

A NEW GENUS OF TRICORYTHIDAE (EPHEMEROPTERA)  
FROM EAST AFRICA

By M. T. GILLIES

(Malaria Institute, Amani, Tanganyika Territory)

AMONG the interesting mayflies collected by Professor Lewis Berner in the course of a visit to Nyasaland was one, a nymph, which was described by Kimmins (1955) and assigned by him to the Ephemerellidae (genus uncertain). Similar nymphs are common in many types of streams in Tanganyika. But despite the striking resemblance they bear to the Ephemerellidae, the adults that emerge from them prove to belong to an aberrant Tricorythid genus, which appears to be a widespread and characteristic member of the Ethiopian fauna. In the account of the genus given here, three species are described, based mainly on the examination of fresh specimens. The types of all of them have been presented to the British Museum (Natural History).

EPHEMERYTHINAE subfam. n.

*Ephemerythus* gen. n.

Oculi in male only slightly larger than in female. Male fore leg, femur : tibia : tarsus 1 : 2 : 0.9-1, second tarsal segment the longest, claws similar; mid and hind legs, 1 : 1 : 0.3, claws dissimilar. Fore wing hyaline or tinted, not milky, wing fringe absent in imago; cross veins numerous, paired marginal intercalaries present in all interspaces from first radial to anterior cubital. Hind wing usually present, very small and narrow with subacute apex and tall pointed spur. Male forceps with two subequal segments, the distal segment tapering apically. Penes concealed by prominent acute penis cover arising from forceps base. Penis lobes (normally retracted) fused at base, apices acute and simple. Subanal plate in female well developed and pointed. Tails three, moderately long in both sexes.

*Nymph* (see Kimmins, 1955, figs. 8, 9) of the sprawling type. Mandibles stout, maxilla without palp, labium with glossae and paraglossae fused almost to apex, labial palp with minute third segment. Pronotum as broad as mesonotum, wing-buds fused almost to apices. Femora broad, adorned with spatulate setae, on the fore femur these forming an almost continuous transverse line just external to the point of overlap of the pronotum. Four to five abdominal gills present on segments 2-5 or 6 respectively, each consisting of an oval plate with underlying paired filaments; that on second segment elytrid, overlapping remainder; that on sixth segment, when present, consisting of a small semicircular plate only.

Type species : *E. niger* sp. n.

*Ephemerythus niger* sp. n. (Figs. 1-3, 6, 9)

*Male imago* (in life).—Eyes black, antennal segments black, filament white. Thorax black; fore femora black, tibiae colourless; tarsi dusky; mid and hind femora white in proximal two thirds, black in distal third, tibiae colourless, tarsi faintly tinged with brownish-yellow. Fore wing hyaline except at extreme base round costal brace, which is black; hind wing dusky to base of spur. Abdomen mainly white, tergites VII and VIII mainly black, X dusky. Forceps white, spines on inner surface of basal segment very small, distributed throughout length. Tails white with black rings.

Body : 5 mm. Fore wing : 5.5 mm.

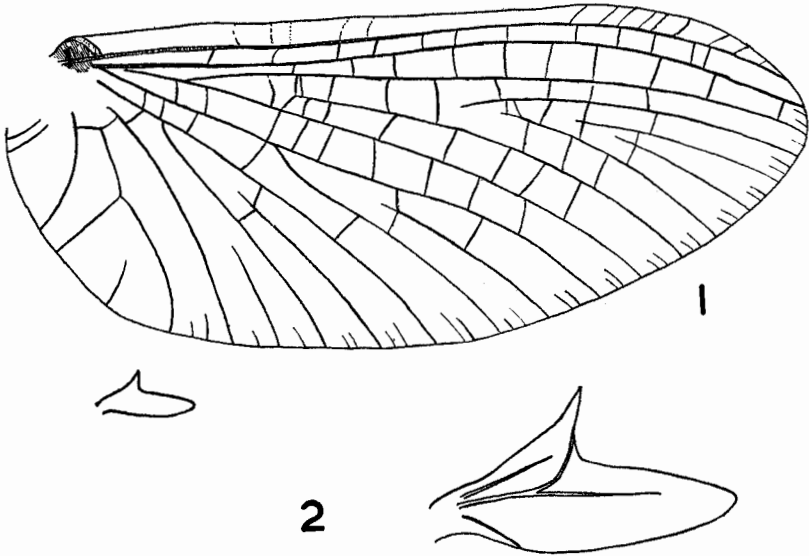
*Female imago* (in life).—A dark, sooty grey insect. Thorax and abdomen dark grey, posterior margins of abdominal tergites darker. Legs uniformly dark grey apart from basal half to two-

thirds of mid and hind femora, which are slightly paler. Fore wings hyaline except at wing root. Hind wings as in male; sometimes reduced or absent. Tails dark grey.

Body: 5.5 mm. Fore wing: 6 mm.

*Male subimago* (in life).—Thorax greyish-brown. Abdominal tergites II–VI yellowish, VIII–X dusky. Wings slightly cloudy with very short marginal fringe.

*Holotype* ♂, TANGANYIKA: Amani, Tanga Province, 25.vi.56. *Paratypes*, Sigi river, below Amani; Mkulumuzi river, Muheza, Tanga Province; Gonja, South Pare district.



FIGS. 1–2.—Wings of male *Ephemerythus niger*: (1) fore wing (inset with hind wing to scale); (2) hind wing.

The male of this species is readily distinguished from the others by the abdominal markings, segments II to V being largely white. In the female of *E. niger* the hyaline fore wings are characteristic.

#### ***Ephemerythus pictus* sp. n. (Figs. 4, 7, 10, 11)**

*Male imago* (in life).—Oculi and ocelli black; antennal scape white, pedicel black, filament white. Thorax greyish-black, with a yellowish tinge laterally. Fore femora and extreme base of tibiae black, rest of tibiae colourless, tarsi yellowish-black; median third of mid, and second quarter of hind, femora pale, rest of femora black, tibiae dusky or colourless, tarsi yellowish-grey. Costal and subcostal areas of wing faintly dusky, especially in basal half; hind wing brownish-purple to base of spur. Venation as in *E. niger*, but cross veins slightly more numerous. Abdominal markings (figs. 4, 7) black on dusky background, except for pale area of tergite IX which is distinctly white; sternites VIII and IX yellowish-black. Basal segment of forceps dusky, distal segment white; spines on basal segment scanty, largely confined to distal swelling. Tails grey with black rings.

Body: 5 mm. Fore wing: 5.5–6 mm. Tails 13–15 mm.

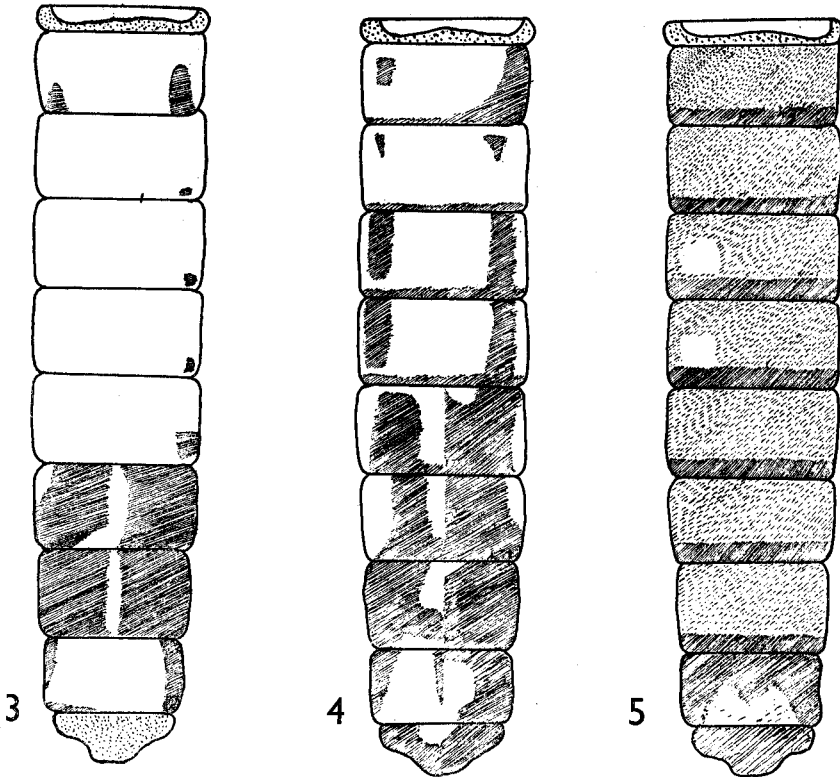
*Female imago* (in life).—A very dark insect. Whole body and tails a uniform dark purplish-brown. Fore legs entirely dark; mid and hind legs similar except for an inconspicuous median pale band across femora. Fore and hind wings purplish-brown throughout.

Body: 5.5–5 mm. Fore wing: 5.5–6 mm.

*Subimago* (in life).—In the male wings pale grey, costal and subcostal areas being darker. In the female wings and body dark purplish-grey.

*Holotype* ♂, TANGANYIKA: Amani, Tanga Province, 20.ix.54. *Paratypes* from the same area at altitudes from 1000–3000 feet.

The male of this species is readily distinguished from the others by the abdominal markings, in which the extent of the dark areas is intermediate between *E. niger* and *E. kiboensis*. From the former species the male of *E. pictus* can also be distinguished by the dusky tinge of the costal and subcostal areas of the fore wing. The female imago is immediately distinguishable from the other species, and indeed from all other African Ephemeroptera known to me, by the uniform deep brown tinting of the wings.



FIGS. 3-5.—Abdominal markings of male *Ephemerythus*, dorsal view showing light variations (left halves) and dark variations (right halves): (3) *E. niger*, (4) *E. pictus*, (5) *E. kiboensis*.

#### *Ephemerythus kiboensis* sp. n. (Figs. 5, 8)

*Male imago* (in life).—Head and oculi greyish-black, antennal scape colourless, pedicel black, filament colourless. Thorax above blackish, pleura and sternum greyish-brown. Fore femora uniform dusky, tibiae and tarsi colourless except for a faint dusky tinge to the tibio-tarsal joint; hind and mid femora brownish-black with broad central pale band, tibiae colourless, tarsi with yellowish-brown tinge. Basal two-thirds to three-quarters of costal and subcostal areas of fore wing and wing root dusky, rest of wing hyaline. Abdominal tergites mainly dusky with dark brownish-purple or black markings; sternites III–VI pale grey, remainder dusky. Basal segment of forceps dusky, distal segment white; basal segment with numerous sharp spines on inner surface extending almost to its base. Tails grey with black rings.

Body: 5 mm. Fore wing: 5.5 mm. Tails 14–15 mm.

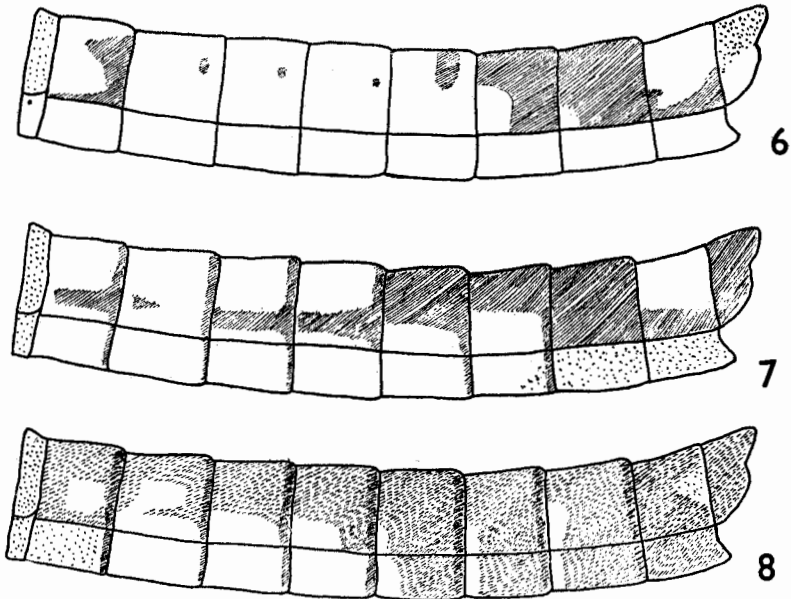
*Female imago* (in life).—Colouring generally as in male. Fore legs entirely dusky, mid and hind femora with faint pale median area, tibiae and tarsi dusky. Fore wing faintly but distinctly dusky throughout. Tails dark purplish-brown.

Body: 5.5 mm. Fore wing: 5.5–6 mm.

*Holotype* ♂, TANGANYIKA: Marangu, Kilimanjaro, 4500 feet, 25.x.54. *Paratypes* from same area and from Arusha, 4-4500 feet.

The male of this species is readily distinguished by the dark colouring of the abdomen. From *E. niger* it can also be distinguished by the dusky costal and subcostal area of the fore wing. In the female imago the uniform faint dusky tinge of the wings is characteristic. Specimens that are probably referable to this species, from Gonja in the S. Pare district of Tanganyika, differ slightly in having the pale areas on abdominal tergites III-V more extensive and the abdominal sternites uniformly dusky. The male subimago of this Pare form has dark iron blue wings and body and white tails. Subimagines from the type locality have not been seen.

Two of the characteristic features of *Ephemerythus* require further comment, namely the hind wings and the gills in the nymph. Females, and less commonly males, of *E. niger* are sometimes found in which the hind wing is entirely absent,



FIGS. 6-8.—Abdominal markings of male *Ephemerythus*, lateral view: (6) *E. niger*, (7) *E. pictus*, (8) *E. kiboensis*.

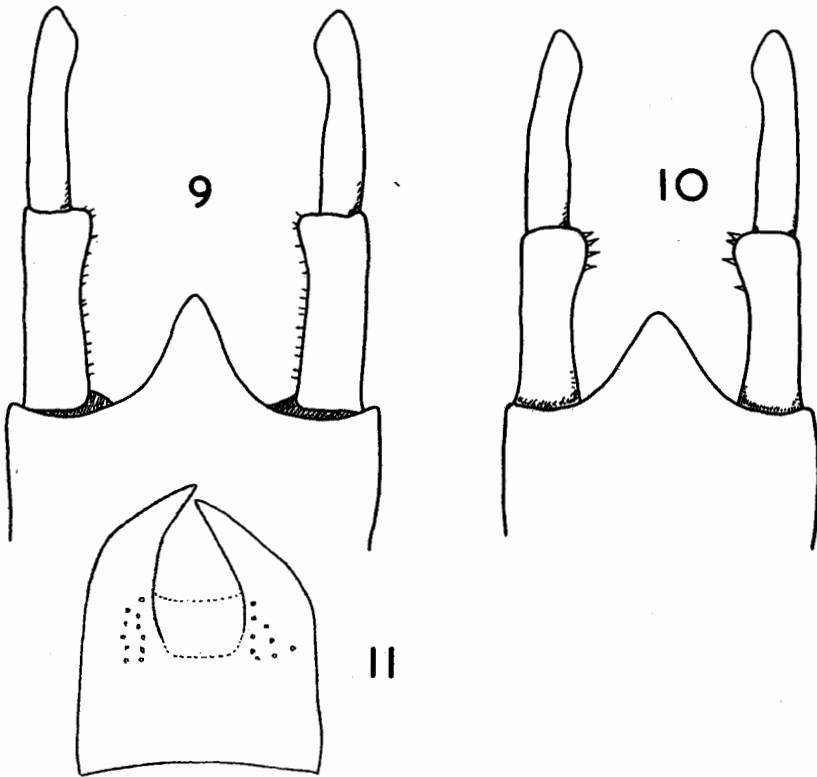
and I have seen a single specimen with a rudimentary hind wing. The venation of the fore wings, however, appears constant. The hind wing is apparently always present in both sexes of the other species described.

In the nymph from Nyasaland, described by Kimmins, gills were present on four abdominal segments. In East African material this same condition is also sometimes seen, but in other specimens an additional lamella is present on the sixth segment. Detailed study of the Tanganyika nymphs has not yet been made, and it is not possible to state whether this difference is a specific one.

#### SYSTEMATIC POSITION

Edmunds and Traver (1954) recognized three subfamilies within the Tricorythidae, separated most clearly on nymphal characters. Demoulin (1955) created a fourth subfamily, Melanemerellinae, for the Brazilian genus *Melanemerella* Ulmer, 1920, originally described as an Ephemerellid. This new African genus, *Ephemerythus*, is also an undoubted Tricorythid, as shown by the great reduction in the cross veins of the fore wings, by the development of the cubital area with *CuP* angled at the

origin of *ICuA* to form what one might call the "cubital fork" characteristic of most Tricorythidae, and by the reduction in the number of segments in the genital forceps to two. Less typical of the family are the paired marginal intercalaries, the hyaline wings with absence of the marginal fringe of hairs and, least of all, the Ephemerellid aspect of the nymph. It goes some way, in fact, towards bridging the gap between *Melanemerella* and the other members of the family, and makes it clear that Demoulin's interpretation of the wing venation of that genus was undoubtedly correct. The differences between the wings of *Ephemerythus* and *Melanemerella* are, however, still very considerable, and hardly justify their inclusion in the same subfamily; and notwithstanding the possibility that the nymph of *Melanemerella*, when discovered, may prove to be similar to *Ephemerythus*, I have had no alternative but to erect a new subfamily to accommodate the latter.



FIGS. 9-11.—Male genitalia of *Ephemerythus*: (9) forceps of *E. niger*; (10) forceps of *E. pictus*; (11) penes of *E. pictus*.

The African Tricorythidae are an important and a heterogeneous group, and often of great local abundance. They comprise the following four subfamilies: Ephemerithinae, with an ephemerelloid nymph; Tricorythinae, as exemplified by *Tricorythus* (s.l.), with a tricorythoid nymph; Leptohyphinae, represented by *Tricorythafer* Lestage (at least one species of this genus occurs in Tanganyika), with an apparently caenoid nymph; Dicercomyzinae, with a curiously heptagenoid nymph. In contrast, the Ephemerellidae are very poorly represented and, apart from the nymphs recorded by Marlier (1954) from the Eastern Congo and referred to as "*Ephemerellinae* n. g." and "*Lithogloea*", they have not been found in tropical Africa. Their place, in fact, seems to be largely taken by the Tricorythidae.

## BIOLOGY AND DISTRIBUTION

*Ephemerythus* nymphs occur in a wide range of habitats from cool mountain streams to warm lowland rivers. They appear to be confined to waters with moderate to fast flowing current, where they may be found on the underside of stones, in the interstices of trailing roots or plants (a typically *Ephemerella*-like refuge), in sunken logs or branches, or occasionally amongst the trash and detritus on the floor of eddies or backwaters. They are feeble swimmers but clamber with agility over submerged objects. In the South Pare Mountains of Tanganyika, *Ephemerythus* nymphs have not been found above 4500 feet, at which altitude water temperatures in the cool season (July) over two 24-hour periods ranged from 58–61° F. On Kilimanjaro, *E. kiboensis* is abundant at an altitude of 4–4500 feet, where water temperatures in October over a single 24-hour period varied between 63–71° F. Casual observations at much greater heights on the same mountain suggested that this is near its upper limit of tolerance. *E. niger*, on the other hand, is common at 3000 feet in the Eastern Usambara Mountains, but also occurs in the tiny Mkulumuzi river at Muheza, Tanga Province, at no more than 600 feet. The altitudinal range of *Ephemerythus* is evidently greater than that of most other Tricorythidae, although surpassed in this respect by *Diceromyzon*.

On the little stream that runs through the densely forested surroundings of the Research Station at Amani, duns of *E. niger* may be caught in small numbers in almost every month of the year. They emerge shortly before dusk, just before the main hatch of Baëtidae, and the final ecdysis takes place during the course of the night. The imagines are frequently found in the daytime resting on the underside of broad leaved vegetation in the vicinity of streams, the duns rarely so. As in many other tropical mayflies, imaginal activity is mainly confined to the first hours of daylight. In the Eastern Usambara Mountains, swarms of male spinners of both *E. niger* and *E. pictus* are regularly to be seen along the precipitous course of the rivers for an hour or so after sunrise. On the cooler slopes of Kilimanjaro their activity is delayed, or possibly prolonged, and at Marangu swarms of *E. kiboensis* were observed on one occasion up till 11.30 a.m., by which time the air temperature had reached 72° F. Females are less commonly caught on the wing, but they are often abundant in cobwebs spun across the waterfalls of mountain streams.

Apart from the localities in north east Tanganyika already mentioned, and Kimmins' record from Nyasaland, I have found *Ephemerythus* nymphs in the Congo river near Brazzaville, in forest streams near Yaounde in the Cameroons, and in lowland torrents in Liberia. It is evidently a widespread and common insect in tropical Africa, and other species undoubtedly await description.

## REFERENCES

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