

A NEW SPECIES OF *ATURBINA* (EPHEMEROPTERA, BAETIDAE) LUGO-ORTIZ AND MCCAFFERTY FROM URUGUAY

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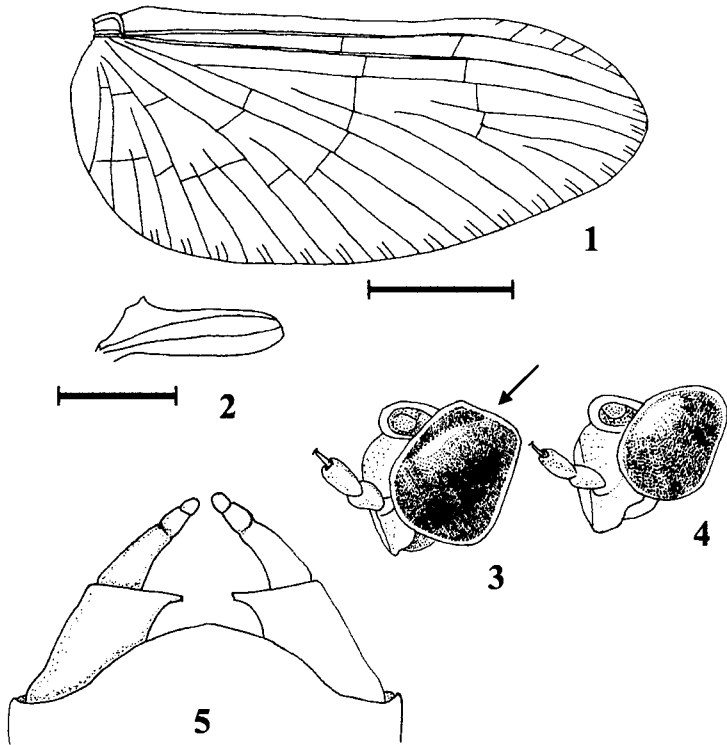
ABSTRACT

Aturbina was described as an aberrant baetid mayfly that lacked turbinate eyes in the male. The species *A. georgei* was shown to be widespread in Brazil and tropical South America. A second species, *A. beatrixae*, is now described from Departamento Maldonado, Uruguay. It differs from all known Baetidae in that the genital forceps possess two short or globular distal segments. The larva is believed to be associated with rotting logs in streams.

INTRODUCTION

In the course of a short visit to Uruguay in the summer of 1983-84, I made light-trap collections of adults of a curious pale baetid from a major afferent of the River Maldonado. The males were apparently unique for this family in lacking turbinate eyes. But despite extensive searches I was unable to find any mature male larvae that could be identified by the presence of the same distinctive feature. A number of years later, Lugo-Ortiz and McCafferty (1996) reported the presence of numerous specimens of a baetid with similar eyes in collections made from Brazil and other South American countries. Of greater interest still, they reported the capture of male baetid larvae with undivided eyes from some of the same localities. Thus, they were able to provide convincing evidence of the all-important association of the two stages, without which a satisfactory description of this curious taxon could not be made. They named the genus *Aturbina*.

Armed with this information, I re-examined the female larvae previously collected from the River Maldonado basin and found one closely resembling those described by Lugo-Ortiz and McCafferty. There were important differences, however, in both adults and nymph.



Aturbina beatrixae. **Fig. 1:** Fore wing. Bar = 1 cm. **Fig. 2:** Hind wing. Bar = 0.5 mm. **Fig. 3:** Male eye, lateral view (From an unpublished drawing by A.D. Mol). Arrow points to sulcus. **Fig. 4:** Female eye, lateral view (the same). **Fig. 5:** Male forceps.

DESCRIPTION

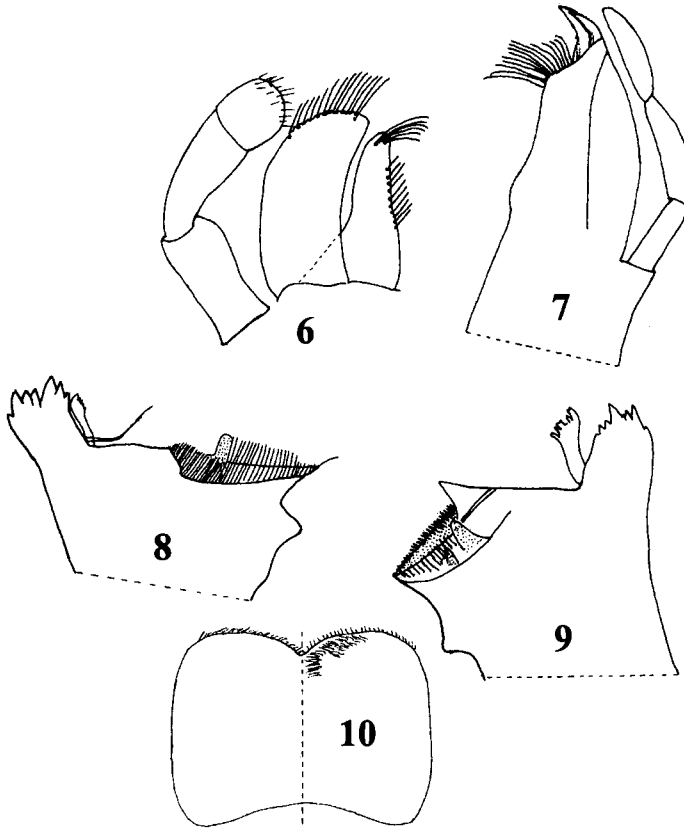
Aturbina beatrixae sp. n.

Male imago. (In life) A generally pale, colourless insect. Eyes translucent grey; thorax dove-grey with blackish-grey markings posterior to wing roots and on mesonotum; legs white, apex of fore tibia and tarsus I dark grey. Abdomen translucent colourless except for postero-lateral white patches on terga II, IV and VI; VII largely white and VIII-X entirely so; tails white.

(In spirit) Oculi undivided (Fig. 3), but extreme dorsal portion separated from the rest by a shallow sulcus. Thorax cream, main sutures and metanotum golden, a distinct metanotal hump present. Legs white. Fore wing (Fig. 1) with a small but conspicuous dark spot at junction of costal brace and subcosta; hind wing (Fig. 2) with two veins, main costal spur preceded basally by a rudimentary peak. Abdomen and cerci creamy white. Forceps (Fig. 5) stout and short with four segments; basal segment equal in length to other three together, the inner basal portion overlapped by a broad posterior extension of sternum IX, the inner distal portion drawn out into a blunt inwardly-directed process; second long segment dwarfed by the first segment, tapering distally; third and fourth segments rounded, the latter globular.

Male: body 4.2 - 5mm; wing 4.2 - 4.5mm

Female: body 5mm; wing 5mm.



Aturbina beatrixae. Larval mouthparts. Fig. 6: Right mandible. Fig. 7: Left mandible. Fig. 8: Labium (palp separated). Fig. 9: Maxilla. Fig. 10: Labrum.

Larva (assigned). *Mouthparts* (Figs. 6 to 10): labrum with deep median notch; incisors of both mandibles fused to near apex, a conspicuous long fine seta projecting medially from base of right prosthema, this seta with barely discernible fraying in outer half; maxillary palps slender, with three segments, reaching to apex of galea-lacinia; labial palps with three segments, apical segment equal in width to second segment. *Legs* slender; posterior margins of femora bearing 8-15 short, spine-like setae; similar more closely spaced setae on anterior margins of tibiae and tarsi; tarsal claws with 3-4 fine teeth in middle section merging with roughened base of claw. *Gills* as in *A. georgei*. *Cerci* with medial hair fringe, terminal filament fringed on both sides.

Material. URUGUAY, Departamento Maldonado, Arroyo de las Cañas, 37 km north of Punta del Este by bridge on road from San Carlos to Aiguá, holotype male imago, 21.I.84; *ibid.* paratypes, 12 male, 4 female, 10 subimagos, 4.I.84 - 21.I.84, 1 nymph, 8.II.84; Dos Hermanos, 23km north of Abra del Perdomo, 2 females, 20.I.84. Holotype and one male and female paratypes deposited in Instituto Miguel Lillo, Universidad Nacional de Tucumán, Argentina, remaining material deposited in the collection of the British Museum of Natural History, London.

Named for Mrs. Trixie Ingham of Buenos Aires, whose unstinting help in many ways made this study possible.

DISCUSSION

The adults of both sexes of *Aturbina beatrixae* generally resemble those of *A. georgei* Lugo-Ortiz and McCafferty in their overall pallor. The wing spot on the costal brace in *A. beatrixae* would seem to be distinctive. The most striking difference between the species lies in the male genitalia. While the greatly enlarged basal segment of the forceps is clearly a shared apomorphy, the presence of a globular fourth forceps segment in *A. beatrixae* immediately distinguishes it from *A. georgei*. Indeed, this last character has not been described for any other member of the Baetidae.

The single larva of *Aturbina* from the Arroyo de las Cañas is not now in very good condition. It is assumed to be that of *A. beatrixae*, but proof of this association is lacking at the present time. The mouthparts of the two species are generally similar, and the legs and gills of the two are almost identical. Most importantly, it has the same distinctive long seta arising from the base of the prosthema of the right mandible as *A. georgei*. However, in *A. beatrixae*, this hair is unbranched, at most minutely frayed.

Until much more is known about the Baetidae of South America little is to be gained by discussion of the phylogeny of *Aturbina*. While lacking turbinate eyes it could be argued that the male eye is nevertheless partially divided into two portions by the sulcus shown in Fig. 3. This sulcus is also present in the species from Surinam studied by Dr. A. D. Mol. although it is not clear from the description if it also exists in the type species *A. georgei*. This sulcus is lined with similar facets to the rest of the eye. It is not therefore homologous with the division between the turbinate and lower portions of the eye seen in other Baetidae.

The presence of a fourth forceps segment in the male is autapomorphic and is presumably not homologous with that seen, for example, in the Siphonuridae.

Structure of the Eyes

I have been fortunate to have had the generous cooperation of Professor M.F. Land of the Centre for Neuroscience at the University of Sussex. From his examination of the eyes of *Aturbina beatrixae* he has been able to show that the eyes of both sexes are of the apposition type throughout. This is in contrast with most baetids where the turbinate region of the male eye is of the superposition type. The female has uniform facets throughout; the male, on the other hand, has a wide horizontal band of enlarged facets. These are not concentrated dorsally, as in the normal turbinate eye in the Baetidae, but are distributed round the middle region of the eye.

This has important consequences in terms of behaviour. Enlarged facets are generally found in regions of high visual acuity (Land, 1997). In the Baetidae, for instance, they are found in the dorsal turbinate eyes, where they presumably serve to locate females entering mating swarms. Professor Land points out that a medial band of large facets is also seen in empid flies that fly over the water surface on the lookout for insects struggling in the surface. He suggests that the mating dance and the pursuit of females by *Aturbina* may take place horizontally, close to a water surface, rather than in the more or less vertical swarms of most other mayflies.

Larval Habitat

The Arroyo de las Cañas flows for 30-40 km between heavily wooded banks across the undulating countryside to the north of San Carlos. Attempts to locate the larval habitat of *A. beatrixae* were only partially successful. Certain Old World baetids are known to live as inquilines in the branchial chamber of fresh water mussels (clams). These mollusks are abundant in certain reaches of the Arroyo de las Cañas but, out of more than 100 examined, none contained mayfly larvae. A more promising clue came from a collection of leaves and rotting logs brought into the lab. A single adult of *Aturbina* emerged from this brew, but the larval skin was unfortunately not recovered. A later collection of rotting wood, dredged from the bed of the river, harboured a variety of baetids including the single larva of

Aturbina described above. Thus, although the association with this habitat cannot be regarded as certain, there is enough evidence to merit further study.

Aturbina appears to be a widespread and not uncommon mayfly in South America (Lugo-Ortiz and McCafferty, 1996; A.D. Mol, in litt.). At a latitude of 34° 41' S, San Carlos is in the southernmost region of Uruguay. Winters are cool and summer heat is moderated by proximity to the Atlantic. Thus *A. beatrixae* would appear to be a species of the Temperate zone, possibly replacing *A. georgei* in this region.

ACKNOWLEDGMENTS

My indebtedness to Mrs. Trixie Ingham for hospitality and help in many ways cannot be exaggerated. I must also record my thanks to Dr. Ad Mol, for sending me details of his material of *Aturbina* from Surinam and for permission to use his drawings of the eyes. I am also most grateful to Professor Mike Land of the University of Sussex for examining and reporting on the structure of the eyes in the male.

REFERENCES

- Land, M. F. 1997. Visual acuity in insects. *Ann. Rev. Ent.* 42: 147-177.
Lugo-Ortiz, C. R. and W. P. McCafferty. 1996. *Aturbina georgei* gen. et sp. n.: A small minnow mayfly (Ephemeroptera: Baetidae) without turbinate eyes. *Aquat. Insects* 18: 175-183.