

NEW RECORDS AND SPECIES OF *EUTHRAULUS* BARNARD
(EPHEMEROPTERA) FROM EAST AFRICA
AND THE ORIENTAL REGION.

By M. T. GILLIES.

BARNARD (1932) created the genus *Euthraulus* (Leptophlebiidae) for a South African mayfly resembling in certain respects the European *Thraulus bellus* Eaton. It differed in the adult in possessing genital forceps strongly swollen basally and, in the nymph, by the first gill being single and filiform and the lamellae of the second to seventh gills being tri-digitate. This species, *E. elegans*, is common in Cape Province (Barnard, 1932), in the South Eastern Cape and Natal (Crass, 1947*a, b*) and has recently been collected in Nyasaland (Kimmins, 1955*a*). Two other species have recently been described from Uganda, *E. bugandensis* and *E. curtus* (Kimmins, 1955*b*), both of them occurring in the vicinity of the northern shore of Lake Victoria and the source of the Nile.

Earlier in the century, Ulmer (1913) described *Thraulus marginatus* from a series of males from Java. In his impressive work on the Ephemeroptera of the Sunda Islands Ulmer (1939) discussed the status of this species and decided to create the new genus *Thraululus* for it. The present writer (Gillies, 1951) added a second species, *Thraululus parvulus*, from material collected in Central India. The nymphs of both were unknown. In 1928 Uéno had described *Choroterpes trifurcata* from Formosa, on the basis of a series of nymphs the gills of which terminated in three long processes. Ulmer (1939) recorded the presence in Java of nymphs thought to belong to this species, and it may be noted that he remarked then on the similarity of the gills of these specimens to those of *Euthraulus*.

Soon after coming to East Africa I had the opportunity of collecting a number of specimens of *Euthraulus*, both as nymphs and adults, and the similarity between the African adults and the Indian species previously studied led to the suspicion that *Euthraulus* and *Thraululus* were synonyms. A comparison of Uéno's description with East African material confirmed the similarities between the nymphs, and a re-examination of some of my Indian material revealed the presence of typical *Euthraulus* nymphs from several localities. The position, therefore, is that *Thraululus* adults are indistinguishable from *Euthraulus*, and that *Euthraulus* nymphs—*Choroterpes trifurcata* and undescribed material—are known to occur in the Oriental region. Thus, even without the confirmatory evidence that might be supplied by knowledge of the early stages of *Thraululus*, it seems clear that *Thraululus* Ulmer is a synonym of *Euthraulus* Barnard, and that the Oriental nymphs with tri-digitate gill lamellae also belong here.

The distinctive characters of the genus are the marked reduction of cross-veins in the fore wing, the ovate hind wing with prominent rounded spur, the basal segments of the male forceps strongly and abruptly swollen basally, the penes separate and simple, and the female subanal plate with a distinct apical notch. The labrum of the nymph has a single deep median notch in the anterior margin, the first gill simple and filiform and both lamellae of gills 2-7 terminating in three fine processes.

List of species of *Euthraulius* Barnard, 1932 (= *Thraululus* Ulmer, 1939) **syn. nov.**

<i>E. elegans</i> Barnard, 1932	CAPE PROVINCE and NATAL; S. AFRICA; NYASALAND.
<i>E. bugandensis</i> Kimmins, 1955b	UGANDA; TANGANYIKA.
<i>E. curtus</i> Kimmins, 1955b	UGANDA.
<i>E. tropicalis</i> sp. n.	TANGANYIKA.
<i>E. usambarae</i> sp. n.	TANGANYIKA.
<i>E. marginatus</i> (Ulmer, 1913) comb. nov.	JAVA.
<i>E. parvulus</i> (Gillies, 1951) comb. nov.	INDIA.
<i>E. trifurcatus</i> (Uéno, 1928) comb. nov.	FORMOSA.
<i>Euthraulius</i> sp. Undescribed nymphs	INDIA; HONG KONG.

Of the Oriental species, it is possible that *trifurcatus* represents the nymph of either *marginatus* or *parvulus*. Alternatively, the nymphs from Java designated as *trifurcatus* by Ulmer (1939) may, in fact, belong to *marginatus*. Ulmer himself observed several differences in the mouthparts between his specimens and the Formosa species, which indicate the probable distinctness of the two forms. I have a series of nymphs from Hong Kong, kindly collected for me by Mr. M. V. Lumm. These differ from *trifurcatus* Uéno in several small details, and the prosthema has two main branches in both mandibles, thereby differing from *trifurcatus* Ulmer (*nec* Uéno). The Hong Kong species may also be distinct. Other nymphs in my collection came from Rawalpindi, in the north-west of the Indian sub-continent, and from Poona. It seems then that *Euthraulius* is widespread and common throughout the Oriental region.

It is equally widespread in Africa. Apart from the records already mentioned, I have recently collected nymphs from the River Congo at Leopoldville and Brazzaville and from a number of streams in Liberia. Notes on some East African species follow, two of them being described as new. The types of both have been presented to the British Museum (Natural History).

Euthraulius bugandensis Kimmins.

TANGANYIKA: Korogwe, Tanga Province, on the Pangani River (alt. c. 900 ft.).

A number of specimens were caught as subimagines at light on 23rd August, 1955. These are rather smaller than as described by Kimmins, but the male genitalia agree very closely with his figures. An enlarged drawing of one penis lobe is reproduced here (fig. 1) in order to show the detail. The subimago in life has pale grey wings. This is a distinctly larger and paler species than the other East African forms known to me.

Euthraulius tropicalis sp. n. (Figs. 2-5, 8-9).

MALE IMAGO.—*In life*: Eyes chocolate-brown, body and tails rather darker. Fore femur dark brown, tibia grey-brown, tarsus white; mid and hind femora dark brown, slightly paler and translucent in the basal one-third, tibiae and tarsi dark grey. Wings unpigmented except for a patch of dark brown pigment at the base of the hind wing.

In fluid: Turbinate eyes coffee coloured, not quite contiguous. Thorax dark brown; fore femur dark brown, tibia paler brown, tarsus almost colourless; mid and hind legs

dark brown, basal pale banding of femora scarcely discernible. Abdomen and tails dark brown. Genitalia as in figures 4-5; distal half of penis lobes subtriangular, the apex bearing three to four sharp spines, main portion unornamented except for a few fine translucent pale spots.

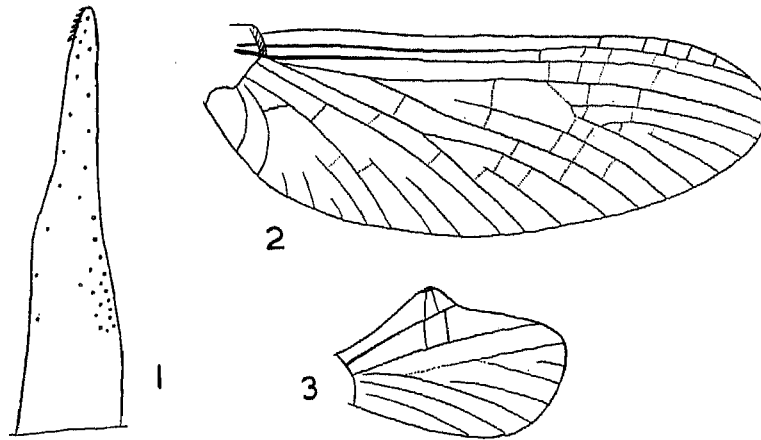
FEMALE IMAGO.—*In life*: A darker insect than the male, body uniformly dark pitch brown, tails almost black; femora and tibiae pitch brown. Wing venation rather darker than in male and cross-veins more distinct.

In fluid: Colouring as in male.

SUBIMAGO.—*In life*: Wings iron blue, body dark greyish-purple.

Body length (both sexes) 5 mm. Wing 5.5-6 mm.

NYMPH.—Uniform dark brown. Mouthparts: labrum 1.8-2 times as wide as deep, notch shallow, upper hair fringe subparallel to lower and nearer anterior than posterior margin of labrum; inner canine of right mandible with only two prongs and prostheca



FIGS. 1-3.—(1) Penis lobe of *E. bugandensis* Kimmins.
(2-3) Fore and hind wings of *E. tropicalis* sp. n.

reduced. Legs: peg-like spines on upper surface of fore femur more or less continuous from median area to the apex, and distributed along both anterior and posterior margins, many of them being serrated; tibiae and tarsi generally well clothed with hairs; hind tarsus with eight to ten narrow spines on anterior margin.

Eggs.—Cream coloured, elongated, the chorion ornamented with a pattern of star-shaped bosses, each with seven to eight irregular raised ribs radiating from the centre.

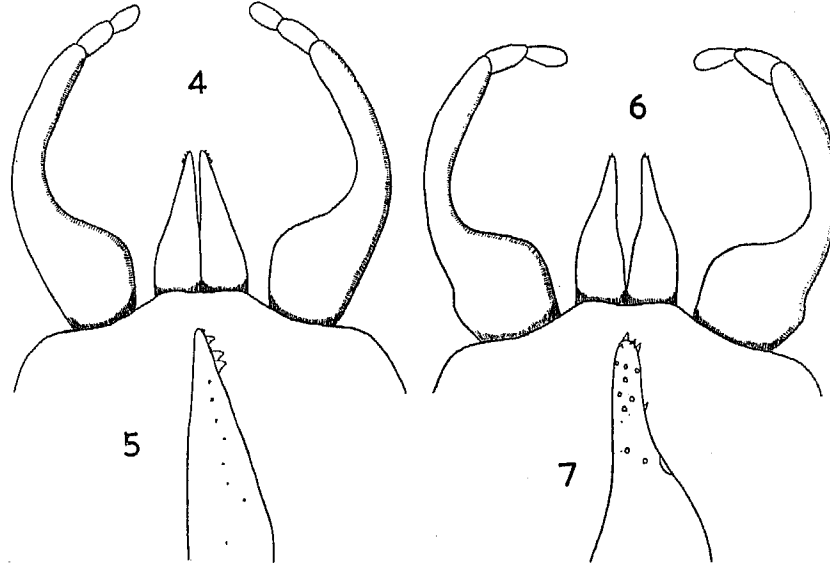
Holotype ♂, paratypes, TANGANYIKA: Mombo, Tanga Province (c. 1200 ft.), x. 54. Tengeni and Muheza, Tanga Province (c. 600 ft.). Nymphs, probably of this species, have been found in Zanzibar.

This species is noticeably darker than *usambarae* sp. n., and the genitalia are quite distinct. The nymph is readily distinguished by the distribution of the peg-like spines on the fore femora and by the relatively deeper labrum. From *bugandensis* it may be distinguished by its darker colour, smaller size and by the male genitalia. From *curtus* it may again be distinguished by the darker colour and the genitalia. From *elegans* it differs in the genitalia of the male and in the greater number of spines on all femora in the nymph.

Euthraulius usambarae sp. n. (Figs. 6-7, 10-11).

MALE IMAGO.—*In life*: A uniform dark brown insect; fore femur and tibia dark brown, tarsus white; mid and hind femora pale in basal one-third, dark brown in distal two-thirds, in which there is a pale interruption, tibiae and tarsi white. Tails brown with reddish annulations.

In fluid: Oculi chocolate-brown. General colouring as in life. Wings much as in preceding species. Basal segment of forceps with a prominent bulge on the outer margin near



FIGS. 4-7.—(4) Male genitalia and (5) detail of penis of *E. tropicalis* sp. n. (6) Male genitalia and (7) detail of penis of *E. usambarae* sp. n.

its base; penes tapering sharply at about three-fifths of the distance from base to apex, a few small spines present, mainly at extreme apex.

FEMALE IMAGO.—General colouring as in male.

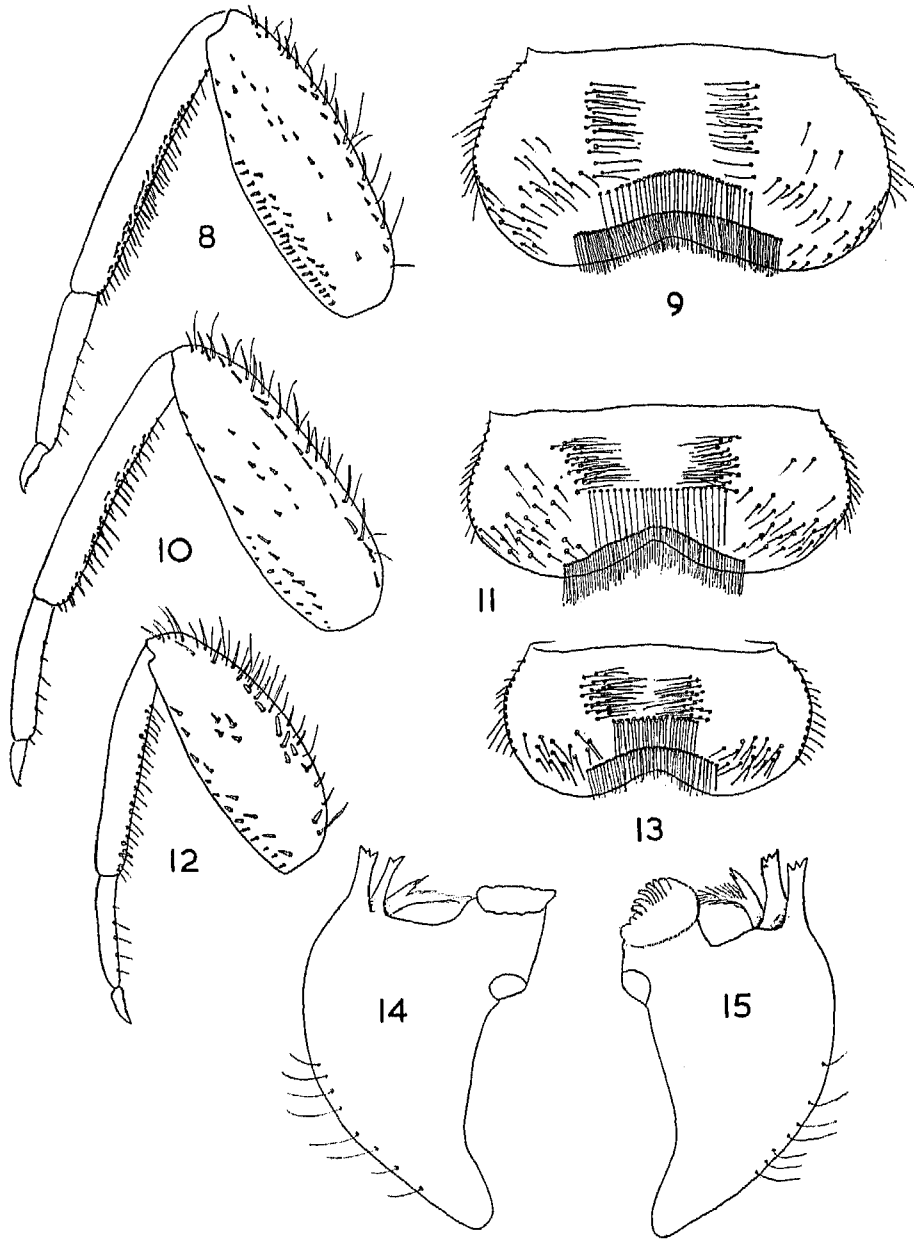
Body length (both sexes) 4-4.5 mm. Wing 4-4.5 mm.

NYMPH.—Uniform dark brown. Mouthparts: labrum 2.2-2.4 times as wide as deep, notch deeper than in *tropicalis*, posterior hair fringe more nearly straight and about equidistant between anterior and posterior margins of labrum; mandibles much as in *tropicalis*. Legs: peg-like spines on fore femur confined to a small median patch on the upper surface and along most of the length of the anterior margin; on the posterior margin they are mainly replaced by long, thinner spines. Hind tarsus with four to six spines on anterior margin.

Holotype ♂, TANGANYIKA: Mpandeni, 20.vi.55; paratypes, Sigi River and other streams draining the Eastern Usambara Mountains, Tanga Province, from Amani (alt. 3000 ft.) to near Muheza (c. 600 ft.).

This species is rather paler than *tropicalis* and there are marked differences in the genitalia. The nymph is readily distinguished by the reduced number of peg-like spines on the fore femur and by the shallower labrum. From *curtus* and *bugandensis* it differs in the genitalia and darker colouring. The penes are similar perhaps to those of *elegans* (Barnard's figure does not show the finer

details), but the swollen base of the proximal forceps segment, particularly on the outer side, and the elongate terminal segment should serve to distinguish it. The apparent absence of *usambarae* from the neighbouring South Pare



FIGS. 8-15.—(8) Fore leg of nymph, (9) labrum of *E. tropicalis* sp. n. (10) Fore leg of nymph, (11) labrum of *E. usambarae* sp. n. (12) Fore leg of nymph, (13) labrum, (14-15) right and left mandible of *Euthraulius* sp. A.

Mountains suggests that, like a number of plants and animals found in the Usambara Mountains, it has a very restricted distribution.

Euthraulus sp. A. (Figs. 12-15).

Nymphs of another species occur in the Sasseneh River at Kihurio, South Pare District. The labrum, mandibles and fore leg are figured here. This species shows a further reduction in the number of peg-like spines on the fore femur.

Euthraulus sp. B.

Adults and nymphs from the South Pare Mountains of Tanganyika and from the lower slopes of Kilimanjaro rather closely resemble the lowland species, *E. tropicalis*. But close examination of the genitalia has shown that they probably belong to a distinct species, the description of which must await further material.

Euthraulus appears to be the commonest Leptophlebiid to be found in small streams in East Africa, particularly at lower altitudes. It is far from being exclusively a torrential form. *E. tropicalis*, for instance, is normally found in sluggish streams, the temperature of which has been observed to reach at least 85° F. in the hot season, and which may become reduced to almost stagnant pools during part of the dry season. It is possible that this ability to survive temporarily low oxygen tensions may be responsible for the very clear cut differences in the distribution of *tropicalis* and *usambarae* in lowland streams at the foot of the Usambara mountains. *E. usambarae* occurs sparingly in permanent cooler streams, while *tropicalis* is often found in great abundance in streams the flow of which is more seasonal.

SUMMARY.

The Oriental genus *Thraulus* Ulmer is shown to be a synonym of *Euthraulus* Barnard, which has a wide distribution in Africa. Two new species are described from Tanganyika.

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