

TWO NEW SPECIES OF *OLIGONEURIOPSIS* CRASS FROM THE REPUBLIC OF SOUTH AFRICA (OLIGONEURIIDAE : EPHEMEROPTERA)

J. D. AGNEW

*Department of Zoology, University of the Witwatersrand,
Johannesburg, Republic of South Africa*

INTRODUCTION

The genus *Oligoneuriopsis* was erected by CRASS (1947) for the reception of his new species *O. lawrencei*. The nymph of this species had already been described by BARNARD (1940), but was wrongly assigned by him to *Elassoneuria trimeniana* (McLACHLAN). BARNARD believed that "since *E. trimeniana* was originally described from Natal, there is the greatest probability that this is its true nymph."

Recently, during the course of hydrobiological studies on various river systems in South Africa, *Oligoneuriopsis* nymphs have been collected which are distinctly different from those of *O. lawrencei*. Two new nymphal types have been recognized, and these are given specific status below. These forms appear to be restricted to small areas, and any one species has not been found to occur together with specimens of another species, in spite of fairly intensive searching in the areas concerned. The forms treated here can thus be regarded as allopatric, and therefore genetically isolated.

Many taxonomists refrain from basing descriptions of new species on immature forms, but in the case of the Ephemeroptera, provided that the generic determination is not in doubt, this course can be well justified on the following grounds.

1. The imaginal stage plays a short, and from a hydrobiological point of view, relatively insignificant part in the life-cycle of these insects. The significance of mayflies in ecological work lies largely in the nymphal phase, and it is in this condition that specimens are most readily collected.

2. Specific boundaries as seen in morphological differences are often better developed in nymphs than in imagines. For example, the nymphs of *Baetis harrisoni* BARNARD are quite distinct from those of *Acentrella capensis* BARNARD (the former, inter alia, having three caudal filaments whereas the latter have only two), but the imagines of these two species are almost identical. BARNARD (1940) writes, "It seems impossible to separate with certainty the adults of this species (i.e. *Acentrella capensis*) from those of *Baetis harrisoni*." KIMMINS (1960) writes on the genus *Baetis* as follows: "This genus is noted for the difficulty of identifying examples specifically and it seems more likely that its taxonomic difficulties will be solved by a study of the larvae than by multiplying descriptions based on faded museum material."

3. In the case of oligoneuriids, it is often difficult or inconvenient to rear the rheophilic nymphs to maturity in the laboratory, and thus good correlated material is often unavailable. Nymphs are more readily collected in the field than imagines and specific names will find readier application for nymphal forms.

Recently EDMUNDS and ALLEN (1966) have dealt more fully with the significance of the nymphal stages in the taxonomy of mayflies. They incline to the view that "the describing and naming of mayfly species on the basis of nymphs only is more useful than when based on adults

only," but point out the precautions that must be taken where species are named on the nymph only. For example, the naming of species from nymphs in large genera where few species are known as nymphs can create more problems than it solves. They conclude that individual judgment is the only guide to acceptable procedure, and that where nymphal stages are described it is highly desirable that comparisons with a "reasonably large number of species" should be made.

In the present case, as will be pointed out below, nymphs of the two new species introduced here occur in very low numbers in the middle of summer only and are not found during the remainder of the year. The emergence period of the adults is apparently restricted to a very short period, and it is unlikely that adult material will be readily collected in the field or reared in the laboratory. For these reasons it is felt that the naming of the two new species on the nymphs only is justified, since the nymph of the single species in southern Africa referred to *Oligoneuriopsis* is known.

DESCRIPTIONS

The descriptions given below are based on specimens stored in alcohol and housed in the National Institute for Water Research, Council for Scientific and Industrial Research, Pretoria. Type material will in due course be lodged in the Transvaal Museum, Pretoria. The collection was kindly sent to the author for study by Mr. G. R. NOBLE of the Institute for Water Research.

The catalogue numbers, collection dates and stations are as follows (lengths given below refer to body length only, i.e. not including caudal filaments) :

Oligoneuriopsis jessicae n. sp. :

GEN 726A 1 nymph, (holotype nymph), 7.iii.60, (for locality see below), 1 nymph, length 20 mm.

GEN 726B 1 nymph, (paratype nymph), 7.iii.60, (for locality see below), 1 nymph, length 18.0 mm.

Oligoneuriopsis elisabethae n. sp. :

VAL 1061B 1 nymph (holotype nymph), 22.ii.60, from Station VD 21 (for locality see below), 1 nymph, length 16.5 mm.

VAL 606G 5 nymphs (paratype nymphs), 14.i.59, from Station VD 26 (for locality see below), 5 nymphs ranging in length from 7.25 to 15.5 mm with a mean of 12.2 mm.

VAL 1026A 2 nymphs (paratype nymphs), 9.ii.60, from Station VD 21 (for locality see below), 2 nymphs of mean length 15.8 mm.

Oligoneuriopsis lawrencei CRASS

TUG 84J34 collected from stones in the current, 17.xi.54, at locality T1a [the exact locality not known to the author with certainty, but probably ascertainable from the TUG (= Tugela River) catalogue]. Nymphs not measured.

GEN 355B collected from stones in the current, 17.xi.59, at the Krom River (? East Griqualand), 10 nymphs ranging in length from 1.75 to 5.75 mm, with a mean of 3.5 mm.

GEN 357A collected from stones in the current, 20.xi.59, tributary of the Umgimvubu River (? E. Griqualand), 1 nymph, length 3.25 mm.

GEN 596A collected from stones in the current, 24.ii.60, Tugela River, Natal, 14 nymphs ranging in length from 14 to 17.5 mm with a mean of 15.6 mm.

GEN 597C collected from stones in the current, 25.ii.60, Sundays Falls, Royal Natal National Park, Natal, 4 nymphs ranging in length from 12.5 to 18.5 mm with a mean of 16.25 mm.
 GEN 650A collected from marginal vegetation, 25.ii.60, Sundays Falls, Royal Natal National Park, Natal, 3 nymphs, mean length 14.5 mm.

The drawings of *O. lawrencei* for comparison with those of the two new species are taken from a specimen catalogued in GEN 650A, collected 25.ii.60, from Sundays Falls in the Royal Natal National Park, Natal.

Oligoneuriopsis jessicae n. sp.

[Fig. 1 (a), (b)]

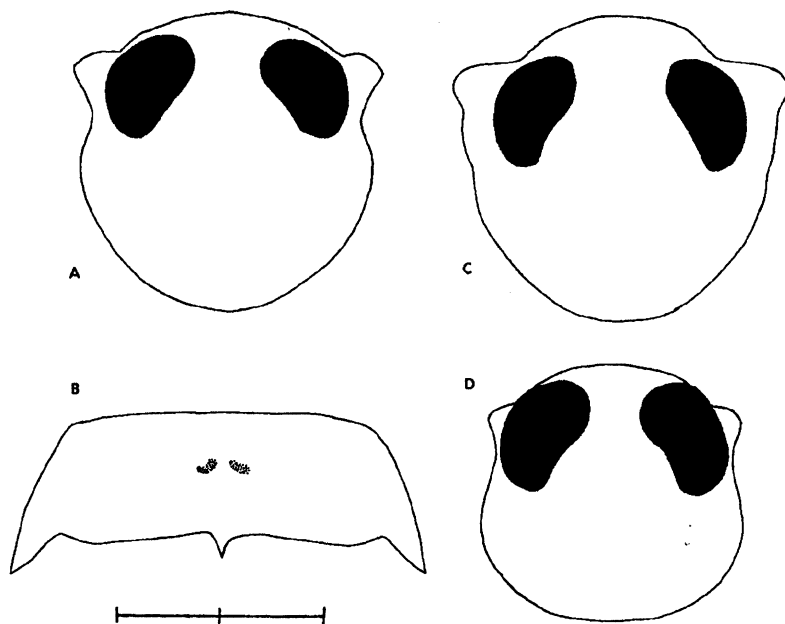


FIGURE 1. Dorsal view of nymphs : a, head of *Oligoneuriopsis jessicae* n. sp.; b, abdominal tergum of *O. jessicae* n. sp.; c, head of *O. elisabethae* n. sp.; d, head of *O. lawrencei*. Scale = 2 mm.

DIAGNOSIS

Mature nymph : Uniform brown colour, with indications of paired lighter dots in the middle of each abdominal tergum. Frontoclypeal region gently rounded, non-carinate. Head widest across posterolateral corners. Width of head 2.9 mm, length of head 3.1 mm: thus head slightly longer than wide. Ventral first gill-tuft with small lateral cover or flap. All abdominal segments with a prominent posterolateral uniacuminate spinous process on each side, directed slightly outwards except in the case of the last few segments where they are directed backwards. Abdominal terga each with a median spine, lying horizontally and directed in a posterior direction on the posterior border of each segment. Anterior spines largest, thereafter becoming progressively smaller until the last spine merely a small nodule. Body length 20 mm, cerci 15 mm, median filament 6.5 mm.

Nymphs of this species show several clear-cut differences when compared with those of *O. lawrencei*, as follows : (1) the lateral abdominal spines are much more strongly developed than in *O. lawrencei*; (2) the head is widest across the posterolateral corners, whereas in *O. lawrencei* it is widest anterior to the eyes; (3) dorsal abdominal spines are present, which do not occur in *O. lawrencei*.

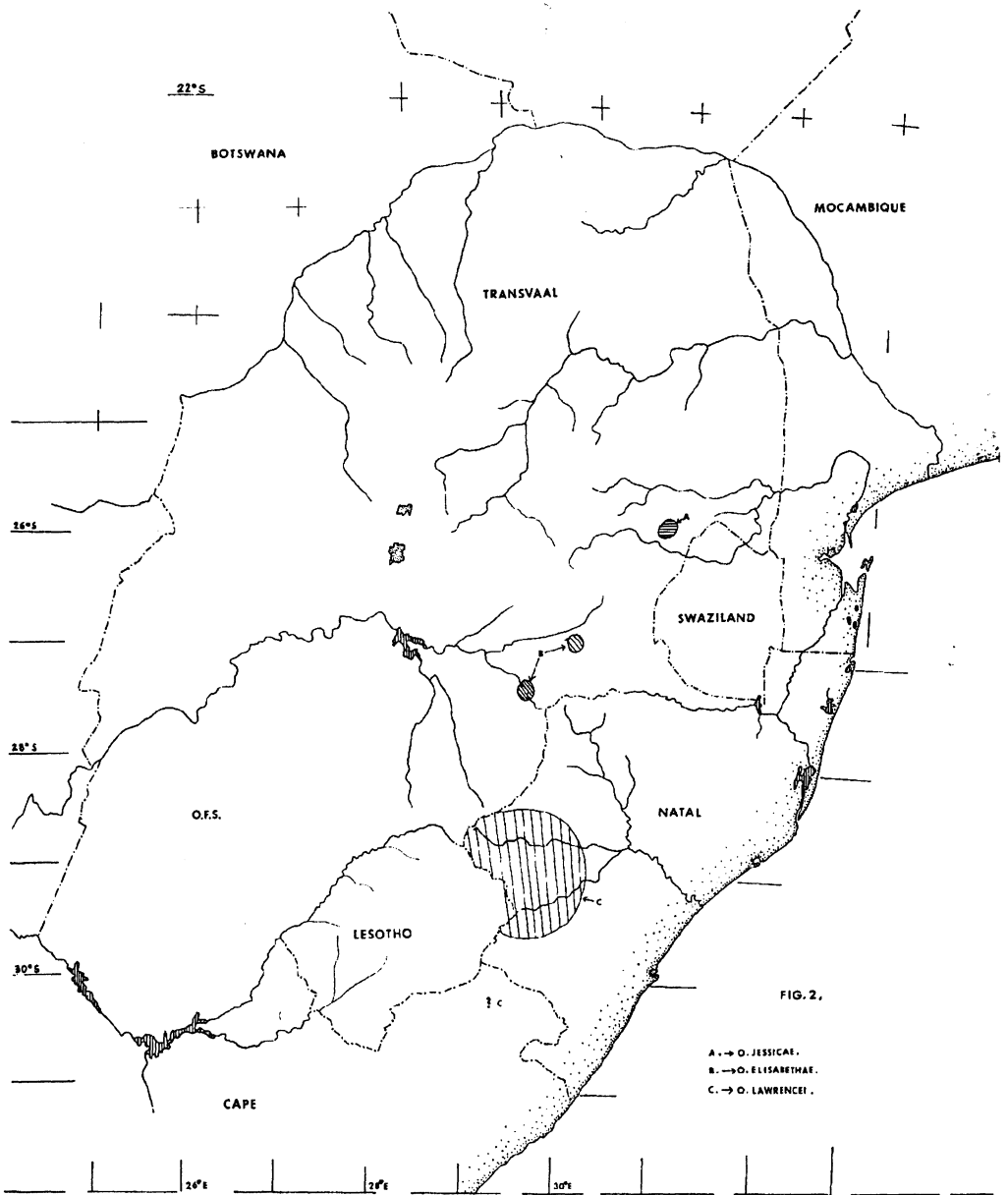


FIGURE 2. Map showing distribution of *Oligoneuriopsis lawrencei*, *O. jessicae* n. sp., and *O. elisabethae* n. sp.

LOCUS TYPICUS

Headwaters of the Queens River, ca 35 km west of Barberton, in the eastern Transvaal. Altitude between 915 m and 1070 m. The specimens were collected by Mr. David HUGHES, during his survey of the area. (See Fig. 2.)

ETYMOLOGY

Named for my wife Jessica Elisabeth for her patient help.

NOTES

The two nymphs of this species were collected at the above locality, at two points ca 0.8 km apart. Both were taken from moss-covered rocks in the current, actually cascade areas. Specimens were apparently not abundant, as evinced by the fact that only two specimens were collected during a thorough examination of the area.

Oligoneuriopsis elisabethae n. sp.

[Fig. 1 (c)]

DIAGNOSIS

Mature nymph : colouration a uniform light-brown without any indications of an abdominal pattern. Sides of frontoclypeal region sub-parallel, then converging to form a rounded apex. Frontoclypeal region non-carinate. Head, as in *O. jessicae*, widest across posterolateral corners. Width of head 3.2 mm, length of head 2.95 mm; thus head slightly wider than long, in contrast to *O. jessicae* described above where it is longer than wide. Ventral first gill-tuft with small lateral flap or cover. Abdominal segments posterolaterally spinose, the spines more strongly developed than in *O. lawrencei*, but not nearly so prominent as in *O. jessicae*. Abdominal terga without median spines. Length of holotype nymph 16.5 mm.

Nymphs of this species differ from those of *O. lawrencei* in having the head widest across the posterolateral corners, and in having more strongly developed lateral abdominal spines, but agree with *O. lawrencei* in the absence of the dorsal abdominal spines which characterise *O. jessicae*.

LOCUS TYPICUS

Nymphs of this new species have been found at two localities, mentioned above as Stations VD 21 and VD 26 (VD = "Vaal-Dam" Catchment Area, i.e. headwaters of the Vaal River). Station VD 21 is on one of the headwater streams of the Vaal, ca 37 km NE. of Amersfoort, Transvaal. Station VD 26 is on the Klip River, which at this point (Steel's Drift) forms part of the Orange Free State — Transvaal boundary, ca 37 km. west of Volksrust, Transvaal. Both Stations VD 21 and VD 26 mentioned were selected and used by F.M. CHUTTER in his study of the Vaal Dam catchment area. Altitudes at both these stations lie between 1525 m and 1675 m. (See Fig. 2.)

ETYMOLOGY

See etymological derivation of previous name.

NOTES

Nymphs of this species have been found attached to fairly large stones in strong current, and on one occasion to aquatic *Potamogeton* in flowing water. Nymphs are rather rare and are to be found only in the summer months. With the exception of the two localities mentioned above, nymphs of *Oligoneuriopsis* do not occur in the streams of the Vaal Dam catchment area.

BIOLOGY OF *OLIGONEURIOPSIS* NYMPHS

CRASS (1947) writes of *Oligoneuriopsis lawrencei*, «The chief period of emergence is evidently during the autumn, since this is the time when imagoes have been taken, and the majority of nymphs found in January and February were approaching maturity.» A comparison of the dates of collection and the body length of the nymphs recorded here under *O. lawrencei* shows that the observations of CRASS also apply in this case. The smallest nymphs are found in early summer and the nymphs grow rapidly until March when imagines are ready to emerge, as the length of fully grown nymphs is about 20 mm (Fig. 3).

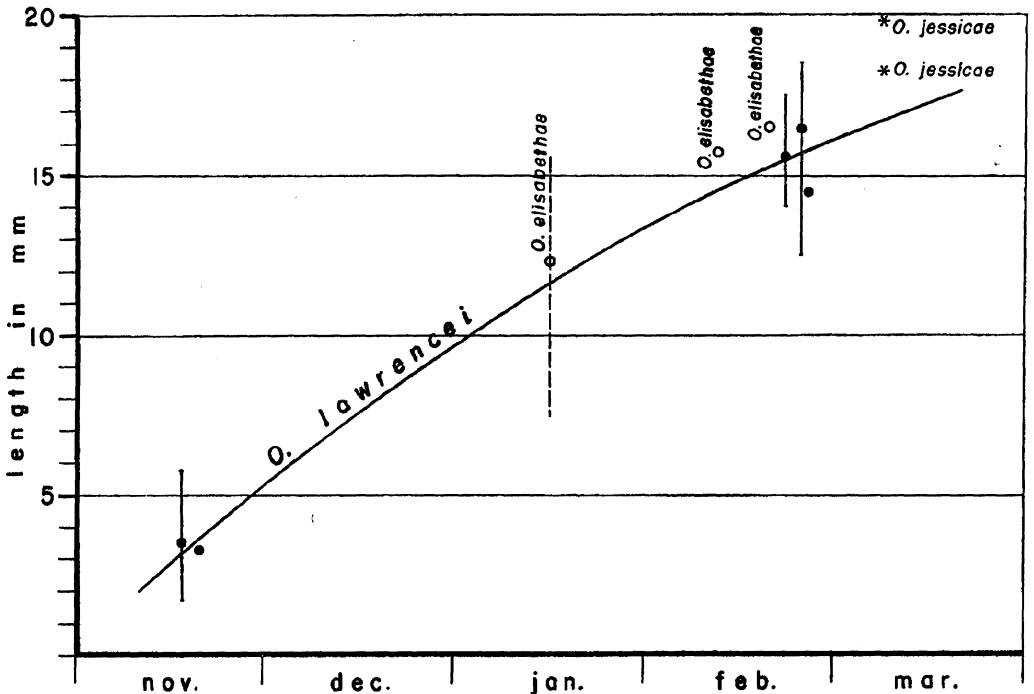


FIGURE 3. Summer growth of nymphs of *Oligoneuriopsis lawrencei* (measurements of *O. jessicae* n. sp. and *O. elisabethae* n. sp. are also shown).

Nymphs are not found during the winter months, and the eggs laid during autumn apparently undergo a diapause of approximately six months, as the smallest nymphs are found in October or November, and the streams do not dry up during winter. The fact that very small nymphs are not found in association with very large nymphs is added support that this species has only one generation per year. Clearly further work is necessary to elucidate this interesting phenomenon.

Turning to the dates of collection and the length measurements of the two new species introduced, it will be seen that there is insufficient data to draw any firm conclusions regarding the growth of the nymphs, as dates all fall within the January-March trimester. Nevertheless it would appear that the growth curves are, in both cases, similar to that of *O. lawrencei* described in the preceding paragraphs.

Extensive sampling in various parts of southern Africa indicates that the species of *Oligoneuriopsis* are limited to the mountainous areas of the eastern Cape, Lesotho, Natal and the eastern Transvaal. The most southerly record for *O. lawrencei* would appear to be the record of CRASS (1947) for the Amatola Mountains, Hogsback area of the eastern Cape. The genus is absent from the southern and western Cape.

DIFFERENTIATION OF NYMPHS

The key given below may be used to separate the nymphs of the species of *Oligoneuriopsis* now known to occur in South Africa.

- | | | |
|---|-----------|-----------------------|
| 1. Head widest in front of eyes (Fig. 1d) | | <i>O. lawrencei</i> |
| — Head widest behind eyes (Fig. 1a, c) | | 2 |
| 2. Abdominal terga each with a median spinous process (Fig. 1b) | | <i>O. jessicae</i> |
| — Abdominal terga without median spinous processes | | <i>O. elisabethae</i> |

ACKNOWLEDGMENTS

My sincere gratitude is expressed to the following persons : Dr. W. L. PETERS for his many kindnesses during my attendance at the First International Conference on Ephemeroptera ; Dr. S. P. JACKSON and Prof. B. I. BALINSKY, both of the University of the Witwatersrand, who made it possible for me to attend the Conference ; and Mr. G. R. NOBLE of the National Institute for Water Research, Pretoria, for allowing me access to the collection of Ephemeroptera material in that Institute, and for supplying field data.

RÉSUMÉ

Deux nouvelles espèces d'*Oligoneuriopsis* CRASS de la république d'Afrique du Sud
(Oligoneuriidae : Ephemeroptera)

Le genre monotype *Oligoneuriopsis* était connu jusque maintenant au Natal, en République d'Afrique du Sud. Basés sur des récoltes de larves, deux nouvelles espèces *O. jessicae* n. sp. et

O. elisabethae n. sp. sont décrites dans cet article. Les deux espèces sont connues au Transvaal et, comme *O. lawrzneci*, sont allopatriques en dépit d'une récolte extensive de leurs spécimens dans la région. Une clé pour les larves des trois espèces est donnée ainsi que des remarques concernant les habitats des deux nouvelles espèces. En se basant sur la croissance des échantillons larvaires, on peut dire que le cycle de vie des trois espèces s'effectue pendant les mois d'été. Les jeunes larves se rencontrent en novembre et les larves ayant atteint leur pleine maturité se rencontrent en mars.

ZUSAMMENFASSUNG

Zwei neue Arten von *Oligoneuriopsis* CRASS von der Südafrikanischen Republik (Oligoneuriidae : Ephemeroptera)

Die monotypische Gattung *Oligoneuriopsis* war vorher in Natal, Südafrikanische Republik bekannt. Von Nymphensammlungen sind zwei neue Arten, *O. jessicae* n. sp. und *O. elisabethae* n. sp. in diesem Artikel beschrieben. Beide Arten sind in Transvaal bekannt, und zusammen mit *O. lawrencei* sind allopatrische Arten trotz ausgedehnten Sammlungen in der Gegend. Ein Schlüssel für die Nymphen der drei Arten ist gegeben, und Habitat-Notizen für die zwei neuen Arten sind beigefügt. Basiert auf das Wachstum der Nymphen-Exemplare enden alle drei Arten ihren Lebenskreislauf während der Sommermonate. Junge Nymphen werden im November gefunden und voll erwachsene Nymphen sind im März vorhanden.

REFERENCES

- BARNARD, K.B. (1940). Additional records, and descriptions of new species of South African Alder-flies (Megaloptera), Mayflies (Ephemeroptera), Caddis-flies (Trichoptera), Stone-flies (Perlaria), and Dragon-flies (Odonata). *Ann. S. Afr. Mus.* **32** : 609-661.
- CRASS, R.S. (1947). The may-flies (Ephemeroptera) of Natal and the Eastern Cape Province. *Ann. Natal Mus.* **11** : 37-110.
- EDMUNDS, G.F. and R.K. ALLEN. (1966). The significance of nymphal stages in the study of Ephemeroptera. *Ann. Entomol. Soc. Amer.* **59** : 300-303.
- KIMMINS, D.E. (1960). Notes on East African Ephemeroptera, with descriptions of new species. *Bull. Brit. Mus. (Nat. Hist.), Entomol.* **9** : 339-355.