KEYS TO THE NYMPHS AND ADULTS OF THE NEW ZEALAND ODONATA

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ABSTRACT

The nymphs and adults of all dragonfly species known to occur in New Zealand are rendered identifiable. In the case of several species, the most important of which is *Antipodochlora braueri*, this is the first formal indication of the nymphal morphology. It is thought likely that few if any species remain unrecorded.

The most urgent need in New Zealand entomology, especially from the point of view of the ecologist, is to have available means to identify as many insects and their larvae as possible. At the Canterbury Museum, we believe that the quickest and most useful advance on a broad front can be achieved, not by the time-consuming preparation of detailed morphological descriptions and illustrations, but by ourselves attempting to identify all, or all but a few rare, taxa in any complex and then indicating as economically as possible how each may be recognised. This paper illustrates the approach. While the nymph of, for example, *Procordulia smithii* remained unknown, one could only render that of *P. grayi* identifiable by describing it in great detail since there would have been no way of knowing just which details would certainly distinguish it from its congenor; instead, the time was devoted to identifying the nymph of *P. smithii* and to satisfying ourselves that still other species of the genus are very unlikely to be encountered or even to exist; now all that needs pointing out, for the moment, is one clearcut difference between the two. Should anyone require further details, the specimens are available for study at the Canterbury Museum. We do not claim that this approach is ideal: much of the evidence remains temporarily a matter of museum rather than published record. We do claim that, for the moment, it produces the most generally useful result for a given expenditure of time, and time is of the essence while so many other groups urgently require attention.

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New Zealand has a very poor dragonfly fauna of but eleven species in ten genera, yet the nymphs of several have not hitherto been certainly identifiable. During late 1964 and early 1965, an attempt was made to identify the nymphs of all the species. Extensive collecting was done by Mr A. G. McFarlane and to a lesser extent by myself. Valuable material was contributed by Dr. V. M. Stout, Mr C. S. Woods, and the Zoology Department of the Auckland University. Mr. R. Ordish made material in the Dominion Museum, Wellington, available for study, and assisted me to collect in Gollan's Valley near Wellington. Then Miss P. Aston of Taumarunui succeeded in rearing from nymphs the adults of two species which were by that time the only ones whose nymphal morphology remained in doubt; one of these was our least-known species *Antipodochlora braueri*, the nymph concerned having been kept in an aquarium for two full years. To all the above, and especially to Miss Aston, I offer my warmest thanks.

We believe our investigations have been sufficiently extensive to make it seem likely that no new dragonfly species await discovery in New Zealand, or, if any do, then they are probably quite rare.

Essential terminology concerning nymphs precedes the nymph key. Remarks on distribution are incorporated in the nymph key. A few of the more important field observations concerning *A. braueri* follow the adult key.

TERMINOLOGY

Paraterga: thin flat pointed posteriorly-directed projections at postero-lateral angles of abdominal segments.

Ligula: in Odonata, that portion of the labium anterior to the insertions of (and excluding) the labial palps.

Movable hook: an articulated prong at the exterior corner of the distal margin of the labial palp.

End-hook: an immovable prong at the interior corner of the distal margin of the labial palp. Unlike the movable hook, the end-hook is not present in all families. In the Coenagriidae, there is a 'crenate truncate lobe' between the two hooks.

Palpal and premental setae: count setae on lateral margin of one labial palp, not counting the movable hook. Count setae on half (left or right) of dorsal surface of prementum.

KEY TO FAMILIES AND SPECIES OF NYMPHS

N.B. It is not known whether the setal formulae given are reliable in the case of very small specimens.

1a External gills absent; abdomen wider at midlength than at base ... ... Suborder ANISOPTERA 2

1b With 3 long leaflike caudal gills; abdomen long and very slender, cylindrical... ... ... Suborder ZYGOPTERA 9

ANISOPTERA

2a (1a) Ligula and palps more or less in one plane remote from antennae and *not* covering face 3

2b Ligula and palps forming a deep bowl covering face to bases of antennae. Typically sprawlers at bottom ...LIBELLULIDAE 5

3a (2a) *Without* paraterga; prementum *not more* than one and one-quarter times as long as broad. *Uropetala carovei* (*U. chiltoni* only subspecifically distinct, if that.) Common in montane bogs; burrowers ... ... PETALURIDAE

3b With paraterga on posterior segments; prementum more than one and one-half times as long as broad. Large elongate clamberers amongst weed ... ... AESHNIDAE 4

4a (3b) Paraterga on abdominal segments 6-9; lateral margins of prementum slightly concave. Common. Warm weedy sites ... ... *Aeshna brevistyla*

4b Paraterga on 7-9; said margins straight or slightly convex. Rare in N. Id., unknown in S. Id. ... ... *Hemianax papuensis*

LIBELLULIDAE (*Diplacodes* libelluline, others corduliine)

5a (2b) Palpal setae 4. Widespread, mainly in lakes ... *Procordulia grayi*

5b Palpal setae 6 or more 6

6a (5b) Premental setae 12 or 13. *Without* abdominal dorsal carinae 7

6b Premental setae 8-10. Abdominal terga 4-8 or 4-9 each with dorsal longitudinal carina 8

7a (6a) Palpal setae 9-11. Mature nymph *ca.* 14mm long. North Island ... ... *Diplacodes bipunctata*

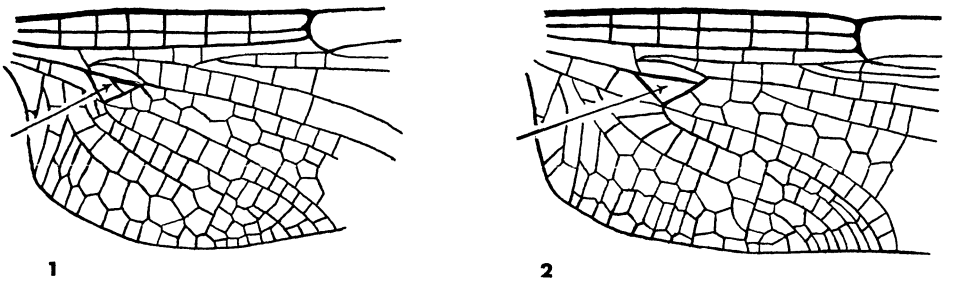
7b Palpal setae 6-8. Mature nymph at least 17mm long. Widespread ... ...*Hemicordulia australiae*

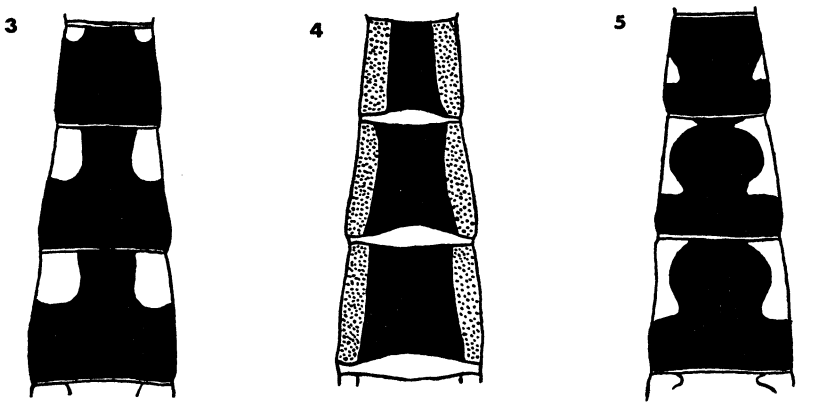
8a (6b) Palpal setae nearly always 7. Abdominal dorsal carinae very conspicuous, each resembling tooth of circular saw, that on 9 being very little smaller than that on 6 or 7. Small bush-streams in N. Id. ... ...*Antipodochlora braueri*

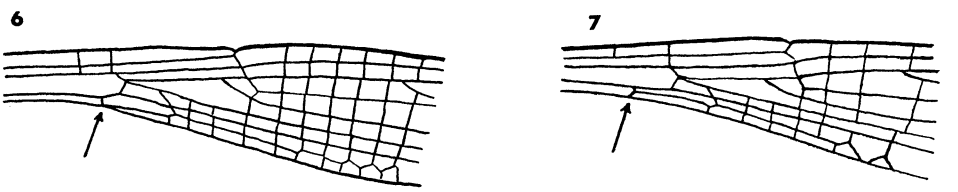
8b Palpal setae nearly always 6. Abdominal carinae in the form of hairy lumps, that on 9 being about quarter the size of that on 6 or 7. Widespread, mainly in flowing water ... ... *Procordulia smithii*

ZYGOPTERA

9a (1b) Ligula with closed 'median cleft', line of closure conspicuous; apices of gills abruptly rounded. The very common 'Blue Damselfly' *Lestes* (*Indolestes*) *colensonis* ... SYMPECMATIDAE







FIGS. 1-7. 1. *Antipodochlora braueri* hindwing. 2. *Procordulia* hindwing. 3. Abdominal pattern, dorsal, segments 3-5, *P. grayi*. 4. *Idem*, *P. smithii*. 5. *Idem*, *Hemicordulia australiae*. 6. *Xanthocnemis zelandica* hindwing. 7. *Ischnura aurora* hindwing.

9b Ligula *without* trace of median cleft; gills acuminate (except in in some very small specimens) ... ... COENAGRIIDAE 10

10a (9b) On distal margin of labial palp, the notch between end-hook and truncate lobe is *ca.* 4x as deep as notches between crenations of said lobe. Three species in literature, but probably there should be only the very common 'Red Damselfly' ... ... *Xanthocnemis zelandica*

10b Comparable proportion: 2x to two and one-half times as deep as notches between crenations. Rather rare in N. Id., not yet recorded in S. Id. ... ... *Ischnura aurora*

KEY TO SPECIES OF ADULTS

Since, in any species, an occasional specimen may fall just outside the size-range indicated, only a tentative assignment to species should be made on the basis of size; if the specimen does not then agree with the other characters given for that species, it should agree with those of either the species immediately above or that immediately below it in the key. The initial phrase following the measurement concerns the dorsal aspect of the abdomen.

Expanse in mm

ANISOPTERA. Wings apetiolate. Basally, hindwing about twice as broad as fore.

110-120 Black and yellow. Side of thorax with two bold yellow stripes. Costa black ... ... *Uropetala carovei* (plus subsp. *chiltoni* of doubtful validity)

100-110 Mainly brown and yellow. Side of thorax *without* bold yellow stripes. Costa bright yellow ... ... *Hemianax papuensis*

85-90 Mainly grey and yellow. Side of thorax with two bold yellow stripes ... ... *Aeshna brevistylea*

75-85 Brown. Side of thorax *without* bold yellow stripes. Triangle in hindwing divided by a crossvein (Fig. 1) ... *Antipodochlora braueri*

67-73 Dark brown and yellow. Triangle in hindwing *without* cross-vein (Fig. 2).
Abdominal pattern as in Fig. 3 ... ... *Procordulia grayi*
Abdominal pattern as in Fig. 4 ... ... *Procordulia smithii*

57-63 Black and yellow. Basal eighth of each wing hyaline.
Abdominal pattern as in Fig. 5 ... ... *Hemicordulia australiae*

50-55 Mainly red. Basal eighth of each wing yellow. ... *Diplacodes bipunctata*

ZYGOPTERA. Wings petiolate. Basally, hindwings about as broad as fore.

50-55 ♂ with blue, ♀ with yellowish markings. Pterostigma more than twice as long as wide ... ... *Lestes* (*Indolestes*) *colensonis*

35-45 ♂ and some♀♀ largely red, most♀♀ dingy with yellow markings; *without* blue on abdomen. Pterostigma scarcely longer than wide. In hindwing, anal vein leaving border of wing at level of Ac (Fig. 6) ... ... *Xanthocnemis zelandica*

24-27 Mainly yellowish-red; 9th and part of 8th segments blue. In hindwing, anal vein leaving border of wing proximal to level of Ac (Fig. 7) ... ... *Ischnura aurora*

ANTIPODOCHLORA BRAUERI

This species was formerly known mainly from a few adults collected from localities near Wellington such as Gollan's Valley and Silverstream. It is now known also from streams near Taumarunui and others inland from Tauranga (Waiorohi Stream 3 i 65 J.G.P.); probably it is widely distributed in the North Island but only in small streams in the bush. Exuviae from which adults had transformed were found in numbers about the end of December; they were usually situated not more than a foot above the water, either on the earthen bank or upon rushes or coarse grass. The adult males patrol, especially in the afternoons until at least 6 pm, just above the surface of the quieter pools, often where the bush meets overhead. The females usually fly ten to fifteen feet higher, often where there is a small glade or open stream-bank. Females were observed to oviposit while flying over shallow pools where there was a current, the tip of the abdomen touching the water momentarily at intervals of from one to a few seconds.