

**The African Euthyplociidae (Ephemeroptera)
(Exeuthyplociinae subfam. n.)**

by

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ABSTRACT

A description is given of the larva of *Exeuthyplocia* Lestage, which closely resembles that of *Afroplocia* Lestage. On the basis of larval and adult characters and the apparent burrowing habits of the larvae, a new subfamily, Exeuthyplociinae, is proposed for the two African genera of Euthyplociidae.

The Euthyplociidae are a mainly tropical and subtropical family, represented in Africa by the two monotypic genera, *Exeuthyplocia* Lestage and *Afroplocia* Lestage. Lestage (1921), in recognising the subfamily Euthyplociinae, nevertheless placed *Exeuthyplocia* in the Polymitarciinae on the grounds of greater affinity with the latter group than the former. Demoulin (1952), in a comprehensive review, transferred *Exeuthyplocia* to the Euthyplociinae, treating this as a subfamily of the Ephoronidae. Dealing with the adults only, he characterised the Euthyplociinae as having the fore wing with small intercalaries or with marginal anastomoses, MA forking distal to or at the same level as RS and the cubital field with numerous sigmoidal veinlets. Edmunds and Traver (1954) endorsed this action by elevating the group to family level.

The larvae of the Euthyplociidae have generally been regarded as sprawling forms, related to but separate from the true, burrowing forms such as the Ephemeridae and Polymitarciidae (Edmunds, Allen and Peters, 1963; Demoulin, 1970; Edmunds, Jensen and Berner, 1976). However, while this is true for most members of the family of which the larvae are known, it overlooks the fact that in *Afroplocia* the fore tibia is flattened to an extent that suggests fossorial habits (Barnard, 1940; Edmunds, 1972). The larva of the other African Euthyplociid, *Exeuthyplocia*, has not been described. I recently collected a series of larval skins of this genus from the River Gambia in West Africa, which shows that they are very close to *Afroplocia*. This finding makes it clear that

both these African genera form a divergent evolutionary line, distinct from other members of the family and apparently with burrowing larvae.

In this paper I propose the recognition of a new subfamily, Exeuthyplociinae, for the African members of the family. This proposal was, in a sense, foreshadowed by Demoulin (1952), when he showed in his key to the adults that these two genera could be distinguished by a number of characters from all the other genera within the family. A description is also given here of the larva of *Exeuthyplocia*.

Euthyplociinae Lestage, 1921

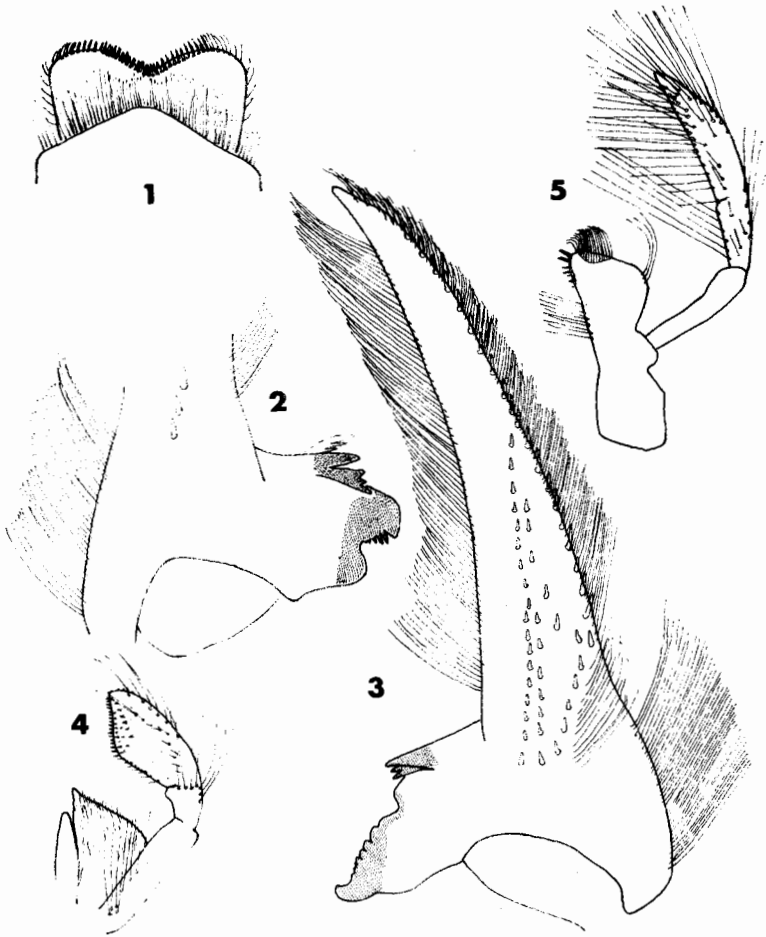
Diagnosis: Hind wing, R1 arising from base of wing, MP bifid. Tails three in both sexes. Larva of the sprawling type, fore tibia cylindrical, femur at most slightly flattened. Abdominal gills projecting laterally from the body, tails smooth or lightly feathered. Neotropical, Oriental and Malagasy Regions.

Exeuthyplociinae subfam. n.

Diagnosis: Hind wing, R1 at its base free or connected to MA, MP single. Median tail in male aborted. Larva burrowing, fore tibia flattened, femur strongly flattened. Abdomen with a lateral branchial channel formed by long hairs; gills either held within this channel or partly projecting laterally from it, tails strongly feathered. Afrotropical Region.

Exeuthyplocia Lestage

LARVA. Antennae about as long as mandibular tusks; clypeus projecting forwards, rounded at apex. *Mouthparts* (figs. 1-5): labrum fringed with fine hairs laterally, changing to spine-like hairs in median notch; mandibular tusks tapered, rounded, strongly haired, a line of blunt, spine-like hairs along almost whole length of outer border and with a series of similar hairs on the dorsal surface extending from near base to a distance of two-thirds along length of tusk; maxillary palps strongly tapered; labial palps with sharp, spine-like hairs along inner distal border, inner apical angle of paraglossae drawn out to a blunt point. *Legs* (figs. 6-8): fore leg closely resembles that of *Afroplocia*, femur subtriangular, tibia flattened, inner (anterior) border produced into a long terminal projection, a single row of blunt, spine-like hairs round all margins, which are densely haired, tarsus terminating in a dense tuft of short hairs, obscuring base of claw and with a line of narrow, spine-like hairs along distal half of inner border; mid leg reduced, tibia with a line of blunt, spine-like hairs extending along dorsal surface to apex, where they are about twice as large, and continuing down outer (posterior) margin; hind leg, margins of femur bordered with long, fine hairs, a comb of finely curved, short spines along central part of anterior margin, distal half of anterior border of tibia with a matching fringe of long, fine hairs and a dense dorsal patch of short, stout hairs on the adjacent

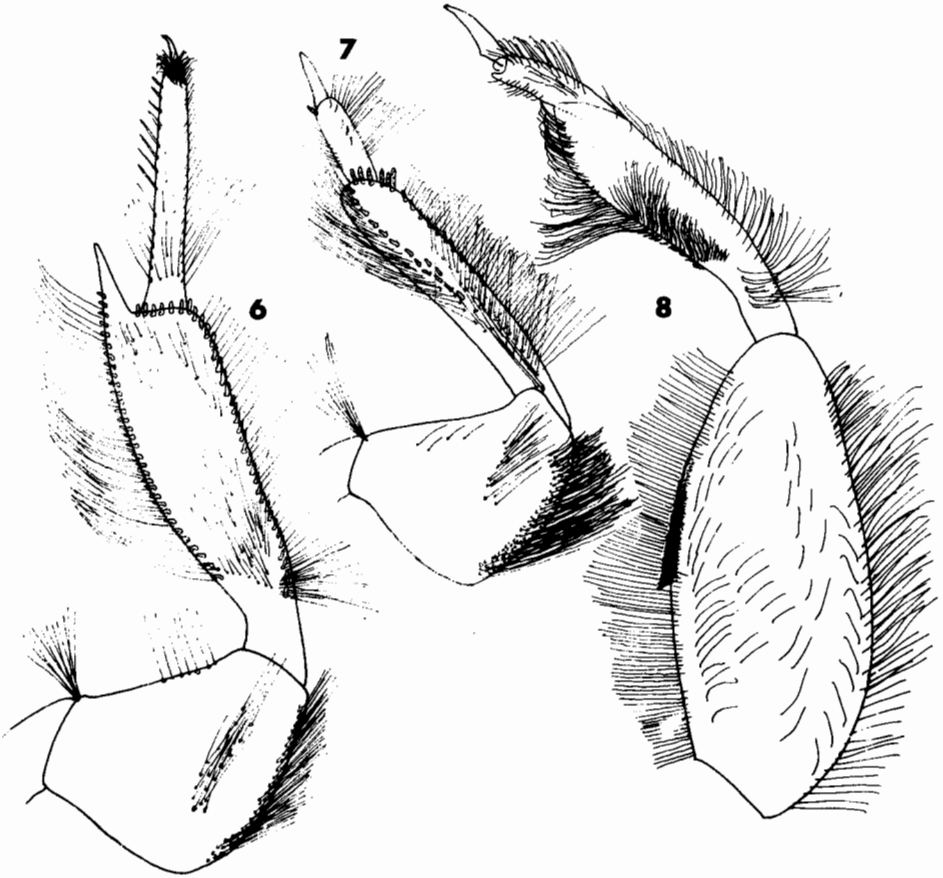


Figs. 1-5. Mouthparts of *Exeuthyplocia*. 1, labrum; 2 and 3, left and right mandibles (dorsal view); 4, right half of labium; 5, maxilla.

dorsal surface. *Thorax*: anterior angle of pronotum deeply emarginate, apex drawn out into a point (fig. 9). *Abdomen* (fig. 10): lateral margins of segments II-VIII with a fringe of long fine hairs, III-IX with a dorso-lateral line of densely packed fine hairs, projecting laterally to abdominal margin, these less dense on segments VIII and IX; on III-VII there are two transverse fringes of fine hairs linking up with the dorso-lateral fringes, on II a single posterior fringe and on VIII a single anterior fringe. Gill lamellae on first segment minute, unequal, upper lamella spatulate, lower lamella about $1\frac{1}{2}$ times as broad as upper lamella

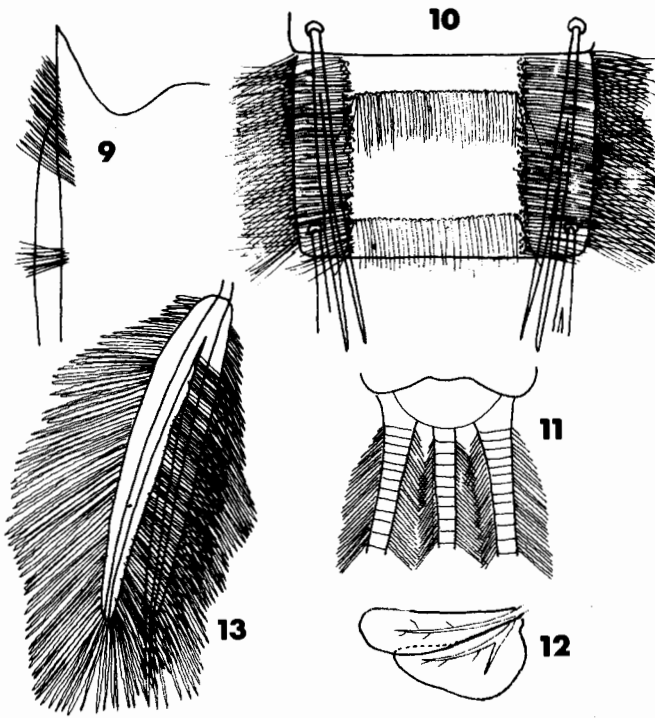
and slightly concave on anterior surface, distal half strongly tapered (fig. 12); on segments II-VII lamellae subequal, strongly fringed with fine filaments (fig. 13); in all larval skins examined the gills are laid parallel with the axis of the body, lying between the two longitudinal fringes of hairs. Tails densely fringed except for the distal one-quarter (fig. 11).

Material. 6 larval skins, collected in a drift-net towed across the surface of the River Gambia at Bansang, The Gambia, 14° 37'W, 13° 20'N, ix. 78.



Figs. 6-8. Larval legs of *Exeuthyplocia*. 6, fore leg; 7, mid leg; 8, hind leg.

The larva of *Exeuthyplocia* closely resembles that of *Afroplocia*. It differs in the unequal lamellae of gill I, in the structure of gills II-VII and in their position at rest. I have compared the series of larval skins of *Exeuthyplocia* from the



Figs. 9-13. *Exeuthyplocia* larve. 9, anterior angle of pronotum; 10, Vth abdominal tergum (filaments of gills not shown); 11, apex of abdomen; 12, 1st gill; 13, lamellae of 5th gill.

River Gambia with a single skin of *Afroplocia* from Natal in the collection of the British Museum. The gills of the former are finer and longer, about $1\frac{1}{2}$ times as long as the depth of adjacent segments and are collapsed along the dorsum of the abdomen between the two longitudinal hair fringes. In *Afroplocia* they are distinctly stouter and project dorso-laterally but still partly within the channel formed by the hair fringes. In length they are about equal to the depth of adjacent segments.

The structure of the abdomen of the Exeuthyplociinae is unique in possessing the double, longitudinal line of closely inserted fine hairs, which in effect form a branchial channel within which the gills can be vibrated. As Barnard (1940) pointed out, the presence of these hairs almost certainly prevents the gills being folded over the back as in most families of the Ephemeroidea. Yet, at the same time, the fills are partially dorsalisated in the manner of other trash and silt inhabitants.

In giving a categorical answer to the question as to whether the Exeuthyplociinae are true burrowers or not we are hampered by lack of whole larvae or of

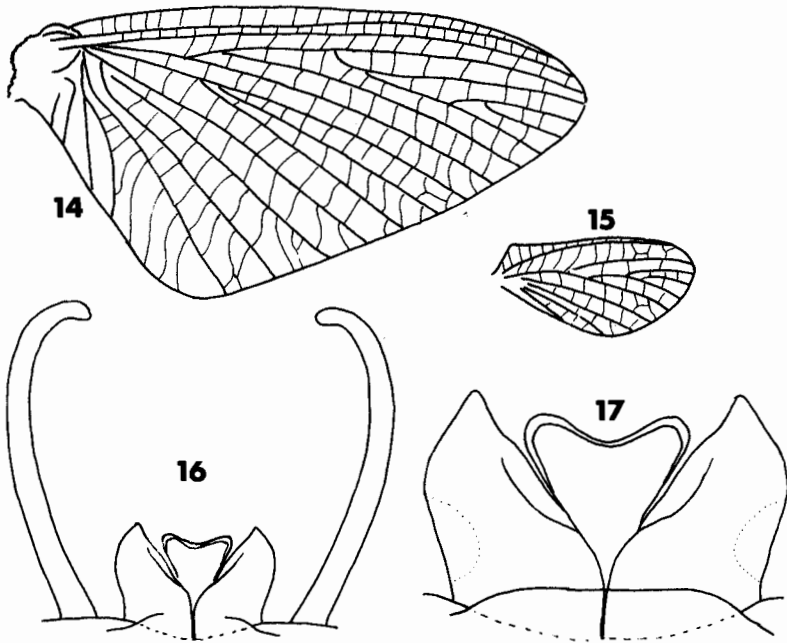
details of their precise habits. Barnard (1937) suggested that the nymphs of *Afroplocia* should be sought "in the mud and amongst the bases of water weeds". Crass (1947), on the other hand, concluded that the species is "not restricted to slow-flowing reaches with muddy banks". In a recent text, Skaife (1979), the African Euthyplociidae are simply referred to as burrowers in mud. In the case of *Exeuthyplocia*, the tidal nature of the River Gambia at Bansang and the dense layer of mud and silt on much of the bottom of the river makes the assumption of burrowing habits for this genus highly probable. As for *Afroplocia*, it may perhaps be that the larvae are normally burrowers but are capable of colonising sandy or gravelly reaches in much the same way as *Ephemera danica* Müller in Europe.

***Exeuthyplocia minima* (Ulmer)**

A long series of adults were caught in a light-trap set up by the River Gambia at Bansang, which is some 300 km from the sea. The wings and male terminalia are illustrated in figs. 14-17. Apart from the posterior half of each abdominal tergum being lightly tinged with purplish brown, they agree well with Ulmer's description (1916, 1920) and with the figures given by Demoulin (1952). However, they differ in one obvious characteristic, namely the overall dimensions, which are considerably greater than those given by Ulmer: — body, male 11-12 mm, female 14-15 mm; wing, male 9-10 mm, female 12 mm; tails, male 25 mm, female 5-6 mm. In contrast to this, Ulmer gave the following measurements: — male and female, body 6.5-7 mm; wing 8-9 mm; tails, male 24 mm, female about 5 mm. Given that his specimens were dried, the difference in body length could be partly explained by this, but even with this qualification, the Gambian material is clearly larger. A series of males from Uganda in the collection of the British Museum, recorded by Kimmins (1960), are to some extent intermediate between these two, with wings and bodies 8.5-9 mm. The penes of *minima* have not previously been figured, but Ulmer described them as consisting of two leaf-shaped lobes with a central process in between. While lacking in detail, this description could be applied to the Gambian material. The penes of the Ugandan males are inseparable from those of Gambian specimens. Although some doubt must remain as to their conspecificity, I have thought it best to treat all this material as *minima* which, on this interpretation, has a very wide distribution in tropical Africa, ranging from the Congo basin to near the extremity of West Africa in one direction and up to the Nile basin in the other.

The male subimago differs from the imago in having the wings faintly milky. The mid legs are more stoutly built than in the imago, while the hind leg is functional, hind femur stout, tibia apparently fused to tarsus and about equal to two-thirds length of femur, one claw hooked on all three legs. Tails about as long as body; median tail aborted.

Catches in a light-trap at Bansang yielded adults of *E. minima* during the months of September to November only, i.e. during the annual flood season towards the end of the rains.



Figs. 14-17. *Exeuthyplocia minima* adult. 14, fore wing; 15, hind wing; 16, male terminalia; 17, penes.

***Afroplocia sampsoni* (Barnard)**

There are two adults and a larval skin in the collection of the British Museum. One, a female subimago, exhibits the unusual feature of two pairs of fine, partly coiled, buccal appendages, presumably vestigial mouthparts. In this it evidently resembles the female imago of *Proboscidoplocia sikorai* (Vayssiere) (Demoulin, 1966). These appendages are lacking in the other specimen in the collection, a female imago. Details of the penes of *Afroplocia* have not been published. *A. sampsoni* has only been recorded from Southern Africa (Demoulin, 1970).

PHYLOGENY

This study serves to emphasise the closeness of the Euthyplociidae to the common ancestor of both the Polymitarciidae and the higher Ephemeroidea. While different opinions have been expressed as to whether the burrowing habit within this superfamily has been acquired secondarily (Edmunds, 1974), or whether it represents the primitive condition (Riek, 1974), it is clear that the Euthyplociinae diverged from the stem leading to the Polymitarciidae at an earlier stage than the Exeuthyplociinae.

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