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THE LARVA OF THE NEW CALEDONIAN ENDEMIC DRAGONFLY *SYNTHEMIS ARIADNE* LIEFTINCK (ANISOPTERA: SYNTHEMISTIDAE)

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Larvae and final-instar exuviae taken from elevated forested streams in New Caledonia are described as *S. ariadne* by supposition. The species has a 2-3 year life cycle and adults show a well synchronised pattern of emergence.

INTRODUCTION

CAMPION (1921) and LIPPITT WILLEY (1955) each described an unidentified odonate larva from New Caledonia, but the major contribution to our knowledge of the island's larval forms came from LIEFTINCK (1971, 1976) who recognised 22 taxa within material collected by several limnological expeditions. Unfortunately, LIEFTINCK (1976) could associate only one endemic species — *Isosticta robustior* Ris — with its adult with certainty. Adults of several species have since been collected with their exuviae or reared in the laboratory to confirm their identification. (WINSTANLEY & DAVIES, 1982; WINSTANLEY, 1983).

Although only six synthemistid species have been described, LIEFTINCK (1976) recognised seven, and possibly eight, taxa in his larval material, none of which appeared a likely candidate for *Synthemis ariadne* Lieftinck, 1975. In November 1982, an undescribed larva was collected at a site where adults of *S. ariadne* were known to be common. That larva is described here as *S. ariadne* by supposition.

COLLECTION METHODS

Larvae were collected from streams by turning over rocks and agitating the substrate with a stiff brush. Displaced larvae were collected in a 1.6 mm mesh net and sorted in a white plastic tray. Larvae were kept alive for as long as possible in separate containers. Dead larvae were preserved in Kahle's fluid, or 70% ethanol.

LARVAL DESCRIPTION

Material: 1 final-instar (F-0) ♀ exuviae; 19 larvae (instars F-2 to F-4, F-6, F-7, F-9 to F-11), tributary of Rivière de Thi, Forêt de Thi, 22° 11'S, 166° 31'E, c. 490 m, 21 November 1982; 2 larvae

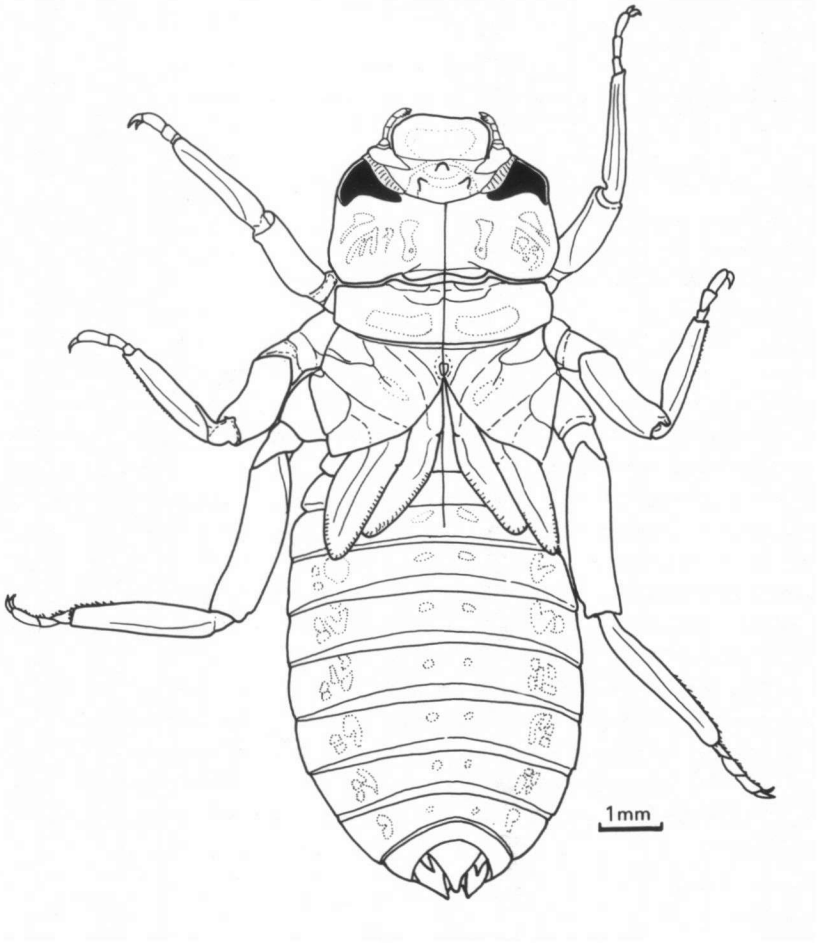


Fig. 1. *Synthemis ariadne* Lieft., F-2 instar: dorsal view.

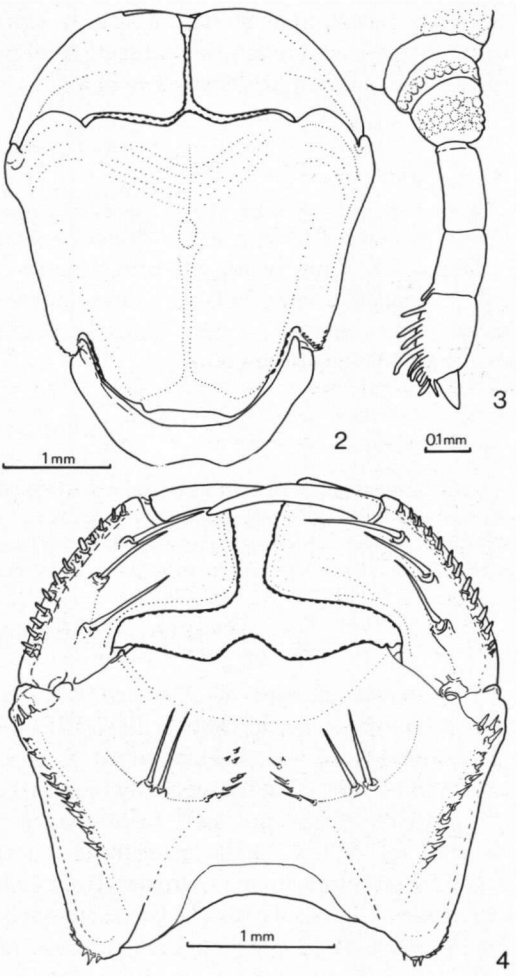
(F-2, F-7), tributary of Ouen Chasne Rivière, eastern slopes of Mt. Rembai, 21° 35'S, 165° 51'E, c. 500 m, 7 November 1982; all collected by W.J. Winstanley. Voucher specimens lodged with N.Z.National Arthropod Collection, D.S.I.R., Auckland, New Zealand, Australian National Insect Collection, C.S.I.R.O., Canberra, Australia, British Museum (Natural History), London, England, and the Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands.

F-2 INSTAR (9 specimens)
Figures 1-4

Measurements: total length 12.8--13.5 mm (to 16.6 mm in poorly preserved specimens); width of head across eyes 3.4-3.7 mm, across postocular lobe 3.6-4.0 mm; hind femur 2.8-3.0 mm; maximum width of abdomen at segment 5/6, 5 mm.

A squat, short-legged, almost hairless larva. The integument minutely verrucose, golden brown, with some darker markings.

Head flattened above, widest across postocular lobe. Frontal plate prominent, slightly hollowed out above, the frontal ridge bluntly rounded. Anterior border of compound eyes plicate. Antennae short, 6 segmented, almost bare except for the penultimate segment which is tufted mesially (Fig. 2). Ocelli prominent. Prementum (Figs 3, 4) short and broad, reaching to the anterior of metacoxae, deeply cupped, heavily sclerotised; anterior margin asetose, minutely crenulate; lateral margin with a row of low tubercles bearing short setae. Premental setae 2+3-5, frequently with a group of minute setulae anterior to the secondary premental setae. Labial palps subtriangular, outer border with low tubercles bearing stout



Figs 2-4. *Synthemis ariadne* Lieft., F-2 instar: (2) left antenna, dorsal view; – (3) labial mask, ventral view; — (4) prementum and labial palps, dorsal view.

setae; apical and inner borders heavily sclerotised, asetose, minutely crenulate, but otherwise entire; palpal setae 3 & 3. Pronotum broad, upper lobes flat. Wing-sheaths strongly divergent, hindwing reaching segment 4 of the abdomen. Legs short, femora broad with faint dark bands proximally and distally. Abdomen short and broad, widest at segments 5/6, dorsoventrally flattened, dorsal and lateral spines absent. Anal pyramid triangular, inner aspects of epiproct and paraprocts sparsely hairy.

F-0 EXUVIAE (1 specimen)

Measurements: total length 17.5 mm; width of head across eyes 4.7 mm, across postocular lobe 4.5 mm; hind femur 4.2 mm; greatest width of abdomen at segment 5/6, 5.5 mm.

Differs little from the foregoing description. Antenna 6 segments. Palpal setae 3 & 3, premental setae 2+2, 2+3, no spiniform setae anterior to the secondary mental setae. Hindwing extending to the posterior margin of segment 5. Cerci two-thirds the length of epiproct.

F-11 LARVA (1 specimen)

Measurements: total length 3.5 mm; width of head across eyes 0.85 mm, across postocular lobe 1.0 mm; hind femur 0.65 mm; greatest width of abdomen at segment 5/6, 1.3 mm. Antenna 4 segmented, penultimate segment tufted mesially as in all later instars. Palpal setae 1 & 1, premental setae 2+2, 2+3. Distal border of labial palp crenate (as it is to instar F-7). Tarsal segments 1, 2, 2.

GENERAL OBSERVATIONS

The unique holotype of *S. ariadne* was recorded as taken at Yiambe (= Yambé?) 0-550 m in mid-October 1967 (LIEFTINCK, 1975). Dr D.A.L. Davies (pers. comm.) took a second male at Mt. Koghis, 22° 10'S, 166° 30'E, c. 490 m, on 23 November 1981, and subsequently I found the species abundant along a 300 m or so stretch of a steep, small, forest-shaded tributary of the Rivière de Thi, 22° 11'S, 166° 31'E, c. 490 m during the late morning on 8 and 9 December 1981. A good series of males and 1 female were taken at that time, but no attempt was then made to find the larva. The larvae collected at the same site on 21 November 1982 were all found under rocks at the head of small runnels where they were associated with larvae of *Synthemis fenella* Campion, *Isosticta robustior* Ris, and the unidentified *Synthemis* species E larva of LIEFTINCK (1976). The *S. ariadne* female exuviae was found on a steep earth bank about 150 mm above water level, and a teneral female *S. ariadne* was taken nearby. No other exuviae were seen but torrential rain throughout that and preceding days would likely have dislodged any others on unprotected emergence supports.

S. ariadne adults are slightly larger than those of *S. fenella*, both species being considerably smaller than the other regional *Synthemis* species. The larva of *S.*

fenella has been reared and identified (WINSTANLEY, 1983), and the larva described here shares with it features such as the almost hairless integument and the entire apical margin of the labial palp, as well as its small size. The F-0 exuviae is too small to be one of the larger regional synthemistids, and it seems reasonable to suppose the larva to be that of *S. ariadne*.

The Mt. Rembai larvae came from a narrow, shallow, but slow-flowing stream in dense forest, again at an altitude of about 500 m. My observations in November/December 1981 and November 1982 suggest that lotic situations within forest shade constitute the biotope for most Odonata endemic to New Caledonia. EDMUNDS (1972) remarked that a reasonably diverse fauna (of Ephemeroptera) occurs in New Caledonia at about 600 m elevation but lowland streams are dominated by Crustacea, Chironomidae, and Odonata. Edmunds did not recognise that the lowland Odonata are almost exclusively adventive species.

The phenology of the New Caledonian Odonata is undocumented but it seems that many endemic species are restricted in their seasonal occurrence. In mid-November 1981 far fewer specimens and species were about than in May of a previous visit (D.A.L. Davies, pers. comm.), and there were fewer still in early November 1982. The absence of F-0 and F-1 larvae amongst the *S. ariadne* material argues for a highly synchronised emergence period. Alternatively, these instars may develop away from the stream as EDA (1964) has shown happens with *Epiophlebia superstes* Sel. in Japan, but the exuviae found so close to the water on an almost bare bank would suggest otherwise.

The range of *S. ariadne* instars taken suggests a larval development period of at least 2 and possibly 3 years. None of the larvae taken survived for more than 65 days and only one moulted (from F-3 to F-2 11 days after capture). Some regional synthemistids are known to be slow growing: *S. fenella* larvae taken as F-0 instars metamorphosed to the adult after 116 and 146 days (unpubl. obs.); *S. miranda* larvae have spent up to 307 days as F-0 larvae (WINSTANLEY, 1983).

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