

***Dicentropilum*, a New Genus of Mayflies (Baetidae, Ephemeroptera) from Africa**

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A new genus of baetid mayflies is described, the adults closely related to the carnivorous genus *Centropiloides* but the nymphs with mandibles of the ancestral grinding type. Two species formerly included in *Afroptilum* are transferred to *Dicentropilum*, *A. decipiens* and *A. spinulosum*. A new species from West Africa is described here.

Key words: Ephemeroptera, Baetidae, *Centropilum*, taxonomy, phylogeny.

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INTRODUCTION

In his account of the African mayflies, Demoulin (1970) described the adult of *Centropiloides spinulosa* from South Africa. Despite the resemblance of this adult to *Centropiloides* Lestage, Gillies (1990) showed that an almost identical adult from East Africa was associated with a nymph typical, not of *Centropiloides*, but of *Afroptilum*. He described this as *A. decipiens*. The unusual structure of the nymphal cerci was figured. Both this species and *C. spinulosa* were placed in the *sudafricanum* group of *Afroptilum*. This was not an entirely satisfactory solution since it introduced a polyphyletic element into *Afroptilum*. On these grounds, it is proposed to remove these two species from the latter genus and create the new genus *Dicentropilum* to accommodate them.

In the course of a recent study on the ecology of the river Niandan in Guinea we have reared a nymph related to *Afroptilum* which has, however, a pair of prominent procoxal papillae, and the cerci bear a strong resemblance to those of *A. decipiens*. The adult associated with it is similar to that of *Centropiloides*. We are treating it as falling within the definition of *Dicentropilum* given below.

***Dicentropilum* gen.n.**

Adult: moderately large insects, fore wing with strongly developed crossveins and single marginal intercalaries, hind wing broad with three longitudinal veins and double costal spur, the two spurs being widely separated.

Nymph: mouthparts with molar region of mandibles well developed, canines of right mandible separate, the prostheca a stout bifid spine, canines of left mandible fused, a tuft of setae present at base of prostheca on both sides; apical segment of labial palp cap-like. A pair of procoxal papillae present at base of fore coxae, inconspicuous in some species. Gill lamellae present on segments I-VII, markedly asymmetrical, anterior margin strongly thickened, no inner, basal lobe. Tarsal claws stout with double row of 3-5 denticles. Tails strongly haired, terminal filament about half as long as cerci; the joints between the individual segments of the cerci set at an oblique angle with the sides, sinuous near the inner* margin (Fig. 13).

Type species. *Afroptilum decipiens* Gill.

***Dicentropitulum papillosum* Wuillot, sp. n.**

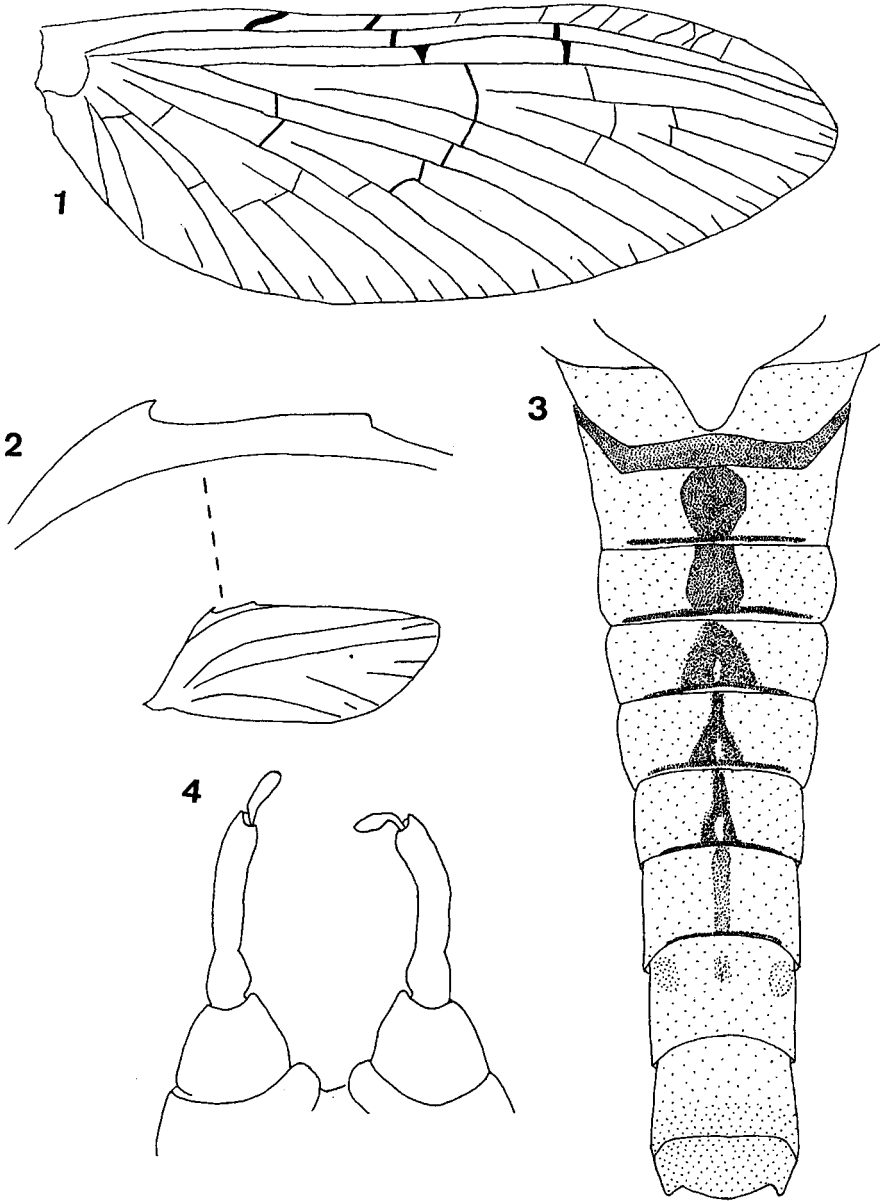
Male imago. Fore wing (Fig. 1) hyaline, proximal crossveins of C, Sc and R1 areas thickened and deeply pigmented dark brown, and to a lesser extent in R4,5 and MA areas; hind wing (Fig. 2) broad, about 2.5 times as long as broad, with double spur, the two spurs widely separated. Abdominal terga cream with prominent, dark, reddish-brown markings on II-VI (Fig. 3). Forceps (Fig. 4), coxite broad at base, tapered distally; 1st and 2nd segments fused, the first segment swollen medially, its separation from the second (long) segment indicated by a shallow constriction; third (terminal) segment long.

Nymph. Mouthparts (Figs. 5 - 9) labrum, dorsal surface with transverse line of setae and dense anterior fringe; left mandible with fused canines, right mandible with divided canines, prostheca on right a stout spine, bifid at apex; maxillary palp short, 2-segmented, a vestigial third segment usually present; apical segment of labial palp small, fused to second segment. Legs stout (Fig. 10), femora with dense hair fringe along outer border, tarsal claws with a double row of 3-5 stout teeth and an apical hair. A pair of elongate, white papillae (see Fig. 10) inserted at base of procoxae. A small median spur on posterior margin of metanotum. Abdominal gills (Fig. 11) markedly asymmetrical, posterior margin strongly thickened at base, anterior margin serrated almost to apex. Abdominal terga with markings as follows (Fig. 12): A pair of small black spots on terga III-X (ovate on anterior terga and circular on posterior terga). A large dark central spot on I, IV or V-VIII. Terga IV and VIII paler. Terminal filament about half as long as cerci; joints of cerci running obliquely across long axis of filament, slightly sinuous near inner margin (Fig. 13).

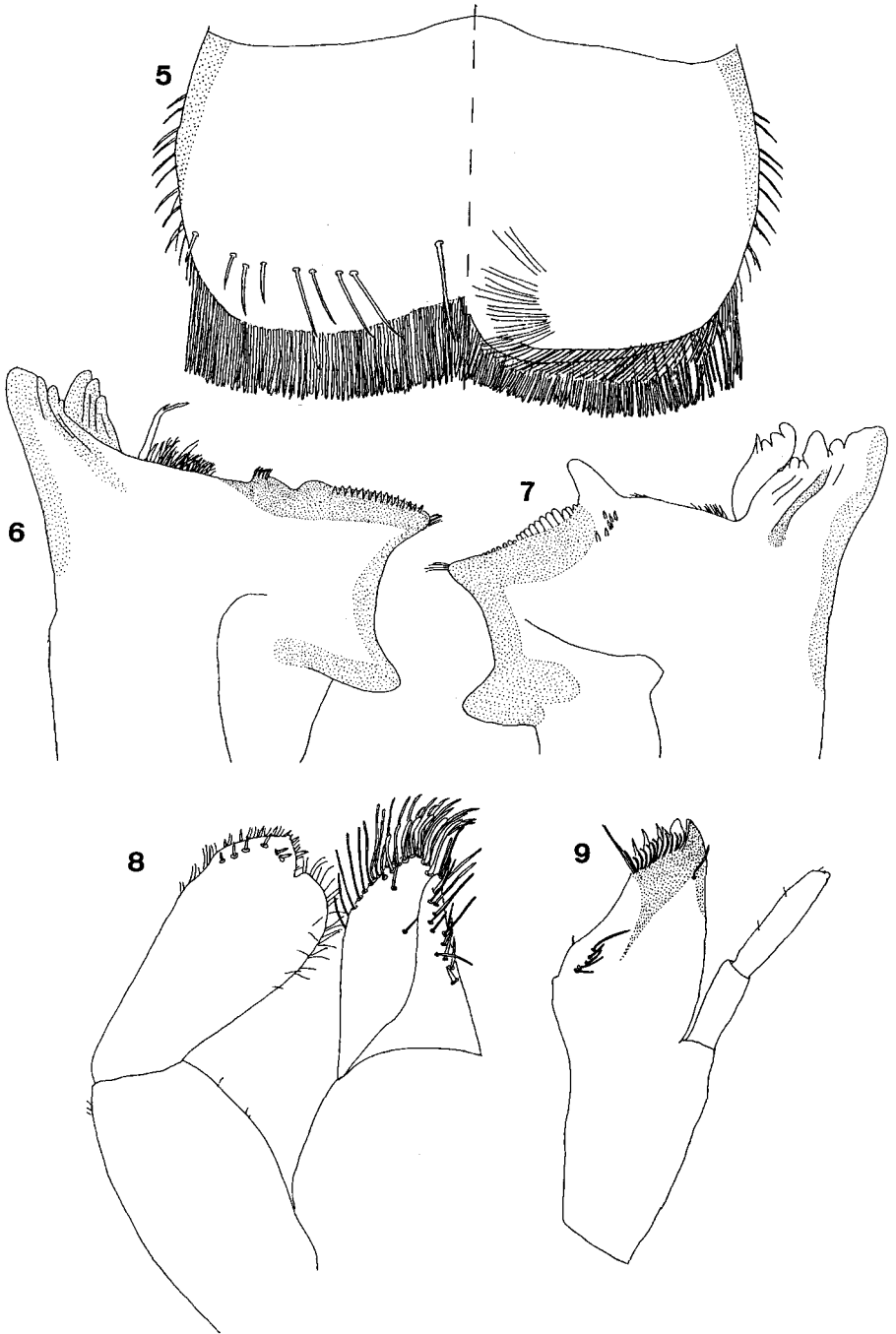
♂ body 6-7 mm: ♂ wing 7 mm, ♀ 8 mm: mature nymph, body without cerci 8-9 mm.

Material: GUINEA: Holotype ♂ imago with associated nymph skin on slide, R. Niandan, Sassambaya, iv.88, deposited in Muséum National d'Histoire Naturelle de Paris. Paratypes, 1 ♀ imago, same provenance, iii.88; 21 nymphs, same provenance, ii.88; 3 nymphs, R. Milo, Boussoulé, xii.91; 3 nymphs, R. Bale, Karako, i.92. LIBERIA: 2 nymphs, St. Paul River, 7.viii.56. ZAIRE: 1 ♀

* Incorrectly described as 'lateral' margin in Gillies, 1990.



Figs.1-4. *Dicentroptilum papillosum*. ♂ imago. 1. Fore wing. 2. Hind wing. 3. Abdomen, dorsal view. 4. Forceps.



Figs.5-9. *D. papillosum*, nymphal mouthparts. 5. Labrum (dorsal view on left, ventral on right). 6,7. Right and left mandibles. 8. Labium. 9. Maxilla.

imago, Kinshasa, 26.vi.56; 2 nymphs, R. Congo, Kinshasa, 26.vi.56.

The adult of *D. papillosum* is distinguished from the other two species recognised here by the pigmented crossveins in the fore wing. The nymph is distinguished from other species of the genus by the greater length of the paired finger-like papillae at the base of the procoxae. Similar structures are present in the genus *Afrobaetodes* Demoulin, but in this case there is an additional single papilla in the mouthparts, arising from the base of the maxillary palp. Procoxal 'osmobranchiae' have been described by Waltz, McCafferty and Kennedy (1985) in the North American species, *Barbaetis benfieldi* Kennedy, a genus that is evidently otherwise unrelated to *Dicentropilum*.

Dicentropilum spinulosum (Demoulin), comb. n.

1970 *Centroptiloides spinulosa* Demoulin, S. Afr. Animal Life 4: 37.

1990 *Afroptilum spinulosum*, Gillies, Aquat. Insects 12: 99.

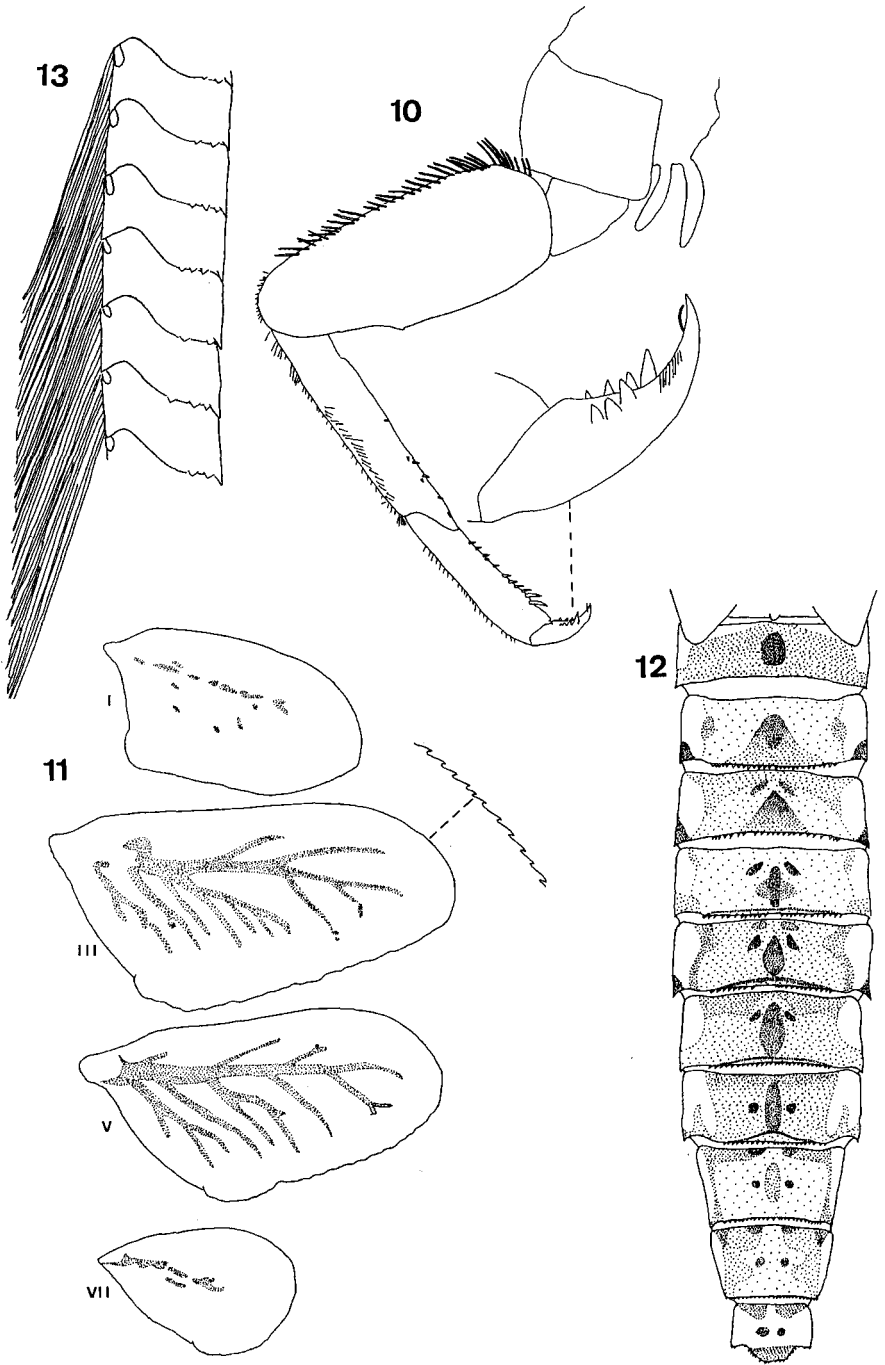
While noting the similarity between the adults of *D. spinulosum* and *D. decipiens*, Gillies (1990) concluded that they could, nevertheless, be separated by the yellow tinting of the costal and subcostal areas of the wings in the former as well as by the abdominal markings and the colour of the hind tarsus.

We have examined a series of nymphs collected by Dr. F.M. Chutter in South Africa from the Letaba River in the northern Transvaal. These are very close to *D. decipiens* from Tanzania and we believe them to be the previously unknown nymphs of *D. spinulosum*. They have the oblique joints between the segments of the cerci and the pair of short procoxal papillae characteristic of *Dicentropilum*. The main difference between the two species lies in the markings on the body. In *D. decipiens* the notum is dark brown and markings are confined to narrowly pale submedian sutures. In *D. spinulosum* these markings are much broader and in addition there are extensive pale markings on the lateral half of the mesonotum. The two species thus appear to be readily separable in the nymphal stages.

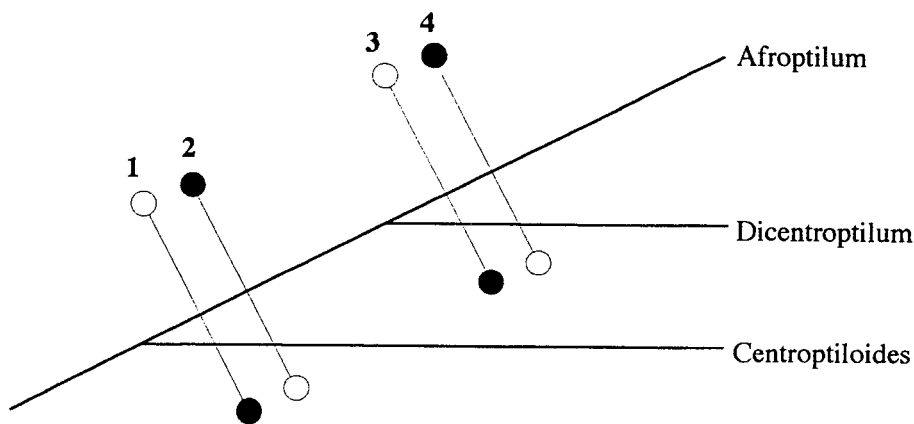
PHYLOGENY

It is proposed that the sister-group of *Dicentropilum* is *Centroptiloides* Lestage. Their common ancestor would presumably have had a broad hind wing and widely separated double costal spurs. The adults of the two genera may not be separable. They differ from the double-spurred species of *Afroptilum* or *Afroptiloides* by the greater breadth of the hind wing (less than 3 times as long as broad) and the wider separation of the two spurs (separated by a distance greater than the height of the basal spur).

The nymphs of the two genera differ strikingly both from each other and from *Afroptilum*. In *Centroptiloides* the mandibles are adapted for seizing and tearing



Figs.10-13. *D. papillosum*, nymph. 10. Fore leg (with detail of claw). 11. Gill lamellae. 12. Abdomen, dorsal view. 13. Right cercus, showing details of inter-segmental joints.



- 1 Mandibles adapted for carnivory
 - 2 Lobes of labrum fused except for median notch
 - 3 Cercal segments oblique with sinuosity
 - 4 Ratio length : breadth of hind wing > 3
- yes

○ no

Fig. 14. Relationships of genera with double-spurred hind wings. Apomorphic characters are shown with black circles.

prey and the labrum is bilobed with a central excavation. In *Dicentropitulum* the mouthparts are of the normal grinding type and the labrum has only a small median notch. In this genus, the segments of the cerci are marked off from each other by obliquely angled joints that are sinuous to a greater or lesser degree (Fig. 13). The West African species further differs from the others by the more prominent procoxal papillae and the deeply pigmented crossveins in the fore wing. The relationships of Baetidae with double costal spurs on the hind wing are shown below (Fig. 14).

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REFERENCES

- DEMOULIN, G. (1970): Ephemeroptera des faunes éthiopienne et malgache. - S. Afr. Animal Life 14: 24-170.
- GILLIES, M.T. (1990): A revision of the African species of *Centroptilum* Eaton (Baetidae, Ephemeroptera). - Aquatic Insects 12: 97-128.
- WALTZ, R.D., W.P. McCAFFERTY and J.H. KENNEDY (1985): *Barbaetis*: a new genus of eastern Nearctic mayflies (Ephemeroptera: Baetidae). - Great Lakes Entomologist 18: 161-165.