

A NEW SPECIES OF *AFRONURUS* (EPHEMEROPTERA) FROM
TANGANYIKA AND RECORDS OF *SIMULIUM* ASSOCIATED
WITH *AFRONURUS* LARVAE.

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IN 1959 Dr. M. T. Gillies sent to me for examination material of *Afronurus* which he had collected during the previous eight years from various localities in Tanganyika. The material comprised three male and two female imagines, and twenty-four larvæ, four of which bore immature stages of *Simulium*. The imagines were somewhat damaged and faded, but the three males could easily be recognised as belonging to the same, apparently undescribed, species. One female also appeared to belong to this species, but could not be assigned to it with confidence. The identity of the second female and the larvæ is not known; they do not resemble any species of *Afronurus* so far described. It is the purpose of this paper to describe the species represented by the males, and to record the association of *Simulium* with some of the larvæ. After having completed this account, I received from Dr. Gillies certain notes he had made when collecting the material; these I have included where appropriate. All the material has been deposited in the British Museum (Nat. Hist.), London.

Family **Heptageniidae**.

Afronurus gilliesi sp. n.

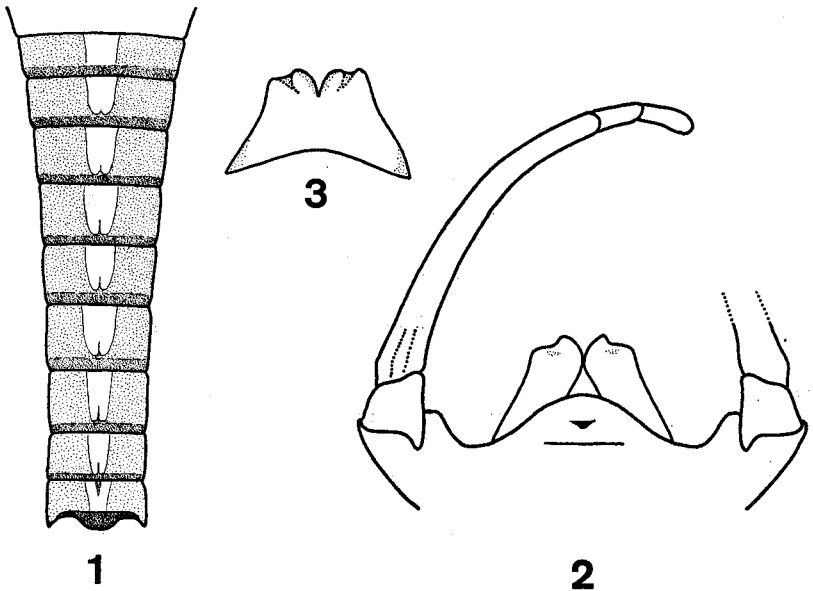
This species differs from other described species of *Afronurus* from the Ethiopian Region in the shape of the fused penes. In this character it appears most closely related to *A. negi* Corbet (1960) from which, however, it can also be distinguished by the shape of the posterior margin of the tenth sternite of the male, this being smoothly convex with a transverse ventral furrow, and by the shape of the forceps-base.

Male: Resembles *A. negi* except in the following respects. Clypeo-frontal ridge and clypeus unmarked. Dorsum of thorax brown, contrasting with the paler pleura; thorax otherwise unmarked save for slight brownish streaks below fore wing bases. Venation of wings uniform pale yellowish-brown; wings unmarked. Apical reddish-brown spot on femora only slightly indicated. (Fore tarsus missing or deformed in type and allotypes.) Abdomen reddish-brown dorsally and probably with one longitudinal mid-dorsal pale band on each tergite (see fig. 1); cerci uniform yellowish-brown; penes united to form a sub-triangular fleshy plate with an apical cleft; ventrally (fig. 2) plate furrowed so as to appear bifid; dorsally (fig. 3) obviously entire and with a small apical furrow on

each side of the main cleft ; plate pale but brownish dorsally at sides of main cleft and laterally at base ; tenth sternite (fig. 2) transversely furrowed with the posterior margin smoothly convex. Forceps-base shaped as in fig. 2. Length of fore wing 8 mm.

Material : ♂ Holotype, Sigi River, Amani (alt. 1,800 ft.), 11.ii.1953 ; ♂ paratype, Sigi River, Amani ; ♂ paratype, forest stream near Mpandeni (alt. 1,000 ft.), Eastern Usambara Mountains. All imagines preserved in alcohol.

Figs. 1-3.



Afronurus gilliesi sp. n.

Male imaginal characters : 1. Provisional reconstruction of abdominal pattern, dorsal view ; 2. Forceps, forceps-base and penes, ventral view (right forceps omitted) ; 3. Penes, dorsal view.

Remarks : The abdominal pattern of these males is very difficult to discern, apparently because it has faded since they were collected, and therefore no definitive description of it can be given. By careful examination, however, it is possible to make out central pale areas on each tergite, and to judge their probable shape. I therefore consider it worthwhile to give here a provisional reconstruction of the abdominal pattern (fig. 1) before the material deteriorates further.

The above description is based on the preserved and damaged specimens available to me. Notes made by Dr. Gillies at the time of collection are, however, informative : " a uniformly dark brown species, fore tibiae and tarsi pitch brown (i.e. blackish-brown), femora burnt umber, tails pitch

brown, forceps black. Fore-leg measurements, femur : tibia : tarsus, 7 : 8.5 : 9 ; Tarsus, 2 : 2.7 : 2.1 : 1.4 : 0.8. Body 11 mm., wing 10 mm., tails 25 mm." From these notes it appears that the blackish component of the body-colour is least stable in alcohol, a fact to be remembered when interpreting descriptions of allied species based on spirit material. The holotype of *A. gilliesi* was collected among other males "dancing high over the Sigi River at sunrise".

Afronurus spp. indet.

Of the two female imagines, one may belong to *A. gilliesi*, since what remains of the abdominal pattern indicates a close similarity with that species. The subanal plate of this specimen is broadly triangular, and smoothly truncated apically by a shallow indentation. It emerged on 31.vii.1955 from a larva collected the previous day from the Ingiliza River, Bombo (alt. ca. 4,300 ft.), South Pare Mountains. Dr. Gillies notes that *Afronurus* larvæ were common in this rocky mountain river (water temperature at 1600 hrs. ca. 14°C) and that one out of seven final instar larvæ carried a *Simulium* pupa.

The other female imago (Marangu, Mt. Kilimanjaro, 13.x.1958) is clearly of a different species, its subanal plate having a deep apical sulcus flanked by pointed tips.

The larval material is of interest because of its association with *Simulium*. This occurred at two localities, as described below.

1. Streams near Marangu, (alt. ca. 4,500 ft.), Mt Kilimanjaro, 24 and 25.x.1954, where larvæ were "common under boulders". One pharate final instar larva bore a cocoon and pupal exuvia of *Simulium copleyi* Gibbins typical form. The cocoon was in the usual position attached to the left wing-sheath with its opening facing posteriorly. One final instar larva bore an empty pupal cocoon of *Simulium* attached to the right wing-sheath and the posterior part of the thorax ; the cocoon faced posteriorly. Also from this locality were preserved two *Afronurus* larvæ (penultimate and final instars) and one unattached *Simulium* larva (about final instar).

2. River draining off Mt. Meru in gorge near Arusha, at about mile four on Moshi road (alt. ca. 4,500 ft.), 1.i.1956. The water temperature at 1600 hrs. was ca. 18°C. *Afronurus* larvæ were abundant and Dr. Gillies notes that ten out of seventeen examined at the site carried *Simulium*. The preserved material included one penultimate *Afronurus* larva bearing a cocoon and pupal exuvia of *S. copleyi* typical form attached to the right wing-sheath and posterior part of the thorax, and facing posteriorly. One *Afronurus* larva (probably antepenultimate instar) bore a *Simulium* larva (about half-grown) on the first abdominal segment ventral to the gill. Also preserved were six *Afronurus* larvæ (two final, two antepenultimate and two earlier instars) and four unattached *Simulium* larvæ (two about final instar and two half-grown).

The pupal exuviae from Kilimanjaro and Meru were identified as *S. copleyi* on the appearance and number (17) of the respiratory filaments, as described by Freeman and De Meillon (1953). The positions in which the pupal cocoons were attached are the same as those recorded for *S. copleyi* form *marlieri* Grenier in the Congo (Marlier, 1950) and in Uganda (Corbet, 1960). The occurrence in the present series of a pupal exuvia of *S. copleyi* on a penultimate instar *Afronurus* provides yet further evidence that the emergence of the two insects involved in this association does not have to be synchronised (see Corbet, in press).

ACKNOWLEDGMENTS.

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SUMMARY.

1. The adult male of a new species of mayfly, *Afronurus gilliesi*, is described and figured.

2. The association of larvæ of *Afronurus* with immature stages of *Simulium copleyi* Gibbins is recorded.

REFERENCES.

- CORBET, P. S. 1960. A new species of *Afronurus* (Ephemeroptera) and its association with *Simulium* in Uganda. *Proc. R. ent. Soc. Lond. (B)* **29**, 68-72.
- (in press). The biological significance of the attachment of immature *Simulium* to mayflies and crabs. *Bull. ent. Res.*
- FREEMAN, P. & DE MEILLON, B. 1953. *Simuliidae of the Ethiopian Region*. British Museum (Nat. Hist.), London.
- MARLIER, G. 1950. Sur deux larves de *Simulium* commensales de nymphes d'Ephémères. *Rev. Zool. Bot. afr.* **43**, 135-44.