

A second large-eyed genus of Caenidae (Ephemeroptera) from Africa

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Introduction

The genus *Caenopsella* was erected by Gillies (1977) for two species of Caenid mayflies from Tanzania, which shared the common and distinctive character of greatly enlarged eyes in the male. The nymph was described from specimens belonging to the type species, *C. meridies* Gillies, that of the second species, *C. major* Gillies, not being known. I recently received from Dr. D. S. Brown a long series of nymphs of large-eyed Caenid nymphs from a number of localities in the highlands of Ethiopia. More important still, his collection included a series of adults and associated nymphal skins. Apart from being slightly larger, the adults are indistinguishable from *Caenopsella major* and evidently belong to that species. But the nymphs are strikingly different from those of *C. meridies*, and this, coupled with the lack of similarity in the terminalia of the two species, makes it necessary to place *C. major* in a separate genus.

Demoulin (1965) gave an account of the mayflies collected by P. Basilewsky and N. Leleup in Tanzania in 1957. Among this material were two Caenid nymphs from the vicinity of Bismarck Hut on Kilimanjaro, at a height of about 3000 m, which he described under the name, *Caenis* sp. no. 1. I have collected on the same mountain on a number of occasions, possibly in the same streams and possess a series of nymphs and two fragmented female imagoes. The nymphs, which include males with large eyes, are closely similar to the Ethiopian specimens of *C. major*, although differing in a number of minor but well-defined characters. The Kilimanjaro '*Caenis*', therefore, is clearly congeneric with *C. major*.

Professor George F. Edmunds Jr. has also kindly sent me a series of nymphs from Nanyuki on Mount Kenya. These specimens are close to others from the East African highlands and the male nymphs have the typical large eyes. Thus, three species of the new taxon are now known, a description of which follows.

The removal of *C. major* from *Caenopsella* leaves only the type species, *C. meridies*, in the genus. However, Dr. J. D. Agnew informs me (in litt.) that he has a second species referable to *Caenopsella*, which he collected in Okavango, Botswana, and that a description of this will be published.

Afrocaenis gen. nov.

Caenis (in part) Demoulin 1965.

Caenopsella (in part) Gillies 1977.

Male oculi much enlarged, lateral diameter of eye equal to three-quarters interocular distance. Prosternum narrow, fore coxae almost contiguous. Fore tibia about 1.5 times femur. Forceps terminating in one or more minute, spine-like bristles. Nymphal claws entirely without teeth; gill-cover with triangular crest,

upper surface ornamented with numerous small, stout hairs but lacking a row of submarginal spine-like hairs.

Type species Caenopsella major, Gilles.

Afrocaenis shares with *Caenopsella* the unusual feature of greatly enlarged eyes in the male, a character otherwise unknown in the Caenidae. The forceps, however, are more reminiscent of *Caenodes*, Ulmer and differ from those in *Caenopsella* in lacking the long, stout bristle that terminates each forceps limb in the latter genus. The nymphs of the two genera give few indications of close relationship, *Caenopsella* being distinguished by the absence of the triangular crest on the dorsal surface of the gill-covers. Apart from the enlarged eyes in mature male nymphs, *Afrocaenis* is notable for the complete absence of teeth on the claws of all legs.

Afrocaenis major (Gillies)

Caenopsella major, Gillies 1977: 452

Description

Male imago. See Gillies (1977).

Female imago. Head and thorax dark mahogany brown; legs dark brown, distal tarsal segments and claws paler; wings clear except for slight opalescence in costal and subcostal areas; abdomen brown, darker along posterior margins of terga; postero-lateral corners of terga 7-9 drawn out into fine points. Tails white, brownish at extreme base.

Nymph. Body dark brown. Mouthparts (figs. 1-5): central portion of anterior margin of labrum smooth in outline. Legs (figs. 6-8): fore femora with an incomplete subapical band of stout hairs, similar but shorter pointed hairs distributed sparsely over dorsal surface of mid and hind femora. Gills (figs. 9-10): marginal fringe of gill-cover composed of long, fine hairs; upper surface with stout hairs on triangular crest and sparsely covered with pointed hairs.

Dimensions

Female body 6-7.5 mm; wing 5-7 mm; tails c. 6 mm.

Material examined

Ethiopia: Lake Wonji, about 45 km south-west of Addis Ababa, c. 2100 m, 8.vi.62., 14♂, 7♀, 9 associated nymphal skins. Numerous nymphs from the following localities: Arussi Province, 27 km south of Asella, Ascaiba stream, c. 2400 m. Arussi Province, 18 km south of Bocaggio, tributary of Ingia river, c. 2900 m. Gojjam Province, 20 km south of Derbra Markos, 2100-2400 m. Shoa Province, 30 km west of Omo River bridge on road from Addis Ababa to Jimma. Shoa Province, 21 km east of Woliso. All collected by D. S. Brown.

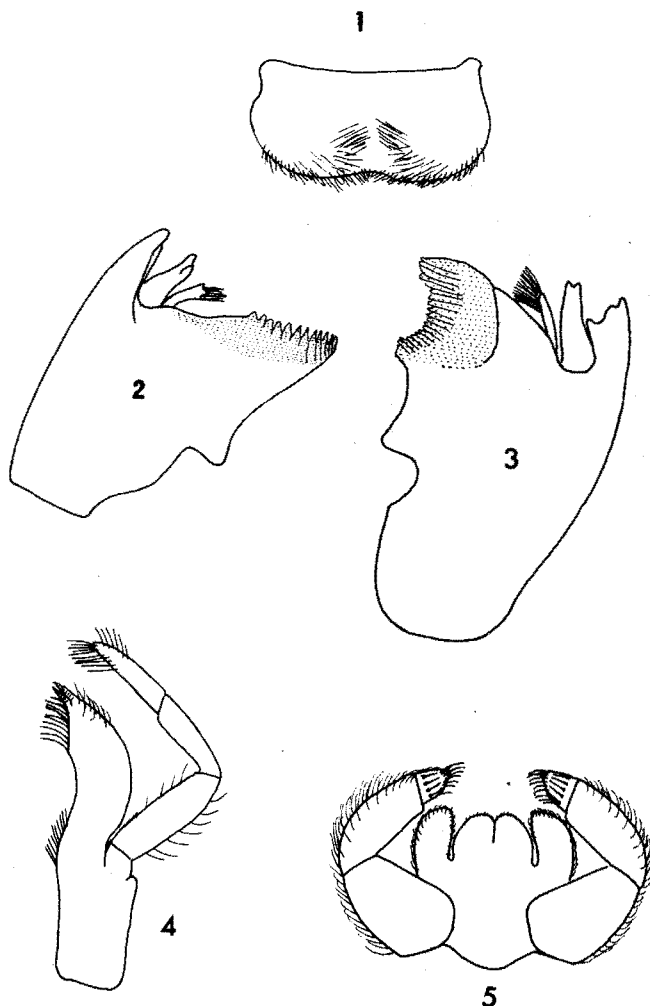
Afrocaenis browni sp. nov.

Caenis sp. no. 1 Demoulin 1965 110.

Description

Female imago. Wings brownish; venation (fig. 13).

Nymph. Male with markedly enlarged oculi. Body in life of differing shades of brown, giving it a marbled appearance. Mouthparts: central portion of anterior margin of labrum irregular in outline. Legs (figs. 14-16): dorsal surface of femora



FIGS. 1-5. *Afrocaenis major* (1) Labrum; (2) and (3) mandibles; (4) maxilla; (5) labium.

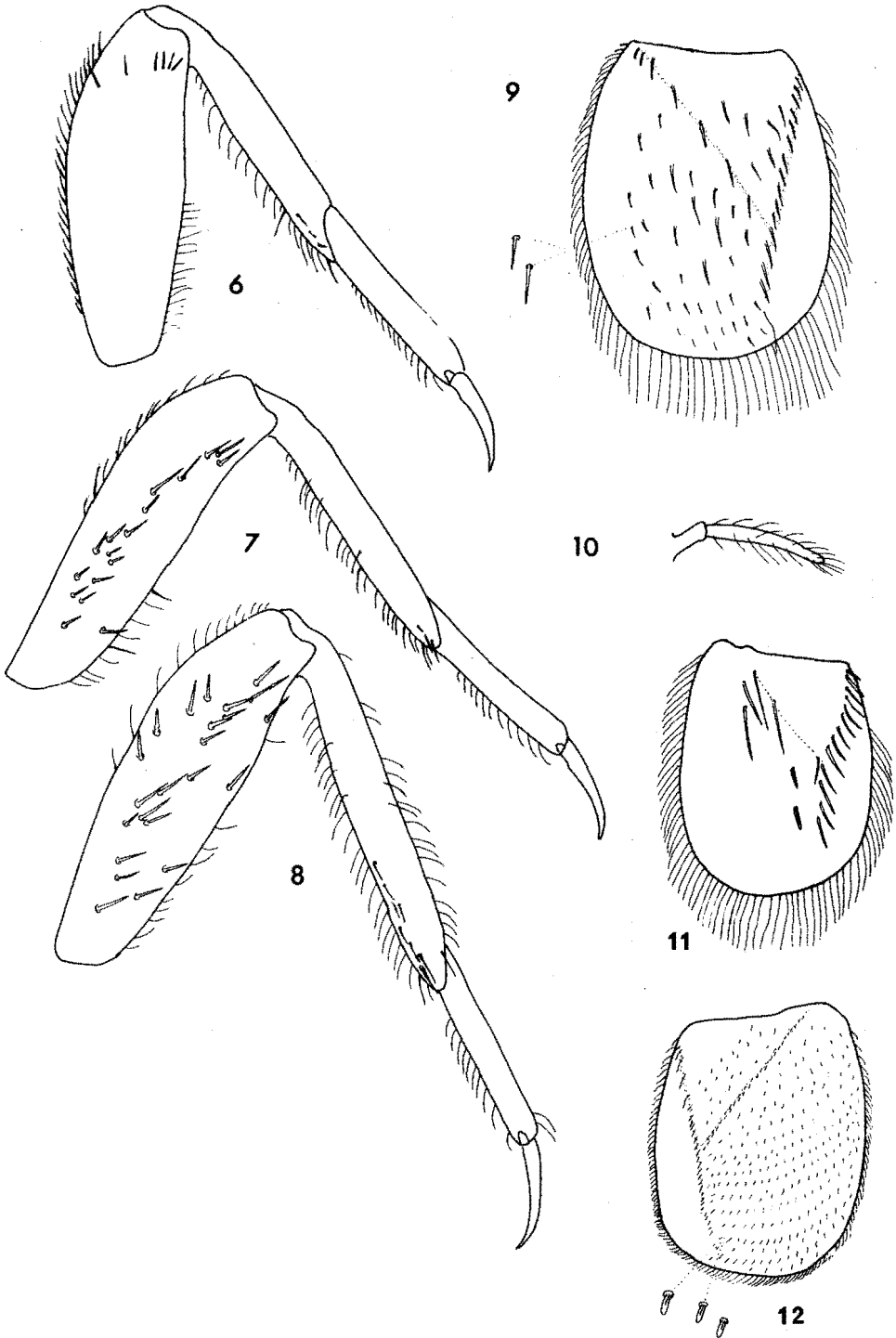
with numerous broad, blunt spines, on fore femur these being restricted to a transverse, subapical band, more generally distributed on mid and hind femora. Gill-cover (fig. 12): marginal fringe composed of relatively short hairs; almost whole of upper surface clothed with broad, blunt hairs.

Dimensions

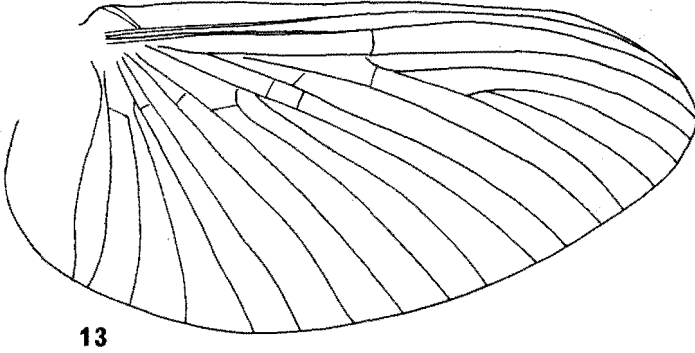
Female wing 8 mm. Mature female nymph (excluding tails) 8-9 mm.

This species is readily distinguished from *A. major* by the shortness of the marginal hairs of the gill-cover and the abundant broad, blunt hairs on the upper surface. The presence of similar blunt hairs on the femora is also a good diagnostic character. *A. browni* appears to be an unusually large Caenid, perhaps the largest member of the family known at present.

Holotype nymph Tanzania: Kilimanjaro, stream near Bismarek Hut, c. 3000 m. 6.x.58. M. T. Gillies (deposited in British Museum (Nat. Hist.)). Two fragmented ♀, 9 nymphs, same provenance, 5.viii.55, 6.x.58, 3.ix.59.

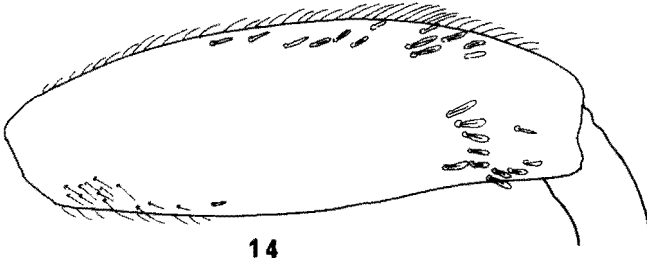


FIGS. 6-12. *Afrocaenis major*. (6) to (8) Fore, mid and hind legs of nymph; (9) gill-cover; (10) 1st gill. *Afrocaenis* sp. (11) gill-cover. *Afrocaenis browni*. (12) Gill-cover.

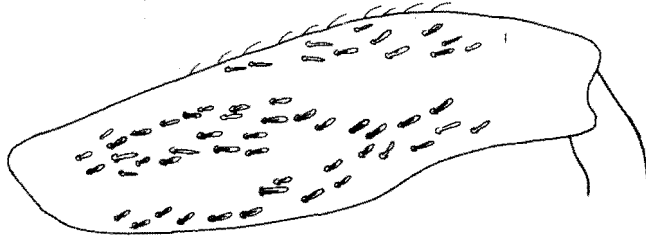


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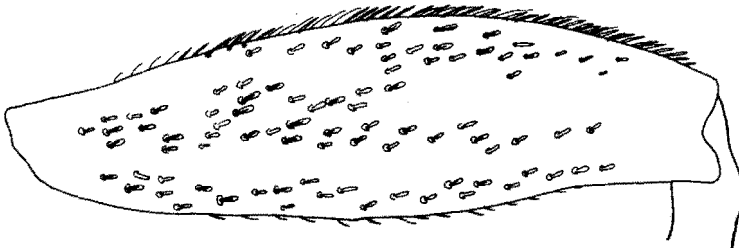
FIG. 13. *Afrocaenis browni*. Wing.



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15



16

FIGS. 14-16. *Afrocaenis browni*. Nymph; fore, mid and hind legs.

The identity and generic placing of this insect remained a puzzle until Dr. Brown's work in Ethiopia enabled the correlation of this adult and nymph of *A. major*. For instance, Demoulin (1965) gave a good description of two (presumably female) nymphs from the type locality, but placed them in the genus *Caenis*. In this, he may have been influenced by the redefinition of the genus by Thew (1960) which cited, as a diagnostic character, the absence of teeth ('spines') on the tarsal claws of the nymphs. However, this character cannot be regarded as a very satisfactory one since, in at least three Palaearctic species, *C. macrura* Stephens, *C. robusta* Eaton and *C. horaria* (L.), the claws possess well-marked basal teeth, Landa (1969), Macan (1979).

The species was collected in a number of streams in the vicinity of Bismarck Hut, the first overnight stopping place for climbers toiling up towards the summit of Kilimanjaro. Nymphs were collected at altitudes between 2300 and 3100 m in dense forest. The stream-beds were mainly composed of basement rock with occasional depressions containing pebbles and detritus. *A. browni* nymphs were living amongst this trash and leaf-litter. Water temperatures on two days in October and one in August ranged between 9° at 0700 hours and 10° at 1300 hours.

In a study of ecology of Upper Kilimanjaro, Salt (1954) recognized the following vegetation zones:

Upper moorland	11,500–14000 ft (3500–4300 m)
Lower moorland	9000–11,500 ft (2700–3500 m)
Cloud forest	6000–9000 ft (1800–2700 m)
Cultivated zone	4000–6000 ft (1200–1800 m).

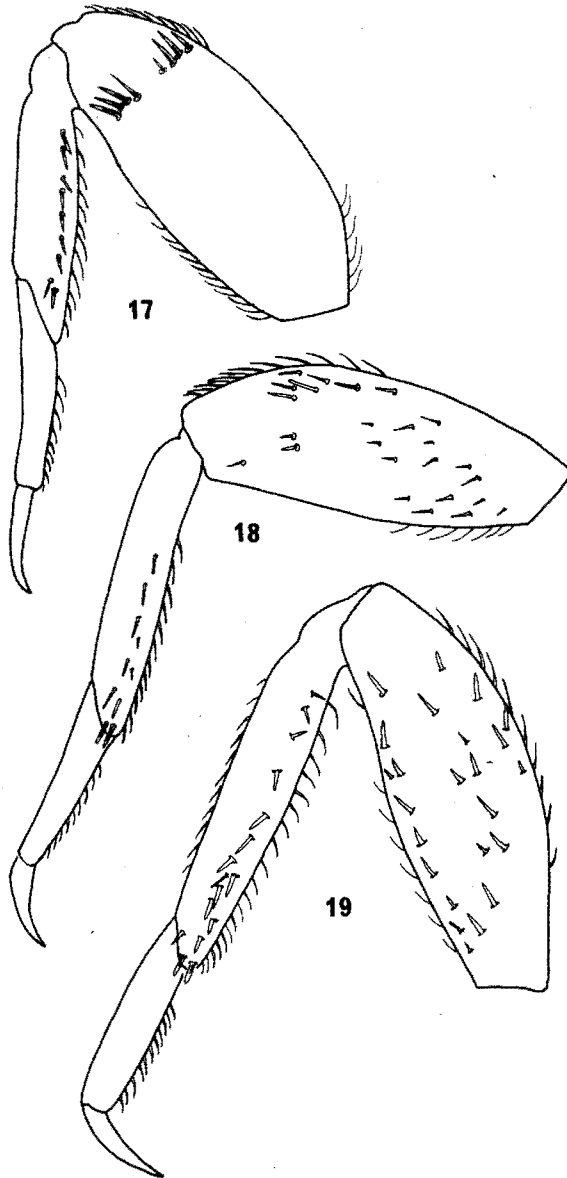
A. browni occurs in streams in the upper part of the Cloud forest and in the lower moorland zones. Collections at other levels were negative for this species. Thus, although more systematic collecting might modify these findings, on the evidence available it appears to be confined to a rather narrow altitudinal zone.

The collections of *A. major* in Tanzania had been made at considerably lower altitudes than this (1400–1500 m), suggesting that temperature differences might partly determine the distribution of the two species. At first sight, the fact that some of Dr. Brown's new material of *A. major* from Ethiopia came from similar altitudes to those of *A. browni* in Tanzania argues against this viewpoint. However, Kilimanjaro is an isolated peak, towering up nearly four miles above the surrounding plain, whereas the Ethiopian highlands form an elevated massif with extensive areas above 2400 m. It was shown by Moreau (1935) that conditions on isolated mountains in East Africa are cooler than at the same altitude on plateaux. This conclusion is borne out in the present instance by data collected by Dr. R. Aram (Dr. J. D. Thomas, personal communication) over a complete year in three streams in the Ethiopian highlands: (1) altitude 2200 m, annual temperature range 13–23°, mean 15°, (2) 2750 m, annual mean 15°, (3) 2200 m, annual range 12–27°, mean 15°. Thus, water temperatures at the same altitudes on Kilimanjaro appear to be considerably cooler. Despite the scantiness of the data from this mountain it seems clear that *A. browni* can be regarded as a cool-adapted species.

Afrocaenis sp.*Description*

Nymph. Legs (figs. 17-19). Gill-cover (fig. 11).

This species resembles *A. major*, and on the same grounds is distinguished from *A. browni*, by the fringe of long hairs on the gill-covers and the presence of numerous stout, pointed hairs on the legs. It differs from *major* in that the hairs on the dorsum of the gill-covers are longer and largely confined to the vicinity of the triangular crest. The hairs on the femora are also stouter, and there is a line of similar hairs down



FIGS. 17-19. *Afrocaenis* sp. Nymph; fore, mid and hind legs.

the dorsum of the tibia on all three pairs of legs. Thus it would appear to be a distinct species, but in the absence of adult material formal description of the species does not seem justified at the present time.

Material examined

Kenya: 10 miles (16 km) south of Nanyuki, Mt. Kenya. (Altitude probably about 1800–2000 m). 5.ii.68. Paul J. Spangler.

It is interesting to note that this species occurs in the gap in known distribution of *A. major* between the Tanzanian and Ethiopian highlands. Further collecting may help to explain this anomaly.

Summary

The East African mayfly, *Caenopsella major*, is transferred to *Afrocaenis* gen. nov. *A. browni* sp. nov. from Kilimanjaro and an unnamed species from Kenya are also assigned to the new genus.

Acknowledgments

I am greatly indebted to Dr. D. S. Brown of the British Museum (Natural History) for giving me his unique series of reared Caenid mayflies from Ethiopia. I am also grateful to Prof. G. F. Edmunds Jr., of the University of Utah, for generously sending me his material of large-eyed Caenid nymphs from Mount Kenya. Dr. J. D. Thomas of the University of Sussex kindly supplied details of water temperatures in the Ethiopian highlands.

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