

21. *Additional Records, and Descriptions of New Species, of South African Alder-flies (Megalopectera), May-flies (Ephemeroptera), Caddis-flies (Trichoptera), Stone-flies (Perlaria), and Dragon-flies (Odonata).*—By K. H. BARNARD, D.Sc., F.L.S., Assistant Director.

(With 19 Text-figures.)

THIS is the eleventh report on the Fauna of the Mountain Ranges of the Cape Province, for the investigation of which I have received grants from the Royal Society of South Africa and the Research Grant Board.* My thanks and acknowledgments are herewith tendered to these bodies. I have also to thank Dr. Hewitt, Director of the Albany Museum, and Dr. Lawrence, Director of the Natal Museum, for submitting material; and to Mr. H. G. Wood (H. G. W.) and Mr. C. W. Thorne (C. W. T.) for their help and co-operation in the field-work.

MEGALOPTERA.

With the exception of a *n. sp.* of *Platychauliodes*, and some additional localities for the other species, no great advance has been made in our knowledge of the Cape Alder-flies since my 1931 paper (Trans. Roy. Soc. S. Afr., vol. xix, 2, 1931). A ♂ and ♀ *Leptosiaxis africana* have been collected, and their genitalia are described; but the larva still remains undiscovered. No larvae or pupae of the *Taeniochauliodes* type have been found which might be assigned to the genus *Platychauliodes*.

The discovery of the common Cape genus, *Taeniochauliodes*, in the Drakensberg in Natal, not only greatly increases the known distribution of the genus, but indicates that the mountain streams in Natal have an Alder-fly fauna hitherto unsuspected.

* Previous reports: 1. "Freshwater Crustacea," Trans. Roy. Soc. S. Afr., vol. xiv, 1927. 2. "Colophon (Coleoptera)," *ibid.*, vol. xviii, 1929. 3. "Alder-flies," *ibid.*, vol. xix, 1931. 4. "May-flies," *ibid.*, vol. xx, 1932. 5. "Terrestrial Isopoda (Woodlice)," Ann. S. Afr. Mus., vol. xxx, 1932. 6. "Further New Species of Colophon," Stylops, vol. i, pt. 8, 1932. 7. "A new Corduline Dragonfly," *ibid.*, vol. ii, pt. 7, 1933. 8. "Caddis-flies," Trans. Roy. Soc. S. Afr., vol. xxi, 1934. 9. "Stone-flies," Ann. S. Afr. Mus., vol. xxx, 1934. 10. "Dragon-flies," *ibid.*, vol. xxxii, 1937.

Chloroniella peringueyi E. P.

1931. Barnard, *loc. cit.*, p. 171.

Localities.—French Hoek Pass (head-waters of River Zonder End) (13th December 1932, K. H. B. and H. G. W., 1 ♂); same locality (October 1933, H. G. W., larva); Oudebosch, River Zonder End Mts. (September 1933, H. G. W., larva); Gt. Winterhoek Mts., Tulbagh (November 1932, K. H. B. and H. G. W., larva); Kaaiman's River, near George (January 1936, H. G. W., 1 ♀).

The French Hoek ♂ has fewer costal cross-veins in the fore-wing, viz. 23; the 5th cross-vein is at the point of origin of Rs, and the 9th at the first cross-vein R-Rs.

The ♀ genitalia resemble those of *Taeniochauliodes*, but, owing to the abdomen of the single specimen not being in good condition, the presence of mobile apical papillae on the lower appendages could not be determined with certainty.

Platychauliodes capensis Brnrd.

(Fig. 1, a, b.)

1931. Barnard, *loc. cit.*, p. 175.

Localities.—Bosch Kloof, Keeromberg, Worcester (January 1933, H. G. W., 1 ♂); Jonkershoek, Stellenbosch (26th February 1931, H. G. W., 2 ♂♂; 4th April 1931, H. G. W., 1 ovig. ♀; 14th February 1933, K. H. B. and H. G. W., 1 ♂, 1 ♀).

Genitalia ♀.—A figure is given which applies to all three species of this genus. The genital plate on the 8th segment is ovate and strongly chitinated, with an apical membranous projection. The subanal plate (lower appendages) is divided into two halves, separated by a groove with membranous lining; the apical lobes have no mobile papillae, such as are found in *Taeniochauliodes* and *Leptosialis* (*v. infra*).

Platychauliodes woodi Brnrd.

(Fig. 1, c.)

1931. Barnard, *loc. cit.*, p. 177.

Localities.—Palmiet River (December 1932, H. G. W., 2 ♂♂); Oudebosch, River Zonder End Mts. (January 1933, H. G. W., 1 ♂, 1 ♀; and January 1934, 1 ♂); Meiring's Poort, Zwartberg Range (January 1935, H. G. W., 1 ♂); Kaaiman's River, near George (January 1936, H. G. W., 3 ♂♂).

Genitalia ♂.—An additional figure is given here to show the subanal lobe (or penis), the apex of which is subpentagonal and shield-like.

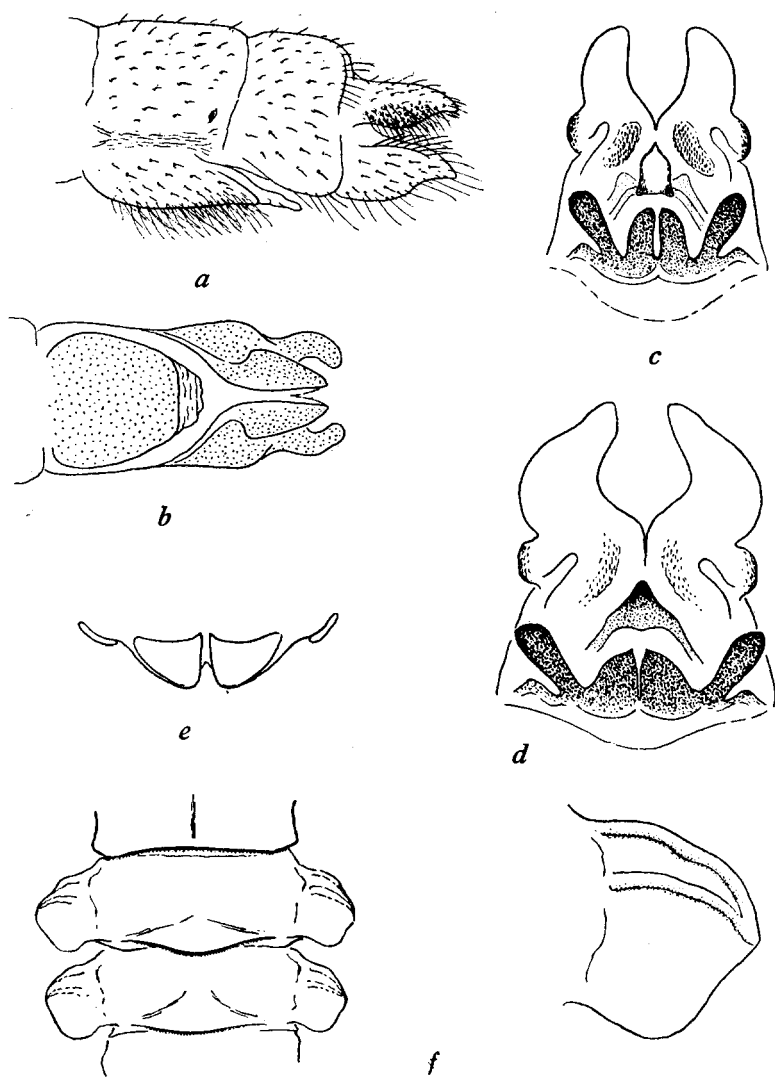


FIG. 1.—*Platychauliodes capensis* Brnrd. *a*, *b*, lateral and ventral views of 8th and 9th abdominal segments, ♀, in *b* the more strongly chitinised areas dotted. *Platychauliodes woodi* Brnrd. *c*, ♂ genitalia viewed from behind and slightly from below, for comparison with *d*. *Platychauliodes thornei* n. sp. *d*, ♂ genitalia, from same viewpoint as *c*. *e*, projections of the genital plate viewed from above, for comparison with fig. 8, *c*, in Barnard, *loc. cit.*, 1931. *Platychauliodes* sp. micropterous ♀. *f*, meso- and meta-thoracic segments with winglets, and one winglet further enlarged.

Platychauliodes thornei n. sp.

(Fig. 1, d, e.)

Locality.—Hottentot Holland Mts. (January 1933, K. H. B. and H. G. W., 1 ♂, 1 ♀).

Similar to the other two species, but larger and distinguished by the ♂ genitalia. The latter are of the same general structure as in *woodi*, but, as may be seen by comparing the figures here given, show several differences. The superior appendages are more falcate and the patch of spinules on inner (ventral) surface is less strongly developed. The median projections of the genital plate are much broader, triangular when viewed from behind, but strongly cowl-shaped as in *woodi*. The lateral projections do not differ very much, but are feebly spatulate, only the top margin being curled over slightly. A subanal lobe, which may function as penis or intermittent organ, ends in a strongly chitinated triangular point.

Fore-wing ♂ 27 mm., ♀ 42 mm.

Named after Mr. C. W. Thorne, of the South African Museum, who has accompanied Mr. Wood and myself on many collecting expeditions in the Cape mountains.

It is possible that the large ♀ described and figured on p. 178 (*loc. cit.*, 1931) belongs to this species.

? Platychauliodes sp.

Micropterous form, or aberration.—In the Gt. Winterhoek Mts., January 1939, Mr. C. W. Thorne found a ♀, 28 mm. in length, which is remarkable for having greatly reduced wings. All four winglets are alike; each consisting of a roughly semicircular membrane, spoon-like, *i.e.* convex above and concave below, without trace of venation except a costal and (?) subcostal thickening meeting at the rounded apex. The length of each winglet is about $\frac{1}{3}$ the width of the thoracic segment (fig. 1, f).

The winglets are considerably smaller than the wing-pads of a normal pupa of *Taeniochauliodes*, and the unexpanded wings contained therein; moreover, they show no evidence of being normal-sized wings which have failed to expand on emergence.

Judging by the shape of the head and the labrum, and the position of the ocelli, the specimen appears to belong to the genus *Platychauliodes*; the lower appendages, however, have mobile papillae at their apices as in *Taeniochauliodes*.

Although of frequent occurrence among the Stone-flies (see Barnard, Ann. S. Afr. Mus., vol. xxx, p. 576, and also *infra*, p. 658), I am not aware of any record of a micropterous Alder-fly.

Taeniochauliodes ochraceopennis E. P.

1931. Barnard, *loc. cit.*, p. 179.

Localities.—French Hoek Pass (River Zonder End system) (December 1932, K. H. B. and H. G. W.); Palmiet River (December 1932, H. G. W.); River Zonder End Mts., 1500–4000 feet (January 1933, H. G. W., pupae and imagos, and January 1934, K. H. B. and H. G. W.); Seven Weeks Poort, Ladismith, Cape (February 1932, K. H. B. and H. G. W.); George, Outeniqua Mts. (January 1931, K. H. B., larva); Robinson Pass, Outeniqua Mts. (February 1932, K. H. B. and H. G. W.); Kalk Bay Mts., Cape Peninsula (May 1933, A. C. Harrison, young larvae); Cathkin Peak, Drakensberg, Natal, 6000 feet (R. F. Lawrence, January 1938).

The largest ♀ yet collected has the fore-wing 38 mm. in length.

The ♀ genitalia resemble those of *Platychauliodes*, but the sub-genital plate is transverse, broader than long, without definite membranous distal projection; and the lower appendages have an apical mobile papilla as in *Leptosialis*.

Leptosialis africana E. P.

(Fig. 2.)

1931. Barnard, *loc. cit.*, p. 184.

Localities.—Gt. Winterhoek Mts., Tulbagh (3rd November 1932, K. H. B., 1 ♂); Hottentots Holland Mts. (23rd November 1932, C. W. Thorne, 1 ♀); Upper Olifants River, north of Ceres (8th October 1937, C. W. Thorne, 1 ♀).

The wings are not held roof-like over the body when at rest, but curled round the body as in *Taeniochauliodes* and other local Corydalids.

In both these specimens the junction of M and Cu₁ in fore-wing is more proximal, only slightly distal to the level of origin of Rs. In the hind-wing the fork of Cu₁ is slightly proximal to the cross-vein M₃₊₄ - Cu₁.

As the ♂ comes from the type locality there is no reason to doubt its identity with *africana*, of which the genitalia have not been described (they are missing in the type specimen). It is unlikely, but nevertheless just possible that a second species may exist in the

Hottentots Holland Mts., although the ♀ shows no differences in venation.

Genitalia ♂. Superior appendages lateral in position, short, incurved, clasper-like, hollowed on inner lower surface; supra-anal

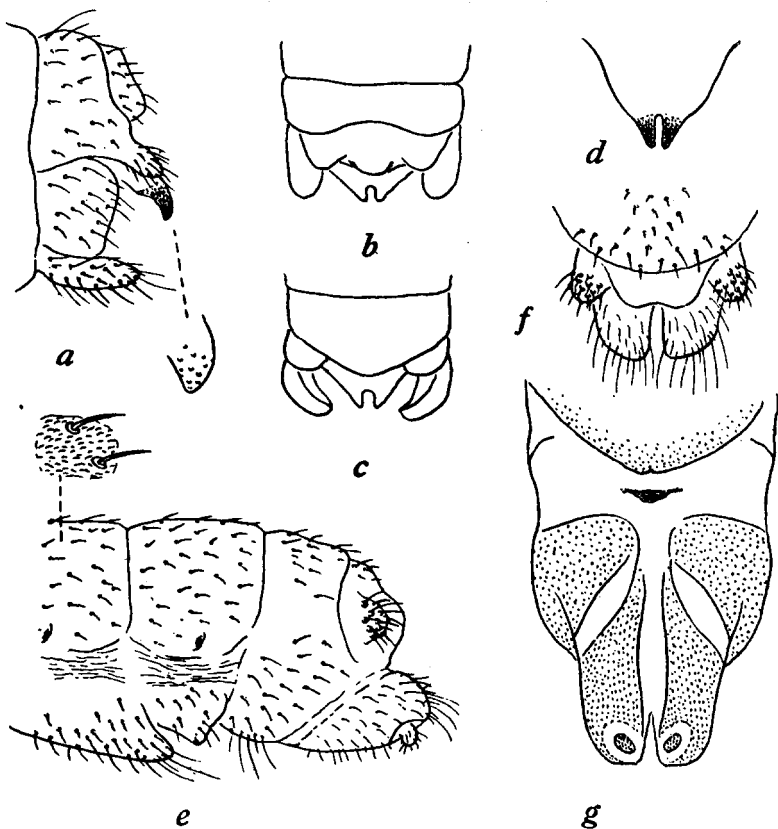


FIG. 2.—*Leptosialis africana* E. P. a, b, c, lateral, dorsal and ventral views of ♂ genitalia. d, supra-anal lobe viewed from behind or flattened, not fore-shortened as in b and c. e, lateral view of 7th, 8th and 9th abdominal segments ♀, with portion of integument further enlarged. f, dorsal view of apical segment ♀. g, ventral view ♀, the more strongly chitinised areas dotted.

lobe (? 10th tergite) triangular, with narrow apical cleft, the two apical points curved downwards and strongly chitinised; subgenital plate broadly rounded.

♀. Subgenital plate on 7th segment broadly rounded, with minute median notch; superior appendages short, rounded-conical; subanal plate divided into two halves by a groove, and ending in a blunt lobe

with a mobile papilla on lower apical surface; the lining of the groove is feebly chitinated and the two halves of the lobe can be moved to and fro, and evidently serve to place the ova in position.

The whole surface of the integument (in both sexes) is minutely hirsute (fig. 2, e) in addition to the larger setae.

EPHEMEROPTERA.

Since the publication of my 1932 paper (Trans. Roy. Soc. S. Afr., vol. xx, pt. 3) numerous additional locality records have accumulated as the result of continued collecting. A few more dried specimens have been found in the S.A. Museum, and small collections have been submitted for identification by Mr. H. K. Munro of the Etomological Department, Pretoria, Dr. J. Hewitt, Director of the Albany Museum, and Dr. R. F. Lawrence, Director of the Natal Museum.

Three undescribed species also have been collected; and a nymph which appears to be the true nymph of *Elassoneuria trimeniana* has been discovered.

Mr. A. C. Harrison has observed another case of longevity, and proved the ovoviviparity of the Red Border Wing (*Cloeon lacunosum*).

A large Polymitarcid from Natal has been described by me in Ann. Natal Mus., vol. viii, 1937.

Some unfortunate typographical errors occurred in the 1932 paper and are herewith corrected:—

Venation, figs. 1, 2, 4, 5, 17, 19, 42. For "1R₂, 1R₃, 1MA, 1M, 1Cu (but not 1A)," read "I (=intercalary) R₂, IR₃, etc., respectively."

Pages 204, 208, and 244, line 32. For "*westermanni*" read "*dislocans*."

Page 245, fig. 35b. For "*westermanni*" read "*dislocans*"; fig. 35c, for "*dislocans*" read "*auriculata*."

Page 217, fig. 7. For "*perkensi*" read "*perkinsi*."

Page 220. Delete last sentence at bottom of page: "the nymph . . . discovered."

Page 230, line 1. For "access" read "assess."

Page 246, line 12. For "long stalk of MA" read "long stalk of M."

Page 252. Delete last sentence of first paragraph: "Other similar . . . October 1931."

Taxonomy.—Dr. Ulmer (Stettin. Entomol. Zeit., xciii, 1932, pp. 204–219) has briefly commented on the new genera proposed by me. In his opinion *Euthraulius*, *Austrocaenis*, and *Austrocloeon* are

of doubtful validity, but he declines to express an opinion as to whether nymphal characters alone are sufficient to justify generic separation (p. 216).

For my part I feel that the nymphal stage has very strong claims for recognition in classification, although its full value cannot be estimated until the nymphal stages of all the known species of imago have been correlated. As examples of the value of nymphal characters one may refer to *Torleya* Lest., *Ephemerellina*, and *Lithogloea*, *Aprionyx* and *Atalophlebia*, *Epeorus* and *Iron* (see Ueno. Annot. Zool. Japon, xlii, 3, 1931, p. 192), and *Acentrella* (v. *infra*). Tillyard (Proc. Linn. Soc. N.S.W., lviii, 1933, p. 2) speaks in favour of founding new genera on nymphal characters alone; and in 1934 (Pap. Proc. Roy. Soc. Tasman. for 1933) he describes the nymph of the genotype of the genus *Atalophlebia* as having denticulate claws, thus confirming the validity of the genus *Aprionyx*.

Genotypes.—It is usually understood that when a new genus containing more than one species is proposed, and the genotype is not specifically designated, the first species listed or described is to be reckoned as the genotype. In view, however, of the resolution of the Budapest Congress of 1927 (see Entomol. Monthly Mag., December 1932), *Austroclleon africanum* (E. P.) and *Aprionyx tabularis* (Eaton) are herewith designated as the genotypes of their respective genera. The other new genera proposed by me were monotypic.

Hot Springs.—Nymphs of *Baetis bellus* and *Centroptilum sud-africanum* have been found at the stream issuing from the Warmbaths near Citrusdal. At the spot where the nymphs occurred the water would be a few degrees lower than 108° to 110° F. (see "South African Caddis-flies," Trans. Roy. Soc. S. Afr., xxi, p. 297).

FAM. PROSOPISTOMATIDAE.

1921. Lestage in Rousseau, Larves et Nymphes Aquatiques, i, p. 177 (*Prosopistomidae*).

1932. Lieftinck, Tijdschr. Entomolog., lxxv, suppl., p. 44 (references).

The remarkable May-fly nymph (only one subimago has ever been discovered) known as *Prosopistoma* has been recorded from Europe, Madagascar, and Java. Recently (August 1939) I have seen a specimen taken from a trout stomach in Kenya.

It seems therefore worth while to mention the occurrence of *Prosopistoma* in Africa, in the hope that some day it will be found in

South Africa. According to Lieftinck the Javanese species lives in the crevices on the undersides of boulders in fast-flowing streams.

FAM. POLYMITARCIDAE.

Polymitarcys savignyi (Pict.).

1932. Barnard, *loc. cit.*, p. 209.

Ulmer (1932, *loc. cit.*, p. 208, and in *litt.* 26/5/32) points out that the vein labelled in my figure 1 as Cu_2 is really only a branch of Cu_1 , and that the true Cu_2 is the vein labelled 1A.

Gen. EXEUTHYPLOCIA Lest.

1918. Lestage, *Rev. Zool. Afric.*, vi, p. 74.

1933. Ulmer, *Peking Nat. Hist. Bull.*, vii, p. 197.

1937. Barnard, *Ann. Natal Mus.*, viii, p. 275.

Distinguished from *Polymitarcys* by the subparallel sigmoid cross-veins in the anal area of the fore-wing.

Exeuthyplocia sampsoni Brnrd.

1937. Barnard, *loc. cit.*, p. 276, fig.

Localities.—Umzimkulu River (28th October 1936); Yarrow and Mooi Rivers (Mid-October 1933); Mooi River, Nottingham Road (6th November 1933). (All in Natal.)

Nymph provisionally assigned to *Exeuthyplocia sampsoni*.
(Fig. 3.)

On the 25th October 1939 Dr. B. Sampson found a single empty nymph-shuck floating in an eddy on the Umzimkulu River, Natal. No imagos were seen, and Dr. Sampson says there was no hatch between 22nd and 30th October.

From the size of the nymph one suspects it to be the nymph of *E. sampsoni*, which is the largest and bulkiest May-fly in the Natal fauna, excepting perhaps *Eatonica schoutedeni*.

It resembles the *Euthyplocia* nymph described by Eaton (*Trans. Linn. Soc. London*, 2nd ser., zool., iii, p. 37, 1883, and pl. 29, 1884), and also *Palingenia*, in the 3-jointed maxillary and labial palps; but differs in having a small, non-fimbriate gill on the 1st abdominal segment. In the latter character it resembles *Ephemera*, *Hexagenia*, and *Polymitarcys*. The 2nd-7th gills, however, are not like those of *Polymitarcys*.

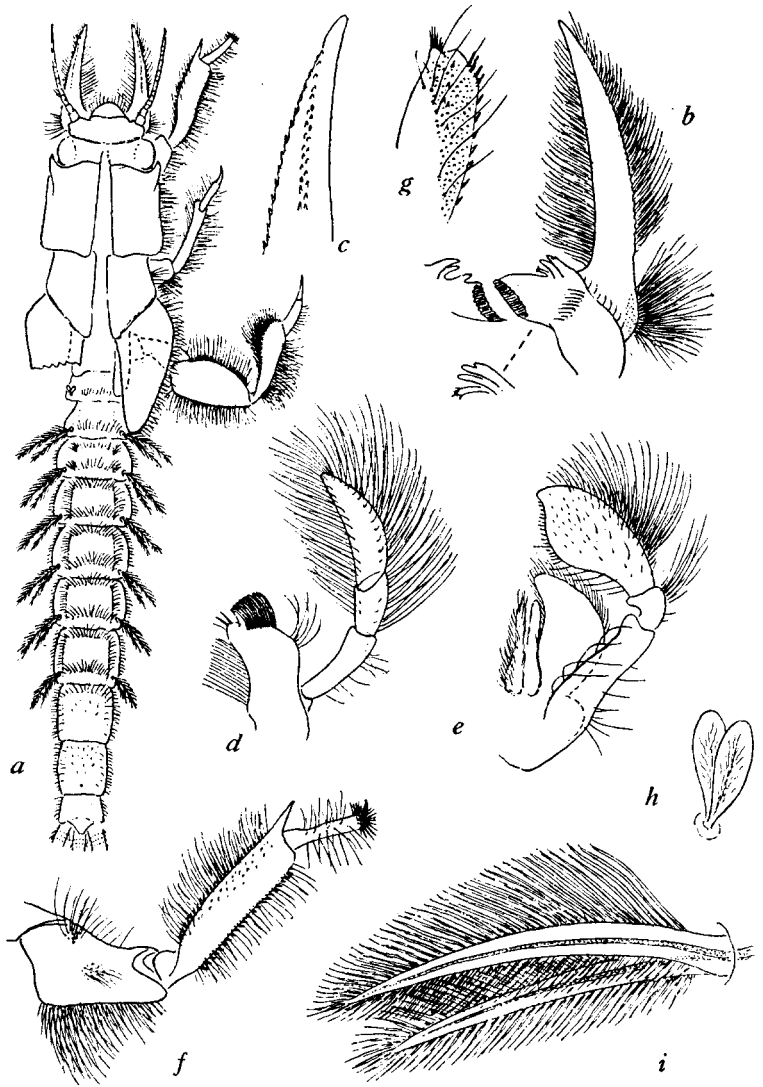


FIG. 3.—Nymph provisionally assigned to *Ezeuthyplocia sampsoni* Brnd. *a*, nymph drawn from empty shuck, showing split in middle line of thorax; left wing-cases cut away to show small 1st gill; cerci cut off. *b*, ventral view of left mandible, and molar portion of right mandible. *c*, dorsal view of apex of left mandible, setae omitted. *d*, maxilla. *e*, labium. *f*, ventral view of fore-leg. *g*, ventral view of apex of tibia of middle leg, only a few of the long setae shown. *h*, 1st gill. *i*, 2nd gill.

Front of clypeus to end of abdomen 25 mm., cerci 12-13 mm. (apparently complete).

Clypeus projecting horizontally, setose. Mandibles triquetral, thickly setose on inner and outer margins, outer margin with short spinules, a line of spinules on upper margin, double proximally, becoming a single series distally.

Tibia of fore-leg with lower surface flattened and spinules along inner and outer margins, upper surface convex, densely setose. Claw of fore-leg short, almost concealed in a thick bunch of short blackish spines and bristles on apex of tarsus. Tibia of middle leg cylindrical, spinose and densely setose on outer surface, long setae also on outer distal portion of lower surface, inner apex with a tuft of stiff bristles. Femur of hind leg broadly ovate, flattened but not specially so on lower surface, both margins and upper surface densely setose, inner (front) margin in addition with spinules, which are inserted ventrally to the long setae. Hind tibia expanding distally, densely setose on hind (outer) margin, inner margin with long setae and stiff bristles, the latter especially numerous and densely packed distally.

Abdomen in cross-section trapezoidal, the dorsal surface narrower than the ventral surface, the former marked by a dorso-lateral setose ridge on segments 3-7; on segments 8 and 9 there is a fringe of setae but no very definite ridge. A single transverse fringe of setae on segments 1, 2, and 8, near hind margin on segments 1 and 2, anterior on 8; on segments 3-7 two transverse fringes of setae.

Gills, 7 pairs; the 1st pair very small, bilamellate, non-fimbriate and non-setose; 2nd-7th pairs elongate, gently curved with very numerous (far more numerous than represented in the figure, especially on anterior margin of upper lobe) long slender filaments. Owing to the dorsal transverse and dorso-lateral fringes of setae on the abdominal segments, it is doubtful if the gills are held curved over the back in life; apparently they can be folded against the sides and more or less protected between the dorso-lateral and ventro-lateral fringes of setae.

FAM. EPHEMERIDAE.

Eatonica schoutedeni (Navas).

1932. Barnard, *loc. cit.*, p. 210.

Locality.—Nelspruit, Transvaal (November), H. K. Munro.

FAM. OLIGONEURIIDAE.

Elassoneuria trimeniana (McLach.).

(Fig. 4.)

1932. Barnard, p. 212, fig. 4 (references).

Lestage (1916, Rev. Zool. Afric., iv, p. 314, figs. 1-5) described a nymph (20 mm. in length, excl. cerci) from the Belgian Congo, resembling in general that of *Oligoneuria rhenana* (see Lestage, Larves et Nymphes Aquatiques, i, p. 214, fig. 54, 1921). The head was not figured, but part of the description says, "bord antérieur finement cilié et offrant sur la partie médiane une saillie longitudinale caréniforme bien visible légèrement prolongée en avant et formant comme un petit nez procéphalique." In this respect it differs from *Oligoneuria* (*loc. cit.*, 1916, p. 318).

In 1917 (Rev. Zool. Afric., v, p. 122, fig. 1) Lestage assigned this nymph to *E. trimeniana*, and gave a figure of the whole animal showing the head with its anterior point and dorsal keel.

The two nymphs (13 mm. in length, excl. cerci) before me, from Cathkin Peak, 6000 ft. alt., Drakensberg, Natal (Dr. R. F. Lawrence, January 1938), differ in the shape of the head which is rounded in front, without any longitudinal keel or ridge, widest in front of eyes instead of across the postero-lateral angles, and in the shorter antennae (as in *Oligoneuria*).

Since *E. trimeniana* was originally described from Natal, there is the greatest probability that this is its true nymph. In which case, either the Congo nymph belongs to another species whose imago is as yet unknown, or the *E. trimeniana* of Ulmer (1916, Arch. Naturg., lxxi, 1915, Abt. A, p. 4) is not the true *trimeniana* of McLachlan. The further alternative that the carinate and pointed head and the longer antennae are assumed only in nymphs larger than, say, 13 mm. does not seem at all likely.

This latter statement is confirmed by some nymphs, 13-19 mm. in length, from Kenya, which I have recently examined. These have the head widest across the postero-lateral angles, without medio-dorsal keel or anterior point, antennae short as in the Natal specimens, but the median cercus at least half the length of the lateral ones.

It seems probable that more than one species will eventually be recognised in Africa.

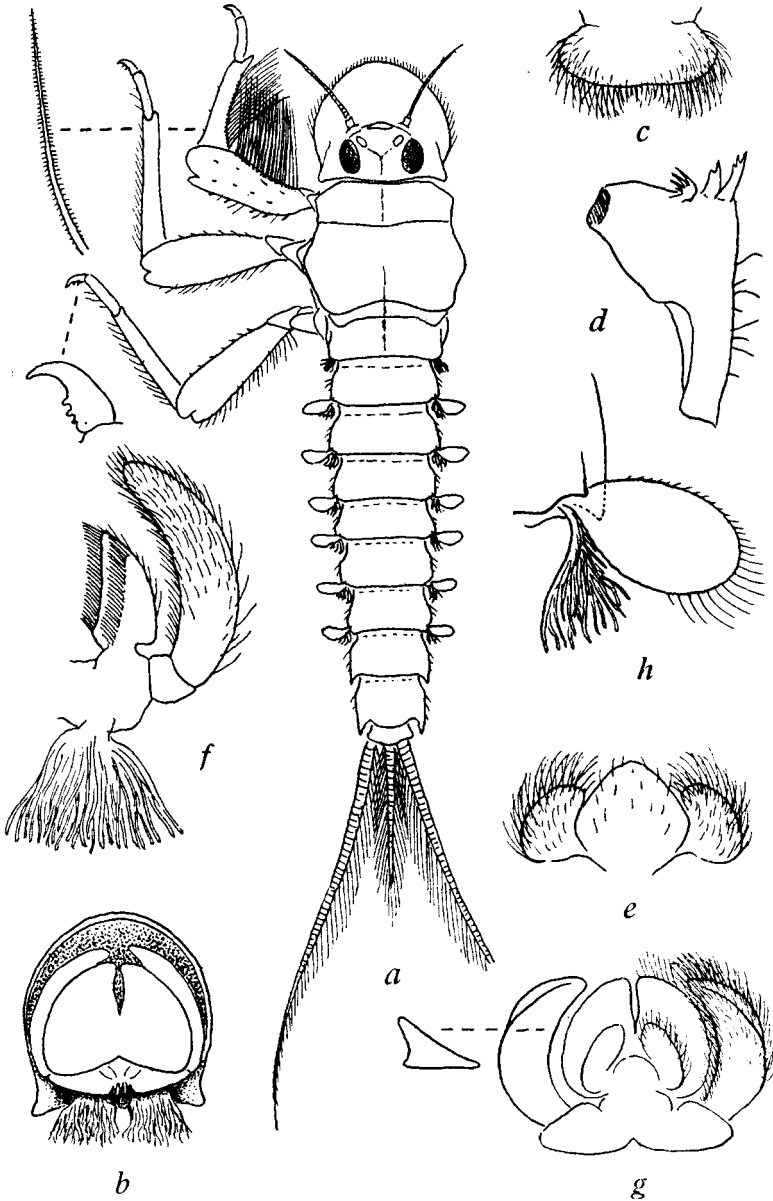


FIG. 4.—*Ellassoneuria trimeniana* (McLach.). *a*, whole animal, with seta from fore-leg, and claw of middle and hind legs further enlarged (the claw of fore-leg is without denticles). *b*, ventral view of head, showing maxillary gills projecting from under the labium (setae omitted). *c*, labrum. *d*, mandible. *e*, hypopharynx. *f*, maxilla, the submarginal row of bristles is on the outer (ventral) surface. *g*, labium, inner (dorsal) view, with cross-section of palp. *h*, one of the lateral gills in dorsal view.

FAM. BAETIDAE.

Cloeon lacunosum Brnrd.

1932. Barnard, *loc. cit.*, p. 214.

Longevity.—Mr. Harrison records a further case (*cf.* Barnard, p. 214). A ♀ subimago emerged at 8 p.m. on 15th July 1932, and transformed to the imago during the night 16th–17th. She lived until 8 p.m. on 7th September 1932, *i.e.* for 54 days after emergence from the nymph. Although ♂♂ were supplied, she died unfertilised, as in the case previously recorded.

Ovoviviparity.—On 12th December 1932 Mr. Harrison was able to prove that this species is ovoviviparous like *C. dipterum*. "A female alighted on the water with wings flat out, and as she lay there a stream of larvules left her. After placing in a tube of water a few more larvules came away. Immediately afterwards a second female alighted and was promptly placed in a tube, when the larvules streamed out and swam fast in all directions."

The larvules possess two cerci and the buds (anlagen) of the seven pairs of gills.

Localities.—Reservoir, Platteklip stream, Cape Town (26th November and 26th December 1932, ♀♀, K. H. B.); Orange Kloof, Table Mt. (1st March 1933, ♀♀, K. H. B. and H. G. W.); St. James (21st January 1933, A. C. H., ♂♂, "swarming"); Muizenberg Reservoir (December 1932, A. C. H., ♀♀, with larvules); Diep River, near Philadelphia, Cape Div. (26th April 1932, K. H. B., nymphs).

Cloeon chaplini Brnrd.

1932. Barnard, *loc. cit.*, p. 216.

Locality.—Jonkershoek, Stellenbosch (November 1931, F. G. Chaplin, nymphs).

Cloeon aeneum Brnrd.

1932. Barnard, *loc. cit.*, p. 216.

Localities.—Palmiet River mouth (31st July 1932 and 25th December 1932, H. G. W.); French Hoek Pass (1st October 1933, K. H. B.); Upton (November 1920, Father Sollier). The latter mutilated specimen in the S.A. Museum collection seems to be this species.

Cloeon perkinsi Brnrd.

1932. Barnard, *loc. cit.*, p. 216.

Locality.—East London (March, H. K. Munro).

Austrocloeon africanum (E. P.).

1932. Barnard, *loc. cit.*, p. 218.

Localities.—S.A. Museum grounds, Cape Town (12th April 1932, 8th May 1933, and 7th December 1932, Dr. E. L. Gill); Welgemoed Farm, east of Ceres (February 1922, K. H. B.); Swellendam Mts. (October 1925, K. H. B.); Platteklip stream, Table Mt. (26th April 1933, K. H. B.); Meirings Poort Mts. (February 1932, K. H. B. and H. G. W.); Boschluis Kloof, Zwartberg Range (February 1932, K. H. B. and H. G. W.).

Austrocloeon virgiliae Brnrd.

1932. Barnard, *loc. cit.*, p. 219.

Localities.—Reservoir, Platteklip stream, Cape Town (26th December 1932, K. H. B.); Ida's Valley, Stellenbosch (20th February 1932, A. C. H.); Boschluis Kloof, Zwartberg Range (February 1932, K. H. B. and H. G. W.); Meirings Poort, Zwartberg Range (January 1935, K. H. B. and H. G. W.); Near Congo Caves, Oudtshoorn Distr. (September 1933, K. H. B.); Willow R., north slopes of Cockscomb Peak (Uitenhage Div.) (K. H. B., October 1938).

Austrocloeon nymphs.

Locality.—Drieling's Kloof, between Laingsburg and Ladismith (February 1932, K. H. B. and H. G. W.).

Pseudocloeon vinosum Brnrd.

1932. Barnard, *loc. cit.*, p. 220.

Localities.—Orange Kloof, Table Mt. (1st March 1933, K. H. B. and H. G. W.); French Hoek Pass (1st October 1933, K. H. B.); Hottentot Holland Mts. (January 1933, K. H. B. and H. G. W.); du Toits Kloof, Rawsonville (25th March 1932, K. H. B.); Seven Weeks Poort, Ladismith, Cape (February 1932, K. H. B. and H. G. W.); Upper Olifants R., north of Ceres (October 1937, K. H. B. and C. W. T.).

Pseudocloeon magae Brnrd.

1932. Barnard, *loc. cit.*, p. 221.

Localities.—Orange Kloof, Table Mt. (1st March 1933, K. H. B. and H. G. W., ♂♂, 1 ♀); Silvermine Stream, Kalk Bay Mts. (12th March 1933, A. C. H.).

Baetis harrisoni Brnrd.

(Fig. 5, a).

1932. Barnard, *loc. cit.*, p. 222.

Localities.—Groot Drakenstein (25th October 1933, K. H. B. and H. G. W.); French Hoek Pass (1st October 1933, H. G. W.); Platteklip stream, Cape Town (26th April 1933, K. H. B.); du Toits Kloof,

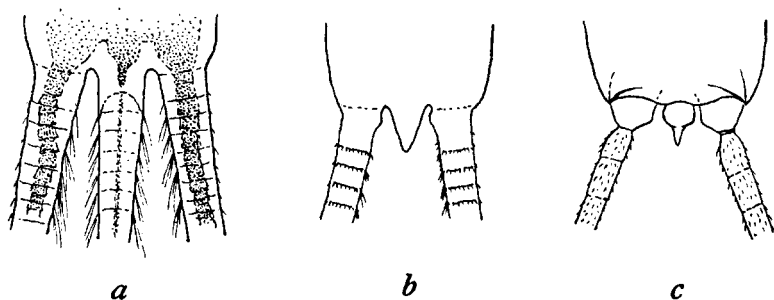


FIG. 5.—*Baetis harrisoni*. a, apex of abdomen of nymph, with subimago ready to hatch.

Acentrella capensis. b, c, apex of abdomen of nymph and of imago.

Rawsonville (25th March 1932, K. H. B.); Seven Weeks Poort, Ladismith, Cape (September 1933, K. H. B., nymphs); Near Cango Caves, Oudtshoorn Distr. (February 1932, K. H. B. and H. G. W., nymphs, and September 1933, K. H. B., imagos); Fairy Glen, Worcester (12th August 1932, K. H. B. and H. G. W.); Porterville (August 1937, A. C. H.); Upper Olifants R., north of Ceres (October 1937, K. H. B. and C. W. T.).

Baetis bellus Brnrd.1932. Barnard, *loc. cit.*, p. 222.

Localities.—Great Winterhoek Mts., Tulbagh (November 1932, K. H. B. and H. G. W.); Warmbaths, Citrusdal (September 1932, K. H. B., nymphs); Platteklip stream, Cape Town (26th April 1933, K. H. B.); Blinkwater stream, above Camps Bay, Cape Peninsula (21st August 1932, K. H. B.).

Baetis sp.

Nymphs of what seems to be a different species of *Baetis* were found at Meirings Poort mountains, Zwartberg Range (February 1932, K. H. B. and H. G. W.).

Acentrella capensis Brnrd.

(Fig. 5, b, c).

1932. Barnard, *loc. cit.*, p. 259.

It seems impossible to separate with certainty the adults of this species from those of *Baetis harrisoni* except by breeding. Unless examined when freshly caught the abdominal coloration is liable to be inconclusive. The short branch of the fork 1 A may be clearly disconnected, or it may be almost connected. In any case this feature is variable among the species of *Baetis*, as Dr. Ulmer has kindly pointed out to me (*in litt.* 26/5/32), and should not be used as a specific character.

Figures are here given of the apex of the abdomen of the nymph and the adult. For comparison a figure is also given of the abdomen and cerci of a nymph of *Baetis harrisoni*, showing the subimago ready to hatch. The median cercus is fully developed in the nymph, but in the final instar the enclosed adult cercus degenerates and becomes detached near the base, remaining behind in the empty shuck after emergence of the subimago.

Localities.—Naudesberg, Worcester (August 1932, K. H. B. and H. G. W., nymphs); Gt. Winterhoek Mts., Tulbagh (November 1932, K. H. B. and H. G. W., nymphs).

Centroptilum sudafricanum Lest.

1932. Barnard, *loc. cit.*, p. 224.

Localities.—Orange Kloof, Table Mt. (1st March 1933, K. H. B. and H. G. W.); Platteklip stream, Cape Town (26th April 1933, K. H. B.); Blinkwater stream, above Camps Bay (31st January, 21st March, and 21st August 1932, K. H. B.); Hottentots Holland Mts. (January 1933, K. H. B. and H. G. W.); Gt. Winterhoek Mts., Tulbagh (November 1932, K. H. B. and H. G. W.); Warmbaths, Citrusdal (September 1932, K. H. B., nymphs); Farm Ezelfontein, 7 miles east of Ceres (September 1933, K. H. B.); Prince Albert, mouth of the Zwartberg Pass (September 1933, K. H. B.); Palmiet River, Kleinmond (March 1932, H. G. W.); Jonkershoek, Stellenbosch (14th February 1933, K. H. B. and H. G. W.); Oudebosch, River Zonder End Mts. (September 1933, H. G. W.); Groot Drakenstein (25th October 1933, K. H. B. and H. G. W.); Meirings Poort, Zwartberg Range (February 1932, K. H. B. and H. G. W.); du Toits Kloof, Huguenot (31st March 1934, H. G. W.).

Centroptilum excisum Brnrd.

1932. Barnard, *loc. cit.*, p. 224.

Localities.—Meirings Poort, Zwartberg Range (February 1932, K. H. B. and H. G. W.); Onderbokfontein, Cold Bokkeveld, north of Ceres (September 1932, K. H. B.); M'fongosi, Zululand (April 1917, W. E. Jones).

Centroptiloides bifasciatum (E.-P.).

1932. Barnard, *loc. cit.*, p. 226.

Locality.—Yarrow River, Karkloof, Natal (18th March 1934, L. A. Day).

FAM. BRACHYCERCIDAE.

Austrocaenis capensis Brnrd.

1932. Barnard, *loc. cit.*, p. 227.

Localities.—Diep River, Philadelphia, Cape Div. (26th April 1932, K. H. B., nymphs); Palmiet River (March 1932, H. G. W., nymph); du Toits Kloof, Rawsonville (25th March 1932, K. H. B.); Seven Weeks Poort, Ladismith, Cape (February 1932, K. H. B. and H. G. W.); Boschluis Kloof, Zwartberg Range (February 1932, K. H. B. and H. G. W.); near Cango Caves, Oudtshoorn Distr. (September 1933, K. H. B., nymphs, imagos).

Austrocaenis sp.

A ♂ imago caught at Groot Drakenstein (25th October 1933, H. G. W.) is smaller and much darker than the normal *capensis*. Length of wing 3.25 mm. Head and thorax dark Vandyke brown, abdomen strongly suffused with sepia, legs normal, but the dark streaks almost black, Sc and R brown, cerci white. Also 2 ♂♂ from Umzimkulu R., Natal (Dr. B. F. Sampson, October 1937).

Gen. TRICORYTHUS Eaton.

Ulmer (1932, *loc. cit.*, p. 215) remarks that *T. discolor*, with its peculiar nymph, is not typical of the genus *Tricorythus*. If that is so, possibly a new genus may later be required for the South African species.

The characteristic nymphs have been found at the following localities: Hogsback, Amatolas, King Williams Town Div. (February 1933, R. F. Lawrence); Seven Weeks Poort, Ladismith, Cape (September 1933, K. H. B.); Cathkin Peak, 6000 feet, Drakensberg,

Natal (January 1938, R. F. Lawrence); Bushmans and Umzimkulu Rivers, Natal (Dr. Sampson).

Tricorythus reticulatus Brnrd.

1932. Barnard, *loc. cit.*, p. 232.

Locality.—Pretoria, at light (February 1934, H. K. Munro, ♀♀) (one with egg-mass), wings, 6.5–7 mm.

FAM. LEPTOPHLEBIIDAE.

Gen. APRIONYX Brnrd.

1934. Tillyard, Pap. Proc. Roy. Soc. Tasman. for 1933, pp. 5, 6 (discussion).

Aprionyx peterseni (Lest.).

1932. Barnard, *loc. cit.*, p. 236.

Localities.—Du Toits Kloof, Rawsonville (25th March 1932, K. H. B.); Lemoenshoek, Langeberg Range (November 1927, K. H. B.); Palmiet River, Kleinmond (March 1932, H. G. W.); Elands Kloof, Citrusdal (5th March 1933, H. G. W.); French Hoek Pass (December 1932, K. H. B. and H. G. W.); Oudebosch, River Zonder End Mts., 1500 feet (January 1933, H. G. W., and January 1934, K. H. B.); Tulbagh Valley and Gt. Winterhoek Mts. (February 1934, K. H. B.); Meirings Poort, Zwartberg Range (January 1935, K. H. B. and H. G. W.).

Aprionyx intermedius Brnrd.

1932. Barnard, *loc. cit.*, p. 238.

Localities.—Fairy Glen, Worcester (12th August 1932, K. H. B. and H. G. W.); Groot Drakenstein (12th September 1932, A. C. H.); Ruiterbosch, Robinson Pass, Outeniqua Range (February 1932, K. H. B. and H. G. W.); Great Winterhoek Mts., Tulbagh (September 1932, K. H. B.).

Aprionyx rubicundus Brnrd.

1932. Barnard, *loc. cit.*, p. 239.

Localities.—Hottentots Holland Mts. (east side of Spitzkop) (November 1932, K. H. B. and H. G. W.); Witte River, Wellington Mts. (1st October 1933, H. G. W.); French Hoek Pass (1st October 1932 and 1933, K. H. B. and H. G. W.); Oudebosch, River Zonder End Mts., 1500 feet (December 1931 and January 1933, H. G. W., and January 1934, K. H. B.); Fairy Glen, Worcester (12th August

1932, K. H. B. and H. G. W.); Gt. Winterhoek Mts., Tulbagh (November 1932, K. H. B. and H. G. W.); Upper Olifants R., north of Ceres (October 1937, K. H. B. and C. W. T.).

When freshly caught most specimens are considerably darker than would appear from the description; in fact, when settling on white stones in the sunlight the flies look quite black. Wing length of ♀♀ 9–10 mm.

Aprionyx pellucidulus (E. P.).

(Fig. 6, a.)

1932. Barnard, *loc. cit.*, p. 239.

Localities.—Hottentots Holland Mts. (January 1933, K. H. B. and H. G. W.); River Zonder End Mts., 3500–4500 feet (January 1933, H. G. W., and January 1934, K. H. B.); Gt. Winterhoek Mts., Tulbagh (November 1932, K. H. B. and H. G. W., nymphs and adults).

Nymph.—With smooth claws, and other features as in diagnosis of *Aprionyx*. Front tibia and tarsus as in *peterseni*, without the fringe of long hairs found in *tabularis*.

Mottled brown, antennae and cerci ochraceous. Femora banded. Gills greyish-white, tracheae blackish. Abdomen pale yellowish or ochraceous, segments 1–9 each with narrow transverse dark band on hind margin, segment 6 slightly suffused on anterior margin, segments 7–9 with anterior half suffused but leaving a narrow pale median line, on either side of which is a small pale spot (fig. 6, a). Females are rather more strongly suffused, the transverse bands being enlarged at both ends into a small dark spot; the whole abdomen is deeper in colour owing to the eggs developing inside.

The suggestion that the Zwartberg nymph (*loc. cit.*, fig. 29, c) might be the nymph of this species is herewith withdrawn.

Aprionyx argus n. sp.

(Fig. 6, d–f.)

Imago.—8–9 strong cross-veins before bulla, 9–10 in pterostigmal area, oblique, straight or nearly so, only occasionally forming forks at costal margin or anastomosing. Hind-wing with Sc extending nearly to end of wing, 4–6 cross-veins in subcostal area. Penis ♂ thin dorso-ventrally, broad, apically notched, with the openings of the vasa deferentia laterally at apex. Clasper with inner margin angularly curved proximally. Ventral plate ♀ apically indented.

Body ♂ 10 mm., ♀ 12 mm.; wing ♂ 10-11 mm., ♀ 12 mm.

♂. Head and thorax dark Vandyke brown. Legs ochreous, femora with dark band in middle and at apex. Abdomen brown,

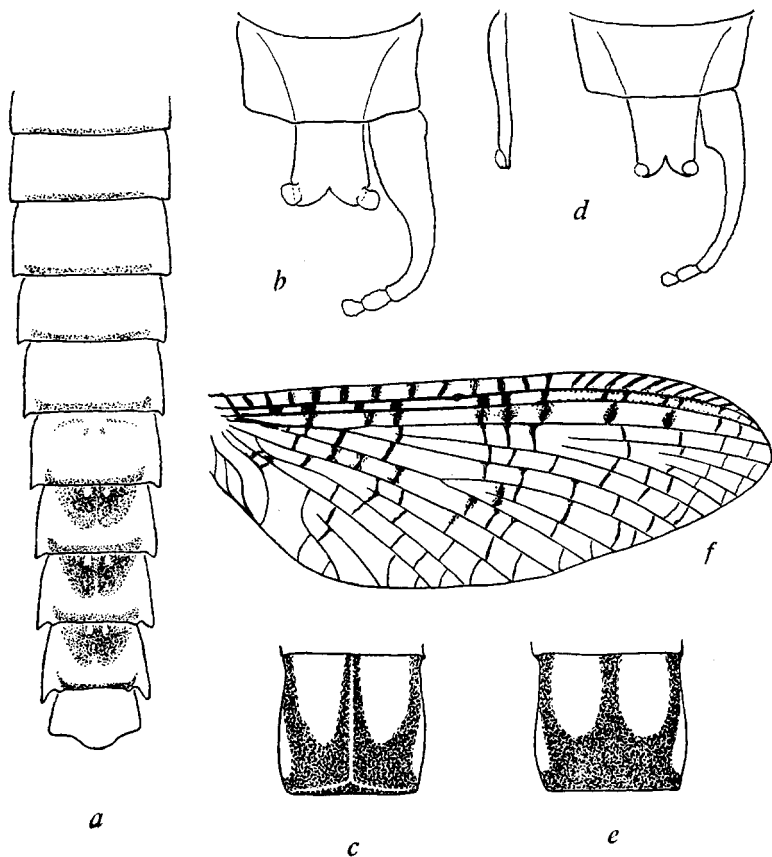


FIG. 6.—*Aprionyx pellucidulus* (E. P.). a, abdomen of nymph. *Aprionyx natalica* (Lest.). b, penis and clasper ♂. c, segment of abdomen. *Aprionyx argus* n. sp. d, penis and clasper, with lateral view of former. e, segment of abdomen. f, fore-wing.

segments 1, 9, and 10 unicolorous, segments 2-8 each with a pair of large pale spots at base dorsally, pale spots laterally and ventrally. Neuration dark fuscous-brown, some specimens more heavily marked than in the specimen figured. Cerci whitish, annulated. Penis pale, apices (or only inner apical margin) of claspers whitish. ♀ similar.

Locality.—Cathkin Peak, 6000 feet, Drakensberg, Natal (R. F. Lawrence, January 1938).

Remarks.—Somewhat like *natalica* but more heavily veined, and reminiscent of the Cape species *peterseni*. A figure of the penis and clasper of *natalica* (fig. 6, *b*), from the above same locality, is given for comparison. Both the Natal species differ from all the Cape species in the shape of the penis.

Adenophlebia auriculata Eaton.

1932. Barnard, *loc. cit.*, p. 242.

Localities.—Stutterheim (September, H. K. Munro); Hogsback, Amatolas, King Williams Town district (February 1933, R. F. Lawrence); Kaaiman's Gat, near George (April 1933, H. G. W.); Howieson's Poort, near Grahamstown (October 1933, J. Hewitt).

Adenophlebia peringueyella Lest.

1932. Barnard, *loc. cit.*, p. 242.

Localities.—Seven Weeks Poort, Ladismith, Cape (February 1932, K. H. B. and H. G. W., also September 1933, K. H. B.); Gt. Winterhoek Mts., Tulbagh (September 1932, K. H. B.); Schoemann's Poort, Cango, Oudtshoorn Distr. (September 1933, K. H. B.); Huis River, between Cango and Calitzdorp (September 1933, K. H. B.).

Three small ♂♂ from Seven Weeks Poort, February 1932, appear to be this species. Wing-length 8 mm.; in two of the specimens there are 8 cross-veins between R_{4+5} and MA_1 , and also between MA_2 and M_{1+2} , in the third specimen 9 cross-veins. The wings are rather heavily spotted, but not so much as in the wing dissected from a Zwartberg Pass nymph (*loc. cit.*, fig. 31). Another ♂ caught on the same occasion has wing-length 8.5 mm.; 9 cross-veins on either side of MA ; veins no more enlarged or spotted than in *auriculata* (*loc. cit.*, fig. 30).

In the extreme western Cape *peringueyella* is a spring fly and does not seem to last on until the summer. It is possible that these small forms may be a later brood (the typical *peringueyella* with wing-length 10–12 mm. occurs in the same locality in September), but it must be remembered that the Zwartberg Range may get some heavy rainfalls in summer, so that a marked diminution in the flow of the streams and consequent lessening of the food supply cannot be invoked to explain the small size of these later forms. If it were possible, observations throughout a whole year at Seven Weeks Poort would prove very interesting.

Adenophlebia dislocans (Wlkr.).

1932. Barnard, *loc. cit.*, p. 244.

Localities.—Platteklip stream, Cape Town (3rd January 1932 and 26th April 1933, K. H. B.); Oudebosch, River Zonder End Mts. (September 1933, H. G. W., and January 1934, K. H. B.); Fouches Hoek, Mosterts Hoek (Breede River valley) (17th April 1933, K. H. B.); du Toits Kloof, Huguenot (31st March 1934, H. G. W.).

Adenophlebia nymphs.

Locality.—Ezelfontein, east of Ceres (September 1933, K. H. B.).

Gen. *CASTANOPHLEBIA* Brnrd.

1932. Barnard, *loc. cit.*, p. 244.

1932. Ulmer, *loc. cit.*, p. 214.

This genus appears to be accepted by Ulmer. Unfortunately Ulmer received a reprint of my paper with the typographical error "long stalk of MA" instead of "long stalk of M" (see corrigenda).

The beautiful May-fly described below is a typical *Castanophlebia* as regards the imago, but shows remarkable features in the nymph, which necessitate an emendation of the generic diagnosis.

Nymph.—Maxillary palp with 3rd joint either short, its junction with 2nd joint transverse, or elongate with oblique junction. Gills seven pairs, either double or single, but always slender and narrow lanceolate.

The reduction of the inner lamina of the 7th gill and its occasional complete absence in *calida*, seems to indicate the course of evolution of the new species.

Genotype: *C. calida* Brnrd.

Castanophlebia albicauda n. sp.

(Fig. 7.)

Imago.—7-8 cross-veins before bulla, 10 (♂) 14-15 (♀) in pterostigmal area, the latter oblique, straight or slightly sigmoid, with occasional Y-forking on costa; subcostal 16-17 (♀); between R_{4+5} and MA_1 8 (♂) 9-10 (♀); between MA_2 and M_{1+2} 9 (♂) 9-10 (♀); 1-3 (4) cross-veins between IMA and MA_1 and MA_2 (not counting proximal connecting veins); IR_{3b} usually not connected with Rs. Hind-wing as in *calida* (not always so many cross-veins in subcostal area as represented in fig. 36, b). Tenth sternite, penis, and forceps

♂ as in *calida*, each lobe of the penis with a small knob in middle, which appears as if it could be extruded into an acute process as in *calida*. Ventral plate of ♀ short, broader than long, with deep excision as in *calida*.

Fore-wing: ♂ 9 mm., ♀ 11 mm.

Castaneous, occiput, and prothorax slightly paler; a dark brown bar on lateral margin of scutum as in *calida*; abdominal segments

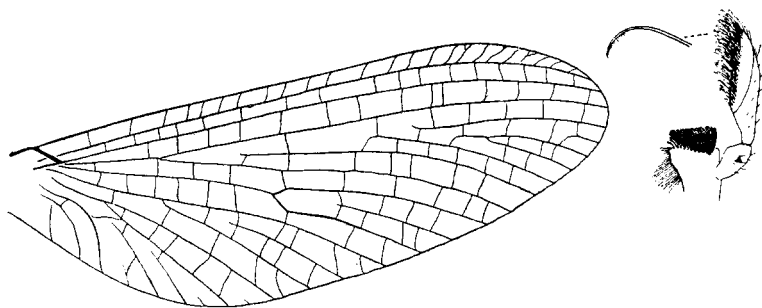


FIG. 7.—*Castanophlebia albicauda* n. sp. Fore-wing (♀), and maxilla.

1-6 ♂, 1-7 ♀ castaneous, the junctions of the segments and the pleural junctions of tergites and sternites pale, segments 7-9 ♂, 8 and 9 ♀ pale fawn. Legs and cerci pale fawn, uniform. Neuration fulvous-castaneous, costal and subcostal areas in pterostigmal region semi-opaque. Neuration in ♂ much paler and less conspicuous than in ♀, the cross-veins especially faint.

Subimago similar but paler.

Nymph.—As in *calida*, but the labrum more angular, the spines on front margins of femora acute. The maxillary palp as figured, the junction of 2nd and 3rd joints oblique, 3rd greatly elongate, with dense brush of setae along its inner margin, most of the setae apically falcate, with extremely minute setules on inner margin. Labial palp with 3rd joint not so slender relatively to the 2nd as figured for *calida* (even for *calida* fig. 37, *g*, shows the 3rd joint too slender). Seven pairs of gills, each gill consisting of a single narrow lamina, with unbranched trachea.

Up to 10-11 mm., cerci 15-18 mm.

Fulvous-castaneous, mature nymphs deep castaneous, pro- and meso-thorax slightly mottled dorsally. Abdominal segments 1-7 castaneous, segments 8-10 pure ivory-white. Ventral surface of thorax and abdominal segments 1-7 pale brownish, usually with the

3 dark spots as in *calida*. Femora ochraceous, tibiae and tarsi paler. Cerci white. Anterior gills greyish, with dark tracheae, the posterior ones white with inconspicuous tracheae. Maxillary palp with 2nd and 3rd joints pale.

Localities.—Gt. Winterhoek Mts., Tulbagh, 4000–5000 feet (end September 1932, nymphs, K. H. B., beginning of November 1932, nymphs and adults, K. H. B. and H. G. W.); Witte River, Wellington Mts. (October 1933, H. G. W., nymphs); Bosch Kloof, Keeromberg, Worcester (end of January 1933, half-grown nymphs, H. G. W.).

Remarks.—A larger and apparently more local fly than the "Chestnut Dun" (*C. calida*). It is easily recognised by the white or pale apex of the abdomen, which is very conspicuous in the nymph (cf. similar coloration in nymphs of *Lithogloea harrisoni*, and Agrionid Dragon-fly nymphs from the Gt. Winterhoek Mts.).

Under a hand-lens the head of the nymph with its maxillary palps projecting forwards resembles a dust-pan with a pair of hand-brushes; and the palps evidently function as brushes to sweep up particles of food-stuff into the mouth.

The fly may be known as the Larger Chestnut Dun.

Castanophlebia calida Brnrd.

1932. Barnard, *loc. cit.*, p. 246, figs. 36, 37.

Localities.—Hottentots Holland Mts. (November 1932, K. H. B., H. G. W., and C. W. T.); Tradouw Pass, Langeberg Range (February 1932, K. H. B., H. G. W., and C. W. T.); Meirings Poort, Zwartberg Range (February 1932, K. H. B., H. G. W., and C. W. T.); Gt. Winterhoek Mts. (September 1932, K. H. B., H. G. W., and C. W. T.); Porterville (August 1937, K. H. B. and A. C. H.); Upper Olifants R., north of Ceres (October 1937, K. H. B. and C. W. T.).

FAM. EPHEMERELLIDAE.

The discovery of a second species of *Lithogloea* necessitates another alteration in the family diagnosis, as the nymph of this n. sp. has only four pairs of gills on segments 1–4.

Gen. EPHEMERELLINA Lest.

1932. Barnard, *loc. cit.*, p. 347.

1932. Ulmer, *loc. cit.*, p. 214.

The generic diagnosis may be completed thus: fore tarsus ♂ slightly longer than tibia, which is twice as long as femur; 1st tarsal joint very

short, 2nd longest, 3rd-5th decreasing, claws alike. Ventral plate ♀ broader than long.

In the subimago the fore-leg of ♂ is no longer than that of the ♀.

Although the fly has not actually been bred, further collecting, especially on Table Mt., leaves no doubt that the nymph described and figured by me (*loc. cit.*, p. 252, fig. 43, *d-g*) is correctly assigned. Both nymphs and flies have been found in the Gt. Winterhoek Mts. and on Table Mt.; and nymphs in several other localities, including the river system in which the type locality is situated.

Whether there is more than one species in the Cape mountains is a moot point. The ♂♂ from the Gt. Winterhoek Mts. have a much more strongly bilobed penis than the single ♂ from the Wellington Mts.

Ephemerellina barnardi Lest.

1932. Barnard, *loc. cit.*, p. 251, fig. 42, *e*, and p. 252, fig. 43, *d-g* (nymph).

Imago.—Some specimens collected in the Gt. Winterhoek Mts., 4000 feet (beginning November 1932, K. H. B. and H. G. W.), are

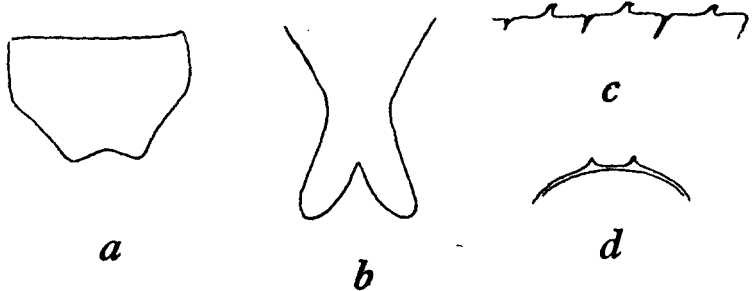


FIG. 8.—*Ephemerellina barnardi* Lest. *a*, ventral plate, ♀. *b*, penis. *c*, *d*, dorsal abdominal spinules of imago, lateral view and cross-section.

very much darker than the original specimens. The whole body is dark Vandyke brown, with lighter marks laterally on the mesothorax. Wings hyaline, slightly milky along the costal margin, longitudinal veins dark brown or sepia, the cross-veins very inconspicuous.

Penis somewhat hour-glass shaped, apically deeply bilobed. Ventral plate ♀ broader than long, lateral margins feebly angular, and distal margin slightly concave.

Abdominal segments 2-6 each with a small transverse thickening in the middle of the tergite, each bearing 2 small conical tubercles or spinules.

Fore-wing ♂ 9 mm., ♀ 10 mm.

These specimens are smaller than the Gt. Winterhoek ♀ (November 1916), but barring the colour are exactly similar. The ventral plate and the abdominal spinules were not mentioned in my description.

The ♂♂ differ in the penis from the Wellington Mts. ♂ figured by me. A subimago from this locality (1st January 1934, H. G. Wood) confirms this figure, though a comparison between subimago and imago is not too reliable. The abdomen in the latter specimen is too mutilated to determine the presence of the spinules.

Some ♀♀ from Table Mt. (5th January, 2nd February, and 29th December 1933, K. H. B.) agree in the shape of the ventral plate and other features, but the coloration is distinctly castaneous or rufous. Fore-wing 10–11 mm.

The original pair described by Lestage is not in the S.A. Museum (Barnard, *loc. cit.*, footnote, p. 202), so that further comparison must wait until more material is obtained from the type locality.

Nymph.—Nymphs similar to that described from the Cedarberg Mts. have been found in the Gt. Winterhoek Mts., end September 1932, K. H. B.; in the head-waters of the Palmiet River (Groenland Mts., south side of Viljoen's Pass, Elgin, 29th October 1931, K. H. B., and Hottentots Holland Mts., November 1932 and January 1933, K. H. B. and H. G. W.); French Hoek Pass (head-waters of River Zonder End) December 1932, K. H. B. and H. G. W.; Table Mt., August–September 1933, K. H. B., half and three-quarters grown.

The Elgin nymph is a large one measuring 12 mm., cerci 9 mm., 3 mm. across the wing-cases and 2.75 mm. high at the same level. The largest from the Gt. Winterhoek Mts. is 10 mm. in body length, and is evidently in a younger stage as the projecting tips of the wing-cases are not so prominent.

The larger nymphs are very solidly built, plump and high; they can be picked off the rock with thumb and finger without damage. They inhabit only those portions of the mountain streams which are shallow and where the water is always rushing tumultuously over the rocks and stones.

Gen. LITHOGLOEA Brnrd.

1932. Barnard, *loc. cit.*, p. 252.

The diagnosis stands, except that the penis is not always broad in contrast with that of *Ephemerellina*, and that gills are present in the nymph on segments 1–6 or 1–4.

The confusion of two species under the name *harrisoni* was due to

my collecting very young nymphs from Table Mt. streams and referring them without actual breeding to the Drakenstein specimens bred by Mr. Harrison. We were led to think that there might be two species in the Drakenstein material by differences in coloration; but this was definitely proved not to be so, as stated on p. 255, lines 5-6. This has been further confirmed by breeding from nymphs of another different colour-pattern.

Barring a slight difference in size, and the penis of the ♂, there is no distinction between the imagos of the two species; but the nymphs are quite distinct.

Genotype: *L. harrisoni* Brnrd.

Lithogloea harrisoni Brnrd.

1932. Barnard, *loc. cit.*, p. 253, figs. 42, a-d, 44 (*harrisoni* part; not the young nymph described and figured).

The locality Table Mt. should be deleted, as the true *harrisoni* has not yet been found in the Cape Peninsula.

Add the following localities: Gt. Winterhoek Mts., Tulbagh (November 1932, K. H. B. and H. G. W.); Palmiet River, Kleinmond (December 1932, H. G. W.); Hottentots Holland Mts. (November 1932, K. H. B. and H. G. W.).

In the nymph the following colour varieties have been observed: From Stellenbosch Mr. Harrison has collected nymphs of a uniform very dark Vandyke brown, almost black. In the Gt. Winterhoek Mts. nearly all the nymphs have definite white spots; the ground colour in the younger nymphs is mottled as originally described (p. 255), but in the larger ones becomes very dark sepia, almost black. The following parts are pure white: 2 small dots on head behind lateral ocelli and contiguous with inner margins of eyes, a large oval median spot on anterior part of mesonotum, whole of 10th tergite and the lateral projections of the 9th segment, the distal ends of all the femora, and the distal half of the cerci except the extreme tips. In life the contrast between the blackish ground-colour and the white thoracic spot, 10th abdominal segment and "knees" is very striking. The nymphs are very conspicuous on the stones and are not in the least protectively coloured as are the nymphs of the following species.

It is interesting to note that in the same locality the nymphs of one of the Agrionid Dragon-flies has the same scheme of coloration: blackish with white terminal segment and white knees; and also the nymphs of *Castanophlebia albicauda* (cf. *supra*).

Lithogloea penicillata n. sp.

1932. Barnard, *loc. cit.*, p. 255, fig. 43, *a-c* (*harrisoni* part, young nymph).

Imago.—As in *harrisoni*, but slightly smaller, and penis narrower (cf. fig. 42, *e*, of *E. barnardi*). Ventral plate ♀ as in *harrisoni*.

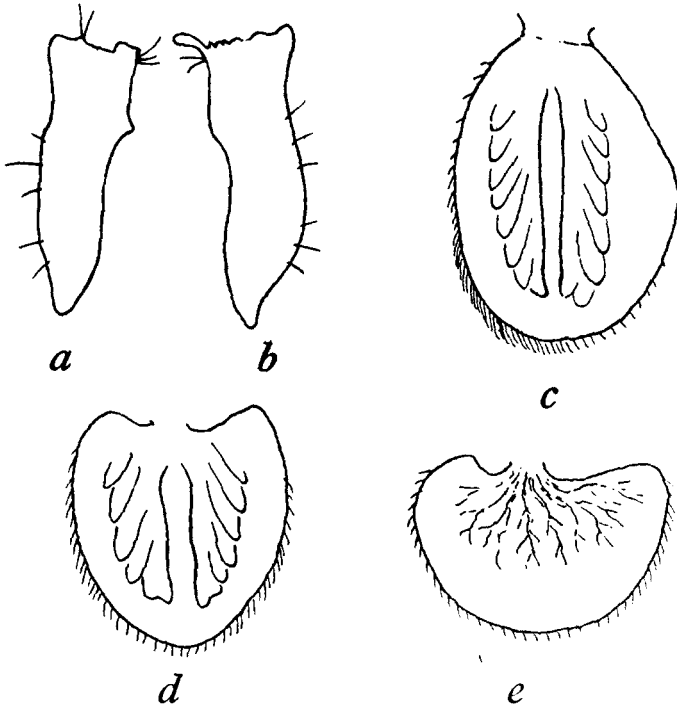


FIG. 9.—*Lithogloea penicillata* n. sp. Nymph. *a*, *b*, left and right mandibles. *c*, *d*, *e*, gills on 2nd, 3rd, and 4th segments, ventral view, the external margin on the left in each case.

Body ♂ 5–6 mm., ♀ 6 mm.; fore-wing ♂ 5.5–6 mm., ♀ 6.5 mm.

Nymph.—Full-grown nymph resembling the young described and figured. Abdomen triquetral in cross-section, medio-dorsally slightly carinate, but none of the segments raised or imbricate. Only three pairs of lamellate gills, those on segments 2 and 3 being double, that on segment 4 single. Gill on segment 1 as in *harrisoni*. Mandibles even more oblong than in the young, the apices being squarely truncate, the outer angle usually worn quite blunt. Cerci feebly setose.

Up to 5–6 mm.

Ochraceous or straw-coloured, with faint darker markings on thorax, abdomen with a series of dark spots dorso-laterally, that on segment 2 being the largest and most conspicuous.

Localities.—Streams on slopes of Table Mt. (Blinkwater, Platteklip, and Skeleton Ravines, Orange Kloof) (November to March, K. H. B.); Amandel River, Hex River, Worcester (October 1931, mature nymphs from trout stomachs, A. C. H.); Gt. Winterhoek Mts., Tulbagh (September 1932, K. H. B., and November 1932, K. H. B. and H. G. W.); Porterville (August 1937, A. C. H.); Seven Weeks Poort, Ladismith, Cape (September 1933, nymphs and subimagos, K. H. B.); Prince Albert, mouth of Zwartberg Pass (September 1933, nymphs, K. H. B.).

FAM. ECDYONURIDAE.

Afronurus peringueyi (E. P.).

1932. Barnard, *loc. cit.*, p. 255.

Localities.—Yarrow River, Karkloof, Natal (18th March 1934, L. A. Day); Umzimkulu River (April 1936, nymphs, Dr. Sampson); Cathkin Peak, 6000 ft., Drakensberg, Natal (January 1938, nymphs, Dr. R. F. Lawrence).

Afronurus harrisoni Brnrd.

1932. Barnard, *loc. cit.*, p. 257.

Localities.—Du Toits Kloof, Rawsonville (25th March 1932, ♀ imago, K. H. B.); Michell's Pass, Ceres (September 1932, nymphs, K. H. B.); Seven Weeks Poort, Ladismith, Cape (September 1933, nymphs, K. H. B.); Upper Olifants River, north of Ceres (October 1937, ♀ imago, K. H. B.).

TRICHOPTERA.

A considerable amount of material has accumulated since the publication of "South African Caddis-flies" (Barnard, Trans. Roy. Soc. S. Afr., xxi, pt. 4, 1934), comprising undescribed species and numerous new locality records due to collecting by Mr. H. G. Wood and myself. Only the most important localities are recorded, namely, those extending the already recorded distribution or linking up widely separated localities.

INAEQUIPALPIA.

FAM. SERICOSTOMATIDAE.

Gen. GOERODES Ulmer.

1907. Ulmer, Cat. Coll. Selys. fasc. 6, p. 37.

1927. Martynov, Ann. Mus. Zool. Ac. Sci. U.R.S.S., xxviii, p. 471 (*Crunobiodes*).

1939. Mosely, Ruwenzori Exp. (Brit. Mus.), iii, p. 4.

This genus is characterised by a fold in the fore-wing of the ♂, and a certain type of genitalia.

As the South African species conform with the genus *Goerodes* as redefined, Mosely (*loc. cit.*, *supra*, p. 2) has transferred it, together with other African species, to *Goerodes*, leaving *Crunociella* with a single Madagascan species.

Goerodes caffrariae (Brnrd.).

(Fig. 10.)

1934. Barnard, *loc. cit.*, p. 302, fig. 2 (♂) (*Crunociella c.*).

Imago ♀.—Fore-wing narrower and more oval than in ♂, covered with hairs only, no scales. Venation similar to that of *sjoestedti* Ulmer,

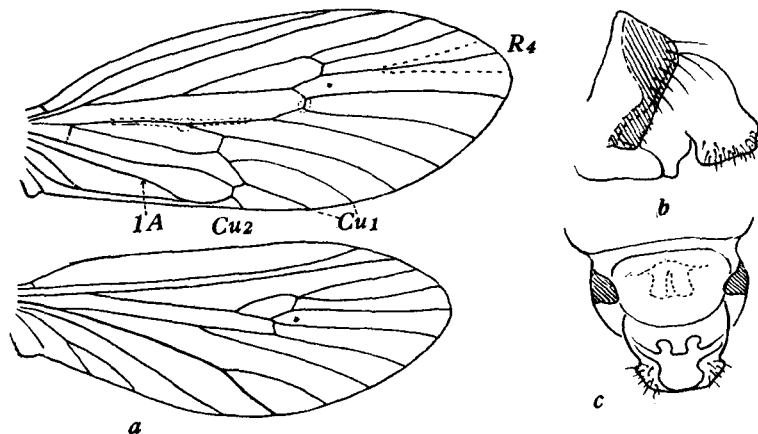


FIG. 10.—*Goerodes caffrariae* (Brnrd.). *a*, fore- and hind-wings ♀, dotted line representing forking of R_4 in one of the specimens. *b*, *c*, lateral and ventral views of ♀ genitalia.

but fork of Cu_1 midway between distal cross-vein of thyridial cell ($M_{3+4} - Cu_1$) and cross-vein $Cu_{1b} - Cu_2$. Basal cross-vein $Cu_1 - Cu_2$ perpendicular and situated at the fork of M and Cu_1 (this cross-vein

was omitted in the figure of the ♂). Hind-wing as in *sjoestedti*; Sc and R separate throughout (as is probably the case in *sjoestedti*, though the figure shows them fused proximally). One specimen has R_4 forked in both fore-wings, as indicated by dotted lines in fig. 10, *a*.

On the membrane the cross-vein $R_5 - M_1$ is surrounded by an oval clear space, and a clear space along M and M_{1+2} , with a slight expansion at forking of M_{1+2} and M_{3+4} . Coloration as in ♂.

Fore-wing 6-6.5 mm.

Genitalia, terminal tergite projecting rather prominently, in dorsal (or ventral) view rounded-truncate; terminal sternite apically trilobed; penultimate sternite forming a flat semicircular plate.

Locality.—Grahamstown (Carl's Rust and Paradise Kloof) (J. Hewitt, 2 ♀♀).

Dyschimus collyrifer Brnrd.

1934. Barnard, *loc. cit.*, p. 306, fig. 5, *a-e*.

Locality.—Malgas River, George (K. H. B., November 1938, 1 ♂).

Dyschimus ensifer Brnrd.

(Fig. 11.)

1934. Barnard, *loc. cit.*, p. 306, fig. 5, *f-k* (♂).

Imago, ♀.—Venation; in fore-wing Cu_{1b} complete to margin, cross-vein from fork of Cu_1 nearly straight to margin, joining Cu_2 and $1A$, neither of the latter veins continued to margin. In hind-wing distal portion of Sc running obliquely upwards and forwards to C (not recurved as in ♂), R incomplete basally and distally, discoidal cell present, fork 3 shortly stalked. Genitalia, supra-anal plate prominent, in dorsal (or ventral) view broadly subtriangular with apical notch; subanal plate small, longer than wide, apically rounded.

Fore-wing 10 mm.

Colour as in ♂, antennae dark umber.

Locality.—Grahamstown (Carl's Rust) (J. Hewitt, 1 ♀).

Remarks.—In the venation of the hind-wing and the genitalia, in both sexes, this species is somewhat isolated from the other two species of the genus.

Rhoizema montanum Brnrd.

1934. Barnard, *loc. cit.*, p. 311, fig. 8.

Locality.—Prince Alfred's Pass, Avontuur, Outeniqua Range, 3500 feet (K. H. B. and C. W. T., January 1940, 1 ♂).

Petroplax phleophila Brnrd.

1934. Barnard, *loc. cit.*, p. 319, fig. 14, a-g.

Locality.—Willow R., north slopes of Cockscomb Peak (Uitenhage Div.) (K. H. B. and C. W. T., October 1938).

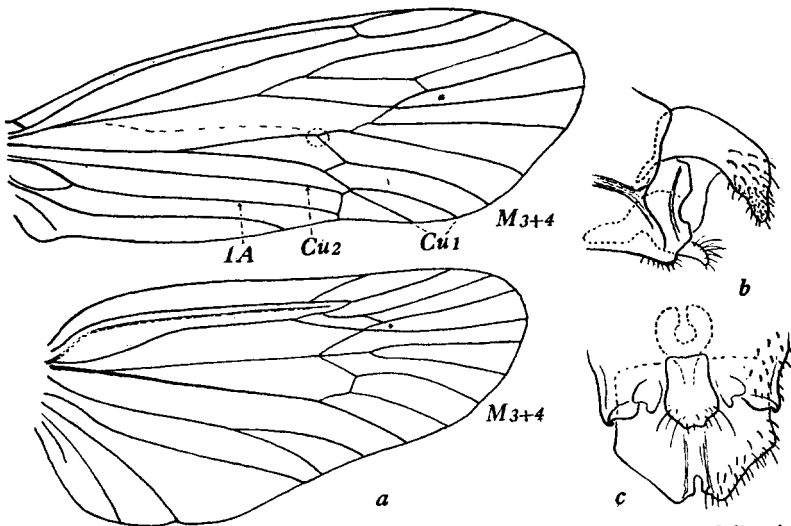


FIG. 11.—*Dyschimus ensifer* Brnrd. a, fore- and hind-wings, ♀, dotted line in fore-wing representing a fold. b, c, lateral and ventral views ♀ genitalia.

Petroplax anomala n. sp.

(Fig. 12.)

Imago, ♂.—Head and thorax dark amber with blackish hairs. Legs and antennae fuscous, the latter unicolorous. Wing membrane with the anastomosis and a streak along M clear white; hairs on fore-wing sepia-brown with golden-brown hairs intermixed, androconia blackish; hairs on hind-wing sepia, fringe blackish.

Fore-wing 7 mm.

Venation.—M prolonged basally and without apparent connection with Cu_1 ; between these two veins a fold forming a deep groove on lower surface; on anterior side of Cu_1 at base on lower surface a series of androconia, extending about 1 mm. in length; Cu_2 and 1A obsolete, represented by a fold which does not extend more than $\frac{1}{3}$ length of wing; thyridial cell resembling that of the ♀ of the other species; two of the branches of M forming a reversed fork or cell which is symmetrical in both right and left wings. Hind-wing with an indication of a cross-vein between M and Cu_{1a} .

Genitalia, 9th and 10th tergites fused, the portion representing the 9th somewhat raised and medianly scabrous, the distal portion (10th) apically cleft, the lower lateral margins with fine recurved serrulations; penis with 2 stout subterminal spiniform processes, whose apices are slightly upturned, the membranous apex bilobed; clasper spatulate, hollowed on inner side, apex rounded (not bifid); 9th sternite with

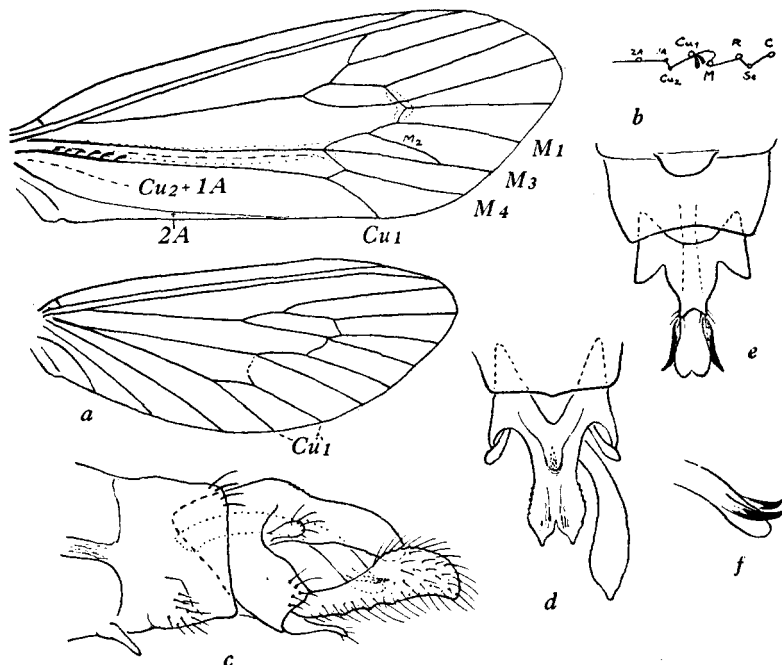


FIG. 12.—*Petroplax anomala* n. sp. a, fore- and hind-wings ♂ (androconia actually on lower surface). b, diagrammatic cross-section of fore-wing near base, showing androconia attached to lower surface of Cu_1 . c, d, e, lateral, dorsal and ventral views of ♂ genitalia. f, lateral view of apex of penis.

stout process, the apex slightly excavate; lamina on 7th sternite transversely crescentic.

Locality.—Grahamstown (Carl's Rust) (J. Hewitt, 1 ♂).

Remarks.—In general features this species unmistakably belongs to the genus *Petroplax* (Barnard, *loc. cit.*, p. 316), but it is markedly distinct from the other three species in the modification of the fore-wing. The patch of androconia is much larger than in the other species.

In consequence of the suppression of Cu_2 and $1A$ in the fore-wing, M and Cu_1 are pushed farther towards the hind margin, and the area between Rs and M becomes very broad.

Cheimacheramus caudalis Brnrd.

1934. Barnard, *loc. cit.*, p. 316, fig. 12.

The Palmiet River specimens (H. G. W., December 1933) are even smaller than the Tradouw ones, viz.: fore-wing ♂ 4.5 mm., ♀ 4.75 mm.

The posterior projection of the ♂ claspers is more slender, the prongs of the fork of 10th tergite longer and less divergent, and the ventral process of 9th sternite bluntly pointed.

Locality.—Upper Olifants River, north of Ceres (K. H. B., October 1937, 1 ♂).

Barbarochthon brunneum Brnrd.

1934. Barnard, *loc. cit.*, p. 321, figs. 15 and 1, *a*.

The specific identity of the Table Mt. form with that from the type locality has been established by breeding. In fresh specimens, especially noticeable in those collected in the Hottentots Holland Mts., there is a pale or white band along the side of the abdomen.

Locality.—Upper Olifants River, north of Ceres (K. H. B. and C. W. T., October 1937, ♂♂, ♀♀).

AEQUIPALPIA.

Petrothrincus triangularis (Hagen).

1934. Barnard, *loc. cit.*, p. 325, fig. 18, *g-q*.

Cases were found (K. H. B., September 1933) in the Valsch Gat stream on the Ceres (north) side of Matroosberg in the Hex River Mts.

FAM. LEPTOCERIDAE.

Pseudoleptocerus cupreus Brnrd.

1934. Barnard, *loc. cit.*, p. 329, fig. 19.

Mosely (Ann. Mag. Nat. Hist. (10), xi, p. 541, figs. 6-10, 1933) has redescribed *P. schoutedeni* Navas. These two species would seem to be closely allied, but Mosely says nothing about the spines on the penis; the shape of the process on the 9th sternite in *schoutedeni* is more like that of *cupreus* var. *subfuscus* (fig. 19, *i*).

Leptocerus schoenobates Brnrd.

1934. Barnard, *loc. cit.*, p. 333, figs. 21, 22, *a-l*.

Localities.—Upper Olifants River, north of Ceres (K. H. B. and C. W. T., October 1937, ♂♂, ♀♀); Clarkson, between Humansdorp and Tsitsikama (C. W. T., November 1938, ♂♂).

Leptocerus bibulus n. sp.

(Fig. 13, a-d.)

Imago.—In fore-wing anastomosis between R_{2+3} and Cu_1 straight, or almost so, slightly oblique; stalk of fork 1 subequal to upper

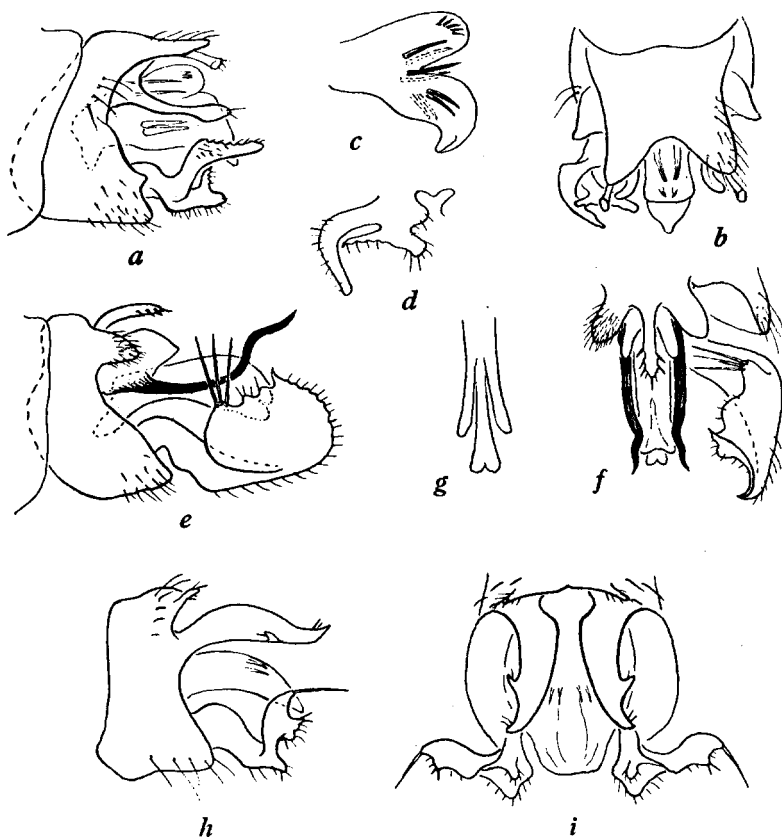


FIG. 13.—*Leptocerus bibulus* n. sp. a, b, lateral and dorsal views of ♂ genitalia. c, penis. d, ventral view of one of the claspers.

Leptocerus spatula n. sp. e, f, lateral and dorsal views of ♂ genitalia. g, ventral view of penis and lower sheath.

Leptocerus dieseli n. sp. h, i, lateral and dorsal views of ♂ genitalia.

branch (R_2) of fork 1; apical cell 4 ♂ with stalk almost or quite obsolete, sessile on anastomosis; stalk of cell 4 ♀ (M_{1+2}) subequal to stalk of fork 1. In hind-wing apical fork 1 very short, about $\frac{1}{4}$ length of its stalk; stalk of apical cell 4 very short, not more than $\frac{1}{2}$ the cross-vein between R_s and M , i.e. the cell almost sessile.

Genitalia ♂ in general similar to those of *potes* Brnrd. (*loc. cit.*, p. 341), but distinguished by the large dorsal plate, different shape of the two dependent processes, spination of penis, and claspers.

Fore-wing 5-6 mm. Coloration as in *potes*.

Locality.—French Hoek Pass (K. H. B. and H. G. W., October 1933).

Leptocerus spatula n. sp.

(Fig. 13, e-g.)

Imago.—In fore-wing anastomosis between R_{2+3} and Cu_1 straight, oblique; stalk of fork 1 equal to upper branch (R_2) of fork; apical cell 4 ♂ with short stalk not quite equal to cross-vein between M and Cu_1 . In hind-wing apical fork 1 short, less than $\frac{1}{3}$ length of its stalk, much shorter in the Clanwilliam specimens; stalk of apical cell 4 about $1\frac{1}{2}$ times length of cross-vein between Rs and M.

Genitalia ♂ somewhat like those of *tuckeri* Brnrd. and variety, but distinguished by the extraordinarily long spinous processes and the more lamellately expanded claspers.

Fore-wing 9 mm. Head and thorax umber brown, abdomen paler; wings pale brown, neuration slightly darker.

Locality.—French Hoek Pass (H. G. W., October 1933, 1 ♂; K. H. B., October 1936, 1 ♂); Jan Diesel's River, Clanwilliam (K. H. B., September 1936, 2 ♂♂); Upper Olifants R., north of Ceres (K. H. B. and C. W. T., October 1937, ♂♂, ♀♀).

Leptocerus tabularis Brnrd.

1934. Barnard, *loc. cit.*, p. 337, fig. 24.

Top of Kasteel's Poort, Table Mt. (7th May 1935, K. H. B.), in very dry places. All attempts to locate the larva of this species have been unsuccessful.

Leptocerus harrisoni Brnrd.

1934. Barnard, *loc. cit.*, p. 337, figs. 25, 26.

Jan. Diesel's River, Clanwilliam (K. H. B., September 1936, 1 ♂).

Leptocerus dieseli n. sp.

(Fig. 13, h, i.)

Imago.—In fore-wing anastomosis between R_{2+3} and Cu_1 straight, oblique; stalk of fork 1 subequal to upper branch of fork; apical cell 4 ♂ with stalk $1\frac{1}{2}$ times length of cross-vein between M and Cu_1 .

In hind-wing apical fork 1 absent; stalk of apical cell 4 subequal to cross-vein between Rs and M.

Genitalia ♂—a transverse band projecting laterally in a short setose process on each side, below this a pair of strongly chitinated processes, with sinuous dorsal margin in lateral view, and a short retrorse spinous projection on lateral margin; penis very broad in dorsal view, with 4 weak spines dorsally; no titillators; claspers relatively small, twisted so that the upper margin (in lateral view) becomes the front margin, in general somewhat like those of *L. cedri* (Barnard, *loc. cit.*, fig. 27, *h, i*).

Fore-wing 6-6.3 mm. Colour of fore-wing uniform greyish.

Locality.—Jan Diesel's River, Clanwilliam (K. H. B., September 1936, 4 ♂♂).

Remarks.—At first sight resembling *L. cedri* in the genitalia, but without the small medio-dorsal bifid process of the latter species, and apical fork 1 in hind-wing completely absent.

Leptocerus cedri Brnrd.

1934. Barnard, *loc. cit.*, p. 341, fig. 27, *h, i*.

Upper Olifants River, north of Ceres (K. H. B. and C. W. T., October 1937, ♂♂, ♀♀).

Leptocerus potes Brnrd.

1934. Barnard, *loc. cit.*, p. 341, fig. 28, *a-g*.

Locality.—Kaimans River, near George (K. H. B., November 1938, ♂♂, ♀♀).

Leptocerus longistylis Brnrd.

1934. Barnard, *loc. cit.*, p. 341, fig. 27, *j-l*.

Locality.—Upper Olifants River, north of Ceres (K. H. B. and C. W. T., October 1937, ♂♂).

Leptocerus securis Brnrd.

1934. Barnard, *loc. cit.*, p. 343, fig. 30, *a, b*.

Localities.—Wellington Mts. (H. G. W., October 1933); French Hoek Pass, east side (K. H. B., October 1936, ♂♂, ♀♀); Pakhuis Pass, Clanwilliam (K. H. B., September 1936, ♂♂, ♀♀); Willow R., north slopes of Cockscomb Peak (Uitenhage Div.) (K. H. B., October 1938); George and Kaimans River (K. H. B., November 1938).

In the George and Kaimans River specimens (1 ♂ from each locality), the medio-dorsal process, instead of being laterally com-

pressed, forms a dorso-ventrally flattened process. When more material is available, this may prove to be of varietal or specific value, though in other respects the genitalia do not seem to show any differences from the typical form.

Leptocerus stephanus Brnrd.

1934. Barnard, *loc. cit.*, p. 348, figs. 22, *k*, 31, *d*, *e*.

Localities.—Tradouw Peak, Langeberg Range (K. H. B., January 1935); Meirings Poort, Spitzkop, Zwartberg Range (K. H. B. and H. G. W., January 1935); Rust en Vrede, near Congo, Zwartberg Range (H. G. W., January 1938).

The Zwartberg Range specimens have the 10th tergite with outstanding lateral spines as figured in fig. 31, *e*.

Leptocerus elaphus Brnrd.

1934. Barnard, *loc. cit.*, p. 348, fig. 31, *f*, *g*.

Localities.—River Zonder End Mts., 4000 feet (K. H. B., January 1934); du Toits Kloof, Wellington Mts. (H. G. W., March 1934).

Leptecho scirpi Brnrd.

1934. Barnard, *loc. cit.*, p. 349, figs. 22, *p-s*, 31, *j*, *k*.

Localities.—River Zonder End Mts., 4000 feet (K. H. B., January 1934); French Hoek Pass (K. H. B. and H. G. W., April 1935).

Gen. LEPTOCERINA Mosely.

The suggestion (Barnard, *loc. cit.*, p. 350) that *furcata* Mosely was synonymous with *ugandanus* Ulmer is confirmed by Mosely (Ann. Mag. Nat. Hist. (10), xvii, p. 429, 1936) after examination of Ulmer's type.

Oecetis afra Mosely.

1934 (May). Mosely, Eos., ix, p. 24, figs. 14–16.

It is possible that *kunenensis* Brnrd., described from the ♀ only, will prove synonymous with the Northern Rhodesian *afra*.

Oecetis lucipetens n. sp.

(Fig. 14.)

Imago.—Tibial spurs 1, 2, 2. Fore-wing with Sc and R thickened and connected by an oblique cross-vein distally, Sc only faintly

continued to costal margin; apical fork 1 sessile, fork 3 shortly stalked; anastomosis stepped; hind-wing narrow, fork 1 absent, M and Cu₁ forked.

Genitalia ♂.—9th (or 9th and 10th?) tergite ovoid, with 2 minute setose apical lobes, and 2 subapical groups of setae on a slightly

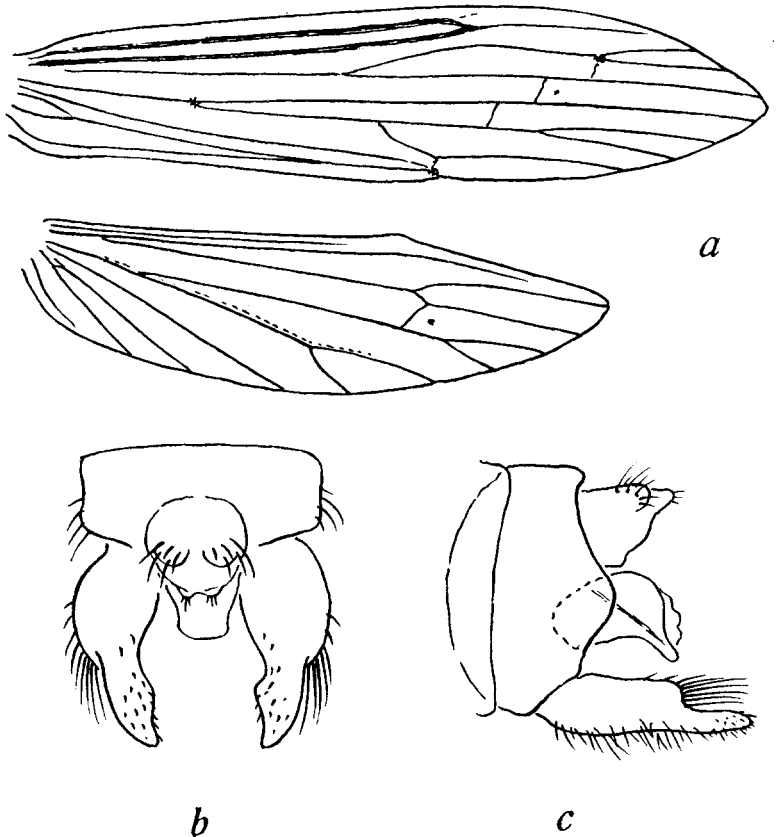


FIG. 14.—*Oecetis lucipetens* n. sp. a, fore- and hind-wings. b, c, dorsal and lateral views of ♂ genitalia.

raised boss-like projection; penis short, curved downwards; clasper distally abruptly narrowed, upper margin proximal to the narrow apex with a fringe of rather long setae.

Fore-wing 6 mm., antenna 18 mm.

Head and thorax fulvous, wings pale with sepia venation, in fore-wing a small dot formed by black hairs at base of fork 1, at base of

thyridial cell, and at junction of Cu_{1+2} with hind margin. Legs and antennae pale.

Locality.—Olifants River, Citrusdal, Clanwilliam Division, Cape (K. H. B., 2 ♂♂, 3 ♀♀, 13th February 1939).

Remarks.—Although this is rather an aberrant species with features reminiscent of *Ptochoecetis*, I am referring it for the time being to *Oecetis* on the advice of Mr. Mosely, to whom I submitted specimens.

The flies were caught round the lamp on the bank of the river; the taxonomist also seeks light on many puzzling cases.

Gen. HOMILIA McLach.

1934. Barnard, Tr. Roy. Soc. S. Afr., xxi, p. 354.

1936. Mosely, Ann. Mag. Nat. Hist. (10), xvii, pp. 429, 432.

Mosely describes two species, one of which, *H. lomia*, is found at Sabie, Transvaal, and in Sierra Leone. He does not give the tibial spur formula for either species. In 1934 under *Leptocerus fissus* (*loc. cit.*, p. 336), I remarked that as this species was stated to have the formula 2, 2, 2 in both sexes, it could not be included in *Homilia* in spite of the similarity of the ♂ genitalia.

The two n. spp. described below have a 2, 2, 2 formula, in the case of *elephas* in both sexes; in other respects they are essentially representatives of the genus *Homilia*. Although the tibial spurs are customarily regarded as of considerable taxonomic importance, I am including both these n. spp. in *Homilia*, and suggest that *L. fissus* may eventually also be transferred to this genus.

Of the two species here described, *knysnaensis* agrees with *vetulata* Brnrd. and *malia* Mosely in lacking the lateral appendages of the 10th tergite; and *elephas* is more closely allied to *lomia* Mosely than to *vetulata* Brnrd. from the Kunene River.

Homilia elephas n. sp.

(Fig. 15, d-f.)

Imago.—Tibial spurs 2, 2, 2; the two on the fore-tibia are subequal and easily distinguished in both sexes when the limb is cleared. Venation as in *lomia* Mosely (*loc. cit.*, fig. 5) in both sexes, stalk of apical fork 1 shorter than its upper branch, and shorter than stalk of apical cell 4.

Genitalia ♂.—9th tergite, as in *vetulata* and *lomia*, with 2 patches of minute spinules or granules, preanal (superior) appendages elongate, slender, sparsely setose; 10th tergite (upper penis sheath) elongate,

deeply cleft, without prongs, apices of lobes acute, near the base of the 10th tergite on each side there arises an elongate process (lateral appendage) (not found in either *vetulata* or *lomia*), sinuous, with setose apex; penis robust, in side view bent downwards at right angles, deeply grooved dorsally and posteriorly; clasper in side view widely bifid, proximal upper branch ending in a sharp, incurved, strongly chitinated apex (cf. *lomia*), distal branch slender, elongate, apically incurved, a slender process arising from inner side, lower margin with a tooth-like process.

Fore-wing 6-7 mm. Antennae 14 mm.

Head and thorax fuscous with black and white hairs. Wings umber brown, somewhat speckled apically with white hairs; in fore-wing a whitish costal mark proximal and another distal to the pterostigmal area, which in the denuded wing by transmitted light is suffused, a whitish mark at junction of Cu_{1+2} with hind margin. Tarsi and antennae annulate.

Locality.—Olifants River, Citrusdal, Clanwilliam Division, Cape (K. H. B., 13th February 1939, 2 ♂♂, 3 ♀♀).

Homilia knysnaensis n. sp.

(Fig. 15, a-c.)

Imago, ♂.—Tibial spurs 2, 2, 2. Fore-wing not scaly, with stalk of apical fork 1 subequal to its upper branch, stalk of apical cell 4 shorter; thyridial cell longer than discoidal cell; anastomosis nearly perpendicular to long axis of wing, cross-veins R_4-M_{1+2} in line, distal to cross-vein $M-M_{3+4}$.

Genitalia ♂, preanal appendages somewhat clavate, setose; 10th tergite an elongate process, its depth basally in lateral view greater than its width in dorsal view, bifurcate for about half its length, with a pair of movable slender processes dorsally; no lateral appendages; penis stout, curved, with subterminal lateral expansions when viewed dorsally; claspers with an internal ventral bifid process at base, one lobe of which bears short spines, the other long setae, on its ventral surface a small digitiform process, with apical spinule, the longer external arm of the clasper apically trifid, the upper two processes being movable.

Fore-wing 8 mm. Antennae 18 mm.

Head and thorax piceous-brown. Fore-wing dark sepia with 2 cuneiform white marks distally from the costa inwards, subcosta and hind-margin as far as end of Cu_2 pale, a pale speck also at junction

of cross-vein $M-M_{3+4}$ with M . Antennae pale sepia, annulated. Legs pale ochreous.

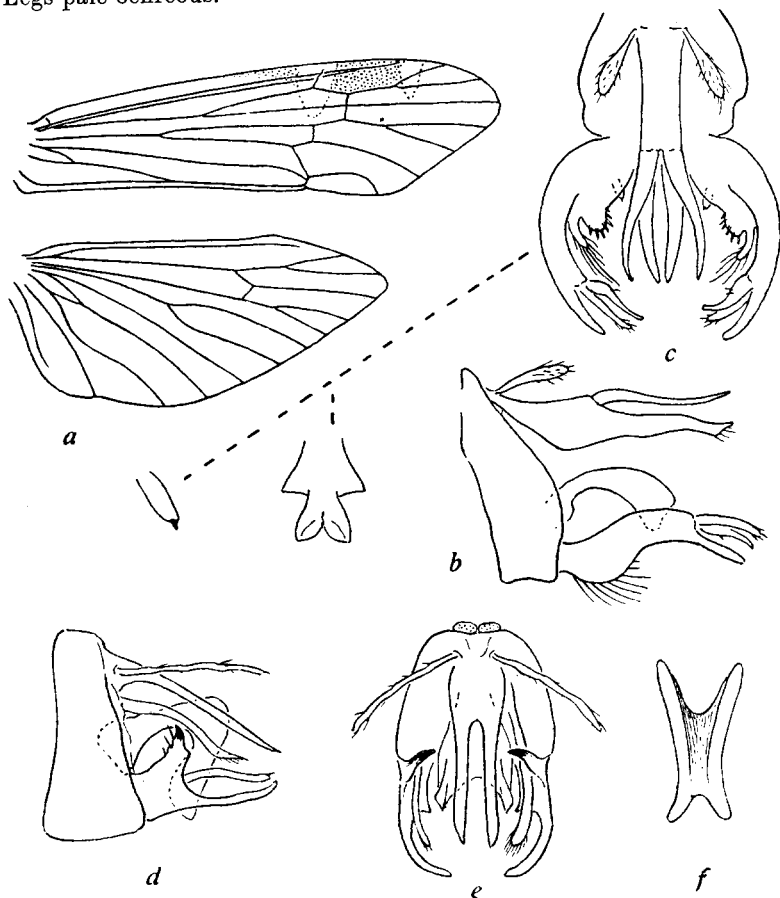


FIG. 15.—*Homilia knysnaensis* n. sp. *a*, fore- and hind-wings. *b*, lateral view of ♂ genitalia. *c*, dorsal view of same, with penis drawn separately to same scale, and ventral basal process further enlarged.

Homilia elephas n. sp. *d*, lateral view of ♂ genitalia. *e*, dorsal view of same, the appendages of 9th tergite displaced, lateral appendages omitted on left side, inner process of clasper omitted on right side. *f*, posterior view of penis (on a larger scale).

Locality.—Goukama River, near Knysna (K. H. B., 5th November 1938, 1 ♂).

Remarks.—The colour pattern of this single specimen suggests its inclusion in the genus *Homilia*, apart from other features.

Gen. ADICELLA McLach.

1932. Barnard, *loc. cit.*, p. 357.

1932. Ulmer, Peking Nat. Hist. Bull., vii.

1936. Martynov, Rec. Ind. Mus., xxxviii, p. 279.

Adicella monachus n. sp.

(Fig. 16.)

Imago.—Venation like that of *pulcherrima* Ulmer, and *biramosa* Mart. (*loc. cit.*, 1936); in fore-wing M_1 and M_2 arising together at upper distal corner of thyridial cell, anastomosis almost straight, R_1 thickened distally, stalk of fork 1 subequal to its upper branch

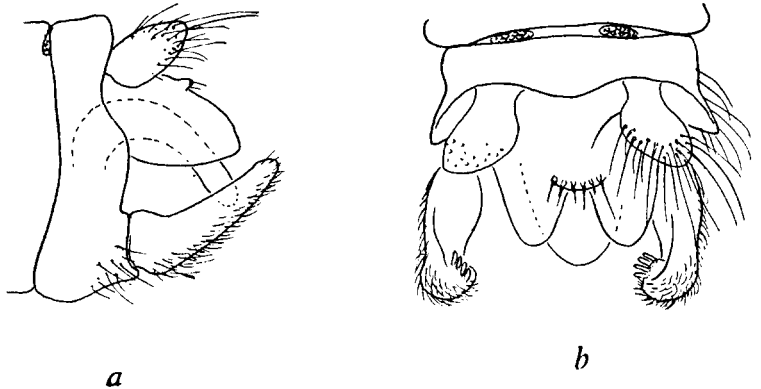


FIG. 16.—*Adicella monachus* n. sp. a, b, lateral and dorsal views of ♂ genitalia.

(R_2); in hind-wing fork of M nearer to level of fork of R than in *biramosa*.

Genitalia ♂, 9th tergite transverse, preanal appendages ovate, strongly setose, 10th tergite forming a broad, cowl-like process, apically bilobed, with a short transverse median ridge, penis stout, simple, strongly curved, clasper uniramous, upturned, somewhat twisted, with a few short spines on apex.

Fore-wing 5.5 mm. Head and thorax ochreous, with greyish hairs, antennae pale ochreous, faintly annulate, wings grey, anastomosis on fore-wing faintly indicated by a whitish streak.

Larva.—Similar to that of *filicornis* (Rousseau, 1921, p. 636, fig. 219). Case composed of small pieces of vegetable matter forming a tube more or less 4-sided in cross-section; sometimes sand-grains are incorporated; one case is composed entirely of sand-grains, but is circular, not 4-sided in section.

Locality.—Natal (Natal Mus.).

Remarks.—As regards the ♂ genitalia this species is very like *syriaca* Ulmer (1907, Notes, Leyden Mus., xxix, p. 52, figs. 71, 72). In lateral view (fig. 71) there is very little difference; but the claspers are described and figured (fig. 72) as 2-jointed. One suspects that this is an error, as they appear to be only 1-jointed in fig. 71. In *syriaca* the fore-wings are yellow, and the species is stated to be the palest or brightest of the species then known. This coloration does not fit the present species. Although *syriaca* has been recorded from widely separated localities (Lestage, 1919, also Barnard, *loc. cit.*), it seems better to regard the Natal form as a separate species until a revised description of *syriaca* has been given.

Potamoryza modesta Brnrd.

1934. Barnard, *loc. cit.*, p. 352, fig. 33.

Larvae and pupae (imagos dissected from latter) were collected at the northern entrance to the Zwartberg Pass, Prince Albert (K. H. B., September 1933); Willow R., north slopes of Cockscomb Peak (Uitenhage Division); Patentie (Gamtoos valley); and Knysna (K. H. B., October–November 1938).

FAM. HYDROPSYCHIDAE.

Gen. CHEUMATOPSYCHE Wallengr.

1891. Wallengren, K. Sv. Ver. Ak. Handl., n.s., xxiv, pp. 138, 142.

1934. Barnard, *loc. cit.*, p. 360. (*Hydropsychodes*.)

1936. Mosely, Ann. Mag. Nat. Hist. (10), xvii, p. 438.

H. maculata (Mosely).

1934 (May). Mosely, Eos., ix, p. 22, figs. 11–13.

1934 (July). Barnard, *loc. cit.*, p. 362, figs. 37, a–f, 38 (*lateralis*).

It is evident that Mosely and I have described forms of the same species. This very common and somewhat variable Western Province species must therefore bear the name proposed by Mosely.

In Ann. Mag. Nat. Hist. (10), xv, p. 231, 1935, Mosely gives a list of the African species of this genus.

Leptonema natalense Mosely.

1933. Mosely, Rev. Gen. *Leptonema*, Brit. Mus., p. 24, figs. 43-48.

1934. Barnard, *loc. cit.*, p. 370, fig. 41, *f-i* (*occidentale*, non Ulmer).

By an oversight the correction was not made in my paper. In this paper delete the words: "Distribution: Cameroons."

Macronema natalense Ulmer.

1934. Barnard, *loc. cit.*, p. 372, fig. 42, *a-e*.

Localities.—Kromme River at Assegai Bush (C. W. T., 1st November 1938, 1 ♀); Goukama River, near Knysna (K. H. B., 5th November 1938, ♂♂).

FAM. POLYCENTROPODIDAE.

Dipseudopsis capensis Wlkr.

(Fig. 17.)

1934. Barnard, *loc. cit.*, p. 374, fig. 43, *a-i*.

Pupa (described from empty skins).—Mandibles bulbous at base, distally very slender, curved, terete. Presegmental dorsal plates on

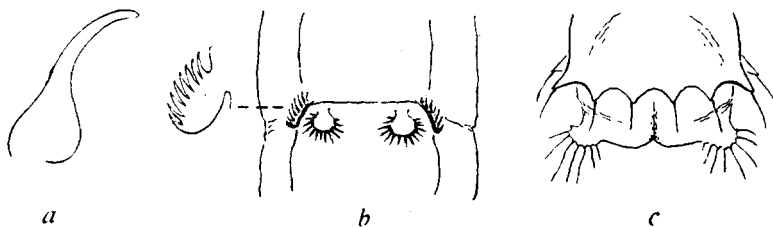


FIG. 17.—*Dipseudopsis capensis* Wlkr. Pupa. *a*, mandible. *b*, dorsal view of 5th and 6th abdominal segments, showing postsegmental plates on 5th and presegmental plates on 6th segment, with postsegmental plate in lateral view and further enlarged. *c*, dorsal view of 9th abdominal segment.

segments 3, 4, and 6-8, sometimes (in 1 out of 13 specimens) also on segment 5; postsegmental plates dorso-laterally on segment 5. The presegmental plates bear spines, 6-8 on the plates on segments 3 and 4, 4-5 on those on segment 8, 10-12 on those on segment 7, and about 14 on those on segment 6; the postsegmental plates are oval in shape, nearly vertically upstanding, and with 6-8 strong spines on upper edge. 9th segment with a transverse dorsal series of 8 chitinised conical projections, the outermost (lateral) one on each side smaller than the others, each bearing a single rather long seta;

posterior margin arcuate, postero-lateral corners with several setae of varying length.

Localities.—Dolley Reservoir, Zwartkops River, Uitenhage (K. H. B. and C. W. T., 28th October 1938, ♂, ♀♀, and empty pupal skins); Goukama River, near Knysna (K. H. B., 5th November 1938, 2 ♀♀).

FAM. PSYCHOMYIDAE.

Ecnomus similis Mosely.

1934. Barnard, *loc. cit.*, p. 378, fig. 45, *e, f*.

Locality.—Grobelars R., Schoemann's Poort, north of Oudtshoorn (K. H. B., October 1937). One ♂ agreeing with Mosely's description, but the inner and distal margins of the claspers are very distinctly scalloped or crenulate.

Ecnomus natalensis Ulmer.

1934. Barnard, *loc. cit.*, p. 378, fig. 45, *g-i*.

Locality.—Knysna (K. H. B., November 1938, 3 ♂♂).

Gen. PADUNIELLA Ulmer.

1912. Ulmer, Notes, Leyden Mus., vol. xxxv, p. 80.

1934. Martynov, Tabl. Anal. Fauna U.R.S.S., vol. xiii, p. 209.

1936. Mosely, Ann. Mag. Nat. Hist. (10), vol. xvii, p. 444.

Tibial spurs ♂ 2, 4, 4, ♀ 1, 4, 4. No ocelli. Maxillary palp ♂ 6, ♀ 5-jointed. Labial palp ♂ 4, ♀ 3-jointed. Wings narrow (much resembling those of Hydroptilids), especially the hind-wing, lanceolate, fore-wing with anal lobe, and forks 2, 3, 4, 5, hind-wing with forks 2 and 5.

Originally instituted for a Javanese species.

Paduniella capensis n. sp.

(Fig. 18.)

Imago.—Venation very similar to that of *africana* (Ulmer) (*cf.* Mosely, *loc. cit.*, fig. 30), but venation very difficult to trace.

Genitalia ♂. 9th tergite in dorsal view triangular with truncate apex, upper appendages ovate both in dorsal and lateral views, with slightly scalloped or serrate edges, setose; penis in lateral view apically enlarged, a slender dorsal process arising near base; claspers oblong, apically bifid, with a setose lobe on middle of upper margin.

Fore-wing ♂ 4, ♀ 4-5 mm. Head, thorax, and abdomen pale brown, fore wing fawn brown, darker (sepia) in the Cu and anal

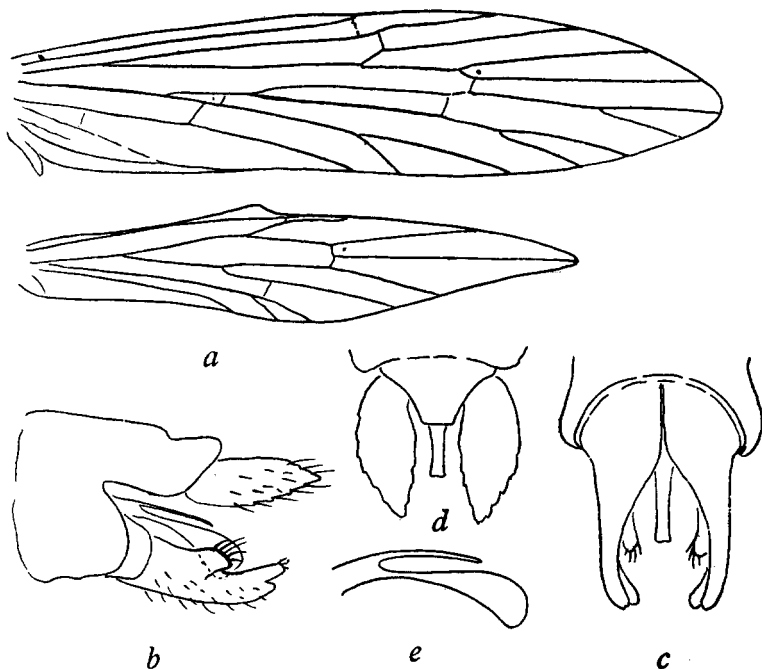


FIG. 18.—*Paduniella capensis* n. sp. a, fore- and hind-wings. b, c, d, lateral, dorsal and ventral views of ♂ genitalia. e, penis.

areas where the scaling is denser; antennae annulate, legs pale ochreous.

Locality.—Schoemann's Poort, north of Oudtshoorn (K. H. B. and C. W. T., October 1937, ♂♂, ♀♀).

Remarks.—Differs from *africana* (Ulmer), from Cameroon and Sierra Leone, in the shape of the upper appendages and the claspers.

FAM. PHILOPOTAMIDAE.

Chimarrha ambulans Brnrd.

1934. Barnard, *loc. cit.*, p. 382, figs. 47 and 1, b.

Localities.—Meirings Poort, Zwartberg Range (K. H. B., January 1935); Bosch Kloof, Clanwilliam (K. H. B., September 1936); George and Kaimans R. (H. G. W., January 1938); Kaimans R. and Tsitsikama R. (K. H. B., November 1938); Goukama R., Knysna (K. H. B., November 1938).

Thylakion urceolus Brnrd.

1934. Barnard, *loc. cit.*, p. 386, fig. 49, *a-j*.

Localities.—Palmiet R., near Kleinmond (Caledon Div.) (K. H. B., December 1934); Willow R., north slopes of Cockscomb Peak (Uitenhage Div.) (K. H. B., October 1938).

FAM. RHYACOPHILIDAE.

Myspoleo agilis Brnrd.

1934. Barnard, *loc. cit.*, p. 388, fig. 50, *a-m*.

Locality.—Upper Olifants River, north of Ceres (K. H. B. and C. W. T., October 1937).

Myspoleo murinus Brnrd.

1934. Barnard, *loc. cit.*, p. 390, fig. 50, *n-p*.

Localities.—Drakenstein (K. H. B., October 1933) and French Hoek Mts. (H. G. W., November 1933); Malgas River, George (K. H. B. and C. W. T., November 1938).

FAM. HYDROPTILIDAE.

Argyrobothrus velocipes Brnrd.

1934. Barnard, *loc. cit.*, p. 393, fig. 52.

Locality.—Found in the Kirstenbosch Botanic Gardens, Newlands, Cape Peninsula (H. G. W., August 1933).

PERLARIA.

To the records in Barnard (Ann. S. Afr. Mus., vol. xxx, 1934) may be added the following:—

FAM. NEMOURIDAE.

Aphanicerca capensis Tillyard.

1934. Barnard, *loc. cit.*, p. 524, figs. 7, 8, *a-h*.

Localities.—Gydo Pass, north of Ceres (K. H. B. and C. W. T., October 1937, ♂, ♀ (var. β)); Kaimans River, near George (K. H. B., November 1938, ♂♂).

Aphanicerca bovina Brnrd.

1934. Barnard, *loc. cit.*, p. 531, fig. 12.

French Hoek Pass (east side) (H. G. W., April 1935, 2 ♂♂).

Aphanicerella barnardi Tillyard.

1934. Barnard, *loc. cit.*, p. 537, fig. 15.

French Hoek Pass (east side) (H. G. W., April 1935, 3 ♂♂, 1 ♀ (var. γ)).

Aphanicerella scutata Brnrd.

1934. Barnard, *loc. cit.*, p. 540, fig. 16.

French Hoek Pass (east side) (H. G. W., April 1935, 1 hemipterous ♂, 7 micropterous ♂♂, 7 micropterous ♀♀, including one pair *in cop*); same locality (H. G. W., September 1935, 1 ♂, 2 ♀♀, and 1 hemipterous ♂, 1 hemipterous ♀).

In the hemipterous ♂ the fore-wing measures 3 mm., extending to the end of the 7th abdominal segment; the hind-wing measures .75 mm.

In the micropterous specimens the fore-wing measures 1 mm. in the ♂♂, and 1.5–2 mm. in the ♀♀; in both sexes the hind-wing measures .4–.5 mm.

Aphanicerella bifurcata Brnrd.

1934. Barnard, *loc. cit.*, p. 542, fig. 18.

Hermitage Kloof, Swellendam (H. G. W., January 1938).

Aphanicerella nigra Brnrd.

1934. Barnard, *loc. cit.*, p. 544, fig. 20.

Additional specimens, including ♂♂ and ♀♀ in copula, from the type locality (K. H. B., 3rd October 1936).

Desmonemoura pulchellum Tillyard.

1934. Barnard, *loc. cit.*, p. 546, fig. 21.

Localities.—Rust en Vrede, near Congo, Oudtshoorn District (H. G. W., January 1938); George (K. H. B., November 1938).

ODONATA.

Chlorocypha caligata (Selys).

1937. Barnard, Ann. S. Afr. Mus., vol. xxxii, p. 185, fig. 4.

At Patentie, in a side stream of the Gamtoos River, a young nymph was found under a stone (K. H. B., 31st October 1938). The gizzard shows 7-10 denticles in a double row (somewhat irregular) on each major fold, and 4-5 in a single row on each minor fold.

Pseudagrion massaicum Sjöst.

var. *cogmani* Brnrd.

1937. Barnard, *loc. cit.*, p. 215, fig. 15.

The Cogman's Kloof River flows into the Breede River, and this Damsel-fly has now been collected (K. H. B., February 1938) higher up the main valley at Robertson.

Gen. SYMPETRUM Newman.

1921. Rousseau, Larves et Nymphes Aquat., vol. i, p. 141.

1930. Lucas, Aquat. Stage Brit. Dragonfl. Ray Soc., No. 117, pp. 79-91, pls. 19-22.

1937. Barnard, *loc. cit.*, p. 251.

The diagnosis given by me in 1937 and based on that of Rousseau, must be slightly altered to include the now authenticated nymph of *S. fonscolombei*, viz.: medio-dorsal projections on abdomen small or absent, and lateral spines on segments 8 and 9 strong or feeble.

Sympetrum fonscolombei Selys.

1929. Brain, Insect Pests and their Control in S. Afr., p. 158, fig. 76 (nymph).

1930. Lucas, *loc. cit.*, p. 83.

1937. Barnard, *loc. cit.*, p. 251, fig. 29 (penis).

Several nymph skins were at hand in 1937, but owing to their extraordinary resemblance to those of *Crocothemis erythrae*, they were not recognised as being really nymphs of *S. fonscolombei*. Imagos have now been bred and the nymph authenticated.

The description of the nymph of *C. erythrae* (Barnard, *loc. cit.*, p. 250) applies except for the following differences: length up to 15-17 mm.; antennae longer than the distance between their bases

by the length of the last two joints; *divided spines on all the tibiae, but only on the fore and hind tarsi* (spines on the mid tarsi being simple).

Gen. PANTALA Hagen.

1921. Ris, Ann. S. Afr. Mus., vol. xviii, pp. 388, 431.

Imago.—Arculus proximal to 2nd Anq. More than 10 Anq in fore-wing, the last one incomplete, 7 in hind-wing. Sectors of arculus with common stalk. Triangle not crossed in either wing. One Ac in hind-wing, and a second cross-vein running obliquely to proximal corner of triangle. Anal field in hind-wing very broad. R_3 strongly sinuous. Irregularly one or two rows of cells in IR_3 -Rspl.

Nymph.—Body sparsely setose. Legs slender, moderately long; divided spines on all joints of all the tarsi. Antennae inserted a little in advance of level of anterior margin of eyes, lateral margins of head behind eyes convergent. Abdomen oval, without medio-dorsal tubercles; segments 8 and 9 with very strong lateral spines. Mask extending to middle coxae; lateral lobes with deep indents.

Pantala flavescens (Fabr.).

(Fig. 19.)

1904. Needham, Proc. U.S. Nat. Mus., vol. xxvii, p. 712, pl. 40, fig. 5 (nymph).

1921. Ris, *loc. cit.*, p. 431.

1937. Barnard, Ann. S. Afr. Mus., vol. xxxii, pp. 182, 260.

Nymph.—Up to 25 mm. Antennae about $1\frac{1}{4}$ times the distance between their bases. Abdomen widest across segment 6. Anal pyramid as long as segments 8 and 9 together; appendix dorsalis longer than the cercoids, and subequal to the cerci. Median lobe of mask with straight margins, meeting in an angle very slightly greater than 90° ; lateral lobes with 9 deep indents, each intervening tooth tipped with about 4 graduated spines; lateral setae 13–14, mental setae 16–20. Gizzard with 2 denticles on each ventral tooth, and a series of 6 on each dorsal tooth. Rectal gills with 48–50 lamellae in each hemibranch.

Localities.—Olifants River, Clanwilliam (April 1937, K. H. B.); Letjesbosch, Beaufort West (L. Boonstra and C. W. Thorne, March 1937. Nymph).

Remarks.—The gizzard and gills are described from the Letjesbosch specimen; the imago was bred from the Clanwilliam nymph.

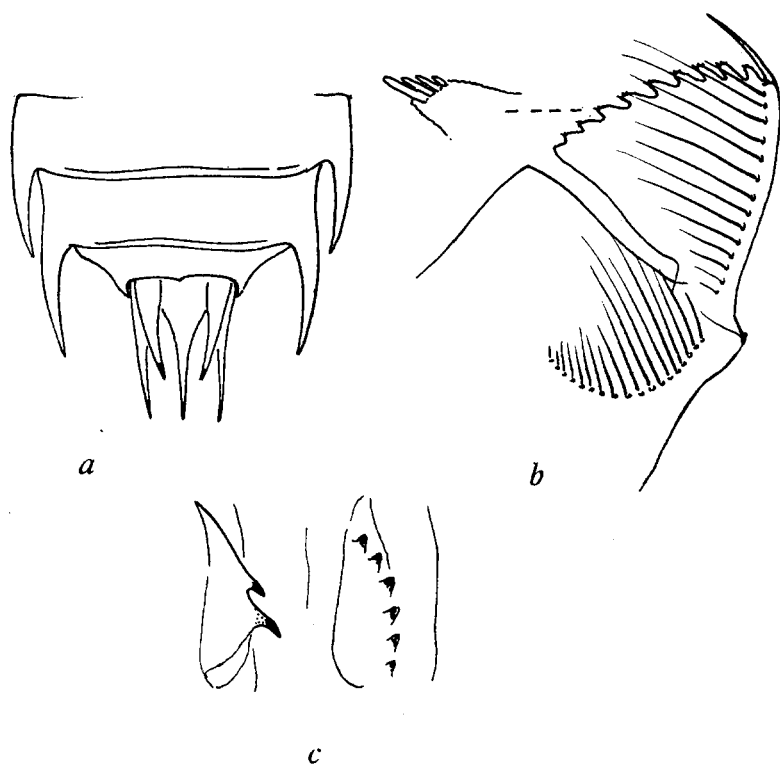


FIG. 19.—*Pantala flavescens* (Fabr.). a, apex of abdomen of nymph. b, median and lateral lobes of mask. c, one ventral and one dorsal tooth of gizzard.