

NEW SPECIES OF EPHEMEROPTERA
FROM UGANDA

BY

D. E. KIMMINS

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NEW SPECIES OF EPHEMEROPTERA FROM UGANDA

By D. E. KIMMINS

SYNOPSIS

In this paper representatives of the families Heptageniidae (= Ecdyonuridae), Baëtidae, Leptophlebiidae, Tricorythidae, Caenidae and Ephemeridae are dealt with—in all twelve new species.

THIS paper is based mainly upon material sent for identification by Dr. P. S. Corbet, of the East African Fisheries Research Organisation's laboratories at Jinja, and by Mr. R. Hartland-Rowe, of Makerere College, Kampala. Much of Dr. Corbet's material was collected by light trap during experimental work on flight periods of Trichoptera.

The East African Fisheries Research Organisation (subsequently referred to by its initials, E.A.F.R.O.) and Mr. Hartland-Rowe have generously permitted me to retain for the British Museum (Nat. Hist.) much of this material, including types, for which I should like to express my sincere thanks. Where duplicate material permitted, a representative set has been returned to Jinja and to Mr. Hartland-Rowe.

Family HEPTAGENIIDAE.

Afronurus ugandanus sp. n.

(Fig. 1.)

UGANDA: Banks of Nile near Kakindu, 3,400 ft., 24-25.viii.1911, 1 ♂, (*S. A. Neave*). Jinja, 7.ix.1933, 1 ♀ subim., (*G. H. E. Hopkins*), 3.iii.1954, 2 ♀, 1 ♀ subim., (*R. Hartland-Rowe*), xii.1954, numerous ♂ ♀ at light, (*P. S. Corbet*); Ripon Falls, 4.iii.1954, 1 ♂, 1 ♀ (*R. Hartland-Rowe*). Entebbe, 8.iii.1954, 2 ♂, 3 ♀ (*R. Hartland-Rowe*). L. Victoria, Kagera Bay, 15.v.1954, 1 ♀ subim., (*N. E. Hickin*).

NYASALAND: Mt. Mlanje, 17.ii.1911, 1 ♂ (*S. A. Neave*).

Mr. Hartland-Rowe's material was preserved in 2% formaldehyde solution and Dr. Corbet's in 70% alcohol, the remainder pinned. The following description was made from the fluid material and the colours may be somewhat paler than in life.

♂. Head pale yellowish brown, eyes reddish brown. Thorax pale yellowish brown, dorsally with faint brownish markings and lightly marked with purplish brown near the coxae. Legs luteous, anterior femur brownish, other femora slightly brownish towards apices. Terminal segment of all tarsi pale fuscous. Wings hyaline, venation

pale yellowish brown. Abdomen yellowish, above pale brownish or reddish, segments II to VII with two short, curved, yellowish streaks, one on each side of the median dorsal line at the base, and the sides of each segment more or less yellowish. Cerci pale yellowish. Forceps and base luteous, the latter with its apical margin quadrately excised between the bases of the forceps, margin of excision sinuous, inner angles of the bases produced in rounded lobes. Forceps four-segmented, basal segment short, tapering, second long, cylindrical, third and fourth short, apex of fourth somewhat concave. Penis-lobes each bilobed, the inner lobes longer than the outer, curved

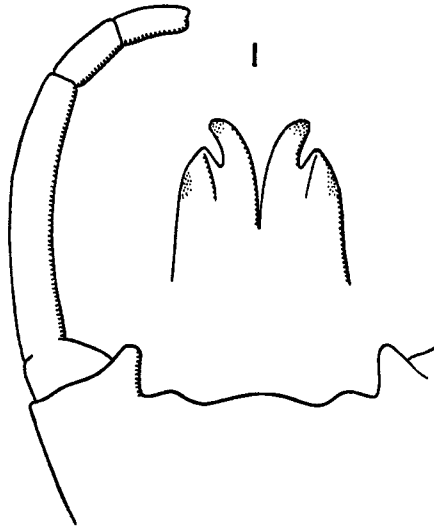


FIG. 1.—*Afromurus ugandanus* sp. n. ♂. Forceps-base, forceps and penis-lobes, the latter more enlarged.

upward and outward, outer broader and more triangular, separated from the inner by a narrow excision. Apex of inner lobe and lateral margin of outer each with a small, finely punctate area.

♀. Markings similar to male but paler. Subgenital plate with sides parallel for a short distance, then tapering to a truncate or slightly excised apex, the whole plate curving downward.

♀ subimago. Head yellowish brown, eyes blackish, a dark, purplish brown line along posterior margin of head between them. Thorax cream-coloured, with pale brown markings above, sides lightly marked with purplish red. Legs luteous, streaked with pale fuscous. Wings smoky fuscous, paler near anal angle, with cream venation, costal and subcostal areas of fore wing and bases of both wings cream. Abdomen dull yellowish with obscure reddish markings dorsally.

Length of fore wing ♂, 8-9 mm., ♀, 11-12 mm.

♂ type (Entebbe, 8.iii) in 2% formaldehyde solution, with apex of abdomen mounted as a microscope preparation; paratypes in Brit. Mus. (N.H.), E.A.F.R.O.

and Hartland-Rowe collections. This species differs from *A. peringueyi* (Esben-Petersen), as figured by Barnard, in the form of the penis-lobes, the outer lobes being relatively broader and having the finely punctate area on the outer (not inner) margin. The inner angle of the forceps-base is more strongly lobed.

Family BAËTIDAE

In this family I have adopted an interpretation of the segments of the forceps differing from that in current use. It appears to me that the so-called basal segment of the forceps in this family is more probably part of the forceps-base, almost completely divided into two parts, since it is filled with muscular tissue, a state which, according to Needham, does not occur in the true segments of the forceps. My interpretation of the forceps therefore credits them with one segment less than is normally recorded.

Centroptilum sudanense Ulmer

(Fig. 2.)

UGANDA: Jinja, 6.iii.1954, 2 ♂ (*R. Hartland-Rowe*).

The two specimens before me have been preserved in 2% formaldehyde solution. They are not in good condition and are considerably bleached. The male genitalia are unusual in form for *Centroptilum* and as they show considerable similarity to those figured by Ulmer for *sudanense*, these specimens have been referred to that species. Ulmer shows the forceps as obscurely divided into three segments. The present examples show no sign of such segmentation and it is possible that the divisions shown by Ulmer were the result of dessication. I am figuring a ventral view, for comparison with *C. notabile* sp. n.

Centroptilum notabile sp. n.

(Figs. 3-5.)

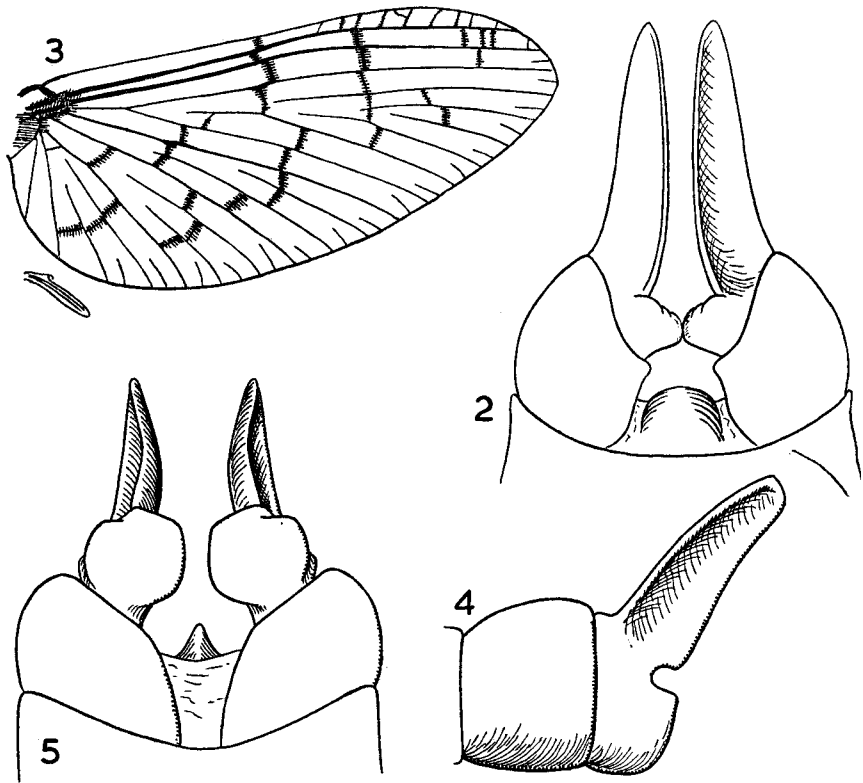
UGANDA: Jinja, 7.v.1954, 1 ♀ (*N. E. Hickin*); at light, ix-xii.1954, 2 ♂, numerous ♀, (*P. S. Corbet*).

♂ (in 70% alcohol). Head ivory-white, ocelli ringed with piceous. Turbinate eyes orange, lower eyes black. Antenna whitish. Prothorax whitish. Mesonotum pale fuscous, sutures darker, scutellum and post-scutellum ivory-white. Metanotum pale to medium fuscous. Sides of thorax whitish, episterna medium fuscous, mesepisternum with a round, blackish spot. Legs greyish or very pale fuscous, faintly marked with reddish at knees. Fore wing hyaline, longitudinal veins whitish, cross-veins fuscous and margined with the same colour. Base of wing tinged with fuscous and orange. About six costal cross-veins beyond the bulla. Hind wing typical of genus.

Abdomen translucent whitish, apices of tergites very faintly margined with pale reddish, tergites III and V each with a curved, purplish black line near apex, the ends curving forward like horns. Cerci lacking in type. Genitalia similar in pattern to *C. sudanense*. Forceps-base large, divided medianly to form two stout lobes with obliquely truncate apices. Between them can be seen a small, pointed plate. Forceps

stout, apparently single-segmented; in side-view directed obliquely upwards, base stout, globular, the lower margin with a small rounded excision. Terminal part of forceps spatulate, its outer surface concave.

♀. Pronotum with scattered purplish black markings. Meso- and metathorax paler than in ♂, mesepisternal spot conspicuous. Abdomen with the curved marking on tergite III with its centre produced forward to within one third from the base;



FIGS. 2-5.—(2) *Centroptilum sudanense* Ulmer, ♂ genitalia, lateral. (3-5) *C. notabile* sp. n. ♂. (3) Wings. (4) Forceps-base, forceps, left lateral. (5) The same, ventral.

a similarly shaped spot occurs on tergite VI and suggestions of such markings on tergites VII-VIII.

Length of fore wing ♂ ♀, 5 mm.

♂ type, ♀ allotype mounted as whole preparations in euparal; paratypes in Brit. Mus. (N.H.) and E.A.F.R.O. collection. This species is related to both *Centroptilum nitidum* Ulmer and *C. sudanense* Ulmer. The former, described from females from Belgian Congo, has the cross-veins of the fore wing shaded with brown, but the dorsal surface of the abdomen is much more extensively marked with reddish. *C. sudanense* has the fore wing cross-veins pale, and abdominal tergites more extensively marked.

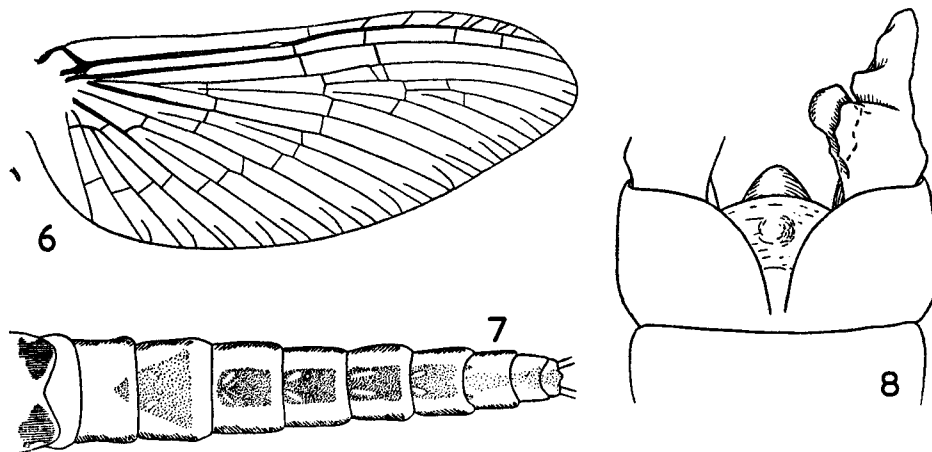
In side view, the forceps of *C. notabile* are less tapered, the ventral excision larger and the basal part more globular. The sclerotized plate between the bases of the forceps is more pointed.

***Centroptilum corbeti* sp. n.**

(Figs. 6-8.)

UGANDA: Jinja, xii. 1954, at light, 6 ♂, 8 ♀, (*P. S. Corbet*).

♂ (in 70% alcohol). Head creamy white, turbinate eyes large, not very tall, chocolate-brown, lower eyes grey. Thorax creamy white, lightly marked dorsally with a fuscous stripe on each side of the median suture, a patch of fuscous near the wing-base and with a reddish spot on each side in front of the wing-base. Metanotum more heavily shaded with fuscous. Legs with the femora whitish, the anterior heavily



FIGS. 6-8.—*Centroptilum corbeti* sp. n. ♂. (6) Wings. (7) Pattern of abdomen, dorsal. (8) Forceps-base and forceps, ventral.

shaded with reddish and with traces of reddish on the median and posterior femora. Tibiae and tarsi fuscous. Fore wing hyaline, with strong fuscous venation. No cross-veins before the bulla, 9-11 in the pterostigma. The subcosta and radius at base are suffused with reddish. Hind wing microscopic, narrow, about 0.25 mm. in length.

Abdomen whitish, lateral margins of segments II-VIII narrowly bordered with fuscous. There is a median, reddish, dorsal stripe on segments II-X, interrupted at the joints of the abdomen and including a pair of small whitish spots near the bases of segments III-VII. Abdomen whitish beneath, cerci fuscous. Forceps-base and forceps whitish. Forceps-base from beneath divided almost to its base to form two broad lobes, apical margins somewhat oblique. Forceps apparently one-segmented, twice as long as lobe of forceps-base, three-branched, the basal (lowest) branch short

and blunt, the second arising just above the first on the inner margin, curving upward, the third or terminal branch digitate, with a rounded projection on the inner margin near its base. The inner surface of the forceps is rather rugose. Between the bases of the forceps, and at a higher level, can be seen a parabolic lobe.

♀ (in 70% alcohol). Resembling the male but the thorax has rather more extensive fuscous markings dorsally, legs and venation a little paler.

Length of fore wing ♂, 10 mm., ♀, 11.5 mm.

♂ type, ♀ allotype (in 2% formaldehyde solution); paratypes in Brit. Mus. (N.H.) and in E.A.F.R.O. collection. This striking insect, with its fuscous tibiae, tarsi and cerci contrasting strongly with the cream ground-colour of the body, should be easily recognizable. In the field it is possible that the ground colour may be some fugitive colour, such as green, which is removed by preservation in alcohol. In the venation of the fore wing it approaches *C. pulchrum* Crass (*nec* Eaton), in which species the hind wing is said to be completely suppressed in both sexes. In the present species the hind wing, although present, is microscopic (0.25 mm.) and apparently without costal process. The robust, apparently single-segmented forceps separate it from any other African *Centroptilum* species known to me except *C. sudanense* Ulmer and *C. notabile* sp. n., and in these species the hind wing is typical of the genus. In the fore wing of *C. corbeti* the intercalary veins extend even further basally than in *C. pulchrum* Crass.

Cloëon dentatum sp. n.

(Fig. 9.)

UGANDA: Jinja, at light, ix-x. 1954 3 ♂, 1 ♂ subimago, (*P. S. Corbet*).

♂ (in alcohol). Head fuscous, turbinate eyes chocolate-brown, lower eyes grey-black. Pronotum reddish, meso- and metanota shining dark fuscous, tinged in places with reddish. Legs very pale ochraceous, median and posterior femora each with a faint reddish ring before the apex. Wings hyaline-iridescent, venation light fuscous, about five oblique cross-veins in pterostigma. Abdomen with segments I-VII translucent whitish; tergite I reddish at base and apex, tergites II-VII each with a pale fuscous or reddish, transverse, pre-apical line, a greyish, median, basal spot and traces of two fine, parallel, median, reddish lines, tergite IV also with a small reddish spot towards each lateral margin. Tergites VIII-IX bright reddish fuscous, X fuscous. Sternites whitish, I-VI each with a small greyish spot at the centre of the apical margin, sternite IX and forceps pale fuscous. Cerci broken in type series.

Forceps-base with its lateral angles stout, cylindrical, apices rather oblique and with their inner apical angles produced in a strong, rounded projection or tooth, the apical margin between them rounded. Basal segment of forceps indistinctly separated from second, short and narrow. Second segment long, its inner basal angle dilated to form a strong tooth, beyond which the segment is abruptly narrowed and then slightly dilated to its apex. Terminal segment short, dilating to an obliquely truncated apex. Above the forceps-base can be seen an arched, sclerotized plate.

♂ Subimago (in alcohol). Head creamy white, turbinate eyes dark greyish lavender, ocelli ringed with black. Pronotum light ochraceous, tinged with reddish. Mesonotum light fuscous, sutures whitish and dark fuscous. Legs light ochraceous, median and posterior femora tinged with reddish as in imago. Cerci white.

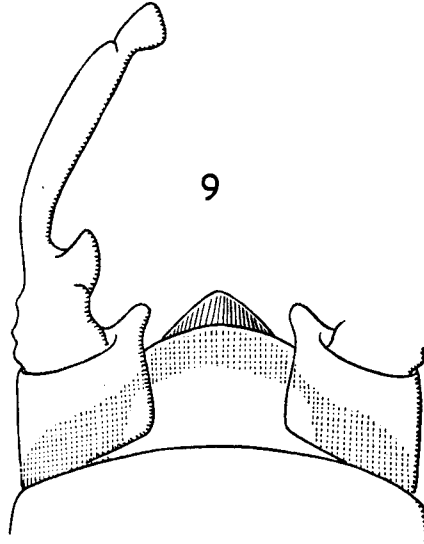


FIG. 9.—*Cloëon dentatum* sp. n. ♂. Forceps-base and forceps, ventral.

Length of fore wing 4 mm.

♂ type mounted whole in euparal as a microscope preparation. The unusual form of the forceps should render the recognition of this species easy in the male sex. I do not know of any African species of *Cloëon* with which to compare it.

Family LEPTOPHLEBIIDAE

Adenophlebiodes decoratus sp. n.

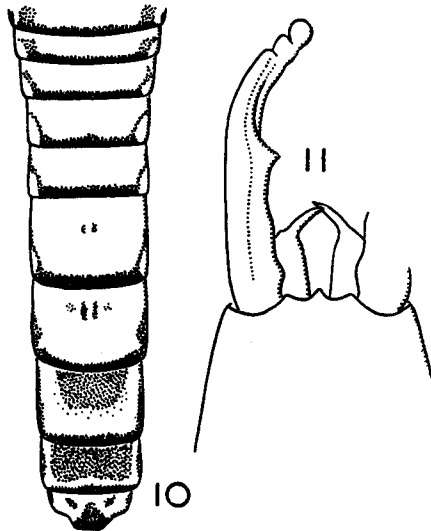
(Figs. 10, 11.)

UGANDA: Jinja, 6.iii.1954, 1 ♂, (*R. Hartland-Rowe*); xii.1954, numerous ♂ ♀ at light, (*P. S. Corbet*). Jinja, Ripon Falls, 6.iii, 21.ix.1954, (*P. S. Corbet*). Kaazi, 16.ii, 12.viii.1954, 2 ♀, 1 ♀ subimagines, (*R. Hartland-Rowe*).

♂ (in 2% formaldehyde solution). Head fuscous, eyes chocolate-brown. Pronotum fuscous, with a purplish tinge. Meso- and metanota very pale fuscous, tinged with purplish. Legs whitish, femora banded with purplish brown at about midway and apex, fore tibia faintly purplish towards apex. Wings hyaline, venation very pale fuscous, the base of the subcosta and the humeral cross-vein in the fore wing purplish. The basal half of the fore wing is very faintly suffused with pale fuscous.

Abdomen translucent whitish, dorsal segments I–VII with apical margins marked with purplish black, which extends as a paler, oblique streak to the spiracles. VIII–IX with more extensive purplish black colouration, deepest at apical margins, the white ground colour only appearing as a longitudinal streak near each lateral margin and a subapical median spot. X whitish, with the apex, a median streak and two basal spots purplish. Ventral surface of abdomen whitish. Cerci white, banded with purplish black. Genitalia white.

♂ subimago (in 2% formaldehyde solution). Markings similar to ♂ imago, those of the legs more defined. Abdominal markings rather less extensive. Cerci conspicuously annulated with purplish black. Wings translucent whitish, without indications of a brownish basal tinge.



FIGS. 10, 11.—*Adenophlebiodes decoratus* sp. n. ♂. (10) Pattern of abdomen, dorsal. (11) Forceps-base, forceps and penis-lobes, ventral.

♀ subimago (in 2% formaldehyde solution). Head whitish, marked with purplish. Pronotum purplish, with whitish markings. Meso- and metanota pale fuscous, with obscure purplish markings. Legs marked as in male. Abdomen with purplish red markings, more extensive but less intense than in male.

Length of fore wing, ♂ ♀, 9 mm.

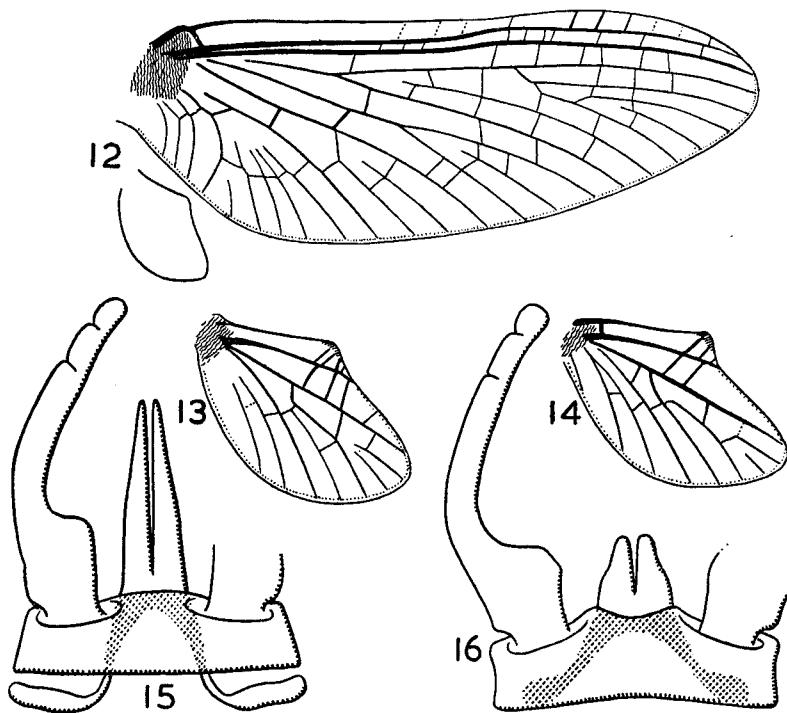
♂ type (Jinja, 6.iii) in 2% formaldehyde; paratypes in Brit. Mus. (N.H.), E.A.F.R.O., and Hartland-Rowe collections. In venation and form of male genitalia, this species agrees well with the characters of *Adenophlebiodes*. It differs from *A. ornata* Ulmer and *A. bicolor* (Crass) in the almost colourless basal half of the fore wing and the colourless hind wing. From *A. delamarei* (Verrier), it differs in the absence of any definite pattern in the basal part of the fore wing, and in the presence of purplish markings on the femora, which are neither figured nor mentioned in Verrier's description.

Euthraulius bugandensis sp. n.

(Figs. 12, 13, 15.)

UGANDA: Entebbe, 8.iii.1954, 3 ♂, 4 ♀ imagines, 1 ♀ subimago (R. *Harland-Rowe*).

♂ (in 2% formaldehyde solution). Head brownish, turbinate eyes dull orange, lower eyes grey. Pronotum brownish, meso- and metanota dark brown. Femora pale fuscous, darker at apices, tibiae and tarsi ochraceous, the former fuscous at



FIGS. 12-16.—*Euthraulius* spp. n. ♂. (12) *E. bugandensis*, wings. (13) Hind wing, more enlarged. (14) *E. curtus*, hind wing. (15, 16) Forceps-base, forceps and penes-lobes, ventral. (15) *E. bugandensis*. (16) *E. curtus*.

base. Wings hyaline, C, Sc, and R in fore wing yellowish brown, remaining veins pale or colourless. Abdomen above mainly fuscous, segments I-IX with a narrow, apical, pale band, II-VIII with a fine, median, longitudinal, pale line; on each side of it, at the base, is a faint, pale, triangular spot, and there is also an ovate, pale spot near each dark fuscous lateral margin. Sternites I-VIII very pale fuscous, IX dark fuscous with a cream, semi-elliptical patch apically, not quite reaching the base of the sternite. Forceps-base pale fuscous, its apical and basal margins darker. Forceps pale cream, the extreme base narrowly fuscous. The basal segment is more abruptly

constricted than in *E. elegans* Barnard, the margins at the base parallel-sided, the part beyond the constriction more slender and the second segment is nearly twice as long as the terminal segment. Penis-lobes long, divided almost to the base, more slender than in *E. elegans*. Cerci cream.

♀ (in 2% formaldehyde solution). Head ochraceous, between the ocelli (which are ringed with piceous) fuscous. Eyes black. Pronotum pale fuscous, with traces of two longitudinal bands and the lateral margins darker. Meso- and metanota brownish. Legs as in ♂. Wings with venation paler. Abdomen above brownish, with obscure paler markings, ventrally pale fuscous with a pair of small, fuscous spots on each sternite. Seventh segment rather darker, ninth forming a parabolic plate with a small, obtuse-angled excision at its apex. Cerci pale ochraceous.

♀ subimago similar in markings to imago.

Length of fore wing ♂ 7 mm., ♀ 8 mm.

♂ type, ♀ allotype in 2% formaldehyde solution; paratypes in Brit. Mus. (N.H.) and Hartland-Rowe collection. The differences between this species and *E. elegans* Barnard have been detailed in the foregoing description of the male. In addition it is noticeably more robust.

Euthraulius curtus sp. n.

(Figs. 14, 16.)

UGANDA: Kazi, 8.iii.1954, 2 ♂, 2 ♀ imagines, (*R. Hartland-Rowe*). Jinja, 3-6.iii.1954, 1 ♂, 2 ♀ imagines, 5 ♂, 4 ♀ subimagines, (*R. Hartland-Rowe*). Jinja, at light, ix-x.1954, numerous subimagines, (*P. S. Corbet*).

♂ (in 2% formaldehyde solution). Head light fuscous, darker around the ocelli. Turbinate eyes pale orange (possibly somewhat bleached), lower eyes dark grey. Thorax shining dark brown, lateral margins of meso- and metathorax creamy white. Legs pale luteous, femora marked with fuscous at base and apex, and with an indistinct, subapical ring. Tibiae fuscous at extreme base. Wings hyaline, in fore wing with C, Sc and R pale fuscous, remaining veins pale. Venation much as in *E. bugandensis*. Abdomen above dirty whitish, with a fine stippling of purplish grey, which becomes denser towards the apex of each segment. There is a pale, mid-dorsal line and the lateral margins are darker brown. The pale dorsal line fades out on segments IX and X. Sternites I-VIII white, apical angles purple-grey, IX white with dark brown lateral bands, somewhat wider at base. Cerci whitish. Forceps-base whitish, finely bordered with fuscous, its apical margin excised. Forceps whitish, basal segment stout at base in ventral view, the lateral margins somewhat divergent until the constriction, thence parallel-sided. Second segment about twice as long as terminal segment. Penis-lobes short and stout, only about half as long as basal segment of forceps, divided almost to base.

♀ (in 2% formaldehyde solution). Head medium fuscous, ocelli ringed with dark brown, eyes piceous. Pronotum fuscous, with a dark ochraceous, median stripe. Meso- and metanota dark brown, paler at sides. Legs ochraceous, with fuscous markings as in male or at times stronger. Wings hyaline, C, Sc and R yellowish brown, remainder almost colourless. Abdomen yellowish brown above, with traces

of a pale mid-dorsal line similar to that of male. Ventrally yellowish (? due to enclosed eggs), sternite IX produced in a variable triangular plate with a truncate or excised apex.

♂♀ subimagines similar in markings to imagines, the abdominal tergites sometimes with a pair of pale basal triangles, one each side of dorsal line.

Length of fore wing, ♂ 6.5 mm., ♀ 7 mm.

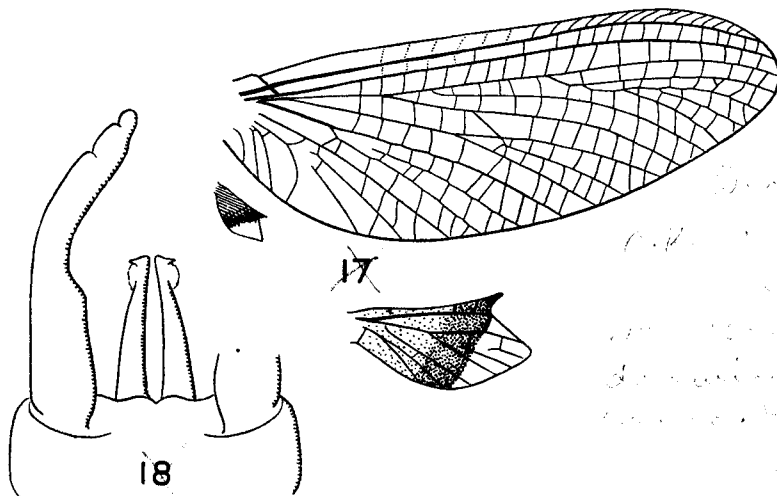
♂ type (mounted in euparal as microscope preparations), ♀ allotype (in 2% formaldehyde solution), both from Kazi, 8.iii.1954; paratypes in Brit. Mus. (N.H.), E.A.F.R.O. and Hartland-Rowe collections. This species differs from both *E. elegans* and *E. bugandensis* in the much shorter and blunter penis-lobes in the male, which are barely half as long as the basal segment of the forceps. It resembles *E. bugandensis* in the slender forceps, but the basal part is less parallel-sided and the apical margin of the forceps-base is excised at its centre.

***Hagenulus fasciatus* sp. n.**

(Figs. 17-18.)

UGANDA: Kaazi, 12.viii.1954, 1 ♂, (*R. Hartland-Rowe*). Jinja, at light, ix-x.1954, 2 ♂, (*P. S. Corbet*).

♂ (in 2% formaldehyde solution). Turbinate eyes light chocolate-brown, lower eyes purplish brown. Thorax shining brown above (in the type somewhat obscured



FIGS. 17, 18.—*Hagenulus fasciatus* sp. n. ♂. (17) Wings, with hind wing more enlarged. (18) Forceps-base, forceps and penis-lobes, ventral.

by an adventitious white deposit), dull ochraceous and brownish at the sides. Anterior femur ginger-brown, tibia with basal two-thirds fuscous, apex and tarsus white. Median and posterior legs with femora ochraceous, with a broad median ring of light ginger-brown, apices fuscous; tibiae fuscous on basal third, remainder and

tarsi whitish. Fore wing hyaline, slightly fuscous basally, venation pale fuscous (fig. 17). Hind wing hyaline, with a narrow, transverse, fuscous band at the level of the costal projection; basad of this transverse band the membrane is very pale fuscous and the apex, beyond the band, colourless. Costal projection acute, prominent.

Abdomen above shining brown, tergite I with an ochraceous patch on each side, tergite IX with an inverted, L-shaped, ochraceous patch laterally. Sternites pale fuscous, I, VIII and IX mainly ochraceous. Cerci fuscous basally, shading to whitish with narrow, fuscous annulations. Forceps pale fuscous, whitish apically. Forceps-base with a sinuous apical margin, its centre with a small median excision. Basal segment of forceps (fig. 18) long, moderately broad, the inner margin becoming closer to the outer about midway, where the forceps is curved inwards. Second and third segments small, third about half as large as second. Penis-lobes long, slender, sub-parallel and tapering. The outer margin is dilated immediately before the apex, which carries a small, out-turned beak.

Length of fore wing 7.5 mm.

♂ type (Kaazi) in 2% formaldehyde solution (one pair of wings dry and genitalia mounted in euparal on microscope slides); one paratype in Brit. Mus. (N.H.), one paratype in E.A.F.R.O. collection, Jinja. This species differs from *H. scotti* Ulmer in its larger size, denser venation and in the striking, pigmented pattern of the hind wing. It also resembles in venation *Habrophlebiodes semicastanea* Gillies, but in this Indian species the hind wing is unpigmented.

Family TRICORYTHIDAE

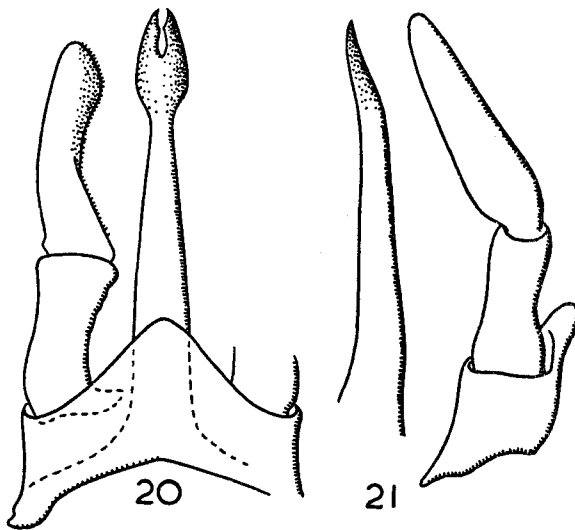
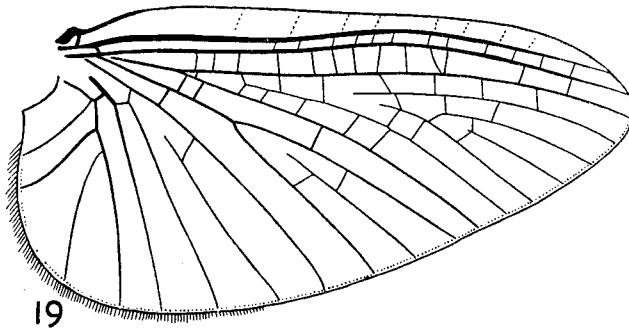
Tricorythus tinctus sp. n.

(Figs. 19-21.)

UGANDA: Owen Falls Dam, at light, collected dead, 24.iv.1954, 30 ♂, 15 ♀ (*P. S. Corbet*). Jinja, Ripon Falls, 25.viii.1954, 1 ♂, 2 ♀ (*R. Harland-Rowe*). Jinja, at light, xii.1954, 3 ♂, 5 ♀, (*P. S. Corbet*).

♂. Head and eyes pitchy black, with a pair of small white spots on the vertex between the ocelli. Antenna with basal segment whitish, inner surface shaded with piceous, remainder of antenna translucent whitish. Pronotum piceous, with scattered whitish markings, the centre and lateral markings suffused with reddish purple. Meso- and metathorax pale ochraceous, mesonotum very finely stippled with piceous, sutures piceous, the triangular posterior part slightly tinged with purplish. Metanotum with a transverse, piceous band. Femora blackish, banded midway and at apices with white. Tibiae blackish, with white apices, tarsi greyish, white at apices. Wings hyaline, costal and subcostal areas grey, veins yellowish and narrowly margined with yellowish, giving the wings a yellowish tinge. Abdominal segments I-VIII transparent, tergites shaded with blackish apically, I-VI tinged with reddish purple except at the base, IX-X blackish. Cerci transparent whitish. Forceps-base whitish, its apical margin produced in a triangle. Forceps colourless, semi-transparent and long, terminal segment about one and one half times as long as, and about as broad

as the basal, not or scarcely tapering, slightly incurved from beneath. Basal segment a little constricted about midway. Penis long and slender, colourless and semi-transparent except at its apex, which is ochraceous. From the side it tapers gradually to an acute apex, from beneath the apex is narrowly spoon-shaped, with a median excision.



FIGS. 19-21.—*Tricorythus tinctus* sp. n. ♂. (19) Wings. (20) Forceps-base, forceps and penis-lobes, ventral. (21) The same, left lateral.

♀. Considerably more robust than male. Head almost entirely black above. Pronotum blackish, suffused with reddish purple as in male. Meso- and metanota light fuscous, sutures paler or bordered with dark fuscous. Legs marked as in male. Wings greyish hyaline, fringed, venation grey. Abdomen ochraceous in gravid females, greyish hyaline after oviposition, tergites shaded with greyish (darkest at apical margin) and tinged with reddish purple. Tergite X entirely grey. Sternites

each with a pair of widely-separated, divergent, grey lines, VII mainly fuscous, IX produced in an elliptical subgenital plate. Cerci short, white, fringed.

Length of fore wing, ♂ 6 mm., ♀ 9.5 mm.

♂ type, ♀ allotype in 2% formaldehyde solution (Owen Falls Dam); paratypes in Brit. Mus. (N.H.), E.A.F.R.O. and Hartland-Rowe collections. This species is closely related to *T. longus* Ulmer from the Congo and Sudan. Its coloration is much darker, the males distinctive with their yellowish tinged wings contrasting with the grey anterior edge. The male genitalia are also similar, but differ in the less tapered terminal segment of the forceps, the stouter basal segment and the more suddenly dilated apex of the penis in ventral view and in the more finely tapered, acute apex of the penis in side view.

Family CAENIDAE

Caenodes jinjana sp. n.

(Figs. 22, 23.)

UGANDA: Jinja, ix-x. 1954, 14 ♂, 56 ♀, (*P. S. Corbet*).

♂ (in 70% alcohol). Head pale cream, shaded with greyish, eyes black, ocelli ringed with black basally. Antennae whitish, terminal filament greyish. Pronotum pale, with indefinite greyish markings. Mesonotum pale ochraceous, sutures pale fuscous. Metanotum pale ochraceous. Anterior legs grey, with darker markings, other legs white. Wings hyaline, anterior margin shaded with grey, costa, subcosta and radius grey, other veins pale. Abdomen translucent whitish, tergites VIII-X lightly shaded with grey, VIII-IX also with a fine blackish lateral line on each side. Cerci transparent, whitish. Forceps white or very pale grey, penis white. Forceps-base roundly produced at its apex between the forceps, which are moderately slender, slightly wider at base and apex, the latter terminating in an acute, inwardly-directed spine. Penis-lobes broad at base, somewhat narrower and parallel-sided from a little before midway to apex, which is widely and deeply excised.

♀. Colouration and markings similar to male.

Length of fore wing ♂ 1.9 mm., ♀ 2.2 mm.

♂ type mounted in euparal as a microscope preparation, ♀ allotype in 2% formaldehyde solution; paratypes in Brit. Mus. (N.H.) and E.A.F.R.O. collection. This species differs from *Caenodes ulmeri* Kimmins in its generally paler colouring, the more slender forceps, rounded forceps-base and less constricted, more deeply excised penis-lobes.

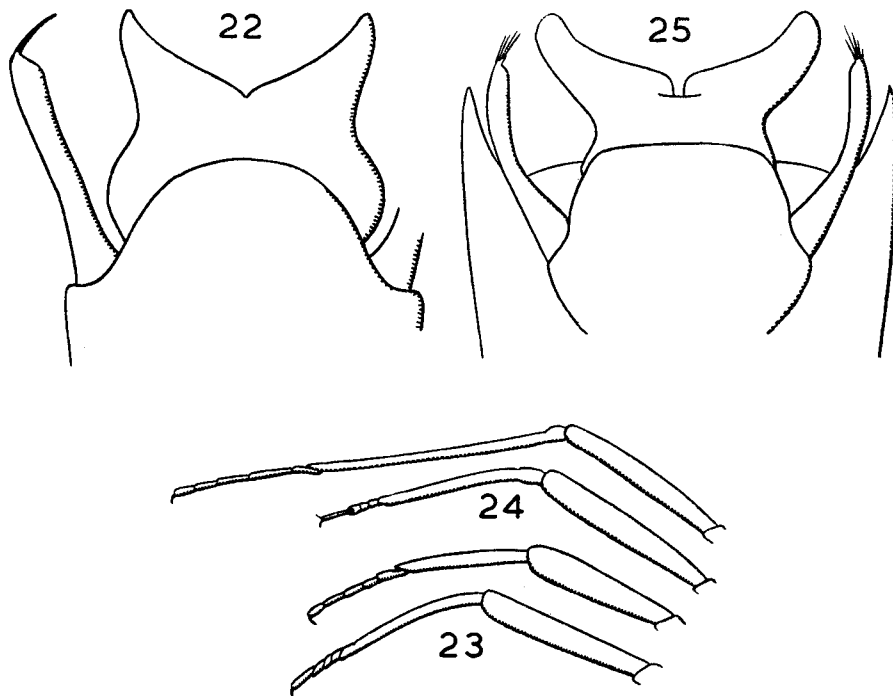
Caenis brevipes sp. n.

(Figs. 24, 25.)

UGANDA: Jinja, at light, xii. 1954, 6 ♂, 1 ♀, (*P. S. Corbet*).

♂ (in 70% alcohol). Head fuscous above, with whitish sutures and fine dots, back of head whitish. Ocelli white, eyes purplish black. Antenna white, joints and terminal style lightly fuscous. Pronotum dark grey with whitish markings. Meso- and metathorax creamy white, faintly shaded with pale grey. Legs whitish, anterior

femur streaked with fuscous, strongly so along upper margin. Fore leg rather shorter than is normal in *Caenis* but longer than in *Caenodes*, fore tibia about as long as hind tibia and tarsus combined (fig. 24). Wing hyaline, anterior margin (costal, subcostal and radial areas) purplish grey. Abdomen whitish, all tergites shaded with grey, leaving only a narrow band at base and apex and a narrow, median stripe whitish. Lateral margins of tergites II–VI also whitish, III–VI with a more definite



FIGS. 22–25.—*Caenodes* and *Caenis*. (22) *Caenodes jinjana* sp. n., ♂ forceps-base, forceps and penis-lobes, ventral. (23) *C. jinjana*, ♂ fore and hind legs. (24) *Caenis brevipes* sp. n. ♂ fore and hind legs. (25) *C. brevipes*, forceps-base, forceps and penis-lobes, ventral.

black speck towards basal angles. Ventrally whitish, lateral margins of sternites II–IX marked with blackish, VIII–IX with faint blackish markings basally. Forceps pale fuscous, cerci white. Forceps-base produced trapezoidally, apical margin obscure. Forceps a little incurved, slightly constricted midway, apex contracted, acute and fringed with short bristles. Penis-lobes wide-spreading, apical margin shallowly excised, with a small median notch.

♀. Larger than male, more strongly marked, thorax pale yellowish fuscous.

Length of fore wing ♂, 2.3 mm., ♀, 2.9 mm.

♂ type, ♀ allotype mounted whole as microscope preparations in euparal; paratypes in E.A.F.R.O. collection, Jinja and Brit. Mus. (N.H.). This species appears to

be related to a new species of *Caenis* from Nyasaland, (in press), but the penis-lobes are even more widely divergent, the forceps constricted midway and the fore leg of the ♂ relatively shorter. This reduction in the fore leg at first raised doubts as to whether *Caenodes* was truly distinct from *Caenis*. The fore leg of the present species is certainly intermediate between typical *Caenis* and *Caenodes*, but I consider it to be a somewhat abnormal *Caenis*. I am still in favour of retaining *Caenodes* as a separate genus, distinguished by having the ♂ fore leg scarcely longer than the hind leg. In *Caenis* the ♂ fore tibia should be at least as long as the hind tibia and tarsus combined. Should further species be discovered showing still more intergrading, it will, of course, be necessary to revise these views. In the figures given here of the legs of the two genera, the magnification of *Caenodes* has been so adjusted that the length of the hind femur in both genera is the same, thus facilitating comparison of the relative lengths.

Family EPHEMERIDAE

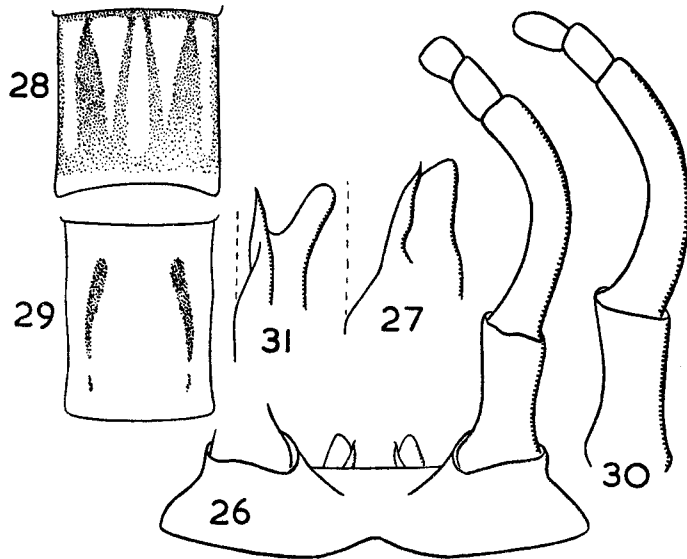
Ephemera aequatorialis sp. n.

(Figs. 26-31.)

UGANDA: Kaazi, 13.viii.1954, 2 ♂ imagines, 1 ♀ subimago, (*R. Hartland-Rowe*). Jinja, xii.1954, 6 ♂, 2 ♀, (*P. S. Corbet*); L. Victoria, Kagera Bay 12.v.1954, numerous subimagines (*N. E. Hickin*).

SIERRA LEONE: Njala, 7.ii.1933, 1 ♂, (*E. Hargreaves*).

♂ (in 70% alcohol). Head ivory-white in front, pale fuscous above, bases of lateral



FIGS. 26-31.—*Ephemera* spp. ♂. (26) *E. aequatorialis* sp. n., forceps-base, forceps and penis-lobes, ventral. (27) Right penis-lobe, more enlarged. (28) Pattern of seventh tergite. (29) Pattern of seventh sternite. (30) *E. natalensis* Barnard, right forceps, ventral. (31) Right penis-lobe, ventral.

ocelli dark fuscous. Antenna with basal segments ivory-white, terminal style fuscous. Eyes purplish black. Prothorax pale fuscous above, lateral margins whitish, meso- and metanota pale shining fuscous, sutures cream and white, lateral margins whitish. Anterior femur white, tinged with fuscous apically, tibia and tarsus fuscous. Median and hind legs very pale fulvous. Wings hyaline, membrane slightly smoky brown, venation fuscous and margined with the same tint. In the fore wing the subcostal area is clouded with fuscous and in the hind wing the posterior margin is shaded with fuscous.

Abdomen ivory-white, tergites II-IX marked as follows: a narrow, transverse, basal band, not reaching the lateral borders, from which arises a pair of narrow longitudinal stripes separated by a median pale line, and from the outer ends of the basal band another longitudinal stripe, at first narrow but dilating and linking up with the median stripe before the apex of the segment. These markings are reddish black and the lateral margins are pale fuscous. Tergites I and X pale fuscous, the latter with a darker median stripe. Sternites III-IX each with a pair of well-separated blackish streaks. Forceps and base pale fuscous, cerci fuscous. Forceps-base wide, moderately produced on each side. Basal segment of forceps cylindrical, about half as long as the curved second segment. Third and fourth segments short. Penis-lobes stout, with ovate apices, and with appressed spiniform titillators.

♀. Dorsal abdominal markings more extensive than in male, but lateral markings almost obsolete. Wings hyaline, costa, subcosta, radius, costal and subcostal cross-veins fuscous, subcostal area fuscous, venation otherwise whitish. Cerci pale fuscous.

Length of fore wing, ♂ 12 mm., ♀ 13 mm.

♂ type, ♀ allotype (Jinja, xii. 1954), preserved in 2% formaldehyde solution; paratypes in Brit. Mus. (N.H.), E.A.F.R.O. collection and in Hartland-Rowe collection. This species may be separated from *E. natalensis* Barnard by the two pairs of reddish black markings on the tergites, the single pair on the sternites, the relatively shorter basal segment of the forceps and the stouter, less divergent lobes of the penis. *E. natalensis*, which is abundant in Lake Nyasa, also occurs in Lake Victoria. There are in the Brit. Mus. (N.H.) two males from Entebbe, 11-12. viii. 1911, (*C. C. Gowdey*), the specimens referred to as *Ephemera* sp. by Eaton in 1913.