

PLATYBAETIS GAGADJUENSIS, A NEW SPECIES FROM NORTHERN AUSTRALIA (EPHEMEROPTERA : BAETIDAE)

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ABSTRACT

A new species of *Platybaetis* is described from nymphal and subimago material collected from Kakadu National Park, Northern Territory. These dorso-ventrally flattened mayfly nymphs are very small and lack a number of characters expressed by the four described species from south east Asia. A subimago was reared and verified Müller-Liebenau's recognition that *Platybaetis* was closely related to a "*Pseudocloeon*" type adult.

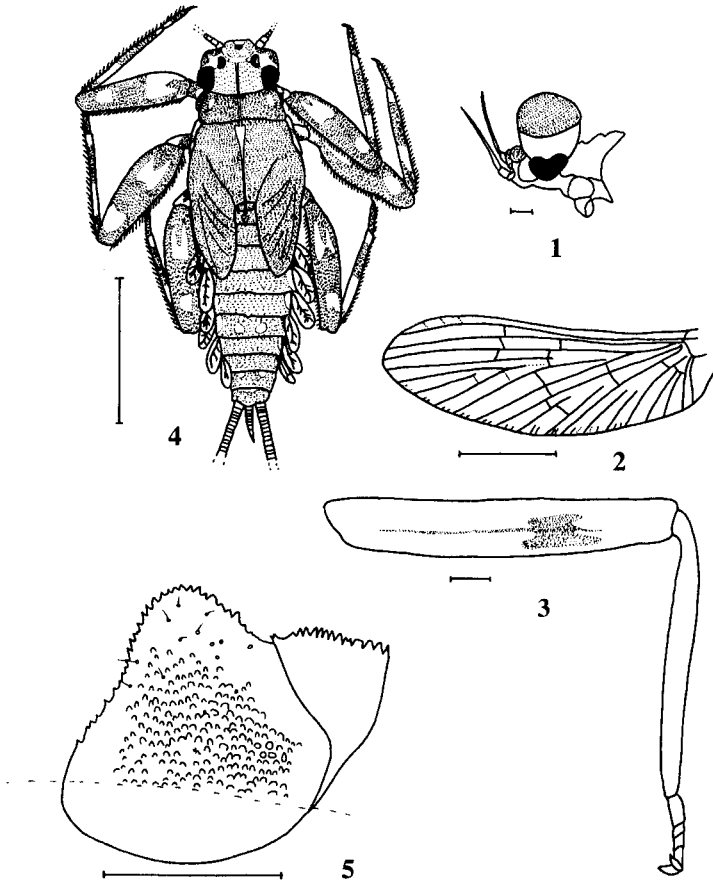
Field collections from the South Alligator River in Kakadu National Park suggested that this species has a distinct diurnal activity which reduces the chance of collection of this small nymph.

The Australian Monitoring River Health Initiative collections from northern Queensland also included nymphs of this species and extends the known distribution across the tropical north of the Australian continent.

INTRODUCTION

The genus *Platybaetis* was described by Müller-Liebenau (1980a) to include a dorso-ventrally flattened nymph in the family Baetidae. In her paper, Müller-Liebenau described *P. edmundsi* from the Philippines, and included a second species *P. eunoi* which was described by Ueno (1955) as "Baetis sp 2" from Nepal. In subsequent papers Müller-Liebenau (1980b and 1984) described two more species, *P. bishopi* from Malaysia and *P. probus* from Sabah. This wide distribution in the oriental region has been extended with specimens of this genus being recorded in Australia by Suter (1992) from the Northern Territory. This species has remained undescribed until this paper.

In 1992 the Monitoring River Health Initiative (MRHI) was established as part of the National Rivers Health Programme in Australia with the aim to assess the health of Australian rivers by developing a series of predictive models for geographical regions throughout Australia. Approximately 1500 sites were chosen as being pristine or at worst having mini-



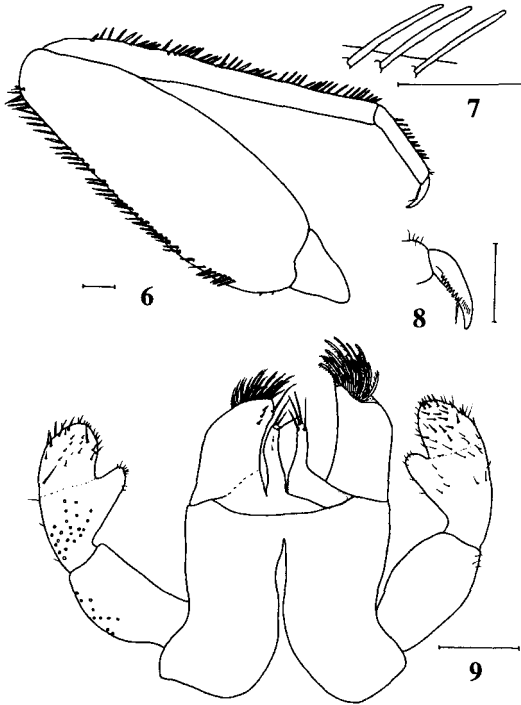
Figs. 1-5. Characteristics of male subimago and nymph of *Platybaetis gagadjuensis*. 1) Lateral view of turbinate eye of male subimago. 2) Forewing of male subimago. 3) Foreleg of male subimago. 4) Whole nymph. 5) Paraproct.

Scale Lines: Figures 1, 3 and 5 = 0.1mm, Figures 2 and 4 = 1.0mm.

mal human impact, and macroinvertebrate samples were taken from each of these sites in Autumn and Spring in 1994 -1996. The predictive models were constructed using family level taxonomic discrimination. Currently the First National Assessment of River Health (FNARH) is being undertaken at a further 1-2000 sites which have been modified by human activities (eg mining, effluent disposal, channel modification, land clearance, hydrological change etc.).

These initiatives have provided a large material base for taxonomic study over the whole continent. I was involved in a taxonomic project under the MRHI which was to provide illustrated keys to voucher species of the Baetidae and Caenidae. Similar such projects were included for the other Australian mayfly families. Through this work additional *Platybaetis* material has been collected from northern Australia, particularly in Queensland. It is likely that more specimens will be forthcoming as FNARH continues.

The subimago and nymph of the Australian species are described and the nymph is compared with the other four described species.



Figs. 6-9. Characteristics of the nymph of *Platybaetis gagadjuensis*. 6) foreleg. 7) Detail of setae lining femora, tibiae and tarsi of legs. 8) detail of tarsal claw of foreleg. 9) Labium.
Scale Lines = 0.1mm.

METHODS

Nymphs were collected using a hand-held dip net with mesh pore size of 250µm held downstream of disturbed substrate, or by hand picking of nymphs clinging to the under-surface of rocks. Mature nymphs from the South Alligator River were kept in 1L plastic rearing containers which had mesh sides and fitted into a polystyrene float so that it could remain in the river and maintain flow and adequate oxygen. Other specimens were preserved in 75% ethanol.

Nymphs were dissected and mounted on slides in polyvinyl lacto-phenol mounting medium. Illustrations were prepared with the aid of a camera lucida. Mouthparts were viewed ventrally (except labrum) and the labium is illustrated with the ventral surface shown on the right hand side of the illustration and the dorsal surface on the left.

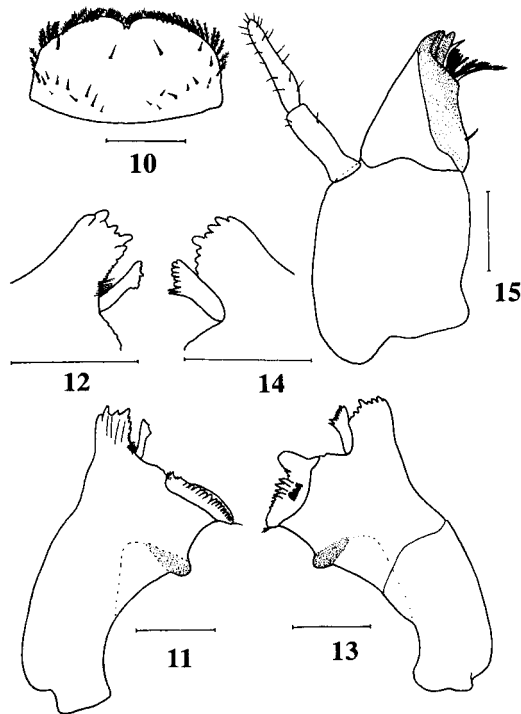
Platybaetis gagadjuensis sp. nov.

Baetidae Genus A sp1 Suter 1992

Platybaetis Dean and Suter 1996

Platybaetis sp 1 Suter 1997

Holotype: 1 nymph dissected and mounted on two slides in polyvinyl lactophenol mountant. Collected from Stewart Ck at timber crossing, Queensland, MRHI site 1121028 17°39' S, 145°58' E 10 July 1997 by Department of Primary Industries (DPI).



Figs. 10-15. Mouthparts of the nymph of *Platybaetis gagadjuensis*. 10) Labrum. 11) Ventral view of right mandible. 12) Detail of incisors and prosthema of right mandible. 13) Ventral view of left mandible. 14) Detail of incisors and prosthema of left mandible. 15) Maxilla. Scale Lines = 0.1mm.

Paratypes: 6 nymphs from the type locality as above; 1 nymph dissected and mounted on two slides in polyvinyl lactophenol mountant collected from South Alligator River above Fisher Ck confluence NT. 13°34' S, 132°34' E, April 1989, coll. P. Suter, A. Wells, P. Cranston; 1 subimago and cast skin in ethanol collected from South Alligator River above Fisher Ck confluence NT. 13°34' S, 132°34' E, reared 21 April 1989, coll. P. Suter, A. Wells, P. Cranston. 3 nymphs Annan River at Main Rd, Qld. MRHI site 107003A 15°42' S, 145°12' E, 29 June 1997, coll. DPI; 2 nymphs South Johnstone River upstream of Central Mill, Qld. MRHI site 112101B 17°37' S, 145°59' E, 26 October 1994 coll. DPI; 1 nymph Herbert River at Long Pocket, Qld. MRHI site 1160098 18°31' S, 146°02' E, 25 June 1997 coll. DPI; 2 nymphs McLeod River at McLeod, Qld. MRHI site 919013A 16°30' S, 145°00' E, 24 June 1997 coll. DPI; 1 nymph Meunga Ck at Ellerbeck Rd., Qld. MRHI site 1140015 18°14' S, 145°56' E 2 July 1997 coll. DPI; 2 nymphs North Johnstone River at Tung Oil, Qld. MRHI site 114004A 17°33' S, 145°56' E, 8 July 1997 coll. DPI; 1 nymph Herbert River at Abergowie, Qld. MRHI site 116006B 18°30' S, 145°55' E, 25 June 1997 coll. DPI; 1 nymph Murray River at Leichhardt, Qld. MRHI site 1140010 18°01' S, 145°56' E, 4 July 1997 coll. DPI.

All types are placed in the Australian National Insect Collection, CSIRO Canberra.

Other Material Examined: Northern Territory: 3 nymphs South Alligator River above Coronation Hill 13°36' S, 132°37' E, May 1988, April 1989, coll. P. Suter, A. Wells, P. Cranston; 4 nymphs South Alligator River at Gimbat OSS Field Station 13°35' S, 132°36' E, April 1989, coll. P. Suter, A. Wells, P. Cranston; 4 nymphs and 1 subimago South Alligator

River above Fisher Ck confluence 13°34' S, 132°34' E, April 1989, coll. P. Suter, A. Wells, P. Cranston.

Imago: unknown.

Subimago (Figs. 1-3): associated by rearing on 21 April 1989.

Body length approx. 3mm; forewings (Fig. 2) with reduced crossvein system, length 3x longer than wide; marginal intercalaries paired; pterostigma with 3 very faint crossveins; hind wings absent. Forelegs (Fig. 3) with a black marking on femora, other segments pale; 4 tarsal segments, leg ratios 1.19: 1.00: 0.11: 0.04: 0.04: 0.08 (tibial length 0.76mm); tarsal claws dissimilar; turbinate eyes round dorsally (Fig.1).

Nymph (Figs. 4-15): Body length: 2.8-4.0mm. Cerci length approx. 2mm, terminal filament reduced to <16 segments, 0.4mm. Body (Fig. 4) colour grey-brown with light markings. Head prognathous, broader than long with very small labrum, lacking a deep incision in posterior margin. Pronotum dark with two light lateral patches. Mesonotum dark with a light triangular central marking. Hind wings absent. Legs appear banded, long with femora flattened; villopore absent; femora dark with two light patches, tibiae dark with light portion centrally and apically, fore tarsi light basally, dark apically, mid and hind tarsi all dark; femora, tibiae and tarsi lined with long blunt setae (Figs. 6 and 7); surface of femora rugose; tarsal claws long with 8-10 teeth and a long apical setule (Fig. 8); segment ratios:

Fore leg: 1.00: 0.97: 0.27 (Femur Length 0.8-1.1mm)

Mid leg: 1.00: 0.90: 0.25 (Femur Length 0.9-1.2mm)

Hind leg 1.00: 0.82: 0.23 (Femur Length 0.9-1.2mm)

Femur length to width ratio, fore leg 2.75, mid leg 3.3, hind leg 3.8.

Abdomen dark with light patches on tergites 6 and 9; small tubercle present on posterior margin of tergites 1-5, not apparent in small specimens; paraprocts with numerous small mesial and apical spines, surface with numerous tubercles (Fig. 5); gills present on segments 2-7, lamellae single and plate-like, margins serrated and ciliated.

Mouthparts: labrum (Fig. 10) lined with pinnate setae, deep central concavity present; right mandible (Fig. 11) with fused incisors with at least 7 apical teeth (8 clear teeth in newly moulted nymphs), inner margin rugose and with basal hairs present, prostheca robust, broadest apically with 8-10 apical teeth (Fig. 12); left mandible (Fig 13) with incisors fused, with approx. 8 apical teeth and 3 small inner teeth, prostheca robust with 6-8 apical teeth and 2 spines (Fig. 14), molar region with large broad tooth on inner margin, smaller teeth centrally. Maxillae (Fig. 15) with a single setule near medial hump, two segmented palp approximately as long as galeolacinia, basal segment 0.8x segment 2. Labium (Fig. 9) with narrow glossae which are shorter than the broad paraglossae; labial palpi three segmented, second segment well developed lobe on mesial margin; segment ratios, 1.00: 0.82: 0.51 (0.14mm), basal segment length 1.6x width.

Etymology: Named after the Gagadju country in which Kakadu National Park is situated and from where this species was first recorded.

DISCUSSION

This species is placed in *Platybaetis* because it possesses the following characters; nymph in both sexes is dorso-ventrally flattened; head is prognathous, is broader than long with very small labrum; hind wings absent; legs with femora flattened; femora, tibiae and tarsi lined with long blunt setae.

Platybaetis gagadjuensis is distinguished from the four other species in the genus by the size, less than 5mm in length, gills present on abdominal segment 2-7, head lacking a deep incision in posterior margin; prosthecae of mandibles large and robust; right mandible with hair fringe on inner margin of incisors; glossae narrow and distinctly shorter than the broad paraglossae; second segment of labial palp with well developed lobe on mesial margin.

Waltz and McCafferty (1987) noted that *Platybaetis* and other closely related genera are "...distinguished from the larvae of all other baetids by their synapomorphic possession

of a ventral femoral patch" (Waltz and McCafferty 1987:553). However, *P. gagadjuensis* does not possess this femoral patch, but is in strong agreement with other generic characters of the genus. It is suggested that the absence of this femoral patch in this species may be due to the very small size of the fully mature nymph and that its expression has not developed. Similarly the absence of a gill on the first abdominal segment may also be related to the reduced size of this species.

The presence of this species in Northern Australia extends the known distribution of this genus in the oriental region being recorded from Nepal (*P. uenoi*), Malaysia (*P. bishopi*), The Philippines (*P. edmundsi*) and Sabah, E. Malaysia (*P. probus*).

The nymphs of *P. gagadjuensis* were collected from riffle zones in the rivers, principally from on rocks in moderately flowing water. Observations made in the South Alligator River in 1989 suggested that the nymphs have a distinctive period of activity in the morning. Nymphs were all collected before midday in the South Alligator River, but never in the afternoon. A similar observation has been made with specimens collected in Queensland. All specimens were collected before 2.30pm eastern standard time. The absence of this nymph in samples collected later in the afternoon may mean that its distribution is more widespread, but it has been missed due to time of collection. In addition with the MRHI samples only being identified to Family some specimens may have been incorrectly identified as juvenile Leptophlebiids, although the quality assurance program has not detected this mis-identification.

Only one subimago was attracted to a UV light trap in the South Alligator River. The reared specimen died as a subimago, but the characteristics of the wing venation is consistent with the *Pseudocloeon* group. Müller-Liebenau (1980a) considered *Platybaetis* closely related to *Pseudocloeon*, but with the difficulties associated with the adult taxonomy no further conclusions can be drawn.

ACKNOWLEDGMENTS

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