic tubercles are present, while they are barely indicated or absent (as in other species) in the specimen examined.

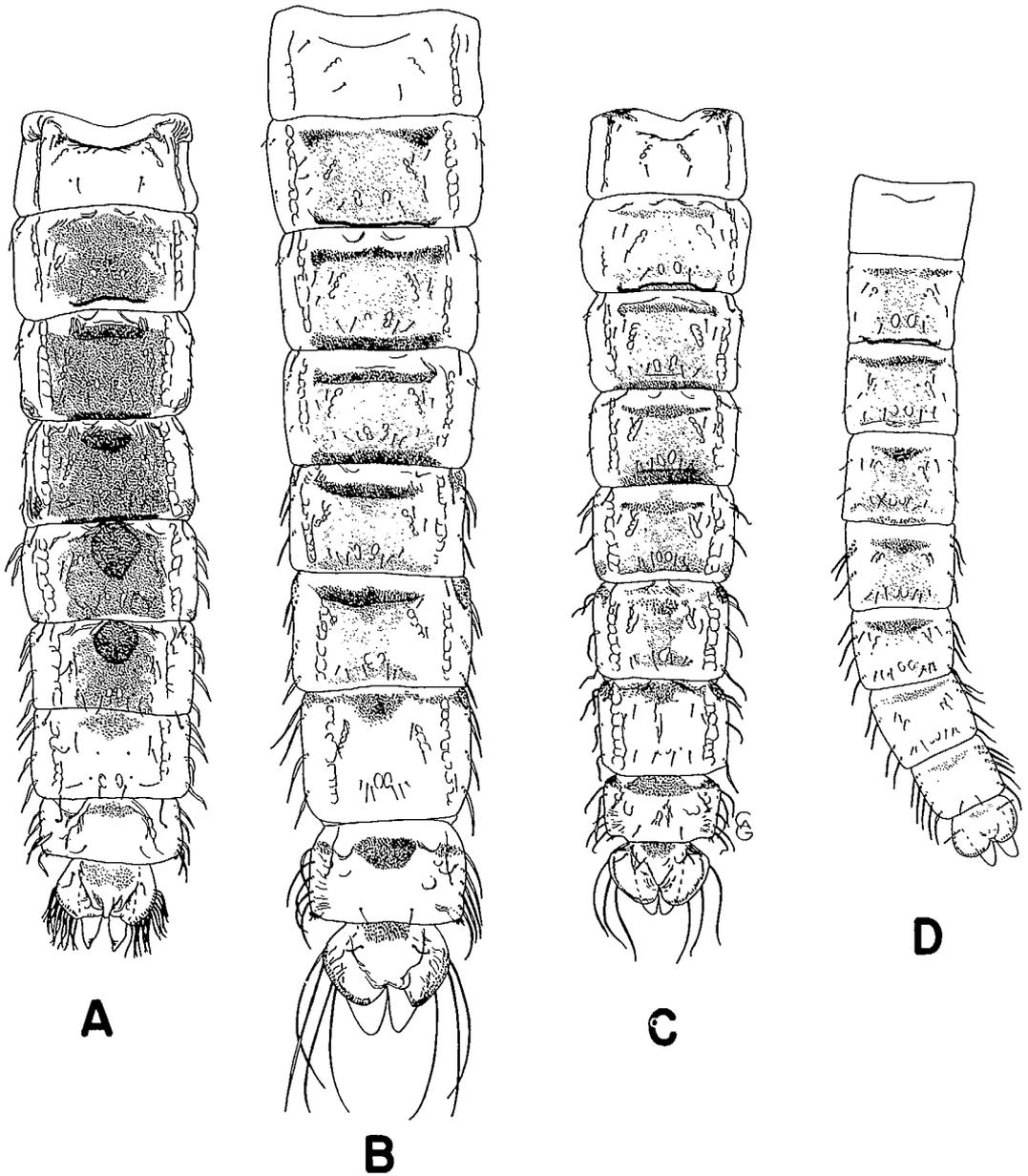


FIG. 24. *Pseudochironomus* spp., pupae, tergites I-IX. A, *P. richardsoni* Mall. B, *P. cf. prasinatus* Staeg. C, *P. pseudoviridis* (Mall.). D, *P. articaudus* n.sp.

- 5 Sternite VIII with 2 or 3 caudolateral spines only (Fig. 24C); anal lobe with about 84 setae *P. pseudoviridis* (Mall.) (Nearctic, p. 78)
- Sternite VIII with 4–10 caudolateral spines and several spinules (Fig. 29A); anal lobe with about 60–73 setae
 *P. fulviventris* (Joh.) (probable syn. *P. banksi* Town.) (Nearctic, p. 75)

Key to known larvae of Nearctic and Palaearctic *Pseudochironomus* Mall.

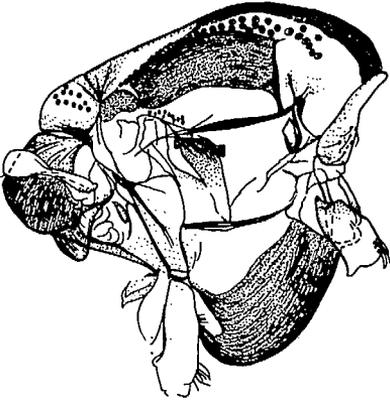
- 1 Mentum (Fig. 26H) with only 9 distinct teeth, first lateral tooth occasionally with a lateral notch; second antennal segment about 1.6 times as long as third; each posterior parapod with about 55 claws *P. richardsoni* Mall. (Nearctic, p. 67)
- Mentum with 13 (or 11) teeth, second lateral tooth small, fifth and sixth lateral teeth often appearing as a wide bifid tooth or sixth reduced; second antennal segment 1.0–1.3 times as long as third; parapods with less numerous claws 2
- 2 Mentum (Lenz 1937 fig. 10, 1941a fig. 91, 1954–62 fig. 415) not strongly arcuate, fifth and sixth lateral teeth normal
 *P. prasinatus* (Staeg.) (Palaearctic) and *P. nigrimanus* (Kieff.) (Palaearctic)
- Mentum (Fig. 29H, 30I, 31G) strongly arcuate, fifth and sixth lateral teeth appearing as a wide bifid tooth with sixth often reduced 3
- 3 Median tooth of mentum bluntly triangular, higher than, but not distinctly wider than first lateral tooth
 *P. julia* (Curr.) (syn. *P. aix* Town, and probably *P. netta* Town.) (Nearctic)
- Median tooth of mentum rounded, lower than or about as high as first lateral tooth and slightly wider than the two first lateral teeth combined 4
- 4 AR about 1.8(?)–2.4; antennal blade longer than segments 2–5 combined
P. fulviventris (Joh.)⁴ (including *Tanytarsus* sp. *J* (Johannsen 1937b p. 15)) (Nearctic, p. 75)
- AR 1.1–1.3; antennal blade shorter or longer than segments 2–5 combined 5
- 5 Basal antennal segment 0.5 times as long as premandible; labral lamella with about 20 apical teeth; antennal blade mostly longer than segments 2–5
 *P. ? pseudoviridis* (Mall.)⁴ (Nearctic, p. 79)
- Basal antennal segment 0.57 times as long as premandible; labral lamella with about 15 apical teeth; antennal blade shorter than segments 2–5
 *P. articaudus* n.sp. (Nearctic, p. 82)

Pseudochironomus crassus Town.
 (Fig. 25A, B)

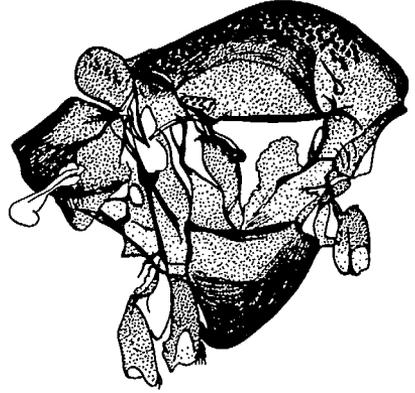
Pseudochironomus crassus Townes, 1945: 15

The male imago is characterized by having about 36 ($n = 1$) dorsocentrals in 1–3 rows; thorax greenish with blackish vittae; abdomen brownish green; AR about 2.1; LR₁ about 0.85; HR about 1.0; about 22 sensilla chaetica on ta₁ of p₂ and about 12 on ta₁ of p₃; gonostylus large and robust; volsellae large; pars ventralis divided to base.

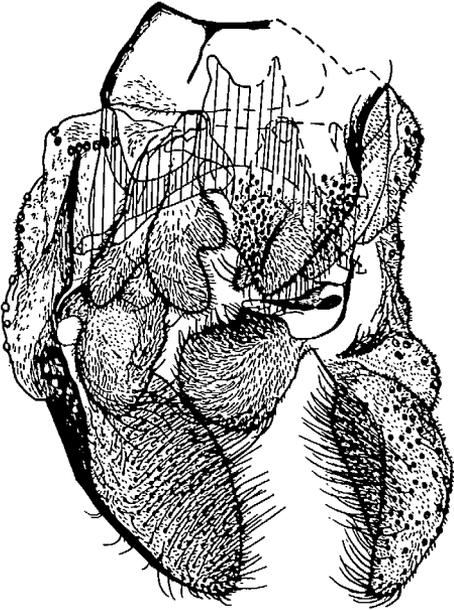
⁴ Although Sublette (1964 p. 121) assumes that *Tanytarsus* sp. *J* of Johannsen (1937 p. 15) is a synonym of *P. ? pseudoviridis*, this cannot be the case since the AR of the larva is about 2.0 as compared with 1.3 for *P. ? pseudoviridis*. Also the pupa described by Sublette (1957 p. 386) apparently belongs to *P. fulviventris* not to *P. pseudoviridis*.



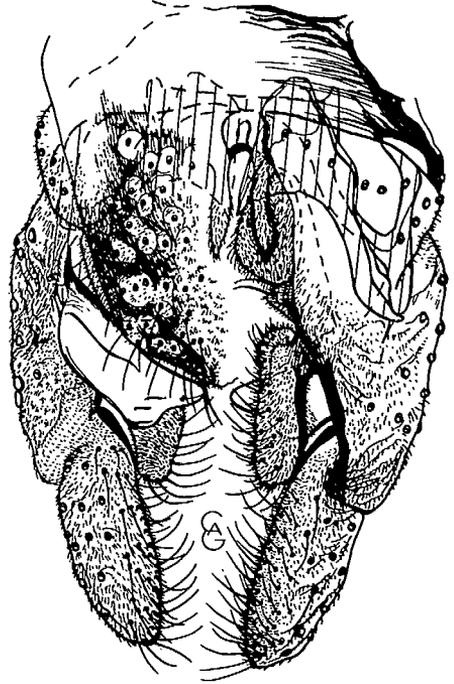
A



C



B



D

FIG. 25. *Pseudochironomus* spp., males. A-B, *P. crassus* Town.: A) thorax, B) hypopygium. C-D, *P. richardsoni* Mall.: C) thorax, D) hypopygium.

MALE IMAGO ($n = 1$)

Length 6.68 mm. Wing length 2.84 mm. Total length/wing length 2.35. Wing length/length of profemur 2.36. Coloration as mentioned by Townes (1945 p. 15) or slightly darker. Legs brown with apex of ta_3 , ta_4 , and base of ta_5 lighter on p_1 and p_2 .

Head — AR = 2.06. Temporals 49. Clypeus with 21 setae. Tentorium 280 μm long. Stipes 214 μm long. Palp lengths (μm): 64, 106, 160, 194, 250.

Thorax (Fig. 25A) — Antepronotum with 13 setae. Dorsocentrals 36 in 1–3 rows, prealars 11, parascutellars 1. Scutellum with 26 setae.

Wing — VR = 1.08. Brachiolum with 3 setae, R with 22 setae, R_1 with 1 seta, R_{4+5} with 3 setae. Squama with 16 setae.

Legs — Spur of front tibia 86 μm long, spurs of middle tibia 96 μm and 84 μm long, of hind tibia 108 μm and 92 μm . Width at apex of front tibia 84 μm , of middle tibia 90 μm , of hind tibia 93 μm long. Sensilla chaetica 22 on ta_1 of p_2 , 12 on ta_1 of p_3 . Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	1202	1417	1202	558	454	343	159	0.85	2.52	2.18	3.08
p_2	1325	1398	626	356	282	196	116	0.45	3.52	4.35	1.85
p_3	1398	1594	773	466	386	239	129	0.48	3.09	3.87	2.89

Hypopygium (Fig. 25B) — T IX with 124 setae including about 100 on posterior projection, 12 setae to each side stronger; laterosternites IX each with 12 setae. Phallapodeme 220 μm long. Transverse sternapodeme 76 μm long. Gonocoxite 300 μm long. Pars ventralis 170 μm long and divided to base. Intermedian volsella 132 μm long, lateral volsella 170 μm long, median volsella 44 μm long. Gonostylus 300 μm long. HR = 1.00, HV = 2.23.

MATERIAL EXAMINED

Male, 6.5 miles off Sturgeonskin Point on Long Point, Lake Winnipeg, 14/7/69, S. S. Chang.

ECOLOGY AND DISTRIBUTION

This is only the second male found of this probably northern species. Distribution: Northwest Territories (Townes 1945 p. 15), Manitoba.

Pseudochironomus richardsoni Mall.

(Fig. 24A, 25C, D, 26)

Pseudochironomus richardsoni Malloch 1915: 500; Lenz 1937: 11, 1941a: 59, 1954–62: 254; Johannsen 1937b: 16; Townes 1945: 15, 1952: 34; Roback 1957: 107–108; Beck and Beck 1959: 92; Sublette 1960: 198; Hudson 1970: 169

The male imago is characterized by having about 60 dorsocentrals in 3–6 rows; thorax and abdomen almost uniformly blackish; AR 1.7–2.6; LR_1 0.84–0.94; HR about 1.6; about 8 or 9 sensilla chaetica on each ta_1 of p_2 and p_3 ; T IX with apical notch; pars ventralis small and completely divided.

The pupa has only about 15 filamentous setae confined to caudal half in fringe of anal lobe.

The larva has an AR of about 1.7, basal antennal segment about 120 μm long, and third antennal segment 0.6 times as long as second.

MALE IMAGO ($n = 1$)

Length 5.40 mm, Wing length 2.55 mm. Total length/wing length 2.12. Wing length/length of profemur 2.12. Coloration as mentioned by Townes (1945 p. 15).

Head — AR = 2.13. Temporals 51. Clypeus with 28 setae. Tentorium 200 μm long. Stipes 210 μm long. Palp lengths (μm): 64, 90, 160, 202, 270.

Thorax (Fig. 25C) — Antepronotum with 6 setae. Dorsocentrals 59 in 3–6 rows, prealars 10, parascutellars 1. Scutellum with 22 setae in 2 or 3 rows.

Wing — VR = 1.09. Brachiolum with 3 setae, R with 15 setae, R_1 with 1 seta, R_{4+5} with 1 seta. Squama with 39 setae.

Legs — Spur of front tibia 78 μm long, spurs of middle tibia 78 μm and 65 μm long, of hind tibia 89 μm and 74 μm long. Width at apex of front tibia 66 μm , of middle tibia 71 μm , of hind tibia 74 μm . Sensilla chaetica 8 or 9 on ta_1 of each p_2 and p_3 . Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	1018	1288	1159	527	417	294	153	0.90	2.49	1.99	3.25
p_2	1153	1251	601	331	270	184	117	0.48	3.33	4.00	2.00
p_3	1153	1404	810	478	393	215	141	0.58	2.75	3.16	2.64

Hypopygium (Fig. 25D) — T IX without distinct projection, with 78 setae; laterosternites IX each with 7 setae. Phallapodeme 130 μm long. Transverse sternapodeme 196 μm long. Gonocoxite 310 μm long. Pars ventralis 80 μm long and completely divided into two 18 μm wide lobes. Intermedian volsella 144 μm long, lateral volsella 122 μm long, median volsella 22 μm long. Gonostylus 190 μm long. HR = 1.63, HV = 2.84.

PUPA ($n = 1$)

Total length 6.68 mm. Exuvium dark, brownish.

Cephalothorax — Thoracic horn (Fig. 26B) with longer branch about 760 μm long, maximum width about 120 μm , shorter branch about 140 μm long. PcS_{1-2} about 140 μm long. PcS_3 about 70 μm long. Frontal plate (Fig. 26C) rugulose, without cephalic tubercle and apparently without frontal setae. MA about 150 μm long. Thorax rugulose. Dc_{1-4} 40–80 μm long, anterior two 18 μm apart, Dc_3 354 μm posterior of Dc_2 , Dc_3 and Dc_4 20 μm apart.

Abdomen (Fig. 24A) — T I bare; T II with hourglass shaped shagreenation, stronger anteriorly, tergite bare along margins; T III–V fully covered by spinules except on margins, with anterior-medial patch of stronger spinules; T VI with median spinules and stronger anterior-medial patch of spinules; T VII–IX with anterior-medial shagreenation. T II with about 101 posterior hooklets, integuments III/IV and IV/V with spinules. Sternite VIII with 6 or 7 caudolateral spines, 7–30 μm long. Sternite I (Fig. 26A) with 2 pairs of tubercles, only one covered with spinules; sternite II with spinules anteriorly and along mesal margin; sternite III with weak anterior-medial and marginal spinules; sternite IV with marginal spinules grading over into PSA; sternites V and VI with very weak anterior-medial spinules and weak PSA; sternite VII with very weak anterior-medial spinules; sternites VIII and IX bare. Segments V–VIII with broad filamentous L-setae as: 3, 4, 4, 5. Anal lobe with 15 filamentous setae in fringe confined to caudal half and a dorsal pair of filamentous setae.

FOURTH INSTAR LARVA ($n = 1$)

Head — Antenna as in Fig. 26D. Length of antennal segments (μm): 120, 30, 18, 14, 17. AR = 1.71. Basal antennal segment 30 μm wide, distance from base to ringorgan 18 μm , to basal mark of seta 20 μm , to distal mark 50 μm , blade at apex 66 μm long. Labrum and palatum as in Fig. 26E. Maxilla as in Fig. 26F. Premandible (Fig. 26E) 135 μm long. Mandible (Fig. 26G) 286 μm long. Mentum as in Fig. 26H.

Abdomen — Procercus 50 μm high, 50 μm wide, with 7 apical setae, about 400 μm long. Supraanal seta 160 μm long. Each parapod with 55 dark yellowish-brown claws of varying sizes.

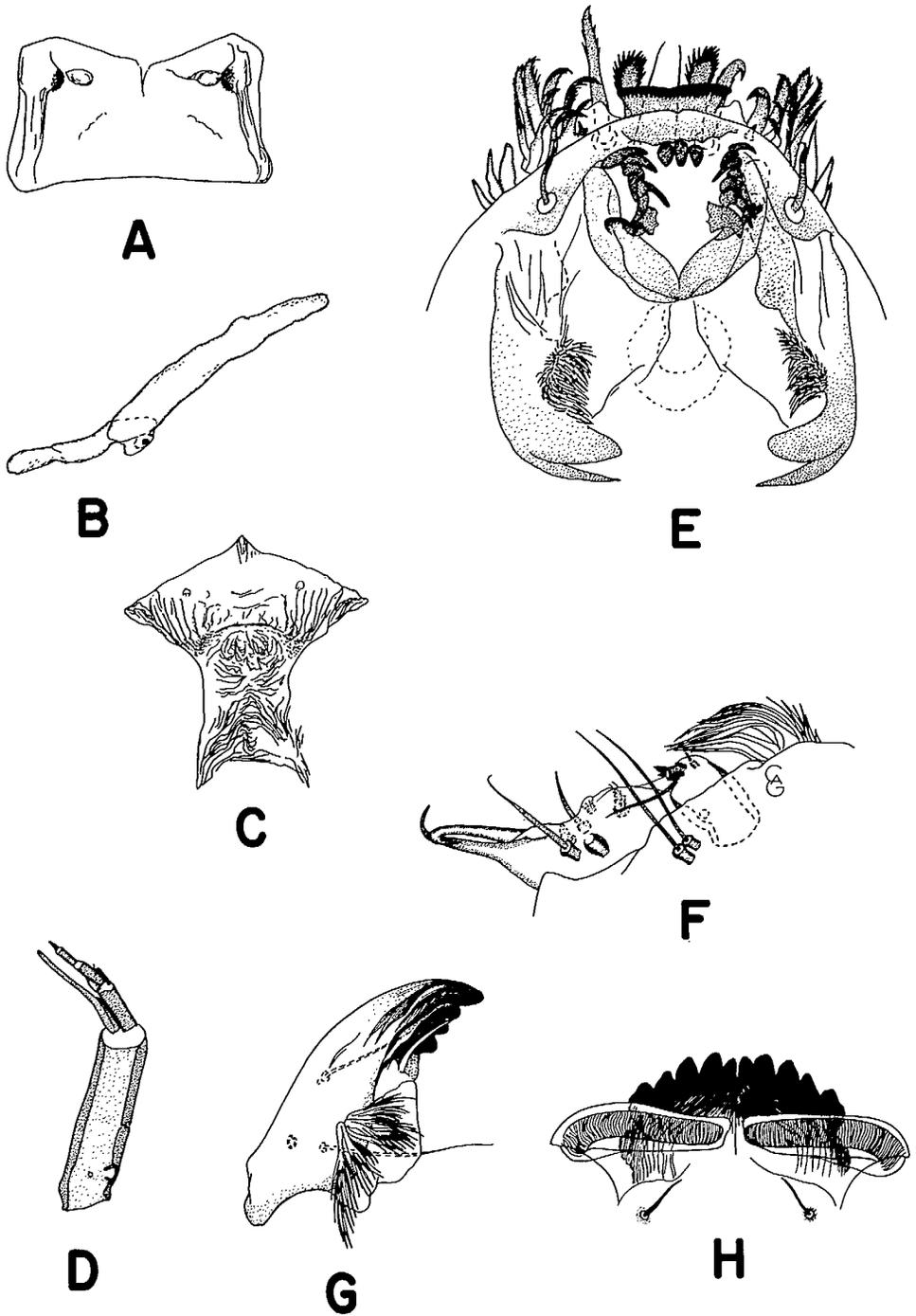


FIG. 26. *Pseudochironomus richardsoni* Mall., immatures. A-C, pupa: A) sternite I, B) thoracic horn, C) frontal plate. D-H, larva: D) antenna, E) labrum, palatum and premandible, F) maxilla, G) mandible, H) mentum.

MATERIAL EXAMINED

Male reared from larva, depth 0.6 m in creek off Mooney's Bay, Ottawa, Ont., 7/10/66, J. Martin.

ECOLOGY AND DISTRIBUTION

The species is known from lakes, ponds, rivers, and streams. Adults are found from the end of March to the beginning of October. The species is known from California to Ontario and New York and south to Florida (Sublette and Sublette (1965 p. 177), Hudson (1970 p. 169)).

Pseudochironomus cf. prasinatus (Staeg.)

(Fig. 24B)

Two pupae from Lake Esrom, Denmark, collected by the author, 21/6/62, are illustrated in Fig. 24B for comparison with the Nearctic pupae.

Pseudochironomus badius n.sp.

(Fig. 27A-C)

The male imago is characterized by having 9-12 dorsocentrals in a single row; thorax with blackish vittae; AR of 1.8-1.9; LR₁ of 0.90-0.94, LR₃ of 0.60-0.64; HR of 1.4-1.5; 3-5 sensilla chaetica on each ta₁ of p₂ and p₃; pars ventralis 46-70 μm long and not, to completely divided.

MALE IMAGO (n = 10)

Length 4.15-4.73, 4.36 mm. Wing length 2.23-2.43, 2.32 mm. Total length/wing length 1.82-1.98, 1.88. Wing length/length of profemur 2.72-2.90, 2.83. Scapus, pedicel, antepronotum, scutal vittae, part of anepisternum, preepisternum, postnotum, coxae, trochanter, extreme base of tibiae, and apical half of ta₃ blackish. Remaining parts brownish green.

Head — AR = 1.80-1.93, 1.84. Temporals 25-44, 33. Clypeus with 8-16, 12 setae. Tentorium 160-220, 197 μm long. Stipes 150-190, 167 μm long. Palp lengths (μm): 48-62, 54; 62-80, 71; 106-126, 115; 128-167, 149; 170-228, 202.

Thorax — Antepronotum with 6-14, 9 setae. Dorsocentrals 9-18, 12 in a single row; prealars 3-5, 4; parascutellars 1. Scutellum with 10-13, 11 setae.

Wing — VR = 1.05-1.12, 1.08. Brachiolum with 2-4, 3 setae; R with 7-12, 9 setae; R₁ without setae; R₄₊₅ with 0 or 1, 1 seta. Squama with 14-26, 21 setae.

Legs — Spurs of front tibia 62-75, 67 μm long (front tibia with 2 spurs in 4 of 10 specimens); spurs of middle tibia 58-67, 63 μm and 55-66, 61 μm long; of hind tibia 64-76, 71 μm and 56-65, 62 μm long. Width at apex of front tibia 50-62, 54 μm; of middle tibia 54-60, 56 μm; of hind tibia 60-67, 61 μm. Sensilla chaetica 3-5, 4 on each ta₁ of p₂ and p₃. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄
p ₁	773-895, 820	945-1129, 1021	859-1061, 931	423-478, 443	331-374, 351	233-270, 250
p ₂	822-957, 875	895-1030, 951	442-515, 471	251-307, 269	196-233, 214	129-153, 139
p ₃	883-1067, 962	1043-1202, 1109	662-736, 687	368-429, 396	319-356, 338	165-196, 179
	ta ₅	LR	BV	SV	BR	
p ₁	110-123, 116	0.90-0.94, 0.91	2.30-2.48, 2.39	1.91-2.01, 1.98	3.00-3.82, 3.33	
p ₂	80-104, 90	0.48-0.50, 0.49	3.11-3.36, 3.23	3.80-3.94, 3.88	3.00-4.67, 3.51	
p ₃	98-117, 104	0.60-0.64, 0.62	2.50-2.77, 2.71	2.91-3.16, 3.01	4.19-5.41, 4.69	

Hypopygium (Fig. 27A-C) — T IX with 32–52, 40 setae; laterosternites IX each with 3–6, 4 setae. Phallapodeme 140–160, 147 μm long. Transverse sternapodeme 64–76, 72 μm long. Gonocoxite 190–235, 218 μm long. Pars ventralis (Fig. 27C) 46–70, 59 μm long; 38–60, 48 μm wide at base; divided at 0–60, 39 μm from base. Penis lobe 40–72, 59 μm long. Intermedian volsella 88–102, 93 μm long; lateral volsella 70–82, 79 μm long; median volsella 24–34, 31 μm long. Gonostylus 130–166, 148 μm long. HR = 1.41–1.52, 1.47; HV = 2.73–3.20, 2.96.

MATERIAL EXAMINED

Holotype: male, 6.5 miles off Sturgeonskin Point on Long Point, Lake Winnipeg, Man., 53°05'N, 98°50'W, 14/7/69, S. S. Chang (CNC No. 15018). Paratypes: 68 males, as holotype; male, 1.25 miles off McCreary Island, 15/7/69, S. S. Chang.

ECOLOGY AND DISTRIBUTION

The species is known only from the northern moderately oligotrophic to mesotrophic part of Lake Winnipeg.

Pseudochironomus rex Haub.

(Fig. 27D, E)

Pseudochironomus rex Hauber, 1947: 458; Beck and Beck 1959: 92

The male imago is characterized by having 9–17 dorsocentrals in a single row; thorax with blackish vittae; AR of 1.6–2.0; LR₁ of 0.83–0.86, LR₃ of 0.56–0.60; HR of 1.5–1.7; 8–13 sensilla chaetica on ta₁ of p₂, 0–4 sensilla chaetica on ta₁ of p₃; pars ventralis 88–118 μm long and undivided or partially divided; caudal projection of T IX narrow and elongate.

MALE IMAGO ($n = 10$)

Length 3.65–4.84, 4.26 mm. Wing length 1.94–2.33, 2.15 mm. Total length/wing length 1.88–2.08, 1.97. Wing length/length of profemur 2.56–2.70, 2.64. Pedicel, anteprepronotum, scutal vittae, part of anepisternum, ventral part of preepisternum, scutellum, postnotum, part of coxae, ti–ta₅ of p₁, extreme base of ti and ta₂–ta₃ of p₂, extreme base of ti and ta₁–ta₅ of p₃ blackish; ta₁ of p₂, ta₁–ta₃ of p₃, and abdomen brown; scutal vittae fused in center.

Head — AR = 1.59–2.04, 1.78. Temporals 26–43, 31. Clypeus with 9–14, 12 setae. Tentorium 166–190, 182 μm long. Stipes 148–180, 163 μm long. Palp lengths (μm): 45–58, 52; 62–87, 71; 100–128, 118; 135–158, 145; 160–232, 185.

Thorax — Anteprepronotum with 5–9, 7 setae. Dorsocentrals 9–17, 12 in a single row; prealars 3–6, 4; parascutellars 0 or 1, 1. Scutellum with 9–12, 10 setae.

Wing — VR = 1.07–1.14, 1.11. Brachiolum with 1–3, 2 setae; R with 6–12, 10 setae; R₁ without setae; R₄₊₅ with 0–2, 1 setae. Squama with 19–27, 22 setae.

Legs — Spur of front tibia 48–66, 60 μm long; spurs of middle tibia 48–66, 57 μm and 44–60, 53 μm ; of hind tibia 56–80, 67 μm and 50–64, 58 μm . Width at apex of front tibia 50–59, 53 μm ; of middle tibia 46–62, 55 μm ; of hind tibia 52–69, 61 μm . Sensilla chaetica 8–13, 11 on ta₁ of p₂; 0–4, 0.7 on ta₁ of p₃. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄
p ₁	724–895, 816	889–1098, 1008	754–932, 854	343–429, 392	276–343, 311	184–233, 209
p ₂	773–987, 894	828–1043, 964	374–466, 432	221–282, 251	172–221, 199	110–147, 134
p ₃	810–1043, 962	969–1196, 1125	577–687, 650	343–429, 388	268–350, 312	135–202, 173

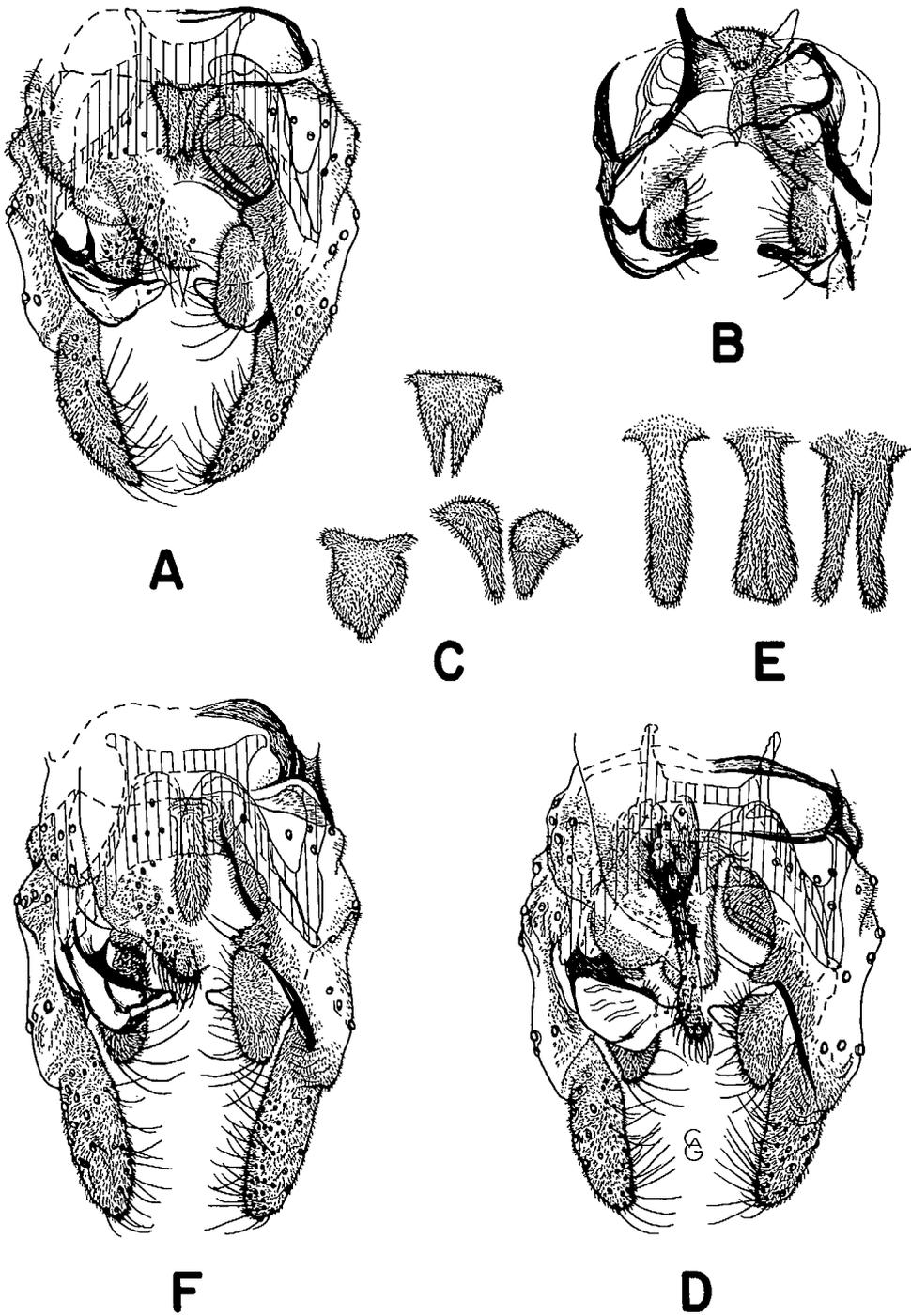


FIG. 27. *Pseudochironomus* spp., males. A-C, *P. badius* n.sp.: A) hypopygium, B) variation of volsella, C) variation of pars ventralis. D-E, *P. rex* Haub.: D) hypopygium, E) variation of pars ventralis. F, *P. middlekaufi* Town., hypopygium.

	ta ₆	LR	BV	SV	BR
p ₁	86-123, 103	0.83-0.86, 0.85	2.45-2.80, 2.64	2.08-2.18, 2.14	2.90-4.85, 3.32
p ₂	69-86, 83	0.44-0.48, 0.45	3.27-3.61, 3.42	4.07-4.39, 4.28	2.94-4.06, 3.34
p ₃	80-117, 98	0.56-0.60, 0.58	2.66-3.04, 2.83	3.09-3.28, 3.21	3.64-4.21, 3.98

Hypopygium (Fig. 27D, E) — T IX with a long, narrow caudal projection (but no true anal point) with 27-54, 39 setae; laterosternites IX each with 2-6, 4 setae. Phallapodeme 122-144, 133 μm long. Transverse sternapodeme 60-90, 79 μm long. Gonocoxite 184-250, 216 μm long. Pars ventralis (Fig. 27E) 88-118, 99 μm long; divided at 50-118, 88 μm from base; 30-40, 35 μm wide at base. Intermedian volsella 86-114, 93 μm long; lateral volsella 68-98, 84 μm long; median volsella 22-37, 27 μm long. Gonostylus 109-162, 138 μm long. HR = 1.49-1.69, 1.57; HV = 2.89-3.39, 3.09.

MATERIAL EXAMINED

Fourteen males 1.5 miles off George Island, Lake Winnipeg, Man., 27/7/69; 26 males, Gull Harbour, Lake Winnipeg, 16/7/69; 12 males, Matheson Island Wharf, Lake Winnipeg, 26/7/69; 77 males, Pine Dock, Lake Winnipeg, 10/7 and 31/7/69; 5 males, 1.2 miles off McCreary Island, Lake Winnipeg, 15/7/69; male, 6.5 miles off Sturgeonskin Point on Long Point, Lake Winnipeg, 14/7/69; 85 males, 2 miles off Grand Rapids, Lake Winnipeg, 13/7/69; 4 males, 2.5 miles off Horse Island, Lake Winnipeg, 29/7/69; (all above leg. S. S. Chang); 95 males, Hecla Island, Lake Winnipeg, 25/8/71, E. Johnson and M. Roberts; 5 males, Beaver Point, Lake Winnipeg, 30/6, 27/7, and 19/8/71, E. Johnson, M. Roberts, S. Warwick, and S. Flam; 8 males, Calders Dock, Lake Winnipeg, 28/6-18/8/71, M. P. McLean, N. Hooper, S. Flam, E. Johnson, and S. Warwick; 243 males, Old Fishing Dock, Lake Winnipeg, 16/6-18/8/71, E. Johnson, N. Hooper, S. Flam, S. Warwick, M. Roberts, B. Andrews, and J. Rambally.

DISTRIBUTION

The species is known from the central and northern parts of Lake Winnipeg, Man., from Okoboji, Iowa, and from the central highlands of Florida (Hauber 1947 p. 458, Beck and Beck 1959 p. 92).

Pseudochironomus middlekaufi Town.

(Fig. 27F)

Pseudochironomus middlekaufi Townes, 1945: 18, 1952: 35; Beck 1961: 125; Sublette and Sublette 1965: 176

nec *Pseudochironomus aureus* (Joh.), Sublette 1967b: 545 (Sublette (1967b p. 545) synonymized *P. middlekaufi* with *P. aureus* (Joh.) (Johannsen 1908 p. 283), which was described from a single female, on the basis of the common combination of black thoracic vittae and uniserial dorsocentrals. However, *P. badius* and *P. rex* also share these characteristics and Sublette's synonymizing has to be rejected at least for the moment.)

The male imago is characterized by having 11-14 dorsocentrals in a single row; thorax with blackish vittae; AR of 1.6-2.0; LR₁ of 0.84-0.86, LR₃ of 0.55-0.57; HR of 1.51-1.55; about 5 sensilla chaetica on ta₁ of p₂ and 0 or 1 on ta₁ of p₃; pars ventralis undivided and about 82 μm long; caudal projection of T IX broad with a small caudal point.

MALE IMAGO ($n = 2$)

Length 4.07-4.20 mm. Wing length 1.76-1.90 mm. Total length/wing length 2.21-2.31. Wing length/length of profemur 2.31-2.32. Coloration as mentioned by Townes (1945 p. 18).

Head — AR = 1.63-1.95. Temporals 30-33. Clypeus with 10-15 setae. Tentorium 170-180 μm long. Stipes 150-158 μm long. Palp lengths (μm): 46-47, 68-70, 100-118, 131-136, 166-183.

Thorax — Antep pronotum with 6–9 setae. Dorsocentrals 11–16 in a single row, prealars 4 or 5, parascutellars 1. Scutellum with 12 or 13 setae.

Wing — VR = 1.12. Brachiolum with 2 setae, R with 7–11 setae, R₁ with 0 or 1 seta, R₄₊₅ with 0 or 1 seta. Squama with 15–18 setae.

Legs — Spur of front tibia 57–63 μm long, spurs of middle tibia 50 μm and 46–50 μm long, of hind tibia 58–64 μm and 46–57 μm. Width at apex of front tibia 54–58 μm, of middle tibia 54–55 μm, of hind tibia 61–62 μm. Sensilla chaetica 5 on ta₁ of p₂, 0 or 1 on ta₁ of p₃. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	761–822	932–969	779–834	350–368	282–319	190–209	86–98
p ₂	810–859	859–895	399–448	221–227	178–196	117–129	76–80
p ₃	853–908	987–1067	540–613	307–356	258–282	141–172	86
	LR	BV	SV	BR			
p ₁	0.84–0.86	2.64–2.72	2.15–2.17	1.94–2.00			
p ₂	0.47–0.50	3.49–3.52	3.92–4.12	2.65			
p ₃	0.55–0.57	2.89–3.01	3.22–3.41	3.24–3.42			

Hypopygium (Fig. 27F) — T IX with a broad, rounded caudal projection with a small caudal point, with about 42 setae, 3 or 4 of them ventrally on projection; laterosternites IX each with 5 setae. Phallapodeme 150–154 μm long. Transverse sternapodeme 100–108 μm long. Gonocoxite 226 μm long. Pars ventralis 82 μm long, 24 μm wide, undivided. Intermedian volsella 96 μm long, lateral volsella 86–90 μm long, median volsella 26–34 μm long. Gonostylus 146–150 μm long. HR = 1.51–1.55, HV = 2.79–2.80.

MATERIAL EXAMINED

Two males, Hecla Island, Lake Winnipeg, Man., 27/7/71, R. Deda and J. Rambally.

DISTRIBUTION

The species is known from New York, Illinois, Florida, and Manitoba (Townes 1945 p. 18; Beck 1961, p. 125).

Pseudochironomus fulviventris (Joh.)

(Fig. 28, 29)

Chironomus fulviventris Johannsen, 1905: 229; Muttkowski 1918: 410, 475, 478, 481; Pearse and Achtenberg 1920: 311–312, 352, 356; Ewers and Boesel 1935: 66

Tendipes fulviventris (Joh.), Bause 1914: 116

Stictochironomus fulviventris (Joh.), Lenz 1921: 161

Pseudochironomus fulviventris (Joh.), Johannsen 1934: 352; Townes 1945: 165, 1952: 34; Hauber 1947: 456; Thienemann 1954: 497, 734–736, 739; Roback 1957: 108; Beck and Beck 1959: 92; Sublette and Sublette 1965: 176; Hudson 1970: 169

?*Pseudochironomus* ? *pseudoviridis*, Sublette 1957: 386, pro parte (pupa)

?*Pseudochironomus banksi* Townes 1945: 17. (The only difference between *P. banksi* and *P. fulviventris* is the presence of a digitiform projection on the third palpal segment in *P. fulviventris*.)

The male imago is characterized by having 14–31 dorsocentrals in a single row; thorax marked with orange-yellow or light brown; AR of 2.1–2.7; LR₁ of 0.96–1.03, LR₃ of 0.60–0.66; 4–8 sensilla chaetica on ta₁ of both p₂ and p₃; third palpal segment with apical digitiform projection; pars ventralis completely or incompletely divided.

The female imago has a digitiform projection on the third palpal segment as in the male; 20–24 setae on R; about 13 or 14 on R₁, about 16–18 on R₄₊₅; 10–14 sensilla chaetica on ta₁ of both p₂ and p₃; about 4 or 5 setae on gonocoxite IX; about 42–47 setae on T IX.

The pupa has about 60–73 filamentous setae in a double row in fringe of anal lobe; apical claw-like spines on lobes underneath gonopodal sheaths; 4–10 stronger spines and numerous weaker spines and spinules caudolaterally on sternite VIII.

The larva has a strongly arcuate mentum with fifth and sixth lateral teeth appearing as a wide bifid tooth; AR of 1.8(?)–2.4; antennal blade longer than segments 2–5 combined; posterior parapsods each with about 17 claws.

MALE IMAGO (*n* = 10)

Length 5.79–6.35, 6.08 mm. Wing length 2.62–3.00, 2.84 mm. Total length/wing length 2.07–2.23, 2.14. Wing length/length of profemur 2.54–2.63, 2.59. Coloration as mentioned by Townes (1945 p. 16).

Head (Fig. 28A) — AR = 2.15–2.56, 2.32. Temporals 35–56, 46. Clypeus with 15–27, 20 setae. Tentorium 220–260, 240 μm long. Stipes 180–206, 196 μm long. Palp lengths (μm): 63–90, 75; 90–130, 104; 182–214, 196; 195–245, 224; 200–321, 273. Apical tooth of third palpal segment 34–54, 46 μm long.

Thorax (Fig. 28B) — Antepronotum with 8–18, 12 setae. Dorsocentrals 14–31, 23 in a single row; prealars 5–11, 8; parascutellars 1–2, 1.5. Scutellum with 17–24, 21 setae.

Wing — VR = 1.05–1.12, 1.08. Brachiolum with 2 or 3, 2 setae; R with 10–15, 13 setae; R₁ without setae; R₄₊₅ with 1–3, 2 setae. Squama with 31–46, 38 setae.

Legs — Spur of front tibia 75–94, 83 μm long; spurs of middle tibia 68–87, 79 μm and 67–85, 73 μm long; of hind tibia 82–94, 88 and 68–87, 78 μm long. Width at apex of front tibia 62–77, 71 μm; of middle tibia 66–80, 74 μm; of hind tibia 71–90, 81 μm. Sensilla chaetica 4–8, 6 on ta₁ of p₂; 4–7, 5 on ta₁ of p₃. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄
p ₁	1018–1153, 1097	1227–1429, 1363	1257–1368, 1342	509–577, 544	429–491, 461	337–393, 366
p ₂	1141–1325, 1257	1202–1410, 1317	619–699, 674	331–380, 362	264–319, 296	172–233, 206
p ₃	1190–1355, 1297	1410–1582, 1521	871–1006, 948	491–558, 527	405–466, 435	221–288, 243

	ta ₅	LR	BV	SV	BR
p ₁	147–178, 167	0.96–1.03, 0.98	2.44–2.71, 2.52	1.77–1.90, 1.83	2.38–3.16, 2.75
p ₂	104–129, 119	0.50–0.53, 0.51	3.08–3.42, 3.31	3.67–3.98, 3.82	2.65–3.40, 2.97
p ₃	117–147, 133	0.60–0.66, 0.63	2.61–2.89, 2.80	2.84–3.12, 2.97	3.20–4.27, 3.56

Hypopygium (Fig. 28C) — T IX with broadly rounded, caudal projection and with 37–66, 50 setae; laterosternites IX each with 5–8, 7 setae. Phallapodeme 178–194, 188 μm long. Transverse sternapodeme 100–122, 113 μm long. Gonocoxite 270–320, 295 μm long. Pars ventralis 114–140, 127 μm long; 46–72, 59 μm wide at base; divided 0–82, 26 μm from base. Intermedian volsella 110–128, 117 μm long; lateral volsella 100–116, 108 μm long; median volsella 20–38, 32 μm long. Gonostylus 176–208, 195 μm long. HR = 1.39–1.85, 1.55; HV = 2.97–3.41, 3.13.

FEMALE IMAGO (*n* = 2)

Length 4.95–5.20 mm. Wing length 3.06–3.14 mm. Total length/wing length 1.61–1.66. Wing length/length of profemur 2.85–2.91. Coloration as in male. Other measurements as in the male with the following exceptions and additions:

Head — AR = 0.45–0.62. Flagellomeres length (μm): 116–140, 67–74, 70–74, 83–86, 160–180. Basal palpal segment 100 μm long.

Thorax — Prealars 10–17. Scutellum with 28–33 setae.

Wing — R with 20–24 setae, R₁ with 13 or 14 setae, R₄₊₅ with 16–18 setae. Squama with 47–49 setae.

Legs — Spur of front tibia 65–68 μm long. Sensilla chaetica 14 on ta_1 of p_2 , 10–13 on ta_1 of p_3 ; ta_1 – ta_3 of front leg as: 1233–1386, 491–503, 411–429. LR_1 as 0.94–0.99. BV_{2-3} as 3.58–3.59, 2.88–2.92. BR_{1-3} as 2.25–2.31, 2.17–2.18, 2.20–2.25.

Genitalia (Fig. 28D) — Notum 149–152 μm long. Gonocoxite IX with 4 or 5 setae. T IX with 42–47 setae. Cercus 280–302 μm long. Seminal capsule 150 μm long, 110–112 μm wide.

PUPA ($n = 1$)

Total length 6.74 mm. Exuvium nearly clear or with slight yellowish infuscation.

Cephalothorax — Thoracic horn not measurable. Frontal plate with faint indication of cephalic tubercle, without frontal setae. (Hauber (1947 p. 458) mentions that cephalic tubercles are present. Sublette (1957 p. 386) mentions, for a pupa which may belong to *P. fulviventris* in the sense of Hauber, that both cephalic tubercles and frontal setae are present. However, Hauber's description probably is in error and Sublette's specimen probably is not a *Pseudochironomus*.) Anterior part of cephalothorax spinulose.

Abdomen (Fig. 29A) — T I apparently bare; T II with stronger anterior and posterior and very weak posteriomedian shagreenation; T III–VI with strong anterior shagreenation, weak over most of the tergites, and slightly stronger posteriorly; T VII and VIII with relatively strong anterior and anteriolateral shagreenation; T IX with anterior spinules. T II with about 93 posterior hooklets, integuments III/IV and IV/V with numerous spinules. Sternite VIII with about 9 spines (Fig. 29D) longer than 20 μm , about 3 between 10 μm and 20 μm long, and numerous spinules (about 10) less than 10 μm long. Sternite I (Fig. 29B) with 2 pairs of spinule-covered tubercles, sternite II with weak posteriomedian shagreenation, sternite III with median shagreenation, sternite IV with spinules along margin grading over into PSA, sternite V with weak PSA and weak median shagreenation, sternites VI–IX apparently bare. Segments V–VIII with broad filamentous L-setae as: 3, 4, 4, 5. Anal lobe with 73 filamentous setae in a double row in fringe, an anteriodorsal pair of setae, and small claws on lobes ventrad of gonopodal sheaths (Fig. 29C).

FOURTH INSTAR LARVA ($n = 1$)

Total length about 10 mm. Head capsule about 0.60 mm long.

Head — Antenna as in Fig. 29E. Length of antennal segments (μm): 125, 20, 16, 11, 4. $\text{AR} = 2.36$. (Hauber (1947 p. 458) gives a ratio of about 1.8 while *Tanytarsus* sp. J of Johannsen (1937b p. 16) has an AR of 2.1.) Basal antennal segment 30 μm wide, distance from base to ringorgan 18 μm , to basal mark of seta 14 μm , to distal mark 46 μm , blade at apex 67 μm long and longer than segments 2–5 combined. Labrum and palatum as in Fig. 29F. Labral lamella with 21 apical teeth. Premandible (Fig. 29F) 120 μm long. Mandible (Fig. 29G) 230 μm long. Mentum as in Fig. 29H. Postmentum 274 μm long.

Abdomen — Procercus 120 μm high, 40 μm wide, with 8 anal setae about 372 μm long. Supraanal seta about 110 μm long. Each posterior parapod with about 17 yellowish-brown claws of varying size.

MATERIAL EXAMINED

Ten males, 2 females, Victoria Beach, Lake Winnipeg, Man., 9/7 and 25/7/69; male, Gull Harbour, Lake Winnipeg, 16/7/69; 2 males, Pine Dock, Lake Winnipeg, 10/7 and 31/7/69; male, Matheson Island Wharf, Lake Winnipeg, 26/7/69; 22 males, McBeth Harbour, Lake Winnipeg, 30/7/69; 947 males, 1.2 miles off McCreary Island, Lake Winnipeg, 15/7/69; male, George Island, Lake Winnipeg, 11/7/69; 6 males, 1.5 miles off George Island, Lake Winnipeg, 27/7/69; 21 males, 6.5 miles off Sturgeonskin Point on Long Point, Lake Winnipeg, 14/7/69; 31 males, 2 miles off Grand Rapids, Lake Winnipeg, 13/7/69; 34 males, Grand Rapids, Lake Winnipeg, 28/7/69; 3 males off Horse Island, Lake Winnipeg, 29/7/69; (all above leg. S. S. Chang); 23 males, Beaver Point, Lake Winnipeg, 30/6/71, E. Johnson and S. Flam; male, Old Fishing Dock, Lake Winnipeg, 29/6 and 14/7/71, E. Johnson, M. Roberts, and S. Flam; 1 mature male pupa reared from larva, Lake Manitoba, Man., 3/7/74, A. Beck.

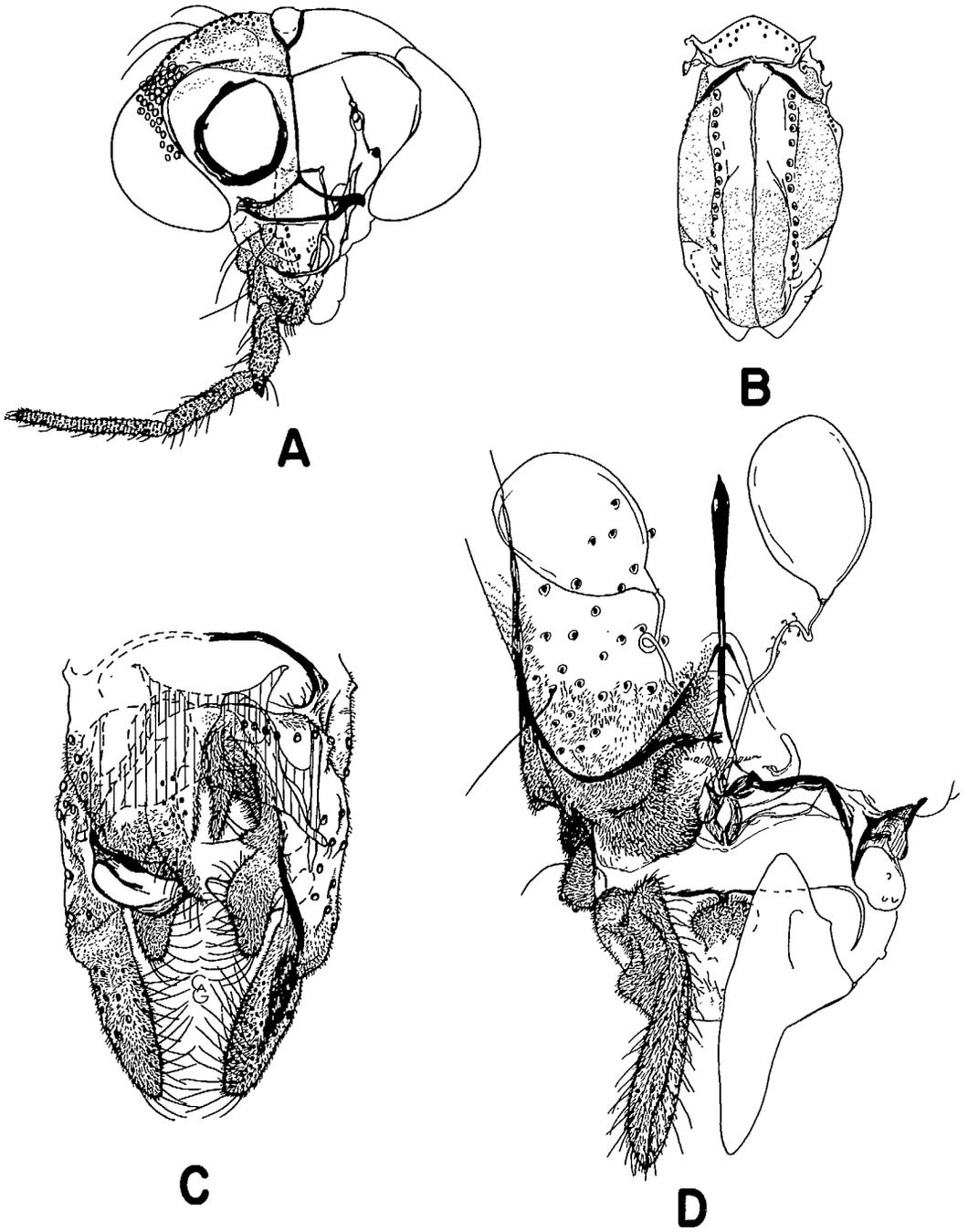


FIG. 28. *Pseudochironomus fulviventris* (Joh.), imagines. A-C, male: A) head, B) thorax, C) hypopygium. D, female genitalia.

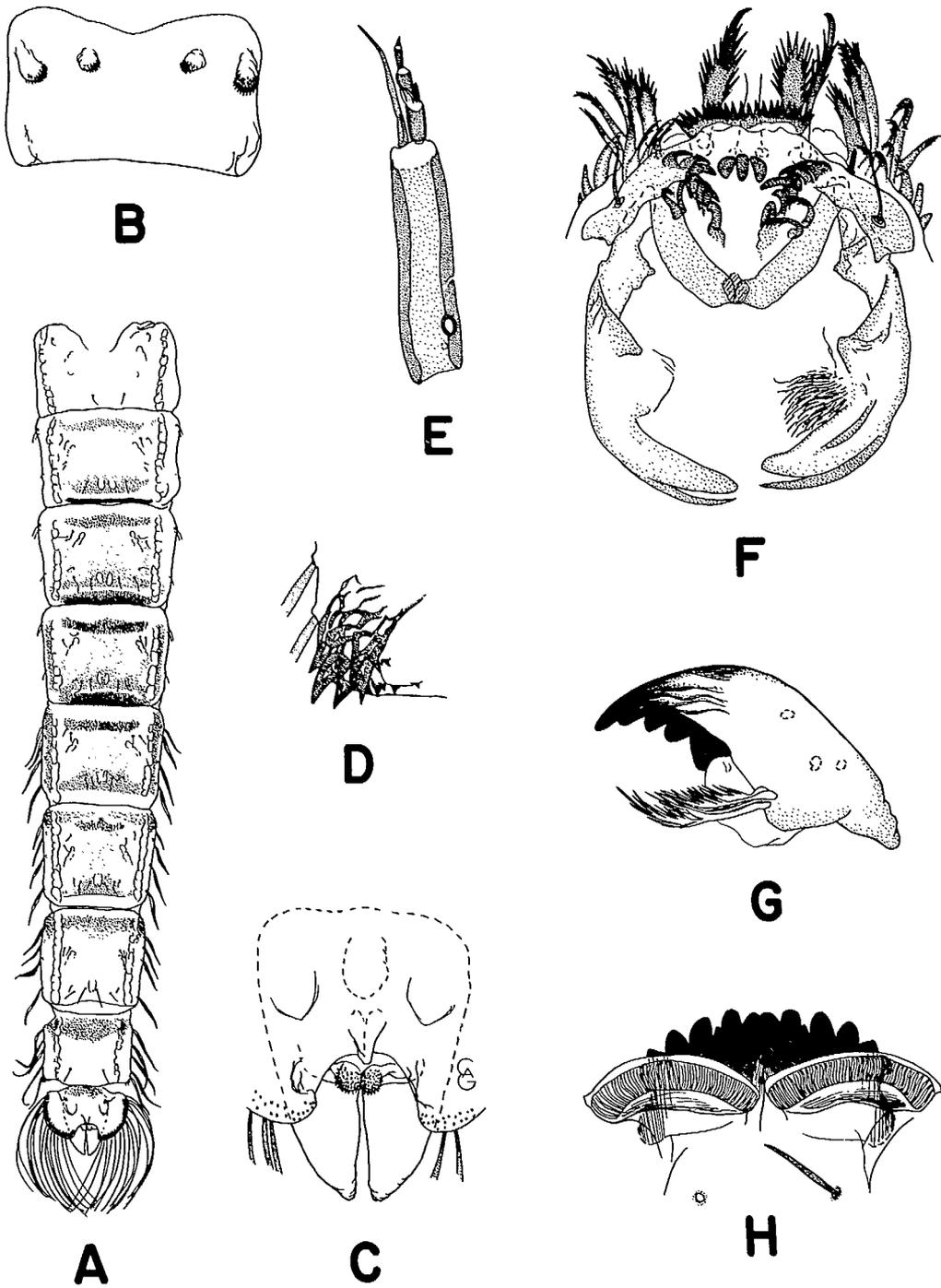


FIG. 29. *Pseudochironomus fulviventris* (Joh.), immatures. A-D, pupa: A) tergites I-IX, B) sternite I, C) detail of anal lobe, D) caudolateral corner of sternite VIII. E-H, larva: E) antenna, F) labrum, palatum, and premandible, G) mandible, H) mentum.

ECOLOGY AND DISTRIBUTION

The species is common in sand or gravel in the littoral zone of lakes (Muttkowski 1918 p. 410, 475, 478, 481). Adults are common throughout the summer. The species is known from Manitoba and South Dakota to Quebec and New York, south to Kansas and Florida (Sublette and Sublette 1965 p. 176; Hudson 1970: 169).

Pseudochironomus pseudoviridis (Mall.)

(Fig. 24C, 30A-E)

Chironomus pseudoviridis Malloch, 1915: 450

Pseudochironomus pseudoviridis (Mall.), Johannsen 1934: 352; Townes 1938: 170, 1945: 16;

Thienemann 1954: 429; Sublette and Sublette 1965: 169; Hudson 1970: 169

nec *Pseudochironomus* ? *pseudoviridis* (Mall.), Sublette 1957: 386 (at least not pupa)

The male imago is characterized by having about 16 ($n = 1$) dorsocentrals in a single row; thorax with orange-brown to brown vittae; AR of 2.2–2.9; LR₁ of 0.90–0.95; R, R₁, and R₄₊₅ with numerous setae; BR₁ about 4.0–5.6; total length/wing length only about 1.5; HR about 1.5; about 8 sensilla chaetica on each ta₁ of p₂ and p₃; pars ventralis wide and partially divided.

The pupa has about 84 filamentous setae in a double row in fringe of anal lobe; apical clawlike spines on lobes underneath gonopodal sheaths; only 2 or 3 spines caudolaterally on sternite VIII.

MALE IMAGO ($n = 1$)

Length 4.77 mm. Wing length 3.20 mm. Total length/wing length 1.49. Wing length/length of profemur 3.95. Coloration as mentioned by Townes (1945 p. 17) or darker areas somewhat more brown.

Head — AR = 2.24. Temporals 46. Clypeus with 19 setae. Tentorium 220 μm long. Stipes 174 μm long. Palp lengths (μm): 55, 81, 104, 137, 215.

Thorax — Anteprenotum with 7 setae. Dorsocentrals 16 in mostly single row, prealars 5, parascutellars 1. Scutellum with 10 setae.

Wing — VR = 1.13. Brachiolum with 9 setae, R with 34 setae, R₁ with 28 setae, R₄₊₅ with 45 setae. Squama with 24 setae.

Legs — Spur of front tibia 55 μm long, spurs of middle tibia both 54 μm long, of hind tibia 62 μm and 60 μm long. Width at apex of front tibia 49 μm , of middle tibia 56 μm , of hind tibia 62 μm . Sensilla chaetica 8 on ta₁ both of p₂ and p₃. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
p ₁	810	969	871	405	337	245	129	0.90	2.37	2.04	5.63
p ₂	846	895	429	245	196	123	86	0.48	3.34	4.06	2.81
p ₃	908	1092	626	343	301	159	98	0.57	2.91	3.20	3.94

Hypopygium (Fig. 30A) — T IX with rounded, caudal projection and 54 setae, laterosternites IX each with 4 setae. Phallapodeme 164 μm long. Transverse sternapodeme 94 μm long. Gonocoxite 230 μm long. Pars ventralis 117 μm long, 30 μm wide at base, maximum width 53 μm , divided at 100 μm from base. Intermedian volsella 105 μm long, lateral volsella 90 μm long, median volsella 18 μm long. Gonostylus 149 μm long. HR = 1.54, HV = 3.25.

PUPA ($n = 1$)

Total length 6.11 mm. Exuvium pale brownish yellow.

Cephalothorax — Thoracic horn (Fig. 30C) with longer branch about 440 μm long, maximum width about 160 μm , shorter branch about 280 μm long. PcS₁₋₂ about 180 μm long, PcS₃ about 70 μm long. Frontal plate (Fig. 30D) rugulose, without cephalic tubercle and apparently without

frontal setae. MA 180–200 μm long. Thorax rugulose. Dc_{1-4} 30–50 μm long, anterior two about 10 μm apart, Dc_3 240 μm posterior of Dc_2 , Dc_3 and Dc_4 about 15 μm apart.

Abdomen (Fig. 24C) — T I with weak posterior shagreenation; T II with weak spinules over nearly whole tergite, spinules slightly stronger anteriorly; T III and IV with strong anterior spinules, weaker posterior and very weak median spinules; T V with strong anterior and weak median spinules; T VI as T V but also with anteriolateral spinules; T VII and VIII with anterior and anteriolateral spinules; T IX with anterior spinules. T II with about 110 posterior hooklets, integuments III/IV and IV/V with spinules. Sternite VIII with 3 caudolateral spines, 5–45 μm long. Sternite I (Fig. 30B) with 2 pairs of spinule-covered tubercles, sternite II bare, sternite III with spinules anteriomedially and mesially and along anterior margin, sternite IV with spinules along margin grading over into PSA, sternite V with weak PSA, sternite VI with anteriomedian spinules and weak PSA, sternite VII with very weak PSA, sternites VIII and IX bare. Segments V–VIII with broad filamentous L-setae as: 3, 4, 4, 5. Anal lobe with 85 filamentous setae in double row in fringe, a dorsal pair of setae, and small claws on lobes ventrad of gonopodal sheaths (Fig. 30E).

REMARKS

The wings of the examined specimen are much larger in comparison with the legs and the body than in the other examined species. They also show a greater number of setae along the radial veins. In the examined specimen the wings are mounted under a separate coverslip and it is possible that they belong to a different species or to a female.

MATERIAL EXAMINED

Male reared from pupa, mouth of Platte Creek, Lake Francis, S.Dak., 2/4/68, P. L. Hudson.

ECOLOGY AND DISTRIBUTION

Townes (1938 p. 170) found the species infrequently at depths of 0.2–2.3 m in the sandy, muddy bottom with plant detritus in eutrophic Chautauqua Lake, N.Y. The species is known from Manitoba, South Dakota, Colorado, Oklahoma, Kansas, Texas, Wisconsin, Michigan, Illinois, and New York.

Pseudochironomus ? pseudoviridis (Mall.)

(Fig. 30F–I)

These two larvae (fourth and third instars) appear to be identical with those described by Sublette (1957 p. 386) except that the antennal blade is longer.

FOURTH INSTAR LARVA ($n = 1$)

Head capsule 0.54 mm long.

Head — Antenna as in Fig. 30F. Length of antennal segments (μm): 59, 18, 16, 10, 4. AR = 1.28. Basal antennal segment 24 μm wide, distance from base to ringorgan 10 μm , to basal mark of seta 14 μm , to distal mark 29 μm ; blade at apex 54 μm long, longer than segments 2–5 combined. Labrum and palatum as in Fig. 30G. Labral lamella with 20 apical teeth. Premandible 118 μm long. Mandible (Fig. 30H) 196 μm long. Mentum as in Fig. 30I. Postmentum 240 μm long.

Abdomen — Lost.

THIRD INSTAR LARVA ($n = 1$)

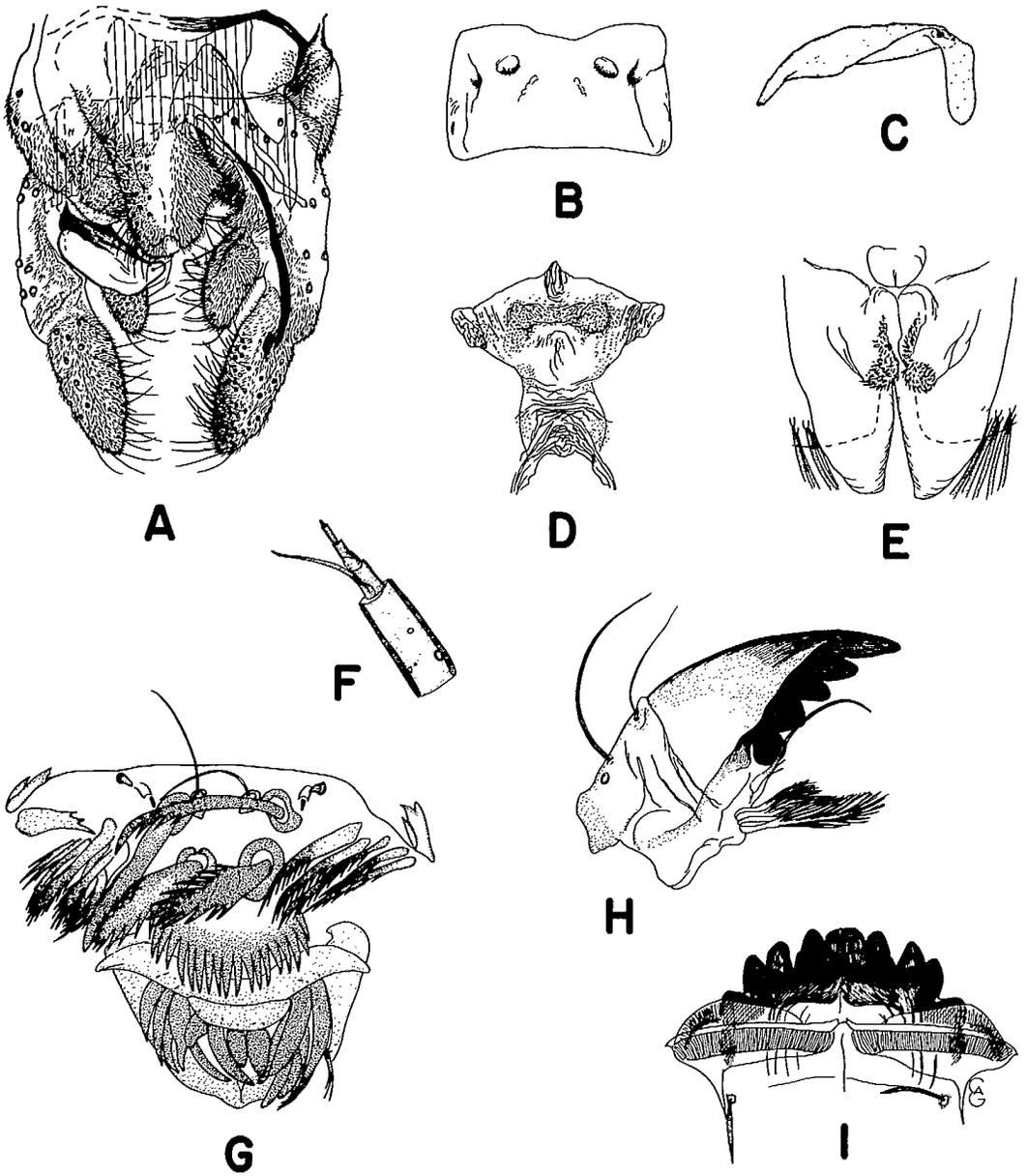


FIG. 30. *Pseudochironomus pseudoviridis* (Mall.) and *P. ? pseudoviridis* (larva). A, male hypopygium. B-E, pupa: B) sternite I, C) thoracic horn, D) frontal plate, E) detail of anal lobe. F-I, larva: F) antenna, G) labrum and palatum, H) mandible, I) mentum.

Head capsule 0.31 mm long.

Head — Length of antennal segments (μm): 34, 16, 12, 9, 4. AR = 0.83. Basal antennal segment 16 μm wide, ringorgan 8 μm from base, basal mark of seta 14 μm from base, distal mark 18 μm from base. Labral lamella with 15 apical teeth. Premandible 56 μm long. Mandible 120 μm long. Postmentum 150 μm long.

Abdomen — Lost.

MATERIAL EXAMINED

Two larvae, Lake Tahoe, Calif., 28/4/65, W. M. Mason.

Pseudochironomus articaudus n.sp.

(Fig. 24D, 31)

The male imago is characterized by having 10–16 dorsocentrals in a single row; thorax marked with orange-yellow; AR of 1.4–1.8; LR₁ of 0.89–0.95, LR₃ of 0.56–0.65; HR of 1.46–1.73; 1–5 sensilla chaetica on ta₁ of p₂ and none on p₃; pars ventralis always undivided and 78–90 μm long; and a long, narrow caudal projection of T IX.

The pupa has about 15 filamentous setae in fringe of anal lobe and no caudolateral spines on segment VIII.

The larva has a sharply arcuate mentum with sixth lateral teeth reduced, an AR of 1.15, and labral lamella with 15 teeth.

MALE IMAGO ($n = 10$)

Length 3.66–4.75, 4.27 mm. Wing length 1.79–2.21, 2.00. Total length/wing length 2.03–2.23, 2.13. Wing length/length of profemur 2.51–2.71, 2.62. Coloration as described by Townes (1945 p. 16) for *P. fulviventris*.

Head (Fig. 31A) — AR = 1.40–1.77, 1.60. Temporals 26–37, 30. Clypeus with 9–15, 12 setae. Tentorium 155–190, 175 μm long. Stipes 128–160, 150 μm long. Palp lengths (μm): 40–53, 47; 60–66, 64; 100–117, 110; 147–171, 157; 180–224, 204.

Thorax (Fig. 31B) — Anteprepronotum with 6–11, 9 setae. Dorsocentrals 8–16, 13 in single row; prealars 4–7, 6; parascutellars 1 or 2, 1.4. Scutellum with 8–15, 12 setae.

Wing — VR = 1.07–1.14, 1.10. Brachiolum with 1 or 2, 2 setae; R with 5–12, 9 setae; R₁ without setae; R₄₊₅ with 1 or 2, 1 setae. Squama with 13–26, 19 setae.

Legs — Spur of front tibia 49–64, 57 μm long; spurs of middle tibia 46–60, 51 μm and 43–55, 50 μm long; of hind tibia 50–66, 60 μm and 44–60, 53 μm long. Width at apex of front tibia 45–56, 52 μm ; of middle tibia 43–56, 50 μm ; of hind tibia 52–62, 56 μm . Sensilla chaetica 1–5, 4 on ta₁ of p₂; none on p₃. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄
p ₁	711–846, 765	853–1043, 940	785–957, 865	362–435, 388	294–362, 317	215–251, 231
p ₂	803–945, 858	803–945, 873	417–491, 443	202–258, 228	165–209, 185	110–135, 121
p ₃	834–994, 892	920–1129, 1012	582–711, 630	313–380, 342	258–319, 286	135–173, 154
	ta ₅	LR	BV	SV	BR	
p ₁	92–117, 102	0.89–0.95, 0.92	2.43–2.53, 2.48	1.91–2.04, 1.97	2.33–3.23, 2.64	
p ₂	76–86, 78	0.48–0.52, 0.51	3.43–3.69, 3.56	3.85–4.12, 3.91	2.59–4.70, 3.09	
p ₃	86–98, 91	0.56–0.65, 0.62	2.85–2.96, 2.86	2.92–3.40, 3.03	2.67–4.29, 3.00	

Hypopygium (Fig. 31C) — T IX with long, narrow caudal projection; with 36–60, 48 setae; laterosternites IX each with 4–6, 4 setae. Phallapodeme 104–140, 124 μm long. Transverse sterna-

podeme 70–96, 86 μm long. Gonocoxite 170–225, 203 μm long. Pars ventralis 78–90, 83 μm long; 20–42, 32 μm wide, undivided. Intermedian volsella 78–96, 86 μm long; lateral volsella 70–94, 83 μm long; median volsella 18–28, 23 μm long. Gonostylus 104–150, 116 μm long. HR = 1.46–1.73, 1.60; HV = 3.14–3.53, 3.35.

PUPA ($n = 1$)

Total length about 4 mm. Exuvium with clear transparent abdomen and pale yellowish cephalothorax.

Cephalothorax — Thoracic horn not measurable. PcS₁₋₂ about 90 μm long. Frontal plate with ridges, but not rugulose, without cephalic tubercle and apparently without frontal setae. MA about 100 μm long. Thorax weakly rugulose posteriorly and dorsally. Dc₁₋₄ 22–40 μm long, anterior two 12 μm apart, Dc₃ 248 μm posterior of Dc₂, Dc₃, and Dc₄ 9 μm apart.

Abdomen — (Fig. 24D) — T I bare; T II with median and anterior shagreenation stronger anteriorly; T III–VI covered with weak shagreenation except on margins, spinules stronger anteriorly and form patch of spinules on some tergites; T VII–IX with weak anterior shagreenation. T II with about 62 posterior hooklets, integuments III/IV with 16 spinules, IV/V with 50 spinules. Sternite VIII apparently without caudolateral spines. Sternite I (Fig. 31D) with 2 pairs of tubercles, one with few weak spinules, other bare; sternites II and III with very weak anteriomedian, marginal, and posterior spinules; sternite IV with spinules along margin grading over into PSA; sternites V and VI with very weak PSA; sternites VII–IX apparently bare. Segments V–VIII with broad filamentous L-setae as: 3, 4, 4, 5. Anal lobe with 15 filamentous setae in fringe.

FOURTH INSTAR LARVA ($n = 1$)

Head capsule 0.42 mm long.

Head — Antenna as in Fig. 31E. Length of antennal segments (μm): 68, 21, 18, 12, 6. AR = 1.15. Basal antennal segment 19 μm wide, distance from base to ringorgan 14 μm , to basal mark of seta 30 μm , to distal mark 42 μm , blade at apex 53 μm long. Labrum and palatum as in Fig. 31F. Labral lamella with 15 apical teeth. Premandible (Fig. 31F) 120 μm long. Mentum as in Fig. 31G. Postmentum 200 μm long.

Abdomen — Procercus 34 μm high, 29 μm wide, with 7 anal setae about 400 μm long. Supraanal seta about 90 μm long. Each parapod with 15 dark yellowish-brown claws of varying size.

MATERIAL EXAMINED

Holotype: male, McBeth Harbour, Lake Winnipeg, Man., 82°08'N, 97°50'W, 30/7/69, S. S. Chang (CNC No. 15019). Paratypes: 2 males, as holotype; 6 males, Gull Harbour, Lake Winnipeg, 16/7/69, S. S. Chang; 2 males, Pine Dock, Lake Winnipeg, 31/7/69 & 3 males, 1.2 miles off McCreary Island, 15/7/69, S. S. Chang; male, Old Fishing Dock, Lake Winnipeg, 21/7/71, R. Andrews and J. Rambally; mature male pupa reared from larva, Heming Lake, Man., 11–24/7/67, A. P. Wiens.

DISTRIBUTION

The species is known only from the central and northern parts of Lake Winnipeg, Man., and from Heming Lake, northern Manitoba.

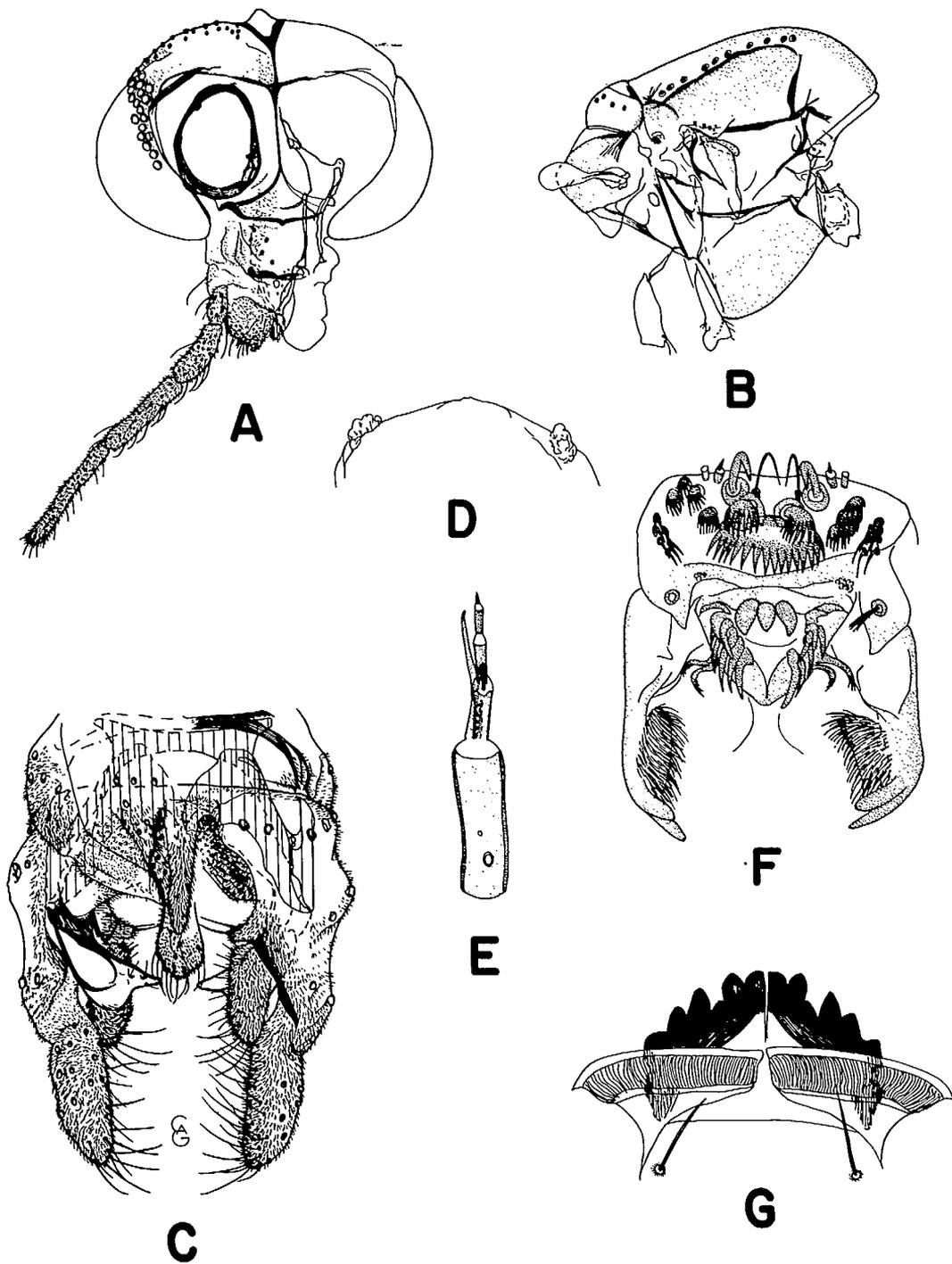


FIG. 31. *Pseudochironomus articaudus* n.sp. A-C, male: A) head, B) thorax, C) hypopygium. D, pupa, sternite I. E-G, larva: E) antenna, F) labrum, palatum, and premandible, G) mentum.

THE *HARNISCHIA* COMPLEX

A number of papers on parts of the group of genera named the *Harnischia* complex by Beck and Beck (1969) have appeared in recent years (Laville and Tourenq 1967; Reiss 1968; Beck and Beck 1969; Ringe 1970; Lehmann 1970; Kugler 1971; Sæther 1971a). (Also, a catalog of tropical African Diptera, placing species treated by Freeman (1957) in different genera to the present work, is in press (Freeman 1977); the Nearctic and Palaearctic *Paracladopelma* Harnisch, is being revised by G. A. Jackson (Department of Natural Resources, East Lansing, Mich.), and a revision of *Microchironomus* Kieffer by P. S. Cranston (British Museum) is in preparation.)

Nevertheless, a number of species could not be placed with any degree of certainty, particularly some adults placed in *Harnischia* (*Harnischia*) (sensu Townes 1945) and some larvae illustrated and placed by Chernovskii (1949) in *Cryptochironomus* Kieffer. The present paper places all these species either in new genera or in the redefined *Gillotia* Kieffer except for one larva described by Chernovskii. Some additional species are placed tentatively in different genera and adults now associated with immatures show that several species were formerly placed incorrectly. However, there remain several tentatively placed species, and problems of species separation and synonyms persist within the genus *Cryptochironomus*.

Notes on the *Harnischia* complex

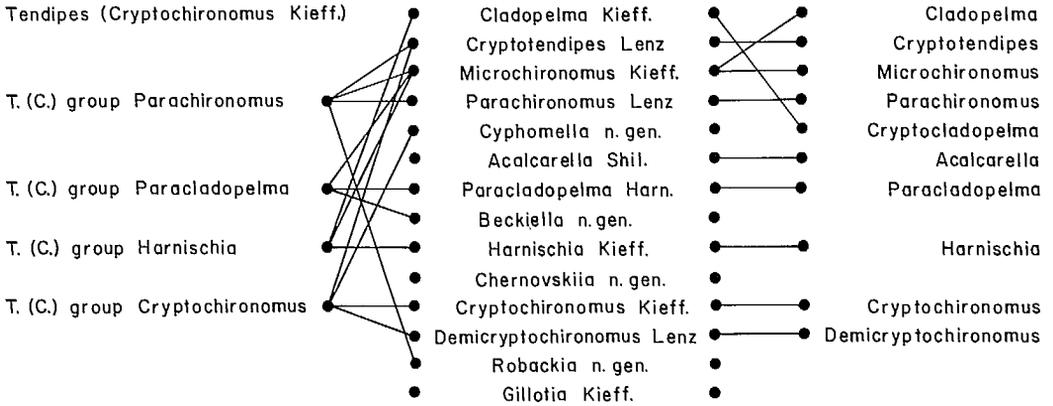
Previous Position of Genera of the *Harnischia* Complex

The systematics of the *Harnischia* complex has mainly been handled in three ways (Beck and Beck 1969 p. 278): (1) by including all species in *Chironomus* Meig. (syn. *Tendipes* Meig.) subgenus *Cryptochironomus* Kieff. and making no further breakdown except to species (i.e. as in Freeman (1957) and Sublette and Sublette (1965)); (2) by separating the species into four groups of the subgenus *Cryptochironomus* such as in Goetghebuer (1937-54) or into the genera *Cryptochironomus* and *Harnischia* (with two subgenera) such as in Townes (1945); (3) by arranging the different species into a number of genera primarily based on the immature stages (Lenz 1954-62; Beck and Beck 1969; Sæther 1971a). The last method of classification is most in accordance with modern systematics and closely resembles the present classification (Fig. 32). The only difference between the system of Lenz (1954-62) and the one used here (besides the erection of new genera and the redefinition of *Gillotia*) is that *Cladopelma* sensu Lenz nec Kieff. is shown here to be a synonym of *Microchironomus* (syn. *Leptochironomus* Pag.), while Beck and Beck's (1969) classification differs by treating *Cladopelma* Kieff. (syn. *Cryptocladopelma* Lenz) as a part of *Harnischia* Kieff.

Diagnosis of the *Harnischia* Complex

Male imagines with 9-11 flagellomeres, female imagines with 5 flagellomeres; frontal tubercles present or absent; antepre-notum (dorsal view) not interrupted medially although usually distinctly notched; squama with or without setae; apex of front tibia on inner side with a low rounded scale, not distinctly projecting; middle and hind tibia usually each with 2 spurs, occasionally one; sensilla chaetica present in apical half of ta_1 of middle leg of male, present or absent on ta_1 of hind leg; pulvilli well developed or occasionally small; volsellae small, inferior volsella often vestigial or absent; gonapophysis VIII of female divided into well-developed dorsomesal and ventrolateral

GOETGHEBUER (1937-54, 1938) PRESENT CLASSIFICATION LENZ (1954-62)



TOWNES (1945) BECK & BECK (1969)

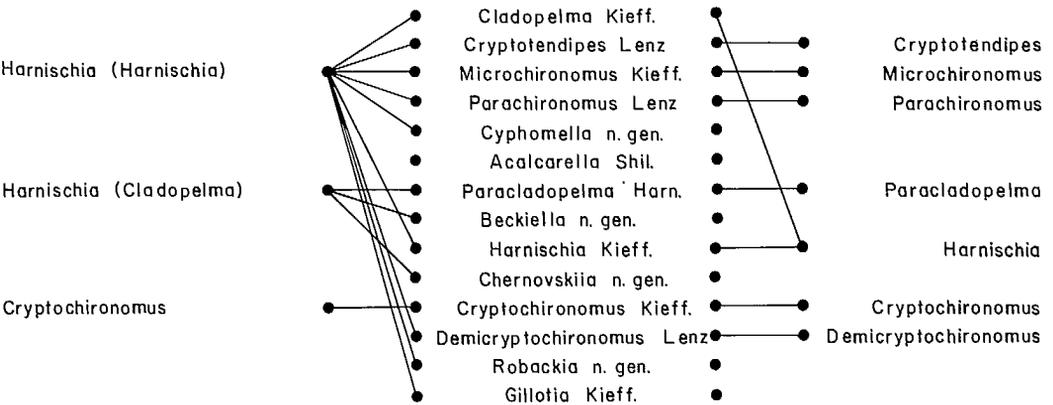


FIG. 32. Present generic position of genera and species of the *Harnischia* complex as compared with the position within the systems of four previous authorities.

lobes with apodeme lobe weak and without microtrichia, dorsomesal lobe with weakly to strongly developed oromesal group shagreenation of microtrichia; labia with microtrichia (except in *Microchironomus*).

Pupa with small to large cephalic tubercle with or without preapical seta, or occasionally without cephalic tubercle; thoracic horn divided into numerous branches; segment V with 0–4, VI with 3 or 4, VII with 3–5, and VIII with 4 or 5 filamentous L-setae; caudolateral corners of segment VIII bare or with long, slender, mostly single spur, comb of very short spines or weak compound spur; filaments of anal lobe uniserial or multiserial.

Larval antenna with 5–8 segments; antennal blade situated at apex of basal segment, or on second, third, or fourth segment; labral sensilla distinct, small and “2-segmented” or long to extremely long and “3-segmented”; pecten epipharyngis consists of one single plate or scale with 2 or 3 apical points, or, in *Parachironomus*, of a strongly convex plate with several pointed and transparent teeth; premandibles with 2–6 teeth; mandible often with lateral teeth flattened; either basal segment of maxillary palp at least twice as long as basal width and median section and occasionally entire mentum light colored, or 2–3 outside teeth of mentum distinctly enlarged, or pecten epipharyngis strongly convex with more than 7 small pointed transparent teeth.

REMARKS

The above diagnosis will separate out all adults of the *Harnischia* complex without too much difficulty. The pupal diagnosis, however, will also fit some other genera such as *Dicrotendipes* Kieff., *Nilodorum* Kieff., *Einfeldia* Kieff., and *Wirthiella* Subl. Only the pecten epipharyngis will separate all larvae of the *Harnischia* complex from other Chironominae. The larvae fall into three distinct groups, one consists of *Cryptotendipes*, *Cladopelma*, and *Microchironomus*, one of *Parachironomus*, and one of the remaining genera.

According to Lehmann (1970 p. 129) *Cryptochironomus* s.l., which equals the *Harnischia* complex, is not a monophyletic unit. A comparative morphology of chironomid female genitalia has, however, shown that the *Harnischia* complex is indeed a monophyletic unit with *Xenochironomus* Kieff. as its sister group (Sæther 1977).

Reorganization of *Demicryptochironomus* Lenz and *Gillotia* Kieffer

Although Sæther (1971a) could place most species described by Townes (1945) tentatively, five species of *Harnischia* (*Harnischia*) sensu Townes could not be placed with any degree of certainty; namely, *fastigata* Town., *cuneata* Town., *argentea* Town., *grisea* (Mall.), and *alboviridis* (Mall.). Since then Lehmann (1971 fig. 26) has given an excellent drawing of the male hypopygium of *Demicryptochironomus vulneratus* (Zett.) and Dr D. R. Oliver (Agriculture Canada, Ottawa) has reared *cuneata* from larva and pupa of typical *Demicryptochironomus* type. Thus, both *fastigata* and *cuneata* belong to *Demicryptochironomus*. The correct name for *Demicryptochironomus* Lenz 1941 with the type species *D. vulneratus* (Zett.), however, is *Schadinia* Lipina, 1939, later shown to be a synonym of *D. vulneratus*. However, *Schadinia* never has been in use following the original description but *Demicryptochironomus* has been used for 36 years, so any transference of names can only lead to confusion. It is, therefore, proposed that a case be put to the International Commission of Zoological Nomenclature to preserve the current use of *Demicryptochironomus*.

The three remaining unplaced Nearctic species, *argentea*, *grisea*, and *alboviridis*, have several common features such as the shape of the gonostylus, the small, but not vestigial, volsellae, and the presence of a central scutal tubercle. All three also appear to have setae on both pairs of volsellae, but *Parachironomus* Lenz and *Paracladopelma* Harnisch, for example, only have microtrichia on the inferior volsellae. Among the species treated by Freeman (1957) *Chironomus* (*Cryptochironomus*) *trifidus* Freem. and *Chironomus* (*Cryptochironomus*) *camelus* Kieff. (syn. *Cryptochironomus niloticus* Kieff.) have a gonostylus of the same type as in *argentea*, *grisea*, and *alboviridis* and setae on the inferior volsellae. Freeman (1977) in consultation with me decided to keep *Gillotia* Kieffer as a separate genus for *Gillotia trifida* (Freem.) (syn. *Chironomus* (*Crypto-*

chironomus) *fuscipes* (Kieff.) and *alboviridis* falls naturally in this genus. A male pupa of *Gillotia alboviridis* (Mall.) n.comb. reared from larva has been found showing that this genus is close to *Demicryptochironomus*.

Erection of New Genera

The reorganization of *Demicryptochironomus* and *Gillotia* still leaves two species placed by Townes (1945) in *Harnischia* (*Harnischia*) unplaced in genera of present usage. The two species, *argentea* and *grisea*, together with the African *camelus* have several features in common and in common with *Gillotia* Kieff. However, associations with immatures show that these species belong to a new genus close to *Paracladopelma* and *Parachironomus*, not *Demicryptochironomus*. Characteristic for the genus is the presence of a central scutal tubercle and it is accordingly named *Cyphomella* n.gen. (little hunchback).

Chernovskii (1949 fig. 11–15) illustrated five different larvae of *Cryptochironomus* s.l. which must belong to unnamed genera of the *Harnischia* complex. Although two were reared and belong to reasonably well-described species his findings up to now were overlooked.

Chernovskii (1949 p. 56, fig. 14), described *Cryptochironomus monstrosus* Chern. from a larva (also illustrated by Roback (1953 fig. 27B, C.)). Larvae in transition to pupae and mature male and female pupae have been found that show this species identical to *Harnischia* (*Cladopelma*) *orbicus* Town. (Townes 1945 p. 151, fig. 172). *Chernovskiiia* n.gen. is described below to accommodate *orbicus*.

The associated larva of *Harnischia* (*Cladopelma*) *tethys* Town. is nearly identical to that of *Cryptochironomus zabolotskyi* Goetgh. as described by Chernovskii (1949 fig. 13). A new genus for *tethys* and *zabolotskyi* named *Beckiella* in honor of Drs E. L. Beck and W. M. Beck Jr. is described below.

Cryptochironomus demeijerei Krus. (placed in *Parachironomus* by Lehmann 1970) was also reared by Chernovskii (1949 fig. 15) and apparently is present in North America. A closely related species, *Harnischia* (*Harnischia*) *claviger* (Townes), a species tentatively placed in *Parachironomus* by Sæther (1971a) has been associated with a pupa and a larva. The larva from North America was described by Johannsen (1937 p. 33) as *Chironomus* sp. *B* and more accurately by Roback (1953 fig. 28) as *Tendipedini* sp. *C*. A new genus named *Robackia* in honor of Dr S. S. Roback is described to accommodate *demeijerei*, *claviger*, and *pilicauda* n.sp.

Acalcarella Shilova from North America

Larvae and pupae of a species closely related to *Acalcarella nucus* (Pankr.) (Fig. 33F) as described by Shilova (1955 p. 319–322) have been found in Shell Lake, Mackenzie River delta, N.W.T. (Wiens et al. 1975 p. 28), thus this genus is Holarctic.

Problems of Species Separation and Synonomies within *Cryptochironomus* Kieffer

In *Cryptochironomus* some groups of imagines are not practically separable, at least not on the basis of the genitalia, although their pupae are quite distinct. Such a group can be called the *Cryptochironomus fulvus* agglomerate and consists of the Nearctic *C. fulvus* (Joh.), *C. ponderosus* Subl. (Sublette 1964 p. 129), *C. parafulvus* (Beck et Beck) (Beck and Beck 1964 p. 201), and at least five additional Nearctic species. A number of European species apparently also belong to this group (see for example Reiss 1968 fig. 13). *Cryptochironomus psittacinus* (Meig.) sensu Reiss (1968 p. 196, fig. 12) and sensu Townes (1945 p. 100, fig. 114) are not identical. Reiss' species may be *Cryptochironomus digitatus* (Mall.) (Fig. 33E; Townes 1945 p. 100, fig. 113), and Townes' species may be *Cryptochironomus redekei* (Krus.) (Ringe 1970 p. 312, fig. 1). Which interpretation of *C. psittacinus* is correct has yet to be determined. For the moment it is better to use *Cryptochironomus stylifera* (Joh.), the first available synonym, for *C. psittacinus* sensu Townes. To clear up problems concerning *Cryptochironomus* an examination of all or nearly all type material will be necessary.

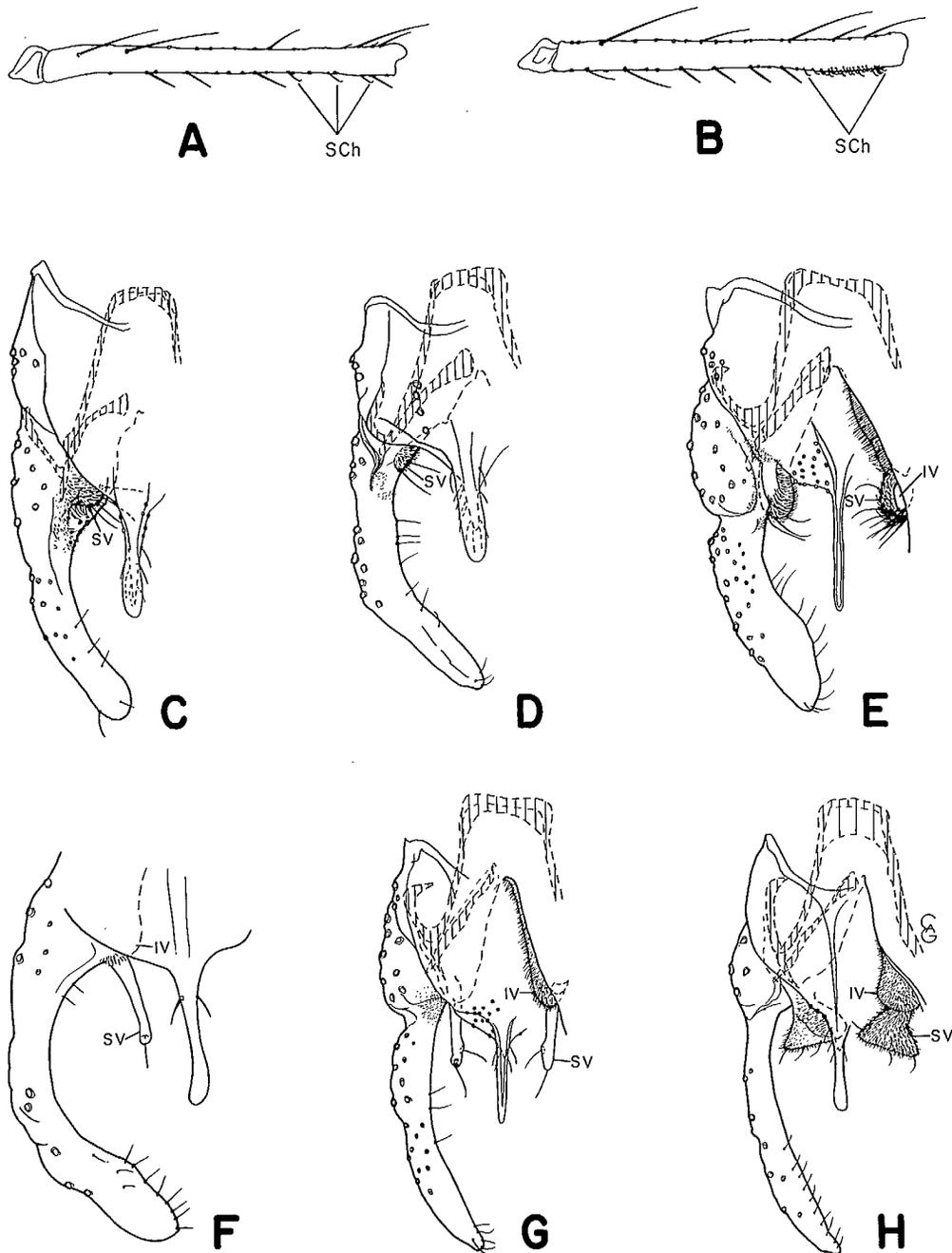


FIG. 33. Male imagines of the *Harnischia* complex. A-B, metatarsus of middle tibia: A) *Harnischia curtilamellata* (Mall.), B) *Parachironomus abortivus* (Mall.). C-H, hypopygium: C) *Harnischia curtilamellata* (Mall.), D) *Cladopelma viridula* (Fabr.), E) *Cryptochironomus digitatus* (Mall.), F) *Acalcarella nucus* Pankr., G) *Parachironomus abortivus* (Mall.), H) *Paracladopelma undine* (Town.). (F after Shilova (1955 fig. 29), the others, specimens from Lake Winnipeg, Manitoba. IV = inferior volsella, SV = superior volsella, SCh = sensilla chaetica.)

Problems of Generic Diagnoses and Placement of Species

Although the findings in this paper bring the status of the *Harnischia* complex more up to date, it is still impossible to give anything but a tentative diagnosis for most genera, because of the presence of at least one additional genus based on the larvae and the fact that several species do not exactly fit in with the more characteristic members of the different genera.

Of the larvae described by Chernovskii (1949 fig. 11–15), "*Cryptochironomus*" *rolli* Kirp. and/or very closely related larvae have been found in North America; some larvae have been found in transition to the pupal stage, indicating that "*C.*" *rolli* belongs to a new genus close to *Demicryptochironomus*.

Of the species treated by Lehmann (1970) as members of *Parachironomus*, *P. demejerei* has already been shown not to belong there, and *P. danicus* Lehm. and *P. siljanensis* Brund. are only tentatively placed. Similarly *P. hirtalatus* (Beck et Beck) and *P. alatus* (E. C. Beck) are only tentatively *Parachironomus* (see Beck and Beck 1969). Other tentative *Parachironomus* are *P. delinificus* (Skuse) n.comb. from Australia (Freeman 1961 fig. 21d) and *P. cylindricus* (Freem.) n.comb. from New Zealand (Freeman 1959 fig. 3d). Other Australian species placed in *Chironomus* (*Cryptochironomus*) by Freeman (1961) are *Cryptochironomus griseidorsum* (Kieff.), *Microchironomus forcipatus* (Freem.), *Cyphomella angusta* (Freem.) n.comb. (tentative placement), *Demicryptochironomus curtivalvus* (Kieff.) n.comb., and *Harnischia dycei* (Freem.) n.comb. (almost certainly a synonym of *Harnischia curtilamellata* (Mall.)).

The African species treated by Freeman (1957) as members of *Chironomus* (*Cryptochironomus*) are placed by Freeman (1977) in the genera defined here (however, see below under *Chernovskia*, *Beckiella*, and *Demicryptochironomus*). The generic placement of a number of species (particularly *Harnischia acuta* (Goetgh.), *Parachironomus melutensis* (Freem.), *Parachironomus reidi* (Freem.), *Parachironomus unicalcar* (Freem.), and *Cryptochironomus rhodesianus* Kieff.), can only be regarded as tentative until the immatures have been described. Many European species in Goetghebuer (1937–54) are so incompletely described that a generic placement has to be tentative. Thus, further revisions are likely, particularly for *Paracladopelma*, *Parachironomus*, *Cyphomella*, and *Cladopelma*.

Keys to genera of the *Harnischia* complex

The following keys should only be considered provisional (see above).

Key to males

- | | | |
|---|---|---|
| 1 | Both volsellae vestigial (Fig. 33C, D); small frontal tubercles or ocelli probably always present; ta_1 of middle leg with 3–7 sensilla chaetica in apical half (at least in all species examined) (Fig. 33A) | 2 |
| | Superior volsella (Fig. 33E–H) well developed, small to large; inferior volsella absent to well developed; frontal tubercles present or absent; ta_1 of middle leg with 0–25 sensilla chaetica (Fig. 33B) | 3 |
| 2 | Volsellae with 4 or more setae, inferior volsella barely indicated (Fig. 33C); gonostylus relatively short and broad, not narrowed distad to joint with gonocoxite | |
| | <i>Harnischia</i> Kieff.
(FIG. 33A, C; TOWNES 1945 fig. 194, 195; LEHMANN 1971 fig. 27, 28; SÆTHER 1971a fig. 1) | |
| | Volsellae with 1–5 setae, inferior volsella absent (Fig. 33D); gonostylus relatively long, slender, and curved, narrowed distad of completely fused joint with gonocoxite | |
| | <i>Cladopelma</i> Kieff.
(FIG. 33D; TOWNES 1945 fig. 196–201; BRUNDIN 1949 fig. 86, 88; REISS 1968 fig. 15–18) | |

- 3 Inferior volsella (Fig. 33E) mostly digitiform, small but distinct, completely covered by superior volsella, free of microtrichia, and with 2–8 setae; superior volsella with several setae and long microtrichia; frontal tubercles or ocelli usually present
..... *Cryptochironomus* Kieff.
(Fig. 33E; TOWNES 1945 fig. 109–114; SUBLETTE 1964 fig. 56, 57, 72–75;
REISS 1968 fig. 11–14; RINGE 1970 fig. 1, 2)
- Inferior volsella absent or not digitiform, when distinct not completely covered by superior volsella, usually without setae, but with short microtrichia; superior volsella (Fig. 33F–H) with or without microtrichia and setae; frontal tubercles usually absent 4
- 4 Inferior volsella absent (superior volsella may be double, giving the impression of two pairs of volsellae in some *Demicryptochironomus* Lenz); superior volsellae (Fig. 34, 35D, 36C, 48B) usually digitiform, at most 1.7 times as wide at apex as at base, with 2–4 apical setae never situated in distinct pits, never with apical or preapical tooth 5
- Inferior volsella small, but present; superior volsella digitiform (Fig. 33G), pediform (Fig. 33H), rounded or rectangular (Fig. 44B), short to long, when digitiform usually with apical tooth and 2 apical setae in distinct pits, when pediform or broadly rectangular covered with microtrichia and numerous setae 7
- 5 Gonostylus with an inner expansion in basal half, with or without an apical tooth; frontal tubercles nearly always absent 6
- Gonostylus without inner expansion, without apical tooth; frontal tubercles present *Demicryptochironomus* Lenz
(Fig. 48A, B; TOWNES 1945 fig. 187, 188; LEHMANN 1971 fig. 26)
- 6 Gonostylus with apical tooth; T IX with setigerous protrusions on each side of anal point; superior volsella without microtrichia *Microchironomus* Kieff.
(Fig. 36C–E; RINGE 1970 fig. 3, 4; KUGLER 1971 fig. 10–12)
- Gonostylus without apical tooth; T IX without distinctly setigerous protrusions; superior volsella with or without microtrichia *Cryptotendipes* Lenz
(Fig. 34, 35; TOWNES 1945 fig. 185, 186, 190; SUBLETTE 1960 fig. 2c, d)
- 7 Superior volsella (Fig. 33F, G; 46C, E) digitiform, at least 2.5 times as long as broad, with 2(–3) apical setae often placed in distinct pits, often with preapical or apical tooth; scutum never with central tubercle; T IX never with caudolateral extensions; middle and hind tibia each with 2 spurs 8
- Superior volsella pediform (Fig. 33H; 39B, D), broadly rectangular (Fig. 44B), rounded or digitiform (Fig. 37D, F); when digitiform and more than 2.5 times longer than broad, either inferior and superior volsellae combined with at least 4 setae, scutum with central tubercle or T IX with caudolateral extensions; middle and hind tibia each with 1 or 2 spurs 10
- 8 Nine flagellomeres, no whorl of long setae; pulvilli and empodium reduced; gonostylus (Fig. 33F) strongly and evenly curved, broadest point near apex *Acalcarella* Shil.
(Fig. 33F; SHILOVA 1955 fig. 29)
- Eleven flagellomeres, setal whorl well developed; pulvilli and empodium well developed; gonostylus (Fig. 33G, 46C) straight or less strongly or less evenly curved, widest point usually further from apex 9

- 9 Gonostylus (Fig. 46C) clavate with widest point in the middle; superior volsella pointed, but no distinct preapical tooth, setae not in distinct pits; 2 protuberances with weak setae ventrally on T IX (at least in *R. claviger*); 0–2 sensilla chaetica on ta_1 of middle and hind legs *Robackia* n.gen.
(FIG. 46A–E, 47; LEHMANN 1970 fig. 7)
- Gonostylus (Fig. 33G) not clavate, widest point not in the middle; superior volsella usually with distinct preapical tooth and setae in distinct pits; T IX without ventral protuberances and weak setae; 5–28 sensilla chaetica on ta_1 of middle leg, 0–15 on hind leg *Parachironomus* Lenz
(FIG. 33B, G; LEHMANN 1970 fig. 1–5, 8–14, 16–21)
- 10 T IX with caudolateral extensions *Gillotia* Kieff.
(TOWNES 1945 fig. 193; FREEMAN 1957 fig. 11g)
- T IX without caudolateral extensions 11
- 11 Scutum with central tubercle; superior volsella (Fig. 37D, F), short digitiform to rounded, without microtrichia; inferior volsella or lobe connecting inferior and superior volsellae usually with setae *Cyphomella* n.gen.
(FIG. 37C–F; TOWNES 1945 fig. 191, 192; FREEMAN 1957 fig. 11i)
- Scutum without tubercle; superior volsella pediform or broadly rectangular, covered with microtrichia; inferior volsella without setae 12
- 12 Mesal margin of gonocoxite with 6–8 setae; inferior volsella not set off as a distinct lobe *Chernovskiiia* n.gen.
(FIG. 39; TOWNES 1945 fig. 172, 173)
- Mesal margin of gonocoxite with 2–5 setae; inferior volsella set off as a distinct lobe 13
- 13 Superior volsella mostly pediform (Fig. 33H), when not pediform either with 2 setae or partially fused with inferior volsella and with 8 setae; acrostichals well developed, but often few in number *Paracladopelma* Harn.
(FIG. 33H; TOWNES 1945 fig. 165–171, 173; LENZ 1959b fig. 1–5, 24, 25; LEHMANN 1971 fig. 30–33; RINGE 1974 fig. 2)
- Superior volsella broadly rectangular with about 16–20 setae (Fig. 44B) or racket-shaped with at least 4 setae; never fused with inferior volsella; acrostichals absent
..... *Beckiella* n.gen.
(FIG. 44A, B)

(A key to females of the more common genera is included in a comparative morphology of the female genitalia in chironomids (Sæther 1977).)

Key to known pupae

- 1 Anal segment with pair of caudomesal conical projections; cephalic tubercles often conspicuous, forked or of a distinctive shape, when smaller often without apical seta; T VIII at most with indication of vestigial spur *Cryptochironomus* Kieff.
(CURRY 1958 fig. 5–8, 12, 17, 22; SUBLETTE 1964 fig. 63, 64, 69, 70)
- Anal segment without paired caudal projections; cephalic tubercles shorter, never forked; T VIII with or without spur or comb 2

- 2 Thoracic horn elongate, arising as a long pedicel branched some distance from body; several tergites and sternites with caudal rows of elevated spines; T VIII with long, slender, mostly single spur *Cryptotendipes* Lenz
(LENZ 1959a fig. 6-13, 17-22, 1954-62 fig. 260-272; DARBY 1962 fig. 129-131)
- Thoracic horn not elongate; at most T VI with a spinous tubercle; T VIII with long to short spur or comb or bare 3
- 3 Segment VII and VIII with 3 and 4 filamentous L-setae respectively; T VIII with a comb of 4 or 5 weak spines *Acalcarella* Shil.
(SHILOVA 1955 fig. 28, 30, 31)
- Segment VII and VIII each with 4 or 5 filamentous L-setae; T VIII with or without comb or spur 4
- 4 Row of hooklets on T II distinctly interrupted 5
- Row of hooklets on T II complete or very narrowly interrupted 10
- 5 T VIII without comb or spur 6
- T VIII with long, slender mostly single spur 9
- 6 T II-VI with caudal rows of very long (about 55 μm) spines "*Cryptochironomus*" sp. Pagast
(PAGAST 1936 p. 274)
- T II-VI at most with short spines 7
- 7 Segment VIII with 4 filamentous L-setae; pedes spurii B with spinules; shagreenation of T III-VI consists of very heavy spinules *Beckiella* n.gen.
(FIG. 44C)
- Segment VIII with 5 filamentous L-setae; pedes spurii B without spinules; shagreenation of T III-VI consists of finer spinules 8
- 8 Segment V with 3 or 4 nonfilamentous or narrowly filamentous L-setae; shagreenation on T II-VII or VIII consisting of relatively strong spinules without a caudal row of distinctly stronger spinules; cephalic tubercle apparently absent *Chernovskiiia* n.gen.
(FIG. 40G, 41C-G)
- Segment V with 4 broadly filamentous L-setae; shagreenation on T II-VI consisting of fine spinules with a caudal row of distinctly stronger spinules on T III-VIII; cephalic tubercle well developed *Harnischia* Kieff.
(SÆTHER 1971a fig. 2)
- 9 T VI without macelike patch of spinules; cephalic tubercle smooth, with distinct apical seta *Microchironomus* Kieff.
(LENZ 1954-62 fig. 252; KUGLER 1971 fig. 9)
- T VI with macelike patch of spinules; cephalic tubercle with spinules, without setae *Cladopelma* Kieff.
(LENZ 1960b fig. 10-17)
- 10 Row of hooklets on T II more than $\frac{1}{2}$ as wide as segment; either cephalic tubercle absent and T VIII bare, or cephalic tubercle short and T VIII with short compound spur of 1-20 small spines 11
- Row of hooklets on T II nearly always less than $\frac{1}{2}$ as wide as segment; cephalic tubercle present, with apical seta; caudolateral corners of T VIII bare, with comb of separate spines, or with a long single or compound spur of about 1-6 spines 14

- 11 Caudolateral corners of T VIII bare; exuvium dark with heavy spinules and reticulations *Robackia* n.gen. (FIG. 45C, 46F-H)
- Caudolateral corner of T VIII with short compound spur; exuvium lighter, with finer spinules in a median or in a posterior band 12
- 12 Segment VIII with 5 filamentous L-setae 13
- Segment VIII with 4 filamentous L-setae "*Cryptochironomus*" near *rolli* Kirp. (FIG. 43F)
- 13 Genital sheath with several strong spines, shagreenation on T II-V strong and relatively extensive *Gillotia* Kieff. (FIG. 49A, B)
- Genital sheath without spines, shagreenation on T II-V less strong and extensive *Demicryptochironomus* Lenz (FIG. 48C, D; LENZ 1960a fig. 21, 1954-62 fig. 311-314)
- 14 T VIII with comb of 5-11 minute spines and segment VIII with 4 filamentous L-setae *Cyphomella* n.gen. (FIG. 37A, B, 38A, B)
- T VIII with or without comb or spur, when comb of minute spines present segment VIII with 5 filamentous L-setae 15
- 15 Seta of cephalic tubercle more than $\frac{1}{3}$ as long as tubercle; T VIII with comb of 3-8 small, separate spines or bare *Parachironomus* Lenz (LENZ 1938 fig. 8-12, 17, 18; 1954-62 fig. 226-228, 233, 239-245)
- Seta of cephalic tubercle less than $\frac{1}{3}$ as long as tubercle; T VIII with a single or compound spur, or bare *Paracladopelma* Harn. (LENZ 1959b fig. 17-23, 1954-62 fig. 296-301)

Key to known larvae

- 1 Body apparently consisting of 20 segments as 7 anterior abdominal segments subdivided;⁶ labral sensilla very long, 3-segmented 2
- Body consists of 13 segments, labral sensilla 2 or 3-segmented 4
- 2 Anterior margin of mentum convex with pointed teeth; labral sensilla more than half as long as antenna "*Cryptochironomus*" *macropodus* Ljachov (CHERNOVSKII 1949 fig. 11)
- Anterior margin of mentum concave without or with indistinct teeth; labral sensilla shorter than half the length of antenna 3
- 3 Antennal blade placed medially on second segment; antenna 6-segmented, slightly more than $\frac{1}{2}$ as long as head "*Cryptochironomus*" sp. Pagast (PAGAST 1936 fig. 5-7)
- Antennal blade placed medially on third or fourth segment; antenna 8-segmented, almost as long as head *Chernovskiiia* n.gen. (FIG. 40A-F; CHERNOVSKII 1949 fig. 14)

⁶ According to Chernovskii (1949 p. 56) *Cryptochironomus monstrosus* Chern. (= *Chernovskiiia* n.gen.) has only 13 segments. However, all the examined specimens show 20 more or less distinct apparent segments.

4	Antenna 7- or 8-segmented	5
	Antenna 5- or 6-segmented	7
5	Antennal blade placed preapically on second segment; mentum with 12 subequal teeth; 4 subequal anal tubules <i>Robackia</i> n.gen. (FIG. 45A, B, D-L; CHERNOVSKII 1949 fig. 15; ROBACK 1953 fig. 28)	
	Antennal blade placed proximally on third segment; mentum either broad with often trifold median tooth and 4 pairs of lateral teeth, or with pale median area and oblique darker lateral teeth making mentum concave; all anal tubules normal or ventral pair reduced	6
6	Mentum with pale median area and about 7 pairs of oblique darker lateral teeth making mentum concave; anal tubules normal <i>Demicryptochironomus</i> Lenz (FIG. 48E-I; PAGAST 1933 fig. 1-3; LENZ 1960a fig. 5-9, 1954-62, fig. 306-310)	
	Mentum with broad, often trifold, dark median tooth and 4 pairs of lateral teeth; dorsal pair of anal tubules well developed, ventral pair reduced <i>Beckiella</i> n.gen. (FIG. 44D-I; CHERNOVSKII 1949 fig. 13)	
7	Antenna more than $\frac{1}{3}$ as long as head	8
	Antenna not more than $\frac{1}{3}$ as long as head	9
8	Mentum concave; head capsule 0.38-0.42 mm long; total length of fourth instar 6.5-7.7 mm " <i>Cryptochironomus</i> " cf. <i>rolli</i> Kirp. (FIG. 42; CHERNOVSKII 1949 fig. 12)	
	Mentum convex; head capsule 0.16-0.19 mm long; total length of fourth instar 2.2-2.8 mm " <i>Cryptochironomus</i> " near <i>rolli</i> Kirp. (FIG. 43A-E)	
9	Mentum with pale median area and oblique darker lateral teeth making mentum concave; antennal blade situated distally on second segment	10
	Mentum straight or convex, with or without pale median area; antennal blade situated at apex of basal segment or proximally on second segment	11
10	Mentum with 7 sharp and free lateral teeth; S II long and bladelike, other S-setae reduced; epipharyngeal comb consists of 3 spines fused at base <i>Gillotia</i> Kieff. (FIG. 49C-H)	
	Mentum with 5-7 lateral teeth, when 7, first lateral teeth fused with median tooth and outer lateral teeth fused with margin of ventromental plate; S II strong, but bristlelike, less than twice as long as S I; epipharyngeal comb consists of a single serrated scale <i>Cryptochironomus</i> Kieff. (LENZ 1954-62 fig. 315, 321; CURRY 1958 fig. 1-4, 8-11, 13-16, 18-21)	
11	Labral sensilla elongate, 3-"segmented"; mentum with broad median, notched or unnotched tooth, at least slightly more pale than lateral teeth; maxillary palp usually at least 2.5 times as long as wide, basal segment more than 0.5 as long as basal antennal segment	12
	Labral sensilla small, 2-"segmented"; mentum with less broad median tooth of same color as lateral teeth; maxillary palp less than 2.5 times as long as wide, basal segment less than 0.5 as long as basal antennal segment	15

- 12 Antennal blade longer than flagellum; median tooth of mentum pointed, triangular; anal tubules vestigial *Acalcarella* Shil.
(SHILOVA 1955 fig. 22-27)
- Antennal blade shorter than flagellum; median mental tooth not pointed triangular; anal tubules not vestigial 13
- 13 Second antennal segment about as long as third, antenna 5-segmented; basal segment of maxillary palp about 4 times as long as wide *Harnischia* Kieff.
(SÆTHER 1971 fig. 3)
- Second antennal segment much longer than third, or much shorter and antenna 6-segmented; basal segment of maxillary palp at most 3 times as long as wide 14
- 14 Antenna 5-segmented, second segment unsclerotized in basal $\frac{3}{4}$; antennal blade at apex of basal segment *Cyphomella* n.gen.
(FIG. 38C-H)
- Antenna 5- or 6-segmented, when 5-segmented, second segment fully sclerotized; antennal blade at apex of basal segment or more usually proximal on second segment *Paracladopelma* Harn.
(LENZ 1959b fig. 6-16, 1954-62 fig. 287-295)
- 15 Pecten epipharyngis a comb with numerous teeth; mentum with double or usually single, pointed, median tooth, 6 or 7 pairs of usually progressively smaller lateral teeth; anterior margin of ventromental plates usually crenulate *Parachironomus* Lenz
(LENZ 1938 fig. 1-7, 13-16, 1954-62 fig. 218-224, 229-235, 236-238)
- Pecten epipharyngis consists of 2 or 3 small scales fused completely or only at base, sometimes serrated; mentum with trifold, medially notched, double, or broadly rounded median tooth, 2 or 3 outer lateral teeth distinctly enlarged; anterior margin of ventromental plates not distinctly crenulate 16
- 16 Antennal blade longer than flagellum; median mental tooth trifold *Microchironomus* Pag.
(KUGLER 1971 fig. 1-7)
- Antennal blade shorter than flagellum; median mental tooth trifold, medially notched, or broadly rounded 17
- 17 Median mental tooth trifold, or single and broadly rounded *Cryptotendipes* Lenz
(LENZ 1959a fig. 1-5, 1954-62 fig. 254-258)
- Median mental tooth notched medially, or double[†] *Cladopelma* Kieff.
(LENZ 1960b fig. 4-9, 1954-62 fig. 273-278)

Cryptotendipes Lenz

Cryptotendipes Lenz 1941b: 34

Lenz (1959a) described all stages of *Cryptotendipes holsatus* Lenz and designated it as the type-species (see also Reiss 1964 p. 63). Beck and Beck (1969 p. 294) designated *Cryptotendipes usmaensis* (Pag.) (Pagast 1931 p. 219) as the type-species. As *C. holsatus* was not included in the original generic description it is, however, not eligible as type species for the genus (International

[†] P. L. Hudson, Southeast Reservoir Investigations, Clemson, S.C. (personal communication) has, however, found a new species of *Cladopelma* in which the median mental tooth is undivided and unnotched. Other separating characteristics may be found in the maxillary palp and in the size and shape of the lateral mental teeth. However, these characters also seem to overlap.

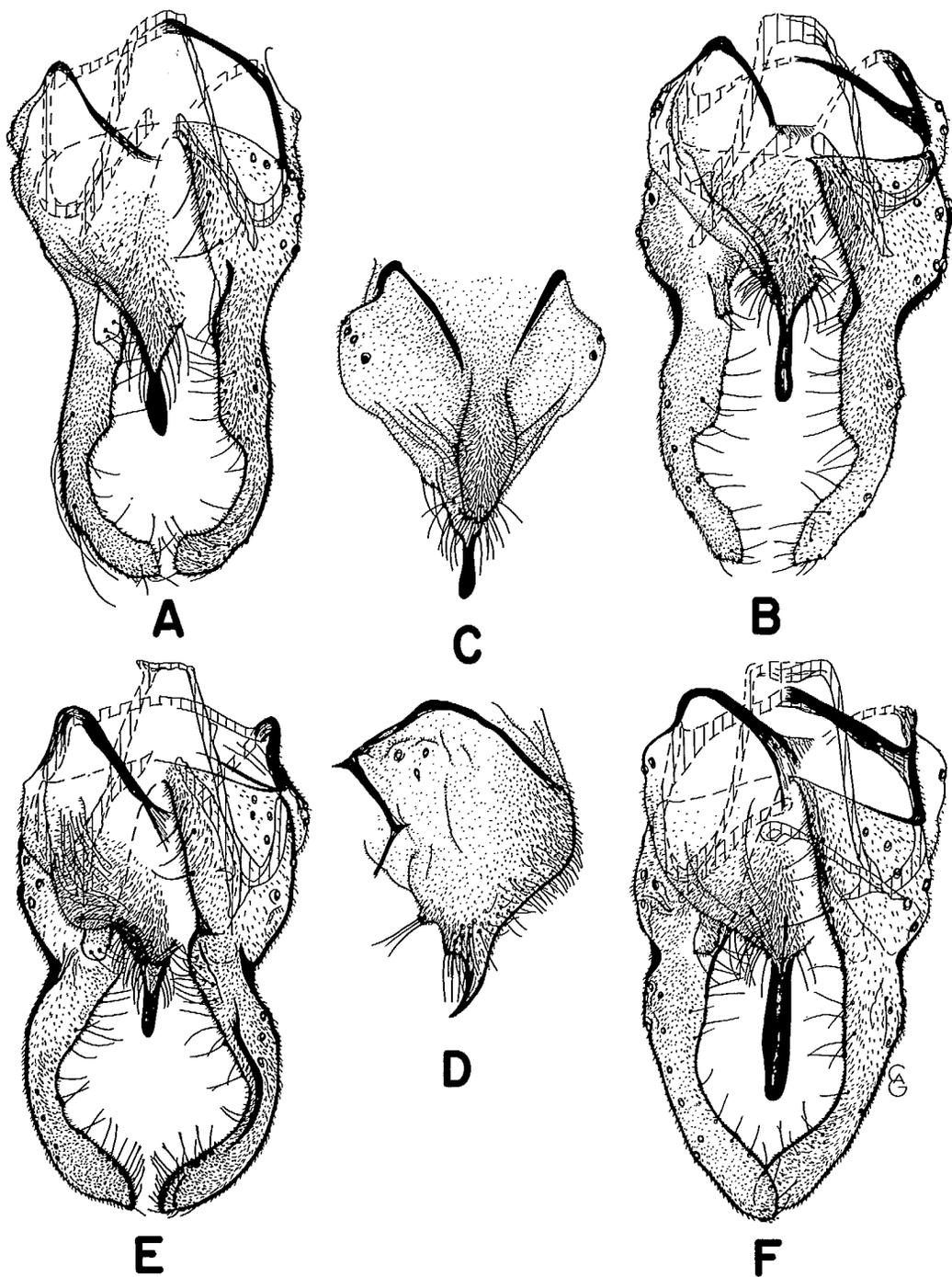


FIG. 34. *Cryptotendipes* spp., male hypopygium. A, *C. emorsus* (Town.). B–D, *C. casuarius* (Town.) (C–D anal point variation, dorsal view (C) and lateral view (D)). E, *C. darbyi* (Subl.) n.comb. F, *C. pseudotener* (Goetgh.)

Code of Zoological Nomenclature, Article 67h) and the designation by Beck and Beck must be regarded as valid. *Cryptotendipes* is, however, as pointed out by Beck and Beck (1969), formally not available as Lenz did not designate a type-species in his original description.

Despite earlier doubt about the identity of *Cryptotendipes pseudotener* (Goetgh.), some recently reared specimens show that at least *C. pseudotener* sensu Townes (1945 p. 164) is a characteristic *Cryptotendipes*. *Cryptotendipes darbyi* (Subl.) n.comb. (Sublette 1960 fig. 2c; Darby 1962 fig. 50, 129–131) described from California is also common in the American Midwest. Pupae from this area, however, do not fit well with Darby's figures. A closer examination of specimens from various localities is needed to determine if more than one species is involved.

Key to known males of *Cryptotendipes* Lenz

- 1 T IX with a high dorsal hump or ridge; inner margin of gonostylus with median projection that forms distinct concavity in apical half 2
T IX without dorsal hump or ridge, or if indicated, protuberance on inner basal margin of gonostylus 4
- 2 Anal point very short, not longer than superior volsella
..... *C. nigrinitens* (Edw.) (Palaeartic)
(EDWARDS 1929 fig. 12i)
Anal point relatively long, longer than superior volsella 3
- 3 Anal point with setae in basal half; projection of inner margin of gonostylus not sharp
..... *C. usmaensis* (Pag.) (Palaeartic)
(PAGAST 1931 fig. 6a)
Anal point proper without setae, but numerous setae at base on T IX; projection of inner margin of gonostylus sharp
..... *C. casuarius* (Townes) (Nearctic)
(FIG. 34B–D)
- 4 Inner margin of gonostylus with sharp median projection that forms distinct concavity in apical half 5
Inner margin of gonostylus either with a basal projection that forms a concavity of most of the inner margin, or without a distinct projection 7
- 5 Anal point very short, shorter than superior volsella; superior volsella without apical microtrichia
..... *C. pflugfelderi* Reiss (Palaeartic)
(REISS 1964 fig. 3)
Anal point as long as or longer than superior volsella; superior volsella with or without apical microtrichia 6
- 6 Superior volsella densely covered with microtrichia
..... *C. pillicuspis* n.sp. (Nearctic)
(FIG. 35)
Superior volsella without microtrichia
..... *C. emorsus* (Town.) (Nearctic)
(FIG. 34A)
- 7 Inner margin of gonostylus with basal projection that forms concavity for most of inner margin; T IX with or without distinct caudolateral shoulders 8
Inner margin of gonostylus without distinct projection; T IX without distinct caudolateral shoulders 9

- 8 T IX with distinct caudolateral shoulders; AR 2.6–2.8
 *C. darbyi* (Subl.) n.comb. (Nearctic)
 (FIG. 34E; SUBLETTE 1960 fig. 2C)
- T IX mostly without caudolateral shoulders, but with cuneate base for anal point;
 AR 3.1–3.5 *C. ariel* (Subl.) n.comb.⁸ (Nearctic)
 (SUBLETTE 1960 fig. 2D)
- 9 Gonostylus apically pointed *C. holsatus* Lenz (Palaeartic)
 (LENZ 1959a fig. 14)
- Gonostylus apically rounded *C. pseudotener* (Goetgh.) (Holarctic)
 (FIG. 34F)

Cryptotendipes pilicuspis n.sp.
 (Fig. 35)

The male imago is characterized by the apically widened, truncate superior volsella which is densely covered by microtrichia and has 3 apical setae, by the gonostylus with its strong apical concavity, and by the tapering and pointed anal point.

MALE ($n = 1$)

Length 4.3 mm. Wing length 2.08 mm. Total length/wing length 2.08. Wing length/length of profemur 2.73. Coloration greenish brown with darker brown vittae.

Head — AR = 2.49. Inner verticals 3, outer verticals 5, postorbitals 2. Clypeus with 21 setae. Cibarial pump, tentorium, and stipes as in Fig. 35A. Tentorium 140 μm long. Stipes 166 μm long. Two vestigial ocelli 18 μm apart, but no tubercles. Palp lengths (μm): 44, 50, 124, 168, 180.

Thorax (Fig. 35B) — Anteprenotum apparently with 1 seta. Dorsocentrals 10, acrostichals 4, prealars 4, parascutellars 1. Scutum with weak protuberance posterior to acrostichals as in all other Nearctic species. Scutellum with 10 setae.

Wing (Fig. 35C) — VR = 1.09. Brachiolum with 2 setae, R with 4 setae, R_{4+5} with 2 setae at apex. Squama with 5 setae.

Legs — All combs with spurs. Sensilla chaetica 7 in apical half of ta_1 of middle leg, absent on hind leg. Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	761	552	840	454	343	202	98	1.52	1.96	1.56	—
p_2	736	632	319	209	165	110	76	0.50	3.02	4.29	5.38
p_3	871	853	527	331	282	153	86	0.62	2.64	3.27	8.15

Hypopygium (Fig. 35D) — Ninth tergum with 26 weak setae, laterosternites IX each with 3 setae. Anal point proper 56 μm long, tapering to point, without setae. Phallapodeme 106 μm long. Transverse sternapodeme 54 μm long. Superior volsella widened and truncate apically, covered with microtrichia, with 3 apical setae. Gonocoxite 124 μm long. Gonostylus 209 μm long, with median projection on inner margin forming strong concavity in apical half. HR = 0.59; HV = 2.07.

MATERIAL EXAMINED

Holotype: male, light trap, McBeth Harbour, Lake Winnipeg, Man., 50°08'N, 97°30'W, 30/7/69, S. S. Chang (CNC No. 14021).

⁸ Hudson (1971 p. 159) referring to Sublette (personal communication), however, suggests that *C. ariel* is a mounting variation of *C. darbyi*.

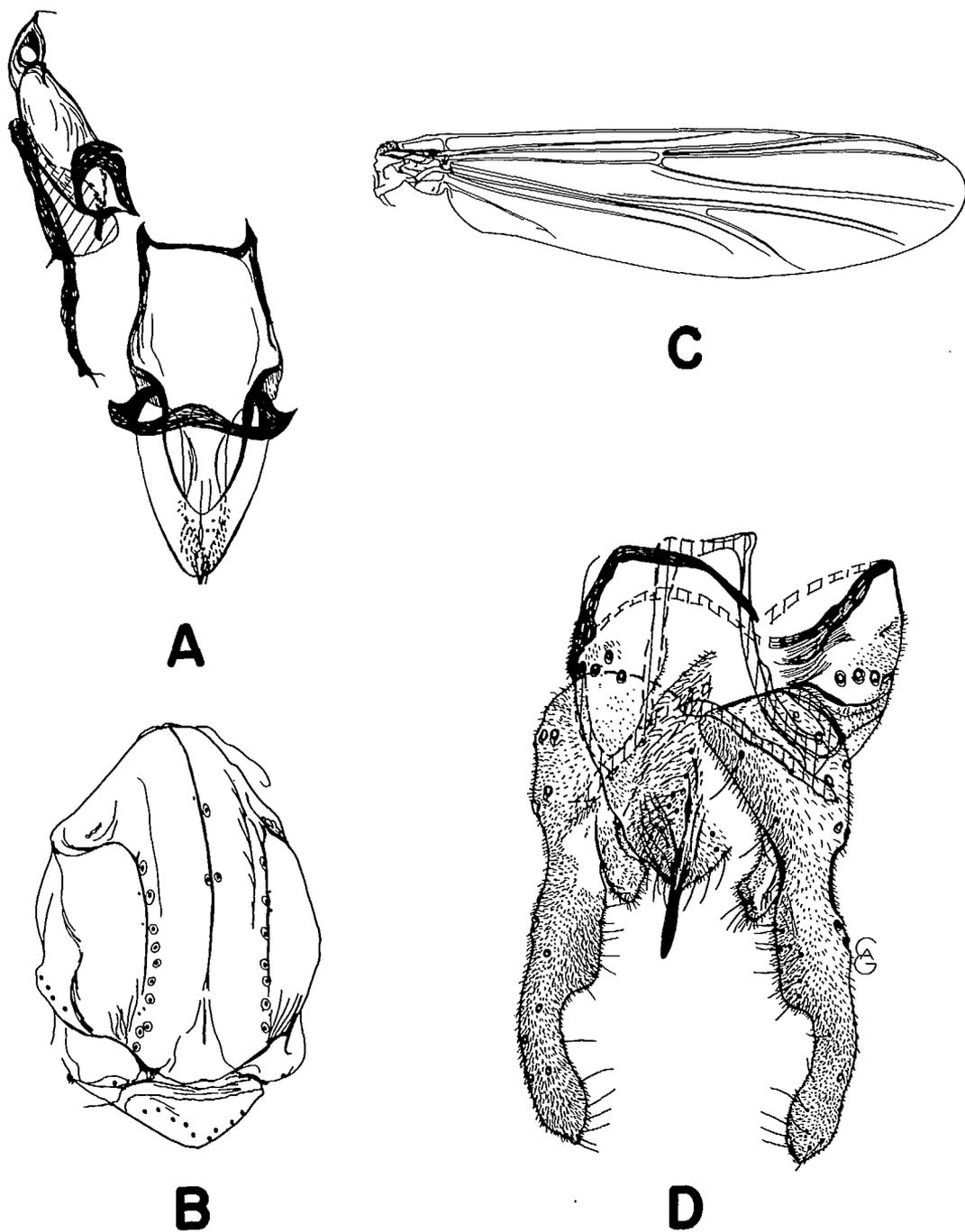


FIG. 35. *Cryptotendipes pilicuspis* n.sp., male. A, cibarial pump, tentorium, and stipes. B, thorax, dorsal view. C, wing. D, hypopygium.

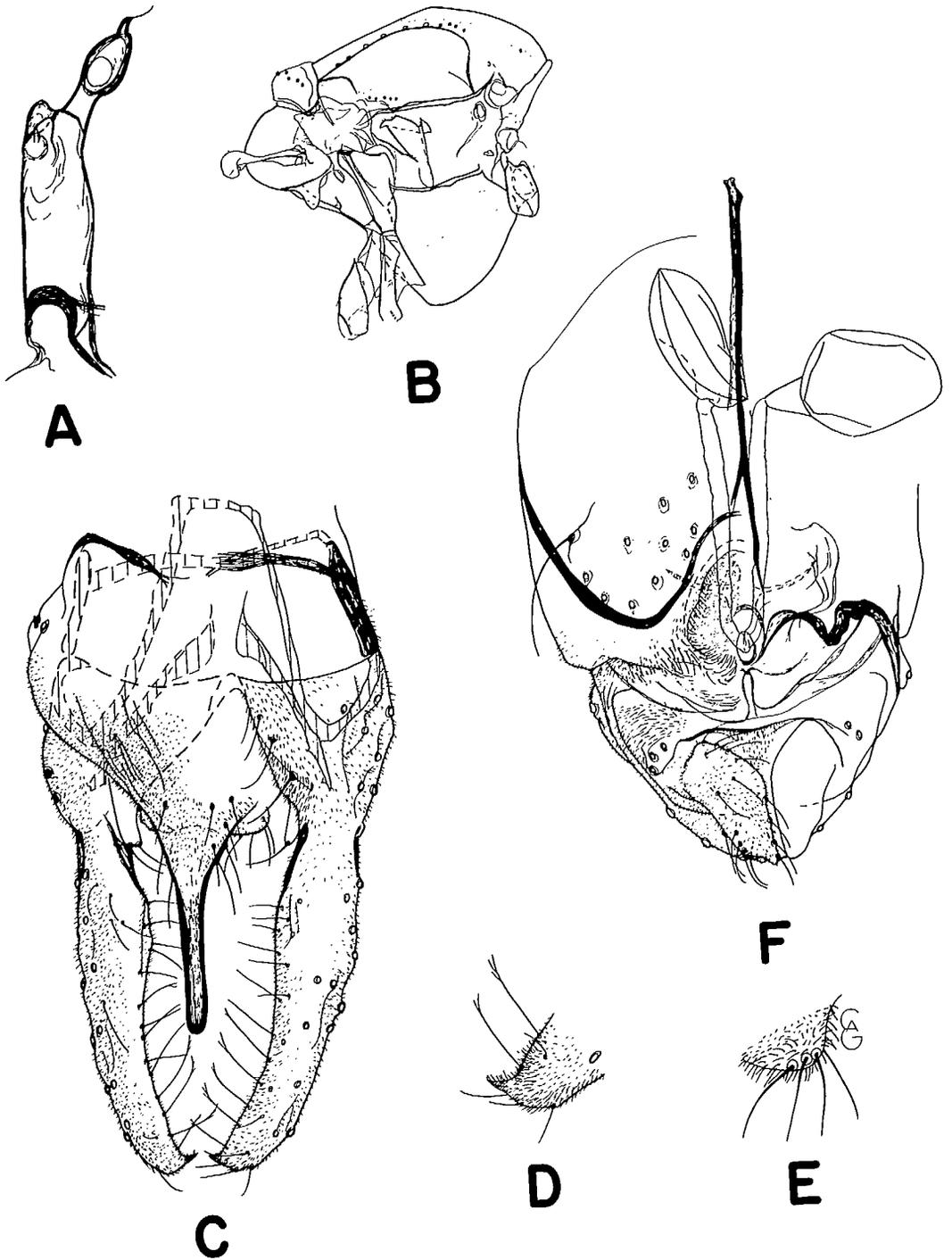


FIG. 36. *Microchironomus nigrovittatus* (Mall.). A, male tentorium. B, male thorax, lateral view. C, male hypopygium. D, apex of male gonostylus. E, apex of tubercle at base of anal point. F, female genitalia.

Microchironomus Kieffer

Microchironomus Kieffer 1918: 113 (type-species *Chironomus* (*Microchironomus*) *lendli* Kieffer 1918: 112 see Freeman (1977))

Leptochironomus Pagast 1931: 210

Cladopelma, Kieffer 1924: 393; Lenz 1954–62: 195 n.syn, nec *Cladopelma* Kieffer 1921a: 274, 1921b: 63, 1921c: 31 (as type-species designated by Harnisch (1923 p. 304) is *Cladopelma virescens* (Meigen) (as *virescens* Kieffer (lapsus)) (see Freeman 1977) although the remaining species described by Kieffer (1921b: 63–65) belong to *Paracladopelma* Harn. and those described by Kieffer (1922: 50–56) probably in *Dicrotendipes*, *Parachironomus*, *Xenochironomus* and *Cryptochironomus*)

One species redescribed and figured by Goetghebuer (1937–54 fig. 114, 146), but overlooked by Kugler (1971), clearly belongs to *Microchironomus* namely *Microchironomus sinuosus* (Kieff.) n.comb. (as *Tendipes* (*Cryptochironomus*) *sinuosus* (Kieff.) in Goetghebuer and as *Cladopelma sinuosus* (Kieff.) in Kieffer (1924 p. 393) and Lenz (1954–62 p. 195)). It appears to be a junior synonym of *Microchironomus tener* (Kieff.). *Microchironomus primitivus* (Joh.) n.comb. described from Java as *Chironomus* (*Cryptochironomus*) *primitivus* by Johannsen (1932 p. 531, fig. 20) is apparently a synonym of *M. tener*. *Microchironomus nigrovittatus* (Mall.) clearly differs from the other known species of *Microchironomus* in the male hypopygium (Fig. 36C). Most likely there are only 4 described species in the genus namely: *M. tener* (Kieff.) (= *M. balticus* Pag., *M. sinuosus* (Kieff.), *M. aegyptius* (Kieff.), *M. primitivus* (Joh.) and *M. forcipatus* (Freem.)); *M. deribae* (Freem.) (= *M. paraderibae* (Lavil. et Tour.)); *M. lendli* (Kieff.) (= *M. stilifer* (Freem.)); and *M. nigrovittatus* (Mall.).

Cyphomella n.gen.

Chironomus, Malloch 1915: 482, pro parte, nec Meigen

Cryptochironomus, Kieffer 1923: 162, 1925: 285; Freeman 1955: 18, pro parte

Tendipes (*Cryptochironomus*), Goetghebuer 1937–54: 38, pro parte, nec Meigen

Harnischia (*Harnischia*), Townes 1945: 165, pro parte, nec Kieffer

Chironomus (*Cryptochironomus*), Freeman 1957: 392, pro parte

Type species: *Cyphomella gibbera* n.sp. by original designation

MALE

Small to moderately large, light greenish to brown colored species; 11 flagellomeres; AR 1.5–4.0; frontal tubercles well developed, vestigial, or absent; acrostichals present or absent; scutum with median protuberance; dorsocentrals uniserial to quadruple; middle and hind tibia each with 1 or 2 spurs; gonostylus pointed, with slightly concave inner margin and a slightly convex outer margin without any median constrictions or curvatures; anal point always situated on a more or less strong conelike extension of T IX; superior volsella without apical microtrichia, with 0–4 setae; inferior volsella or a lobe connecting inferior and superior volsellae usually with 1–11 setae, occasionally with only an indication of a setal base; other characteristics as for the *Harnischia* complex as a whole.

PUPA

Thoracic horn with at least 50 branches; cephalic tubercles long, conical, with preapical seta shorter than $\frac{1}{3}$ total length (i.e. *Paracladopelma* type); thorax regulose; row of hooklets on T II uninterrupted; weak anteriomedian to posteriomedian spinules on T III grading over into stronger posterior spinules, only a few weak median spinules on T IV in addition to stronger posterior ones, only stronger posterior spinules on T V and VI, weak anteriomedian group shagreenation on T VII and VIII filamentous L-setae on segments V–VIII as 4, 4, 4 or 5, 4; caudolateral corners of T VIII with a comb of 5–11 straight and short separate spines.

LARVA

Antenna less than $\frac{1}{2}$ as long as head capsule, with 5 segments; antennal blade placed at apex of basal segment, swollen at base, second antennal segment unsclerotized in basal $\frac{2}{3}$; labral sensillum about 0.4 times as long as antenna, 3-segmented, basal segment apparently without blade; seta posteriores (S II) of labrum relatively long, thick and bladelike; seta anteriores (S I) shorter and thinner, but also bladelike; premandible with 2 long and 2 short teeth; basal segment of maxillary palp about 3.4 times as long as basal antennal segment, about 2.3 times as long as wide; mentum with wide, convex, median tooth with lateral notches, and 6 slightly darker pairs of lateral teeth; ventromental plates about twice as long as wide, with distinct striations; anterior parapods with long and very thin claws; rest of abdomen not known.

Key to males

- 1 Frontal tubercles present and well developed; middle and hind tibia each with 1 or 2 spurs; AR 1.5–2.0 2
 - Frontal tubercles absent or vestigial; middle and hind tibia each with 2 spurs; AR 2.5–4.0 4
- 2 Middle and hind tibia each with 2 spurs; superior volsella with 3 apical setae, inferior volsella with 1 seta; no lobe connecting volsellae, gonostylus narrow from base to apex *C. angusta* (Freem.) n.comb. (Australia) (FREEMAN 1961 fig. 21E)
 - Middle and hind tibia each with 1 spur; superior volsella without setae or with 4 or 5 apical setae, lobe connecting inferior and superior volsellae with 8–11 setae or inferior volsella with 0 or 1 seta; gonostylus distinctly wider near base than preapically 3
- 3 Lobe connecting inferior and superior volsellae with 8–11 setae; superior volsella proper short, without apical setae *C. gibbera* n.sp. (Nearctic) (FIG. 37C, D)
 - No lobe connecting inferior and superior volsellae; inferior volsella with 0 or 1 seta; superior volsella long, with 4 apical setae *C. cornea* n.sp. (Holarctic) (FIG. 37E, F)
- 4 Inferior and superior volsellae together with about 5–7 setae; AR about 2.9 *C. grisea* (Mall.) n.comb. (Nearctic) (TOWNES 1945 fig. 192)
 - Inferior and superior volsellae together with 10–13 setae; AR either about 2.5 or about 3.9 5
- 5 Superior volsella overreached by inferior volsella; AR about 2.5; central tubercle of scutum divided into 2 small tubercles, 1 on each side of the acrostichals; dorsocentrals probably uniserial to biserial *C. camelus* (Kieff.) (Ethiopian) (FREEMAN 1957 fig. 11i)
 - Superior volsella overreaching inferior volsella; AR about 3.9; central scutal tubercle probably undivided; dorsocentrals in quadruple row *C. argentea* (Town.) n.comb. (Nearctic) (TOWNES 1945 fig. 19)

Cyphomella gibbera n.sp.
(Fig. 37A-D)

The male imago is characterized by low AR (1.5-1.9); large frontal tubercles; presence of only 1 spur on middle and hind tibia; absence of setae at apex of superior volsella and presence of a lobe, carrying 8-11 setae, which connects inferior and superior volsellae.

Pupa with the characteristics of the genus.

MALE ($n = 4$, EXCEPT WHEN OTHERWISE STATED, PARTLY BASED ON MATURE MALE PUPAE)

Length 3.25-4.30, 3.65 mm. Wing length 1.87-2.24 mm. (2). Total length/wing length 1.67-1.76 (2). Wing length/length of profemur 2.76 (1). Coloration brown with blackish brown thorax, vittae only slightly darker than remaining areas of thorax.

Head — AR = 1.56-1.84, 1.70 (5). Inner verticals 4 or 5, 5; outer verticals 5-7, 6; postorbitals 2-4, 3. Clypeus with 8-10, 9 setae. Tentorium (Fig. 37C), 120-140 μm (3) long. Stipes 140-168 μm (2) long. Frontal tubercles 12-30 μm (3) long, 8-12 μm (3) wide. Palp lengths (μm): 40-44, 43; 40-62, 48; 120-140, 130; 124-160 (3); 152-200 (3).

Thorax — Anteprenotum with 2 (2) setae. Dorsocentrals 6-9, 7 (6); acrostichals apparently absent; prealars 2 or 3, 3; parascutellars absent. Scutum with central tubercle. Scutellum with 5 or 6, 5 (6) setae.

Wing — VR = 1.10 (1). Brachiolum with 2 setae, R with 6 or 7 (3) setae, R_{4+5} with 2 (3) apical setae. Squama with 6-11, 8 setae.

Legs ($n = 1$) — Middle and hind tibia each with only 1 spur on combs. Sensilla chaetica 4 in apical half of ta_1 of middle leg, absent on ta_1 of hind leg. Lengths (μm) and proportions of legs:

	fe	fi	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
p_1	810	632	908	393	362	233	117	1.44	2.13	1.59	3.50
p_2	754	754	356	209	172	123	80	0.47	3.19	4.24	3.48
p_3	932	932	607	350	343	172	92	0.65	2.58	3.07	7.09

Hypopygium (Fig. 37D) — Ninth tergum reticulated, with 12-21, 16 (6) setae; laterosternites IX each with 2-4, 3 setae. Anal point proper 60-76, 68 μm (7) long; 6-7, 6 μm (5) wide 0.5 from base; 10-14, 12 μm (5) wide at apex. Phallapodeme 90-110, 99 μm (6) long; transverse sternapodeme 42-60, 51 μm (7) long. Superior volsella short without apical microtrichia or seta. Lobe connecting inferior and superior volsellae with 8-11, 10 (7) setae. Gonocoxite 130-174, 148 μm (7) long. Gonostylus 144-188, 160 μm (7) long; widest near base, with a slight basal projection on inner margin. HR = 0.89-0.94, 0.92 (7); HV = 2.19-2.29, 2.24.

PUPA ($n = 6-7$)

Total length 3.76-4.33, 4.13 mm (6).

Cephalothorax — Thoracic horn with at least 50 branches. Cephalic tubercle (Fig. 37B) 98-128, 107 μm high; 50-90, 61 μm wide at base; 10-16, 12 μm (6) before pointed apex; with a 21-32, 26 μm long preapical seta.

Abdomen (Fig. 37A) — Shagreenation as in generic diagnosis. Row of hooklets on T II consists of 60-74, 66 hooks. Caudolateral corners of segment VIII consist of 5-9, 6 spines 18-36, 26 μm long and 0-3, 1 vestigial spine 5-17, 9 μm (4) long. Anal lobe with 46-62, 51 filamentous setae in fringe. Otherwise as in generic diagnosis.

REMARKS

The figured pupa (Fig. 37A) was the only one with 5 filamentous setae on segment VII. All other pupae had 4 setae on each segment of V-VIII.

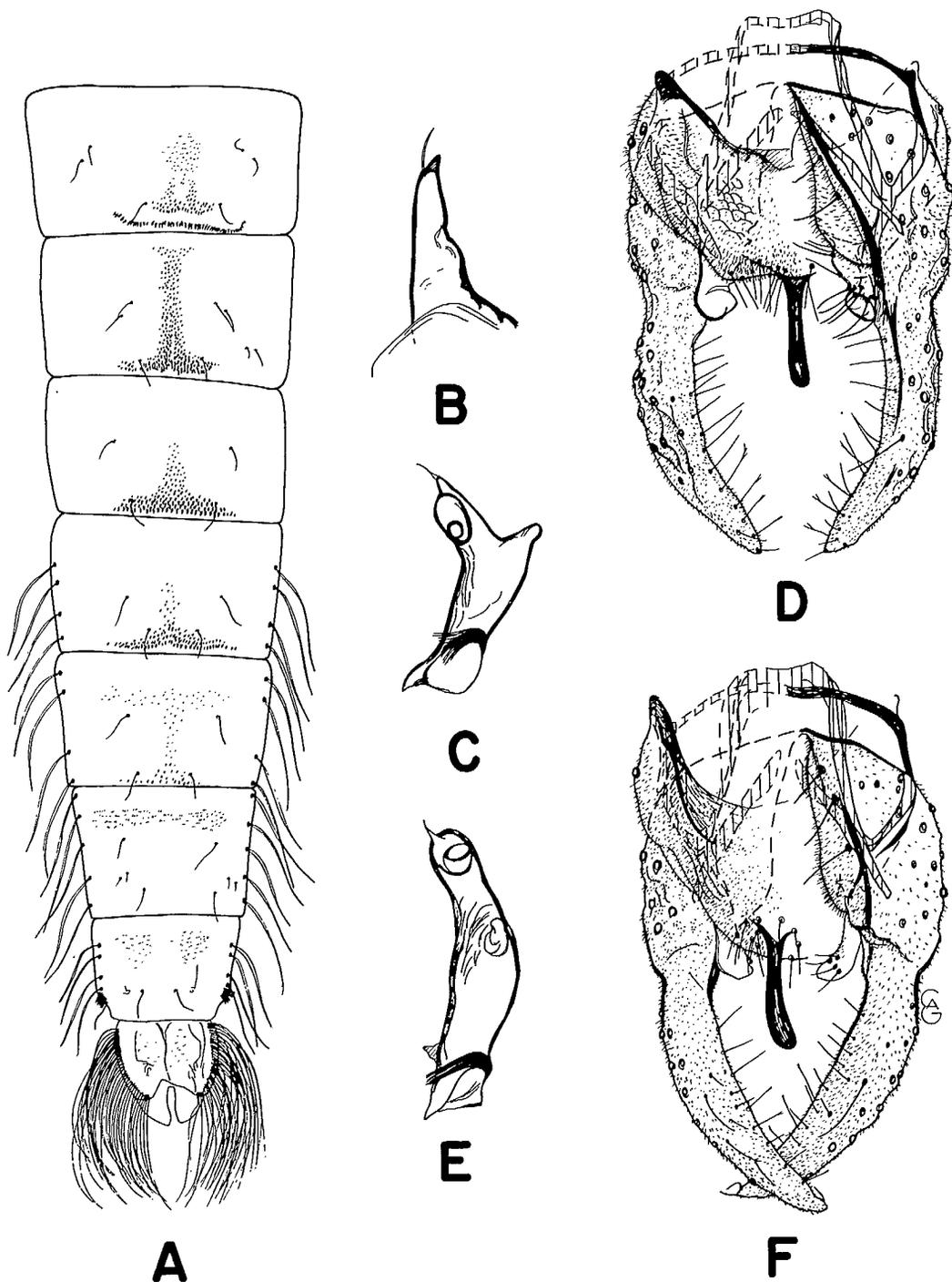


FIG. 37. *Cyphomella* spp. A–D, *Cyphomella gibbera* n.sp.: A) abdomen of male pupa, B) cephalic tubercle of pupa, C) male tentorium, D) male hypopygium. E–F, *Cyphomella cornea* n.sp.: E) male tentorium, F) male hypopygium.

MATERIAL EXAMINED

Holotype: male, Gavins Point Dam, Lewis and Clark Lake, Yankton, S.Dak., 42°51'N, 97°29'W, 6/5/69, P. L. Hudson (CNC No. 14019). Paratypes: male, as holotype; mature male pupa, Missouri River, Clay County Park, Vermillion, S.Dak., 12/6/71, P. L. Hudson; male, drift, Missouri River, S.Dak., 2/5/71, P. L. Hudson; male, deepwater area, Lewis and Clark Lake, Yankton, S.Dak., 1/6/67, P. L. Hudson; 5 pupae, Missouri River, Vermillion, S.Dak., 7/6/76, J. Novotny; 1 pupa, Missouri River, Greenwood, S.Dak., 1/6/76, J. Novotny.

Cyphomella cornea n.sp.

(Fig. 37E, F)

The male imago is characterized by the low AR (1.82–1.85), the large frontal tubercles, the presence of only one spur on middle and hind tibia, and the presence of 4 or 5 apical setae on superior volsella and 0 or 1 seta on inferior volsella.

MALE ($n = 3$, EXCEPT WHEN OTHERWISE STATED)

Length 3.67–3.86 mm. Wing length 1.91–2.13 mm. Total length/wing length 1.77–1.92. Wing length/length of profemur 2.60–2.71. Coloration greenish brown with dark orange-brown vittae and thoracic markings.

Head — AR = 1.63–1.85. Inner verticals 3, outer verticals 6 or 7, postorbitals 5 (2). Clypeus with 8–12 setae. Tentorium (Fig. 37E) 140–142 μm (2) long. Stipes 128–146 μm (2) long. Frontal tubercles 20–28 μm high, 10–12 μm wide. Palp lengths (μm): 40–44; 40–50; 138–154; 132–155; 180–231.

Thorax — Antepnotum with 3 or 4 setae. Dorsocentrals 8 or 9, acrostichals apparently absent, prealars 3, parascutellars absent. Scutum with central tubercles. Scutellum with 6–8 setae.

Wing — VR = 1.08–1.09 (2). Brachioleum with 2 or 3 (2) setae, R with 7–9 setae, R_{4+5} with 2 apical setae. Squama with 7–12 setae.

Legs — Middle and hind tibia each with only 1 spur on combs. Sensilla chaetica 4 in apical half of ta_1 of middle leg, absent on ta_1 of hind leg. Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	724–822	589–650	822–981	386–485	307–374	221–264	104–117
p_2	675–761	675–754	331–374	196–221	135–178	98–117	80–86
p_3	810–908	822–916	515–575	288–337	239–258	135–159	86–104
	LR		BV		SV		BR
p_1	1.40–1.51		1.98–2.10		1.50–1.60		2.92–3.04 (2)
p_2	0.48–0.50		3.12–3.30		4.05–4.22		3.08–4.62 (2)
p_3	0.62–0.65		2.81–2.87		3.06–3.23		5.71 (1)

Hypopygium (Fig. 37F) — Ninth tergum with 15–21 setae and 4–6 additional setae on ventral surface, laterosternites IX each with 2 setae. Anal point 70–72 μm long, 6–7 μm wide 0.3 from base, 12–15 μm wide at apex. Phallapodeme 100–115 μm long, transverse sternapodeme 54–60 μm long. Superior volsella nearly without microtrichia, broadened at apex, with 4 or 5 apical setae. Inferior volsella without setae, but on one side of one specimen an apparent setal base with seta lost. Gonocoxite 159–170 μm long. Gonostylus 178–187 μm long, widest about $\frac{1}{3}$ from base, with a slight basal projection on inner margin. HR = 0.89–0.91; HV = 2.04–2.13.

REMARKS

The volsellae of this species are not typical of *Cyphomella*. The gonostylus, T IX, scutal tubercles, etc., however, are similar to those of *C. gibbera*.

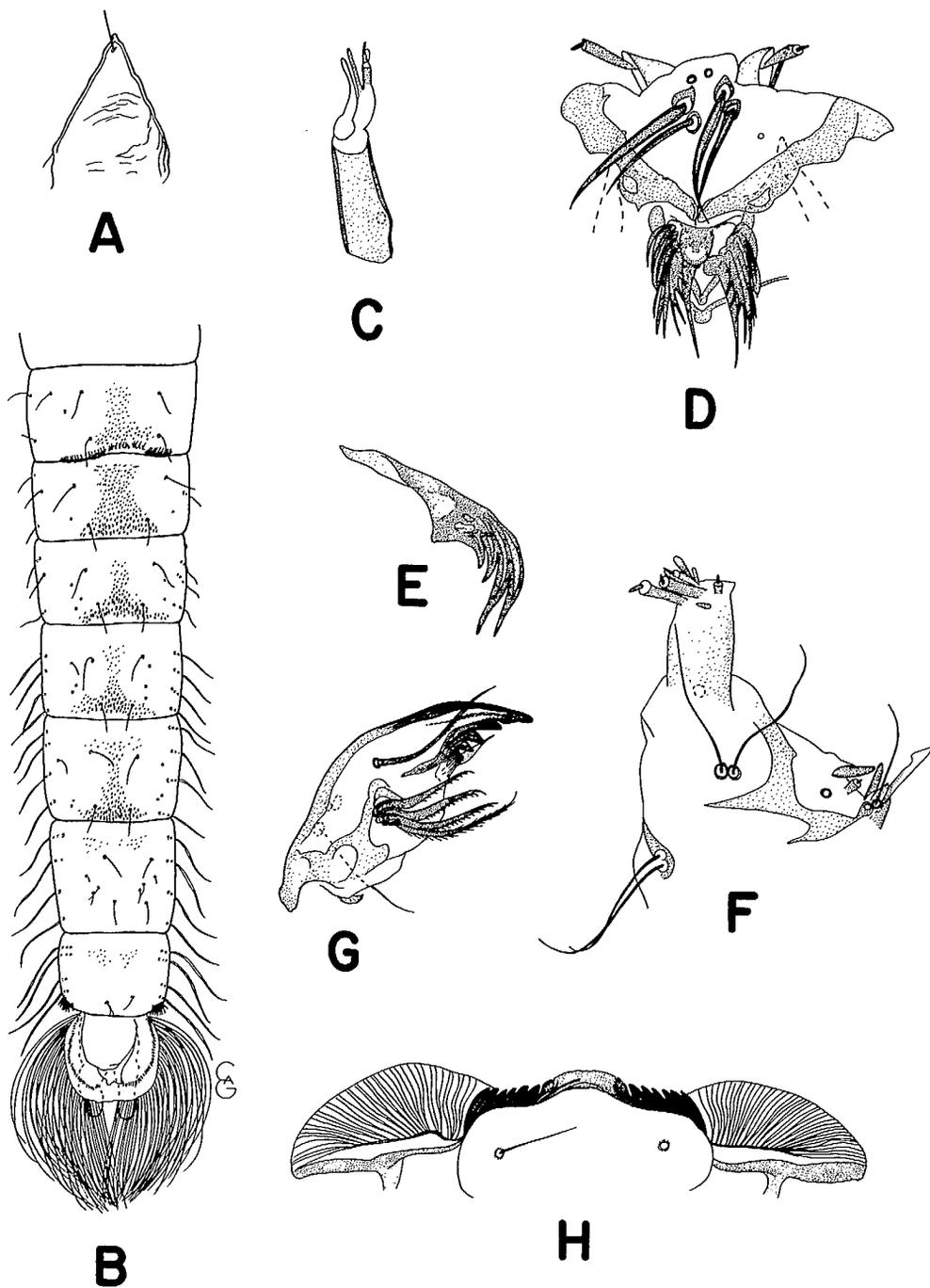


FIG. 38. *Cyphomella* sp. A-B, pupa: A) cephalic tubercle, B) T I-IX. C-H, larva: C) antenna, D) labrum and palatum, E) premandible, F) maxilla, G) mandible, H) mentum.

MATERIAL EXAMINED

Holotype: male, Gavins Point Dam, Lewis and Clark Lake, Yankton, S.Dak., 42°51'N, 97°29'W, 25/5/69, P. L. Hudson (CNC No. 14020). Paratype: male, Lake Francis Case, Platte Bay, S.Dak., 27/4/67, P. L. Hudson; male, light trap, Eggfing, lower part of River Inn, Bayern, Germany, 5/7/76, J. Reichhoff.

Cyphomella sp.

(Fig. 38)

One pupa reared from larva appears to be a *Cyphomella*. The pupa is smaller than *C. gibbera*, but otherwise identical, and the larval exuvium is almost unseparable from *Paracladopelma*.

PUPA ($n = 1$)

Total length 2.72 mm.

Cephalothorax — Thoracic horn with more than 50 branches. Cephalic tubercle (Fig. 38A) 53 μm high, 43 μm wide at base, 5 μm before pointed apex, with a 14 μm long preapical seta.

Abdomen (Fig. 38B) — Shagreenation as in generic diagnosis. Row of hooklets on T II consists of 38 hooks, hooks not dense in center. Caudolateral corner of segment VIII consists of 6 or 7 spines 12–26 μm long and 0–2 vestigial spines 5–8 μm long. Anal lobe with 38 filamentous setae in fringe. Otherwise as in generic diagnosis.

LARVA ($n = 1$)

Head capsule length 0.27 mm.

Head — Antenna as in Fig. 38C. Lengths of antennal segments (μm): 48, 22, 2, 2, 1. AR = 1.78. Basal antennal segment 17 μm wide; blade at apex 24 μm long, 6 μm wide at base, 2 μm wide at apex; second antennal segment sclerotized only in apical 9 μm . Labral sensillum as in Fig. 38D. Premandible (Fig. 38E) 68 μm long. Maxillary palp as in Fig. 38F. Mandible (Fig. 38G) 102 μm long. Labral sensilla/basal segment of maxillary palp/basal segment of antenna as 0.58/0.75/1.00. Mentum as in Fig. 38H. Postmentum 98 μm long.

Abdomen — Posterior parapods with long and very thin unserrated claws. Remaining parts of abdomen lost.

REMARKS

Although these immatures are not associated with any adults the pupa has to belong to *Cyphomella*. The larva is very hard to separate from *Paracladopelma*, but appears to differ at least in features of the antenna.

MATERIAL EXAMINED

One pupa reared from larva, drift, Sutherland Cana¹ Lincoln Co., Neb., 24/6/76, M. L. Nulty.

Chernovskiiia n.gen.

Monstrella Chernovskii, Zhadin 1940: 883, nomen nudum
Harnischia (*Cladopelma*), Townes 1945: 151, pro parte, nec Kieffer
Cryptochironomus, Chernovskii 1949: 56, pro parte, nec Kieffer
Orthoclaadiinae gen.l. *macrocera* Chernovskii 1949: 94

Type species: *Harnischia (Cladopelma) orbicus* Townes 1945: 51 (= *Chernovskii orbicus* (Town.) n.comb.)

IMAGO

Medium size, greenish to brownish colored species; female with 5 flagellomeres; acrostichals 0-6; scutum without median protuberance; middle and hind tibia each with 2 spurs; sensilla chaetica few, present in apical half of middle metatarsus; anal point of male somewhat spatulate; male gonocoxite with 6 or 7 setae along mesal margin; superior volsella clubshaped to pediform, with more than 10 apical setae, covered with microtrichia; inferior volsella not produced as a distinct lobe, sometimes very small, without setae; male gonostylus evenly curved on inner and outer margins, nearly equally wide for its full length; gonocoxapodemes VIII of female rounded caudolaterally, not clearly joined mesally; gonapophysis VIII divided into dorsomesal lobe with extensive oromesal group shagreenation, and ventrolateral lobe without caudolateral microtrichia; apodeme lobe normal; T IX normal; gonocoxite IX with 2 setae; segment X with 1-6 setae on each side; cerci medium sized; labia with distinct microtrichia; seminal capsules ovoid; spermathecal ducts straight.

PUPA

Thoracic horn with numerous branches; cephalic tubercles apparently absent; thorax nearly smooth; row of hooklets on T II very broadly interrupted medially; pedes spurii B not apparent, without spinules; pedes spurii A well developed only on sternite IV; weak patch of spinules present or absent caudomedially on T I; strong patch medially to posteriomediaally on T II-VIII of male, T II-VII or VIII of female, sternites V-VIII of male, and sternites V-VII or VI and VII of female; anteriolateral patches of spinules present on sternite I; caudolateral corners of T VIII without comb or spur; lateral setae nonfilamentous to narrowly filamentous on segment V, 3 or 4 filamentous on VI, all 4 on VII, and 5 on VIII filamentous; numerous filamentous setae in fringe of anal lobe, setae partially biserial in apical third of lobe.

LARVA

Antenna almost as long as head capsule, with 8 segments, antennal blade placed medially on third or fourth segment; labral sensillum about $\frac{1}{3}$ or $\frac{1}{2}$ as long as antenna, 3-segmented, with blade at apex of basal segment; seta posteriores (S II) of labrum moderately long, thick, and bladelike; seta anteriores (S I) short and bristlelike; premandible with 3 teeth; maxillary palp nearly as long as or larger than basal 3 segments of antenna combined; mentum with concave anterior margin and very weak indications of 4 or 5 pairs of flat lateral teeth; ventromental plates about as wide as long, with distinct striations, procerci low, with relatively short anal setae; posterior parapods very long and tapering with relatively few apical claws; anal tubules long and digitiform, all well developed.

DISTRIBUTION AND ECOLOGY

The larvae of the genus are known from sandy areas of large rivers in the USSR and from the Mississippi, Missouri, Savannah, and Sacramento rivers in the USA (Chernovskii 1949 p. 56, 94; Roback 1953 p. 120), as well as from sandy substrates of a lake in South Carolina.

Key to males

- 1 Acrostichals present; superior volsella pronouncedly pediform, inferior volsella very small *C. orbicus* (Town.) n.comb. (Holarctic)
(Fig. 39A, B, E)
- Acrostichals apparently absent; superior volsella club-shaped to pediform, inferior volsella clearly projecting *C. amphitrite* (Town.) n.comb (Nearctic)
(Fig. 39D, E)

(*Chironomus (Cryptochironomus) pullatus* Freeman (1957 p. 401) from Africa may possibly also belong in this genus)

Key to females

- 1 Acrostichals present; segment X with 5 or 6 setae on each side, ventrolateral lobe about 22–26 μm wide *C. orbicus* (Town.)
Acrostichals absent; segment X with 1–4, usually 1 or 2, setae on each side; ventrolateral lobe about 30–34 μm wide *C. amphitrite* (Town.)
(FIG. 39C, 41A, B)

Key to pupae

- 1 Shagreenation of T II–VI forms a semicircular patch with 2–4 fenestrae; T VIII of both sexes and sternite VIII of male each with 33–69 spinules; T I with weak caudolateral groups of spinules in addition to median group; sternite I with extensive median group shagreenation; T II with 19–28 hooklets on each side *C. orbicus* (Town.)
(FIG. 40G, 41E, F)
Shagreenation of T II–VI forms an inverted T; T VIII with 1–28 spinules; sternite VIII of male with 65–110 spinules; T I without caudolateral groups of spinules; sternite I with only trace of median group shagreenation; T II with 13–19 hooklets on each side *C. amphitrite* (Town.)
(FIG. 41C, D, G)

Key to larvae

- 1 Basal antennal segment about as long as second and third segments combined, antennal blade placed medially on fourth segment; labral sensillum about $\frac{1}{3}$ as long as antenna *C. orbicus* (Town.)
(FIG. 40A–F; CHERNOVSKII 1949 fig. 14 as *Cryptochironomus monstrosus*)
Basal antennal segment shorter than second segment, antennal blade placed medially on third segment; labral sensillum about $\frac{1}{2}$ as long as antenna *C. macrocera* (Chern.) n.comb.⁹
(Chernovskii 1949 fig. 71, 72 as Orthocladiinae gen. ?l. *macrocera*, possibly a junior synonym of *C. amphitrite* (Town.) n.comb.)

Chernovskiiia orbicus (Town.) n.comb.

(Fig. 39A, B, E, 40, 41E, F)

Harnischia (*Cladopelma*) *orbicus* Townes, 1945: 151, fig. 173

Monstrella Chernovskii, Zhadin 1940: 883, nomen nudum, n.syn.

Cryptochironomus monstrosus Chernovskii, 1949: 56, fig. 14, n.syn.

The male imago is characterized by the presence of a few strong acrostichals, strongly pediform superior volsella, and strongly reduced inferior volsella.

The female has a ventrolateral lobe 22–26 μm wide, and 5 or 6 setae on each side of segment X.

The pupa has a semicircular patch of spinules on T II–VI, T VIII of male with 33–67 spinules, T VIII of female with 60–69 spinules, sternite VIII of male with 35–63 spinules, T II with 19–28 hooklets on each side, T I with caudolateral groups of weak spinules, and sternite I with extensive median group shagreenation.

⁹ According to J. E. Sublette, Eastern New Mexico University, Portales, N.M. (personal communication) what appears to be the mentum of Orthocladiinae gen. ?l. *macrocera* Chern. in the description by Chernovskii in reality represents the collapsed ventromental plates.

The larva is characterized by having the basal antennal segment about as long as second and third segments combined, segments 2-4 about equally long, antennal blade placed medially on fourth segment, style of fifth segment about as long as segments 6-8 combined or shorter, labral sensillum about $\frac{1}{3}$ as long as antenna, maxillary palp about as long as 4 basal antennal segments combined, and anal setae about as long as anal tubules and more than half as long as posterior parapods.

MALE ($n = 1-2$, EXCEPT WHEN OTHERWISE STATED, PARTLY BASED ON MATURE PUPAE)

Length 4.28-4.75 mm. Wing length 2.21 mm. Total length/wing length 2.15. Wing length/length of profemur 2.21. Front tibia brown, darkest toward apex; apical $\frac{1}{4}$ of ta_1 , and ta_2 - ta_5 , brown; coloration otherwise as mentioned by Townes (1945 p. 152).

Head — AR = 2.37-2.56. Temporals 12 or 13. Clypeus with 8 or 9 setae. Tentorium (Fig. 39A) 182-184 μm long. Stipes 180-190 μm long. Frontal tubercles absent. Palp lengths (μm): 54-60, 62-69, 160, 196-220, 254-266.

Thorax — Anteprenotum apparently without setae. Dorsocentrals 9-15, 11 (5); acrostichals 5 or 6; parascutellars 1 (4); prealars 4 (5). Scutellum with 14-19, 15 (5) setae.

Wing — VR = 1.12. Brachiolum with 2 setae, R with 8, R_1 with 1, R_{4+5} with 2 apical setae. Squama with 10-22, 15 (6) setae (about 8 in Townes).

Legs — Sensilla chaetica 5-7 in apical half of ta_1 of middle leg, apparently absent on hind leg. Lengths (μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5
p_1	895-981	717-761	1129-1214	503-552	405-429	313-319	147-221
p_2	889-981	810-895	405-478	233-251	172-202	110-135	80-98
p_3	945-1067	1030-1116	736	374	343	184	123
		LR		BV		SV	
p_1		1.57-1.60		1.94-2.00		1.49	1.80
p_2		0.51-0.53		3.43-3.55		3.92-4.13	2.86
p_3		0.66		2.85		2.97	3.33

Hypopygium (Fig. 39B, E) — Ninth tergum with 18-26, 21 (8) setae, laterosternites IX with 3 or 4 setae. Anal point proper 73-90, 78 μm (8) long. Phallapodeme 140 μm long. Transverse sternapodeme 56 μm long. Superior volsella (Fig. 39E, above) with 13-16, 14 (7) setae; 73-78 μm long; width across apex perpendicular to anal point 52-60 μm , basal width 16-22 μm . Inferior volsella strongly reduced. Mesal margin of gonocoxite with 6 or 7, 6 (5) setae. Gonocoxite 160-200, 179 μm (8) long. Gonostylus 190-236, 211 μm (8) long; 44 μm wide. HR = 0.81-0.90, 0.85 (8); HV = 1.98-2.14.

FEMALE ($n = 2$, BASED ON MATURE FEMALE PUPAE)

Head — Lengths of antennal segments (μm): 70-86, 50-52, 46-53, 50-60, 140-161. AR = 0.64-0.65. Temporals 9. Clypeus with 10 setae.

Wing — Brachiolum with 2 or 3 setae. Squama with 16-21 setae.

Genitalia — Genitalia about as in *C. amphitrite* (Fig. 41A, B). T IX with 34-38 setae. Gonocoxite with 2 or 3 setae. Segment X with 5 or 6 setae on each side. Cercus 119-136 μm long. Seminal capsules 114-130 μm long, 74-78 μm wide. Notum 182-210 μm long. Ventrolateral lobe 22-26 μm wide.

PUPA

Total length 4.53-5.87, 5.13 (11).

Abdomen (Fig. 40G, 41E, F) — T I (Fig. 41E) with weak caudolateral and caudomedian spinules. Spinule patches on T II-VI (Fig. 40G) semicircular with 2-4 fenestrae. T VIII with

33-67, 45 (12) spinules in male; 60-69, 65 (3) spinules in female. T II with 19-28, 23 (15) hooklets to each side. Sternite I (Fig. 41F) with extensive median group shagreenation. Sternite VIII of male with 35-63, 45 (12) spinules. Anal lobe with 78-115, 93 (15) setae in fringe.

LARVA ($n = 11$, EXCEPT WHEN OTHERWISE STATED)

Total length 5.07-7.90, 6.98 mm. Head capsule length 0.19-0.21 0.20 mm.

Head — Antenna as in Fig. 40A. Length of antennal segments (μm) ($n = 5-6$): 55-60, 58; 22-32, 26; 28-34, 28; 30-32, 31; 10-19, 15; 2-6, 4; 3-4, 3; 3-5, 4. AR = 0.48-0.52, 0.51 (5). Basal antennal segment 17-19 μm (3) wide; blade on fourth segment 22-24 μm (3) long; style of fifth segment 11-12 μm (3) long. Labral sensillum as in Fig. 40D. Premandible 46-54 μm (3) long. Maxillary palp as in Fig. 40B, C. Mandible 56-68, 63 μm (6) long. Labral sensilla/maxillary palp/antenna about as 0.3/0.8/1.0. Mentum as in Fig. 40E. Postmentum 60-76 μm (7) long.

Abdomen (Fig. 40F) — Procercus 2-5, 3 μm (6) high, 3-6, 4 μm (6) wide, with about 9 apical setae 60-140, 94 μm (8) long. Supraanal seta 50-90, 75 μm (10) long. Supraanal seta/anal setae 0.64-1.17, 0.90 (8). Anal tubules digitiform; one pair 100-160, 128 μm (7) long; other pair 105-188, 146 μm (7) long. Posterior parapods slender: 230-290, 252 μm (8) long.

REMARKS

Some of these larvae may possibly belong to *C. amphitrite*. However, 4 of the 13 larvae examined were in transition to pupae and showed the pupal characteristics of *C. orbicus*.

MATERIAL EXAMINED

Two males, one mature male pupa, Missouri River, Clay County Park, Vermillion, S.Dak., 28/6/71 and 14/7/71, P. L. Hudson; 6 mature male pupae, 3 mature female pupae, 1 larva, Missouri River, Clay County, Vermillion, S.Dak., 7/6/76, J. Novotny; 1 larva, Missouri River, Yankton, S.Dak., 2/6/76, J. Novotny; 6 larvae, Missouri River, S.Dak., no date, P. L. Hudson; 1 male pupa, Missouri River, Salix, Iowa, 8/6/76, J. Novotny; 1 mature male pupa, Missouri River, Fort Calhoun, Neb., 11/6/75, NALCO Environmental Sciences; 3 larvae, Mississippi River, near Cordova, Ill., 11/7/72, NALCO Environmental Sciences; 2 larvae, Sacramento River, Freeport, Calif., no date, L. J. Tilley; 1 larva, sandy substrate, Lake Marion, S.C., no date, P. L. Hudson.

Chernovskiiia amphitrite (Town.) n.comb.
(Fig. 39C-E, 41A-D, G)

Harnischia (*Cladopelma*) *amphitrite* Townes, 1945: 151, fig. 172

(*Chernovskiiia macrocera* (Chern.) (Chernovskii 1949 fig. 71, 72 as Orthoclaadiinae gen.?l. *macrocera*) may possibly be a junior synonym of *C. amphitrite*)

The male imago is characterized by the absence of acrostichals, by the club-shaped superior volsella, and by the small but protruding inferior volsella.

The female has a 30-34 μm wide ventrolateral lobe and 1-4 setae on each side of segment X.

The pupa has a patch of spinules on T II-VI resembling an inverted T, T VIII with 1-28 spinules, sternite VIII of male with 65-110 spinules, T II with 13-19 hooklets to each side, T I without caudolateral groups of weak spinules and sternite I with nonextensive median group shagreenation.

(The larva of *C. macrocera*, a possible synonym, is characterized by having the basal antennal segment shorter than the second, third segment slightly shorter than second, segments 4-6 about equally long, antennal blade placed medially on third segment, style of sixth segment more than twice as long as segments 7 and 8 combined, labral sensillum about $\frac{1}{2}$ as long as antenna, maxillary palp slightly longer than 4 basal antennal segments combined, and anal setae about $\frac{1}{2}$ as long as anal tubules and less than $\frac{1}{4}$ as long as posterior parapods.)

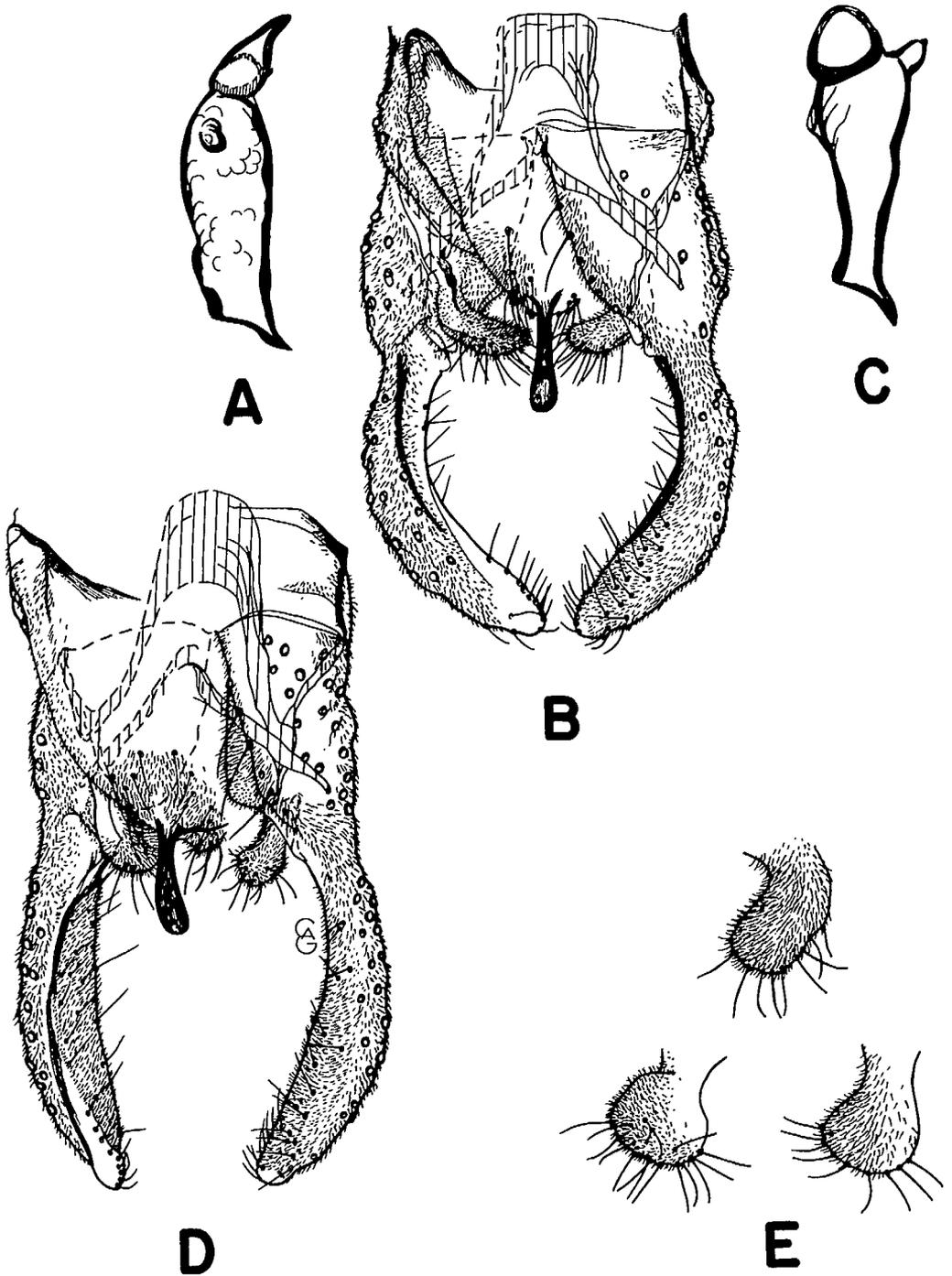


FIG. 39. *Chernovskia* n.gen. A–B, *C. orbicus* (Town.) n.comb., male: A) tentorium, B) hypopygium. C–D, *C. amphitrite* (Town.) n.comb.: C) tentorium of female, D) male hypopygium. E, variation in superior volsella of male of *C. orbicus* (above) and *C. amphitrite* (below).

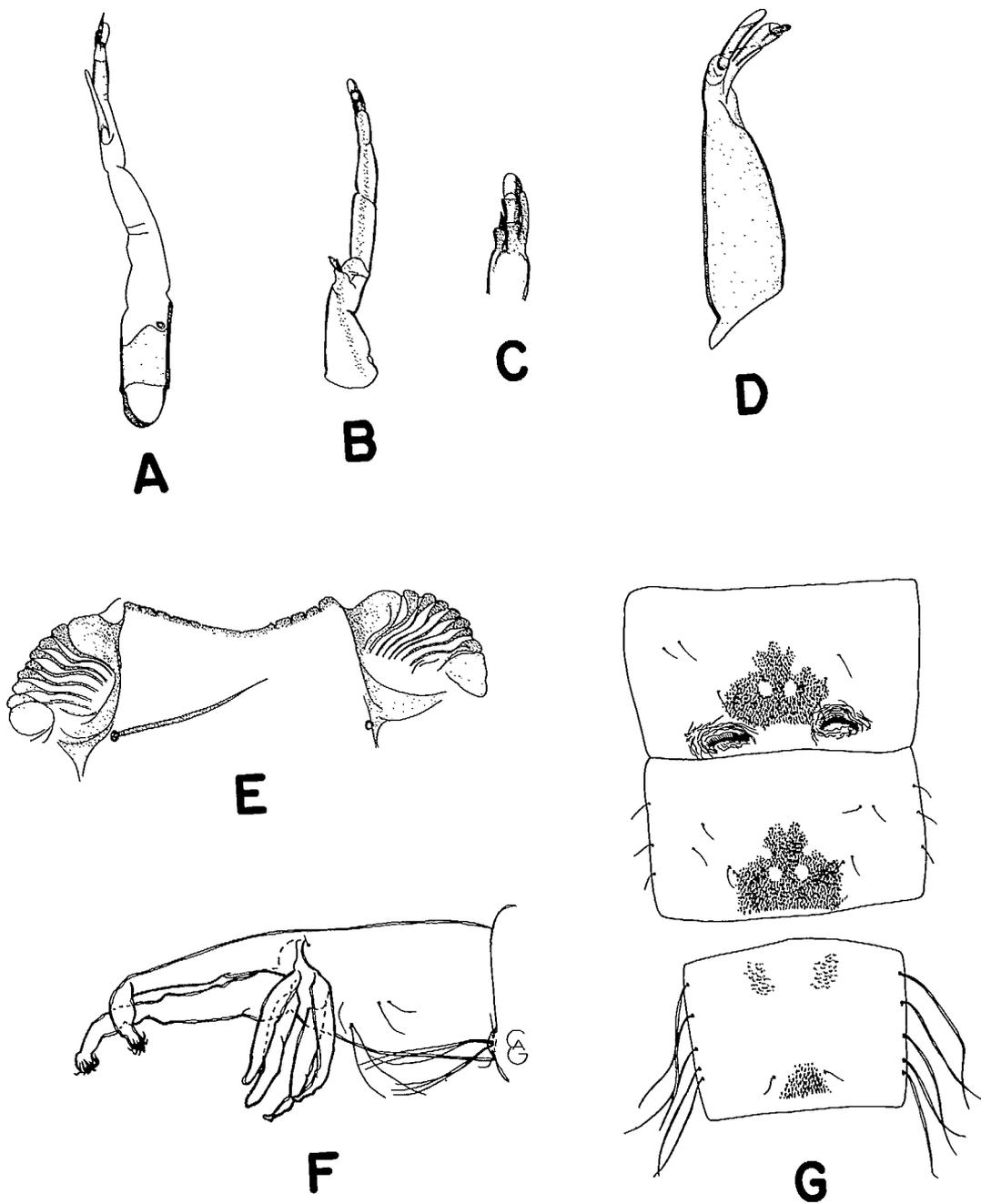


FIG. 40. *Chernovskitia orbicus* (Town.) n.comb. A-F, larva: A) antenna, B) maxillary palp, C) apex of maxillary palp, D) labral sensillum, E) mentum, F) caudal abdominal segments. G, tergites II-III and VIII of larva in transition to pupa.

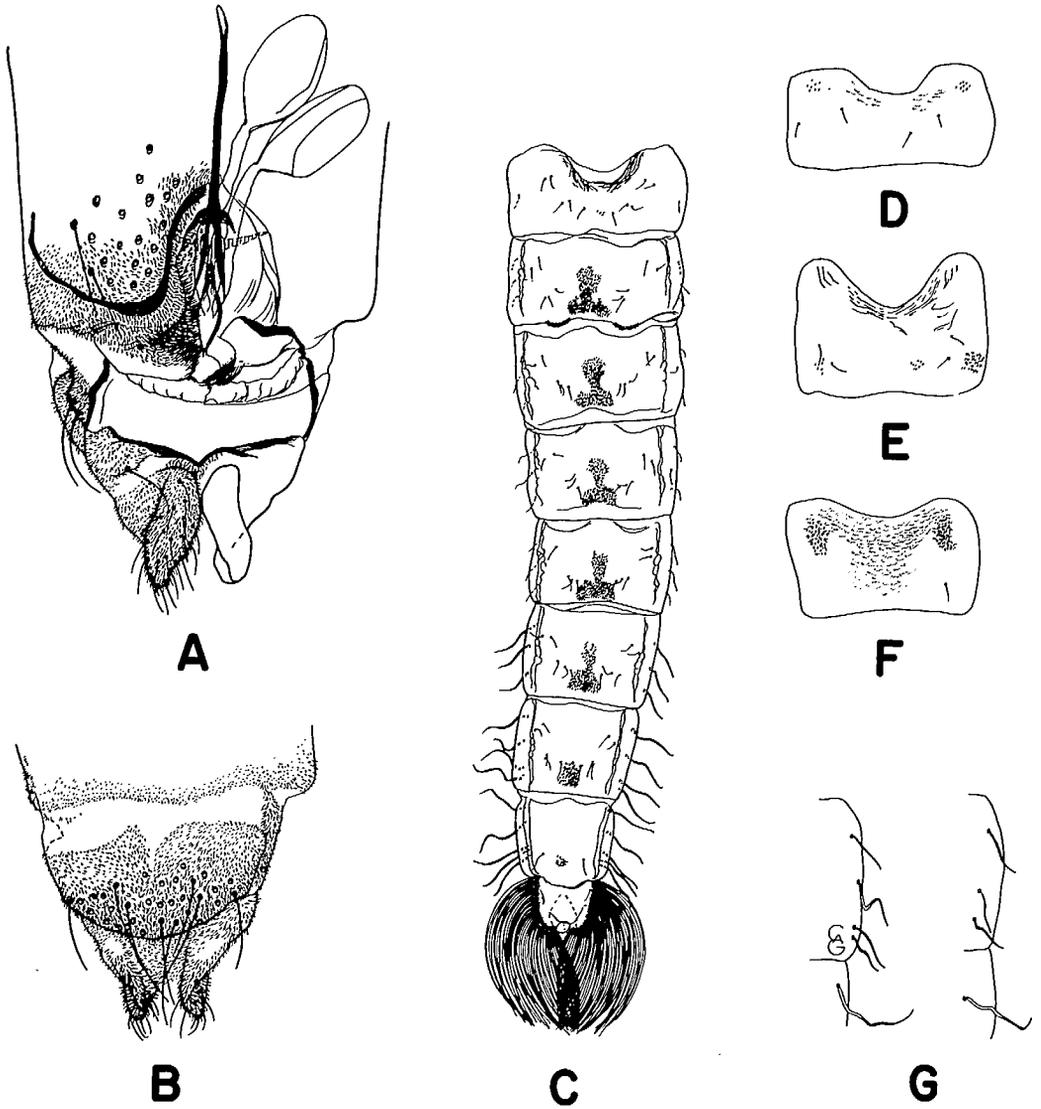


FIG. 41. *Chernovskitia* n.gen. A-B, *C. amphitrite* (Town.) n.comb., female genitalia: A) ventral view, B) dorsal view. C-G, *Chernovskitia* n.gen. pupae: C-D and G, *C. amphitrite* (Town.) n.comb., C) tergites I-IX, D) sternite I, G) variation in lateral setae of segment V. E-F, *C. orbicus* (Town.) n.comb.: E) tergite I, F) sternite I.

MALE (BASED ON MATURE MALE PUPAE)

Head — AR about 2.5–2.6 (3). Frontal tubercles absent. Clypeus with 16 (1) setae. Palp lengths (μm) ($n = 1$): 60, 60, 152, 92, 166.

Thorax — Anteprenotum apparently without setae. Dorsocentrals 10–13, 12 (5); acrostichals apparently absent; parascutellars 1 or 2, 1 (5); prealars 4 or 5, 5 (5). Scutellum with 10–12 (3) setae.

Wing — Squama with 10–16, 13 (5) setae.

Hypopygium (Fig. 39D, E) — Ninth tergum with 22–36, 25 (7) setae; laterosternites IX with 3–5 (2) setae. Anal point proper 68–86, 74 (6) μm long, placed preapically on T IX. Phallapodeme 112–124 (2) μm long. Transverse sternapodeme 39–46 (2) μm long. Superior volsella (Fig. 39E below) with 10–16, 11 (7) setae; 66–82, 72 μm (4) long; 34–56, 44 μm (4) wide at apex; 15–37, 25 μm (4) wide at base. Inferior volsella projecting, but not lobelike, without setae. Mesal margin of gonocoxite with 6 or 7, 6 (7) setae. Gonocoxite 170–186, 175 μm (8) long. Gonostylus 190–212, 202 μm (8) long; 39–49, 42 μm (4) wide; HR = 0.83–0.88, 0.87 (8).

FEMALE ($n = 4$, EXCEPT WHEN OTHERWISE STATED, BASED ON MATURE FEMALE PUPAE)

Head — Lengths of antennal segments (μm): 74–76, 75; 50–54, 51; 58–60, 59; 64–70, 66; 160–184, 169. AR = 0.63–0.72, 0.67. Temporals 8 (2). Clypeus with 12–15 (2) setae. Tentorium as in Fig. 39C. Frontal tubercles absent. Fourth palpal segment 120 μm (1) long, fifth 150 μm (1) long.

Thorax — Anteprenotum apparently without setae. Dorsocentrals 11–14, 12; acrostichals apparently absent; parascutellars 1 or 2; prealars 4. Scutellum with 12–17, 15 setae.

Wing — Brachiolium with 2 (2) setae, R with 17–20 (2) setae, R_1 with 7 (2) setae, R_{4+5} with 17–20 (1) setae. Squama with 14–21, 17 setae.

Genitalia (Fig. 41A, B) — T IX with 34–40, 37 setae. Gonocoxite IX with 2 setae. Segment X with 1–4, 2 setae on each side. Cercus 117–120, 119 μm long. Seminal capsules 112–124, 120 μm long; 62–64, 63 μm wide.

PUPA ($n = 13$ –14)

Total length 4.93–6.31, 5.25 mm.

Abdomen (Fig. 41C, D, G) — T I (Fig. 41C) with weak caudomedian, but no caudolateral spinules. Spinule patches on T II–VI (Fig. 41C) inverted T-shaped. T VIII with 1–28, 18 spinules. T II with 13–19, 17 hooklets to each side. Sternite I (Fig. 41D) with very weak group shagreenation. Longest spinules of pedes spurii A on sternite IV 12–14, 13 μm . Sternite VIII of male with 65–110, 84 (10) spinules. Anal lobe with 68–98, 84 setae in fringe.

MATERIAL EXAMINED

One mature male pupa, 2 mature female pupae, 1 female exuvium, Missouri River, Clay County Park, Vermillion, S.Dak., 14/6–14/7/71, P. L. Hudson; 6 mature male pupae, Missouri River, Clay County, Vermillion, S.Dak., 24/5 and 7/6/76, J. Novotny; 1 mature male pupa, Missouri River, Salix, Woodbury Co., Iowa, 8/6/76, J. Novotny; 2 mature male pupae, 1 mature female pupa, Missouri River, Fort Calhoun, Neb., 28/5/75, NALCO Environmental Sciences.

"Cryptochironomus" cf. rolli Kirp.

(Fig. 42)

The larvae appear to be identical to those described by Chernovskii (1949 p. 54, fig. 12).

FOURTH INSTAR LARVA ($n = 9$, EXCEPT WHEN OTHERWISE STATED)

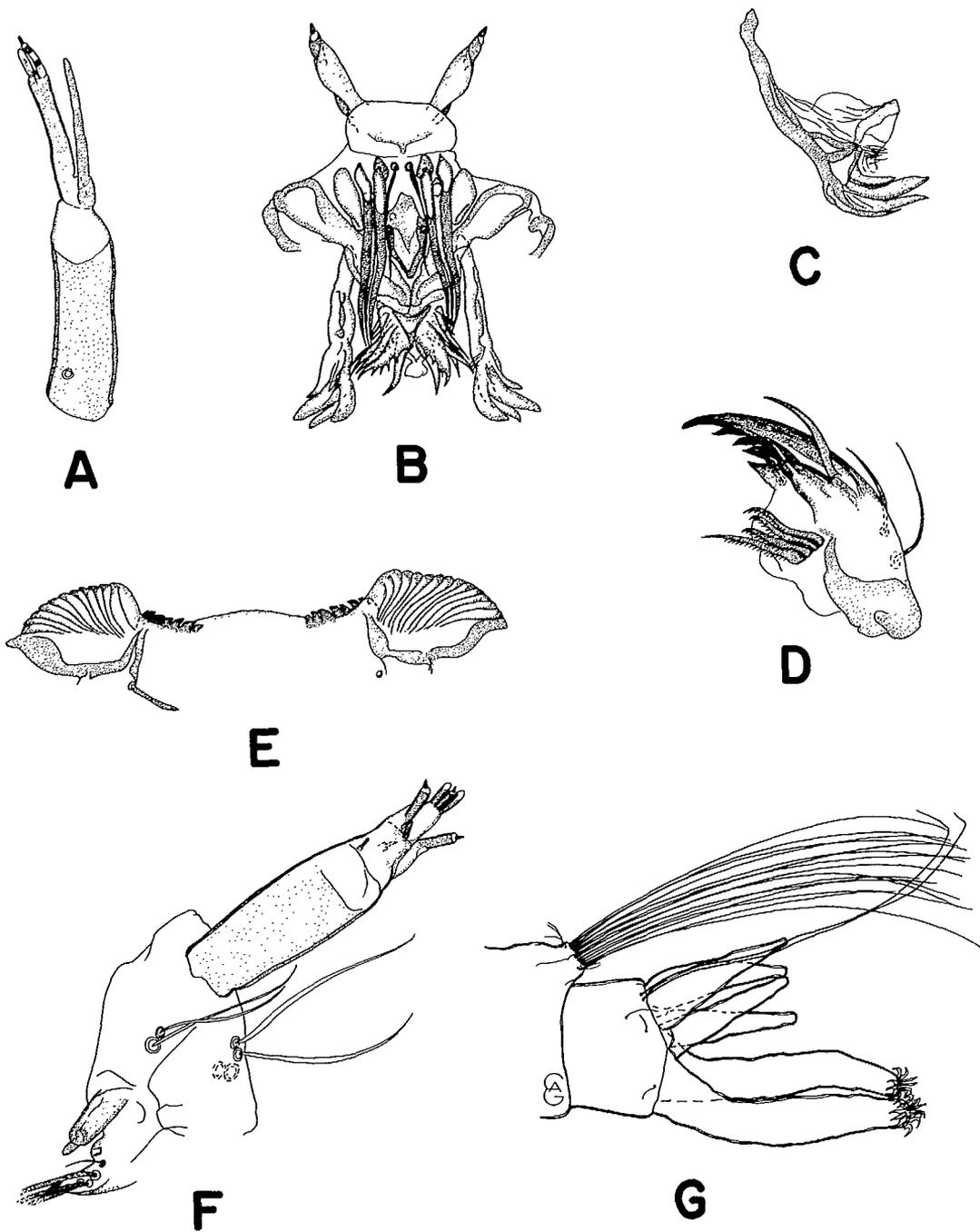


FIG. 42. "*Cryptochironomus*" cf. *rolli* Kirp., larva. A, antenna. B, labrum and palatum. C, premandible. D, mandible. E, mentum. F, maxilla. G, caudal abdominal segments.

Total length 6.50–7.69, 7.20 mm (9). Head capsule length 0.38–0.42, 0.40 mm (4).

Head — Antenna as in Fig. 42A. Length of antennal segments (μm) ($n = 7-8$): 80–110, 93; 46–62, 56; 4–8, 6; 5–7, 6; 3–5, 4. AR = 1.07–1.44, 1.23 (7). Basal antennal segment 23–29, 26 μm (7) wide. Blade proximally on second segment 56–68, 63 μm (5) long. Style at apex of second segment 11–14, 13 μm (6) long. Labrum and palatum as in Fig. 42B. Maxilla as in 42F. Premandible (Fig. 42C) 80–90 μm (3) long. Mandible (Fig. 42D) 120–138, 128 μm (6) long. Mentum as in Fig. 42E. Postmentum 155–168, 161 μm (4) long.

Abdomen (Fig. 42G) — Procercus 20–26, 23 μm (9) high; 30–46, 40 μm (9) wide; with about 8 apical setae 601–791, 671 μm (9) long. Supraanal seta 368–589, 486 μm (9) long. Supraanal seta/anal setae 0.54–0.87, 0.72 (9). One pair anal tubules 150–220, 182 μm (9) long; the other 180–250, 231 μm (9) long. Posterior parapods 320–370, 343 μm (8) long.

THIRD INSTAR LARVA ($n = 1$)

Total length 3.60 mm. Head capsule length 0.25 mm.

Head — Length of antennal segments (μm): 60, 49, 5, 5, 3. AR = 0.94. Basal antennal segment 17 μm wide. Blade proximally on second segment 50 μm long. Style at apex of second segment 11 μm long. Premandible 59 μm long. Mandible 81 μm long. Postmentum 90 μm long.

Abdomen — Procercus 14 μm high, 23 μm wide, with anal setae 356 μm long. Supraanal seta 307 μm long. Supraanal seta/anal setae 0.66. Anal tubules 100–135 μm long. Posterior parapods 240 μm long.

MATERIAL EXAMINED

Eight larvae, Lake Michigan, near Campbell Plant, Ottawa County, Mich., 13/8/70, J. G. Truchan; 2 larvae, Lake Michigan, near Manistee, Manistee County, Mich., 16/7/57, C. M. Fetterolf.

DISTRIBUTION AND ECOLOGY

The species is known from sandy areas in fast-moving rivers in the USSR (Chernovskii 1949 p. 54), and from sandy areas at depths of 5–15 feet in Lake Michigan.

"Cryptochironomus" near *rolli* Kirp. (Fig. 43)

Compared to "*C.*" cf. *rolli* this larva has a shorter maxillary palp relative to the antenna, and considerably longer labral sensilla. The anterior margin of mentum is convex but is concave in "*C.*" cf. *rolli*. In most other details, however, it is similar and almost certainly belongs to the same genus. The pupa has an uninterrupted broad row of hooklets on T II, the shagreenation consists of a posterior band of spinules, T VIII has a compound spur, and segments VII and VIII each have 4 filamentous L-setae. The pupa thus is close to that of *Demicryptochironomus*.

PUPA ($n = 2$, BASED ON LARVAE IN TRANSITION TO PUPAE)

Hooklets of T II (Fig. 43F) uninterrupted, 38–42 hooklets occupy more than $\frac{1}{2}$ width of tergite. Shagreenation consists of a posterior band about 5–6 spinules wide. Segments VII and VIII (Fig. 43F) each with 4 filamentous L-setae. Caudolateral corners of T VIII with a compound spur (Fig. 43F). Anal lobe with 35–43 setae in fringe.

LARVA ($n = 5-7$, EXCEPT WHEN OTHERWISE STATED)

Total length 2.25–3.15, 2.72 mm. Head capsule length 0.16–0.20, 0.19 mm.

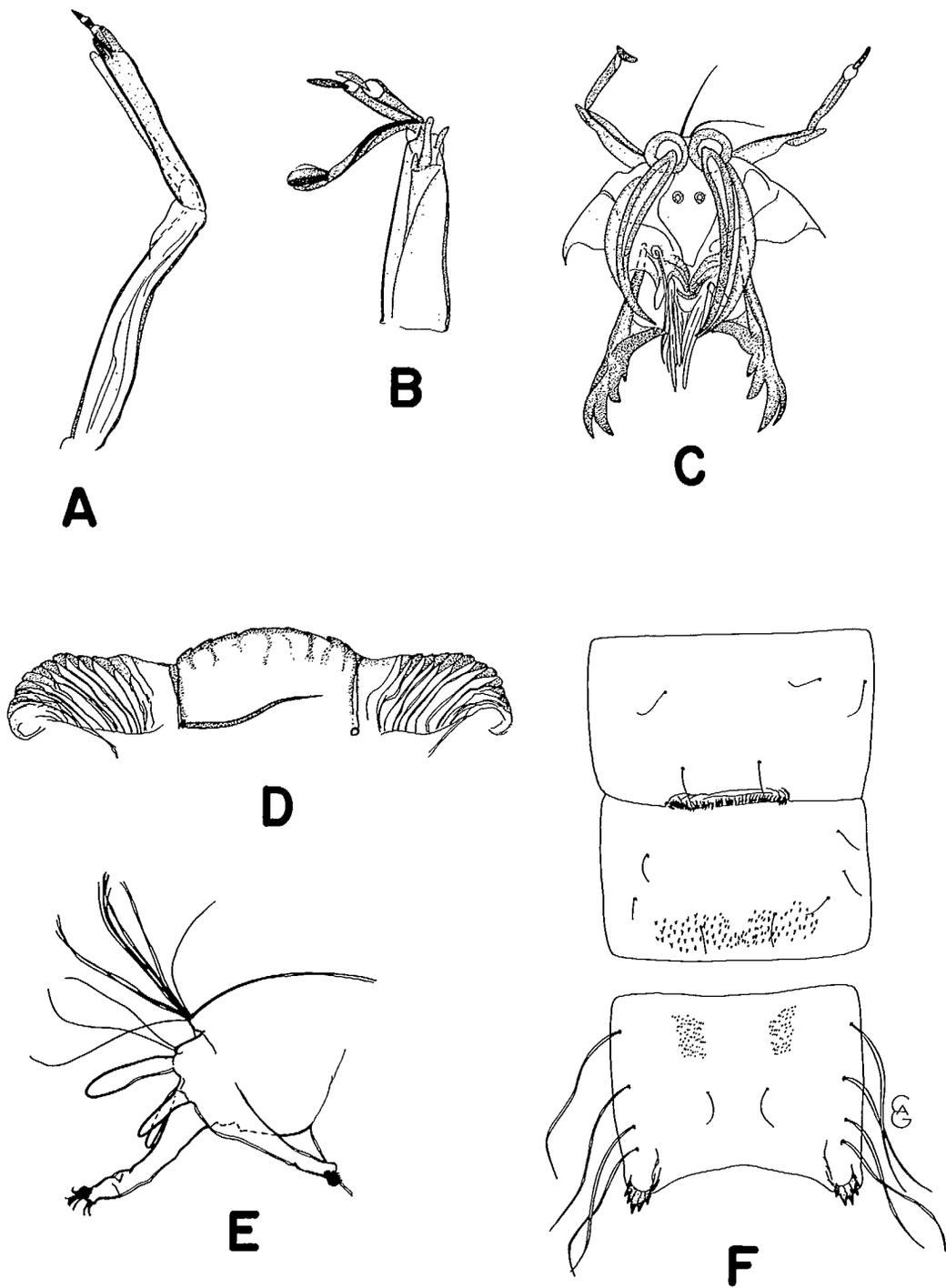


FIG. 43. "*Cryptochironomus*" near *rolli* Kirp. A-E, larva: A) antenna, B) maxillary palp, C) labrum, palatum, and premandibles, D) mentum, E) caudal abdominal segments. F, tergites II-III and VIII of pupa.

Head — Antenna as in Fig. 43A. Length of antennal segments (μm): 57–62, 60; 30–36, 32; 3.5–5.0, 4; 2–4, 3; 3–4, 3. AR = 1.29–1.54, 1.43. Basal antennal segment 11 μm (2) wide. Style at apex of second segment 8–10, 8 μm (4) long. Labrum and palatum as in Fig. 43C. Maxillary palp as in Fig. 43B. Premandible (Fig. 43C) 30–40 μm (2) long. Mandible 58–68, 62 μm long. Mentum as in Fig. 43D.

Abdomen (Fig. 43E) — Procercus 8–10, 9 μm (4) high; 18–22, 20 μm (4) wide; with 7 apical anal setae 210–260, 228 μm long. Supraanal seta 150–200, 168 μm (4) long. Supraanal seta/anal setae 0.63–0.77, 0.73 (4). Anal tubules digitiform, rounded at apex; one pair 70–100, 90 μm (4) long; other pair 100–150, 133 μm (4) long. Posterior parapods slender, 146–210 μm (2) long.

MATERIAL EXAMINED

Two larvae, Mississippi River, near Cordova, Ill., 25/7/72, NALCO Environmental Sciences; 4 larvae, Charley Creek area, Lewis and Clark Lake, S.Dak., 31/7–13/8/63, P. L. Hudson; 1 larva, Miller Creek area, Lewis and Clark Lake, S.Dak., 31/7/63, P. L. Hudson.

DISTRIBUTION AND ECOLOGY

The species is known from the Mississippi and Missouri River systems.

Beckiella n.gen.

Chironomus (*Cryptochironomus*), Goetghebuer 1938: 57 nec Kieffer
Harnischia (*Cladopelma*); Townes 1945: 152, pro parte, nec Kieffer

Type species: *Harnischia* (*Cladopelma*) *tethys* Townes 1945: 152 (= *Beckiella tethys* (Town.) n.comb.)

MALE

Medium size, greenish to brownish colored; frontal tubercles absent; acrostichals apparently absent; scutum without median protuberance; middle and hind tibia each with 1 or 2 spurs; anal point relatively long, situated on a bluntly triangular projection of T IX; gonostylus evenly curved on inner and outer margin, stout, with widest point in apical half; superior volsella at least with 4 apical setae, covered with microtrichia, more or less widened at apex, but never pediform; inferior volsella small, without setae; other characteristics as for the *Harnischia* complex as a whole.

PUPA

Thoracic horn with numerous branches; cephalic tubercles small or perhaps absent; thorax rugulose; row of hooklets on T II very broadly interrupted; pedes spurii B with spinules; shagreenation posterior on T I, strong and covers all of T II–VI except most lateral parts, orally on VII, absent on VIII; caudolateral corners of T VIII without spur or comb; 4 filamentous L-setae on each of segments V–VIII.

LARVA

Antenna with 7 segments, basal segment about as long as second and third segments combined or shorter, second segment about as long as third, antennal blade proximally on third segment; labral sensilla 3-segmented, with blade at apex of basal segment; seta posteriores (S II) of labrum long, thick and bladelike; seta anteriores (S I) of labrum short and bladelike; premandible apparently with 2 or 3 teeth; maxillary palp about as long as basal 2 segments of antenna; mentum with broad to relatively broad median tooth with shoulders, with 4 pairs of lateral teeth; ventromentum about as wide as long, with distinct striations; posterior parapods long and tapering with few weak apical claws; procerci absent, only one pair of short anal setae; dorsal pair of anal tubules long,

tapering, about same size and shape as posterior parapods; ventral pair of anal tubules strongly reduced, hidden between bases of posterior parapods.

DISTRIBUTION AND ECOLOGY

Larvae of the genus appear to prefer sandy substrates of large rivers and lakes in USA and USSR, probably the Vardar River in Yugoslavia, and probably the Nile and the Congo.

Key to males

- 1 Superior volsella nearly three times as wide at apex as at base
..... *B. zabolotzkyi* (Goetgh.) n.comb. (Palearctic)
(GOETGHEBUER 1938 fig. 1)
- Superior volsella less than twice as wide at apex as at base 2
- 2 Middle and hind tibiae each with 2 spurs *B. hirsti* (Freem.) n.comb. (Ethiopian)
(FREEMAN 1957 fig. 13a)
- Middle and hind tibiae each with 1 spur *B. tethys* (Town.) n.comb. (Holarctic)
(FIG. 44A, B)

Key to known larvae

- 1 Median portion of median mental tooth about $\frac{1}{2}$ width of whole tooth including
shoulders *B. zabolotskyi* (Goetgh.)
(CHERNOVSKII 1949 fig. 13)
- Median portion of median mental tooth distinctly less than $\frac{1}{2}$ width of whole tooth
including shoulders *B. tethys* (Town.)
(FIG. 44D-I)

Beckiella tethys (Town.) n.comb. (Fig. 44)

Harnischia (*Cladopelma*) *tethys* Townes, 1945: 152, fig. 174

The male imago is characterized by the presence of only one spur on the middle and hind tibia, and the superior volsella only slightly wider at apex than at base and carries 14–20 setae.

The larva differs from *Beckiella zabolotskyi* (Goetgh.), the other known larva, by having a narrower median portion of the median mental tooth.

MALE ($n = 10-11$)

Length 2.56–3.49, 2.92 mm. Wing length 1.22–1.72, 1.43 mm. Total length/wing length 1.93–2.13, 2.06. Wing length/length of profemur 2.43–2.65, 2.49. Coloration as mentioned by Townes (1945 p. 152).

Head — AR = 1.55–1.88, 1.74. Inner verticals 2 or 3, 3; outer verticals 3–5, 4; postorbitals 2–6, 4. Clypeus with 6–11, 9 setae. Tentorium (Fig. 44A) 120–150, 138 μm long. Stipes 112–142, 123 μm long. Frontal tubercles or ocelli absent. Palp lengths (μm): 28–38, 35; 34–46, 41; 86–104, 94; 114–138, 124; 124–190, 158.

Thorax — Anteprenotum apparently without setae. Dorsocentrals 7–10, 8; acrostichals apparently absent; parascutellars 1; prealars 2–4, 3. Scutum without central tubercle. Scutellum with 4–7, 6 setae.

Wing — VR = 1.15–1.20, 1.18. Brachiolum with 2 setae; R with 2–4, 3 setae; R₁ with 0–3, 0 setae; R₄₊₅ with 1 or 2, 2 setae at apex. Squama with 1–4, 3 setae (0 or 1 in Townes).

Legs — Middle and hind tibia each with one spur on longer inner comb, none on shorter outer comb. Sensilla chaetica 1 at apex of ta₁ of middle leg, none on hind leg. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄
p ₁	503–656, 570	301–399, 338	619–840, 717	343–442, 388	233–319, 270	159–221, 185
p ₂	466–589, 522	405–558, 468	245–325, 279	110–147, 129	80–117, 96	49–80, 63
p ₃	503–687, 575	515–699, 597	350–478, 410	178–251, 214	172–251, 202	86–141, 112
	ta ₆	LR	BV	SV	BR	
p ₁	86–98, 91	2.02–2.13, 2.08	1.67–1.81, 1.75	1.24–1.30, 1.28	2.27–2.55, 2.42	
p ₂	49–63, 52	0.57–0.62, 0.60	3.63–3.96, 3.73	3.43–3.68, 3.55	2.50–3.88, 3.45	
p ₃	63–86, 70	0.67–0.71, 0.69	2.50–2.81, 2.66	2.73–2.96, 2.86	4.23–5.45, 4.88	

Hypopygium (Fig. 44B) — Ninth tergum with 10–20, 13 setae; laterosternites IX with 1 or 2, 1 seta. Anal point proper 50–86, 59 μm (4) long. Phallapodeme 64–92, 78 μm long. Superior volsella with 14–20, 16 apical setae; barely wider to twice as wide at apex as at base. Gonocoxite 101–138, 113 μm long. Gonostylus 135–172, 152 μm long. HR = 0.71–0.80, 0.74; HV = 1.88–2.05, 1.95.

PUPA (*n* = 1)

Total length 4.43 mm.

Cephalothorax — Thoracic horn with numerous branches. Cephalic tubercles not observed, perhaps absent.

Abdomen (Fig. 44C) — Shagreenation and lateral filaments as in generic diagnosis. Row of hooklets on T II broadly interrupted with 11 hooklets far lateral to each side. Anal lobe with 55 uniseriate filamentous setae in fringe.

LARVA (*n* = 2, EXCEPT WHEN OTHERWISE STATED)

Total length 4.34 mm (1). Head capsule length 0.26–0.28 mm.

Head — Antenna as in Fig. 44D, E. Lengths of antennal segments (μm): 48–50, 24–25, 25–26, 14, 4, 4–5, 3. AR = 0.64–0.68. Antennal blade 48–50 μm long, situated proximally on third segment. Style relatively wide, 10 μm long, situated at apex of fourth segment. Labrum and palatum as in Fig. 44F. S II 45–50 μm long. Labral sensilla (Fig. 44F) 30 μm (1) long, 3-segmented, with blade at apex of basal segment. Premandible (Fig. 44F) 50–52 μm long. Maxillary palp as in Fig. 44G. Mandible (Fig. 44H) 82–86 μm long. Mentum as in Fig. 44I. Postmentum 124–132 μm long.

Abdomen — Procerci absent, one pair of short anal setae. Dorsal pair of anal tubules 160 μm (1) long, 21 μm (1) wide from near base to near apex; ventral pair about 9 μm (1) long, reduced. Posterior parapods 174 μm (1) long, 29 μm (1) wide.

MATERIAL EXAMINED

Male, Gavins Point Dam, Lewis and Clark Lake, Yankton, S.Dak., 19/8/64; larva, deepwater area, plankton, Lewis and Clark Lake, Yankton, S.Dak., 20/5/71; male, 2 miles east, 6 miles south, Gayville, S.Dak., 29/5/72; male, Missouri River, Clay County Park, Vermillion, S.Dak., 15/6/72; mature male pupa reared from larva, Missouri River, Springfield, S.Dak., 18/7/72; (all above leg.: P. L. Hudson); 2 larval head capsules, 34–35 cm in core taken at 22 m, Glenora, Bay of Quinte, Lake Ontario, 17/3/72, W. F. Warwick; 17 males, light trap, Gevgelija, Yugoslavia, 6/7/76, W. Bestler.

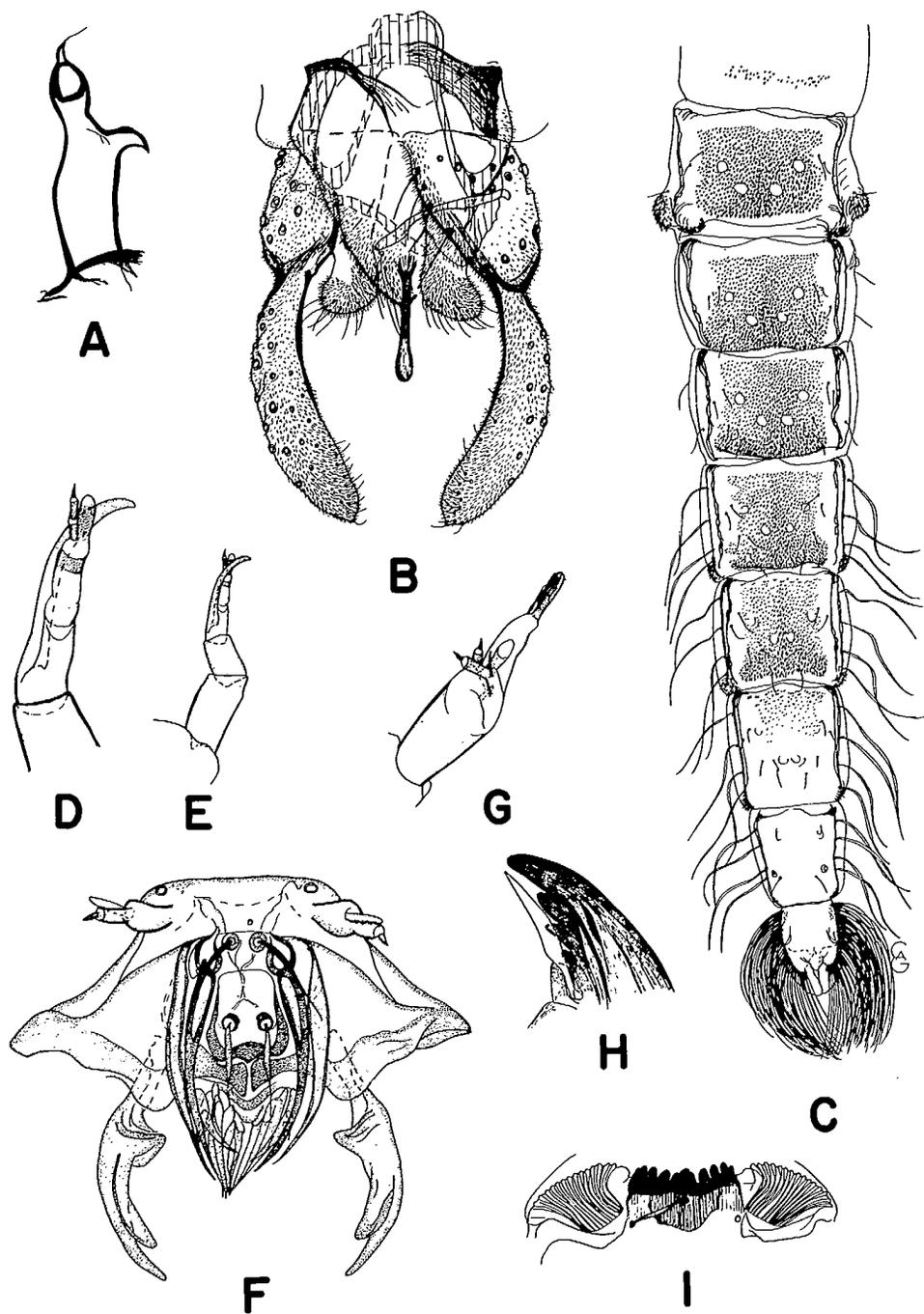


FIG. 44. *Beckiella tethys* (Town.) n.gen., n.comb. A-B, male: A) tentorium, B) hypopygium. C, abdomen of male pupa. D-I, larva: D) apex of antenna, E) antenna, F) labrum and palatum, G) maxillary palp, H) apex of mandible, I) mentum.

Robackia n.gen.

Tendipes (*Parachironomus*), Kruseman 1933: 195, pro parte
Tendipes (*Cryptochironomus*), Goetghebuer 1937-54: 44, pro parte nec Kieffer
Harnischia (*Harnischia*), Townes 1945: 158, pro parte nec Kieffer
Cryptochironomus, Chernovskii 1949: 56, pro parte nec Kieffer
Parachironomus, Lehmann 1970: 140, Sæther 1971a: 50, pro parte, nec Lenz

Type species: *Tendipes* (*Parachironomus*) *demeijerei*, Kruseman 1933: 195 (Lehmann 1970 p. 140, fig. 7). (= *Robackia demeijerei* (Krus.) n.comb.)

MALE

Medium size greenish species with orange to reddish brown markings; frontal tubercles absent; acrostichals present; scutum without median protuberance; middle and hind tibia each with 2 spurs; anal point long, on caudal projection of T IX, caudal projection with several ventral setae (at least in *Robackia claviger* (Town.) n.comb.); gonostylus clavate, with very slightly concave inner margin, strongly convex outer margin, narrow at base, widest point near apex; superior volsella digitiform, long, pointed, with 2 apical setae not in distinct pits, without microtrichia; inferior volsella small, without setae; other characteristics as for the *Harnischia* complex as a whole.

PUPA

Cephalic tubercles apparently absent; thorax rugulose; row of hooklets on T II uninterrupted, occupy about $\frac{2}{3}$ - $\frac{3}{4}$ the width of tergite; shagreenation strong, T II-V nearly completely covered, central parts of T VI covered by spinules; sternites I, II, or III with bands of spines; caudolateral corners of segment VIII without comb or spur; segments V-VIII each with 4 filamentous L-setae or occasionally with only 3 L-setae on VIII.

LARVA

Antenna with 7 segments, basal segment slightly shorter than second and third segments combined, second segment distinctly longer than third; antennal blade distally on third segment, longer than third segment; labral sensilla 3-segmented, with a long basal blade; seta posteriores (S II) only moderately long and broad; premandible with 4 apical teeth; maxillary palp as long as basal 3 segments of antenna, or slightly shorter; mentum with 12 or 14 teeth, teeth subequal or median 2 teeth slightly wider and lower; ventromental plates about as wide as long, with strong striations; posterior parapods very long, slender; two pairs of anal tubules, about half as long as posterior parapods; procerci low, with well-developed anal setae.

DISTRIBUTION AND ECOLOGY

As for *Beckiella* the larvae apparently live in the sandy substrates of rivers and large streams including the Missouri, Mississippi, Savannah, and Blackwater rivers and Yugoslavian and Russian rivers, but have also been found in reservoirs in South Dakota and South Carolina, and in sandy substrates of exposed shores of all the Great Lakes.

Key to males

- 1 . Anal point apparently bare except for 2 basal setae, AR about 1.5, LR₁ about 2.2
..... *R. demeijerei* (Krus.) n.comb. (Palearctic)
(LEHMANN 1970 fig. 7)
- Anal point with about 10-12 weak setae in addition to 2-6 stronger basal setae,
AR 1.8-2.4, LR₁ 1.7-1.9 2

Head — Antenna as in Fig. 45A. Lengths of antennal segments (μm): 46–53, 49; 33–40, 37; 18–20, 20; 12–14, 13; 9–12, 10; 3; 3. AR = 0.53–0.62, 0.59. Antennal blade 28–35, 32 μm long. Style at apex of fifth segment 11–14, 13 μm long. Maxilla as in Fig. 45B. Premandible 38–50, 44 μm long. Mandible (Fig. 45E) 62–68, 66 μm long. Mentum as in Fig. 45D. Postmentum 136–154, 144 μm long.

Abdomen (Fig. 45F) — Procercus 4–6, 5 μm high; 10–16, 13 μm wide; with 6 or 7 aual setae 360–390, 375 μm long. Supraanal seta 200–260, 228 μm long. Supraanal seta/anal setae 0.53–0.68, 0.61. Anal tubules 120–150, 137 μm long. Posterior parapods 220–250, 237 μm long.

THIRD INSTAR LARVA ($n = 1$)

Total length 4.35 mm. Head capsule length 0.17 mm.

Head — Lengths of antennal segments (μm): 34, 28, 16, 13, 10, 3, 3. AR = 0.45. Antennal blade 35 μm long. Style of fifth segment 14 μm long. Premandible 25 μm long. Mandible 44 μm long. Postmentum 96 μm long.

Abdomen — Procercus 3 μm high, 9 μm wide, anal setae 284 μm long. Supraanal seta 176 μm long. Supraanal seta/anal setae 0.62. Anal tubules 92 μm long. Posterior parapods 160 μm long.

MATERIAL EXAMINED

Six larvae, Lake Michigan, near Campbell Plant, Ottawa County, Mich., 13/8/70, J. G. Truchan; 2 larvae, Lake Michigan, near Manistee, Manistee County, Mich., 16/7/57, C. M. Fetterolf; 1 larva, Big Black Creek, Muskegon County, Mich., 7/6/67, R. B. Willson.

DISTRIBUTION

The species is known from Holland; rivers in the USSR; Bluefish River, Y.T.; Martin River, N.W.T.; Mississippi and Savannah rivers; and from Michigan including Lake Michigan (Kruseman 1933 p. 195; Johannsen 1937b p. 33; Chernovskii 1949 p. 56; Roback 1953 p. 120; Wiens et al. 1975 p. 28).

According to D. Barton, Alberta Oil Sands Environmental Research Program, Fort McMurray, Alta. (personal communication) it is common in sandy substrates of exposed shores of all the Great Lakes. W. M. Beck, Florida A and M University, Tallahassee, Fla. (personal communication) has the following records of the species: North Platte Creek, Goshen Co., Wyo., Mar. 1975; Oconee River, Polk Co., Tenn., Nov. 1974; Belews Creek, Forsythe Co., N.C., Apr. 1972; Little River, Oconee Co., S.C., May 1974; Whetstone Creek, Oconee Co., S.C., Sept. 1975; Brushy Creek, Greenville Co., S.C., Sept. 1975; Five Mile Creek, Garvin Creek, and Devils Fork Creek, all Anderson Co., S.C., Aug.–Sept. 1975; Blackwater River, Okaloosa Co., Fla., Jan. 1971.

Robackia claviger (Town.) n.comb.

(Fig. 45G–L, 46)

Harnischia (*Harnischia*) *claviger* Townes, 1945: 158 fig. 180

The male imago is characterized by a wing length of 1.6–2.1 mm, AR of 2.00–2.44, a LR_1 of 1.7–1.9, squama with 9–12 setae, presence of weak setae on the often spatulate anal point, and anal point 0.65–0.87 times as long as the phallopodeme.

The pupa appears to have more extensive and stronger shagreenation than *R. demeijerei*.

The tentatively associated larva is characterized by having 14 mental teeth and enlarged proximal teeth on mandible.

MALE ($n = 6$, EXCEPT WHEN OTHERWISE STATED)

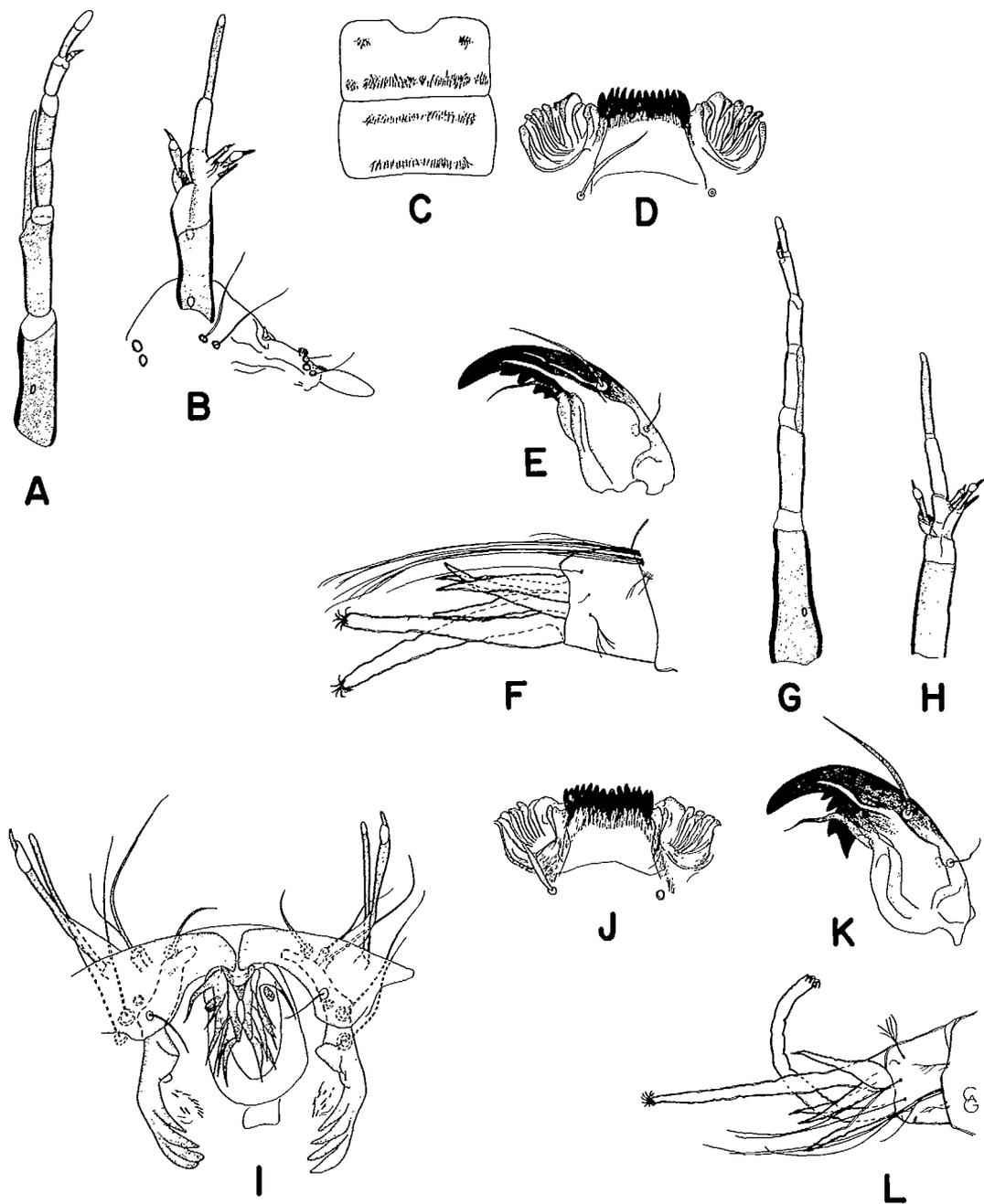


FIG. 45. *Robackia* n.gen., immatures. A-F, *R. demijerei* (Krus.) n.comb: A) larval antenna, B) larval maxilla, C) sternites I-II of pupa, D) larval mentum, E) larval mandible, F) caudal abdominal segments of larva. G-L, *R. claviger* (Town.) n.comb. larva: G) antenna, H) maxillary palp, I) labrum, palatum, and premandibles, J) mentum, K) mandible, L) caudal abdominal segments.

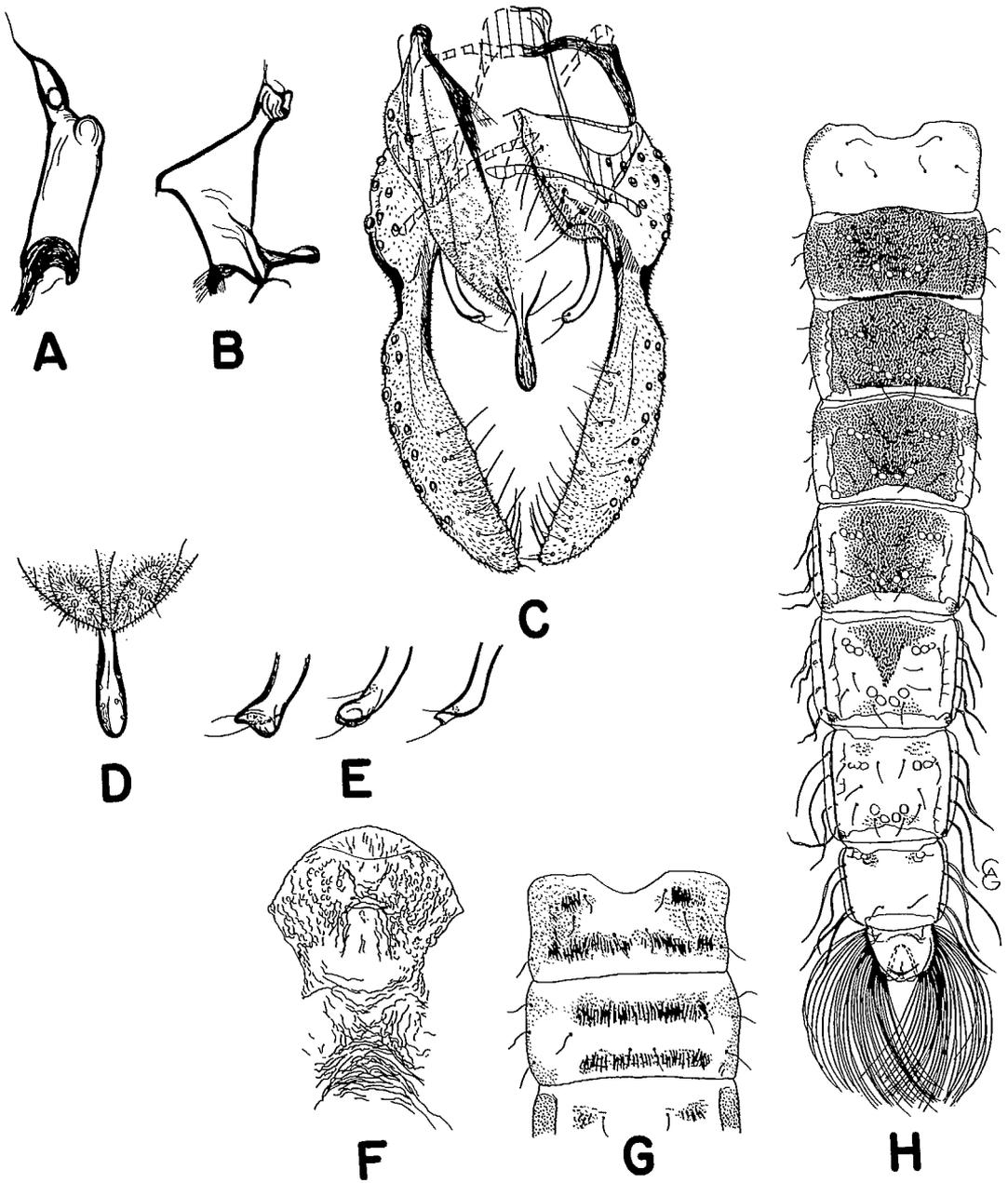


FIG. 46. *Robackia claviger* (Town.) n.gen., n.comb. A-E, male: A-B) tentorium, in normal position (A), and more lateral view (B), C-E) hypopygium, with details of ventral side of anal point (D), and variations in apex of superior volsella (E). F-H, pupa: F) frontal plate, G) sternites I-III, H) abdomen.

Length 3.15–4.07, 3.60 mm. Wing length 1.57–1.10, 1.82 mm. Total length/wing length 1.93–2.06, 1.99. Wing length/length of profemur 2.37–2.48, 2.42. Coloration as mentioned by Townes (1945 p. 158).

Head — AR = 2.00–2.44, 2.19. Temporals 13–17, 14. Inner verticals 2 or 3, 2; outer verticals 4–6, 5; postorbitals 6–9, 7. Clypeus with 8–14, 12 setae. Tentorium (Fig. 46A, B) 125–164, 143 μm long. Stipes 118–160, 135 μm long. Frontal tubercles or ocelli absent. Palp lengths (μm): 34–44, 39; 44–64, 53; 110–150, 125; 130–146, 139; 145–201, 176 (5).

Thorax — Antepronotum with 0 or 1, 0 seta. Dorsocentrals 6–8, 7; acrostichals 8–10, 9; prealars 4 or 5, 4; parascutellars 1. Scutum without central tubercle. Scutellum with 8–12, 9 setae.

Wing — VR = 1.03–1.10, 1.07. Brachiolum with 2 or 3, 3 setae; R with 2–8, 4 setae; R₁ with 0 or 1, 0 seta; R₄₊₅ with 2 setae at apex. Squama with 9–12, 11 (5) setae.

Legs — Middle and hind tibia each with 2 spurs. Sensilla chaetica 1 or 2 (3) in apical $\frac{1}{2}$ of ta₁ of middle leg; 0–2, 1 (5) in apical $\frac{1}{2}$ of ta₁ of hind leg. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄
p ₁	638–883, 751	460–613, 526	791–1153, 954	448–644, 548	319–466, 393	239–343, 297
p ₂	577–846, 683	577–779, 664	313–417, 355	165–245, 199	98–147, 125	63–86, 77
p ₃	619–822, 725	730–981, 850	485–711, 583	258–350, 304	190–258, 218	104–135, 124

	ta ₅	LR	BV	SV	BR
p ₁	98–129, 117	1.71–1.89, 1.81	1.57–1.70, 1.68	1.30–1.40, 1.35	2.44–2.86, 2.62 (5)
p ₂	45–63, 54	0.51–0.55, 0.54	3.53–3.95, 3.78	3.65–3.96, 3.79	3.22–4.65, 3.67
p ₃	63–76, 68	0.66–0.73, 0.69	2.99–3.08, 3.02	2.53–2.78, 2.69	5.47–6.88, 6.38 (5)

Hypopygium (Fig. 46C–E) — Ninth tergum with 2 setae at base of anal point and 9–11, 11 ventral setae. Anal point proper 70–96, 85 μm long; 8–12, 10 μm wide 0.5 from base; 11–16, 12 μm wide at apex; with 10–12, 10 very weak setae. Anal point 0.65–0.87, 0.81 times as long as phallapodeme. Phallapodeme 98–110, 105 μm long. Transverse sternapodeme 30–50, 38 μm long. Superior volsella with 2 apical setae not in distinct pits and with mesally directed apical point (Fig. 46E). Inferior volsella without setae, with microtrichia. Gonocoxite 130–168, 143 μm long. Gonostylus 190–253, 225 μm long. HR = 0.60–0.68, 0.64; HV = 1.46–1.72, 1.60.

PUPA ($n = 3$)

Total length 3.45–3.55 mm. Exuvia dark brown.

Cephalothorax — Thoracic horn with numerous branches. Cephalic tubercles apparently absent, frontal plate rugulose (Fig. 46F). Thorax rugulose.

Abdomen (Fig. 46G, H) — T II with 50–60 caudal hooklets. T I without shagreenation; T II with strong spinules covering all of tergite; T III fully shagreenated except on caudolateral margins; T IV fully shagreenated except on most of lateral margin; T V fully shagreenated except all of lateral margin; T VI with anterior, median, and a weak posterior band of spinules; T VII with a few anterior and a few posteriomedian fine spinules; T VIII with a few, weak anterior spinules. Most unshagreenated areas of T III–VIII with distinct reticulation, reticulation weak on VIII, particularly strong on IV–VII. Sternite I (Fig. 46G) with two anteriomedian groups of altogether 23–32 spines to 26–35 μm long, and posterior band of 42–72 spines to 40–50 μm long. Sternite II (Fig. 46G) with anterior band of 38–70 spines to 44–54 μm long, and posterior band of 40–48 spines to 46–54 μm long. Sternite III (Fig. 46G) with anteriolateral groups of altogether 9 spines to 42–46 μm long. Segments V–VIII each with 4 filamentous L-setae. Anal lobe with 29–34 setae in fringe.

LARVA (TENTATIVELY ASSOCIATED, $n = 4$, EXCEPT WHEN OTHERWISE STATED)

Total length 5.81–7.98 mm. Head capsule length 0.33–0.36 mm.

Head — Antenna as in Fig. 45G. Lengths of antennal segments (μm): 72–84, 77; 52; 30–32, 31; 22–27, 25; 18–20, 20; 3; 3. AR = 0.54–0.60, 0.57. Antennal blade 40–42, 40 μm long; situated

distally on second segment. Style relatively broad, 20–22, 21 μm long situated on apex of fifth segment. Annular organ 18–22 μm from base on basal segment. Labrum and palatum as in Fig. 45I. Labral sensilla 3-segmented, 50 μm (1) long, with a 42 μm (1) long basal blade. Premandible (Fig. 45I) 58–66, 62 μm long, with 4 apical teeth. Mandible (Fig. 45K) 106–120, 114 μm long. Maxillary palp (Fig. 45H) 140 μm (1) long. Length of labral sensilla/length of maxillary palp/length of antenna about as 0.2/0.6/1.0. Mentum as in Fig. 45J. Postmentum 205–218, 211 μm long.

Abdomen (Fig. 45L) — Procercus 4–5, 4 μm high; 16–19, 17 μm wide; with about 6 anal setae. Anal setae 400–440, 420 μm long. Supraanal seta 280–368, 339 μm long. Supraanal seta/anal setae 0.70–0.85, 0.81. Anal tubules 200–240 μm (3) long. Posterior parapods slender; 420–476, 454 μm long.

REMARKS

The larva has not been associated through rearing. However, it closely resembles the larva of *Robackia demejerei*, and the adults of these two species are very similar. As there are no other known Nearctic *Robackia* spp., the larva has to belong to *R. claviger* or to an undescribed species.

MATERIAL EXAMINED

Male, Missouri River, Clay County Park, Vermillion, S.Dak., 15/6/72, P. L. Hudson; 2 mature male pupae, Missouri River, Vermillion, S.Dak., 7/6/76, J. Novotny; 5 males, Missouri River, 2 miles east, 6 miles south, Gayville, S.Dak., 27/6/72 and 6/8/72, P. L. Hudson; 1 larva, Charley Creek area, Lewis and Clark Lake, Yankton, S.Dak., 31/6/63, P. L. Hudson; 1 mature male pupa, 1 larva, Missouri River, Yankton, S.Dak., 2/6/76, J. Novotny; 1 mature male pupa, Missouri River, Salix, Iowa, 8/6/76, J. Novotny; 2 tentatively associated larvae, Mississippi River, near Cordova, Ill., 6–21/7/72, NALCO Environmental Sciences; 2 pupae, Thompson River, Jocassee Reservoir, Oconee Co., Salem, S.C., 16/8/74, P. L. Hudson; 1 pupa, Little River, Oconee Co., Salem, S.C., 4/9/75, P. L. Hudson; 1 male, Catawba River, York Co., 12 miles southeast Rock Hill, S.C., 2/5/76, P. Carlson; 1 larva, N.C., 4/3/75, P. L. Hudson.

DISTRIBUTION

W. M. Beck Jr. (personal communication) has the following records of the species: Penebscot River, Me., June 1974; St. Croix River, Minn., June 1973; Tambigbee River, Ala., Oct. 1974; Black Creek, Forest Co., Miss., Nov. 1972; Garvin Creek, Anderson Co., S.C., Aug. 1975; Blackwater River, Okaloosa Co., Fla., Apr. 1970 and 1976; Polk Creek, Leon Co., Fla., Mar. 1975. Townes (1945 p. 158) mentions the species from South Carolina, Indiana, Nebraska, and Washington (Columbia River).

Robackia pilicauda n.sp.

(Fig. 47)

The male imago is characterized by a wing length of 1.2–1.5 mm, AR of 1.76–2.07, LR₁ of 1.8–1.9, squama with 4–8 setae, and a nonspatulate anal point which is 1.03–1.14 times as long as the phallopodeme and carries several weak and 3–6 strong setae either on the anal point itself or at the base.

MALE ($n = 10$ –11, EXCEPT WHEN OTHERWISE STATED)

Length 2.50–3.03, 2.74 mm. Wing length 1.20–1.46, 1.34 mm. Total length/wing length 1.90–2.20, 2.05. Wing length/length of profemur 2.40–2.60, 2.48. Coloration apparently as in *R. claviger* (Townes 1945 p. 158).

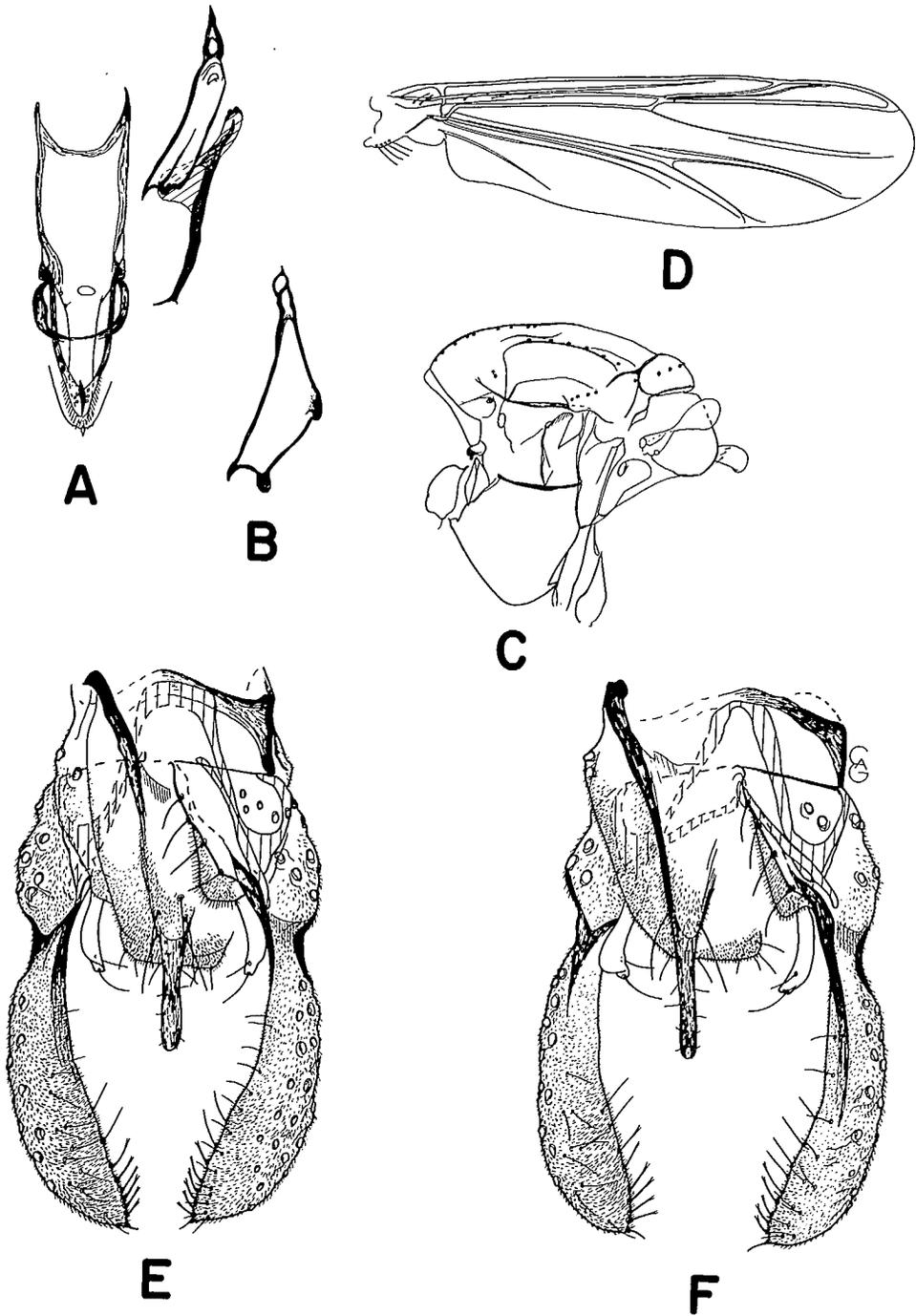


FIG. 47. *Robackia pilicauda* n.sp. male: A, cibarial pump, tentorium and stipes. B, tentorium, different view. C, thorax. D, wing. E-F, hypopygium, variation (E, holotype).

Head — AR = 1.96–2.07, 1.92. Temporals 12–16, 13; inner verticals 2 or 3, 2; outer verticals 3–6, 4; postorbitals 5–9, 7. Clypeus with 9–14, 12 setae. Cibarial pump, tentorium, and stipes as in Fig. 47A, B. Tentorium 110–132, 122 μm (9) long. Stipes 108–128, 115 μm long. Palp lengths (μm): 22–36, 30; 36–58, 46; 96–130, 114; 83–122, 105; 140–188, 164 (8).

Thorax (Fig. 47C) — Antepronotals absent. Dorsocentrals 5–8, 6; acrostichals 5–10, 7; prealars 3–5, 4; parascutellars 1. Scutellum with 5–8, 7 setae.

Wing (Fig. 47D) — VR 1.08–1.15, 1.12. Brachiolum with 2 or 3, 2 setae; R with 2–6, 3 setae; R_{4+5} with 1 or 2, 1 setae at apex. Squama with 4–8, 6 setae.

Legs — Middle and hind tibia each with 2 spurs. Sensilla chaetica absent. Lengths (μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂
p ₁	478–607, 539	319–411, 362	619–791, 712 (7)	342–435, 402 (7)
p ₂	429–564, 487	399–527, 463	227–282, 254	117–153, 136
p ₃	454–601, 523	515–675, 599	343–466, 408	190–233, 216
	ta ₃	ta ₄	ta ₅	
p ₁	245–313, 291 (7)	178–227, 208 (7)	86–115, 96 (7)	
p ₂	76–106, 86	43–63, 50	37–48, 41	
p ₃	141–184, 162	76–98, 84	43–60, 50	
	LR	BV	SV	BR
p ₁	1.81–1.94, 1.90 (7)	1.58–1.74, 1.66 (7)	1.28–1.34, 1.31 (7)	2.38–2.70, 2.53 (7)
p ₂	0.53–0.57, 0.55	3.58–4.09, 3.87	3.57–3.95, 3.74	3.00–4.64, 4.03
p ₃	0.66–0.70, 0.68	2.88–3.16, 3.01	2.64–2.88, 2.75	4.73–6.69, 5.70

Hypopygium (Fig. 47E, F) — Ninth tergum with 3–6, 4 strong setae (longer than 25 μm long) at base or on anal point and 7–12, 9 ventral setae. Anal point 74–100, 85 μm long; with 5–10, 8 very weak (less than 10 μm long) setae. Anal point 1.03–1.14, 1.09 times as long as phallapodeme. Phallapodeme 70–96, 80 μm long. Transverse sternapodeme 18–38, 25 μm long. Superior volsella with 2 apical setae not in distinct pits. Gonocoxite 110–120, 116 μm long. Gonostylus 154–180, 168 μm long. HR = 0.67–0.74, 0.69; HV = 1.54–1.72, 1.64.

REMARKS

The species is very closely related to *R. claviger*. The differences in size and number of setae may not hold up when a larger number of specimens is examined. However, the relatively longer and less spatulate anal point in *R. pilicauda* indicates that the species is more than a Palaearctic subspecies of *R. claviger*.

MATERIAL EXAMINED

Holotype: male, 350 m above sea level, light trap, Gevgelija, Yugoslavia, 41°09'N, 22°30'E, 6/7/76, W. Bestler (Zoologisches Sammlung des Bayerischen Staates). Paratypes: 10 males, as holotype.

Demicryptochironomus Lenz

(Fig. 48)

Schadinia Lipina, 1939: 107 (new genus name in English summary, description p. 98), (proposal of suppression in preparation)

Demicryptochironomus Lenz, 1941b: 34, 1954–62: 222, 1960a (formally a junior synonym)

Type species: *Demicryptochironomus vulneratus* (Zett.)

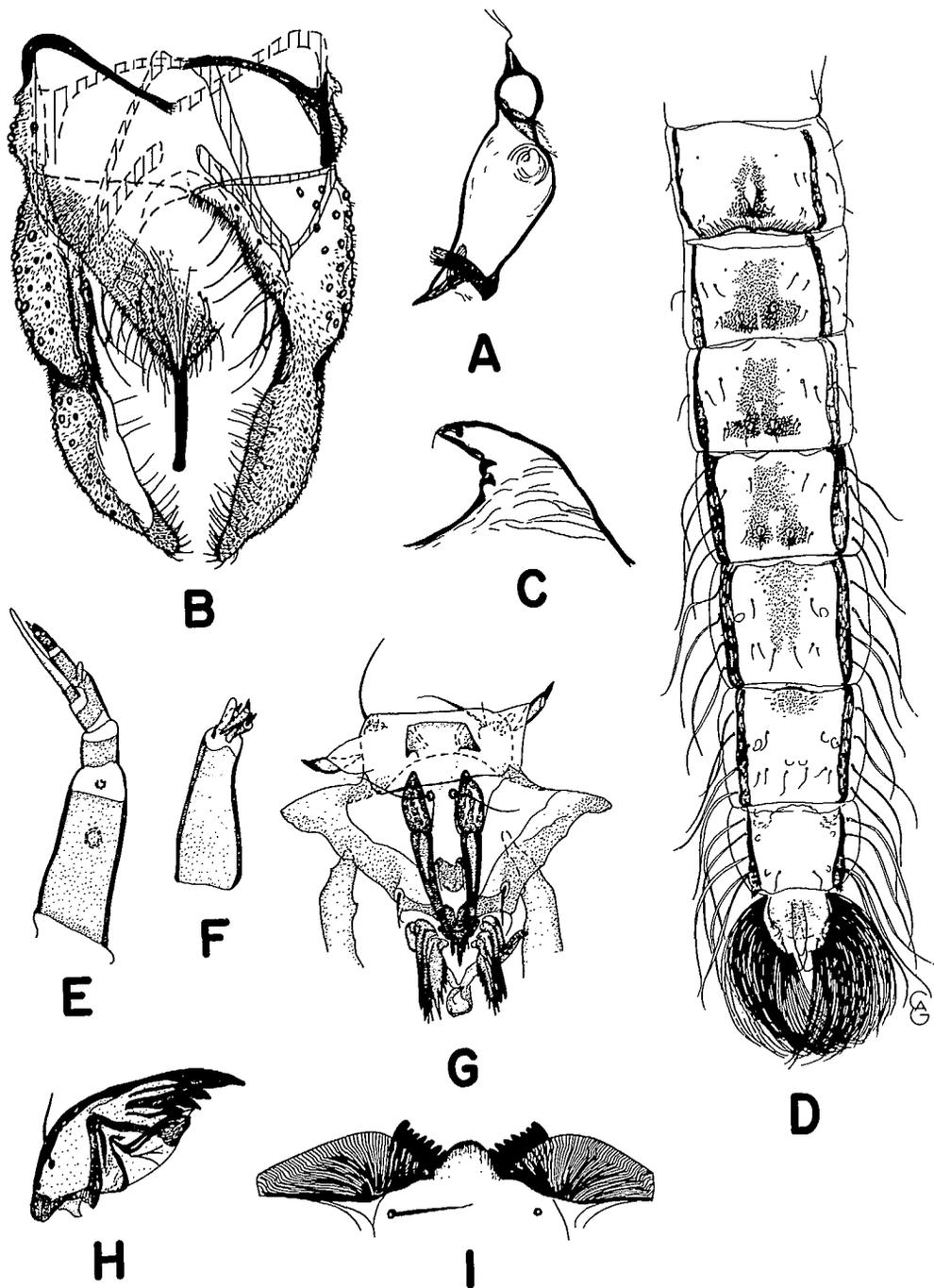


FIG. 48. *Demicroptochironomus cuneatus* (Town.) n.comb. A-B, male: A) tentorium, B) hypopygium. C-D, male pupa: C) cephalic tubercle, D) abdomen. E-I, larva: E) antenna, F) maxillary palp, G) labrum and palatum, H) mandible, I) mentum.

MALE

Medium to moderately large species with greenish abdomen and greenish to blackish thorax; AR = 2.0–4.0; frontal tubercles present; scutum without median tubercle; acrostichals present; middle and hind tibia each with 2 spurs; anal point long, on cuneate or occasionally more rectangular base; gonostylus long, straight, or slightly concave on inner margin, inner margin without expansion, outer margin convex, whole gonostylus banana-shaped; superior volsella digitiform or occasionally divided with dorsal part covering ventral part, with 2 or 3 apical setae and no apical microtrichia; inferior volsella absent; other characteristics as in the *Harnischia* complex as a whole.

IMMATURE STAGES

See Fig. 48C–I and Lenz (1954–62 p. 222).

Key to known males

- 1 Superior volsella with 3 apical setae, short, divided with dorsal part covering ventral part (perhaps undivided in *D. curtivalvus* (Kieff.) n.comb.), at least with basal microtrichia 2
Superior volsella with only 2 apical setae, relatively long, undivided, without microtrichia 4
- 2 Anal point spatulate; AR about 2.0 *D. curtivalvus* (Kieff.) n.comb. (Australia) (FREEMAN 1961 fig. 21f)
Anal point not spatulate; AR about 4.0 3
- 3 LR₁ about 1.25; superior volsella with apical microtrichia
..... *D. vulneratus* (Zett.) (Palearctic) (LEHMANN 1971 fig. 26)
LR₁ about 1.5–1.6; superior volsella without apical microtrichia
..... *D. ploenensis* Lenz (Palearctic) (LENZ 1960a fig. 1)
- 4 Base of anal point with shoulders making base partly rectangular; inner margin of gonostylus essentially straight *D. cinereithorax* (Goetgh.) n.comb. (Ethiopian) (FREEMAN 1957 fig. 11H)
Base of anal point distinctly cuneate; gonostylus inner margin distinctly concave 5
- 5 Base of anal point large, about $\frac{3}{4}$ as long as anal point; AR about 3.3
..... *D. cuneatus* (Town.) n.comb. (Nearctic) (FIG. 48A, B)
Base of anal point small, less than $\frac{1}{2}$ as long as anal point; AR about 2.3
..... *D. fastigatus* (Town.) n.comb. (Nearctic) (TOWNES 1945 fig. 187)

Gillotia Kieffer

Gillotia Kieffer, 1921a: 272, 1921c: 31, 1922: 62; Freeman 1977
Chironomus, Malloch 1915: 468, pro parte, nec Meigen
Harnischia (*Harnischia*), Townes 1945: 165, pro parte, nec Kieffer
Chironomus (*Cryptochironomus*), Freeman 1957: 391, pro parte

Type species: *Gillotia trifida* (Freem.) (syn. *Chironomus fuscipes* (Kieff.) preocc.) by monotypy.

MALE

Medium size, light greenish to brown colored species; 11 flagellomeres; AR 2.8-4.0; frontal tubercles absent; acrostichals present, scutum with central protuberance; dorsocentrals uniserial to biserial; middle and hind tibia each with 2 spurs; gonostylus pointed, with straight inner margin and a slightly convex outer margin without any median constrictions or curvatures; T IX with sharp caudolateral projections; superior volsella without apical microtrichia, with 1 or 2 setae; inferior volsella lobelike, with 1-3 apical setae; other characteristics as for the *Harnischia* complex as a whole.

PUPA

Thoracic horn with at least 50 branches; cephalic tubercles short, conical, with preapical seta about 1/4 as long as total length; thorax rugulose; row of hooklets on T II uninterrupted, wider than half the width of the tergite; strong and extensive shagreenation on T II-VI; filamentous L-setae on segments V-VIII as 4, 4, 4, 5; caudolateral corners of T VII with a strong, single spine; genital sheath of male with 5-7 strong, brown, apical spines.

LARVA

Antenna less than 1/3 as long as head capsule, with 5 segments, antennal blade placed 2/3 from base of second antennal segment; labral sensilla 3-segmented; S II of labrum relatively long and bladelike; S I and S III apparently reduced; premandible with 6 teeth; epipharyngeal pecten consisting of 3 blades fused at base; basal segment of maxillary palp about 0.7 times as long as basal antennal segment, about 3 times as long as wide; mentum with wide, pale, convex median tooth and 7 dark pairs of free, pointed, lateral teeth; ventromental plates about 2.5 times as long as wide; procerci lower than wide; supraanal seta about half as long as anal setae; rest of abdomen not known.

REMARKS

The larva of the genus is intermediate between *Demicryptochironomus* and *Cryptochironomus*, the pupa is close to *Demicryptochironomus*, but with a shagreenation about as extensive as in *Robackia* and very characteristic spines at apex of the genital sheaths. The male imagines most resemble *Cyphomella*. The labrum and the mentum of the larva are of *Demicryptochironomus* type and this is probably the closest related genus as other characteristics the genus may have in common with *Cryptochironomus*, *Robackia*, and *Cyphomella* are more likely to be sympleiomorphic features.

Key to males

- 1 Caudolateral extensions of T IX far lateral, each with 2 apical setae; AR about 4.0
..... *G. trifida* (Freem.) (Sudan)
(FREEMAN 1957 fig. 11g)
- Caudolateral extensions of T IX close to anal point, pointed, with several setae; AR
about 2.8 *G. alboviridis* (Mall.) n.comb. (Nearctic)
(TOWNES 1945 fig. 133)

Gillotia alboviridis (Mall.) n.comb.
(Fig. 49)

Chironomus alboviridis Malloch, 1915: 482
Harnischia (Harnischia) alboviridis (Mall.), Townes 1945: 165

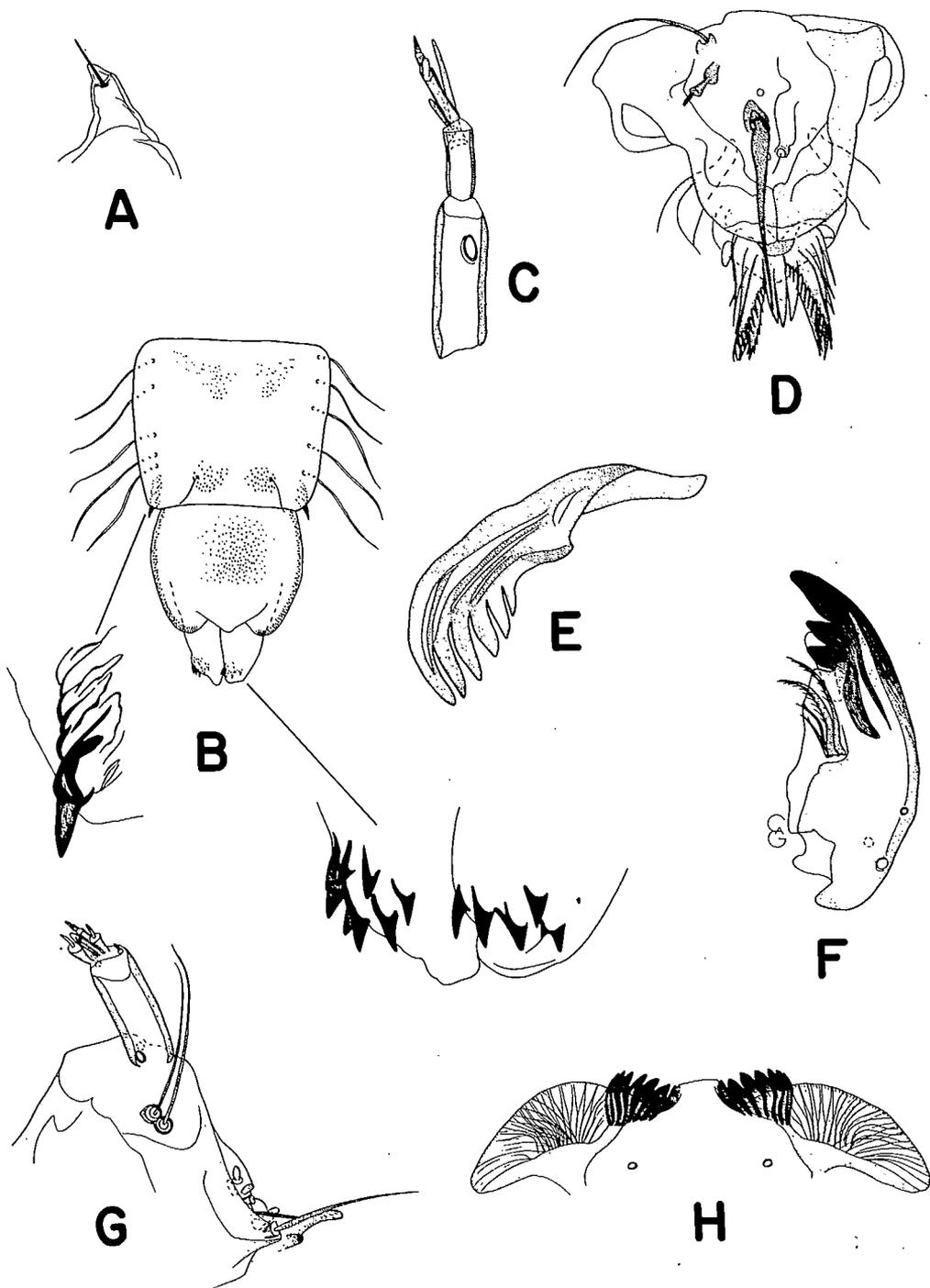


FIG. 49. *Gilletia alboviridis* (Mall.) n.comb. A-B, pupa: A) cephalic tubercle, B) T VIII-IX. C-I, larva: C) antenna, D) labrum and palatum, E) labral sensilla, F) premandible, G) mandible, H) maxillary palp, I) mentum.

The material examined consists only of a badly broken, nearly mature male pupa reared from larva. The only information that can be given in addition to Townes' redescription is that long and strong acrostichals are present. The hypopygium is partly lateral. However, its very characteristic shape (Townes 1945 fig. 193) makes the identification nearly certain. The inferior volsellae, however, appear to have 3 rather than 1 apical seta.

PUPA ($n = 1$)

Total length 5.12 mm.

Cephalothorax — Thoracic horn with numerous branches. Cephalic tubercles (Fig. 49A) 58 μm high, 40 μm wide at base, with a 20 μm long preapical seta. Thorax rugulose.

Abdomen — Shagreenation as in generic diagnosis. Row of 98 hooklets on T II. Caudolateral corners of segment VIII (Fig. 49B) with a single, 60 μm long, spur. Anal lobe with 81 filamentous setae in fringe. Genital sheath (Fig. 49B) with 5–8 brown, strong, 16–34 μm long, apical spines.

LARVA ($n = 1$)

Head capsule about 0.33 mm long.

Head — Antenna as in Fig. 49C. Lengths of antennal segments (μm): 50, 29, 20, 4, 6. AR = 0.85. Basal antennal segment 18 μm wide, ringorgan 32 μm from base, basal setal mark 3 μm from base. Antennal blade 35 μm long, situated $\frac{3}{4}$ from base on second segment. Apical style of second segment 11 μm long. Labrum and palatum as in Fig. 49D. Labral sensilla 3-segmented. Premandible (Fig. 49E) 76 μm long with 6 teeth. Mandible (Fig. 49F) 106 μm long, with 3 pointed teeth; seta interna consisting of 2 long, weakly serrated setae and 2 short, apically serrated setae. Maxillary palp as in Fig. 49G, basal segment 34 μm high, 12 μm wide. Length of basal segment of maxillary palp/length of basal segment of antenna 0.7/1.0. Mentum as in Fig. 49H. Postmentum 130 μm long.

Abdomen — Procercus 18 μm high; 23 μm wide; with 7, up to 613 μm long, anal setae. Supraanal seta about 310 μm long. Rest of abdomen unknown.

MATERIAL EXAMINED

Damaged nearly mature pupa with larval exuvium, Neosho River, Coffey Co., Kans., 10/8/76, D. L. Andersen.

DISTRIBUTION

Townes (1945: 166) and Sublette and Sublette (1965: 166) mention the species from Illinois, Iowa, and Oklahoma, in addition to the above new record from Kansas.

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