

Three new species of *Elassoneuria* (Ephemeroptera :
Oligoneuriidae) from tropical Africa

M. T. GILLIES

School of Biological Sciences, University of Sussex

SYNOPSIS

Three new species of *Elassoneuria* are described, *E.disneyi* from the Cameroons, and *E.grandis* and *E.kidahi* from Tanzania. The taxonomy of the nymphs is discussed, and *E.congolana* Navas is redescribed.

The genus *Elassoneuria* was erected by Eaton (1881) for *Oligoneuria trimeniana* McLachlan from Natal. Subsequently, *E.congolana* was described by Navas (1911) from Zaire and *E.candida* by Eaton (1913) from Nigeria. In each case only the female was known. Perhaps because of this, Ulmer (1916) synonymised both the last two species with *trimeniana*, which was thus regarded as having a wide distribution in Africa south of the Sahara. This interpretation was followed by Lestage (1919) and Barnard (1932) and persisted until Kimmins (1960a) re-examined the types of *trimeniana* and *candida* and showed that they were distinct. He also (1960b) pointed out differences in the male terminalia of specimens from Uganda and from the Congo basin. In his comprehensive survey of the Ethiopian mayflies, Demoulin (1970) followed Kimmins in recognising the distinctness of *candida* but, with reservations, left *congolana* in synonymy with *trimeniana*.

Recently, Browne & Agnew (*in litt.*) have made a closer study of *Elassoneuria* nymphs in South Africa and find that two distinct species are involved. It is hoped that their current studies will establish which of the two is *trimeniana*. Thus it is clear that the genus contains a good many more species than was suspected by earlier workers and that, for the moment, there is no evidence that *trimeniana* occurs north of the Zambezi.

A few years ago I received a few reared adults and a large number of nymphs of *Elassoneuria* from the Cameroons, sent to me by Dr R.H.L.Disney. The ecology of this species has been studied by him and by other medical entomologists on account of its phoretic association with species of *Simulium*. A description of this mayfly follows. I have also collected *Elassoneuria* myself from the Congo basin and from Tanzania, and take the opportunity here to give an account of the material. Lastly, I have received nymphs of two species from Liberia, collected by Dr R.L.Garms. This paper is therefore based on a comparative study of all this material. Through the kindness of Mr G.A. Browne and Dr J.D.Agnew I have also been able to see photomicrographs of both their

South African nymphs and to confirm their distinctness from the West African nymphs described here.

Specific differences in the adults of *Elassoneuria* are not well marked except in the forceps of the male and, in certain instances, in the terminalia of the female. There appear to be small differences in the development of cross-veins between species, but I have not been able to make out major venational differences in the hind wings comparable to those described by Demoulin (1966) in the very distinct *E. insulicola* Demoulin from Madagascar. On the other hand there are a number of good characters in the nymphs, of which the type and distribution of chaetae in the abdominal gill lamellae appear to be the best. Others no doubt remain to be demonstrated. An interesting asymmetrical feature of the mouthparts is a tuft of fine hairs on the molar area of the right mandible only. The types of all species described here have been deposited in the British Museum (Natural History) (BMNH).

Elassoneuria disneyi sp. n.

Male subimago (in spirit). Thorax orange-brown with pale sutures. Femora cream, tibiae and tarsi dark brown, darker on fore legs. Abdominal terga generally cream with scattered grey markings, an interrupted dark median line on segments 2-7, more or less complete on 8-9; sterna cream with orange-brown band across base of forceps; tails cream. Terminalia (fig. 9, dissected out of subimaginal skin): forceps with four segments, basal segment long with well-marked spur on inner surface near base.

Female imago (in spirit). Colouring and markings as in male, median dark dorsal line on abdomen extending to segment 8. Points of subanal plate much shorter than the lateral processes of the ninth segment. Wings (figs. 1, 2).

Measurements (in mm.). Body, male 18, female 20; tails male 7, female 8; forewing 18-20.

Nymph. Generally as described by Berner (1954). Mouthparts (figs. 25-28: right mandible, prosthecal comb with 18-23 hairs, basal tuft with 12-16 hairs, some of them stout and bifid; inner interior angle of molar surface with a conspicuous tuft of about 40-50 short, fine hairs; left mandible without molar hair-tuft. Gills: lamellae (figs. 16-21) with numerous blunt, peg-shaped chaetae along anterior border and on basal three-quarters of dorsal surface, posterior border with smaller numbers of more pointed chaetae; a marginal fringe of fine hairs also present, not or scarcely longer than the blunt chaetae, most numerous on the outer half of anterior and posterior borders; a few scattered fine hairs also present on upper surface near the base and more generally on the ventral surface; all except posterior one-fifth to one-quarter pigmented brown. Posterior extension of ninth abdominal segment with or without blunt chaetae on inner margin.

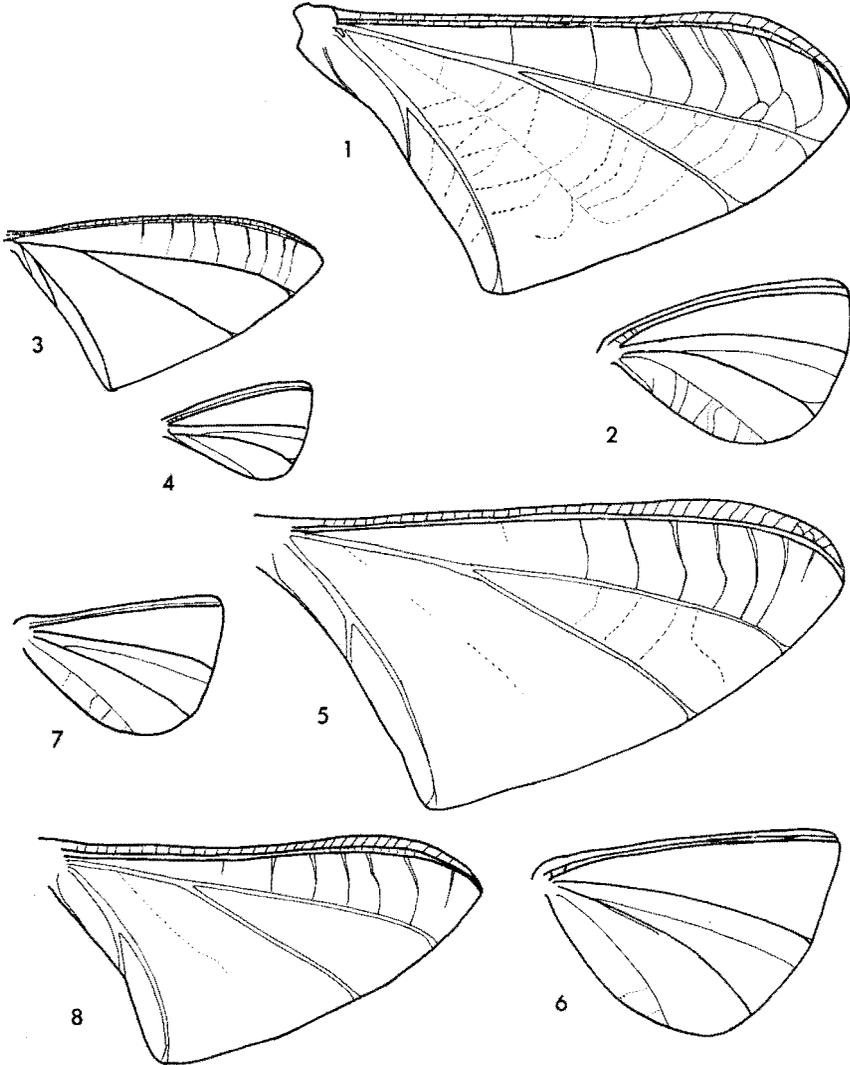
Holotype ♂ imago, dissected out of subimaginal skin, with associated nymph shuck. CAMEROONS: Bille River, near Kumba, West Cameroon, 16.iv.1969 (*R.H.L. Disney*), BMNH.

Paratypes: 2 ♂ subimagines, 4 ♀ imagines, streams near Kumba, 1968-69. Numerous nymphs from Kumba area; also Grande Capitaine, East Cameroon.

A series of nymphs from Liberia (Deha Creek, Garboyea Creek and Koejar River), collected by Dr R.L. Garms, are very similar to the Cameroons specimens and may perhaps be conspecific with it. The second gill lamella, however, has rather more blunt chaetae on the posterior half and the apex of the gill is more pointed (fig. 24). Examina-

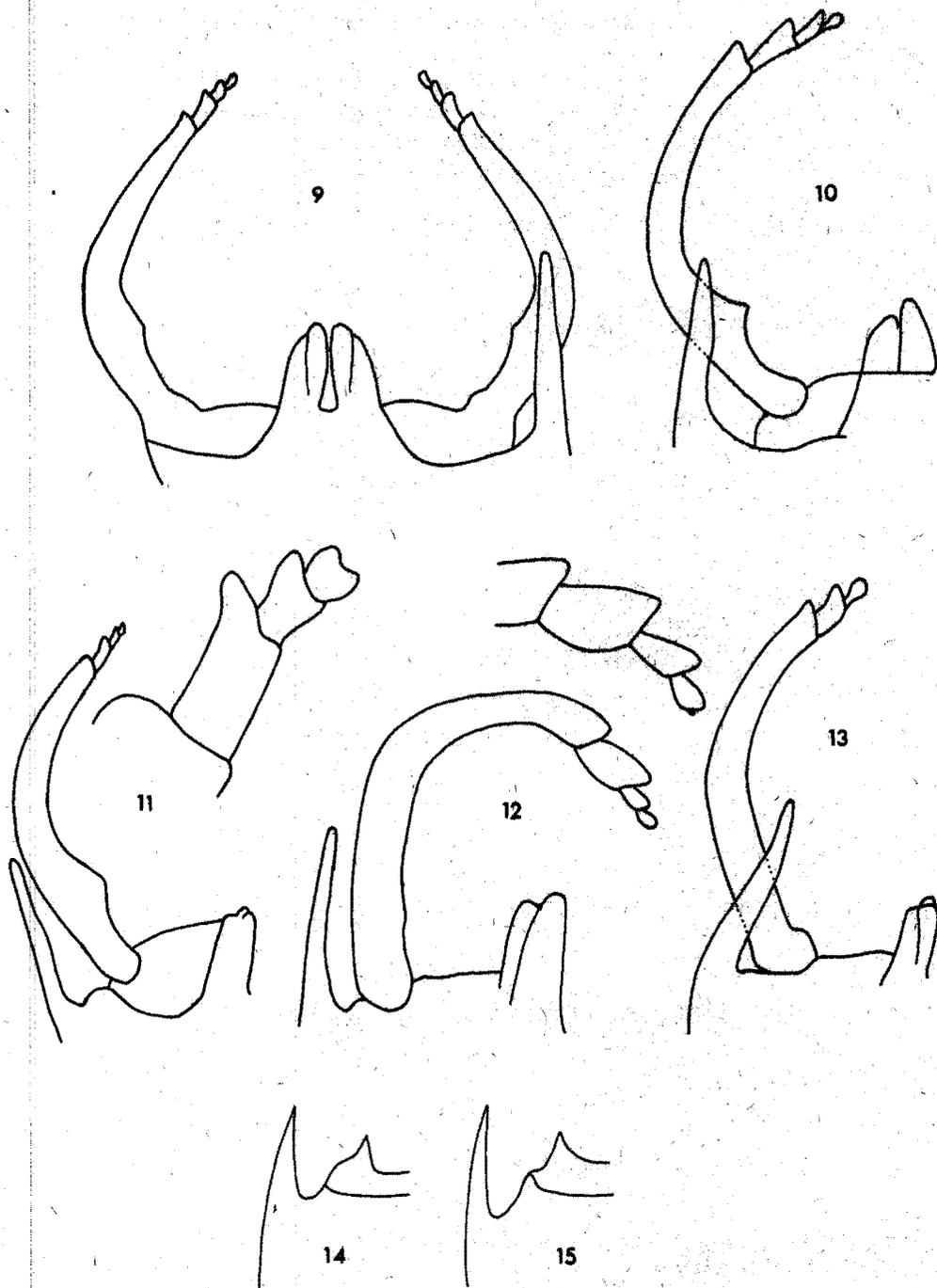
tion of an immature nymph from Togo, sent to me a number of years ago by Dr Lewis Berner, shows that the nymphs he described are close to *E. disneyi* and may also be conspecific with it.

This species resembles *trimeniana* and *candida* in its large size and in the reticulum of very fine veinlets in the forewing. The forceps generally resemble those figured by Kimmins for *E. candida* from Uganda, except that the second to fourth segments are longer and finer. The anal plate in the female also differs from that of *candida*. The gills



Figs. 1-8. Wings of *Elassoneuria* (to scale): (1, 2) *E. disneyi*; (3, 4) *E. congolana*; (5, 6) *E. grandis*; (7, 8) *E. kidahi*.

of the nymph are distinctive; in particular, they are quite different from those of the two South African forms studied by Browne & Agnew (*in litt.*), one of which presumably represents the nymph of *trimeniana*.



Figs. 9-15. (9-13) Male terminalia: (9) *E. disneyi*; (10) *Ellassoneuria* sp. Victoria Falls; (11) *E. kidahi*; (12) *E. grandis* (curve of forceps exaggerated in mount); (13) *E. congolana*. (14-15) Female terminalia: (14) *E. congolana*; (15) *E. grandis*.

The biology of the nymphs of *E. disneyi* has been described by Germain & Grenier (1967) and Disney (1971), who have also given an account of its association with *Simulium berneri* Freeman.

***Elassoneuria grandis* sp. n.**

Male imago (in life). Thorax chocolate-brown with white sutural pattern. Wing membrane clear, main veins grey-brown, a well-marked irregular dark spot at junction of costal brace and radius; radial cross-veins strongly developed, most of them not strongly tapered posteriorly, vestigial cross-veins in rest of wing field very scanty. Fore legs dark chocolate throughout, mid and hind femora grey with dark knee spot, tibiae and tarsi cream. Abdominal terga grey; on segments 2–8 the colour is intensified into lateral and submedian dark grey patches with an incomplete greyish-black median line, tergum 9 largely greyish-black, sterna white. Forceps (fig. 12) white with four segments; in one specimen a minute fifth segment present; penes chocolate-brown and with a conspicuous narrow band of the same colour across forceps base. Tails white.

Female imago (in life). Colouring generally as in male; wings (figs. 5, 6); legs white with only faint dark spot at knee. Acute points of subanal plate extending more than halfway to apex of lateral processes (fig. 15).

Measurements (in mm.). Body, 17–20; wing 19–20.

Holotype ♂ imago, TANZANIA: Ruhuji River, Njombe (34° 45' E, 9° 20' S), altitude 1800 m., 23.iii.1963, in BMNH.

Paratypes: 3 ♂, 2 ♀, same locality as holotype, 27–28.iii.1963, caught at a lamp about one hour after dark.

This species differs from other described species in the shape of the male forceps, particularly in the absence of a spur on the inner side of the basal segment and the greater width of the second segment; the subanal plate of the female also appears distinctive. The egg-masses in life are cream with a faint greenish tinge.

***Elassoneuria kidahi* sp. n.**

Male imago (in spirit). Similar to *E. grandis*, but smaller and median dark streak on each abdominal segment shorter and broader. Fore tibia and tarsus very dark grey, mid and hind tibiae and tarsi paler; all femora cream. Wings (figs. 7, 8). Forceps (fig. 11) white, first segment with spur on inner margin above base, second segment large; third and fourth segments variable, sometimes as figured, in others both segments very small and wedge-shaped, in others again a minute globular fifth segment can be made out.

Female imago (in spirit). Legs generally cream. Points of subanal plate less than half the length of lateral processes of ninth segment; these points dark brown, two very dark spots on tenth sternum behind them.

Measurements (in mm.). Body 14–17; wing 15–16.

Holotype ♂ imago, TANZANIA: Great Ruaha River at Kidahi rest-camp (37° 43' E, 7° 33' S), altitude approximately 700 m., 29.iii.1963, light-trap 1900–1945 hours, in BMNH.

Paratypes: 20 ♂, 9 ♀, same data as holotype.

E. kidahi differs from all described species in the shape of the forceps. It is intermediate in size between *congolana* and the large species *trimeniana*, *disneyi* and *grandis*.

From *E.candida* it differs in the male forceps and in the subanal plate of the female. The egg-masses in life are as in *E.grandis*.

The specimens were caught at a time when the Great Ruaha River was in full flood. At Kidahi the river sweeps round the base of the Southern Highlands of Tanzania before flowing on into the evolved lowland stretches of the Rufiji River. Thus *E.kidahi* appears to be a species of lowland torrents, in contrast to *E.grandis* which occurs in highland streams of the same watershed. In East Africa *Elassoneuria* is not as generally distributed as might be expected. For instance, I never encountered any member of the *Oligoneuridae* in north-east Tanzania despite a good many years casual collecting in that area. I have, however, a single fragmentary specimen of *Elassoneuria* from the Sabaki River near Malindi on the Kenya coast.

Elassoneuria sp.

Nymph. All gills (fig. 22) have a dense fringe of long, fine hairs covering the outer one-third to one-quarter of the anterior border and the outer half of the posterior border of the lamellae. The longest of these hairs are 3-4 times the length of the blunt marginal chaetae. Lamellae unpigmented. Mouthparts similar to *E.disneyi*. Posterior projection of ninth abdominal segment with long fine hairs and without blunt chaetae on inner margin; pigment confined to apex.

Material from LIBERIA: numerous nymphs collected by Dr R.L. Garms, 1969-71, St Paul River, Yah River, Makona River, St John River, Kahn Creek, Bah Creek and Dorne Creek.

Other nymphs from some of the same streams in Liberia may be conspecific with *E.disneyi* (see fig. 24).

Elassoneuria trimeniana (McLachlan)

Oligoneuria trimeniana McLachlan, 1868 : 177

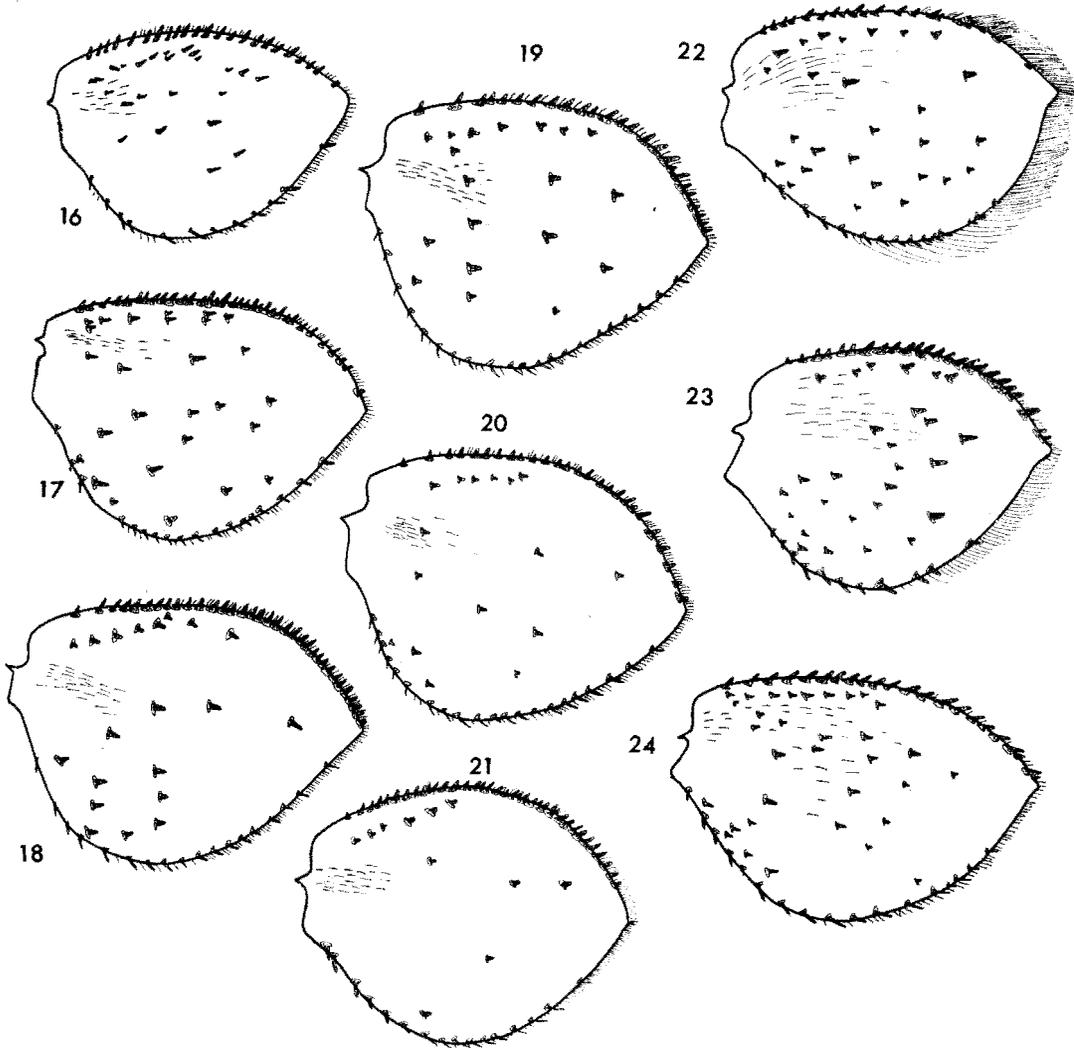
Elassoneuria trimeniana (McLachlan), Eaton, 1881 : 191

Discussion of the status and distribution of *E.trimeniana* must await completion of the current studies of Browne and Agnew on the South African species of *Elassoneuria*. In an earlier note (Gillies, 1963) I mentioned seeing a male from Victoria Falls that was possibly referable to *E.trimeniana*. Figure 10 shows the forceps of this specimen. The terminalia figured by Demoulin (1966) as those of *trimeniana* are quite different, in fact, they agree closely with those of specimens from the Congo River, described below, and probably refer to *E.congolana*.

Elassoneuria congolana Navas

Elassoneuria congolana Navas, 1911 : 221

This species was described by Navas from material from the Congo basin. At the western edge of the basin the outflow from the whole river system pours through the mile-wide gap below Kinshasa and Brazzaville in a series of stupendous rapids. *E.congolana* occurs abundantly here, and in the two cities adults can be collected in large numbers round lamps at night. I have collected a number of nymphs from the edge of



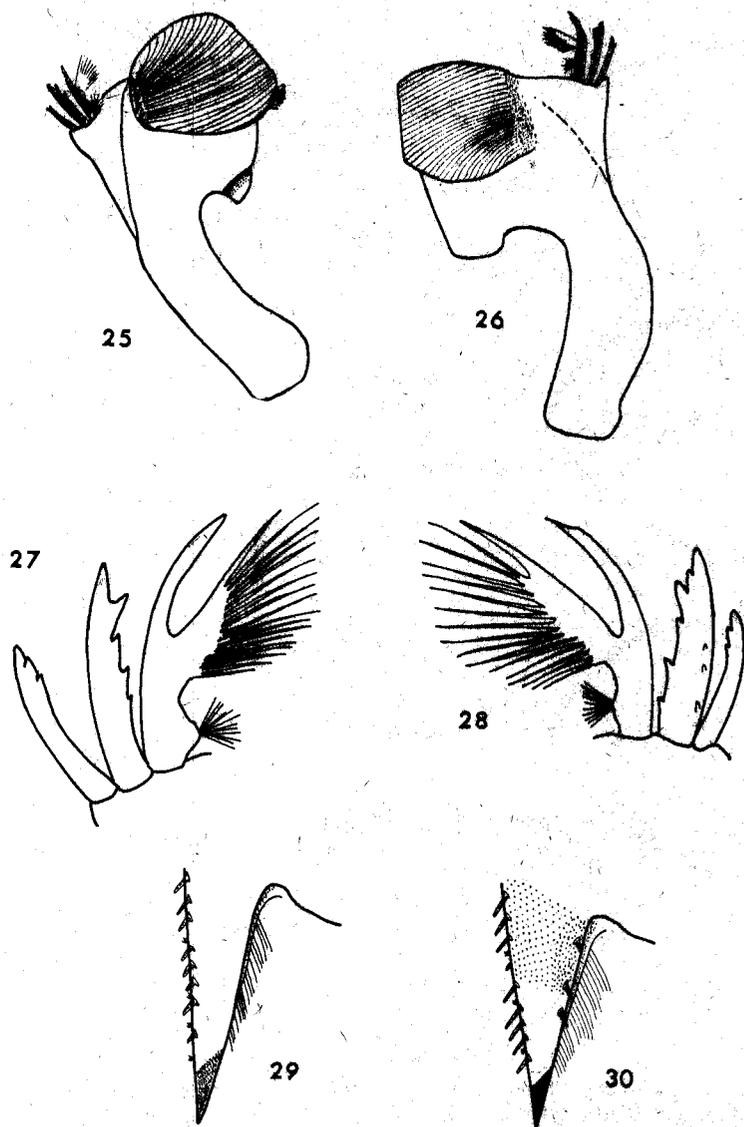
Figs. 16-24. Gill lamellae of nymphs: (16-21) Second to seventh gills of *E. disneyi*; (22) second gill *Elassoneuria* sp., Yah River, Liberia; (23) second gill *E. congolana*; (24) second gill *Elassoneuria* sp. (*E. disneyi*?) Liberia.

the rapids at Kinshasa, which are assumed to be those of *congolana*. This conclusion, however, was not confirmed by breeding out adults.

A comparison of this material with other species shows that *E. congolana* differs rather markedly from them in a number of respects:

(1) Smaller size, wing length 10-14 mm.

(2) Forceps of male normally with only three segments and lacking a spur on the inner side near the base (fig. 13). However, in 4 out of 40 specimens examined a very small fourth segment was present, whereas in 2 others a distinct notch partially divided the third segment. In all these specimens the shape of the third segment is rather different from that shown in figure 13. In a single specimen from Brazzaville there was a well-



Figs. 25-30. (25-28) Nymphal mouthparts of *E. disneyi*: (25) right mandible; (26) left mandible; (27) canines and prostheca of right mandible; (28) canines and prostheca of left mandible. (29-30) Lateral processes of ninth abdominal segments of nymph: (29) *E. disneyi*; (30) *Elassoneuria* sp. (*E. disneyi*?), Liberia.

marked spur on the inner side of both limbs of the forceps; the second and third segments, however, are typical of *congolana*, as are the wings and abdominal markings.

(3) Points on subanal plate of female rather more than half length of lateral processes of ninth sternum (fig. 14).

(4) There is no trace in preserved specimens of the median dark line or of other abdominal markings, which are well developed in other species. I am unable to identify

in my material the "points brun" of the abdomen, cited by Navas as characteristic of this species.

(5) Wing membrane milky; *C*, *Sc* and *R*₁ dark brown, remaining veins milky. Cross-venation generally reduced (figs. 3, 4).

(6) Nymph. Prosthecal comb of mandibles with 10–14 stout hairs, basal tuft with 9–12 hairs, right molar hair-tuft with 10–20 fine hairs. Gill lamellae (fig. 23) drawn out to a fine point at the apex; outer one-third of posterior margin with a fringe of fine hairs which are distinctly longer than the blunt chaetae; hair-fringe on anterior border composed of short hairs, thus differing from *Elassoneuria* sp. from Liberia.

Thus *E. congolana* is quite distinct from other described species in both adult and nymphal characters. The extent to which it occurs outside the Congo basin remains to be determined.

Material examined. ZAIRE, Kinshasa, 5 ♂, 24.vi.1956, 2 ♀, 6.xii.1955, 15 nymphs, 25.vi.1956. CONGO, Brazzaville, 34 ♂, 3 ♀, 27.vi.1956.

The following table summarises the specific differences noted between adults of the African species of *Elassoneuria* at present. I have not included the Malagasy species, *E. insulicola*, since it differs from all the others in several important respects. Should the nymph, when described, show comparable differences, one might have to question the validity of retaining *insulicola* in the genus *Elassoneuria* as defined at present.

Species	Wing size (mm.)	Male forceps		Female terminalia
		Number of segments	Spur on first segment	Lateral processes on ninth segment
<i>trimeniana</i>	17–22*	?	?	long
<i>congolana</i>	10–14	3 (4)	absent	medium
<i>candida</i>	21	4	present	short
<i>disneyi</i>	18–20	4	present	long
<i>grandis</i>	19–20	4	absent	medium
<i>kidahi</i>	15–16	4 (5)	present	long

* Esben-Petersen (1913).

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