

ACINORETRACUS, A NEW AFROTROPICAL GENUS
FOR SOME SPECIES PREVIOUSLY PLACED IN
DICROTENDIPES (DIPTERA: CHIRONOMIDAE:
CHIRONOMINAE)

Epler, J.H., A.D. Harrison & L. Hare. 1999. *Acinoretracus*, a new Afrotropical genus for some species previously placed in *Dicotendipes* (Diptera: Chironomidae: Chironominae). – Tijdschrift voor Entomologie 141 [1998]: 209-220, figs. 1-33, tables 1-4. [ISSN 0040-7496]. Published 1 March 1999.

A new genus, *Acinoretracus*, is established for four Afrotropical species previously placed in *Dicotendipes*. These species are *Chironomus* (*Carteria*) *regalis* Goetghebuer, 1936 (selected as type-species for *Acinoretracus*); *Ch. (Dicotendipes) multispinosus* Freeman, 1957; *Ch. (D.) penicillatus* Freeman, 1957; and *Ch. (D.) crispi* Freeman, 1957. The adult male and female, pupa and larva are described and figured for *A. multispinosus* and *A. penicillatus*, and notes are given for the other two species. *Acinoretracus* is very close to *Kiefferulus* but can be distinguished by the following characters: adult male: superior volsella with dense apical brush of long, fine setae, without large setae; inferior volsella with narrowed, upturned apex bearing several apical setae; adult female: gonocoxite IX vestigial, without setae; pupa: cephalic tubercles low, rounded; thoracic horn base with anteriorly directed flange-like lobe; long, taeniate ventral antepronotal and anterior precorneal setae; pedes spurii B and larval ventral tubules absent; larva: S I plumose on inner side only; mentum with first and second lateral teeth not fused; short and wide, medially contiguous ventromental plates, with basally forked striae; mandible with rugose lateral margin and U shaped pecten mandibularis; lateral and ventral tubules absent.

Correspondence: Dr. J. H. Epler, 461 Tiger Hammock Rd., Crawfordville, FL 32327, USA. E-mail: johnneplr@freenet.th.fl.us

Key words. – Diptera; Chironomidae; taxonomy; *Acinoretracus*; *Kiefferulus*; *Dicotendipes*; Afrotropical.

Compared to the western Palaearctic and most of the Nearctic, the taxonomy of the midge family Chironomidae from the Afrotropical region is poorly known. Generic relationships of many species are uncertain because their immature stages, often necessary for delimiting genera, are unknown, in spite of their ecological importance in African fresh waters. Here we report on reared material of several problematic species that require establishment of a new genus.

Goetghebuer (1936) placed a newly described Afrotropical species, *Chironomus regalis*, in the sub-genus *Carteria* Kieffer, 1921. *Carteria* had been shown earlier (Strand 1928) to be preoccupied by *Carteria* Diesing, 1866; Strand (1928) offered *Carteronica* as a replacement name; *Tendipes longilobus* (Kieffer, 1916) was retained as the type-species. Freeman (1957) considered *Carteronica* to be a synonym of *Chironomus*

(*Dicotendipes*). Later workers, such as Hamilton et al. (1969), re-elevated *Dicotendipes* Kieffer, 1913, to generic status. Epler (1987:19, 1988:9, 32) noted that four Afrotropical species placed in *Dicotendipes* by Freeman & Cranston (1980) could not be maintained in that genus. Epler (1988) also stated that *Carteronica* was not a synonym of *Dicotendipes*, and that *Carteronica longilobus* did not belong with those Afrotropical species previously considered to belong to *Carteronica*. Cranston et al. (1990) showed that *C. longilobus* was best placed in *Kiefferulus* Goetghebuer, 1922; *Carteronica* became a junior synonym of *Kiefferulus*.

Based on the morphology of the adult genitalia and the immature stages, the Afrotropical species '*Dicotendipes*' *multispinosus* (Freeman, 1957) and '*D.*' *penicillatus* (Freeman, 1957) require establishment of a new genus. Similarities in the adult genitalia, and to a

lesser extent coloration, between these two species and '*D. crispus*' (Freeman, 1957) and '*D. regalis*' (Goetghebuer, 1936) allow the latter two species to also be included in this grouping. In this paper, the new genus name *Acinoretracus* is proposed for those four Afrotropical species removed from *Dicrotendipes*. The adult stages are redescribed, and the pupa and larva described for the first time, for *A. multispinosus* and *A. penicillatus*.

METHODOLOGY

Morphological terminology and abbreviations follow Sæther (1980), Epler (1988) and Langton (1994). For the anteromedian circular area of thinner cuticle on the larval frontal apotome we adopt the term apotomal fenestra, as suggested by Epler in Cranston (1996). This structure is distinct from the frontal pit found in *Dicrotendipes*, although some *Dicrotendipes* (and other genera, such as *Glyptotendipes*) may possess an apotomal fenestra (see Cranston 1996 and Epler 1987, 1988).

Other abbreviations used: BMNH = British Museum (Natural History).

Measurements are in μm , unless otherwise stated, and consist of the range followed by the mean if more than three specimens were measured. In the description of *Acinoretracus multispinosus*, data from Amakye & Sæther (1993) are included in brackets ([]) if they were outside of the range of the measurements performed in this study; some data from their redescription are also incorporated into the description of the genus below.

SYSTEMATICS

Acinoretracus Epler, Harrison et Hare **gen. n.**

Type-species: *Chironomus (Carteria) regalis* Goetghebuer, 1936: 465, by present designation.

Etymology

An anagram of *Carteronica*. Gender masculine.

Adult male

Medium-sized species, wing length about 1.6-3.0 mm; general colouration yellowish-brown to brown, thorax with dorsal median dark stripe extending from front to postnotum; abdomen with darker posterior bands and/or median lines/triangles or almost completely dark; wings unmarked.

Head. – Eyes bare, with dorsomesal extension. Temporal setae uniserial, beginning mesad to dorsomesal eye extension and running behind the eyes. Antennae with 11 flagellomeres; AR about 2.0-3.0. Frontal tubercles minute/vestigial. Clypeus subquadrate, setose.

Cibarium with internal sensillae. Maxillary palp with 5 palpomeres, palpomere 1 weakly sclerotized; palpomere 3 with 5-8 subapical sensilla clavata.

Thorax. – Antepronotum bare, lobes dorsally divided. Scutum not extending over antepronotum, scutal tubercle not present. Humeral pit obsolete; thoracic scar moderately developed. Acrostichal setae long, beginning close to antepronotum, 6-20; dorso-central setae 7-14/side, uniserial; prealar setae 4-6/side; with one supraalar seta/side. Scutellum with 6-17 setae, uni- or biserial.

Wing. – Membrane without macrotrichia, with moderate punctuation of microtrichia. Brachiolum with 2-3 setae and proximal and distal groups of sensilla campaniformia. Anal lobe well developed, apex of wing rounded or slightly truncate. Veins R, R1 and R4+5 with setae; squama with setae. Costa not extended. Apical and posterior subapical margin of wing with scale-like setae.

Legs. – Apex of foretibia with rounded scale, without spur; foretarsus without beard. Middle and hind tibiae each with two combs; middle combs each with 1 spur; hind combs with inner comb with 1 spur, outer with 1-6 spurs. Sensilla chaetica present on apical $\frac{2}{3}$ of metatarsus of middle leg, sometimes with sensilla chaetica on metatarsus of hind leg. Tarsal claws simple; empodium well developed; pulvilli small, simple, about $\frac{1}{2}$ length of claw.

Abdomen. – With moderate coverage of long setae, arranged in loosely transverse rows.

Hypopygium (figs. 1, 8). – Anal tergal bands strong, converging before anal point and continuing onto point as a ridge. Anal point broad or narrow, downturned apically and sometimes hooked. Median anal tergite setae present or absent between dorsal ridges at base of anal point, lateral setae present along base of anal point. Superior volsella with short to elongate cylindrical base, with dense apical brush of long, fine setae, without large sensilla chaetica (setae); apex sometimes bifid. Median volsella absent or present as small wart-like protuberance that bears 4-10 long setae. Inferior volsella with narrowed, upturned apex bearing several apical setae, volsella sometimes swollen dorsally before apex. Gonostylus semi-quadrate and bulbous, sometimes with weak crista ventralis and a moderately to well developed thinner outer heel, or gonostylus more elongate and strongly curved medially, without crista ventralis or apical heel.

Adult female

As in the male, with following differences:

Head. – Antenna with 5 flagellomeres; AR about 0.33-0.46.

Thorax. – With about 2 humeral setae (anterior-most dorso-central setae).

Wing. – Slightly stouter than in male, with more

setae on veins.

Genitalia (figs. 11, 12). – Gonocoxite IX vestigial, without setae. Gonapophysis VIII with well developed dorsomesal and ventrolateral lobes. Apodeme lobe well developed, with dense microtrichia. Labia without microtrichia. Seminal capsules ovoid with a short neck; spermathecal ducts without loops or bends.

Pupa

Exuviae brown, margins darker.

Cephalothorax. – Cephalic tubercles low, rounded; frontal setae small (fig. 15). Dorsum mostly smooth, with longitudinal row of tubercles, some of which are sharply pointed. Thoracic horn plumose; base reniform, with anteriorly directed flange-like lobe, with 2 tracheal bundle scars (fig. 17). Dorsal anteprenotal seta short, ventral seta long and taeniate. Anterior precornal seta very long and taeniate, posterior seta short (fig. 17). Four dorsocentral setae; Dc1 and Dc2 close, Dc3 and Dc4 close; Dc1 and Dc4 thicker than Dc2 and Dc3.

Abdomen (fig. 18). – An uninterrupted row of posterior hooklets on T II, about $\frac{1}{2}$ width of segment. S II and III with posterior transverse medial band of long spines. Pedes spurii A present on S IV; pedes spurii B absent. Segment VIII with dark caudolateral combs, with 1-4 large spurs and 1-5 smaller spurs or spines; without ventral tubules. Setation: Each side of segment I with 1 lateral seta; II-IV with 3 lateral setae; V-VII with 4 lateral taeniae, these arranged with first two closer together on anterolateral margin and last two closer together on posterolateral margin; VIII with 5 lateral taeniae; anal lobe with a pair of dorsal taeniae and a biserial fringe of about 80-130 taeniae/side. Tergites and sternites with one pair of 0-setae. Shagreen: T I bare; T II-V (VI) with a mostly continuous field of points which become progressively larger posteriorly, weaker towards midline so that posterior points appear in two groups, on T III-VI these posterior shagreen groups slightly elevated above rest of integument; T VI sometimes with anterior and posterior fields of points, largest points in posterior portion of posterior field; T VII-VIII with anterior pair or transverse band of points, weaker on T VIII; anal disc without shagreen. Conjunctives III-IV, IV-V, V-VI with fine spinules. Pleura of II-III (IV) with longitudinal bands of fine to coarse spinules. S I bare; S II-V with scattered fine spinules; S VI-VII (VIII) with anterior patches of fine spinules.

Larva

Head capsule yellow/yellow-brown, with darker posterior margin, mentum, premandibles and mandibular teeth. Two pairs of eyespots. Body usually whitish in life but some specimens with red pigment; claws brown.

Head. – Antenna (fig. 30) with 5 segments. Ring organ in basal third of basal segment. Antennal blade shorter than flagellum; accessory blade short, about $\frac{1}{3}$ length of segment 2. Style and Lauterborn organs present at apex of segment 2.

Dorsum of head either with frontoclypeal apotome and labral sclerite 2 (fig. 26), or frontal apotome and labral sclerites 1 and 2, with anterior margin of frontal apotome indistinct (fig. 23); apotome with anteromedian fenestra. Labrum (fig. 28) with S I plumose on inner side only; S II simple and on short pedestal; S III simple; S IVA minute, 2-segmented; S IVB simple, shorter than S IVA. Labral lamella with marginal fringe. Pecten epipharyngis simple, with 9-16 pointed teeth, no teeth on surface. Premandible (fig. 31) with 5-6 teeth, brush well developed.

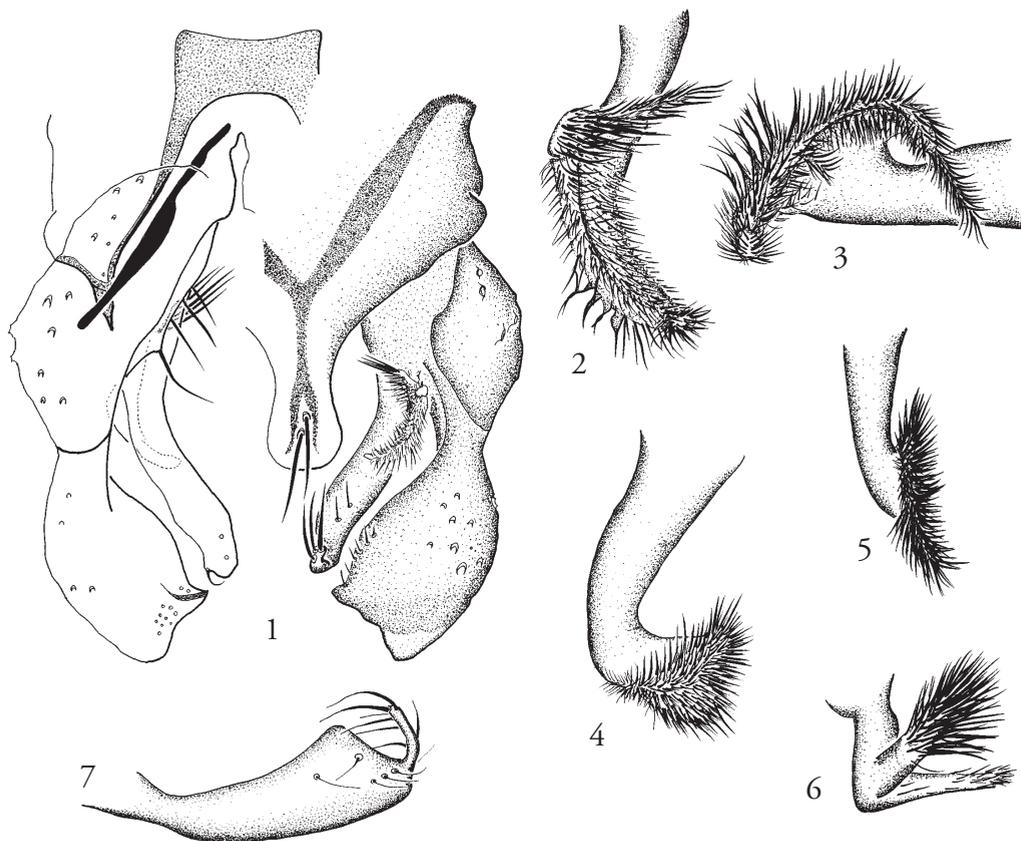
Mandible (fig. 32) with rugose outer margin, a pale dorsal preapical tooth and dark apical and three inner teeth. Pecten mandibularis composed of about 12 coarse setae arranged in U shape. Seta subdentalis (fig. 33) apically widened with numerous fine apical teeth. Seta interna plumose, with four main branches.

Mentum (figs. 24, 27) with 13 teeth, median tooth trifid and lower than first lateral teeth; first lateral teeth separate from seconds. Ventromental plates short and wide, 3.5- 4.0 \times wider than long, contiguous or nearly so medially; with smooth anterior margin; most striae complex, fork-like, with several branches arising from base of each stria (fig. 25); innermost and outermost striae simple. Setae submenti simple, at base of ventromental plates. Maxilla (fig. 29) without serrate lacinial chaetae; maxillary palp about twice as long as wide and with very long a seta. Triangulum occipitale wide.

Body. – Anterior parapods with simple and pectinate claws; posterior parapod claws simple. Lateral and ventral tubules absent. Procerci slightly longer than wide, each with 2 minute basal setae and 7-8 moderately long apical setae. Supraanal setae fine, slightly shorter than anal tubules. Two pairs of anal tubules, about 3 \times as long as wide.

Remarks

When all life stages are considered, *Acinoretracus* can be seen to be very close to *Kiefferulus*, not *Axarus* or *Lipiniella* as suggested by Hare in Cranston, et al. (1990). *Kiefferulus* has recently been expanded by the inclusion of several species previously assigned to other genera (Cranston et al. 1990); they (ibid.: 421) presented an emended diagnosis for the genus. Note that in their listing of included species, the authors omitted the South African species *K. nigropunctatum* (Freeman, 1957) (O. A. Sæther personal communication), *K. modocensis* (Sublette, 1960), a western Nearctic species; and Epler (1995) recently moved *Chironomus pungens* (Townes, 1945), an eastern Nearctic



Figs. 1-7 *Acinoretracus multispinosus*, adult male. – 1, Hypopygium; 2, left superior volsella, dorsal; 3, left superior volsella, lateral aspect of fig. 2; 4, left superior volsella, dorsal; 5, left superior volsella, dorsal; 6, left superior volsella of holotype, dorsal; 7, inferior volsella, lateral.

species, to *Kiefferulus*. The diagnosis of Cranston et al. (1990) is already in need of further emendation, for, as noted below, an undescribed southern Nearctic species of *Kiefferulus* has been found in which the larval ventromental plates are contiguous medially. One of us (ADH) is not in complete agreement with their synonymy of some African *Nilodorum* species with *Kiefferulus*.

While some life stages (the female) of *Acinoretracus* may not be clearly separable from *Kiefferulus* as currently defined, the complete suite of characters taken from all life stages demonstrates the generic uniqueness of *Acinoretracus* from *Kiefferulus*. These differences include:

Adult male: superior volsella with dense apical brush of long, fine setae, without large setae; inferior volsella with narrowed, upturned apex bearing several apical setae. No described species of *Kiefferulus* pos-

sesses such genitalia. Two species, *A. multispinosus* and *A. regalis*, possess a rudimentary median volsella that bears several large setae.

Adult female: gonocoxite IX vestigial, without setae. Sæther (1977: 170) describes the female genitalia of *Kiefferulus* with gonocoxite IX 'small, with about 2 setae'. However, Cranston et al. (1990: 423) noted that in *K. longilobus* gonocoxite IX is small and apparently without setae; while Harrison (1996: 10) found 'gonocoxite IX large with about 10 setae' in *K. chloronotus* (Kieffer).

Pupa: cephalic tubercles low, rounded; thoracic horn base with anteriorly directed flange-like lobe; long, taeniate ventral anteprenotal and anterior precorneal setae; pedes spurii B and larval ventral tubules absent. Note that while in Holarctic *Kiefferulus* the precorneal setae are subequal, in the Afrotropical

species *K. fractilobus* (Kieffer), the posterior pre-corneal seta is much larger and taeniate (JHE, unpublished data based on rearings from Nigeria by LH).

Larva: S I plumose on inner side only; mentum with first and second lateral teeth not fused; short and wide, contiguous ventromental plates, with forked striae; mandible with rugose outer margin and U shaped pecten mandibularis; ventral tubules absent. Pinder & Reiss (1983) and Cranston et al. (1990) diagnose *Kiefferulus* larvae as having medially separated ventromental plates. However, an undescribed southern Nearctic species (*Kiefferulus* sp. A in Epler 1992, 1995) has contiguous ventromental plates. This species has been reared by JHE and has a pupa and adult very similar to *K. dux* (Johannsen). Note that the ventromental plate striae of *K. sp. A* are simple, not forked as in *Acinoretracus* (fig. 25).

It can be hypothesized that *Acinoretracus* and *Kiefferulus* form a sister group within the *Chironomus* group (as defined by Epler 1988: 194), but the nature of the relationships between *Kiefferulus* and related genera must await a world-wide revision of *Kiefferulus*, utilizing characters from all life stages.

***Acinoretracus multispinosus* (Freeman) comb. n.**
(figs. 1-7, 14, 17-22, 23-25)

Chironomus (Dicrotendipes) multispinosus Freeman 1957: 373 (original description of adult male).

Dicrotendipes multispinosus (Freeman). Freeman & Cranston 1980: 190 (catalog).

'*Carteronica*' *multispinosus* Freeman. Cranston et al. 1990 (larval ventromental plates).

Dicrotendipes multispinosus (Freeman). Amakye & Sæther 1993 (redescription of adult male; description of adult female).

Description

The male of this species was recently redescribed by Amakye & Sæther (1993); they also described the female in detail. Some of their data are included below in brackets in the descriptions of those life stages.

Adult male (n=4-5). – Colour. Head yellowish-brown, antennae light brown; thorax yellowish with dark median stripe extending from front of scutum to postnotum; wings unmarked, pale yellowish-brown; haltere pale; legs yellowish with femoral apices brown, bases and apices of tibiae brown; abdomen yellowish with brown posterior triangular areas/bands, tergite VIII and hypopygium almost completely brown.

Length. Total 3.63-4.60, 4.21 mm [3.31-4.48, 3.98 mm]; thorax 0.90-1.03, 1.02 mm; abdomen 2.73-3.58, 3.19 mm.

Head. Frontal tubercles 2.5 long. Temporal setae

12-19; clypeal setae 12-23, 18; cibarial sensilla 4-8. Lengths of palpomeres 1-5: 43-50 [30-56, 44]; 45-47 [37-52, 47]; 128-150 [135-168, 152]; 145-165 [150-179, 165]; 200 [233-248, 235]. AR 2.79-2.78 [2.28-2.60, 2.48].

Thorax. Setae: acrostichals 7-18[6-9, 8]; dorsocentrals 10-11, 10 [7-14, 9]; prealars 5 [4-5, 5]; scutellars 8-16 [6-12, 9].

Wing. Wing length 1.63-2.10, 1.86 mm [1.74-2.02, 1.88 mm]; width 0.44-0.61 mm. VR 1.16-1.24. Setae: R 20-34; R1 17-26; R4+5 20-39; squama 4-9 [6-10]. Wing apex rounded (fig. 14).

Legs. Tarsomere 1 of middle leg with 7-10 sensilla chaetica; tarsomere 1 of hind leg with 0-1 sensilla chaetica. Lengths and proportions of legs see Table 1.

Hypopygium (fig. 1). Superior volsella cylindrical, shaft bare but with expanded pad with dense brush of long setae apically (figs. 4, 5), or apex bifid (figs. 2, 3, 6). Median volsella reduced to small protuberance, with [4]5-10, 7 large anteromedially directed setae. Inferior volsella with narrowed, upturned apex, bearing 3-7 large setae and several smaller setae; volsella dorsally expanded preapically (fig. 7). Gonostylus bulbous/quadrangle, with crista ventralis. Anal point ridge bearing 2-5 setae; anal point with 8-12 smaller lateral setae.

Adult female (n=1). – Colour. Similar to male.

Length. Total 4.00 mm [4.62 mm]; thorax 1.15 mm; abdomen 2.85 mm.

Head. Frontal tubercles 2.0 long. Temporal setae 16; clypeal setae 18; cibarial sensilla 14. Lengths of palpomeres 1-5: 45 [56]; 52 [56]; 150 [180]; 155 [184]; 250 [263]. AR 0.46 [0.45].

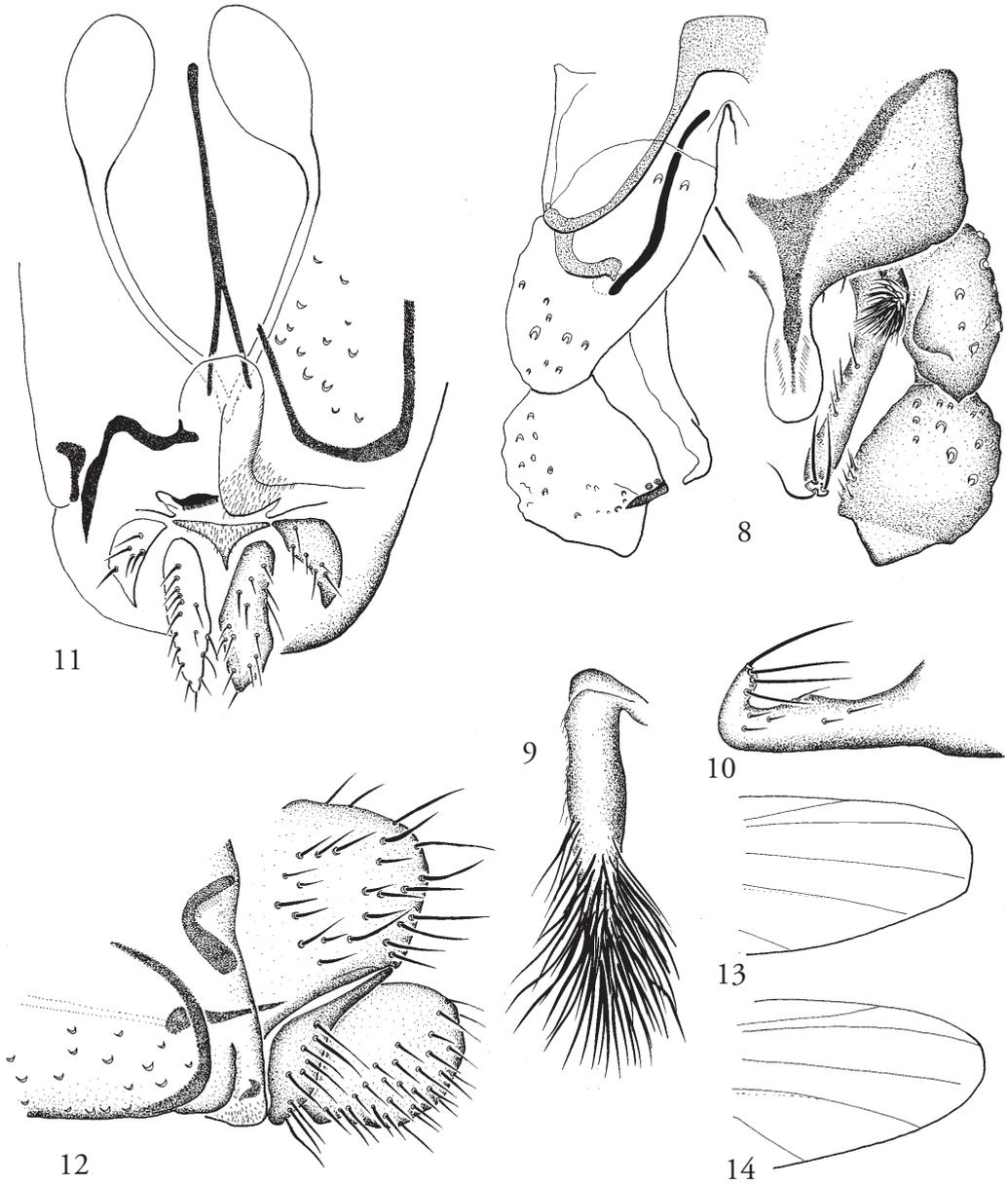
Thorax. Setae: acrostichals 14; dorsocentrals 11 + 2 humerals [16], 10; prealars 5; scutellars 15 [13].

Wing. Wing length 1.90 mm; width 0.65 mm. VR 1.17 [1.19]. Setae: R 31; R1 31; R4+5 42; squama 14 [12].

Legs. Tarsomere 1 of middle leg with 19 sensilla chaetica; tarsomere 1 of hind leg with 10 sensilla

Table 1. *A. multispinosus* male: lengths and proportions of legs (n = 1-2).

	P1	P2	P3
fe	[942] 1060-1160	[887] 1000-1070	[867] 1020-1100
ti	[638] 740-810	[742] 890	[943] 1100-1150
ta1	[1420] 1480	[457] 520	750
ta2	[667] 690	[220] 230	400-420
ta3	[581] 610	[157] 170-180	320-330
ta4	570	[95] 110-120	175-190
ta5	240	[57-67] 85-100	100-120
LR	2.00 [2.22]	0.58-0.63 [0.71]	0.68-0.73
BV	1.55	3.83-4.24	2.76-3.04
SV	1.22 [1.15]	[3.35] 3.50-3.63	2.68-2.83



Figs. 8-13. *Acinoretracus penicillatus*, adult male and female. – 8, Hypopygium; 9, superior volsella; 10, inferior volsella, lateral; 11, female genitalia, ventral; 12, female genitalia, lateral; 13, wing apex. – Fig. 14. *A. multispinosus*, wing apex.

chaetica. Lengths and proportions of legs see Table 2.

Abdomen. Notum 150 [128] long. Tergite X with 8 setae. Cercus 125 [145] long.

Pupa (n=4-6). – Colour. Exuviae light brown, with clear band at posterior margin of T (II) III-V, T VI-VIII and anal lobes paler brown.

Length. Total 4.55-5.52, 5.10 mm; cephalothorax 1.25-1.38, 1.33 mm; abdomen 3.30-4.15, 3.78 mm.

Cephalothorax. Frontal setae 30-35, 32 long. Dorsal anteprenotal seta 80-100 long, thin (n=2); ventral anteprenotal seta at least 113 long, taeniate (n=1). Anterior precorneal seta around 195-238 long, taeniate; posterior seta about 15 (broken?). Dorsocentral setae lengths (n=1): Dc1 48; Dc2 83; Dc3 45; Dc4 33. Dorsum with row of 7-11, 9 tubercles.

Abdomen (fig. 18). T II with posterior row of 22-27, 25 hooklets. S II (fig. 19) with posteromedian row of 33-54, 46 spines; S III with posteromedian row of 3-15, 10 spines. Shagreen on T II-VI with spinules larger anteromedially, followed posteriorly by smaller spinules which become progressively larger posteriorly, with posterior groups of larger spines separated medially by area of much smaller spinules; shagreen area on T II consists of a small rectangular area and two anterolateral patches, these patches sometimes joined with median patch to form broad T-shaped area; on T III-V shagreen broadly quadrilateral or X-shaped, with small fenestrations; on T VI broadly triangular; on T VII with two anterolateral patches or patches joined to form band; T VIII with two small anterolateral patches of fine spinules or sometimes with two longitudinal bands of fine spinules. T VIII with 1-3 large and several smaller caudolateral spurs (figs. 20-22). Anal lobes with 96-128, 113 taeniae.

Larva (n=4-5). – Colour. Head capsule light yellow-brown.

Head. Postmentum length 185-202, 191. Frontal apotome and labral sclerite 1 not fused but anterior margin of apotome not distinct, apotome weakly pebbled (fig. 23). Length of antennal segments 1-5: 68-85, 76; 22-30, 28; 11-15, 14; 7-8, 8; 5-7, 6; AR 1.08-1.40, 1.26. Premandible 80-93, 86 long. Pecten epipharyngis with 13 teeth (n=2). Mandible length 158-172, 167; pecten mandibularis with 11-14, 13 setae. Mentum (fig. 24) width 115-125, 121. Ventromental plates 158-175, 166 wide; 43-47, 45 long; VPR 3.51-3.84, 3.73; with 41-52, 48 striae.

Remarks

Freeman (1957: 373) stated the superior volsella of *multispinosus* was bifid. However, in many specimens the apex is not bifid, but pad-like with a dense brush of setae (figs. 4, 5; see also Amakye & Sæther 1993: figs. 2F, 2J, 2K). In the holotype specimen and three

Table 2. *A. multispinosus* female: length and proportions of legs (n=1).

	P1	P2	P3
fe	[1040] 1060	[973] 1000	[983] 1040
ti	720 [756]	[860] 880	[1068] 1080
ta1	1460	480	690
ta2	630	210	370
ta3	560	160	310
ta4	560	110	190
ta5	220	100	115
LR	2.03	0.55	0.64
BV	1.64	4.07	2.85
SV	1.22	3.92	3.07

of the five males associated with immature stages from Nigeria, one a pharate male still within its pupal skin, the apex of the volsella is bifid (figs. 2, 3, 6). In another pharate male pupa, the superior volsellae were broadly setose, similar to fig. 4. No other differences were noted among the adults, and no differences were noted in the immature stages between those adults with apically bifid or pad-like superior volsellae.

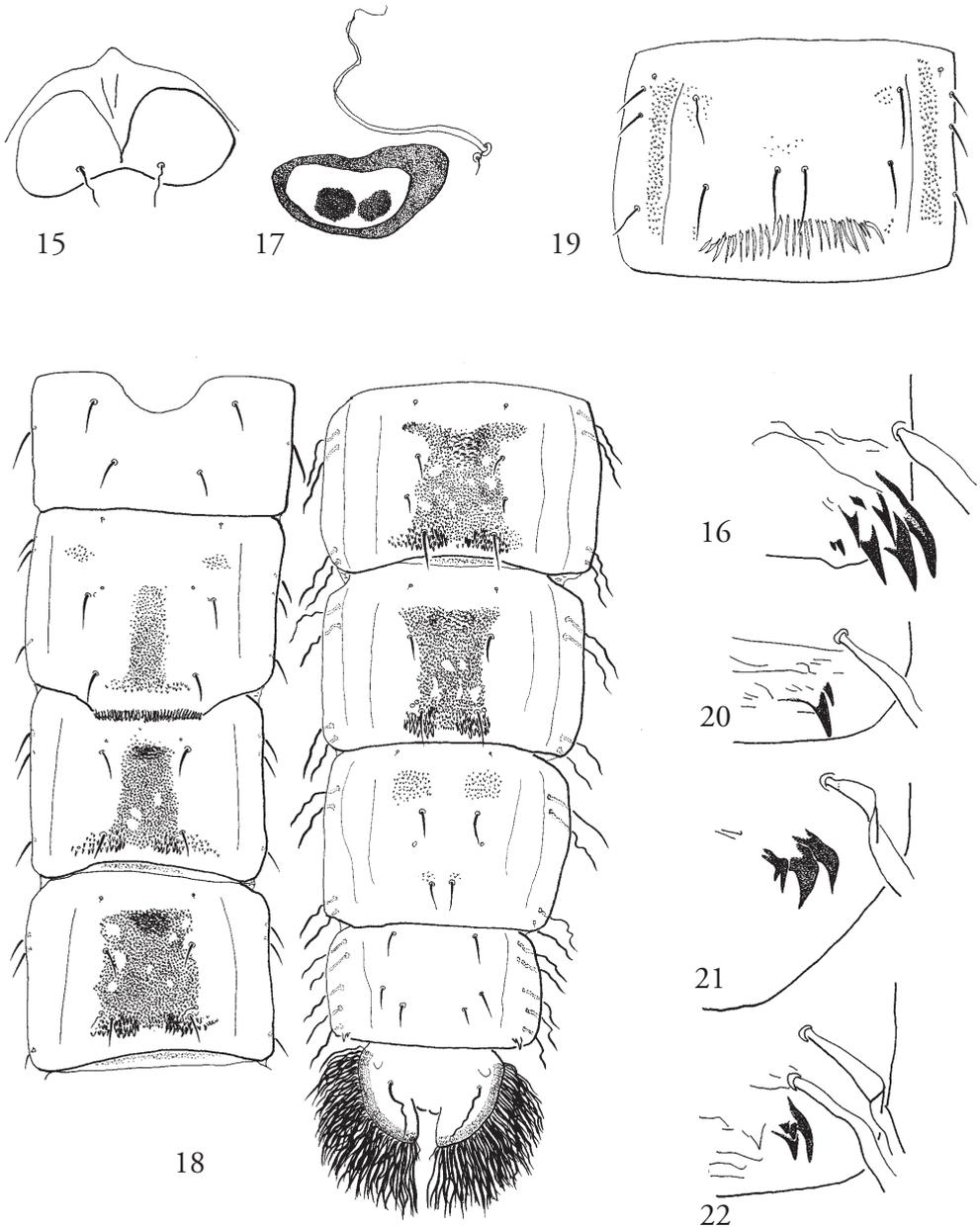
In *Acinoretracus multispinosus* and *A. regalis* a small, median protuberance, which bears several large setae, is present above the base of each inferior volsella. Amakye & Sæther (1993) termed the protuberance a median volsella; this structure is absent in *A. crispus* and *A. penicillatus*.

Amakye & Sæther (1993: 269, 272) refer to a 'more or less distinct crista dorsalis' on the gonostylus of *multispinosus*. However, this ridge-like structure is actually ventral and could be termed a crista ventralis. This structure is also present on *A. regalis* and *A. penicillatus*.

See Remarks under *A. regalis* for comments concerning the separation of *A. multispinosus* and *A. regalis*.

Pupae of this species and *A. penicillatus* may prove difficult to separate. In general, the pupa of *A. penicillatus* is larger (5.53-5.91 mm vs. 4.55-5.53 mm in *A. multispinosus*) and has a higher T II hooklet count (26-30 vs. 22-27 in *A. multispinosus*) but fewer anal lobe taeniae (84-100 vs. 96-128 in *A. multispinosus*). These numbers may prove meaningless when more populations are sampled; our sample is admittedly small. The shagreen spinules on T II-VI are larger anteromedially in *A. multispinosus*; in *A. penicillatus* they are subequal anteromedially. Another useful character for separation is the presence of larger anterior and posterior triangular clear areas on T VII-VIII on *A. penicillatus*; such areas are reduced or not present on our *A. multispinosus* material.

Larvae of *A. multispinosus* are very similar to *A. penicillatus*. In our material, fourth instar *A. multispinosus* larvae were smaller; however size differences may not hold throughout the species' range and in general may not provide a good character for separa-



Figs. 15-16. *Acinoretracus penicillatus* pupa. – 15, Cephalic tubercles; 16, tergite VIII caudolateral spurs. – Figs. 17-22. *A. multispinosus*, pupa. – 17, Thoracic horn base and precorneal setae; 18, abdomen, dorsal; 19, sternite II; 20-22, tergite VIII caudolateral spurs, variations.

tion. A good distinguishing feature is the well defined labral sclerite 1 of *A. multispinosus*; in *A. penicillatus* this sclerite is fused with the frontal apotome.

The immature stages of *A. multispinosus* described in this paper were collected from Lake Opi, a shallow (maximum depth 4 m), slightly acidic (pH 6.0-6.5) and dilute (low in dissolved minerals) body of water in the West African Guinea Savanna region near Nsukka, Nigeria. Larvae of *A. multispinosus* were uncommon at depths greater than 0.5 m in this lake (Hare & Carter 1986). For more detailed information on the chemistry of Lake Opi see Hare & Carter (1984).

The species is known from Burkina Faso, Cameroon, Chad, Ghana, Nigeria, Uganda and Zaire.

Material examined. – [BURKINA FASO] Haute Volta, a.o.f., Tangrela, 3-12-56, Cercle de Banfora, J. Hamon, ORSTOM réc., 1 ♂ paratype (BMNH). CAMEROON: Kumba, vi-vii-58, D. J. Lewis, 1 ♂ (BMNH). NIGERIA: Lake Opi nr. Nsukka, 8-iii-1977 to 6-viii-1980, leg. L. Hare, numerous associated adults, pupal exuviae and larvae. UGANDA: Lake Bungani, 1-viii-1932, G. H. E. Hopkins, holotype ♂ (BMNH).

Acinoretetracus penicillatus (Freeman) **comb. n.**
(figs. 8-13, 15, 16, 26-33)

nec *Carteria regalis* Goetghebuer. Freeman 1955: 371. [mis-identification].

Chironomus (Dicrotendipes) penicillatus Freeman 1957: 374 (original description of adult male).

Dicrotendipes penicillatus (Freeman). Freeman & Cranston 1980: 190 (catalog).

Description

Adult male (n=3). – Colour. Head and antennae light brown; thorax brown, with dark median stripe extending from front of scutum to postnotum; legs brown; wings unmarked, pale brownish; abdomen brown, tergites I-VI with central dark stripe, VII, VIII and hypopygium uniform brown.

Length. Total 4.15-4.90 mm; thorax 1.05-1.15 mm; abdomen 3.10-4.90 mm.

Head. Frontal tubercles 2.0 long. Temporal setae 11-15; clypeal setae 18-22; cibarial sensilla 11-18. Lengths of palpomeres 1-5: 30-33; 42-45; 108-113; 105-125; 154-170. AR 1.95-2.08.

Thorax. Setae: acrostichals 11-13; dorsocentrals 10-11; prealars 5-6; 7-8.

Wing. Wing length 2.00-2.03 mm; width 0.50-0.54 mm. VR 1.16-1.20. Setae: R 25-30; R1 13-19; R4+5 20-23; squama 6-7. Wing apex slightly truncate (fig. 13).

Legs. Tarsomere 1 of middle leg with 8-13 sensilla chaetica; tarsomere 1 of hind leg with 0 sensilla chaetica. Lengths and proportions of legs see Table 3.

Hypopygium (fig. 8). Superior volsella digitiform,

shaft bare but with dense brush of long setae apically (fig. 9). Median volsella absent. Inferior volsella with narrowed, upturned apex, bearing 3-4 large setae and several smaller setae (fig. 10). Gonostylus bulbous /quadrate, with crista ventralis. Anal point ridge without dorsal setae; anal point with 3-6 smaller lateral setae.

Adult female (n=1-2). – Colour. Similar to male.

Length. Total 3.77-4.26 mm; thorax 1.12-1.28 mm; abdomen 2.65-2.98 mm.

Head. Frontal tubercles vestigial. Temporal setae 13-17; clypeal setae 22-32; cibarial sensilla 17-18. Lengths of palpomeres 1-5: 38-40; 40-43; 100-112; 108-117; 177-185. AR 0.33.

Thorax. Setae: acrostichals 13-14; dorsocentrals 10-11 + 2 humerals; prealars 5; scutellars 8.

Wing. Wing length 2.18-2.35 mm; width 0.63-0.70 mm. VR 1.14-1.16. Setae: R 31; R1 20-23; R4+5 35-41; squama 9-10.

Legs. Tarsomere 1 of middle leg with 21-23 sensilla chaetica; tarsomere 1 of hind leg with 0 sensilla chaetica. Lengths and proportions of legs see Table 4.

Abdomen. Notum 155 long. Tergite X with 10-11 setae. Cercus 113 long.

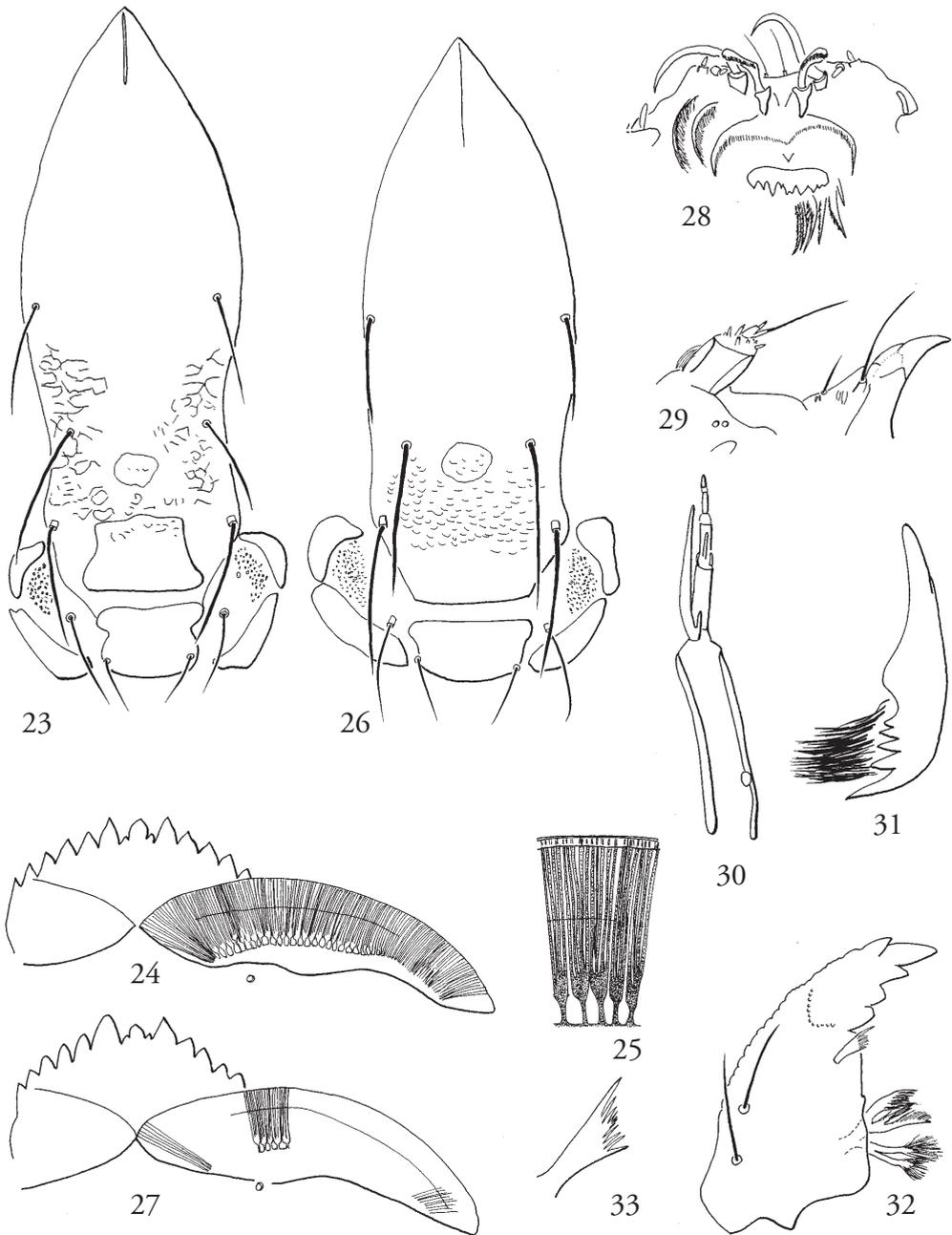
Pupa (n=3-4). – Colour. Exuviae brown, with clear band at posterior margin of T II-VI, T VII-VIII with clear anterior and posterior triangular areas; anal lobes paler brown.

Table 3. *A. penicillatus* male: lengths and proportions of legs (n = 2-3):

	P1	P2	P3
fe	990-1040	920-950	1020-1040
ti	745-760	860-880	1140-1160
ta1	1130-1150	400-420	690-700
ta2	530-540	220-240	410-420
ta3	475-480	190-195	330-340
ta4	380	120	190
ta5	180-185	95-100	115-120
LR	1.49-1.54	0.47-0.48	0.60-0.61
BV	1.83-1.86	3.38-3.60	2.71-2.73
SV	1.55	4.36-4.45	3.13-3.14

Table 4. *A. penicillatus* female: lengths and proportions of legs (n=2-3).

	P1	P2	P3
fe	1000	960	1000-1090
ti	760	910	1120-1220
ta1	1250	460	680-710
ta2	540	230	345-400
ta3	460	190	320-330
ta4	360	120	180
ta5	180	100	120
LR	1.64	0.51	0.58-0.61
BV	1.95	3.64	2.90-2.93
SV	1.41	4.07	3.12-3.25



Figs. 23-25. *Acinoretracus multispinosus* larva. – 23, Apotome and labral sclerites; 24, mentum and ventromental plate; 25, detail of ventromental plate striae. – Figs. 26-33. *A. penicillatus*, larva. – 26, Apotome and labral sclerites; 27, mentum and ventromental plate; 28, labral structures; 29, maxilla; 30, antenna; 31, premandible; 32, mandible; 33, seta subdentalis.

Length. Total 5.53-5.95 mm; cephalothorax 1.30-1.38 mm; abdomen 4.20-4.65 mm.

Cephalothorax. Frontal setae 30-50, 38 long. Dorsal anteprenotal seta not measurable (broken off?); ventral anteprenotal seta at least 150 long, taeniate (n=1). Anterior precorneal seta not measurable, taeniate; posterior seta about 80. Dorsocentral setae lengths (n=2-3): Dc1 40-50; Dc2 100; Dc3 21-33; Dc4 40-43. Dorsum with row of 11-17, 13 tubercles.

Abdomen. T II with posterior row of 26-30, 28 hooklets. S II with posteromedian row of 27-36, 33 spines; S III with posteromedian row of 10-15, 13 spines. Shagreen on T II-VI becomes progressively larger posteriorly, with posterior groups of larger spines separated medially by area of smaller spinules; on T II consists of broad T- or V-shaped area; on T III- T V shagreen broadly quadrilateral or X-shaped, with small fenestrations; on T VI broadly triangular; on T VII with two anterolateral patches or patches joined to form band; T VIII with two anterior patches of fine spinules. T VIII with 3-4 large and several smaller caudolateral spurs (fig. 16). Anal lobes with 84-100, 92 taeniae.

Larva (n=3). – Colour. Head capsule yellow-brown.

Head. Postmentum length 235-260. Frontal apotome and labral sclerite 1 fused, apotome strongly pebbled (fig. 26). Length of antennal segments 1-5: 75-90; 28; 13-15; 10; 5; AR 1.19-1.48. Premandible 85-100 long. Pecten epipharyngis with 14-16 teeth (n=2). Mandible length 175-190; pecten mandibularis with 8-12 setae. Mentum (fig. 27) width 123-135. Ventromental plates 188-203 wide; 50-54 long; VPR 3.57-3.76; with 48-50 striae.

Remarks

See remarks under *A. multispinosus* for separation of the immature stages.

Our associated material was collected at the type-locality from bottom mud in acid, brown water dystrophic lakes and ponds at a depth of about 1.5 m; they were not collected in the marginal reeds. The small lake at Betty's Bay is described by Harrison (1958).

The species is known only from South Africa.

Material examined. – [SOUTH AFRICA]: Cape Province, Cape Peninsula, Hout Bay, Skoorsteenskop, 11-1951, P. Brinck, 1 ♂ paratype (BMNH). SOUTH AFRICA: Western Cape Province: Betty's Bay, Malgat Vlei, January and February 1994, leg. A.D. Harrison, numerous associated adults, pupal exuviae and larvae.

Acinoretracus regalis (Goetghebuer) comb. n.

Chironomus (*Carteria*) *regalis* Goetghebuer 1936: 465 (original description of adult male).

Chironomus (*Dicrotendipes*) *regalis* Goetghebuer. Freeman

1957: 373 (redescription).

Dicrotendipes regalis (Goetghebuer). Freeman & Cranston 1980: 190 (catalog).

This species is very similar to *A. multispinosus*, differing mainly in having a normal spur count on the hind tibial combs. Freeman (1957) stated that the two species could be separated by differences in the genitalia, such as the anal point being narrower in side view in *multispinosus* (this difference has been difficult to observe), more rounded gonostylus in *multispinosus* (Freeman himself stated that this difference may not be constant), and the bifid nature of the superior volsella in *multispinosus* (which, as discussed above, is not always bifid). The two species are so similar in structure that it may be that both are the same; *A. multispinosus* may only be a variety with extra spurs on the hind tibial comb. We have made *regalis* the type-species for the genus because it was the first described species; should *multispinosus* fall as a synonym, no name changes or change in type-species status would be necessary. Reared material and more adult material will be needed to solve the potential problem of separation of *regalis* from *multispinosus*. The immature stages of *A. regalis* are unknown.

The species is recorded from Burkina Faso, Ghana, Sierra Leone and Zaire.

Material examined. – [GHANA] Gold Coast: Addah, Adidome, 1921, N.L. Braybrock, in hut, 2 ♂ (BMNH). [ZAIRE]: Congo-Belge: Eala, 17-iv-1936, J. Ghesquière (label reads 'compared with holotype by P. Freeman 1955'), 1 ♂ (BMNH).

Acinoretracus crispus (Freeman) comb. n.

Chironomus (*Dicrotendipes*) *crispus* Freeman 1957: 374 (original description of adult male).

Dicrotendipes crispus (Freeman). Freeman & Cranston 1980: 190 (catalog).

This species differs from the other three in the genus by having a more slender and strongly curved gonostylus, long and slender superior volsella, and a narrow anal point that is sharply hooked apically (Freeman 1957: figs. 8g, 8j). The inferior volsella is similar to that of *A. penicillatus* in that it lacks the preapical dorsal swelling. The immature stages are unknown.

The species is recorded from Chad, Ghana, Mali, Nigeria and Sudan.

Material examined. – [GHANA]: Gold Coast: Red Volta, Nangodi, 8-x-1954, G. Crisp, 1 ♂ paratype (BMNH).

Key to adult males of *Acinoretracus*

1. Gonostylus broad, bulbous, semi-quadrate; superior volsella short ; anal point broad (figs. 1, 8)2
- Gonostylus more slender, strongly curved; superior volsella long and slender; anal point slender (see Freeman 1957: figs 8f, 8j) *A. crispi*
2. Hind tibia with 1 spur on outer tibial comb3
- Hind tibia with 4-5 spurs on outer tibial comb...
..... *A. multispinosus*
3. Median volsella present with 4-7 large setae; inferior volsella with dorsal subapical swelling (similar to figs. 1, 7; see also Freeman 1957: figs. 8d, 8h) *A. regalis*
- Median volsella absent; inferior volsella without subapical swelling or at most a slight dorsal expansion (figs. 8, 10) *A. penicillatus*

ACKNOWLEDGMENTS

We are grateful to Drs. P. S. Cranston and S. J. Brooks for the loan of material from the British Museum (Natural History) and to Mr. B. A. Caldwell, Dr. Cranston and Dr. O. A. Sæther for their comments on the manuscript. The senior author wishes to especially thank Dr. Barry Merrill and Judy Merrill (Merrill Consultants, Dallas, TX) for providing funds for laboratory and computer equipment.

REFERENCES

Amakye, J. S. & O. A. Sæther, 1993. Redescription of the Afrotropical *Henrardia quadrispinosa* Goetghebuer and *Dicrotendipes multispinosa* (Freeman) (Diptera, Chironomidae). – Journal of the Kansas Entomological Society 66: 263-273.

Cranston, P. S., 1996. Immature stages of two unusual species of *Dicrotendipes* (Diptera: Chironomidae) from Australia. – Australian Journal of Entomology 35: 263-270.

Cranston, P. S., C. J. Webb & J. Martin, 1990. The saline nuisance midge *Carteronica longilobus* (Diptera: Chironomidae): a systematic reappraisal. – Systematic Entomology 15: 401-432.

Epler, J. H., 1987. Revision of the Nearctic *Dicrotendipes* Kieffer, 1913 (Diptera: Chironomidae). – Evolutionary Monographs 9: 102 pp. + 37 plates.

Epler, J. H., 1988. Biosystematics of the genus *Dicrotendipes* Kieffer, 1913 (Diptera: Chironomidae: Chironominae) of the world. – Memoirs of the American Entomological Society 36: 1-214.

Epler, J. H., 1992. Identification Manual for the Larval Chironomidae (Diptera) of Florida. – Florida Department of Environmental Regulation, Orlando, FL. 302 pp.

Epler, J. H., 1995. Identification Manual for the Larval Chironomidae (Diptera) of Florida. Revised edition. – Florida Department of Environmental Protection, Tallahassee, FL. 317 pp.

Freeman, P., 1955. Diptera (Nematocera) Chironomidae. – South African Animal Life. Results of the Lund University Expedition in 1950-1951, 2: 361-381.

Freeman, P., 1957. A study of the Chironomidae (Diptera) of Africa south of the Sahara. Part III. – Bulletin of the British Museum of Natural History, Entomology 5: 323-426.

Freeman, P. & P. S. Cranston, 1980. Family Chironomidae. – In: Crosskey, R. W. (ed.). Catalogue of the Diptera of the Afrotropical Region. British Museum (Nat. Hist.), London, 1: pp. 175-202.

Goetghebuer, M., 1936. Chironomides du Congo Belge. – Revue de Zoologie et de Botanique Africaines 28: 453-492.

Hamilton, A. L., O. A. Sæther & D. R. Oliver, 1969. A classification of the Nearctic Chironomidae. – Fisheries Research Board of Canada Technical Report 124: 42 pp.

Hare, L. & J. C. H. Carter, 1984. Diel and seasonal physico-chemical fluctuations in a small natural West African lake. – Freshwater Biology 14: 597-610.

Hare, L. & J. C. H. Carter, 1986. The benthos of a natural West African lake, with emphasis on the diel migrations and lunar and seasonal periodicities of the *Chaoborus* populations (Diptera, Chaoboridae). – Freshwater Biology 16: 759-780.

Harrison, A. D., 1958. Hydrobiological studies on alkaline and acid still waters in the western Cape Province. – Transactions of the Royal Society of South Africa 36: 213-244.

Harrison, A. D., 1996. Chironomidae from Ethiopia, Part 3. Chironomini, with description of a new species (Insecta, Diptera). – Spixiana 19: 43-87.

Langton, P. H., 1994. If not 'filaments', then what? – *Chironomus* 6: 9.

Pinder, L. C. V. & F. Reiss, 1983. The larvae of Chironominae (Diptera: Chironomidae) of the Holarctic region - Keys and diagnoses. – Entomologica Scandinavica Supplement 19: 293-435.

Sæther, O. A., 1977. Female genitalia in Chironomidae and other Nematocera: morphology, phylogenies, keys. – Bulletin of the Fisheries Research Board of Canada 197: 209 pp.

Sæther, O. A., 1980. Glossary of chironomid morphology terminology (Diptera: Chironomidae). – Entomologica Scandinavica Supplement 14: 1-51.

Strand, E., 1928. Miscellanea nomenclatoria zoologica et palaeontologica. I-II. – Archiv für Naturgeschichte 92A: 30-75.

Received: 29 September 1998
Accepted: 12 November 1998