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Occurrence of the mayfly family Teloganodidae in northern New South Wales

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Abstract Teloganodid mayfly nymphs, previously known in Australia only from south-eastern Queensland, have now been recorded from numerous localities in the coastal drainages of northern New South Wales (NSW) from the Barrington Tops district to the Richmond River system. The nymphs seem to be restricted to riffles in forest streams and occur over a wide altitudinal range with records up to 940 m. They appear identical to those of *Austremerella picta* Riek, but rearing to the adult is needed to be certain that they represent the same species. The apparent restriction of Australian Teloganodidae to southern Queensland and northern NSW poses a biogeographical puzzle.

Key words biogeography, Ephemoptera, Teloganodidae.

INTRODUCTION

The family Teloganodidae, recently elevated from subfamily status in the Ephemerellidae (McCafferty & Wang 1997), is a curious component of the Australian mayfly fauna (Campbell 1990). It is represented by a single species, *Austremerella picta* Riek, which for most of the time since its description over 30 years ago (Riek 1963; Allen 1965) was known only from the type locality: a small, stony stream in Lamington National Park in southern Queensland (Hubbard & Campbell 1996). Recently Dean (1996; p. 64) commented that 'nymphs are also known from a forest stream in far northern New South Wales' but did not name the stream or provide further distributional information. McCafferty and Wang (1997) added a further locality in south-eastern Queensland, Flaggy Creek near Laidley. Here we report the occurrence of nymphs of the family at numerous localities in north-eastern New South Wales (NSW), showing that it is far more widespread than previously thought. We also comment on its micro- and macrohabitat requirements, and present some preliminary data on its diet.

DISTRIBUTION AND HABITAT

During a 1993 survey of aquatic macroinvertebrates of the Williams River system, part of the Hunter River basin, Chessman and Growns (1994) recorded teloganodid nymphs from three localities in the Barrington Tops district. At about the same time, Boulton *et al*. (1994a, 1994b) located the family in several streams farther north during aquatic faunal surveys associated with environmental impact assessments for proposed timber harvesting. These sites were in the Clarence, Bellinger, Macleay and Manning river basins. Subsequently, the sampling of numerous sites in northern NSW as part of the national river bioassessment program (the Monitoring River Health Initiative) has produced additional records of the family (NSW Environment Protection Authority, unpubl. data), as have some student research projects (Paul Massey-Reed, unpubl. data; Sandra Grinter, unpubl. data). The family has now been recorded from all of the major NSW coastal drainage basins from the Hunter north to the Queensland border (Table 1; Fig. 1).

The nymphs from these localities appear identical to those figured by Peters and Campbell (1991) and Dean (1996). Their habitat requirements seem to be quite stringent, as all collections were from streams in native forest (often rainforest) despite numerous similar-sized streams in agricultural areas at equivalent altitudes being sampled by us and others. Additionally, all specimens were taken by kick sampling in riffles, despite pools being sampled intensively at most of the same sites. The nymphs occupy streams of a range of sizes (from 1 to 11 m wide), at altitudes from 60 to over 900 m (Table 1). At least one of the streams is intermittent (Friday Creek; Paul Massey-Reed, unpubl. data).

Most nymphs have been collected from leaf packs in flowing water or from riffles with coarse substrata (pebbles, cobbles, boulders to 800 mm and bedrock) where sticks and leaves are trapped. They do not occur in areas where silt cover is evident. Preliminary analyses of gut contents of five nymphs ranging in total length, excluding cerci, from 2 to 6 mm indicate that they are detritivores; fore-gut contents comprised particles of leaves up to 0.5 mm. The mandibles are well developed, heavily sclerotised, and apparently suited for shredding leaves and perhaps wood. The nymphs grow to 10 mm (Dean 1996), but we have not examined guts of nymphs of this size. Given that the later instars of some mayfly nymphs can be predatory (e.g. *Kirrara* sp.; Chessman 1986), further analyses are required.

Table 1 Locality records for Ephemerellidae in New South Wales

Locality no.*	Stream	Major river basin	Elevation (m)	Source of information
1	Rocky Creek	Richmond	540	EPA, unpublished
2	Clarence River	Clarence	300	EPA, unpublished
3	Tributary of Little Nymboida River	Clarence	490	Boulton *et al*. (1994a)
4	Bangalore Creek	Clarence	440	Boulton *et al*. (1994a)
5	Orara River	Clarence	240	Massey-Reed (1997)
6	Friday Creek	Clarence	285	Massey-Reed (1997)
7	Boggy Creek	Macleay	880	Boulton *et al*. (1994b)
8	Never Never River (upper)	Bellinger	600	EPA, unpublished
9	Never Never River (lower)	Bellinger	60	EPA, unpublished
10	Urumbilum River	Clarence	140	EPA, unpublished
11	Urumbilum River (upper)	Clarence	535	Massey-Reed (1997)
12	Urumbilum River (lower)	Clarence	160	Massey-Reed (1997)
13	Platypus Creek	Bellinger	410	EPA, unpublished
14	Kalang River	Bellinger	210	Boulton *et al*. (1994a)
15	Little Wonder Creek	Nambucca	80	Grinter, unpublished
16	Tributary of Forbes River	Hastings	710	EPA, unpublished
17	Ellenborough River	Hastings	610	EPA, unpublished
18	Lansdowne River	Manning	130	EPA, unpublished
19	Caparra River	Manning	210	EPA, unpublished
20	Scrubby Creek	Manning	940	Boulton *et al*. (1994b)
21	Williams River	Hunter	470	Chessman & Growns (1994)
22	Wangat River	Hunter	340	Chessman & Growns (1994)
23	Chichester River	Hunter	240	Chessman & Growns (1994)

*See Fig. 1 for geographical locations. EPA, Environment Protection Authority.

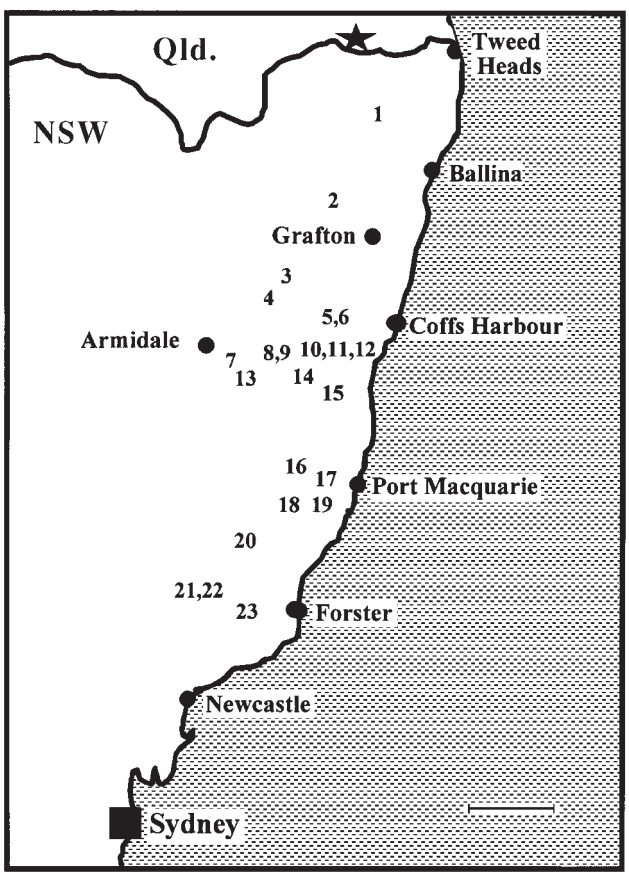

Fig. 1. Locality records of Teloganodidae in northern New South Wales. ★, Lamington National Park. Scale bar = 100 km.

DISCUSSION

Teloganodid mayflies are clearly widespread and locally fairly common in the coastal drainages of northern NSW. The absence of records from this area in the past simply highlights the lack of detailed ecological surveys of streams in the region. However, the Blue Mountains to the west of Sydney, which contain cool, forested streams that appear suitable for teloganodids, have been sampled extensively for macroinvertebrates (Growns *et al*. 1995), but the family has never been found there. Thus, the Barrington district may represent the southern limit of the family's distribution.

Rearing to the adult would be necessary to be sure that the NSW nymphs represent the same species as the Queensland specimens, but this was beyond the scope of the present study. Assuming that the NSW specimens belong to *A. picta* or a closely related species, it is surprising that the new records should be to the south of the original locality rather than to the north. Teloganodids are widespread in the Afrotropical and Oriental biogeographical regions, but *A. picta* belongs to the recently erected subfamily Austremerellinae, which is known only from Australia, Vietnam and southern and south-eastern China (McCafferty & Wang 1997). These authors hypothesised that this subfamily arose in Gondwanaland prior to its break-up, and dispersed to Asia from Australia. It would, therefore, be expected to be distributed northwards through eastern Queensland. However, sampling in Queensland for the Monitoring River Health Initiative has so far failed to locate teloganodids further north

than south-eastern Queensland (Diane Conrick, Queensland Department of Natural Resources, pers. comm.), and extensive searching between Townsville and Cairns has also yielded no specimens of the family (Ian Campbell, Monash University, pers. comm.). Yet north-eastern Queensland contains many fast-flowing, stony, mountain streams that should provide ideal habitat for teloganodids. Thus, the historical biogeography of the family in Australia remains enigmatic.

We are only now beginning to obtain a good understanding of the distribution of many freshwater invertebrates at the species level; few taxa are as unmistakable as teloganodid nymphs and biogeographers have been understandably hesitant about drawing generalisations from limited data sets potentially confounded by misidentifications. We predict that as taxonomic resolution of freshwater invertebrates and collecting coverage of northern New South Wales rivers improve, there may be other groups that share similarly enigmatic distribution patterns shedding light on this conundrum.

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