

***New species of Afroptilum  
(Baetidae, Ephemeroptera)  
from West Africa (1)***

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ABSTRACT

Four new species of the widely distributed genus *Afroptilum* Gillies are described from West Africa. Three of them are shown to belong to the tarsale-group of species while one, *A. plumosum*, lacks a hind wing in the male and is placed in the dimorphicum-group. In the nymphs of all four species, a tibio-patellar suture is present in mid and hind legs only, thus differentiating them from species of *Centroptilum* Eaton.

KEYWORDS : Mayflies — Taxonomy — *Afroptilum* — Baetidae — West Africa.

RÉSUMÉ

QUELQUES NOUVELLES ESPÈCES DU GENRE *AFROPTILUM* (BAETIDAE, EPHEMEROPTERA) EN AFRIQUE DE L'OUEST

Quatre nouvelles espèces du genre *Afroptilum* Gillies provenant d'Afrique de l'Ouest sont décrites. Parmi ces espèces, trois appartiennent au groupe « tarsale » alors que la dernière, *A. plumosum*, caractérisée par l'absence d'aile postérieure chez le mâle imago, est placée dans le groupe « dimorphicum ». La suture tibio-patellaire est absente sur les pattes antérieures des larves des quatre espèces d'*Afroptilum* étudiées, ce qui permet de les différencier du genre *Centroptilum* Eaton.

MOTS CLÉS : Éphéméroptères — *Afroptilum* — Baetidae — Systématique — Afrique de l'Ouest.

INTRODUCTION

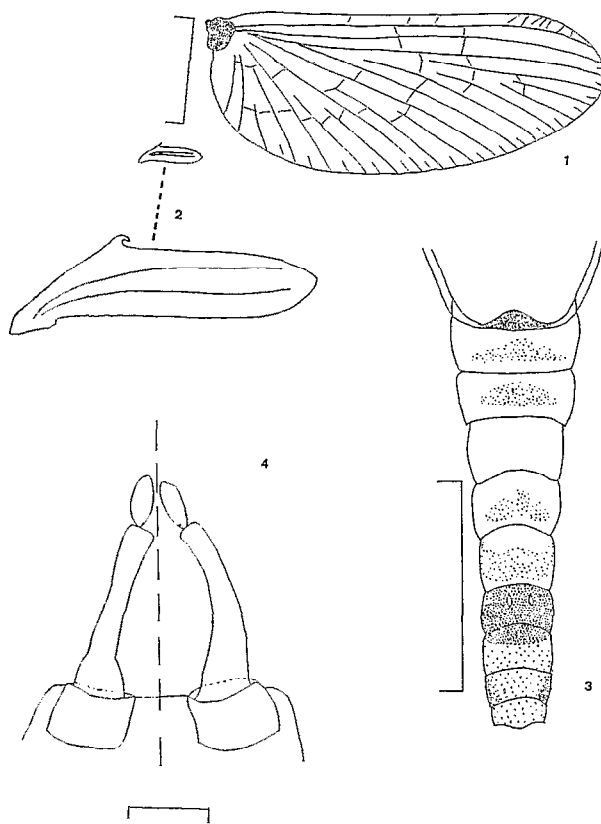
*Afroptilum* is one of the commonest baetids in rivers in East and South Africa. Four species-groups and one subgenus were recognised by Gillies (1990). It is allied to the holarctic genus, *Centroptilum* Eaton

from which, as redefined by McCafferty and Waltz (1990), the adult differs by the lack of a prominent spine between the limbs of the forceps. As recently shown by Kluge (in litt.), the nymph of *Afroptilum* is characterised by the lack of a tibio-patellar suture on the fore leg.

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FIGS. 1-4. — *Afroptilum christinae* n. sp. ♂ imago. 1 : fore wing. 2 : hind wing (with detail of spur). 3 : abdomen, dorsal view. 4 : forceps.

*Afroptilum christinae* n. sp. ♂ imago. 1 : aile antérieure. 2 : aile postérieure. 3 : abdomen, vue dorsale. 4 : genitalia.

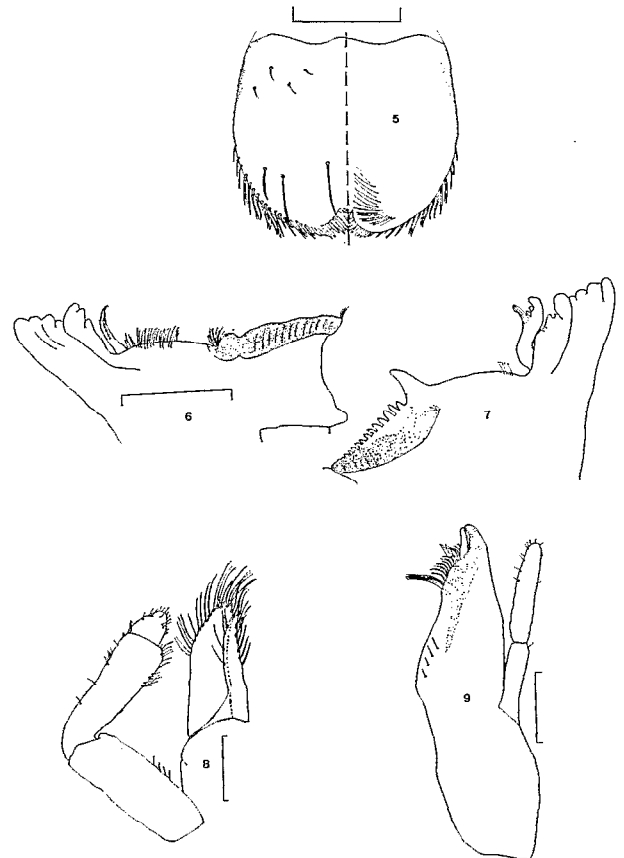
In the course of studies in the River Niger basin in Guinea and Mali a number of species of *Afroptilum* were reared from nymphs. Four new species with their associated nymphs are described here. The types of all species have been presented to the Muséum national d'histoire naturelle de Paris. Further discussion on the validity of the generic definitions used is given below.

## DESCRIPTIONS OF NEW SPECIES

### *Tarsale-group of species*

#### *Afroptilum christinae* sp. nov., Wuillot

♂ imago. Fore tibia about twice as long as femur, tarsus subequal to tibia. Fore wing hyaline, stigma

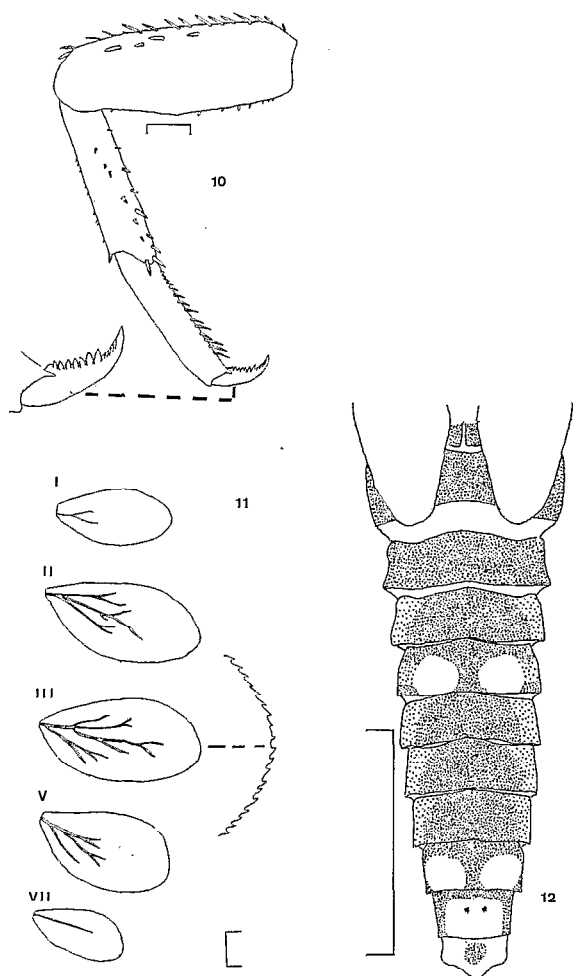


FIGS. 5-9. — *Afroptilum christinae* n. sp. nymph, mouthparts. 5 : labrum (dorsal view on left, ventral on right). 6 : distal margin of right mandible. 7 : distal margin of left mandible. 8 : labium. 9 : maxilla.

*Afroptilum christinae* n. sp. larve, pièces buccales. 5 : labrum (vue dorsale à gauche, vue centrale à droite). 6 : marge distale de la mandibule droite. 7 : marge distale de la mandibule gauche. 8 : labium. 9 : maxille.

with 5-7 crossveins (fig. 1); hind wing narrow, pointed, with 2 veins and small, curved costal spur (fig. 2). Abdominal terga I-VI cream with broad, orange, transverse bands on II, III, V-VI; VII-X fawn, VII being darker than the rest (fig. 3). Segments 1 and 2 of forceps fused, second (long) segment stout, third segment elongate (fig. 4).

*Nymph.* Mouthparts (figs. 5-9) : upper surface of labrum with 1 median and 2 lateral, long, fine setae; canines of both mandibles divided, prosthema of right mandible a stout spine with 5-6 fine teeth along inner margin; maxillary palp with 2 segments, apical teeth of galea-lacinia broad, blunt; apical segment of

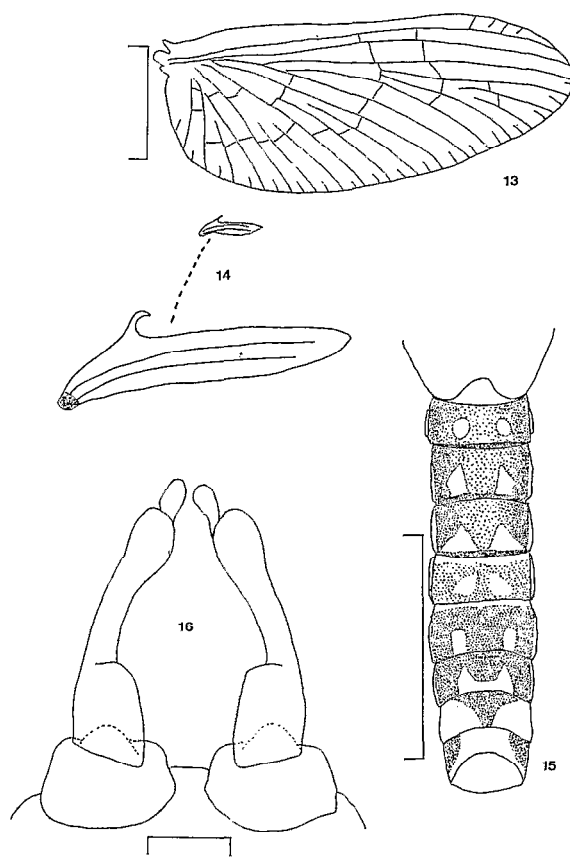


FIGS. 10-12. — *Afroptilum christinae* n. sp. nymphal parts. 10 : fore leg (with detail of claw). 11 : gill lamellae I-III, V, VII (with detail of distal margin of gill III). 12 : abdomen, dorsal view.

*Afroptilum christinae* n. sp. larve. 10 : patte antérieure (détail de la griffe). 11 : trachéobranches I-III, V, VII (détail du bord distal de la troisième branchie). 12 : abdomen, vue dorsale.

labial palp cap-shaped, second segment without apicomedial projection. Legs stout, anterior margin of femora with a line of spine-like setae, tarsi with more than 10 spine-like setae along internal border, tarsal claws with two rows of 6-7 large teeth (fig. 10). Abdomen dark brown, variable in intensity, IV and VIII-X broadly pale (fig. 12). Abdominal gills present on segments I-VII, ovate with serrated margins (fig. 11). Terminal filament about 2/3 length of cerci.

♂ wing 3-4 mm ; body wing 3-4 mm.

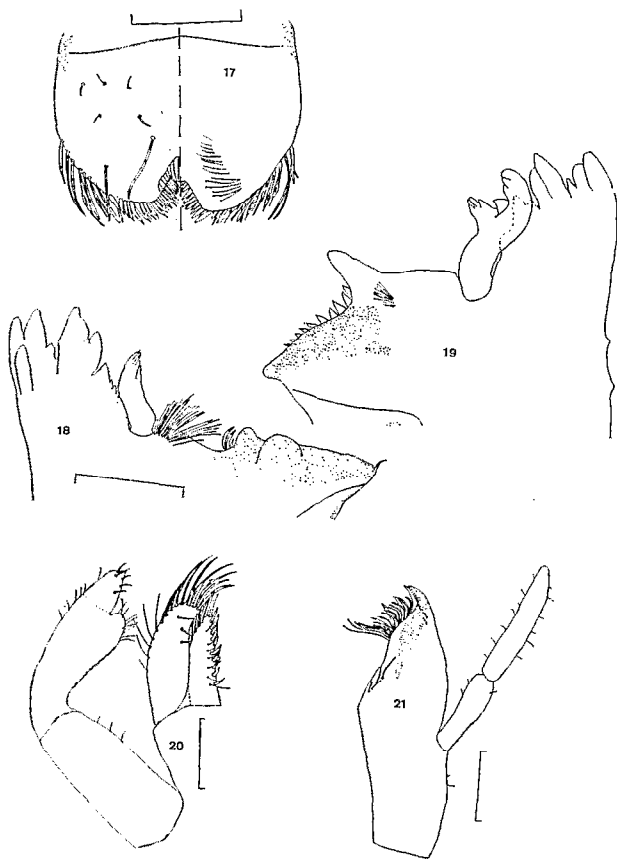


FIGS. 13-16. — *Afroptilum niandanensis* n. sp. ♂ imago. 13 : fore wing. 14 : hind wing (with detail of spur). 15 : abdomen, dorsal view. 16 : forceps.

*Afroptilum niandanensis* n. sp. imago. 13 : aile antérieure. 14 : aile postérieure (détail de l'éperon). 15 : abdomen, vue dorsale. 16 : genitalia.

**Material.** Guinea : holotype ♂ imago with associated larval skin (on slide), R. Kaba at Ouré Kaba, 01.92, 2 ♂♂ ; same provenance, 01.92 ; 8 nymphs, R. Niandan at Sassambaya, 02.87.

The adult of *A. christinae* differs from those of *A. indusii* (Crass), *A. medium* (Crass) and *A. tarsale* Gillies by the presence of only 2 veins in the hind wings. From *A. badium* (Kopelke), *A. falcatum* (Crass), *A. medium* (Crass) and *A. tarsale* it differs by the shape of the ♂ forceps, and from *A. loweae* (Kimmins) by the markings on the abdomen. As regards the other new members of the *tarsale* group described here, it differs from *A. niandanensis* and *A. baborum* by the fusion of the first two forceps segments and by the abdominal markings. It would appear to

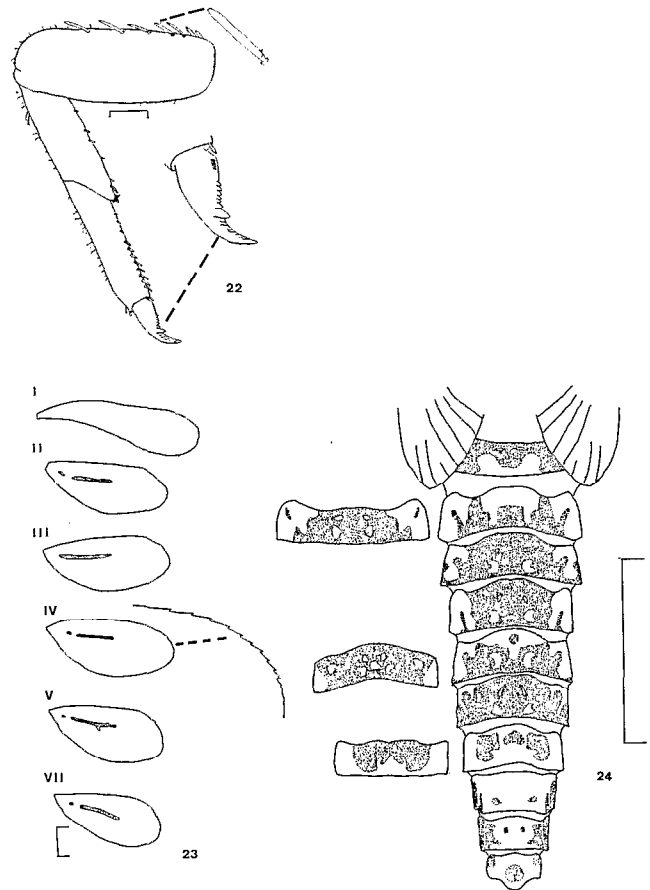


FIGS. 17-21. — *Afroptilum niandanensis* n. sp. nymph, mouthparts. 17 : labrum (dorsal view on left, ventral on right). 18 : distal margin of right mandible. 19 : distal margin of left mandible. 20 : labium. 21 : maxilla.

*Afroptilum niandanensis* n. sp. larve, pièces buccales. 17 : labrum (vue dorsale à gauche, vue ventrale à droite). 18 : marge distale de la mandibule droite. 19 : marge distale de la mandibule gauche. 20 : labium. 21 : maxille.

be closest to the much larger species, *A. flavum* (Crass) from South Africa, but differs by the smaller number of stigmatic crossveins.

The nymph of *A. christinae* differs by the second segment of the labial palp lacking a medial apical projection and from *A. indusii* by the bulbous third segment of the labial palp of the latter. From the figure of *A. medium* given by Crass (1947) the gills of *A. christinae* differ by their symmetrical and ovate aspect. The nymphs of *A. tarsale* and *A. niandensis* differ from *A. christinae* by the bifid prosthema of the right mandible in these species.

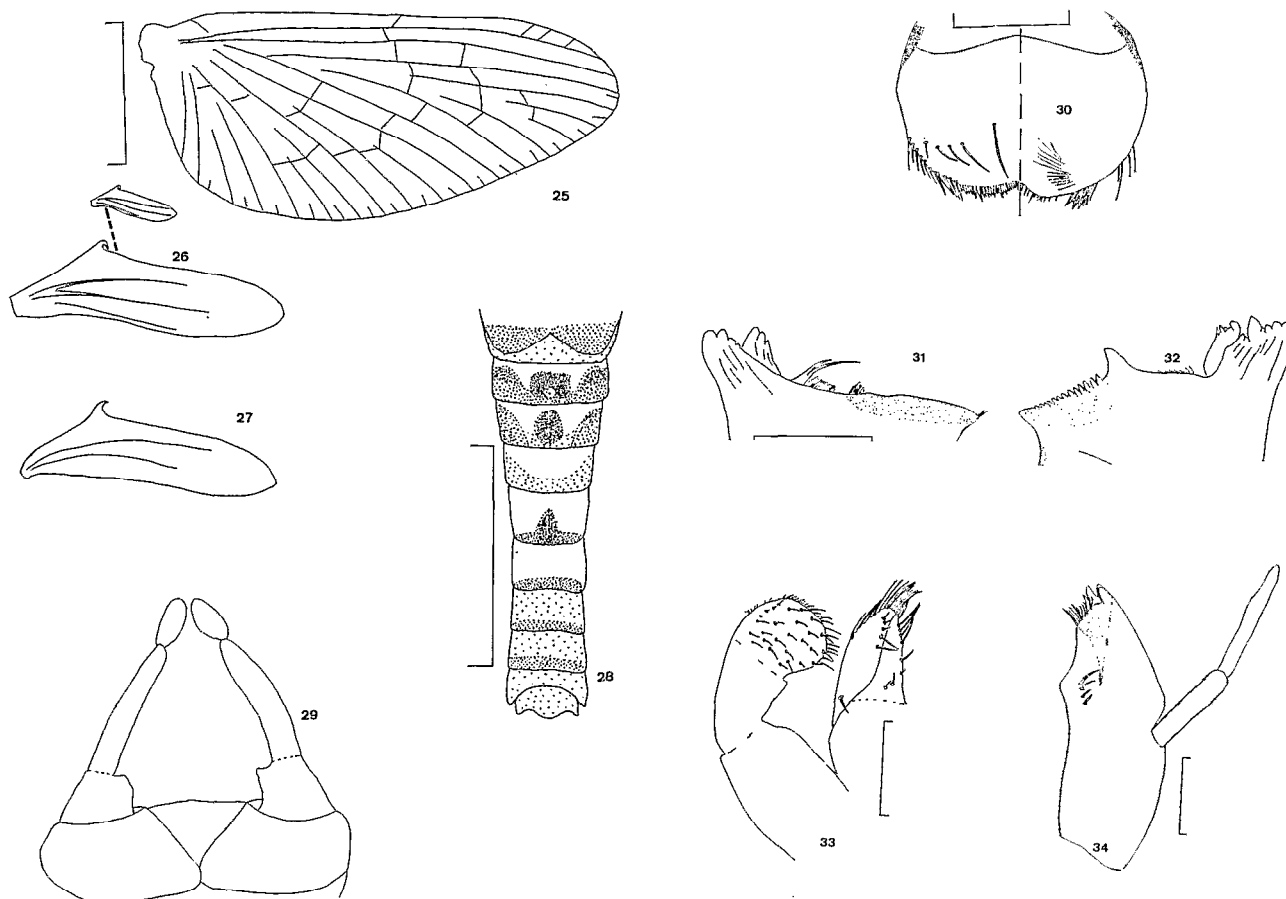


FIGS. 22-24. — *Afroptilum niandanensis* n. sp. nymphal parts. 22 : fore leg (with detail of claw and femoral setae). 23 : gill lamellae I-V, VII (with detail of distal anterior margin of gill IV). 24 : abdomen, dorsal view (variation in pattern on terga II, V and VII).

*Afroptilum niandanensis* n. sp. larve. 22 : patte antérieure (détail de la griffe et d'une soie fémorale). 23 : trachéobranchies I-V, VII (détail du bord distal de la branche IV). 24 : abdomen, vue dorsale (avec variation de la pigmentation sur les terga I, V et VII).

### *Afroptilum niandanensis* sp. n., Wuillot

♂ imago. Fore tibia 1.5-1.75 times length of femur ; tarsus subequal to tibia. Fore wing hyaline, stigma with 4-5 crossveins (fig. 13) ; marginal intercalaries present in all spaces from 2nd or 3rd interspace rearwards ; hind wing narrow, pointed, spur backwards directed, with 2 longitudinal veins (fig. 14). Abdominal terga with background colour varying from pale cream to red with lateral pale spots as in fig. 15. Basal forceps segment partially fused with long second segment which is broadened in outer 1/4.



Figs. 25-29. — *Afroptilum babaorum* n. sp. ♂ imago. 25 : fore wing. 26-27 : hind wing (2 specimens). 28 : abdomen, dorsal view. 29 : forceps.

*Afroptilum babaorum* n. sp. ♂ imago. 25 : aile antérieure. 26-27 : aile postérieure (2 individus). 28 : abdomen, vue dorsale. 29 : genitalia.

♀ imago : not known.

*Nymph.* Mouthparts (figs. 17-21). Dorsal surface of labrum with paired long, fine, setae near mid line. Canines of right mandible partially fused, each with 2-3 coarse teeth, prosthoea stout, finely toothed at apex; left canines fused, prosthoea very stout, bilobed apically, base excavated, without setal fringe. Maxillary palp with 2 segments, longer than galea lacinia. Apical segment of labial palp fused with second segment, the inner apical margin of which projects beyond the line of fusion. Legs (fig. 22) stout, tarsal claws with double row of 6-7 fine teeth, the apical tooth in both rows the largest. Abdominal gills ovate (fig. 23), lamella I the longest; anterior margin serrated almost to apex. Abdominal terga

Figs. 30-34. — *Afroptilum babaorum* n. sp. nymph, mouthparts. 30 : labrum (dorsal view on left, ventral on right). 31 : distal margin of right mandible. 32 : distal margin of left mandible. 33 : labium. 34 : maxilla.

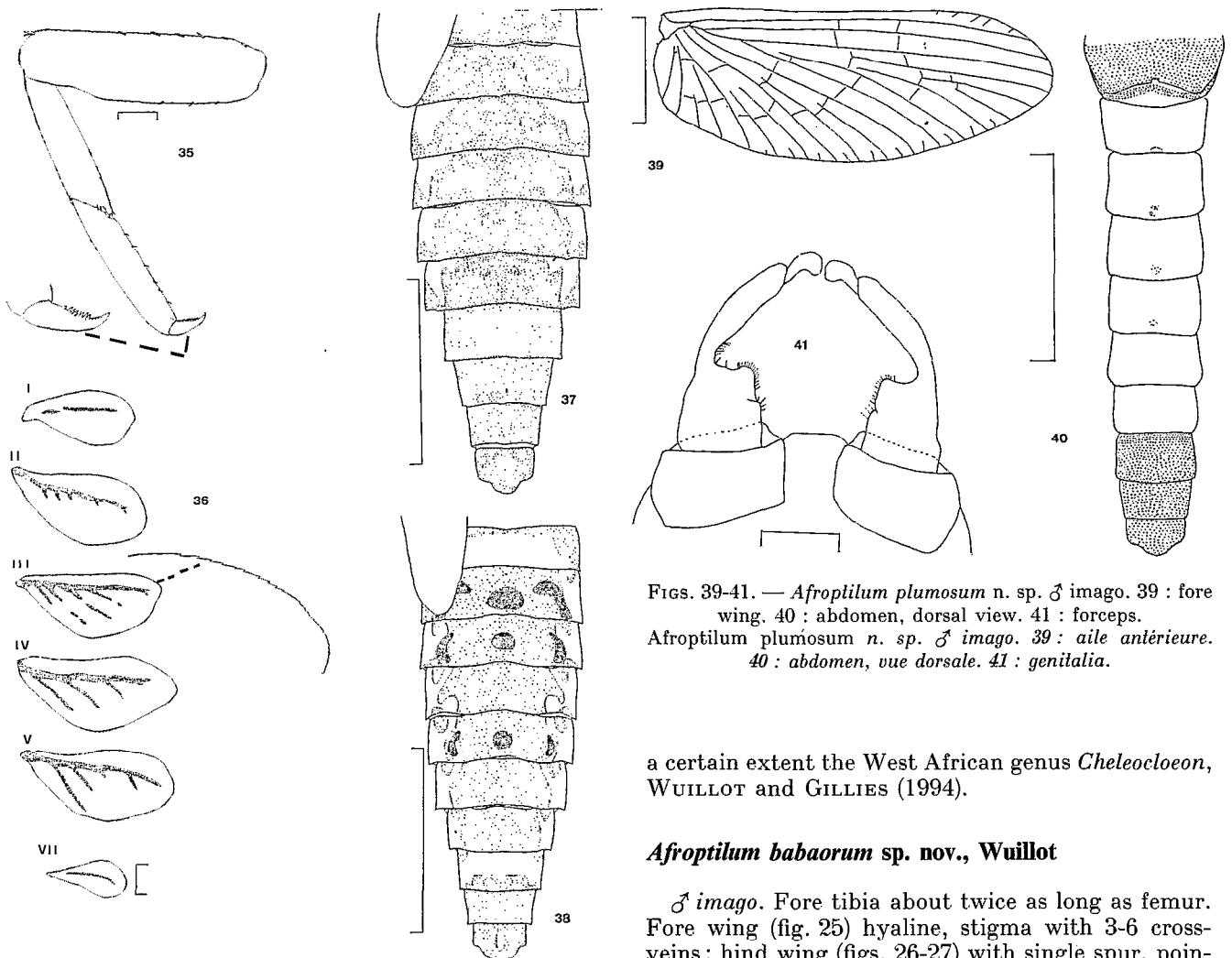
*Afroptilum babaorum* n. sp. larve, pièces buccales. 30 : labrum (vue dorsale à gauche, vue ventrale à droite). 31 : marge distale de la mandibule droite. 32 : marge distale de la mandibule gauche. 33 : labium. 34 : maxille.

pigmented as in fig. 24, colour variable, reddish, brown or cream (in spirit), may be much reduced in immatures.

♂ wing 3-4 mm; body c. 4 mm.

*Material.* Guinea : holotype ♂ imago, associated nymph skin on slide, R. Niandan at Sassambaya, 02.92; same provenance 1 ♂, 03.88; 4 ♂♂ 02.92; 10 nymphs, 02.87; 3 nymphs, 02.92.

*A. niandanensis* belongs to the *A. tarsale* group of *Afroptilum*, i.e. those with a single spur on the hind wing and 3 segments on the genital forceps. It differs from *A. indusii*, *A. medium* and *A. tarsale* by the presence in these species of 3 longitudinal veins in



FIGS. 35-38. — *Afroptilum babaorum* n. sp. nymphal parts. 35 : fore leg with detail of claw. 36 : gill lamellae I-V, VII (with detail of distal anterior margin of III). 37-38 : abdomen, dorsal view (2 specimens).

*Afroptilum babaorum* n. sp. larve. 35 : patte antérieure (détail de la griffe). 36 : trachéobranchies I-V, VII (détail du bord distal antérieur de la branchie III). 37-38 : abdomen, vue dorsale (2 individus).

the hind wing, from *A. flavum* (Crass) and *A. falcatum* (Crass) by their larger size and shape of the forceps, from *A. badium* (Kopelke) by the shape of the basal forceps segment and from *A. christinae* sp. nov. and *A. loweae* (Kimmings) by the abdominal markings. The nymph appears to be unique among other species of *Afroptilum* in the length of the 1st gill lamella relative to the other lamellae, resembling to

FIGS. 39-41. — *Afroptilum plumosum* n. sp. ♂ imago. 39 : fore wing. 40 : abdomen, dorsal view. 41 : forceps.

*Afroptilum plumosum* n. sp. ♂ imago. 39 : aile antérieure. 40 : abdomen, vue dorsale. 41 : genitalia.

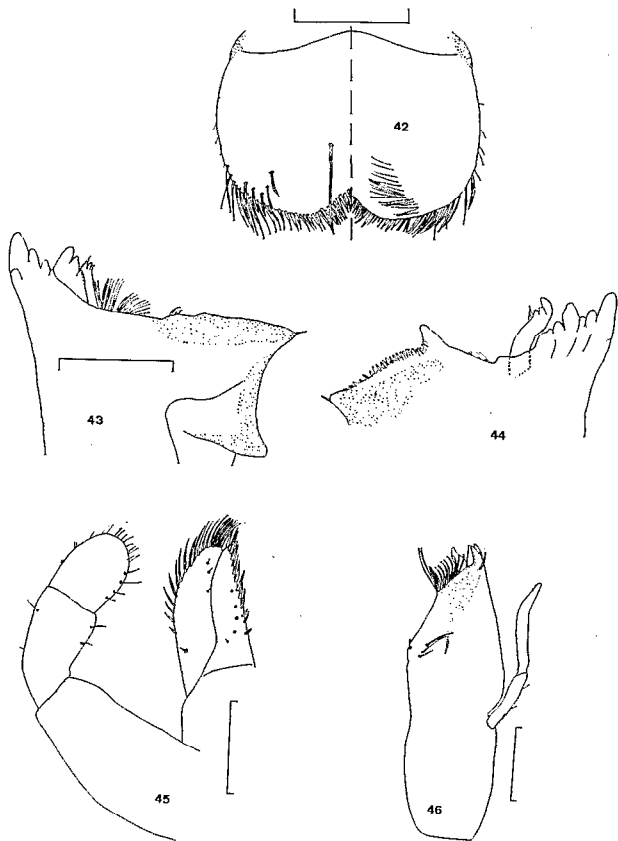
a certain extent the West African genus *Cheleocloeon*, WUILLOT and GILLIES (1994).

#### *Afroptilum babaorum* sp. nov., Wuillot

♂ imago. Fore tibia about twice as long as femur. Fore wing (fig. 25) hyaline, stigma with 3-6 cross-veins; hind wing (figs. 26-27) with single spur, pointed with either 2 or 3 longitudinal veins. Abdominal terga (fig. 28) I-IV or V usually cream with reddish markings, VII or VIII-X fawn; some specimens very pale. Forceps (fig. 29), basal and 2nd segment apparently fused, at point of fusion basal segment about 1.5 times as wide as 2nd segment and truncated at inner margin.

♀ imago : not known.

Nymph. Mouthparts (figs. 30-34), dorsal surface of labrum with a submedian pair of long setae; canines of right mandible divided, prosthema a stout, bifid spine, left canines fused, prosthema broad, toothed at apex; maxillary palp with 2 segments, extending well beyond galea lacinia; apical segment of labial palp fused with 2nd segment, globose, no projection at inner apical margin. Legs (fig. 35), femora with scattered spine-like setae along anterior margin, tarsus with scarce setae along posterior margin, tarsal



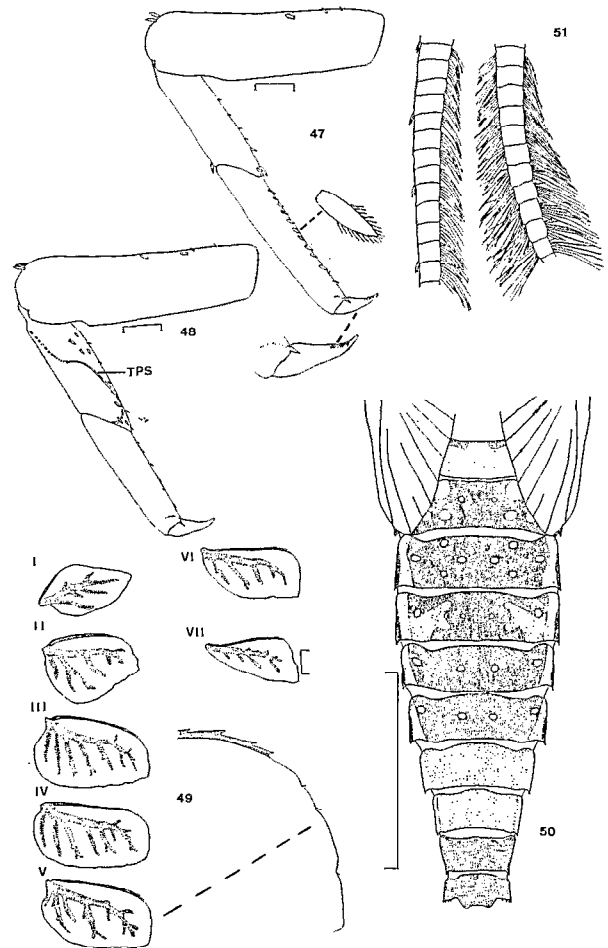
FIGS. 42-46. — *Afroptilum plumosum* n. sp. nymph, mouthparts. 42 : labrum (dorsal view on left, ventral on right). 43 : distal margin of right mandible. 44 : distal margin of left mandible. 45 : labium. 46 : maxilla.

*Afroptilum plumosum* n. sp. larve, pièces buccales. 42 : labrum (vue dorsale à gauche, vue ventrale à droite). 43 : marge distale de la mandibule droite. 44 : marge distale de la mandibule gauche. 45 : labium. 46 : maxille.

claws with single row of 8-10 denticles. Abdominal gills (fig. 36) on I-VII, ovate, asymmetrical, anterior margin serrated almost to apex. Abdominal terga with variable markings (figs. 37-38) ranging from dark red to cream on a darker background. Terminal filament slightly shorter than cerci.

♂ wing 3-4 mm; body 3-5 mm.

**Material.** Guinea : holotype ♂ imago with associated nymph skin on slide, R. Niandan at Sassambaya, 02.92. Same provenance, 1 ♂ imago with associated nymph skin, 02.92, 4 ♂♂, 02.88, 03.88, 05.88, 25 nymphs, 03.88, 02.92. R. Kaba at Ouré-Kaba, 1 ♂ imago with associated nymph skin, 10 nymphs, 01.92. R. Bale at Karako, 1 ♂, 3 nymphs, 01.92.



FIGS. 47-51. — *Afroptilum plumosum* n. sp. nymphal parts. 47 : fore leg (with detail of claw and plumose spine-like setae). 48 : hind leg (TPS = tibio-patellar suture). 49 : gill lamellae I-VII (with detail of anterior margin of gill V). 50 : abdomen, dorsal view. 51 : cercus and terminal filament.

*Afroptilum plumosum* n. sp. larve. 47 : patte antérieure (détail de la griffe et d'une soie plumose). 48 : patte postérieure (TPS = suture tibio-patellaire). 49 : trachéobranchies I-VII (détail du bord distal de la branchie V). 50 : abdomen, vue dorsale. 51 : cerque et paracerque.

R. Niger at Beliya, 2 nymphs, 01.92. Mali : R. Bakoye at Kokofata, 3 nymphs, 01.92.

*A. babaorum* differs from other species of the group in the ♂ forceps and tergal markings. The nymph closely resembles that of *A. tarsale* from Tanzania, the canines of the right mandible being divided and the prostheca a stout bifid spine. It differs in the much longer maxillary palp and in the presence of submedian long setae on the dorsal surface of the labrum.

### *Dimorphicum*-group of species

#### *Afroptilum plumosum* sp. nov., Wuillot

♂ *imago*. Fore tibia less than 1.5 times length of femur, tarsus longer than tibia. Fore wing hyaline, stigma with 3-5 crossveins; marginal intercalaries reduced, none anterior to R3 or posterior to CuA (fig. 39). Hind wing absent. Abdominal terga I-VII white, VIII-X brown; II-V with a very small central spot (fig. 40). First segment of forceps broad with sub-parallel sides, fused with second segment (fig. 41), the junction of the segments being marked by an abrupt change in width; inner surface of first segment pinched in at about mid point.

♀ *imago*: not known.

*Nymph*. Mouthparts (figs. 42-46). Dorsal surface of labrum with paired long fine setae near mid line. Canines of right mandible divided, prosthema stout with 3-4 apical teeth: canines of left mandible fused. Maxillary palp, two-segmented, tapered at apex and curved outwards, short, not reaching as far as base of apical fringe of hairs. Apical segment of labial palp more than half length of second segment, rounded at apex; second segment not expanded at medial apical margin. Legs (figs. 47-48) stout; anterior margin of femora with a few scattered setae only; tarsus of fore leg with a line of plumose setae along posterior margin; claws short with minute teeth apically. Abdomen generally dark, terga I, VII and VIII pale, tergal markings as in figure 50. Gills (fig. 49) present on I-VII, strongly asymmetrical, anterior margin ribbed and terminating in 1-5 large teeth. Terminal filament subequal to cerci (fig. 51), strongly haired, insertions of hairs conspicuously pigmented; lateral margins of cerci with stout spines at every fourth joint.

♂ wing 4 mm; body 3-4 mm.

*Material*. Mali: holotype ♂ imago, associated nymphal skin (on slide), R. Bakoye at Kokofata, 01.92; 1 ♂ imago, 01.92; 2 nymphs, 01.92; same provenance. Guinea: R. Niandan, at Sassambaya, 02.89; 1 ♂ imago, 03.87; 16 nymphs, same provenance.

*A. plumosum* is the first species of *Afroptilum* to be described in which the hind wing is absent in the male. This condition is known in the females of *A. excisum* Crass and *A. dimorphicum* Soldan and Thomas, but in these species a normally developed hind wing is present in the male. The female of *A. plumosum* is not known, but presumably it lacks a hind wing also. The nymph differs from both

*A. dimorphicum* and *A. excisum* in the absence of a prominent medial anterior projection on the labial palp.

#### DISCUSSION

In recent years the genus *Centroptilum* Eaton has been the centre of some controversy, and general agreement on its status has still not been achieved (McCAFFERTY and WALTZ, 1990; JACOB, 1991; KLUGE and NOVIKOVA, 1992). In Africa, a number of species previously placed in *Centroptilum* were transferred by GILLIES (1990) to the new genus *Afroptilum*. These African species were held to differ in having *Baetis*-like forceps, i.e. the second segment tapered towards the apex and the apical segment not pearshaped. GILLIES also attached importance to the presence of lateral tergal spines on the posterior abdominal segments of *Centroptilum* and their absence in *Afroptilum*. However, it was pointed out by McCAFFERTY and WALTZ (1990) that these spines are also absent in certain North American species of *Centroptilum* and that reliance cannot be placed on this character at the generic level.

More recently, Dr. N. Ya. Kluge (in litt.) has drawn our attention to the taxonomic significance in *Afroptilum* of what he refers to as the "tibio-patellar suture". This structure is present on the tibiae of a number of Baetid genera, and was first described as "the tibial seam" in *Cloeodes* Traver and certain other genera by WALTZ and McCAFFERTY (1987). It has been figured by KLUGE and NOVIKOVA (1992) for *Centroptilum* and *Cloeon*. It is often associated with a line of fine or very fine setae. According to Kluge, however, in *Afroptilum*, this suture is only present on the mid and hind legs. We have confirmed the observations of Dr. Kluge in the 4 species described here (figs. 47, 48), as well as in 6 other species from East Africa. The 10 species include the type species of the genus, *A. sudafricanum* (Lestage). This contrasts with species classified as *Centroptilum*, *Cloeon* and *Procloeon*, in which this seam is well developed on the tibiae of all three pairs of legs (KLUGE and NOVIKOVA, *loc. cit.*). It appears, therefore, to be an apomorphic character separating *Afroptilum* from *Centroptilum* and related genera.

#### ACKNOWLEDGEMENTS

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