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Chironomidae from Ethiopia, Part 2. Orthocladiinae with two new species and a key to *Thienemanniella* Kieffer

(Insecta, Diptera)

By **A. D. Harrison**

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Males, females, pupae and larvae of Orthocladiinae found in the Ethiopian Highlands and Rift Valley lakes, are described. The known species are: *Bryophaenocladius brincki* (Freeman), *Corynoneura dewulfi* Goetghebuer, *Cricotopus albitibia* (Walker), *Cricotopus bizonatus* Freeman, *Cricotopus dibalteatus* Freeman, *Cricotopus flavozonatus* Freeman, *Cricotopus harrisoni* Freeman, *Cricotopus scottae* Freeman, *Limnophyes minimus* (Meigen), *Limnophyes natalensis* Kieffer, *Paratrichocladius micans* (Kieffer), *Paratrichocladius pretorianus* (Freeman), *Pseudosmittia guineensis* (Kieffer), *Pseudosmittia rectilobus* (Freeman), *Smittia maculipennis* Goetghebuer, *Thienemanniella lineola* Freeman, *Thienemanniella safi* Lehmann.

In addition, two new species are described: *Chaetocladius awasae*, from males and females, and *Cricotopus unizonatus* from males, females, pupae and larvae.

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Introduction

This paper is the second in the series on Chironomidae collected in Ethiopia; the first was on the Tanypodinae (Harrison 1991).

Freeman & Cranston (1980) list Orthocladiinae of Sub-Saharan Africa; most of the males of these are described and illustrated by Freeman (1953, 1956). Lehmann (1979, 1981) gives more details of some of these, and also describes further species, and some females and pupae. Harrison (in press) includes Ethiopian material in a paper on the genus *Nanocladius* from Africa south of the Sahara.

Males, females, pupae and larvae of known species, and a detailed description of two new species are given in the present paper. Specimens were collected by the author and colleagues from the Biology Department, Addis Ababa University (Harrison 1991). The ecological background is given in Harrison & Hynes (1988), Tilahun Kibret & Harrison (1989), and Tesfaye Berhe, Harrison & Hynes (1989).

Short notes only are given for *Cardiocladius* spp., *Parametriocnemus scotti* (Freeman), *Rheocricotopus capensis* (Freeman) and *Tvetenia calvescens* (Edwards), as this material was sent to Drs. O. A. Saether and G. A. Halvorsen who are revising these genera.

Methods

Adults were caught by sweeping vegetation along stream and river banks and lakeshores, or by sweeping through swarming males; many were caught at lights at night. Running water species were bred out in an aquarium in the laboratory at Addis Ababa. A number of valuable specimens were found drowned in streams and rivers. Larvae and pupae were collected during river and lake survey programmes.

Most specimens were mounted in Canada Balsam dissolved in Cellosolve, or in Euparal[R]. Measurements were made with an eyepiece micrometer, and all drawings with a drawing tube on the microscope.

Generic definitions of females follow the models of Saether (1977); pupal descriptions follow Coffman, Cranston, Oliver & Saether (1986) and Langton (1984); larval descriptions follow Cranston, Oliver & Saether (1983). Hirvenoja (1973) is the basic reference for the section on the genus *Cricotopus*. Morphological terminology is from Saether (1980).

Station numbers (ET) given in the text are those of Harrison & Hynes (1989), who give site descriptions and map references.

Types and paratypes of the new species are deposited in the Zoologische Staatssammlung, Munich.

Bryophaenocladius (Odontocladius) brincki (Freeman)

Chaetocladius brincki Freeman, 1956; *Bryophaenocladius (Odontocladius) brincki,* Lehmann 1979; Freeman & Cranston 1980.

The male of this species has been described by Freeman and a good description of the male palp, wings and hypopygium is given by Lehmann (1979). Extra details of the Ethiopian specimens are given here.

Adult Male (N = 2 mounted)

Wing length. 1.6 mm.

Colour. Head, thorax and abdomen dark brown.

Head. AR 1.5. Setation: Outer verticals 4, inner verticals 4, clypeals 4. Palp segments 32, 35, 138, 127, 115 μm, tooth like projection on apex of segment 3. (Lehmann 1979, labels this segment as 2, as he does not count the basal segment as 1).

Thorax. Setation: Lateral antepronotals 4, dorsocentrals 15, posterior prealars 3, scutellars 4 per side.

Wings. Anal lobe obtuse, costa slightly produced. Setation: Brachiolum 1, R 12, R_1 3, R_{4+5} nil, squama 4.

Legs. LR fore 0.61, mid 0.53, hind 0.60, hind tibia with strong comb. No sensilla chaetica.

Hypopygium. As in Lehmann (1979) small, rounded inferior volsella projection with strong setae mostly at the tip.

Specimens examined. 2 males netted in woodland near Lake Awasa. 84.5.27 and 85.9.15; coll. ADH.

Comments. The unusual palp segment 3 seems to be a useful feature for distinguishing this species from others.

Ecology. The collection site suggests that the larvae live in damp soil like others of the genus.

Distribution. Southern Cape Province, S. Africa, Zaire, Kenya and the Ethiopian Rift Valley.

Cardiocladius spp.

Most specimens of *Cardiocladius,* coll. ADH, were sent to Dr. O. A. Saether, to be included in a revision of the genus which he and G. A. Halvorsen are producing. According to Dr. Saether (personal communication), the collection included both *C. oliffi* Freeman and *C. africanus* Freeman.

Freeman (1956) illustrates the male hypopygia of both of these species. The larvae collected from the Ethiopian Highlands were very similar to those illustrated for the genus by Cranston et al. (1983) except that labral seta S I is palmate, not simple.

Specimens examined. Adults: 1 male and 1 female downstream from ET. 2 C, 85/10/21. Pupa: 1 with pharate male, ET. 20, 84/1/20. Larvae: numerous, from streams and rivers on both sides of the Rift Valley. Coll. ADH.

Ecology. Larvae were caught in stony rapids.

Distribution. *C. oliffi* from Natal, South Africa, and Ethiopia; *C. africanus* from Natal, Zaire and Ethiopia.

Chaetocladius awasae, spec. nov.

Types. Holotype: ♂, Ethiopia, Lake Awasa, 84/5/27, in copula with ♀ paratype (ZSM). – Paratype: ♀, same data, in copula with ♂ holotype (ZSM).

Males and females could be associated as 2 pairs were found in copula.

Adult Male (N = 5 mounted)

Wing length. 1.5 mm.

Colour. Head dark brown, antennae and palps brown. Thorax brown, scutal stripes fused; legs brown, halteres brown. Abdomen and hypopygium brown.

Head. AR 0.6. Setation: Outer verticals 4, inner verticals 8, clypeals 6. Palp segments: 25, 46, 85, 78, 104 μm.

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 8, posterior prealars 3, scutellars 3 per side.

Wings (Fig. 1). Anal lobe produced, costa moderately produced (by about 90 μm), anal vein reaching just beyond fork, moderately large microtrichia on membrane giving a granular appearance. Setation: Brachiolum 1, R 6, R_1 nil, R_{4+5} nil, squama 6.

Legs. LR fore 0.69, mid 0.57, hind 0.59, no sensilla chaetica.

Hypopygium (Figs 2, 3 & 4 – aspect during copulation). Anal point long and pointed, with no setae, microtrichia extend about halfway to tip, tergite XI 16–20 setae, lateral tergite IX with 8 setae; virga well-developed, with about 8 straight rods attached anteroventrally (Fig. 4); superior volsella with no obvious external projection; inferior volsella projection peg-like, with one seta, lying caudally; gonostylus (Fig. 3) with strongly chitinized lateral keel, crista dorsalis well-developed, partially obscuring large apical spine (megaseta), most setae on ventral side.

Adult Female (N = 2 mounted)

Wing length. 1.2 mm.

Colour. Head light brown, antennae and palps light brown. Thorax light brown, scutal stripes darker and well separated, legs very light. Abdomen light brown.

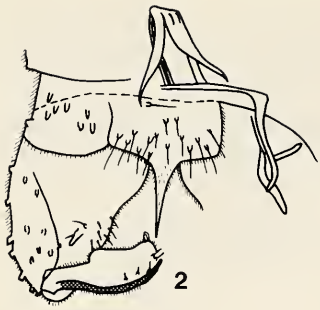
Head. AR 0.6, 5 flagellomeres. Setation: Outer verticals 4, inner verticals 4, clypeals 12. Palp segments: 23, 37, 78, 69, 99 μm.

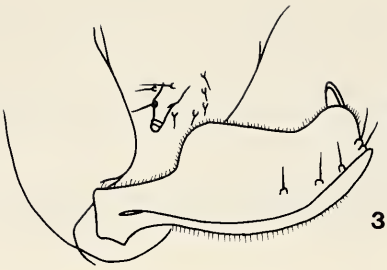
Thorax. Setation: Lateral antepronotals 3, dorsocentrals 14, posterior prealars 6, scutellars 3 per side.

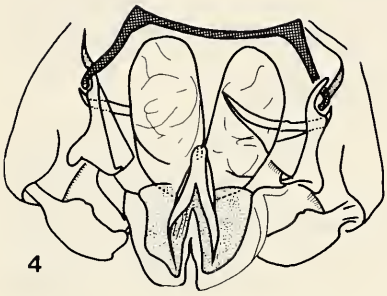
Wings. Similar to male, anal lobe slightly produced, almost obtuse. Setation: Brachiolum 1, R 13, R_1 4, R_{4+5} 12, squama 4.

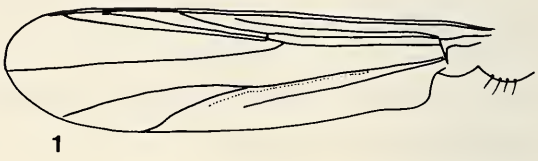
Legs. LR fore 0.64, mid 0.44, hind 0.52. No sensilla chaetica.

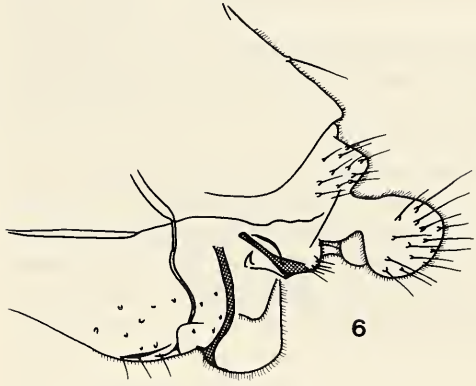
Genitalia (Figs 5, 6). Gonapophysis VIII widely divided with large ventrolateral lobe and small dorsomesal lobe (left of Fig. 5), small apodeme lobe present; gonocoxapodeme narrow, coxosterna-

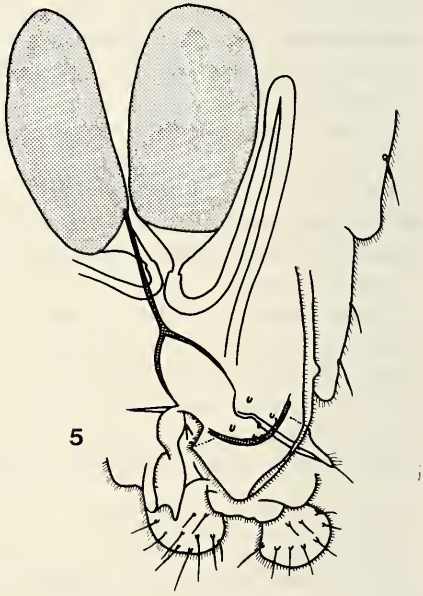












Figs 1–6. *Chaetocladius awasae*. Adult: 1. ♂ Wing. 2. Hypopygium. 3. ♂ Gonostylus. 4. ♂ Virga. 5. ♀ Genitalia ventral. 6. ♀ Genitalia lateral.

podeme almost straight. Tergite IX undivided, left and right setal patches well-separated but not on protrusions, gonocoxite IX small, flattened and not free dorsally, with 7 setae, 6 caudo-ventral and 1 caudo-dorsal. Cerci almost spherical, 74 μm long, 0.44 × length of seminal capsule which is brown, very large and elongated, 168 μm long with small neck, spermathecal ducts glandular, with long oral loop, up to ¾ length of capsule, duct narrows after passing ramus (Fig. 6), no bulb discernible.

Specimens examined. About 50 males and 2 females swarming near Lake Awasa among trees, 84/5/27; coll. ADH.

Comments. This species seems to fit into *Chaetocladius* as the wing membrane is coarsely granular, vein Cu_2 is only slightly curved and the anal point is long and without lateral setae. It differs from *C. melaleucus*, the only other species reported from sub-Saharan Africa, which has a gonostylus without a strong keel, and the dorsal part of the inferior volsella borne on a large gonocoxite lobe.

Ecology. The collecting site indicated that the larvae live in damp soil; they were collected during the rainy season.

Distribution. Known only from Awasa, Ethiopian Rift Valley.

Corynoneura dewulfi Goetghebuer

Corynoneura dewulfi, Freeman 1956; Lehmann 1979.

Adult Male (N = 6 mounted)

Freeman (1956) describes the antennae, wings and hypopygium and shows how the three known African species can be differentiated on the structure of the last flagellomere and the apodemes. Lehmann (1979) describes the wings, the tip of the hind tibia with S-shaped apical setae and also the hypopygium in some detail. The following details are not given by previous authors:

Wing length. 0.9 mm.

Head. AR 0.3, 9 flagellomeres, apical one clubbed with terminal rosette of short setae as in Freeman (1956). Setation: Outer and inner verticals nil, clypeals 6. Palp segments: 13, 13, 16, 23, 46 μm.

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 7, posterior prealars 2, scutellars 1 per side.

Wings. As illustrated by the above authors. Setation: Brachiolum 1, all R veins nil, squama nil.

Legs. AR fore 0.50, mid 0.61, hind 0.60; hind leg: Tibia with conspicuous projection for comb with S-shaped seta terminally, inner side of tarsomere 1 with a row of 7 short robust setae. No sensilla chaetica.

Hypopygium (Fig. 7): The ventral view is illustrated by Freeman and Lehmann. The Ethiopian specimens also had the long points of the phallapodeme protruding posteriorly alongside the inner edges of the gonocoxites. In addition, the Ethiopian specimens show that the enlarged phallapodeme and the lateral sternapodeme protrude just below laterosternite IX (Fig. 7).

Adult Female (N = 4 mounted)

Wing length. 0.63–0.96 mm.

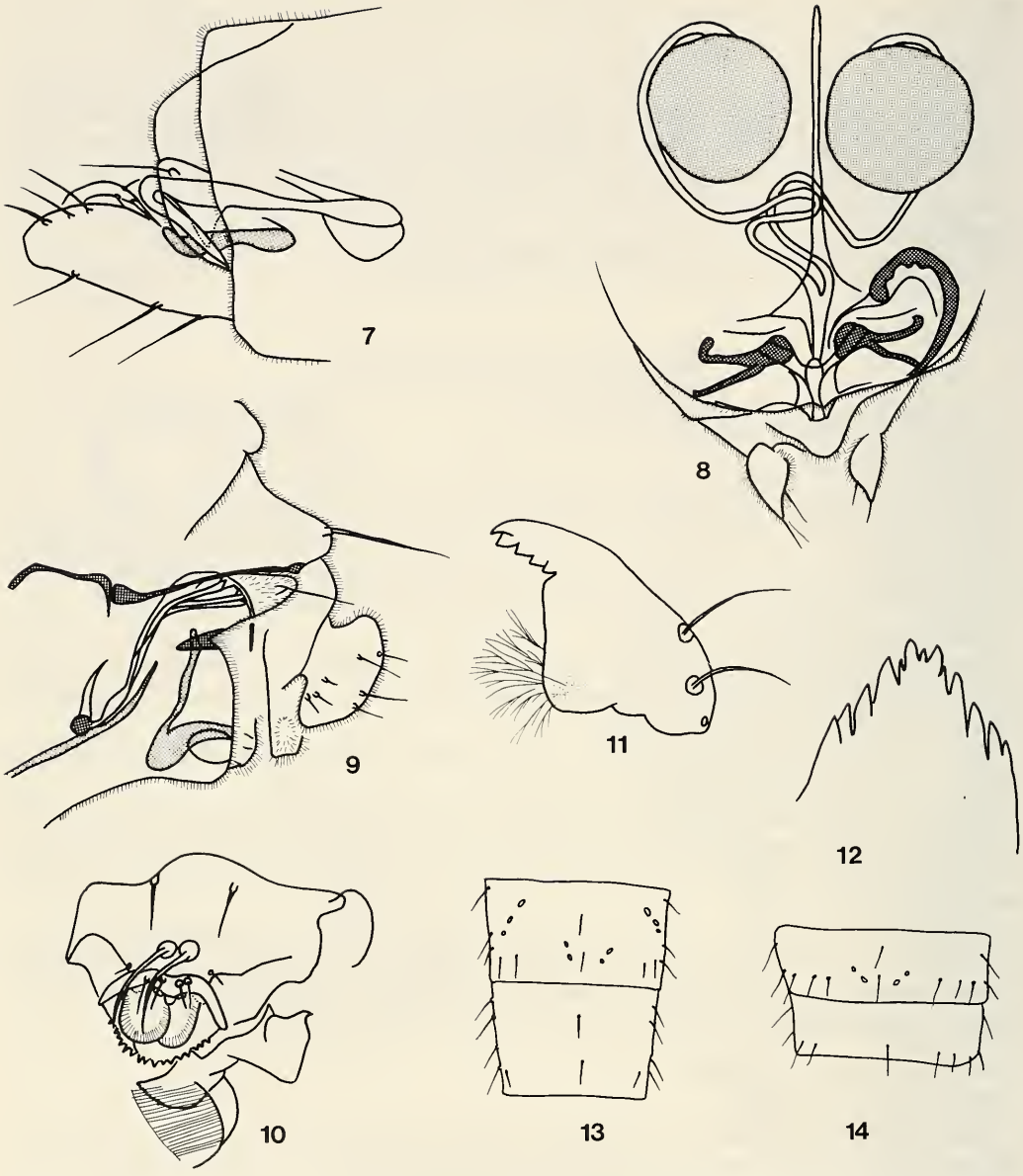
Head. AR 0.34. 5 flagellomeres, apical with corona of setae about 0.6 length of flagellomere. Setation: Outer and inner verticals nil, clypeals 6. Palp segments: 14, 14, 16, 21, 37 μm.

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 7, posterior prealars 2, scutellars 1 per side.

Wings. Similar to male. Setation: Brachiolum nil, no setae on R veins, squama nil.

Legs. Similar to male, LR fore 0.48, mid 0.68, hind 0.61. No sensilla chaetica.

Genitalia (Figs 8, 9). Lehmann (1979) gives some details of the genitalia but this is a fuller account. Similar to definition; gonopophysis VIII undivided, apodeme lobe very large and strongly chitinized, gonocoxapodeme fairly straight; tergite IX with caudal concavity (not in figures) and one seta per side, gonocoxite IX long and narrow with one seta; coxosternapodeme large, structure difficult to discern, the two coxosternapodemes appear to lie in the domed roof of the genital cavity with chitinized lamellae protruding into the cavity, these lamellae appear to be joined, in some way, to



Figs 7–12. *Corynoneura dewulfi*. Adult: 7. Hypopygium. 8. ♀ Genitalia, ventral. 9. ♀ Genitalia, lateral. Larva: 10. Labrum. 11. Mandible, 12. Mentum.
Figs 13–14. *Cricotopus albitibia*. Abdominal tergites III & IV: 13. ♂. 14. ♀.

the walls of the cavity (Fig. 9). Segment X and postgenital plate well-developed, cerci small (8 μm). Labia fused, membranous centrally but strongly chitinized laterally. Seminal capsules (8 μm) spherical, brown, no distinct neck, mouth placed orally; spermathecal ducts large, somewhat coiled, joining to a common duct before discharging into the genital cavity. The common duct appears to be surrounded by a sheath, also noted by Lehmann (1979).

Pupa

None found, but Lehmann illustrates a pupa similar to those in Coffman et al. (1986) with lamellate anal and L setae.

Larva

Similiar to diagnosis in Cranston et al. (1983).

Head capsule. Length 240 μm. With surface sculpturing, similar to that of *C. scutellata* Winnertz (Cranston et al. 1983).

Colour (preserved specimens). Head light, antennal segment 1 light, others dark. Body light brown, anterior and posterior claws and procercal setae light.

Antenna. 1.02 × length of head capsule, 4 segments, 1 120 μm, 2 48 μm, 3 58 μm, 4 3 μm; ring organ with median spine 0.42 from base of segment 1; blade slightly curved, about 35 μm long.

Labrum (Fig. 10). S setae simple, one strongly developed pair appear to be S III; spines of pecten epipharyngis small and shape obscure, first chaetulae lateralis obscure, shown in Fig. 10 with a dotted line. Two outer chaetulae lateralis enlarged and flattened, anterior pair plumose, posterior pair overlapping and serrate. Premandible with large colourless and transparent brush and with small teeth.

Mandible (Fig. 11). Apical tooth sub-equal to subapical tooth, seta subdentalis absent, seta interna well-developed.

Mentum (Fig. 12). Triangular shaped, median tooth much smaller than first lateral tooth, second lateral tooth smaller than rest.

Maxilla. Palp normal with sensilla; setae maxillaris numerous and simple; lacinal chaetae large, serrate to almost plumose, but at least one spatulate and simple; chaetulae of palpiger normal.

Body. As for genus; seta from ventral basal side of posterior parapod light brown and simple, 0.36 length of parapod.

Specimens examined: 1 male, Wendo Genet, ET. 3, 83/12/10; 1 male and 3 females Kosso River, ET. 17, 84/1/12; 1 male, Weyb River, ET. 21, 84/1/20; 1 male, Micha stream, ET. 24, 84/1/22; 1 male, Ashilo River, ET. 28, 84/1/24; 3 males and 1 female, Abo River. ET. 2, 84/10/11; 1 male, Abo River, ET. 2, 84/11/8; 2 males and 1 female, Abo River, 85/5; coll. ADH. Larvae from numerous streams and rivers in the Ethiopian Highlands.

Comments. The male gonostyli seem to be too weakly developed to act as proper claspers so it would appear that the enlarged and protruding phallapodemes and the lateral sternapodemes are designed to grip within the genital cavity of the female, possibly assisted by the coxosternapodemes with their chitinized lamellae.

Ecology. Larvae in fast flowing rivers and streams.

Distribution. From Western Cape Province, S. Africa, through central Africa to the Ethiopian Highlands.

Cricotopus albitibia Walker

Cricotopus albitibia, Freeman 1956; *Cricotopus (Cricotopus) albitibia,* Lehmann 1979.

The males and females have been described by Freeman and Lehmann and the latter also described the pupa. The Ethiopian material is used to expand the descriptions of these stages and for a description of the larva.

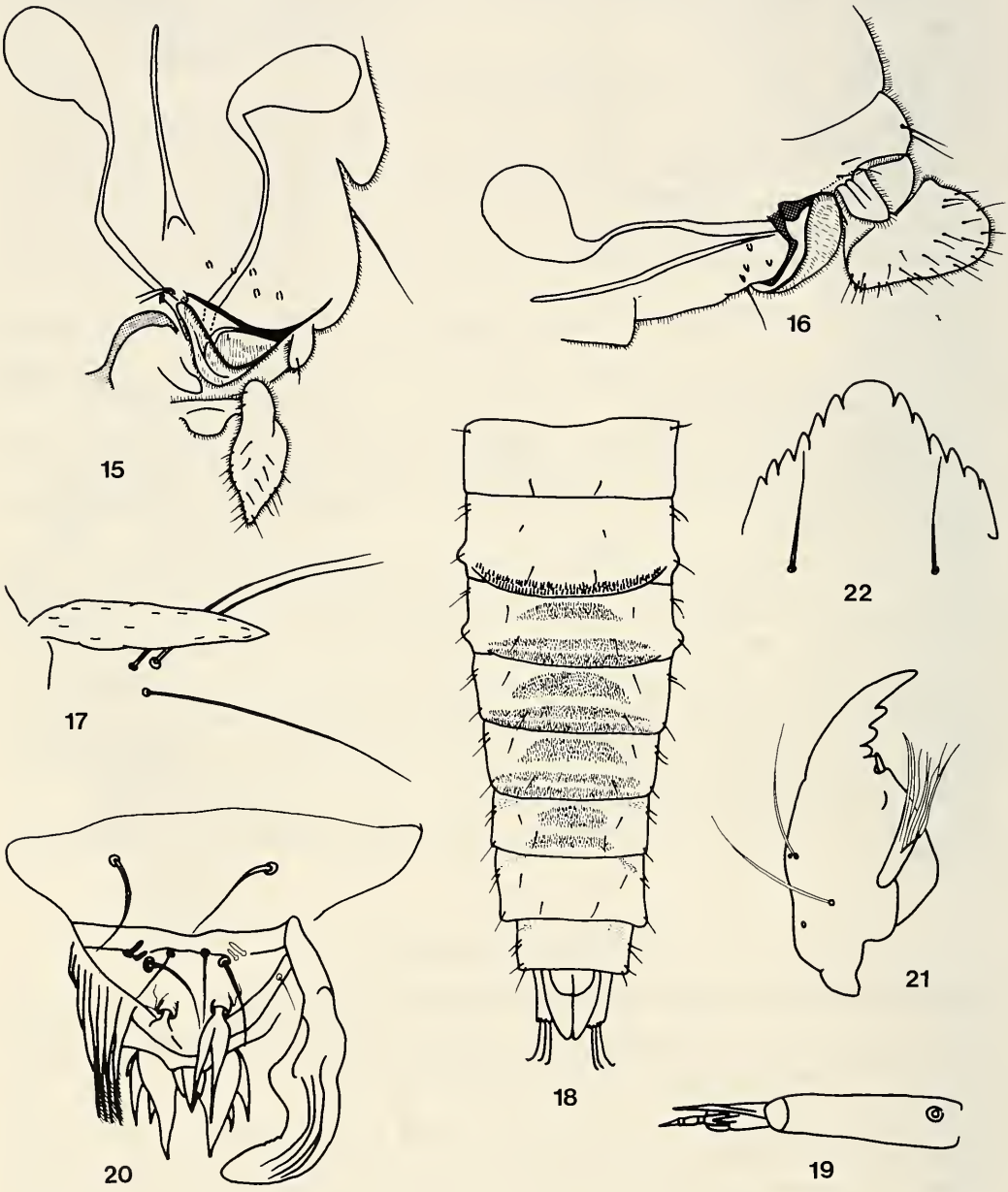
Adult Male (N = 4 mounted)

Wing length. 1.5 mm.

Colour. The Ethiopian specimens are similiar to Walker's type, as described by Freeman, in that the tibia of all legs are white almost to the knees with only narrow darker bands near the tip,

somewhat wider on the anterior leg than the others. Abdomen dark brown with tergite 1, the base of 2 and all of 4 "leaden yellow" (Freeman 1956).

Head. AR 1.2. Setation: Outer verticals 4, inner verticals 1, coronal setae 2 per side, clypeals 10. Palp segments: 32, 35, 81, 104, 127 μm.



Figs 15–22. *Cricotopus albitibia*. Adult: 15. ♀ Genitalia, ventral. 16. ♀ Genitalia, lateral. Pupa: 17. Thoracic horn. 18. Abdomen. Larva: 19. Antenna. 20. Labrum. 21. Mandible. 22. Mentum.

Thorax. Setation: Lateral antepronotals 4, dorsocentrals 20, humerals 0, acrostichals 8, posterior prealars 3, scutellars 4 per side.

Wings. Setation: Brachiolum 1, R nil, R_1 nil, R_{4+5} nil, and squama 4.

Legs. LR fore 0.90, mid 0.47, hind 0.57. Sensilla chaetica on tarsomere 1 of hind leg.

Abdomen. Fig. 13 shows the setation on tergites III & IV; there are only two median setae on each tergite.

Hypopygium. As described by Freeman and Lehmann; dorsal portion of inferior volsella long, curving posteriorly.

Adult Female (N = 7 mounted)

Wing length. 1.4 mm.

Head. AR 0.47. Setation: Outer verticals 4, inner verticals nil, clypeals 18, last flagellomere with long subapical seta. Palp segments: 28, 37, 67, 81, 158 μm.

Thorax. Setation: Lateral antepronotals 2 or 3, dorsocentrals 22, acrostichals 15, humerals 0, posterior prealars 3.

Wings: Setation: Brachiolum 1, R 4 or 5, R_1 nil, R_{4+5} 7, squama 4 or 5.

Legs. LR of fore 0.48, mid 0.48, hind 0.53. Sensilla chaetica on tarsomere 1 of mid and hind leg.

Abdomen. Fig. 14 shows the setation of tergites III and IV; there are two median setae on III and one on IV.

Genitalia (Figs 15 ventral, 16 lateral). Similar to generic description in Saether (1977). Gonopophysis VIII divided into two ventrolateral lobes, anterior portion is well chitinized but posterior portion is more membranous with many microtrichia, anterior portion with oral projection, dorsomedial lobe not apparent. Gonocoxapodeme of VIII and coxosternapodeme of IX well developed; gonocoxite IX small and weakly chitinized with one (or no) seta; segment X normal, postgenital plate small and rounded; cerci 99 μm. Seminal capsules spherical but with very wide necks, 99 μm, duct slightly curved with short, central narrow section, slight bulb before separate openings.

Pupa (N = 1 mounted)

The pupa contained a pharate male of this species.

Cephalothorax. 2 median and 2 lateral antepronotals, dorsocentrals 2 pairs; dorsum finely rugose. The thoracic horn (Fig. 17) is pointed whereas Lehmann's is longer, parallel-sided and blunt.

Abdomen (Fig. 18). Distal patches of anteriorly pointing spines on tergites II–V, that on II of large spines in 2 rows of about 50 each; proximal and distal patches of posteriorly pointing spines on tergites III to VI; small antero-lateral patches of shagreen on VI-VIII. Setation shown in Fig. 18. Pedes spurii B on segments II and III, pairs of pedes spurii A, with anteriorly pointing spines distal on sternites IV-VI.

Larva (N = 10 mounted)

Some of the larvae were collected in the same limited habitat as the pupa. Structure is similar to the generic description in Cranston et al. (1983).

Head capsule. Length 360–390 μm.

Colour. Unmounted larvae are green in life but fade to cream-coloured in spirit and have no obvious markings; the head capsule is creamy yellow with a very thin, dark occipital rim; the anal setae are light.

Antenna (Fig. 19). 5 segments, blade reaches to base of segment V, Lauterborn organs reach to the trip of segment III. Ratio of segments 1–5: 1, 0.23, 0.12, 0.07, 0.07.

Labrum (Fig. 20): S I bifid, remaining setae simple, chaetae serrate to plumose, the central scale of the pecten epipharynx longer than the two lateral scales; first pair of chaetulae laterales much larger than scales and largely covering other chaetulae. Premandible with one apical tooth, brush absent.

Mandible (Fig. 21). Apical tooth shorter or subequal to combined width of three inner teeth, seta subdentalis apically pointed, seta interna large. Outer margin smooth, mola smooth.

Mentum (Fig. 22). One median tooth and 6 laterals, median tooth 3.3 × width of first lateral tooth.

Maxilla. Chaetulae of palpiger somewhat more than 2 × as high as wide with rounded points, lamellae of galea pectinate, lacinal chaetae simple, pecten galearis absent, seta maxillaris simple.

Body. Anterior claws serrate to pectinate, posterior claws simple, abdominal segments with small setal tufts, anal tubercles shorter than post parapods, bluntly pointed.

Specimens examined. 3 males and 5 females, at lights, Lake Langano, 83/3/14; 7 males and 4 females, netted at Lake Awasa, 84/5/27; 1 pupa and 7 larvae, Lake Langano, 84/1; occasional larvae from weed beds at Lake Awasa during survey 1983–84. Coll: ADH.

Ecology. The Lake Awasa larvae were in sparse weed beds subject to some wave action; the Langano specimens were in an algal film on rock near the shore line, subject to wave action. Scott (1958) reported larvae from a sandy bottom with vegetation from the Great Berg River, S. Africa. This species is not found in the torrents of streams and rivers.

Distribution. Most of sub-Saharan Africa (Freeman 1956).

Cricotopus bizonatus Freeman, 1956

Pupae and larvae were associated with adults by means of a pupa, containing a pharate male, with larval head capsule attached.

Adult Male (N = 4 mounted)

Freeman's (1956) description is supplemented as follows:

Wing length. 1.5 mm.

Colour. These Ethiopian specimens resemble those described by Freeman, the first and middle tibia have white rings and the whole of abdominal tergites I and IV and the base of II are light and the hypopygium white.

Head. AR 0.95. Setation: Outer verticals 4, inner verticals 1, coronal setae 2 per side, clypeals 8. Palp segments: 46, 58, 92, 138, 187 μm.

Thorax. Setae, lateral antepronotals 5 (very small), dorsocentrals about 50, humerals nil, acrostichals 14, posterior prealars 3, scutellars 4 per side.

Wings. Setation: Brachiolum 1, setae on R 0, R_1 0, R_{4+5} 0, and squama 4.

Legs. LR of fore 0.60, mid 0.43, hind 0.56. Sensilla chaetica on tarsomere 1 of hind leg.

Abdomen. Fig. 23 shows the setation on tergites III & IV; there are only two median setae on both segments.

Hypopygium. Tergite IX with about 25 setae, lateral tergite IX with 8; the apodemes and inferior volsella are shown in Fig. 24.

Adult Female (N = 3 mounted)

Wing length. 1.3 mm.

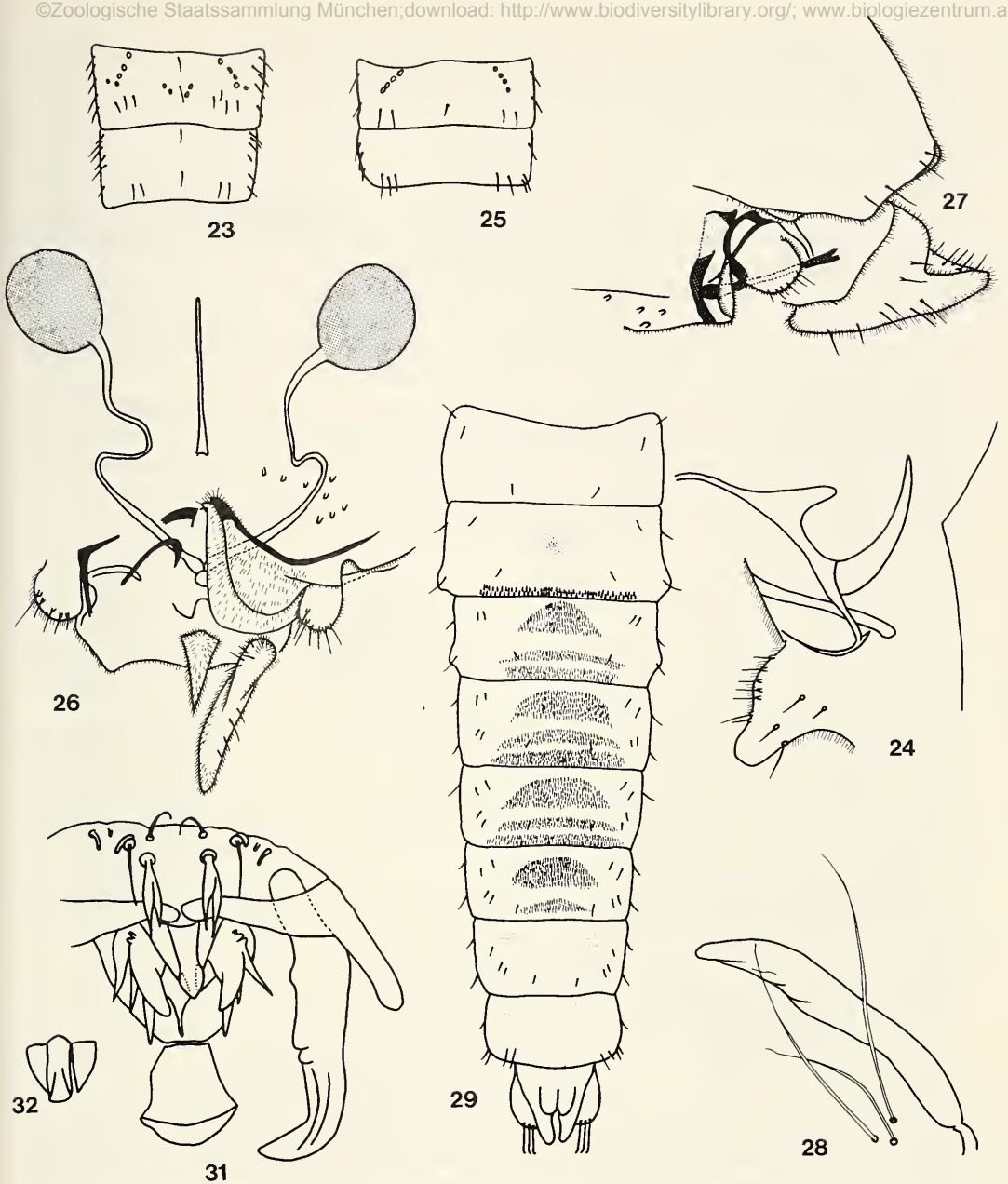
Head. AR 0.45. Setation: Outer verticals 5, inner verticals 1, clypeals 20; flagellomeres 5. Palp segments: 23, 58, 76, 120, 184 μm.

Thorax. Setation: Lateral antepronotals 3 or 4, dorsocentrals 4, acrostichals 28, humerals 0, posterior prealars 4 or 5.

Wings. Setation: Brachiolum 1, R 1 or nil, R_1 nil, R_{4+5} 1 or 2 near tip, squama 7.

Legs. LR fore 0.53, mid 0.41, hind 0.57. Sensilla chaetica on tarsomere 1 of mid and hind legs.

Abdomen. Fig. 25 shows the setation of tergites III & IV; there is only one median seta on tergite III and none on tergite IV.



Figs 23–29, 31–32. *Cricotopus bizonatus*. Adult: 23. ♂ Abdominal tergites III and IV. 24. Hypopygium. 25. ♀ Abdominal tergites III and IV. 26. ♀ Genitalia, ventral. 27. ♀ Genitalia, lateral. Pupa: 28. Thoracic horn. 29. Abdomen. Larva: 31. Labrum. 32. Central scale.

Genitalia (Figs 26 ventral, 27 lateral). Similar to generic description in Saether (1977). Gonopophysis VIII divided into two rounded ventrolateral lobes with antero-lateral portion more strongly chitinized, with oral projection, dorsomedial lobe small (left of Fig. 26), apodeme lobe well-developed. Gonocoxapodeme narrow, coxosternapodeme weak, best seen in lateral view; gonocoxite

IX spherical with about 7 setae; segment X normal, postgenital plate elongated and pointed. Cerci 161 μm; seminal capsules spherical, brown, 81 μm, spermathecal duct with bends, central section narrower, with separate opening.

Pupa (N = 5 mounted)

Body length. 3.3 mm.

Colour: Unmounted specimens greenish in preservative, cephalothorax darker than abdomen, abdominal tergites with narrow posterior dark bands on tergites I–V, tergite VI darker than those posterior. Pigmentation does not correspond with shagreen.

Structure similar to generic description in Coffman et al. (1986).

Cephalothorax. Large frontal setae on frontal apotome, one postorbital seta; thorax with 1 median and 2 lateral antepronotals, thoracic horn long with no spinules, three long precorneals (Fig. 28). Dorsum rugose, dorsocentrals in two pairs, 2nd and 4th small.

Abdomen (Fig. 29). Distal patches of anteriorly pointing spines on tergites II–V, those on II large and in 2 rows; proximal and distal patches of posteriorly pointing spines on tergites III–VI, small anterolateral patches of shagreen on VII & VIII and distal patch on VIII; pedes spurii B on segments II and III; a pair of weakly developed pedes spurii A on sternite VI. Setation as in Fig. 29, setae small and sometimes poorly developed. Anal lobe with 3 subequal megasetae.

Larva. (N = 10 mounted)

Structure similiar to the generic description in Cranston et al. (1983).

Body length. 3.5–5.4 mm.

Colour: Unmounted larvae in spirit: Head capsule dark brown with broad lighter region around the eye, dorsal surface finely rugose. Body greenish with dark bands on posterior third of tergites III–VII, tergite VIII darker than more posterior tergites.

Antenna (Fig. 30). With 5 segments, ratio of segments 1–5 is 1: 0.37: 0.18: 0.16: 0.09. Ring organ on basal third of segment 1. Lauterborn organs very small.

Labrum (Fig. 31). S I bifid, chaetae (not in figure) both serrate and simple; pecten epipharynx consisting of 3 scales, the two lateral scales partially underneath the central scale, (Fig. 32 shows view from underneath deflected scales); first pair of chaetulae laterales subequal in size to scales. Premandible with one apical tooth and no brush.

Mandible (Fig. 33). Apical tooth shorter than combined width of three inner teeth but length varies with degree of wear; seta subdentalis apically pointed, but point sometimes broken off; seta interna present, branched; outer margin crenulate, mola smooth.

Mentum (Fig. 34). One median and 6 pairs of lateral teeth, three middle teeth often worn down, median tooth less than twice the width of first lateral teeth.

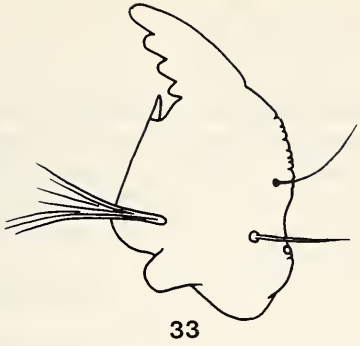
Maxilla. Palpiger with acute triangular chaetulae; lamellae of galea appear to be simple; pecten galearis absent.

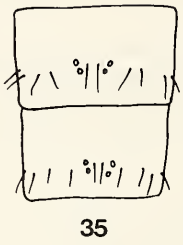
Body. Anterior parapods separate, short claws at base strongly hooked but with extra points making them double or triple hooks; long claws near tip with many small teeth on inner surface, pectinate. Posterior parapods with short, simple, strongly hooked claws; procercus about twice as long as wide, anal tubules subequal to parapods, tips rounded, about 150 μm long and 50 μm wide. Abdominal segments each with one pair of setal tufts.

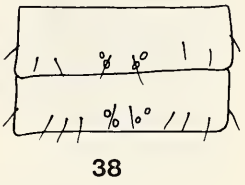
Specimens examined. 27 males and 8 females caught at lights, Addis Ababa, 11/82; 2 males and 1 female, Wabe Shebele River, ET. 30, 84/1/24; 4 males, Abo River, ET. 2 B, 85/5; 3 males, 3 females, Abo-Kebene River below ET. 2 C, bred out from larvae, 85/4 and 85/10/31; coll. ADH & Tesfaye Berhe.

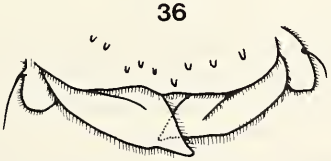
Ecology. All larvae were from stony torrents; mild pollution from the city of Addis Ababa, with high dissolved oxygen levels, led to an enormous increase in the density of larvae and large swarms of adults at lights. See Tesfaye Berhe et al. (1989).

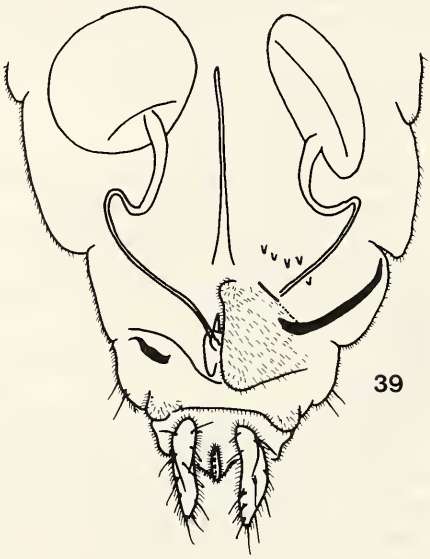
Distribution. Natal and Transvaal, S. Africa, Zaire and Ethiopian Highlands.











Figs 30, 33–34. *Cricotopus bizonatus*. Larva: 30. Antenna. 33. Mandible. 34. Mentum.
Figs 35–39. *Cricotopus dibalteatus*. Adult: 35. ♂ Abdominal tergites III and IV. 36. Hypopygium, tergite IX. 37. Hypopygium, ventral. 38. ♀ Abdominal tergites III and IV. 39. ♀ Genitalia, ventral.

Cricotopus dibalteatus Freeman, 1956

All the stages of this species were associated by means of male and female pupae, containing developing adults, with larval exuviae attached.

Adult Male (N = 4 mounted)

Body length. 1.7–2.25 mm.

Wing length. 1.56 mm (all 4 specimens).

Colour (unmounted specimens). Head mostly yellow but brownish postorbital, antennae and palps brown. Thorax dull (leaden) yellow, stripes dark brown, separate, lateral widely spaced from central, pleura mostly yellow, preepisternum, scutellum and pronotum brown. Leg I: Femur brown, tibia brown with wide white ring, tarsus dark brown, legs II and III uniformly yellowish brown, tarsi slightly darker. Wings with brownish tinge. Abdomen: Tergites I and oral half of II and V leaden yellow, the rest dark brown; hypopygium dull yellow.

Head: AR 0.45–0.46. Setation: outer verticals 6, inner verticals 2, clypeals 9. Palp segments 35, 35, 58, 92, 147 μm.

Thorax. Setation: Lateral antepronotals 6, dorsocentrals 17, acrostichals 18, posterior prealars 5, scutellars 4 per side.

Wings: Anal area moderately developed, costa slightly produced. Setation: Brachiolum 1, R 4 or 5, R_1 1, R_{4+5} 1 or 2 towards tip, some with none, squama 1.

Legs. LR fore 0.62, mid 0.54, hind leg 0.63, sensilla chaetica on tarsomere 1 of hind leg.

Abdomen. Fig 35 shows the setation on tergites III and IV; there is only one lateral seta per side on each segment.

Hypopygium (Figs 36, 37). Fig. 36 shows the characteristic mammae-shaped terminal lobes on tergite IX which has about 9 setae, with one on the lateral tergites. Fig. 37 shows the rest of the hypopygium; in some specimens the inferior volsella is more capitate than in that illustrated. The crista dorsalis is limited to a small flange just dorsal to the megaseta.

Adult Female (N = 1 mounted)

Wing length. 1.55 mm.

Colour. Similar to male.

Head: AR 0.55. Setation: Outer verticals 5, inner verticals 1, clypeals 10; 5 flagellomeres. Palp segments: 35, 32, 60, 85, 156 μm.

Thorax. Setation: Lateral antepronotals 2, dorsocentrals 17, posterior prealars 4, scutellars 6 per side.

Wings. Similar to male but broader. Setation: Brachiolum 1, R 7, R_1 3, R_{4+5} 4 or 5 towards tip, squama 1.

Legs. LR fore 0.58, mid missing, hind 0.56; sensilla chaetica on tarsomere 1 of leg III (leg II missing).

Abdomen. Fig. 38 shows the setation of tergites III and IV which is similar to that of the male.

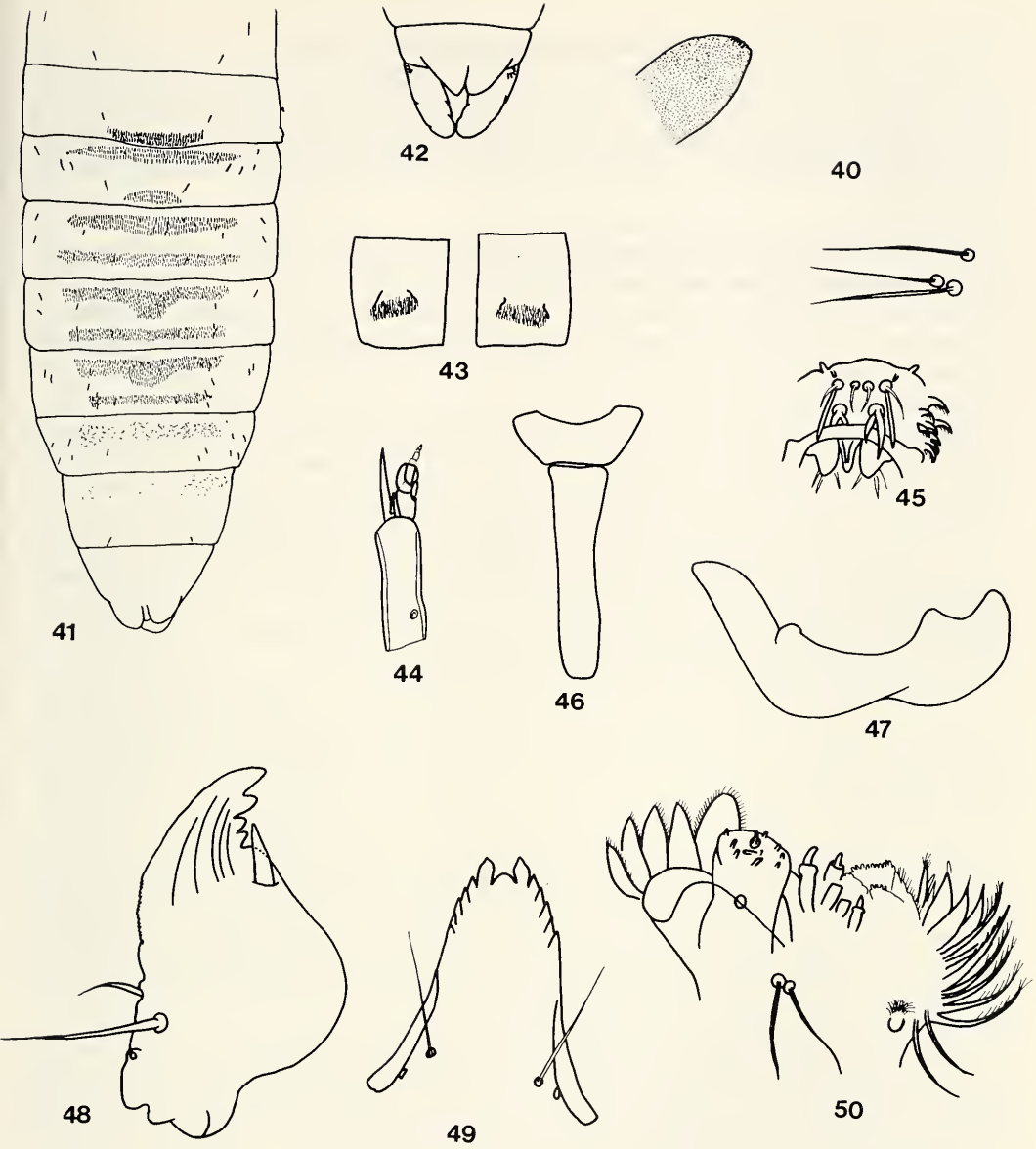
Genitalia (Fig. 39). Similar to generic description. Gonopophysis VIII divided into 2 ventrolateral lobes with weakly developed oral projection, lobes not divided into anterior chitinized and posterior membranous portions, dorsomedial lobes not apparent; coxosternapodeme well developed but gonocoxapodeme of IX small; gonocoxite IX with 2 setae; segment X normal, postgenital plate triangular with oblong ventral projection. Seminal capsules large, greatest diameter 115 μm, 1.4 length of cerci, almost spherical, light in colour, spermathecal ducts with sharp bend, widest third near capsule then narrow to separate openings.

Pupa (N = 2 mounted)

Not following closely generic definition in Coffman et al. (1986).

Length. 3.5 mm.

Cephalothorax. All setae very small, frontal setae on frontal apotome. 2 postorbitals, antepronotals not discerned, dorsocentrals in two pairs of 2, three precorneals. Thoracic horn small (37 μm) (Fig. 40), granular surface with small patch of terminal spines; dorsum finely rugose.



Figs 40–50. *Cricotopus dibalteatus*. Pupa: 40. Thoracic horn. 41. ♀ Abdomen. 42. ♂ Anal lobes. 43. Pedes spurii A. Larva: 44. Antenna. 45. Labrum. 46. Basal sclerite. 47. Premandible. 48. Mandible. 49. Mentum. 50. Maxilla.

Abdomen (Fig. 41). Distal patches of anteriorly pointing spines on tergites II and III, patches of posteriorly pointing spines as follows: one proximal on III, a proximal and distal patch on IV–VI, and proximal patches of very small spines on VII and VIII. All setae (Fig. 41) are very small, there are no setae on the anal lobe in the female (Fig. 41) or the male (Fig. 42). There are pedes spurii B on segment II and large pedes spurii A ventral on segment VI with large black spines (Fig. 43).

Larva (N = 14 mounted)

Not following closely the generic definition in Cranston et al. (1983).

Colour (preserved specimens). Head capsule dark brown to black, including main mouthparts, lighter around the eyes and a lighter dorsal transverse stripe at about one third of length from occiput. Body dark green in life, greenish brown when preserved, with no obvious markings as dorsum fairly uniformly pigmented, anterior claws light brown, posterior claws and anal setae dark brown to black.

Length. Variable to 3.1 mm, head capsule 347 μm.

Antenna (Fig. 44). Short, with 5 segments, ratio 1–5, 1, 0.25, 0.15, 0.08, 0.075.; Lauterborn organs well developed, blade reaches to base segment 5.

Labrum (Fig. 45). S I bifid, other simple, chaetae serrate, seales of pecten epipharynx appear to be fused into one; first pair of chaetulae laterales subequal to fused scale, and covering other chaetulae; ungula slightly U-shaped, basal sclerite large and long (Fig. 46). Premandible with 1 apical tooth (Fig. 47).

Mandible (Fig. 48). Short, apical tooth not much longer than first inner tooth; seta subdentalis pointed; seta interna absent; outer margin finely crenulate; mola smooth.

Mentum (Fig. 49). Long, with U-shaped cross section when in situ, 6 lateral teeth, median tooth much shorter and lighter in colour that first lateral teeth, broken in many specimens.

Maxilla (Fig. 50). Chaetulae of palpiger very large and spindle shaped, one rounded, with setules on margins, no pectinate lamellae on galea, large multilobate sensillae, lacinal chaetae mostly plumose, seta maxillaris simple.

Body. Anterior claws comb-like, posterior claws simple; anal tubercles shorter than post parapods, slightly tapering, tips rounded. No setal tufts on segments.

Specimens examined. 6 males and 1 female, Abo River, below ET. 2 C, bred out in laboratory, 85/10/31; 2 pupae, Abo River, ET. 2, 83/11/17; 5 larvae Abo River, ET. 2, 83/11/17; 4 larvae, Sekord River, ET. 14, 83/12/29; 1 larva, Danka River, ET. 20, 84/1/20; 3 larvae, Tegona Shet, ET. 25, 84/1/22; 2 larvae, tributary of Ashilo River, ET. 28, 84/1/24; numerous other larvae were seen during sorting the fauna of streams and rivers in the Ethiopian Highlands.

Comments. These Ethiopian specimens are fairly close to Freeman's types, specially as regards the male hypopygium, but differ in their colour pattern. The type and paratype, from Table Mountain, Cape Town, South Africa have uniformly yellowish brown legs with no rings, but Freeman had a specimen from the Transvaal with a white ring on the anterior tibia. Freeman's specimens have tergites I, II and V completely leaden yellow, whereas these specimens have the anal half of II dark. More specimens, specially from South Africa, will be needed to determine if these differences are more than just colour varieties.

C. dibalteatus shows a number of peculiarities: in the male there are the well developed terminal lobes on tergite IX; in the female the large seminal capsules, longer than the cerci, and the almost uniform gonopophysis VIII; in the pupa the very small thoracic horn, and the lack of setae on the anal lobes in both sexes; in the larva the long, narrow mentum, the lack of a seta interna on the mandible and the large chaetulae on the palpiger of the maxilla.

Ecology. The larvae were found in stony torrents of mountain streams and rivers.

Distribution. Western Cape and Transvaal, S. Africa, and Ethiopian Highlands. The author has recently received specimens of all stages from the Gamtoos River, Southern Cape (coll: F. de Moor).

Cricotopus flavozonatus Freeman, 1953

Cricotopus flavozonatus, Freeman 1956; Lehmann 1979.

All three stages of the Ethiopian material were associated by means of a pupa with pharate adult male and larval head capsule attached.

Adult Male (N = 4 mounted)

This has been described by Freeman (1953, 1956) and Lehmann (1979). The body is dark brown to black and there are yellow basal bands in tergites I, II, IV and V and the gonocoxites and gonostyli are very light. There are white rings on tibia 1 and 2 and sometimes a slight trace of one on 3.

Previous descriptions are supplemented as follows:

Wing length. 2.0 mm.

Head. AR 0.9. Setation: Inner verticals 1 or 2, outer verticals 4, coronals 2 per side, clypeals 12. Palp segments 23, 80, 115, 104, 196 μm.

Thorax. Setation: Lateral antepronotals 2 or 3, dorsocentrals 27, acrostichals about 18, posterior prealars 3 or 4, scutellars 4 per side.

Wing. Setation: Brachiolum 1, R 7, R_1 nil, R_{4+5} nil, squama 8.

Legs. LR fore 0.68, mid 0.49, hind 0.56; sensilla chaetica on tarsomere 1 of hind leg.

Abdomen. Fig. 51 gives the setation of tergites III and IV; there are only 3 median setae per tergite.

Hypopygium. This is well illustrated by Freeman (1956); Lehmann (1979) gives more details including the structure of the apodemes. 10 setae on tergite IX and 7 on lateral tergite IX; gonocoxite lobe rounded with dense setae, gonostylus appears very broad in dorsoventral aspect; a large crista is apparent in lateral aspect.

Adult Female (N = 6 mounted)

Wing length. 2.2 mm.

Head. AR 0.42. 5 flagellomeres, large subapical seta. Setation: Outer verticals 4, inner verticals 2 or 3, clypeals 14. Palp segments: 46, 41, 94, 120, 216 μm.

Thorax. Setation: Lateral antepronotals 4, dorsocentrals 2, acrostichals about 22, posterior prealars 4, scutelars 5 per side.

Wings. Setation: Brachiolum 2, R 13, R_1 nil, R_{4+5} 5, squama 9.

Legs. LR fore 0.60, mid 0.48, hind 0.57; sensilla chaetica on tarsomere 1 of mid and hind legs.

Abdomen. The setation of tergite III and IV is given in Fig. 52.

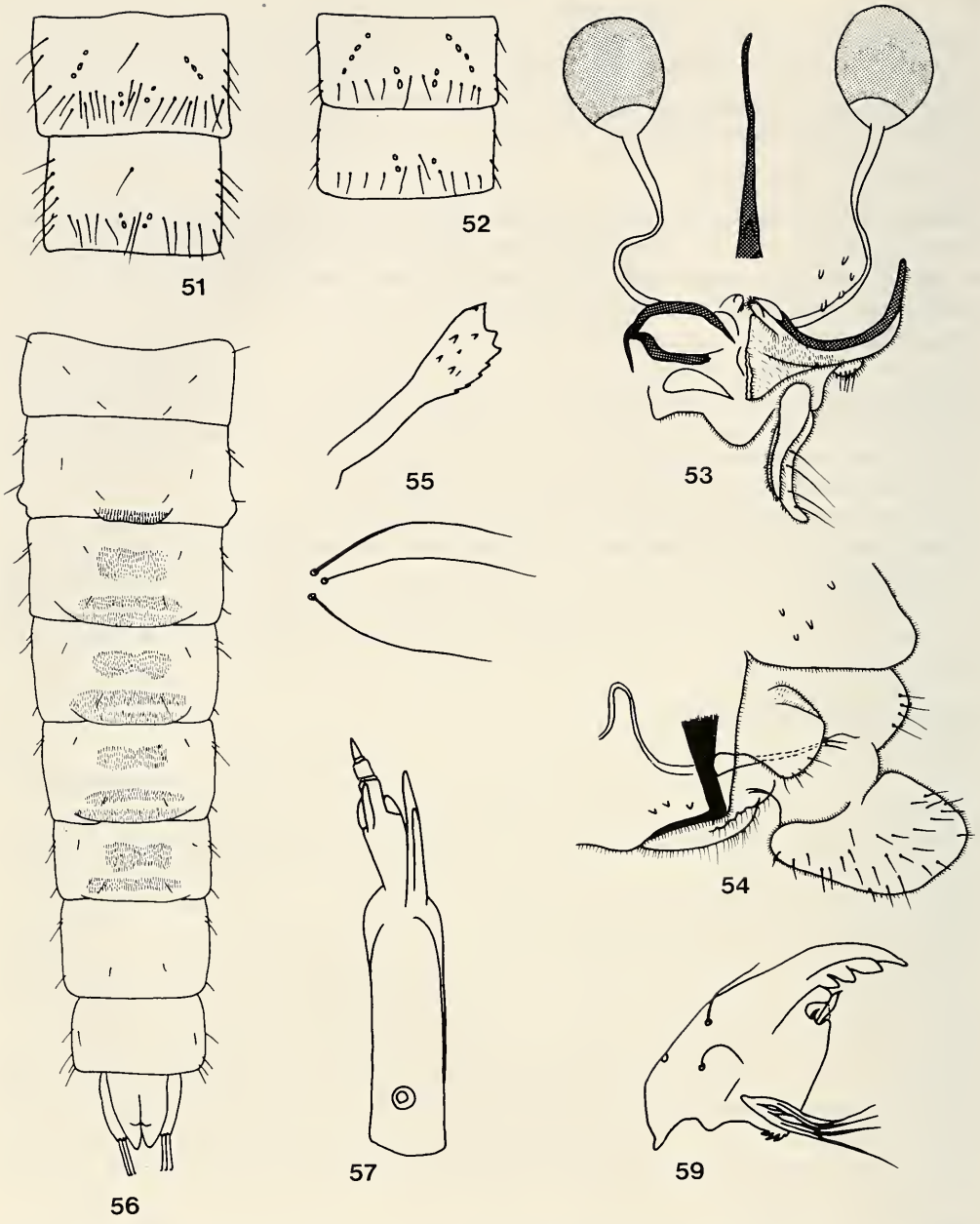
Genitalia (Figs 53, 54). Similar to generic description Saether (1977). Gonopophysis VIII divided into two ventrolateral lobes, the anterior portion well chitinized but posterior portion more membranous but with large microtrichia on inner edge; the ventrolateral lobes have strong anterior projection, under these there are small dorsomesal lobes (left side of Fig. 53). Gonocoxapodeme VIII and coxosternapodeme IX well developed. Gonocoxite IX well-developed with 4 setae, squarish in lateral view (Fig. 54). Postgenital plate rounded, cerci broad in lateral view, 96 μm (Fig. 54). Seminal capsules spherical and brown, 76 μm, spermathecal ducts with narrower central section and with bends and separate openings.

Pupa (N = 1 mounted)

Colour. Unmounted, preserved specimens are yellowish with no definite markings. Lehmann (1979) gives a description.

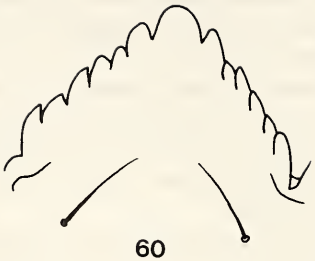
Cephalothorax. 2 setae on frontal apotome, 2 postorbitals, no verticals, 2 median and two lateral antepronotals and two pairs of dorsocentrals. The thoracic horn of the Ethiopian specimens (Fig. 55) is very similar to those pictured by Lehmann.

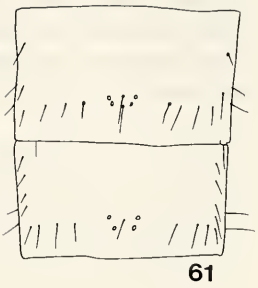
Abdomen (Fig. 56). Distal patches of anteriorly pointing spines on tergites II–V, that on II narrow, with two rows of large spines; proximal and distal patches of posteriorly pointing spines

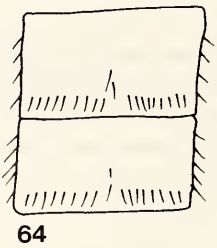


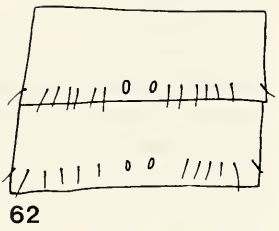
Figs 51–57, 59. *Cricotopus flavozonatus*. Adult: 51. ♂ Abdominal tergites III and IV. 52. ♀ Abdominal tergites III and IV. 53. ♀ Genitalia, ventral. 54. ♀ Genitalia, lateral. Pupa: 55. Thoracic horn. 56. Abdomen. Larva: 57. Antenna. 59. Mandible.

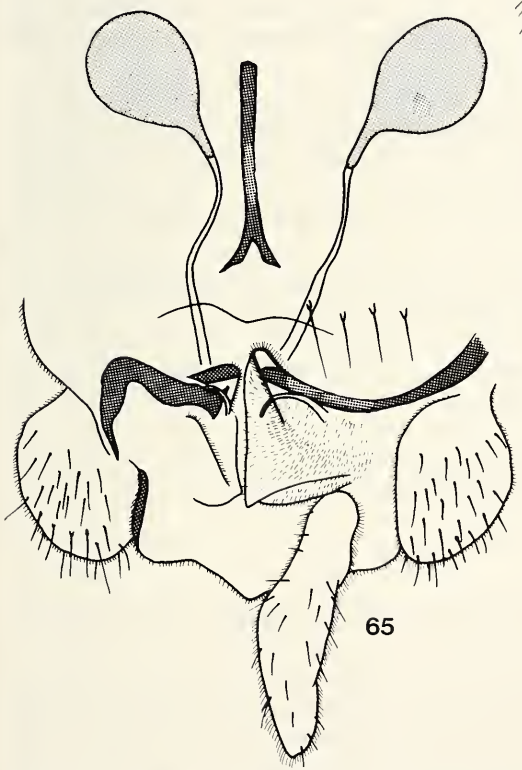
on tergites III–VI; small antero-lateral patches of shagreen on tergites VII and VIII; pedes spurii B on segment II, a pair of small weakly developed pedes spurii A on sternite VI. Setation as in Fig. 56, 3 subequal megasetae on anal lobe.

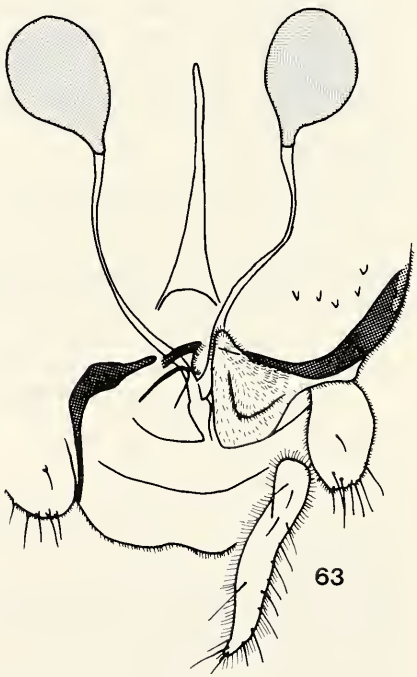












Figs 58, 60. *Cricotopus flavozonatus.* Larva: 58. Labrum. 60. Mentum.
Figs 61–63. *Cricotopus harrisoni.* Adult: 61. ♂ Abdominal tergites III and IV. 62. ♀ Abdominal tergites III and IV. 63. ♀ Genitalia.
Figs 64–65. *Cricotopus sp.* A, female: 64. Abdominal tergites III and IV. 65. Genitalia.

Larva (N = 14 mounted)

Length (unmounted larvae in alc.) (N = 7). 3.9–4.1 mm

Colour (unmounted). Head capsule light brown dorsally and ventrally, yellowish laterally, occiput, mandibles and mentum darker brown. Body yellowish with no markings. Post parapod claws light brown, anal setae light.

Antenna (Fig. 57). With 5 segments, ratio of segments 1–5 is 1, 0.3, 0.12, 0.1, 0.1. Lauterborn organs relatively large.

Labrum (Fig. 58). S I bifid, chaetae simple, pecten epipharynx of 3 subequal scales, first pair of chaetulae lateralis almost twice the length of scales but largely covered by wide second pair. Premandible with one apical tooth and no brush.

Mandible (Fig. 59). Apical tooth long and narrow but shorter than the combined width of three inner teeth; seta subdentalis apically pointed, seta interna large and branched; outer margin smooth in some specimens but slightly crenulate in others; mola mostly smooth but three small spines on posterior edge.

Mentum (Fig. 60). One median and 6 lateral teeth. The median tooth is about 2.5 × the width of the lateral teeth; in some specimens it is much longer than the one shown.

Maxilla. Palpiger with tall triangular chaetulae, some with rounded tips, dorsal lamellae of galea pectinate, lacinal chaetae simple, seta maxillaris simple.

Body. Anterior parapods separate, basal claws hooked with few internal teeth, terminal claws almost straight with many small teeth, pectinate. Posterior parapods with simple hooked claws; procercus twice as long as wide, anal tubercles shorter than parapods in expanded specimens, slightly tapering but rounded at tips. No setal tufts on abdominal segments.

Specimens examined. Adults: 2 males, Kosso R., ET. 17, 84/1/12; 1 male, 1 female, Weyb R., ET. 21, 84/1/20; 5 males and 2 females, Abo R., ET. 2, 84/10/11; 4 males and 1 female, Abo-Kebene R., below ET. 2 C, 85/5; 1 male and 2 females, Abo-Kebene River, below ET. 2 C, 85/10. Pupa: 1, Kosso R., ET. 17, 84/1/12. Larvae: 7, tributary of Abo R., ET. 2 A, 83/11/17; 3, Wabe Shebele R., ET. 30, 84/1/24; 2, Kosso R., ET. 17, 84/1/12; 6, Abo-Kebene R., 85/10. Numerous larvae and some pupae were seen during a survey of the polluted Abo-Kebene R. Coll. ADH.

Ecology. In torrential streams and rivers; it was widespread but sparse in clean streams but was very dense in the slightly polluted section of the Abo-Kebene R., Addis Ababa (Tesfaye Berhe et. al. 1989).

Distribution. Western Cape Province and Natal, S. Africa, Inyanga Mountain, Zimbabwe, (ADH 1962), Zaire, Uganda and Ethiopian Highlands.

Cricotopus harrisoni Freeman, 1956

Cricotopus harrisoni, Lehmann 1979.

Adult Male (N = 2 mounted)

Both Freeman and Lehmann describe the hypopygium, the latter in detail; this description supplements their's.

Colour (dry, unmounted specimen). Head: mainly black or dark brown, antennae dark brown. Thorax including pleura and preepisternum, dark brown to black, shiny, scutellum matt black; halteres dark brown. Legs: all coxae creamy white, all femurs dark brown to black, tibia black those of I and II with white rings, tarsus I brown, tarsi II and III light brown with darker tips. Abdominal tergites: I steely blue, II mostly matt black with oral and narrow anal steely blue bands, III oral half steely blue, the rest matt black, IV mostly steely blue but small anterolateral matt black patches, V mostly steely blue but with small lateral matt black patches, VI & VII mostly steely blue, VIII & IX mostly matt black. Hypopygium light brown.

The colour pattern is associated with microtrichia as it is in other species of *Cricotopus* (Sublette & Sublette 1987). The microtrichia in the matt black patches are 3–4 μm high and about 1 μm wide and are densely arranged in semi-geometric patches; even in transmitted light they appear black when vertical to the direction of the light, but clear in other positions. The microtrichia in the steely blue patches are smaller and much more scattered, the steely blue colour appears to arise from the reflective quality of the integument/air interface. In alcohol, the colour is a fairly uniform dark brown but the true colours appear when specimens are redried.

Wing length. 1.93 mm.

Head. AR 1.2. Setation: Outer verticals 8, inner verticals 2, clypeals 22. Palp segments: 25, 37, 106, 127, 230 μm.

Thorax. Setation: Lateral antepronotals 5 or 6, dorsocentrals about 34, acrostichals about 14, posterior prealars 5, scutellars 4 per side.

Wings. Anal lobe slightly produced, costa slightly produced. Setation: Brachiolum 1, R 3, R_1 nil, R_{4+5} nil, squama 4.

Legs. LR fore 0.67, mid 0.48, hind 0.57; sensilla chaetica on tarsomere 1 of hind leg.

Abdomen. Fig. 61 shows the setation of tergites III and IV.

Hypopygium. This is well illustrated by Freeman and Lehmann; the dorsal part of the inferior volsella is slightly more capitate in Freeman's drawing and in the Ethiopian specimens, but this may be a matter of aspect. These specimens have 6 setae on tergite IX and 8 on the lateral tergite.

Adult Female (N = 1 mounted)

Wing length. 2.45 mm.

Colour. Similar to male with same pattern of dense and sparse microtrichia.

Head. AR 0.52. Antenna with 5 flagellomeres. Setation: Outer verticals 9, inner verticals 1, clypeals 25. Palp segments 46, 74, 104, 152, 235 μm.

Thorax. Setation: Lateral antepronotals 8, dorsocentrals 38, acrostichals about 10, posterior prealars 5, scutellars 3 or 4 per side.

Wings. Anal lobe not produced. Setation: Brachiolum 1, R 6, R_1 nil, R_{4+5} 2 near tip, squama 12.

Legs. LR fore 0.63, mid 0.46, hind 0.50; sensilla chaetica on first tarsomeres of mid and hind legs.

Abdomen. Fig. 62 shows the setation of tergites III and IV; there are no median setae.

Genitalia (Fig. 63). Ventrolateral lobes of gonopophysis VIII with oral projection, anterior part of lobe more strongly chitinized than posterior part, small dorsomesal lobe at tip of coxosternapodeme (left of figure) which is strongly developed (right of figure). Gonocoxapodeme large, gonocoxite IX large with about 12 setae. Segment X normal, postgenital plate rounded, cerci about 154 μm; seminal capsules brown, ovoid with small necks, 92 μm long, 0.60 length of cerci; spermathecal ducts almost straight, central portion narrower, with bulbs at separate openings.

Pupa and Larva

Unknown.

Specimens examined. 6 males and 1 female, Abo R., ET. 2, 85/5; coll. ADH.

Comments. Freeman (1956) lists three species with steely blue and matt black patterns on the abdominal tergites: *C. kisantuensis, C. harrisoni* and *C. rodriguensis* (from Rodriguez Island). Apart from this feature they all have a well-developed dorsal part of the inferior volsella. Lehmann (1981) places *kisantuensis* into a new subgenus *Marius* based mainly on the shape of the dorsal part of the inferior volsella and the unique arrangement of the pupal anal setae, the innermost being greatly offset ventro-orally. The shape of the inferior volsella does not seem to be a good feature as there is so much variation within the genus *Cricotopus*. Nevertheless, if the other two species have similar pupae this subgenus may be useful for this group with their peculiar colour pattern (including species A below); *kisantuensis* is then the type species.

Ecology. All the adults were bred out in the laboratory from a bottom sample taken in a stony run in the cool, upper reaches of the Abo stream at 2500 m. Lehmann's specimens were taken in a torrential stream at 1800 m.

Distribution. Natal and Transvaal, S. Africa; Zaire, Kenya and the Ethiopian Highlands.

Cricotopus sp. A.

This description is based on a single large female; it appears to belong to a new species but this cannot be certain until the male is found.

Adult Female (N = 1 mounted)

Wing length: 3.5 mm; Body length: 3.7 mm.

Colour (specimen in spirit). Head with antennae and palps dark brown. Thorax including pleura and preepisternum dark brown, shiny, scutellum matt; halteres light. Legs: Femurs brown, tibia I dark brown, no white ring; other tibia yellowish brown but extremities dark, first tarsomere light but then gradually darkening to tarsomere 5. Abdomen medium brown but shiny patches as follows: all of I, oral halves of II and III, oral ¾ of VI and VII, anal ¼ of VIII, the rest matt; cerci almost white.

Head. AR 0.53. Antenna with 5 flagellomeres, 1 strong, subterminal seta. Setation: Outer verticals 5, inner verticals 0, clypeals 34. Palp segments: 41, 60, 87, 133, 228 μm.

Thorax. Setation: Lateral antepronotals 5, dorsocentrals 40, posterior prealars 8, scutellars 6 per side.

Wings. Anal lobe small and obtuse. Setation: Brachiolum 1, R 9, R_1 0, R_{4+5} 5 on one wing 3 on other, near tip.

Legs. LR fore 0.68, mid 0.48, hind 0.63; sensillae chaetica on first tarsomere of legs II and III.

Abdomen. Fig. 64 shows the setation of segments III and IV.

Genitalia (Fig. 65). Ventrolateral lobes of gonopophysis VIII with oral projection, lobes more or less uniformly strongly chitinized, small dorsomedial lobe at tip of coxosternapodeme, small apodeme lobe (both to left of figure). Coxosternapodeme of VIII and gonocoxapodeme both strongly developed. Gonocoxite IX large and robust with about 30 setae; segment X normal, postgenital plate obtusely pointed, cerci about 207 μm; seminal capsules, brown, ovoid with long necks, greatest diameter, without neck, 92 μm, 0.44 × length of cerci; spermathecal ducts almost straight, central portion narrow, openings could not be discerned.

Specimens examined. 1 female, Abo R., ET. 2, 84/10/18; coll. ADH.

Comments. This species fits into *Marius* because of the shiny and matt patches on the thoracic tergites. The female genitalia are very similar to those of *C. (M.) harrisoni* with well-developed coxosternapodeme and gonocoxapodeme, robust gonocoxite IX, and brown seminal capsules with distinct necks. The main differences between the species seem to be largely a factor of size, although they can easily be separated as sp. A has no white rings on any of the legs.

Ecology. The female was collected alive from under a stone alongside a waterfall on a torrential stream.

Distribution. Ethiopian Highlands.

Cricotopus scottae Freeman, 1956

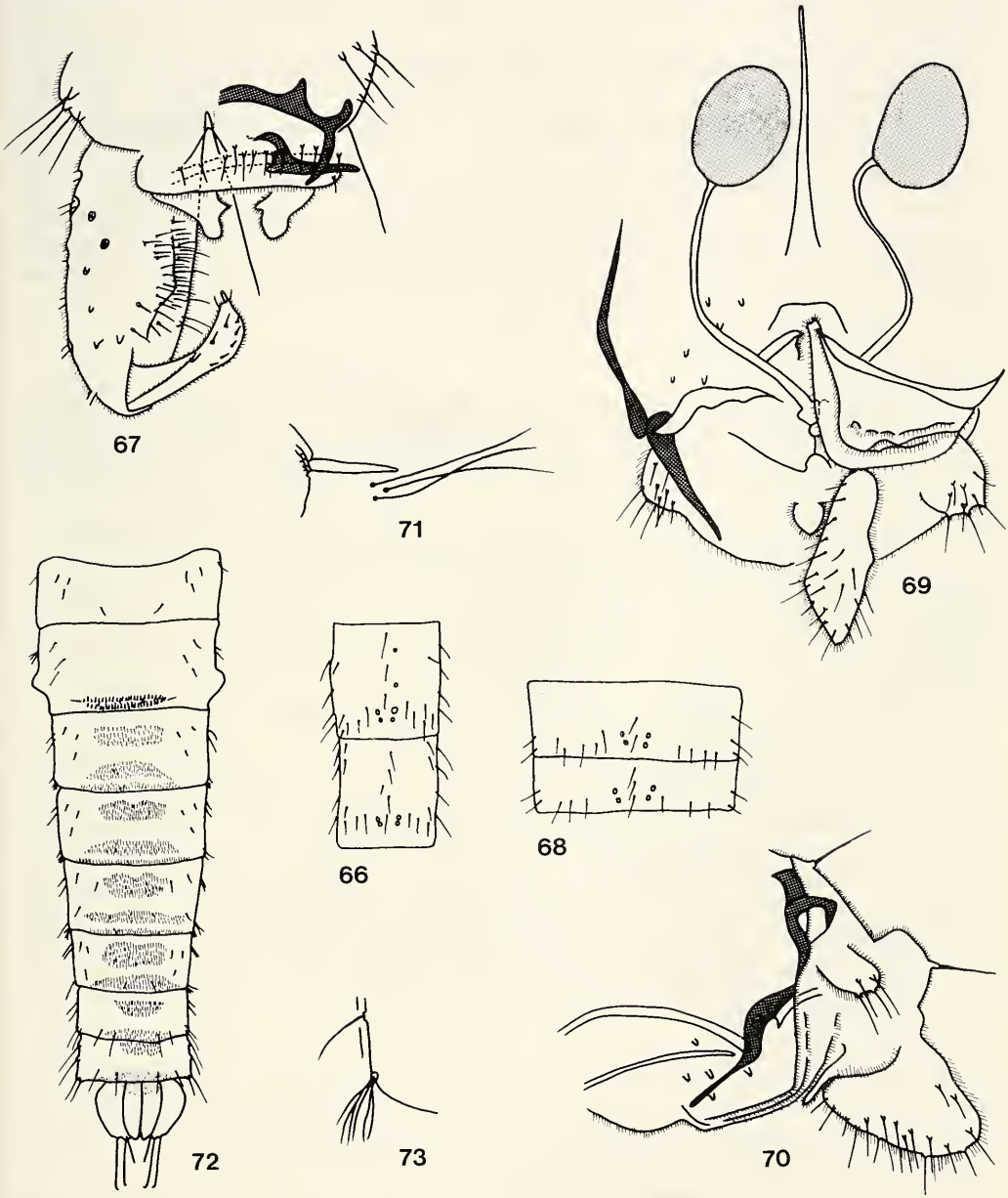
Cricotopus scottae, McLachlan 1969 (larva and pupa).

Freeman (1956) gives a very short description with no figures, so a full description is given here. The larva was associated with the adult in Zimbabwe in 1963, by the author, ADH, by breeding

out specimens in the laboratory. The Ethiopian material included three pupae with pharate adult males.

Adult Male (N = 3 mounted)

Wing length. 1.5–1.6 mm.



Figs 66–73. *Cricotopus scottae*. Adult: 66. ♂ Abdominal tergites III and IV. 67. Hypopygium. 68. ♀ Abdominal tergites III and IV. 69. ♀ Genitalia, ventral. 70. ♀ Genitalia, lateral. Pupa: 71. Thoracic horn. 72. Abdomen. 73. Setae on segment III.

Colour (unmounted specimens in spirit). General colour brown, without light bands on legs or abdominal tergites. Head light brown, antennae and palps brown. Thorax: Tergal stripes brown and separate on light brown or yellowish background, scutellum light brown, postnotum brown, pleura light brown, sternum brown, legs light brown. Abdomen brown. Hypopygium brown but gonostylus lighter. Pinned, dried specimens appear darker (Freeman 1956).

Head. AR 1.3. Setation: Outer verticals 4, inner verticals nil, clypeals 10. Palp segments: 23, 30, 48, 73, 92 μm.

Thorax. Setation: Lateral antepronotals 2, dorsocentrals 15, acrostichals 7 or 8, posterior prealars 3 or 4, scutellars 6.

Wings. Costa clearly produced beyond R_{4+5}, anal lobe obtuse. Setation: Brachiolum 1, R nil, R_1 nil, R_{4+5} nil, squama 6.

Legs. LR fore 0.58, mid 0.50, hind 0.52; sensilla chaetica on tarsomere 1 of hind leg.

Abdomen. Fig. 66 shows the setation on tergites III and IV. In some specimens there are 3 median setae on tergite III but in others there are two additional setae, shown by empty sockets on figure.

Hypopygium (Fig. 67). 13 or 14 setae on tergite IX and about 6 on lateral tergite. No obvious inferior volsella or inner lobe on the gonocoxite nor crista dorsalis on the gonostylus.

Adult Female (N = 2 mounted)

Wing length. 1.4 mm.

Colour (specimens in spirit). Similar to male but generally lighter with legs the same. Head, antennae and palps light brown. Thorax mostly light brown, tergite stripes light brown on yellowish background. Abdomen light brown but strongly chitinized region at base of coxites of IX appears as dark spots, cerci whitish.

Head. AR 0.70. 5 flagellomeres, apical flagellomere with one large, almost terminal seta. Setation: Outer verticals 2, inner verticals nil, clypeals 7. Palp segments: 23, 23, 39, 51, 85 μm.

Thorax. Setation: Lateral antepronotals one, dorsocentrals 9 or 10, acrostichals 7 or 8, posterior prealars 4, scutellars 2 per side.

Wings. 1.4 mm, similar to male, costa clearly produced. Setation: Brachiolum one, R nil, R_1 nil, R_{4+5} 4 or 5 towards tip, squama 6.

Legs. LR fore 0.56, mid 0.44, hind 0.57. Sensilla chaetica on tarsomere 1 of legs II and III.

Abdomen. Fig. 68 shows setal pattern on tergites II and III.

Genitalia (Figs 69, 70). Similar to generic description; ventromedial lobes of gonopophysis VIII with slightly more strongly chitinized portion anterolaterally, with rounded ridges and denser microtrichia than medioposterior portion; strong oral projection at tip of coxosternapodeme, dorsomesal lobe present under this projection (left side of Fig. 69). Gonocoxite IX rounded with 9 or 10 setae, strongly chitinized and with dark structure at base of gonocoxite; this probably includes the knob (Saether 1980). Gonocoxapodeme slightly bent. Postgenital plate small, rounded with weak point, cerci 55 μm. Seminal capsules ovoid, 87 μm, light brown, no neck, ducts slightly bent widening in distal third and with bulbs, openings separate.

Pupa (N = 3 mounted)

Similar to generic diagnosis.

Body length. 2.5–2.7 mm.

Cephalothorax. Frontal setae on frontal apotome, 2 postorbitals. Thorax: dorsocentrals in 2 pairs of 2, 3 precorneals, thoracic horn (Fig. 71) small and pointed, some specimens with point more rounded than in figure, without spines.

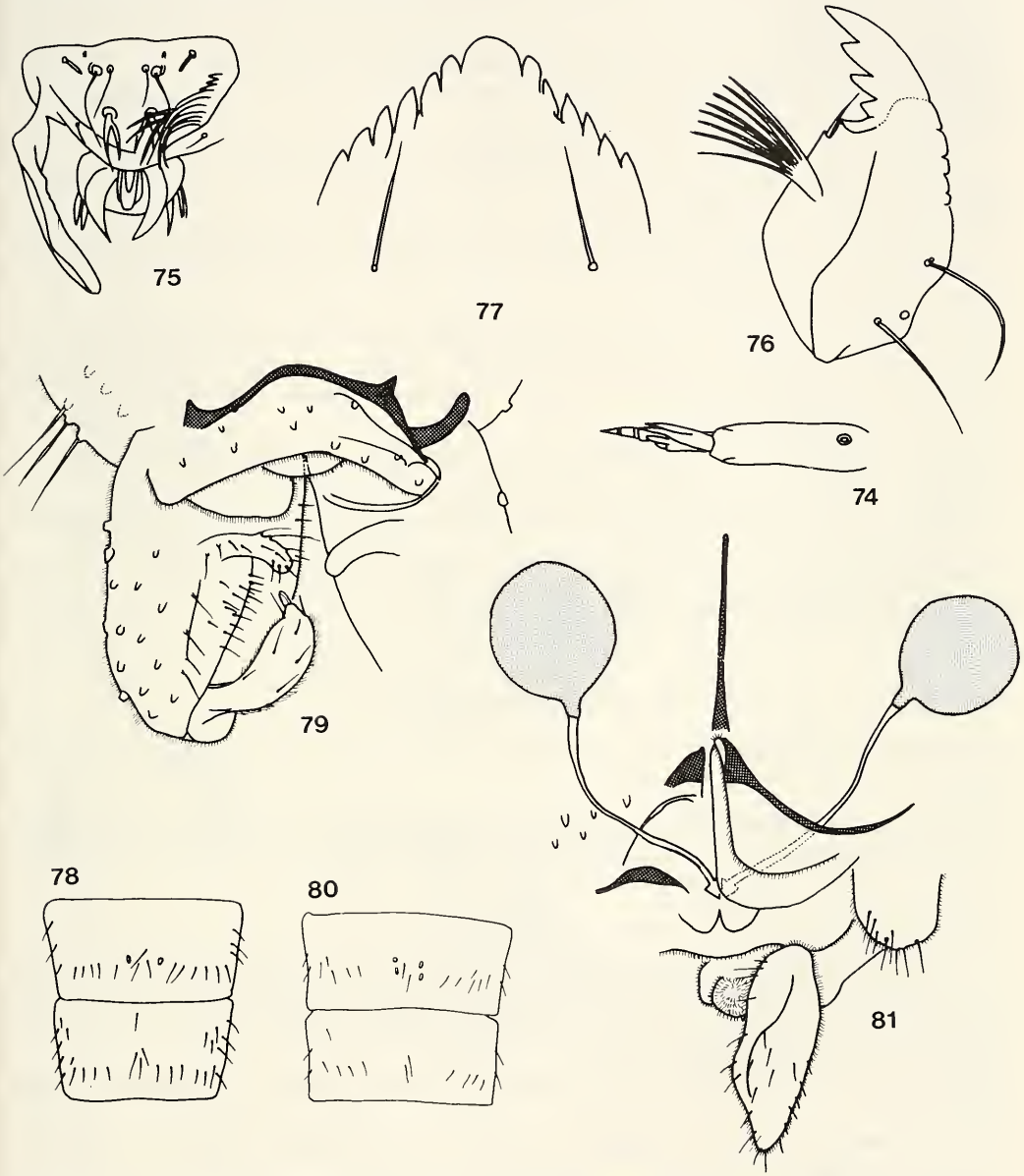
Abdomen (Fig. 72). Distal patches of anteriorly pointing spines on tergites II–V, that on II with large spines in 2 rows; proximal and distal patches of posteriorly pointing spines on tergites III–VIII and a proximal patch on IX. Setation: (as in Fig. 72) posterolateral setae on segments III–VI plumose (Fig. 73). Pedes spurii B on segment II, no sign of pedes spurii A on sternites. Anal lobe with 3

anal megasetae but inner seta smaller and slightly more dorsal than others and straight; male genital sac subequal with lobes.

Larva (N = 9 mounted)

Similar to generic diagnosis.

Body length. Variable, up to 3.5 mm.



Figs 74–77. *Cricotopus scottae*. Larva: 74. Antenna. 75. Labrum. 76. Mandible. 77. Mentum.
Figs 78–81. *Cricotopus unizonatus*. Adult: 78. ♂ Abdominal tergites III and IV. 79. Hypopygium. 80. ♀ Abdominal tergites III and IV. 81. ♀ Genitalia.

Colour (in spirit). Light yellowish, head capsule yellowish except for dark brown teeth on mandibles and mentum and very narrow dark occipital band. No obvious markings on head and body. Anal setae light.

Antenna (Fig. 74). With 5 segments, ratio 1–5, 1, 0.37, 0.13, 0.9, 0.9. Lauterborn organs small but obvious. Blade reaches to end of segment 3.

Labrum (Fig. 75). S I bifid, others simple, chaetae simple, spinules simple; pecten epipharynx of 3 scales, inner slightly longer than outer, first pair of chaetulae laterales much larger than scales; premandible with one apical tooth, broader than in the figure which shows it edge on.

Mandible (Fig. 76). Teeth and distal edge of mola very dark, rest of mandible very light, seta subdentalis long and thin but broken in some specimens, seta interna large and branching, outer margin of mandible crenulate, mola smooth.

Mentum (Fig. 77). 6 pairs of lateral teeth, width of median tooth 2.2 × that of first lateral tooth.

Maxilla. Palpiger with triangular chaetulae, dorsal lamellae of galea pectinate, others simple, lacinal chaetulae simple, setae maxillaris simple.

Body. Claws on anterior parapod with many internal teeth and long apical ones comb-like, posterior claws simple. Anal tubercles long and tapering (336 μm), longer than anal setae (260 μm). No setal tufts on body segments.

Specimens examined. Adults – 1 male, Lake Langano at lights, 83/12/11; 1 male and 4 females, netted at Lake Awasa, 84/2/11; 1 male, Lake Awasa at lights, 84/2/10; 3 pupae, Lake Awasa, 84/2/9; 9 larvae from Lake Awasa taken during survey, 1983–1984. Other larvae were seen from weed beds samples from Lake Awasa and from Lake Ziway, 1984–1985. Coll. ADH.

Comments. The larvae and pupae were very similar to those described from Lake Kariba by McLachlan (1969).

Ecology. The larvae inhabit slow-flowing rivers and streams and the weed beds of lakes exposed to wave action.

Distribution. Western Cape Province, Natal and Transvaal, S. Africa, Zimbabwe, Zaire, the Ethiopian Rift Valley and Lake Chad (Dejoux 1983).

Cricotopus unizonatus, spec. nov.

Types. Holotype: ♂ imago, Wabe Shebele River, 84/1/24 (ZSM). – Paratpye: pupa and pharate ♀, same data (ZSM).

The three stages of this species were associated by means of a pupa of a pharate female with the characteristic colour pattern and with larval head capsule attached.

Adult Male (N = 2 mounted)

Wing length. 2.2 mm.

Colour. Head dark brown to black, antennae and palps brown. Thorax dark brown to black, pleura somewhat lighter, tergite stripes fused, legs dark brown with light ring central on tibia II, comprising about half the length. Abdomen dark brown, tergite IV almost white except for narrow oral and anal bands. Hypopygium brown.

Head. AR 1.34. Setation: Outer verticals 4, inner verticals 1, clypeals 12. Palp segments: 36, 46, 81, 106, 161 μm.

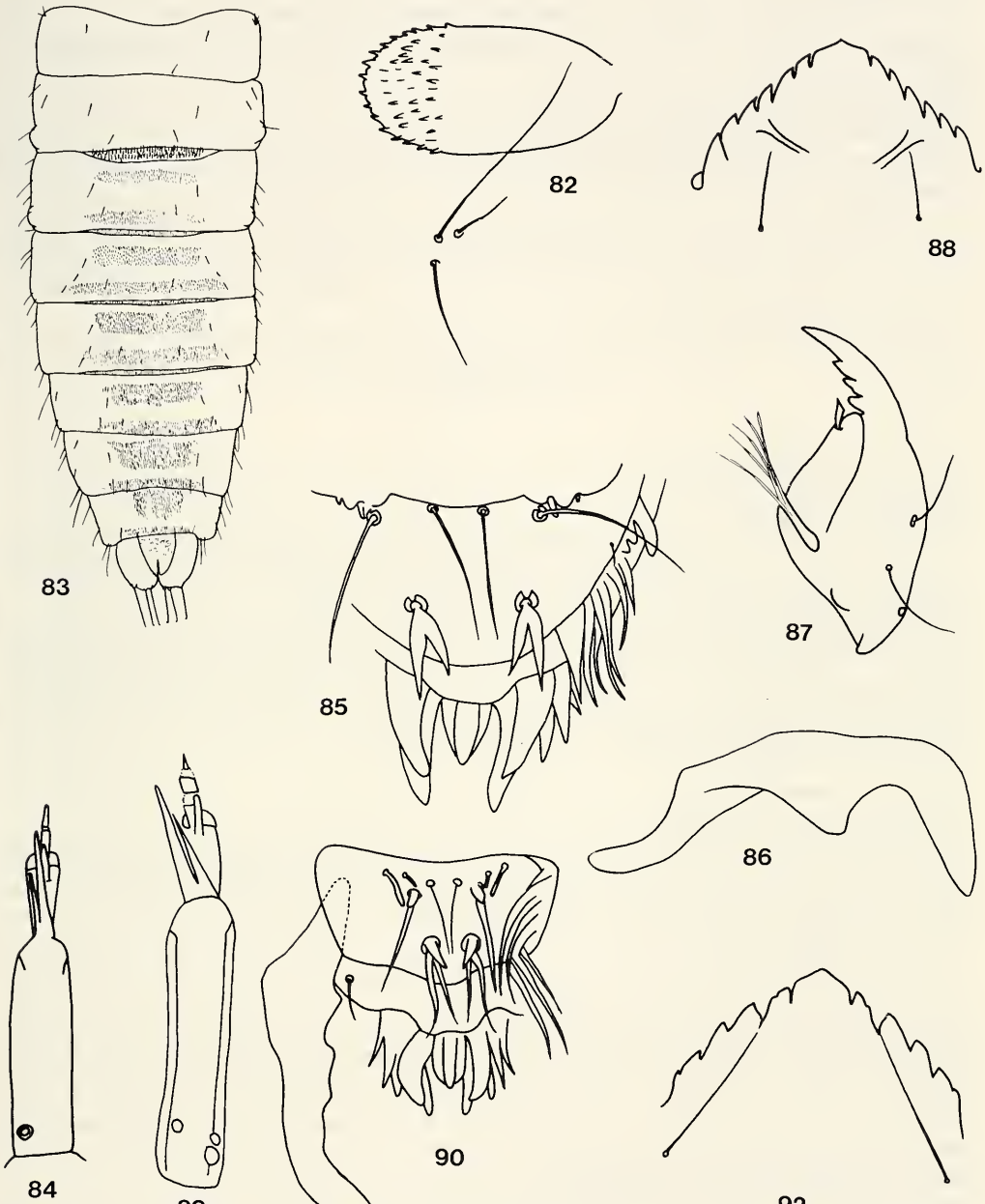
Thorax. Setation: Lateral antepronotals 5, dorsocentrals 22, acrostichals 6, posterior prealars 4, scutellars 4 per side.

Wings. Anal lobe produced, costa slightly produced. Setation: Brachiolum 1, R 1, R_1 nil, R_{4+5} nil, squama 14.

Legs. LR fore 0.6, mid 0.48, hind 0.59. Sensilla chaetica in tarsomere 1 of leg III.

Abdomen. Fig. 78 shows the setation on tergites 3 & 4.

Hypopygium (Fig. 79). With about 12 setae on tergite IX and 6 on lateral tergite IX; the inferior volsella is long and curved posteriorly; there is no crista dorsalis on the gonostylus.



Figs 82–88. *Cricotopus unizonatus*. Pupa: 82. Thoracic horn. 83. Abdomen. Larva: 84. Antenna. 85. Labrum. 86. Premandible. 87. Mandible. 88. Mentum.
Figs 89–90, 92. *Cricotopus* larva A. 89. Antenna. 90. Labrum. 92. Mentum.

Adult Female (N = 1 mounted)

The only female available was a pharate female still within the pupal exuviae.

Colour. Similar to the male, only tibia II with light band and only abdominal tergite IV light; genitalia light brown.

Head. Antenna with 5 flagellomeres. Setation: Outer verticals 5, inner verticals 1.

Thorax. Setation: Lateral antepronotals 2, dorsocentrals 24, posterior prealars 4, scutellars 6 per side.

Wings. Squama with 17 setae.

Legs. Sensilla chaetica on tarsomere 1 of mid and hind legs.

Abdomen. Fig. 80 shows the setal pattern on tergites III and IV. There are only 2 median setae on each tergite.

Genitalia (Fig. 81). Similar to generic description, ventromedial lobes of gonopophysis VII with more chitinized portion anterolateral, strong oral projection at tip of coxosternapodeme, dorsomedial lobe appears to be present under this projection (left side of figure). Gonocoxite IX with about 10 setae; gonocoxapodeme slightly bent.

Postgenital plate small, rounded, cerci 131 μm. Seminal capsules almost spherical, brown, with small brown neck, 74 μm, ducts with central narrow portion, very slightly bent, with bulbs, openings separate.

Pupa (N = 5 mounted)

Similar to generic description.

Length. 3.4–4.3 mm.

Cephalothorax. Frontal setae on frontal apotome, 2 postorbitals, 2 median and 2 lateral antepronotals, dorsocentrals in 2 pairs of 2, 3 precorneals, one much longer than the others; thoracic horn (Fig. 82) club-shaped with spines on terminal third; dorsum rugose.

Abdomen (Fig. 83). Distal patches of anteriorly pointing spines on conjunctives behind tergites II–V, those behind II large and in 2 rows; distal and proximal patches of posteriorly pointing spines on tergites III to VIII, very fine shagreen in oral patch on tergite IX. Setation as in Fig. 83. Pedes spurii B on segments II and III; no sign of pedes spurii A on tergites. Anal lobe with 3 subequal megasetae, male genital sac 1.35 as long as lobes.

Larva (N = 6 mounted)

Similar to generic description.

Colour (preserved specimens). Head capsule yellow but teeth of mandible, distal edge of mola, and mentum dark brown to blackish; thin occipital band, almost black. Body yellowish with no obvious markings; claws and anal setae, yellowish brown.

Length. Variable, up to 4.7 mm.

Antenna (Fig. 84). With 5 segments, ratio 1–5, 1, 0.18, 0.9, 0.7, 0.55. Lauterborn organs well-developed, blade reaches almost to the end of segment 4.

Labrum (Fig. 85). S I bifid, others simple, chaetae simple, spinules simple; pecten epipharynx of 3 scales, inner slightly longer than outer, first pair of chaetulae laterales much larger than scales, second pair as large and partially overlapping first; premandible (Fig. 86) with one apical tooth.

Mandible (Fig. 87). Apical tooth long and pointed but not shorter than combined length of 3 inner teeth; seta subdentalis broad but with point offset, seta interna large and branching; outer margin of mandible smooth; mola smooth.

Mentum (Fig. 88). With 6 pairs of lateral teeth; median tooth broad with small point (often broken in some specimens), 3.4–4 × the width of first lateral tooth.

Maxilla. Palpiger with triangular setae; dorsal lamellae of alea mostly simple but at least 1 pectinate; lacinal chaetae simple, pecten galearis absent, seta maxillaris simple.

Body. Claws on anterior parapod comb-like, posterior claws simple, anal tubercles as long as post parapods in preserved specimens, tips rounded. No setal tufts on body segments.

Specimens examined. Two males found drowned, type and paratype, paratype with damaged hypopygium; 5 pupae, 1 with pharate female, 2 larvae, Wabe Shebele River, ET. 30, 84/1/24; 1 larva, Kosso R., ET. 17, 84/1/12; 2 larvae, Abo-Kebene R., below ET. 2 C, 85/10. Coll. ADH.

Comments. This species is readily distinguishable from all other African species by the light band on tibia II only, the single abdominal light band on tergite 4 (males and females) and the brown hypopygium with long, posteriorly directed inferior volsella. No species with these features is listed in Hirvenoja (1973). The pupae differ from other sub-Saharan pupae described so far by the presence of spines in the conjunctives between the abdominal tergites. The larva superficially resembles that of *C. flavozonatus* but the central tooth of the mentum is much wider and has a small point in unworn specimens.

Ecology. The larvae were found in fast-flowing, stony torrents.

Distribution. Ethiopian Highlands.

Cricotopus larva A

(N = 6 mounted)

This larva has not been associated with adults or pupa. Similar to generic description.

Colour (preserved specimens). Head capsule brown to dark brown, teeth of mandible, distal edge of mola, and mentum dark brown to blackish, antenna yellow. Body yellowish with no obvious markings; anterior claws yellow, posterior claws and anal setae brown.

Length. All specimens mounted, so total length not reliable: head capsule about 576 μm long.

Antenna (Fig. 89). With 5 segments, ratio 1–5, 1, 0.23, 0.07, 0.07, 0.06; ring organ close to base but 2 other ring-like structures just distal to it; Lauterborn organs small; blade reaches to the end of segment 4.

Labrum (Fig. 90). S I bifid; bases of S I and S II covered by processes; chaetae simple; pecten epipharynx of 3 scales, first pair of chaetulae laterales much longer than scales; premandible with one apical tooth.

Mandible (Fig. 91). Teeth and distal edge of mola dark brown, apical tooth shorter than combined length of 3 inner teeth, seta subdentalis broad with point; seta interna large and branching, some shorter branches plumose.

Mentum (Fig. 92). With 6 pairs of lateral teeth, lateral teeth 2 and 6 reduced, forming a shelf at base of preceding tooth; median tooth broad and obtusely pointed, about 3.7 times the width of first lateral tooth.

Maxilla. Palpiger with triangular chaetulae, some dorsal lamellae of galea pectinate, lacinal cheaetae simple, seta maxillaris simple.

Body. Shorter combs of anterior parapod pectinate, long ones serrate, posterior claws simple; anal tubercles (240–307 μm) longer than post parapods in preserved specimens, tapering to rounded tips; no setal tufts on segments.

Specimens examined. 5 larvae from Danka R., ET. 20. 84/1/20; 1 larva from 'Abo-Kebene R., just below ET. 2 C, 1985. Coll. ADH.

Comments. This larva differs from all other African *Cricotopus* larvae described so far, by the characteristic mentum and the processes covering the bases of S I and S II on the labrum. It may belong to *C. harrisoni*.

Ecology. The larvae were found in torrential streams at high altitude; the larvae from the Danka R. were from aquatic moss on rocks in fast current.

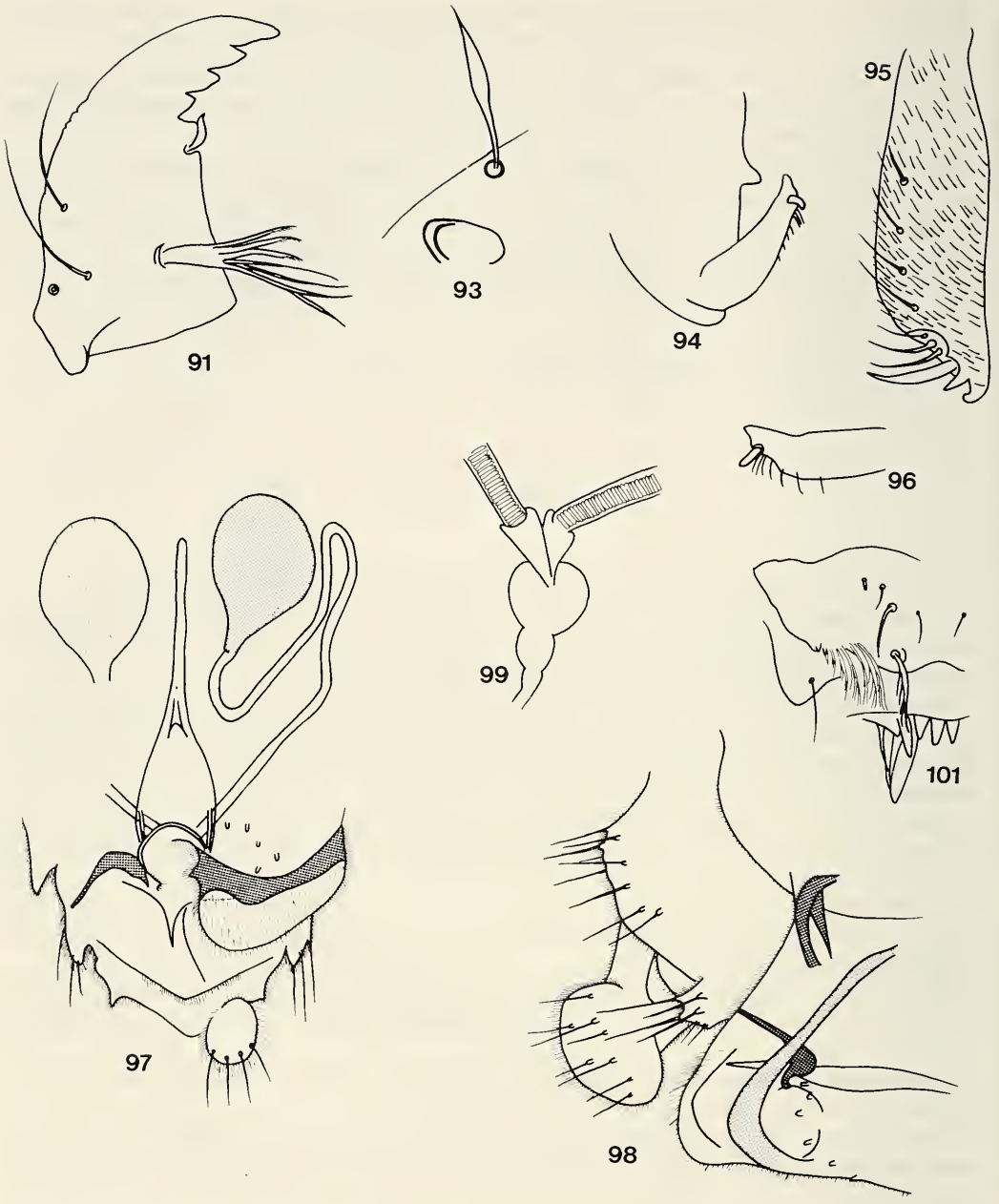


Fig. 91. *Cricotopus* larva A. Mandible.
Figs 93–99, 101. *Limnophyes minimus.* Adult: 93. ♂ Lanceolate seta and humeral pit. 94. Hypopygium, gonocoxite, gonostylus. 95. Gonostylus. 96. Gonostylus. 97. ♀ Genitalia, ventral. 98. ♂ Genitalia, lateral. 99. Spermathecal ducts. *Limnophyes* sp. Larva: 101. Labrum.

Limnophyes Eaton

Saether (1990) saw 18 males of this genus from Africa and sorted them into two species, three specimens from Mt. Kenya into *L. minimus* (Meigen) and the rest from south and central Africa into *L. natalensis* (Kieffer). He based this separation mainly on the status of the thoracic lanceolate setae peculiar to this genus.

Those without lanceolate humerals he placed into *L. minimus* and those with these setae into *L. natalensis*. He did not find the presence or absence of lanceolate prescutellars to be a consistent feature. There were differences in the shape of the humeral pit itself but these also were not consistent. Both these species have a holarctic distribution.

The Ethiopian specimens have been sorted into these two species but, as discussed later (General Comments), there seems to be some overlap.

Limnophyes minimus (Kieffer)

Limnophyes minimus, Saether (1990).

Adult Male (33 mounted)

Wing length. 1.3–1.5 mm.

Colour. Head, antennae, palps and thorax brown, legs lighter brown with lighter trochanters, abdomen and hypopygium brown, teneral specimens lighter brown with legs and gonostylus yellowish.

Head. AR 0.6–0.88 (most 0.71–0.8). Setation: Inner verticals 1, outer verticals 3 or 4, clypeals 10. Palp segments: 21, 28, 58, 56, 91 μm.

Thorax. Setation: Dorsal antepronotals 1–3, lateral antepronotals 0–3, dorsocentrals 10–13, posterior prealars 6–7, supraalars 1, preepisternals 4–5 in single row. Lanceolate setae: Humerals 0, prescutellars 0–3. Humeral pit variable, some oval with margin only slightly chitinized, some small and circular with margin slightly to strongly chitinized on posterior to dorsal edge.

Wing: With prominent microtrichia, no anal lobe, Cu_1, strongly curved. Setation: R 2 to 3, R_1 0, R_{4+5} 0, squama 4.

Legs. LR fore 0.53–58, mid 0.47–0.48, hind 0.54–0.58; no sensilla chaetica.

Hypopygium (Figs 94–96). Very similar to the lectotype of *L. minimus* Meigen (Saether 1990). Anal point bluntly triangular or rounded, virga of 2–3 spines, inner angle of dorsal inferior volsella acute. Megaseta of gonostylus tends to point dorsally and pointed tip of gonostylus twists to point ventrally (Fig. 94). Fig. 96 shows setation of gonostylus in lateral view, the large macrotrichium is pointed but from a more dorsal aspect it appears wider and even truncated (Fig. 94).

Adult Female (N = 18)

Wing length. 1.5–1.6 mm.

Colour. Similar to male, teneral specimens mostly creamy yellow, with brown episternum and scutal stripes.

Head. AR 0.40 to 0.56. Setation: Inner verticals 1, outer verticals 3, clypeals 10. Palp segments: 23, 28, 54, 58, 82 μm.

Thorax. Setation: Dorsal antepronotals 4, lateral antepronotals 1 or 2, dorsocentrals 11–12, posterior pre-alars 8, supra-alars 1, pre-episternals 5–6 in single row, scutellars 2 or 3 per side. Lanceolate setae similar to male.

Wings. Similar to male. Setation: Brachiolum 1, R 7–9, R_1 4–6, R_{4+5} 8–13, scutellars 4 or 5.

Legs. LR fore 0.54–0.58, mid 0.44–0.45, hind 0.54–0.58. No sensilla chaetica.

Genitalia (Figs 97–99). Similar to lectotype of *L. pusillus* in Saether (1990). Ventrolateral lobes of gonopophysis VIII well separated, each with small, pointed medial projection with small dorsomesal lobe underneath (left side of Fig. 97), apodeme lobe weak, coxosternapodeme slightly curved. Gonocoxapodeme large, gonocoxite IX with 6 setae; segment X normal, cerci small, 34 μm, 0.6 length of seminal capsule (without neck), tergite with numerous setae (Fig. 98). Seminal capsule with microtrichia on inner surface (left of Fig. 97), brown, with neck, spermathecal duct glandular for full length, long and looped, with small bulbs (Fig. 99) and common opening.

Pupa

Not known.

Specimens examined. Adults: 24 males and 14 females at lights, Addis Ababa, 83/9 and 83/10; 2 males Weyb. R. ET. 21, 84/1/20, 1 male, 2 females Micha stream, 3500 m, ET. 24, 84/1/22; 4 males, 2 females Abo River ET. 2 84/10/11. Large numbers of teneral males and females were caught at lights at Addis Ababa during September and October, 1983 but all were not examined in detail.

Ecology. As many adults were caught, but only one larva in the nearby river, it must be assumed that the larvae live in damp soil. This is common for the genus (Cranston et al. 1983); Saether (1990) gives more details.

Distribution. Holarctic, Mt. Kenya and Ethiopian Highlands, Kerguelen Island, South Atlantic (Saether 1990).

Limnophyes natalensis Kieffer

Limnophyes natalensis, Freeman 1956; Lehmann 1979; Saether (1990).

Adult Male (N = 7 mounted)

Wing length. 1.32–1.70 mm.

Colour. Head, antennae, palps and thorax dark brown; legs brown with lighter trochanters, abdomen and hypopygium brown.

Head. AR 0.23–0.68. Setation: Inner verticals 1, outer verticals 4, clypeals 10. Palp segments: 23, 30–37, 56–91, 77–82, 126–131 μm.

Thorax. Setation: Dorsal antepronotals 1–2, lateral antepronotals 3–4, dorsocentrals 12–15, posterior prealars 6–8, supraalars 1, preepisternals 4–5 in single row, scutellars 3 per side. Lanceolate setae: humerals 1–8, prescutellars 0–6. Humeral pit small and circular with a strongly chitinized posterior-to-dorsal border.

Wings. With prominent microtrichia, no anal lobe, Cu_1 strongly curved. Setation: Brachiolum 1, R 3–6, R_1 0–1, R_{4+5} 0–4 (mostly 0), squama 4–5.

Legs. LR fore 0.42–0.54, mid 0.46–0.63, hind 0.46–0.58. No sensilla chaetica.

Hypopygium. As described by Freeman and Lehmann, with anal lobe broadly triangular with tip sometimes slightly indented, and inner angle of dorsal inferior volsella acute. Virga with 3 spines. Structure of gonostylus similar to that of *L. minimus* (Figs 94–96).

Adult Female (N = 3 mounted)

Wing length. 0.9 to 1.2 mm.

Colour. As for male.

Head. AR 0.40–0.46. Antennae with 5 flagellomeres. Setation: inner verticals 1, outer verticals 4, clypeals 13. Palp segments 14–23, 23–28, 54–58, 58–63, 105–114 μm.

Thorax. Setation: Dorsal antepronotals 1, lateral antepronotals 3, dorsocentrals 12, humerals 3, posterior prealars 8, supraalars 1, preepisternals 6 in single row, scutellars 3–4 per side. Lanceolate

setae: humerals 1–7, prescutellars 1–20 (the two high values came from the same individual which also had 3 just behind the antepronotum).

Wings. Similar to male. Setation: Brachiolum 1, R 10, R_1 5–6, R_{4+5} 5–8, scutellars 4–5.

Legs. LR fore 0.50–0.55, mid 0.42–0.48, hind 0.53–0.57; no sensilla chaetica.

Genitalia. Indistinguishable from those of the Ethiopian specimens of *L. minimus* (Figs 97–99), including the number of setae.

Pupa and larva. Unknown but see below.

Specimens examined. 2 males and 1 female, Weyb R., ET. 21, 84/1/20; 1 male 1 female, Abo R., ET. 2, 84/10/11; 2 males, Kebene R., below ET. 2 C, 84/11/29; 2 males pond near Dinsha, Bale Mountains, 84/10/20; 2 males Abo-Kebena R. Addis Ababa, below ET. 2 C, bred out in laboratory, 85/11; 1 female, shore of Lake Awasa, 84/8/25.

Ecology. The genus is known to breed in damp soil, but 2 emerged from an aerated aquarium containing a sample of stony stream bottom.

Distribution. Holarctic (Saether 1990). In Western Cape, Natal, Transvaal in S. Africa; Zimbabwe, Zaire, Uganda, Kenya, Sudan, Ethiopian Highlands.

Limnophyes sp.

Larva (N = 1 mounted)

One larva was found which fits into the generic diagnosis. It could not be associated with either of the two species above, but when stream stony bottom from the same locality was aerated in an aquarium two *L. natalensis* emerged.

Body size. 3.6 mm.

Colour. Dark yellow, anterior and posterior claws light yellow, anal setae brown.

Antenna (Fig. 100). 0.7 length of mandible, 5 segmented, proportions segment 1–5, 1, 0.38, 0.13, 0.2, 0.1; blade almost as long as flagellum, accessory blade present, Lauterborn organs present; style does not reach to end of segment 3.

Labrum (Fig. 101). S1 deeply serrate, other S setae simple; pecten epipharynx of 3 pointed scales, chaetulae lateralis – ventral scales much shorter than dorsal scales, one of these appears striated. Premandible (Fig. 102) with 4 teeth, no brush.

Mandible (Fig. 103). Apical tooth shorter than combined width of next 3 teeth; seta subdentalis with simple point; seta interna plumose.

Mentum (Fig. 104). With 2 median teeth higher than first lateral pair.

Maxilla. Palp normally developed, galear lamellae absent, chaetulae simple, seta maxillaris simple.

Body. Anterior and posterior claws simple, anal tubercles tapering to rounded tips, shorter than parapods, body setae small and simple.

General comments on the genus *Limnophyes* in the Ethiopian Highlands

I am not satisfied that there are two clearly defined species present. The only character which is used to separate them is the presence or absence of lanceolate setae near the humeral pit (Fig. 93). Nevertheless, some samples of males, such as 4 from the Weyb River, were very similar in every respect except that two had one lanceolate humeral each and the others none. This was seen also in some samples from the Abo River, Addis Ababa. It would seem possible that as the lanceolate humerals can be reduced to 1, so they can be reduced also to none. There seems to be some overlap between the two species as now understood. In contrast to this there are the very large samples of adults taken at a house light in Addis Ababa, in which 14 males were mounted and none had lanceolate humerals. At the other end of the scale there were the males with 5–8 lanceolate humerals collected in different localities.

Parametriocnemus scotti (Freeman, 1953)

Metriocnemus scotti, Freeman 1956; *Parametriocnemus scotti,* Lehmann 1979; Freeman & Cranston 1980.

Most specimens were sent to Dr. O. A. Saether who is revising the genus. The male genitalia are illustrated by Freeman (1956) and by Lehmann (1979) who also shows the pupa. The larvae are very similar to those illustrated for the genus by Cranston et al. (1983).

Specimens examined. Adults: 1 female ET. 17, 84/1/12; 1 male ET. 3, 84/1/12; 1 male ET. 17, 84/1/12; 1 male ET. 21, 84/1/20; 1 male ET. 2, 84/10/11; 1 female ET. 2, 84/10/18; coll. ADH. Larvae were found in most streams sampled on both sides of the Rift Valley.

Ecology. From stony torrents, but were never numerous. They are sensitive to even mild organic pollution.

Distribution. Western Cape Province, Natal, S. Africa, Zimbabwe (ADH), Zambia, Zaire, Kenya, Uganda, Ethiopian Highlands.

Paratrichocladius micans (Kieffer)

Trichocladius micans, Freeman 1956; *Paratrichocladius micans,* Lehmann 1979; Lehmann 1981; Freeman & Cranston 1980.

Freeman (1956) says that the gonostyli of this species are "sometimes yellow" but does not say if the one he illustrates is yellow or brown. Lehmann (1979, 1981) does not mention the colour of the gonostyli. All the Ethiopian males had yellow gonostyli. As there may be more than one species currently listed under *micans* a detailed description is given here.

Adult Male (N = 3 mounted)

Wing length. 2.12 mm.

Colour. As in Freeman (1956), head, palps and antennae dark brown, antepronotum light, with silvery sheen on living and dried specimens. Thorax mostly dark brown but shoulders light brown or yellowish, halteres yellow. Legs: Basal half to two-thirds of femora yellowish, apex dark brown, anterior tibiae and tarsi dark brown, others light brown with darker tarsi; one specimen had nearly the whole of the femora dark brown and all tibiae and tarsi dark brown, rather like those of *Paratrichocladius pretorianus* Freeman. Abdomen: Tergites dark brown with dark setae. Hypopygium brown except for yellow gonostyli.

Head. AR 0.96. Setation: Outer verticals 3, inner verticals 1 or none, clypeals 9. Palp segments: 32, 46, 101, 120, 186 μm.

Thorax. Setation: Lateral antepronotals 2, dorsocentrals 12 or 13 in large light alveoli, acrostichals about 12, variable, posterior prealars 3, scutellars 6–8 per side, irregularly biserial; fine dense microtrichia on antepronotum and humeral region.

Wings. Anal lobes slightly produced, costa slightly produced. Setation: Brachiolum 1, 2 on one specimen, R 6–9, R_1 0, R_{4+5} 0, squama 11.

Legs. LR fore 0.64, mid 0.49, hind 0.57; sensilla chaetica on tarsomere 1 of hind leg.

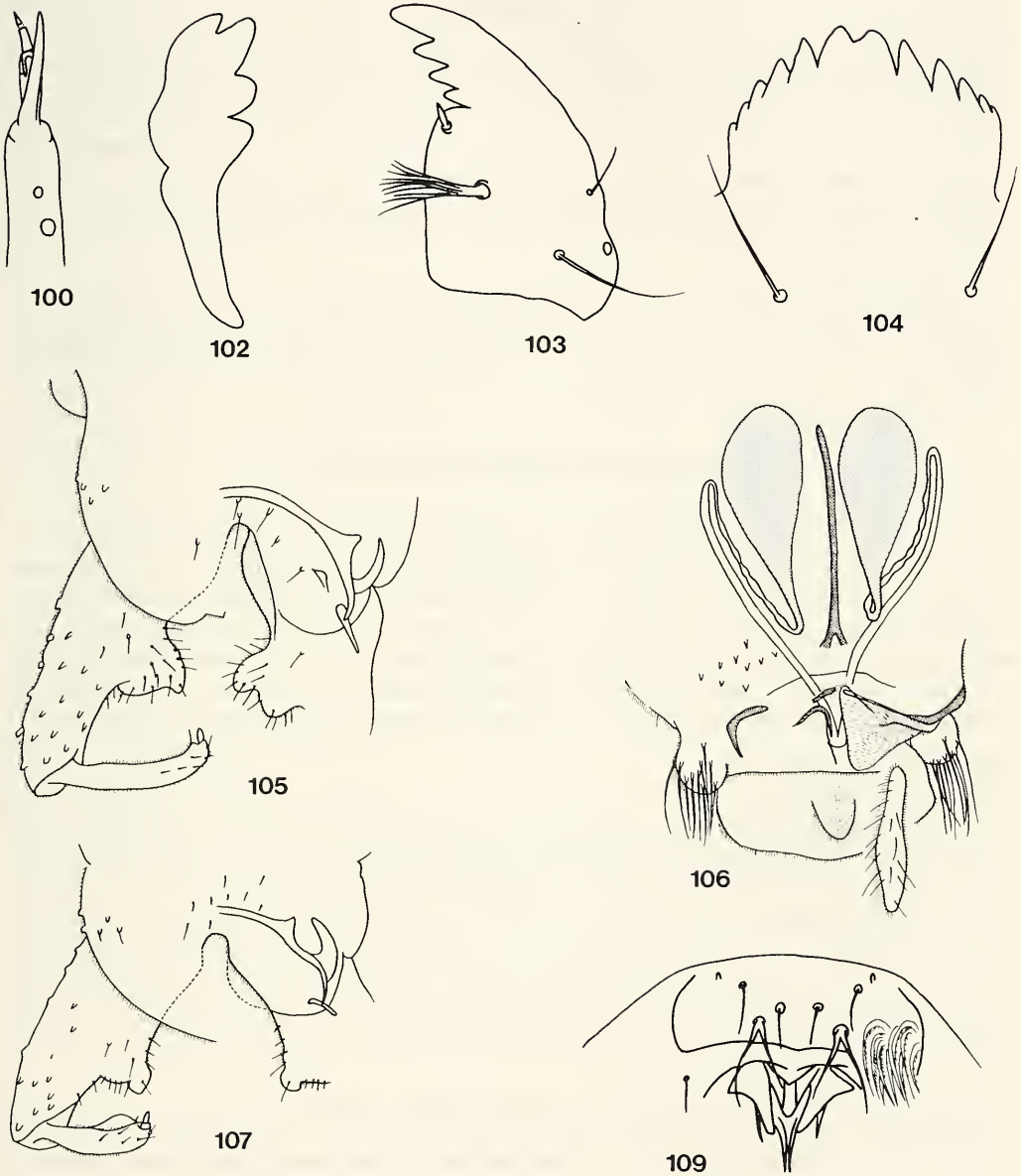
Hypopygium (Fig. 105). Dorsal part of inferior volsella well developed and turned towards the rear, gonostylus long and narrow with no crista dorsalis, phallapodeme small, gonocoxite with anteromedial flange well covered with long macrotrichia; tergite IX with about 6 setae, lateral tergite IX with 5.

Adult Female (N = 2 mounted)

Females were collected with males of *P. micans* and *P. pretorianus,* but are provisionally allocated to the former because of the characteristic colour pattern of the legs.

Wing length: 2.2 mm.

Head. AR 0.58. Antenna with 5 flagellomeres. Setation: Outer verticals 6, inner verticals 2, clypeals 12. Palp segments 39, 58, 97, 127, 209 μm.



Figs 100, 102–104. *Limnophyes* sp. Larva: 100. Antenna. 102. Premandible, 103. Mandible. 104. Mentum.
Figs 105–106. *Paratrichocladius micans*. Adult: 105. Hypopygium. 106. ♀ Genitalia.
Fig. 107. *Paratrichocladius pretorianus*. Adult: 107. Hypopygium.
Fig. 109. *Paratrichocladius* larva. Labrum.

Thorax. Lateral antepronotals 0, dorsocentrals 19 in large light alveoli, acrostichals about 12, posterior prealars 4, scutellars 14 in two irregular rows.

Wings. Similar to male. Setation: Brachiolum 1, R 15 or 16, R_1 11, R_{4+5} 8–10, squama 10.

Legs. LR fore 0.61, mid 0.45, hind 0.53; sensilla chaetica on tarsomere 1 of mid and hind legs.

Genitalia (Fig. 106). Ventrolateral lobes of gonopophysis VIII with oral projection, lobes more or less evenly, strongly chitinized, small dorsomedial lobe at tip of coxosternapodeme and well-developed apodeme lobe (both on left of Fig. 106). Coxosternapodeme of VIII weakly developed medially. Gonocoxapodeme bent; gonocoxite XI rounded with 12–14 setae all directed posteriorly; segment X normal, postgenital plate bluntly pointed, cerci 122 μm. Seminal capsules brown, elongated with long necks, 131 μm without neck, about 1.1 × length of cerci; spermathecal ducts looped alongside capsules, in 2 sections, a narrower proximal section with irregular constrictions followed by a thicker, glandular section, openings separate with slight bulbs.

Specimens examined. 5 males, Abo R., ET. 2, 84/10/11 & 18; 1 male and 2 females, Abo-Kebene R., below ET. 2 C, 85/5; 1 male and 2 females Abo-Kebene R., below ET. 2 C, 85/11; coll. ADH.

Ecology. Adults were caught near stony torrents.

Distribution. Western Cape Province, Natal, Transvaal, S. Africa; near Harare, Zimbabwe (1963–64, ADH); Victoria Falls, Zambia (1962, ADH.); Zaire; Uganda; Ethiopian Highlands; North Yemen.

Paratrichocladius pretorianus (Freeman, 1956) var?

Trichocladius pretorianus Freeman, 1956; *Paratrichocladius pretorianus,* Freeman & Cranston 1980.

Freman described this species from one male from Pretoria, South Africa; the colour is different from *micans* in that the mesonotal stripes are clearly separated on a yellow background, the alveoli of the dorsocentral setae are not very distinct and the antepronotum does not have a silvery sheen on the dried type specimen. The Ethiopian specimens do not have the stripes clearly separated and the alveoli of the dorsocentral setae are distinct. The Pretoria specimen may have been partly teneral or the Ethiopian specimens may be a colour variety; their hypopygia are similar to that of the type.

Male (N = 3 mounted)

Wing length. 1.73 mm.

Colour. Head, antennae and palps dark brown. Antepronotum light, some silvery sheen on dried specimens, rest of thorax dark brown except for yellow shoulders; halteres yellow. Legs brown, trochanters yellow. Abdomen dark brown. Hypopygium all brown.

Head. AR 1.0. Setation: Outer verticals 4, inner verticals 2, clypeals 10. Palp segments. 46, 51, 104, 127, 202 μm.

Thorax. Setation: Lateral antepronotals 2 (very small and fine), dorsocentrals 12, post prealars 4, scutellars 9 per side; humeral region with fine, dense microtrichia.

Wings. Anal lobe slightly produced, costa slightly produced. Setation: Brachiolum 1, R variable, 4, 5, 6, 7 or 8, R_1 nil, R_{4+5} nil, squama 9.

Legs. LR fore 0.58, mid 0.48, hind 0.62; sensilla chaetica on tarsomere 1 of mid and hind legs.

Hypopygium (Fig. 107). Tergite IX 10 setae, lateral tergite IX 6 setae; dorsal part of inferior volsella well developed and rounded with 1 terminal seta, gonostylus with large crista dorsalis.

Specimens examined. 2 males, Abo-Kebene R., below ET. 2 C, 85/4; 2 males Abo-Kebene R., below ET. 2 C, 85/5; coll. ADH.

Comments. Freeman's specimen did not have a produced costa; it will have to be examined again before this species can be defined properly.

Ecology. The adults were caught near stony torrents and would seem to have the same habitat as *P. micans*.

Distribution. Transvaal S. Africa and the Ethiopian Highlands.

Paratrichocladius larva

These larvae were found with both of the above species and could not be associated with either one.

N = 6 mounted

Similar to generic diagnosis.

Colour. Head capsule dark brown; mandibles and mentum dark brown; antennae brown. Body green in life but yellowish when preserved; anterior claws yellow, posterior claws dark brown to black, anal setae dark.

Body length. 2.6–4.3 mm; Head capsule. 324–360 μm.

Antenna (Fig. 108). Blade reaches almost to the end of the flagellum, Lauterborn organs comparatively large; ratio of segments 1–5, 1, 0.26, 0.13, 0.13, 0.13.

Labrum (Fig. 109). S I bifid, chaetae serrate, pecten epipharynx of single scale or three fused scales; first pair of chaetulae laterales broad, covering the bases of the others which are narrow and pointed; premandible (Fig. 110) with one apical tooth.

Mandible (Fig. 111). Apical tooth not much longer than next tooth, seta subdentalis bluntly pointed, seta interna long and narrow; outer margin weakly crenulate; mola smooth.

Mentum (Fig. 112). 6 lateral teeth, the first pair usually longer than the median tooth and well over half its width, also usually broader in the middle than at base.

Maxilla. Palpiger with triangular chaetulae, lamellae of galea pectinate, lacinal chaetae simple, seta maxillaris simple.

Body. Anterior claws pectinate, posterior claws simple, anal tubercles subequal to posterior parapods, slightly tapering, tips rounded. Segments without tufts.

Comments. Distinctive features are the short antenna with comparatively long blade, pecten epipharynx of a single or fused scale, short apical tooth of mandible and the median mental tooth shorter than the lateral pair. The dark brown head capsule with almost black posterior claws is a useful feature for sorting under the dissecting microscope, but the larvae can be confused with those of *Cricotopus dibalteatus*. This larva differs from the species illustrated in Cranston et al. as its antennal flagellum is much longer, the 3 scales of the pecten epipharynx appear to be fused and the lamellae of the galea are pectinate.

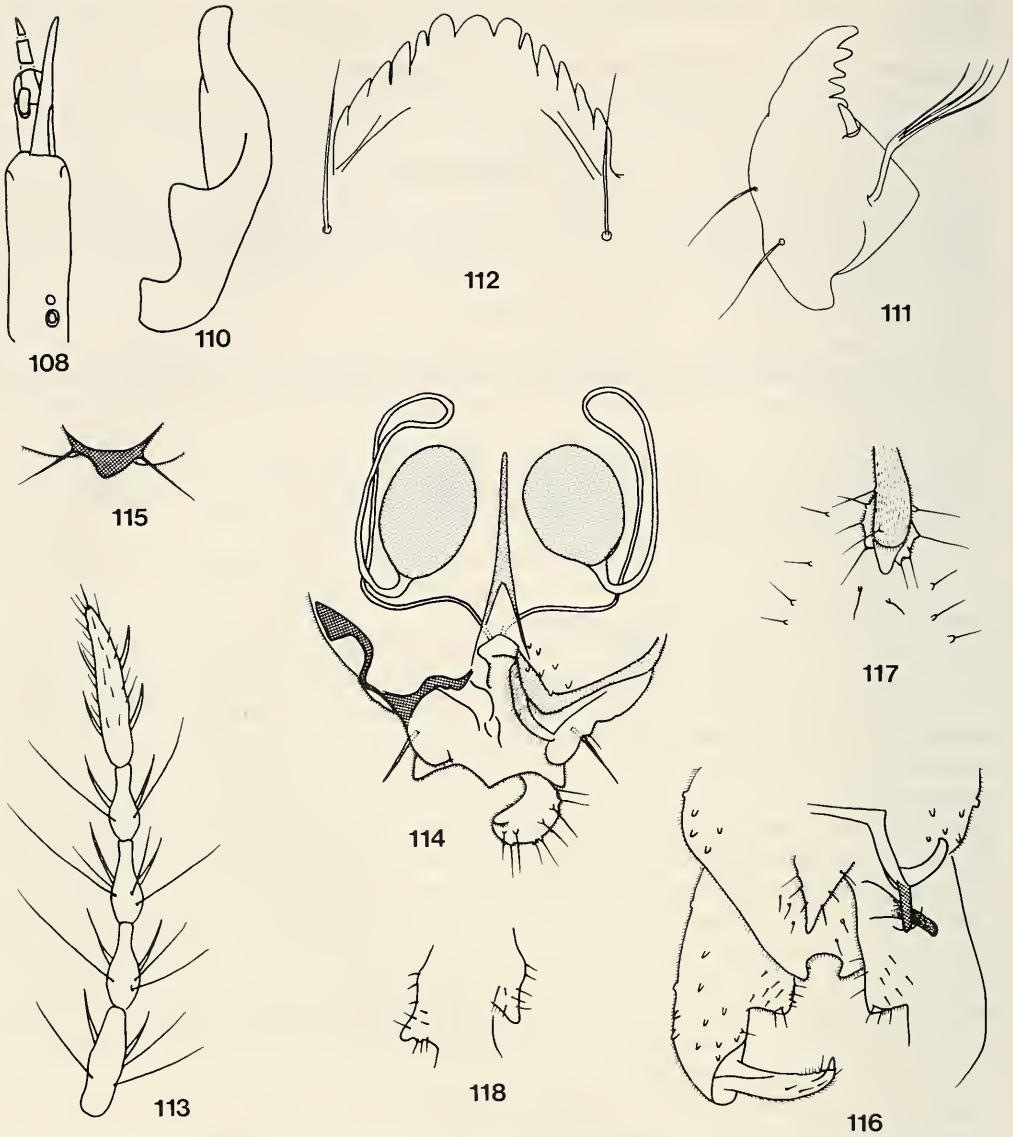
Specimens examined. 1 Micha Stream, 3500 m, ET. 24, 84/1/22; 1 Wabe Shebele R., ET. 30; 84/1/24, 3 Abo-Kebene R., below ET. 2 C, 85/10; 1 Abo-Kebene R., below ET. 2 C, 85/7; coll. ADH.

Ecology. All from stony torrents.

Pseudosmittia guineensis (Kieffer)

Smittia guineensis, Freeman 1956; *Pseudosmittia guineensis*, Freeman & Cranston 1980.

Freeman (1956) synonomized three species, *Camptocladius guineensis* Kieffer, *Camptocladius longicosta* Kieffer and *Smittia longicostalis* Goetghebuer, which were all described from the female. He says "this species is peculiar in the female because of the unusual length of the antennae with their flask-shaped segments, also the costa is greatly produced and R_{4+5} ends basal to the level of



Figs 108, 110–112. *Paratrichocladius* larva. 108. Antenna. 110. Premandible. 111. Mandible. 112. Mentum.
Figs 113–115. *Pseudosmittia guineensis*. Adult: 113. ♀ Antenna. 114. ♀ Genitalia, ventral. 115. ♀ Tergite IX.
Figs 116–118. *Pseudosmittia rectilobus*. Adult: 116. Hypopygium. 117. Anal point. 118. Anal points.

the tip of M_{3+4}." Freeman had a collection from Zaire of 5 females and one male with an indistinctly produced costa, which he described as the male of this species. A similar male was collected with females at lights in Ethiopia and this and others are used for this description.

Adult Male (N = 6 mounted)

This description supplements that of Freeman (1956).

Wing length. 1.3 mm.

Colour. Body mostly dark brown to black. Antennae, palps and legs brown.

Head. AR 0.61–0.64. Setation: Outer verticals 2, inner verticals 4, clypeals 6. Palp segments: 27, 35, 51, 76, 156 μm.

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 4–6, posterior prealars 2, scutellars 2 per side.

Wings. Anal lobe obtuse, costa produced almost to wing tip, R_{4+5} ending basal to tip of M_{3+4}, Cu_1, bent. As Freeman points out, the extended part of the costa is very narrow, but it can be discerned on mounted specimens. Setation: Brachiolum 1, R nil, R_1 nil, R_{4+5} nil, squama nil.

Legs. LR fore 0.4, mid 0.4, hind 0.4–0.5. No sensilla chaetica.

Hypopygium. Similar to that illustrated by Freeman (1956), there is no anal point but a broad, V-shaped ridge on tergite IX with 2 setae on either side and long microtrichia at tip, the virga is dark except for the spines and 64 μm long. The gonocoxal lobe is reduced and the gonostylus is strongly curved.

Adult Female (N = 1)

This description supplements that of Freeman (1956).

Wing length. 1.2 mm.

Colour. Similar to male.

Head. AR 0.52. Antenna (Fig. 113): length 365 μm, flagellomeres flask shaped with flagellomere 6 subequal to 4 + 5. Setation: Outer verticals 1, inner verticals nil, clypeals 6. Palp segments: 18, 23, 51, 58, 85 μm.

Thorax. Setation. Lateral antepronotals nil, dorsocentrals 5, posterior prealars 2, scutellars 1 per side.

Wings. Slightly brown tinged, anal lobe obtuse, costa strongly produced, R_{4+5} ends well basal to tip of M_{3+4}. Setation: Brachiolum 1, R 4, R_1 nil, R_{4+5} 1 at tip, squama nil.

Legs. LR fore 0.35, mid 0.39, hind 0.45; no sensilla chaetica.

Genitalia (Figs 114, 115). Similar to diagnosis; gonopophysis VIII divided into two large ventrolateral lobes, dorsomesal and apodeme lobes small but distinct (left of Fig. 114); coxosternapodeme broad, gonocoxapodeme somewhat curved (Fig. 115); tergite IX with rounded caudal point and one seta per side; gonocoxite IX narrow and in broad contact with tergite IX, with 2 setae, 1 large (dorsal) and 1 small; cerci small, 46 μm, 0.54 length of seminal capsule. Seminal capsules ovoid, brown, 85 μm long, seminal ducts narrow, looping anterior to capsule, not widened distally, opening appears to be common.

Specimens examined. 1 male, Wendo Genet, near ET. 3, 83/12/10; 13 males netted at Lake Awasa, 84/8/25; 2 males and 1 female at car lights, Wendo Genet, near ET. 3, 85/9/16; coll. ADH.

Comments. The female differs from other known females in the genus (Saether 1977, 1981) by its narrow seminal ducts. The characteristic antennae appear to be unique among African species.

Ecology. See remarks for *Ps. rectilobus*.

Distribution. West Africa, Central Africa and the Ethiopian Highlands.

Pseudosmittia rectilobus Freeman, 1953

Smittia rectilobus, Freeman 1956; *Pseudosmittia rectilobus*, Freeman & Cranston 1980.

Only males were collected and this description adds to that of Freeman.

There was considerable variation in the AR, the thoracic setation and the structure of the hypopygium but there were intermediate forms between the extremes and the various variations did not segregate into clearcut phenotypes.

Adult Male (N = 7 mounted)

Wing length. About 1.7 mm.

Colour. Body dark brown to black. Antennae, palps and legs brown.

Head. AR 1.1–1.6 but most specimens 1.4 and 1.5; Setation: Outer verticals 4, inner verticals 1, clypeals 8. Palp segments: 23, 46, 92, 101, 138 μm.

Thorax. Setation: Lateral antepronotals 1, dorsocentrals 2 with 6, 2 with 8, 1 with 9, 1 with 11, 1 with 14, posterior prealars 1+5, scutelars 4 per side.

Wing. Anal lobe prominent and costa not produced, as in Freeman (1955, 1956). Setation: Brachiolum 1, R 4, R_1 nil, R_{4+5} nil, squama nil.

Legs. LR fore 0.65, mid 0.53, hind 0.55; no sensilla chaetica.

Hypopygium (Figs 116–118). Fig. 116 shows the form with a long anal point and inner lobe of gonocoxite right-angled, Fig. 117 shows a short anal point and Fig. 118 shows two gonocoxite lobes more produced. 3 specimens had long anal points and right-angled lobes, 2 specimens had anal points of intermediate length, 1 with a right-angled lobe and the other with an acute lobe, 2 had short anal points and acute lobes. There was little variation in the shape of the gonostylus. No virga was discernible.

Specimens examined. 2 from house lights, Addis Ababa, 83/10; 2 swarming over lawn, Addis Ababa, 83/9; 1 Zenbaba River (ET. 18), 84/1/12; 1 Abo-Kebena River (ET. 2) 84/10/11; 1 trapped at pond in Bale Mountains, 3200 m, 84/10/20; 1 at lights at Wendo Genet (near ET. 3), 85/9/16; coll. ADH.

Comments. Freeman (1956) says that some of his specimens had the more produced gonocoxite lobes.

Ecology. Very few larvae of this genus were found in aquatic samples, suggesting that they live in damp soil as do species in other parts of the world.

Distribution. From the Western Cape Province, South Africa, through Central and East Africa to the Ethiopian Highlands (Freeman 1956).

Rheocricotopus capensis (Freeman, 1953)

Trichocladius capensis, Freeman 1956; *Rheocricotopus capensis*, Lehmann 1979; Freeman & Cranston 1980.

Most specimens were sent to Dr. O. A. Saether for his revision of the genus. The male hypopygium is illustrated by Freeman (1956) and Lehmann (1979), the female genitalia and the pupa by Lehmann (1979). The Ethiopian pupae are very similar to those illustrated by Coffman et al. (1986) and the larvae to those illustrated for the genus by Cranston et al. (1983).

Specimens examined. Adults: numerous males and females downstream from ET. 2 C (Addis Ababa), 84/11/29, April–May 1985 & Nov. 1985; 1 female from ET. 17, 84/1/12; 1 male, ET. 21, 84/1/20. Pupal exuviae: ET. 2 C, downstream, April–May 1985. Larvae: Numerous, from streams and rivers on both sides of the Rift Valley. Coll. ADH.

Ecology. In stony rapids. This species was able to take advantage of mild pollution in the torrential Abo-Kebene R., upper Addis Ababa, where it appeared in large numbers during 1982, Tesfaye Berhe et al. (1989).

Distribution. Western Cape Province, Natal, Transvaal, S. Africa, Zimbabwe (ADH), Zaire, Tanzania, Ethiopia.

Smittia maculipennis Goetghebuer

Smittia maculipennis, Freeman 1956; Freeman & Cranston 1980.

Goetghebuer described this species from a female and Freeman saw 9 additional females but no males. The Ethiopian material consists of 10 females, and 3 males found with them have been assigned provisionally to this species. The females differ from all other African species by the dark markings on the wings, which appear blueish black in live and pinned specimens and dark brown in mounted specimens and those in alcohol. The males have no markings on the wings.

Male (N = 3)

Wing length. 1.4 mm.

Colour. Head dark brown; antennae and palps light brown. Thorax dark brown, anepisternum lighter. Legs brown; wings glossy and transparent. Abdomen: Tergites I–V light, VI–VIII brown. Hypopygium brown.

Head. AR 1.5. 12 flagellomeres, last with apical seta. Setation: Outer verticals 4, inner verticals 2–4, clypeals 4. Palp segments: 23, 25, 64, 78, 108 μm; segment 3 much broader than others.

Thorax. Setation: Lateral antepronotals 1, dorsocentrals 5 or 6, posterior prealars 3, scutellars 2 per side.

Wings (Fig. 119). Anal lobe obtuse, costa greatly produced, Cu_1 bent, anal vein extending just beyond fork. Setation: Brachiolum 1, R nil, R_1 nil, R_{4+5} nil, squama nil.

Legs. Most legs missing, LR mid 0.4.

Hypopygium (Fig. 120). Tergite IX with 3 setae, lateral tergite IX 4 setae, large anal point with microtrichia almost to tip, dorsal part of inferior volsella small and hook-like with no setae or microtrichia; gonostylus with large crista dorsalis.

Adult Female (N = 10)

This description supplements that of Freeman (1956).

Wing length. 1.2 mm.

Colour. Head dark brown; antennae and palps brown. Thorax dark brown; wings with one large dark brown marking ragged at edges and almost divided by thin unpigmented strip in cell M_{1+2}; legs brown. Abdomen dark brown.

Head. AR 0.5, 5 flagellomeres, last flagellomere with apical seta. Setation: Outer verticals 2, inner verticals 2, clypeals 8. Palp segments: 23, 28, 58, 81, 92 μm, segment 3 much broader than others.

Thorax. Setation: Lateral antepronotals 2, dorsocentrals 9, posterior prealars 3, scutellars 2 per side.

Wings (Fig. 121). Anal lobe obtuse, costa strongly produced, Cu_1 bent, anal vein ending just beyond fork. Setation: Brachiolum 1, R 8, R_1 1, R_{4+5} 7 or 8, squama nil.

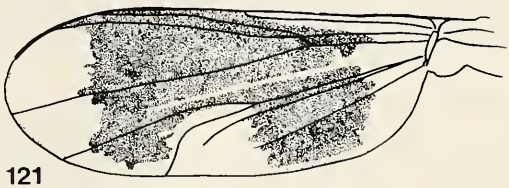
Genitalia (Fig. 122). Similar to diagnosis. Gonopophysis VIII widely divided into two ventrolateral lobes, narrow dorsomesal and apodeme lobes (on left of Fig. 122); coxosternapodeme narrow, gonocoxapodeme curved; tergite IX somewhat square terminally with 3 setae per side. Gonocoxite IX about the same size as the cerci, with 4 or 5 setae; segment X and postgenital plate weak; cerci small, 35 μm long, 0.5 of seminal capsules. Seminal capsules ovoid with neck, strongly chitinized, brown, 71 μm long with neck; spermathecal ducts with loops, separate openings.

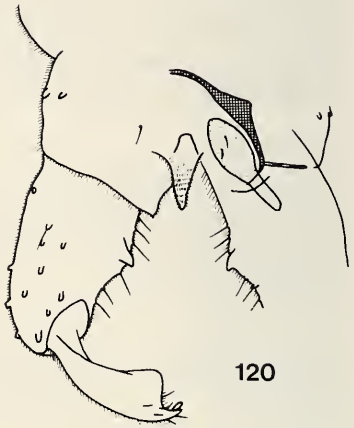
Specimens examined. 1 female, netted near Lake Awasa, 84/5/27; 1 male and 1 female, at lights, Shasemane, 84/8/25; 2 males and 8 females netted from bushes near Lake Awasa, 84/8/25. Coll. ADH.

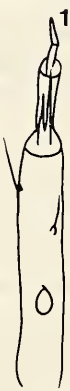
Comments. There were no other *Smittia* males collected with the 8 females, only males of other genera. The dark markings on the female wings are due to the presence of densely packed, dark microtrichia, apart from this feature the female is similar to others described.

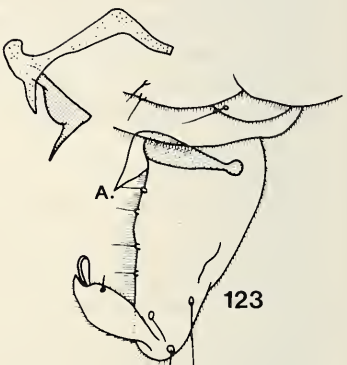
Ecology. The collecting sites indicate that the larvae live in damp soil; they were all collected during the rainy season.

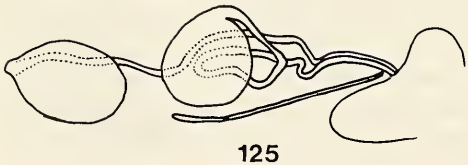
Distribution. Zaire, Kenya and Ethiopia.

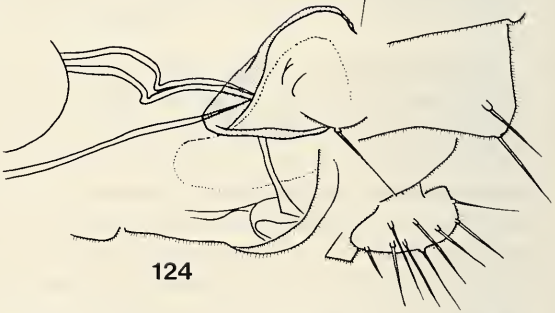












Figs 119–122. *Smittia maculipennis*. Adult: 119. ♂ Wing. 120. Hypopygium. 121. ♀ Wing. 122. ♀ Genitalia.

Fig. 123. *Thienemanniella lineola*. Hypopygium.

Figs 124–125. *Thienemanniella* sp. 124. ♀ Genitalia, lateral. 125. Seminal capsules.

Fig. 126. *Thienemanniella* larva type A. Antenna.

Fig. 127. *Thienemanniella* larva type B. Antenna.

Thienemanniella lineola Freeman, 1953

Thienemanniella lineola, Freeman 1956; Freeman & Cranston 1980.

Adult Male (N = 3 mounted)

These Ethiopian specimens are very similar to those described by Freeman (1956), including the colour pattern, the wings, the 1 or 2 setae per side on the basal abdominal segment and the shape of the apodemes. The antenna has 10 flagellomeres but differs from Freeman's specimens in that the last flagellomere is longer than the two proceeding segments instead of being shorter; it is shorter than the preceding 3 flagellomeres. Further details are:

Wing length. 1.0 mm.

Colour. Head dark brown; antennae and palps brown. Thorax: Scutal stripes dark brown, narrowly separated by lighter background, preepisternum dark brown, humeral region and anepisternum yellowish; legs brown. Abdominal tergites and hypopygium brown.

Head. AR 0.36. 10 flagellomeres. Setation: Outer and inner verticals nil, clypeals 8. Palp segments: 18, 14, 30, 48, 120 μm.

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 7–9, posterior prealars 3, scutelars 1 per side.

Wings. As illustrated by Freeman (1956). Setation: Brachiolum 1, all R veins nil, squama nil.

Legs. AR fore 0.80, mid 0.65, hind 0.70; no sensilla chaetica.

Hypopygium (Fig. 123). Tergite IX with two small setae on either side, lateral tergite IX with one large seta; aedeagal lobe of phallapodeme with an acute exterior angle (Fig. 123 A).

Adult Female

Unknown.

Pupa and Larva

Unknown.

Specimens examined. 1 male, Wabe Shebele River, ET. 30, 84/1/24; 1 male, Abo River, ET. 2, 84/10/11; 1 male, Abo River, ET. 2, 85/5; coll. ADH.

Ecology. The last male (above) was bred out from a sample taken in a fast stony torrent.

Distribution. Widespread from the western Cape Province, South Africa, through Central Africa (Freeman 1956) to the Ethiopian Highlands.

Thienemanniella safi Lehmann, 1979

Adult Male (N = 1)

Wing length. 1.2 mm.

Colour. Similar to *T. lineola.*

Head. AR 0.29. 12 flagellomeres. Setation: Outer and inner verticals nil, clypeals 10. Palps broken.

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 9, post prealars 3, scutellars 1 per side.

Wings. As per Lehmann (1979). Setation: Brachiolum 1, R veins nil.

Legs. Broken or missing.

Hypopygium. As per Lehmann (1979). Phallodeme with a large, blunt aedeagal lobe and gonocoxite with a broad inner lobe.

Adult Female

Unknown.

Pupa and Larva

Unknown.

Specimen examined. 1 male, Wabe Shebele River, 84/1/24; coll. ADH.

Comments. The specimen was very similar to Lehmann's description.

Ecology. The only specimen was found drowned in a sample from a stony torrent.

Distribution. Zaire (Lehmann, 1979) and the Ethiopian Highlands.

Thienemanniella sp.

Adult Female (N = 2 mounted)

These 2 females appear to be identical, but they cannot be associated with their males.

Wing length. 0.9 mm.

Colour. Head light brown; antennae and palps light. Thorax: Scutal stripes brown on yellowish background, preepisternum brown, rest of thorax yellowish; legs light brown. Abdomen: Tergites brown, rest yellowish.

Head. AR 0.45. 5 flagellomeres. Setation: Outer and inner verticals nil, clypeals 6. Palp segments: 14, 12, 28, 117 μm.

Thorax. Setation: Lateral antepronotals nil, dorsocentrals 7, post prealars 3, scutellars 1 per side.

Wings. With long clavus, similar to that of the female *T. trivittata* Goetghebuer (Freeman 1956). Setation: Brachiolum 1, R veins nil, squama nil.

Legs. AR fore 0.65, mid 0.57, hind 0.67; no sensilla chaetica.

Genitalia (Figs 124, 125). Gonopophysis VIII appears undivided, dorsomesal lobes could not be discerned. Gonocoxapodeme almost straight, apodeme lobe chitinized but much smaller than in *Corynoneura*. Tergite IX with caudal concavity and 2 setae per side. Gonocoxite IX reduced but with one long seta; coxosternapodeme arching over genital cavity but with no sclerotized lamellae as in *Corynoneura*. Segment X normal, cerci small; labia appear to be chitinized; post genital plate small and obtusely triangular, cerci small, 0.38 × length of seminal capsule (Fig. 125) which is large and oval, 55 μm long, light in colour, the mouth of the left one was placed orally, the right one appears to have been twisted through 90°; spermathecal ducts almost straight, openings separate.

Specimens examined. 1 from Wabe Shebele River, ET. 30, 84/1/24; 1 from Abo River, ET. 2, 85/5; coll. ADH.

Comments. The first specimen was collected with 2 species of males; the second was bred out in the laboratory with a male of *T. lineola*.

Ecology. As for the males.

Thienemanniella larvae

Two types of larvae were collected in the Ethiopian Highlands; they were not associated with any adults. They could belong to the two above species, but other species are also known from Africa (Freeman 1956; Lehmann 1979, 1981).

Type A

This has the same general structure as described by Cranston et al. (1983).

Colour. Head capsule light brown, antennal segment 1 light brown, segment 2 dark brown, 3–5 light.

Antenna (Fig. 126). Proportions of segments 1–5, 1, 0.33, 0.27, 0.04, 0.06.

Body. Setae short and pale, some about half the segment length; anterior and posterior claws yellowish, posterior tubercles pointed, shorter that parapods, basal seta of posterior parapods simple and same colour as claws; anal tubercles shorter than parapods and pointed.

Specimens examined. 4 Dima River, ET. 10, 83/11/20; 2 Micha River, 84/1/22; 1 tributary of Micha River, 84/11/20; coll. ADH.

Comments. Larvae were rare in the samples even though a fine net of 20 μm mesh was used; it would seem that many could have escaped.

Ecology. All larvae were caught in fast-flowing stony torrents; the Micha sites were at 3500 m.

Distribution. Known only from the Ethiopian Highlands.

Type B

This also has the same general structure as described by Cranston et al. (1983), except that antennal segments 4 & 5 appear to be fused.

Colour. Body green in life. Head and antennal segments 1 & 2 dark brown.

Antenna (Fig. 127). Proportions of segments 1–4+5, 1, 0.27, 0.09, 0.09.

Body. Segmental setae appear to be absent; claws of anterior parapod dark brown, claws of posterior parapod yellow, basal seta of posterior parapod simple and yellow; anal tubercles short and blunt.

Specimens examined. 2 prepupae from Wabe Shebele River, ET. 30, 84/1/24; coll. ADH.

Comments. In one of these prepupae some pupal structure can be seen; there are single rows of well-formed hooklets in the posterior conjunctives of tergites IV, V and VI and of sternites VII and VII; there are small dorsal spines on tergites V–VII.

Ecology. Both specimens were prepupae and were fixed to rock in the torrent, without cases, looking like small green commas, tipped with black. The river bed was not shaded.

Key to African species of *Thienemanniella* (males)

1. Anal lobe of wing present, though not produced, basal abdominal segment of male with a group of 4–6 setae on either side ..... *trivittata* Goetghebuer

   Anal lobe of wing reduced, 1 or two setae per side on basal abdominal segment 2

2. Antenna with 12 flagellomeres 3

   Antenna with 10 flagellomeres 4

3. Gonocoxite with well-developed inner lobe near apex; inner, protruding portion of phallapodeme short ..... *safi* Lehmann

   Goncoxite with poorly developed inner lobe near apex; inner protruding portion of phallapodeme long and directed posteriorly ..... *afra* Lehmann

4. Length of last flagellomere equal to that of 5 preceding flagellomeres ..... *antennata* Freeman

   Length of last flagellomere equal to 2 or 3 of the preceding flagellomeres 5

5. Aedeagal lobe blunt and rounded, anal tergite with 1 seta per side ..... *fuga* Lehmann

   Aedeagal lobe pointed, anal tergite with 2 setae per side ..... *lineola* Freeman

Nanocladius angustistilus, Freeman 1956; *Eukiefferiella calvescens,* Lehmann 1979; *Eukiefferiella angustistilus,* Freeman & Cranston 1980.

Most specimens have been sent to Dr. O. A. Saether and G. A. Halvorsen, for their proposed revision of the genus. It has not yet been possible to separate the African specimens from the European specimens of this species.

African males are described by Freeman (1956) and in more detail by Lehmann (1979), who also described the pupa. The larvae are very similar to those illustrated for similar species by Cranston et al. (1983).

Specimens examined. 1 male ET. 21, 84/1/20; 1 male ET. 2, 84/10/11; 1 pharate female in pupa ET. 2, 83/11/17. Larvae: a few from ET. 2, 83/11/17; 1 from ET. 24, 84/1/22. Coll. ADH.

Ecology. From the upper zones of mountain streams in stony torrents.

Distribution. Western Cape Province, S. Africa, Zaire, Ethiopian Highlands.

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