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Reinstatement of *Afroptiloides* as a Genus (Baetidae, Ephemeroptera)

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ABSTRACT

The recent proposal that the cluster of closely related species with minnow-like larvae, known as *Afroptiloides*, should be synonymised with the unique baetid genus *Acanthiops*, which has a crawling type of larva, is critically examined. The synapomorphies cited as evidence of recent common ancestry of the two taxa are not confirmed. The existence of gradational forms between them could also not be demonstrated. It is concluded that the case for the proposed synonymy has not been established. The genus *Acanthiops* is redefined and the subgenus *Afroptiloides* is reinstated, raised to generic status and redefined.

KEYWORDS: *Acanthiops, Afroptiloides*, synonymy, Ephemeroptera, Baetidae.

INTRODUCTION

As pointed out by McCafferty and Waltz, (1990), the genus *Afroptilum* Gillies contained a number of essentially polyphyletic elements. The task of disassembling this taxon into monophyletic units has been undertaken by various authors, among them Wuillot & Gillies (1994), Gillies and Wuillot (1997), Lugo-Ortiz & McCafferty (1996a, b, c, 1997, 1998), McCafferty et al. (1997), and Barber-James & McCafferty (1997). One of these taxonomic units was *Afroptilum (Afroptiloides)*. It is the action of these last-named authors in synonymising *Afroptiloides* with *Acanthiops* Waltz & McCafferty that is critically examined here.

The task has been made easier for me by the generous present by Dr Jean-Marc Elouard of one of two larvae of *Acanthiops marlieri* (Demoulin), which he had himself collected in the Parc Nacional des Virunga, Zaire.

THE GENUS *ACANTHIOPS*

Demoulin (1967) gave a detailed description of the larva of a curious baetid mayfly from Eastern Zaire (Congo) under the name *Centroptilum marlieri*; he emphasised the extent to which it departed from the normal morphological form of the Baetidae.

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Waltz and McCafferty subsequently (1987) created the genus *Acanthiops* for this unique larva. The adult remained unknown.

When McCafferty and de Moor (1995) synonymised the widespread subgenus *Afroptilum (Afroptiloides)* Gillies with the still rarely seen *Acanthiops*, they gave no grounds on which one could judge the validity of their action. These have now been provided by Barber-James and McCafferty (1997).

DISCUSSION

In their introduction, Barber-James and McCafferty make the following statements:

1. The type of *Afroptiloides* – *A. varium* (Crass) – shares a most recent common ancestor with the type of *Acanthiops* – *A. marlieri* (Demoulin).
2. *Acanthiops* (by which was meant *Acanthiops* plus *Afroptiloides* as depicted in Fig. 1) is a monophyletic genus with several gradational species.
3. *Afroptiloides* cannot stand as a separate taxon.

To understand the basis of this claim, it may be useful to refer to Fig. 1, which illustrates the single species of *Acanthiops* and four species of *Afroptiloides* (*sensu* Gillies, 1991).

It will be seen that, far from all five species being a single monophyletic group, *A. marlieri* stands by itself. The most obvious feature is the squat form of the body and the telescoping of the anterior six or seven abdominal segments so that the gills are closely overlapping like tiles on a roof ("imbriquées" in Demoulin's original description). It may be thought surprising that, although this body-form appears to be unique in the Baetidae, it was not included in the generic definition of *Acanthiops* given by Waltz and McCafferty. On the contrary, they refer to it as having a "minnow-like larva", a term usually reserved for those with slender free-swimming aquatic stages. Similarly, this distinctive body-form receives no mention in the review of the genus by Barber-James and McCafferty.

The existence of autapomorphies, however striking, does not preclude close relationship – in this case synonymy – with other taxa, provided they share synapomorphies that indicate their origin from an immediate common ancestor. However, as will be shown below, McCafferty and his co-authors have not established a convincing case for such a relationship between *Acanthiops marlieri* and the cluster of species previously placed in *Afroptiloides*.

To validate their action the authors cite three synapomorphies thought to have arisen independently in an immediate common ancestor:

1. *A symmetrically reduced, rounded and centered terminal segment of the labial palp.* This character, however, is shared with a number of plesiotypic lineages, notably the type species of *Afroptilum*, *A. sudafricanum,* as well as with three other species formerly placed in that genus, *A. christinae* Wuillot, *A. indusii* (Crass) and *A. niandanensis* Wuillot. These three species were placed by Lugo-

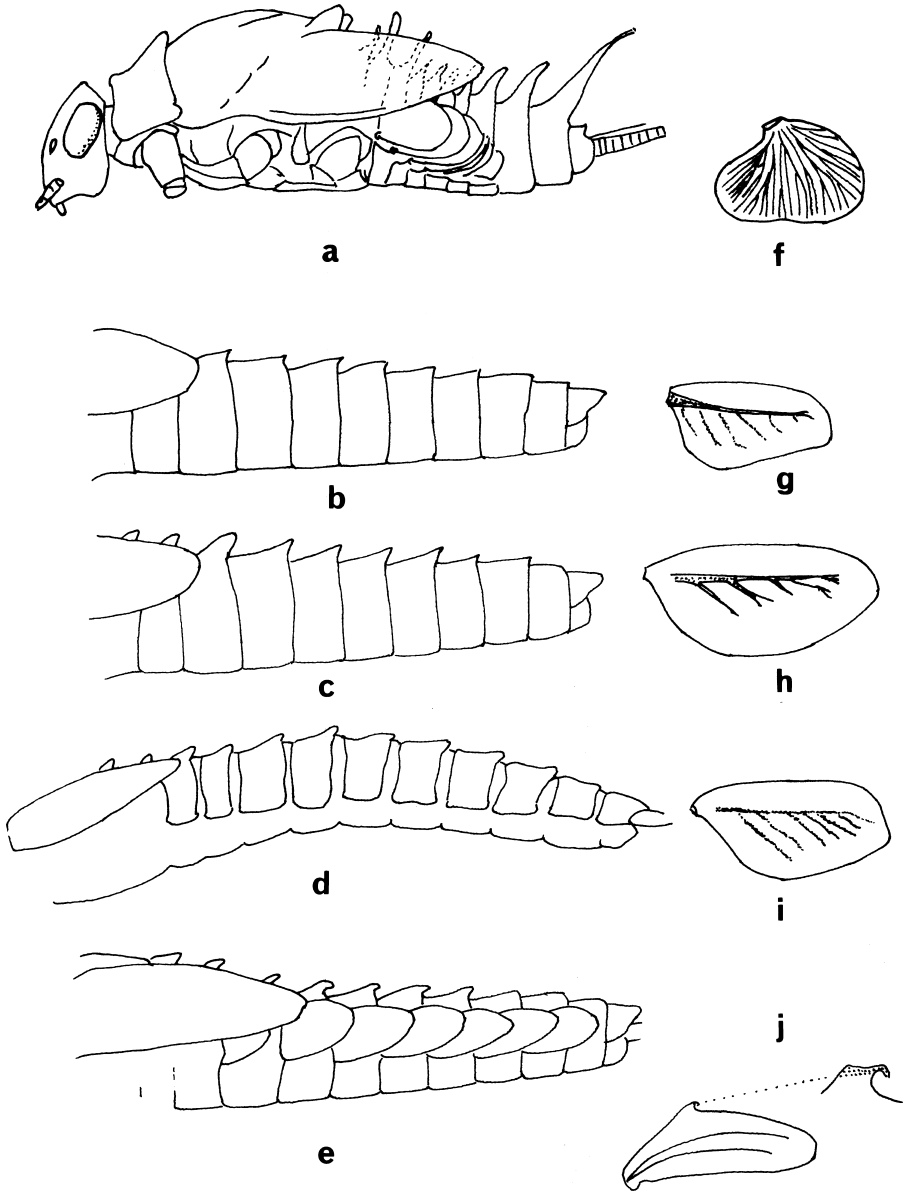

Fig. 1. *Acanthiops* and *Afroptiloides* spp. (a–e) Lateral view of larvae of *Acanthiops* and *Afroptiloides*: a, *Acanthiops marlieri* (from Demoulin, 1967); b, *Afroptiloides varium* (from Gillies, 1991); c, *Afroptiloides variegatum* (from Gillies, 1991); d, *Afroptiloides tsita* (from Barber-James & McCafferty, 1997); e, *Afroptiloides njombae* (from Kimmins, 1955).
(f–i) IVth gill lamella of *Acanthiops* and *Afroptiloides* spp., sources as above: f, *A. marlieri;* g, *A. varium*; h, *A. variegatum;* i, *A. tsita*.
(j) *Afroptiloides variegatum*: Hind wing and detail of spur (original).

Ortiz & McCafferty (1996, 1998) in the three new genera *Peuhlella*, *Dabulamanzia* and *Susua*. It is also characteristic of both known species of the genus *Platycloeon* Gillies & Wuillot from East Africa, which was treated by Lugo-Ortiz & McCafferty (1998) as yet another synonym of *Acanthiops*.

2. *A double row of denticles on the tarsal claws.* Again, this character is exhibited in a wide range of other genera including *Afrobaetodes* Demoulin, *Afroptilum*, *Centroptiloides* Lestage, *Cloeon* Leach, *Dicentroptilum* Wuillot & Gillies, *Platycloeon*, *Potamocloeon* Gillies, *Pseudocentroptiloides* Jacob and *Thraulobaetodes* Elouard & Hideux.

Morihara and McCafferty (1979) expressed the opinion that the double row of teeth represents the plesiotypic condition in the Baetidae. Yet Barber-James and McCafferty now cite it without explanation as part of the synapomorphy characterising *Acanthiops*.

3. *The medial armature of the abdominal terga.* The extraordinary development of the dorsal abdominal spines in *A. marlieri* is shown in Fig. 1a. This culminates in the spine on segment IX which projects backwards well beyond the bases of the cerci.

This luxuriant armature is in sharp contrast with the modest spurs seen in all known species of *Afroptiloides* (Figs. 1 b–e); moreover, in all of them the degree of development of the spurs declines progressively on the more posterior segments, to vanish altogether by the time the IXth segment is reached.

To explain this discrepancy, Barber-James and McCafferty describe the differences between the species as examples of "stepwise progression" within a monophyletic group. This is certainly true of the species of *Afroptiloides* (Figs. 1b–e), but the argument can in no way be extended to include *A. marlieri* (Fig. 1a). The common involvement of tergal spines in the two taxa is much more likely to be due to homoplasy than to recent shared ancestry. Indeed, the authors themselves remark that dorsal tuberculation, similar to that seen in *Afroptiloides*, is found convergently in several unrelated baetid genera.

Thus the claim that the two taxa share an immediate common ancestor is based on two plesiomorphies and one homoplasy. The proposed synonymy must therefore be rejected.

STATUS OF *AFROPTILOIDES*

As constituted at present, the two genera comprise the following species:

Acanthiops marlieri (Demoulin)	E. Congo
Afroptiloides elgonensis (Lugo-Ortiz & McCafferty.) *comb.nov.*	Kenya
A. griffithsi (Lugo-Ortiz & McCafferty.) *comb.nov.*	Kenya
A. njombae (Lugo-Ortiz & McCafferty.) *comb.nov.*	Malawi
A. tsita (Barber-James & McCafferty.) *comb.nov.*	S. Africa

A. variegatum Gillies. *comb.nov.*	Tanzania
A. varium (Crass) *comb.nov.*	S. Africa

Gillies described the adult and larva of a further species, *A. bicaudatum*, from Mount Nimba, Guinea. McCafferty et al. (1997) pointed out that *A. bicaudatum* differs from the other described species of *Afroptiloides* in certain important characters and transferred it to the new genus *Micksiops*. I have seen a second species of the genus from the Rift Valley, Kenya.

Afroptiloides Gillies

Centroptilum (*partim*) Crass. 1947: 85.
Acentrella sp. A, Kimmins. 1955: 870
Afroptilum (Afroptiloides) Gillies. 1990: 99.
Acanthiops (*partim*) Barber-James and McCafferty. 1997: 85.

Type species: *Afroptiloides varium* (Crass).

Adult. Hind wing spur on dorsal margin single or sub-bifid (Fig. 1j); two or three longitudinal veins. Male forceps three-segmented, terminal segment pear-shaped.

Larva. Right mandible incisors separate, on left fused; setal patch present on both sides. Glossae and paraglossae of labium similar in size and length; terminal palpal segment cap-shaped. Tibiae with dorsal row of fine hairs; tarsal claws bidentate. Median dorsal spurs developed variously on notum and abdominal terga I–VIII, those on posterior half decreasing in size progressively and absent on IX. Gills 6 or 7, lamellae strongly asymmetrical, main tracheal branches broad, limited in number (Fig. 1g–i). Cerci with swimming hairs on medial surfaces; median caudal filament reduced to a single segment.

Acanthiops Waltz and McCafferty

Centroptilum (*partim*) Demoulin, 1967.
Acanthiops Waltz & McCafferty, 1987.

Type species: *A. marlieri* (Demoulin).

The following characters should be added to the description of the genus given by Waltz and McCafferty:

Larva ‘crawler’-like, body squat with telescoping of anterior five or six abdominal segments. Maximal development of dorsal abdominal tergal spines attained on segment IX. Dorsum of integument ornamented with lines of ornate studs like finely patterned Moroccan leather (described by Demoulin as “miniscules verrues serrées”). Posterior margins of femora at most scantily haired. Tib-

iae without dorsal line of fine setae. Gill lamellae closely overlapping; on II–VII with progressively larger medial lobes (Fig. 1f); all tracheal branches fine, numerous. Cerci bare, without swimming hairs.

Afroptiloides differs from *Acanthiops* and *Afroptilum* by the apomorphic development of a fringe of dorsal setae on the tibiae. From *Micksiops* and *Afroptilum* it is distinguished by the apotypic presence of dorsal abdominal spines variously on terga I–VIII.

The phylogenetic relationships of the four genera – *Afroptilum* s.str., *Afroptiloides, Micksiops* and *Acanthiops* – remain unclear. Taking into account the existence of what Barber-James and McCafferty aptly called "the profusion of homoplasy in the Baetidae", it could be argued that judgement should be witheld until the fauna of African waters is better known. In particular, the importance of working from reared material, so that the larvae and adults of baffling taxa can be reliably associated, cannot be overstated.

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