Michael Hubbard

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Indobaetis: A New Genus of Baetidae from Sri Lanka (Insecta: Ephemeroptera) with two new species

by

INGRID MÜLLER-LIEBENAU
Max-Planck-Institut für Limnologie,
Abt. Allgemeine Limnologie, D-2320 Plön

and

DENNIS K. MORIHARA
XTERMCO, 305 Dairy Road, Kahului, Maui 96732, Hawaii

Abstract:

A new genus of Baetidae from Sri Lanka with two species, *Indobaetis costai* gen. n. sp. n. and *I. starmuehlneri* gen. n. sp. n., are described and morphological characteristics are illustrated. The new genus differs from all other genera of the family in its combination of characters which do not allow placement within any known genus of the family. *Indobaetis* is most closely related to the *Baetis muticus* group of which its phylogenetic relationship is discussed.

Introduction

Most of the material studied was collected by Prof. Dr. C. F. STARMÜHLNER, Vienna, and supplemented by Dr. G. WENINGER, Vienna, and Dr. H. H. COSTA, Kelaniya, during the Austrian-Ceylonese Hydrobiological Mission 1970 of the 1st. Zoological Institute, University of Vienna (Austria) and the Departement of Zoology, Vidyalankara, University of Ceylon, Kelaniya. Another new genus and species, *Indocloeon primum*, from the same collection has already been described (MÜLLER-LIEBENAU, in press).

Descriptions

Genus *Indobaetis*, gen. n.

Mature nymph: — Head bowed ventrally, head and thorax laterally flattened. Antennae: half length of body, small spine at inner apical margin of each segment in basal half of antennae. Mandibles: all canini fused basically, nearly equal in length and vaulted ventrally; right prostheca slender, pointed. Labial palpus: variable in new species (Fig. 1b, 2b). Glossa with transverse row of bristles on dorsal surface near apex. Maxillary palpus: two-segmented, variable in new species; teeth at apex of galea-lacinea long, pointed. Legs: slender with strong setae on outer margin of femur and tibia. Claws: single long seta between both apical denticles. Hind wing pads absent; 6 pairs of abdominal gills (segment II-VII). Paraproct: tongue-like prolongation at inner posterior

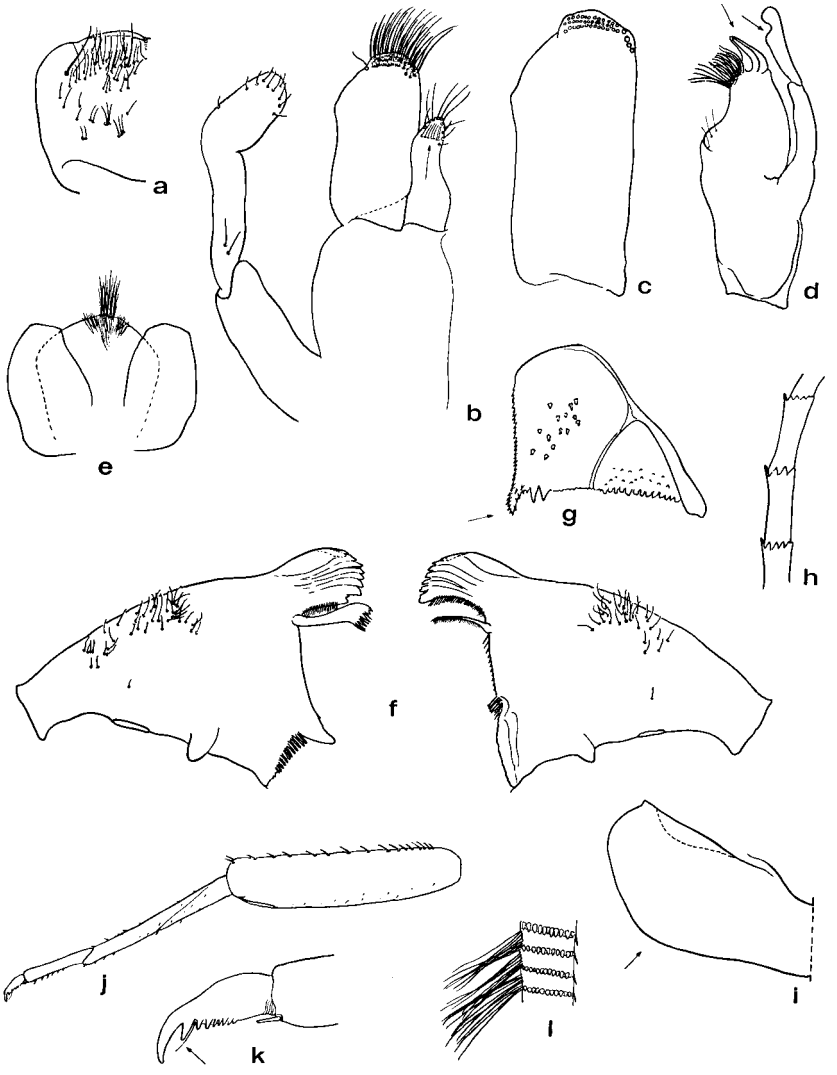

Fig. 1: *Indobaetis costai* gen. n. sp. n., nymph: a) left half of labrum; b) left half of labium; c) paraglossa, ventral; d) maxilla; e) hypophyrynx; f) left and right mandible; g) paraproct; h) part of antenna; i) left half of metatergum; j) leg; k) claw; l) segments of right cercus

edge. Cerci: about half length of body, terminal filament shorter than cerci. Terga (Fig. 4 and 6): surface with apically rounded scales, scale bases more or less rounded or trapezoid; posterior margin of terga with elongate, pointed spines.

Type species: — *Indobaetis costai*, sp. n.

Indobaetis costai, sp. n.
Fig. 1, 3, 4

Material: 40 nymphs.

Mature nymph. — Coloration (Fig. 3): uniformly light brown on dorsum of abdomen; distal muscle insertions on dorsum pale on segments II—IX; caudal filaments lighter than dorsum of abdomen. Body length: 4,5—6,3 mm; cerci as long as body, terminal filament half length of caudal filaments. Antennae (Fig. 1h): half length of body; spine at inner apical margin of each segment in basal half of antenna. Labrum (Fig. 1a): two strong submarginal bristles on each half and a number of finer bristles. Mandibles (Fig. 1f): all canini fused basically and similar in size, vaulted ventrally; right prostheca slender, pointed. Maxillae (Fig. 1d): apical teeth of galea-lacinia long, pointed; maxillary palpus reaching beyond galea-lacinia, with indentation on inner margin near apex. Labium (Fig. 1b): glossa smaller than paraglossa and about 2/3 length of paraglossa, a subapical transverse row of ca. 6 fine bristles; labial palpus slender, no inner apical lobe on 2nd segment, third segment about twice as long as broad. Hypopharynx (Fig. 1e): "brush" at apex of middle lobe. Legs (Fig. 1j): slender with strong setae on outer margin of femur and tibia, claws (Fig. 1k) with a single long seta between two apical denticles near margin. Hind wing pads absent (Fig. 1i). Six pairs of abdominal gills present (II. — VII. segment). Paraproct (Fig. 1g): tongue-like prolongation at inner posterior edge. Surface of terga (Fig. 4) with rounded scales; posterior margin with elongate, pointed spines.

Holotype: — Mature nymph; slide preparation. Ceylon, FC 6/c, Deniyaya, Kiriwel-Dola, 11. 11. 1970, leg. STARMÜHLNER.

Paratypes: 35 nymphs in alcohol, 4 slide preparations.

Holotype and some Paratypes (in alcohol and 2 slide preparations) are deposited at the Zool. Staatssammlung, München. The remaining Paratypes are deposited at Florida A & M university, Entomology and Structural Pest Control, Tallahassee, Florida, U.S.A.

Indobaetis starmuehlneri, sp. n.
Fig. 2, 5, 6

Material: 2 nymphs.

Mature nymph. — Coloration (Fig. 5): similar to that of *I. costai* sp. n., but muscle insertions less clearly developed; caudal filaments lighter than

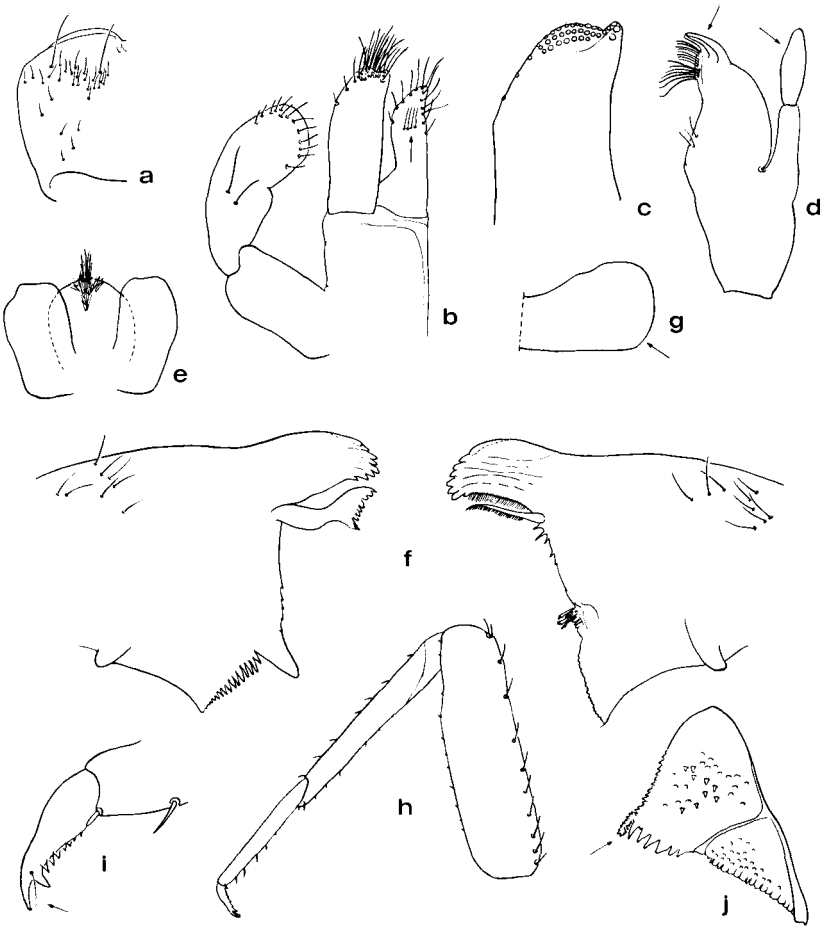

Fig. 2: *Indobaetis starmuehlneri* gen. n. sp. n., nymph: a) left half of labrum; b) left half of labium; c) apex of paraglossa, ventral; d) maxilla; e) hypopharynx; f) canini and molar area of left and right mandible; g) right half of metatergum; h) leg; i) claw; j) paraproct

dorsum of abdomen. Body length: 4,5 mm, terminal filament 1,9 mm, cerci (broken in both specimens) probably longer than terminal filament. Antennae: half length of body; small spine at inner apical margin of each segment in basal half of antenna. Labrum (Fig. 2a): two strong submarginal bristles on each half and a number of finer bristles. Mandibles (Fig. 2f):

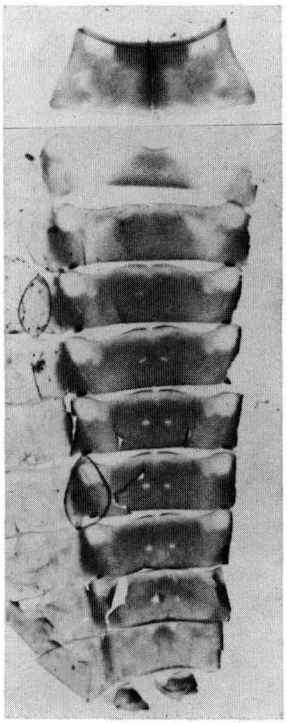

Fig. 3: *Indobaetis costai* gen. n. sp. n., nymph: color pattern of pronotum and abdomen

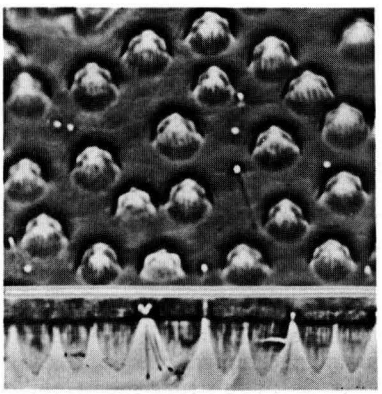

Fig. 4: *Indobaetis costai* gen. n. sp. n., nymph: surface and posterior margin of terga

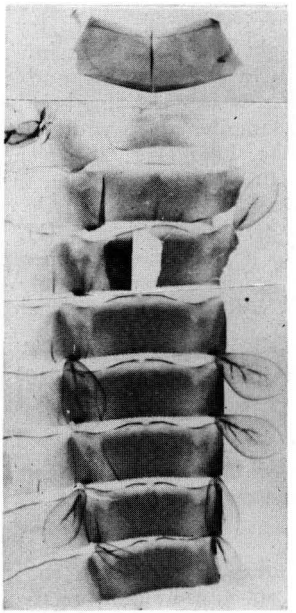

Fig. 5: *Indobaetis starmuehlneri* gen. n. sp. n., nymph: color pattern of pronotum and abdomen

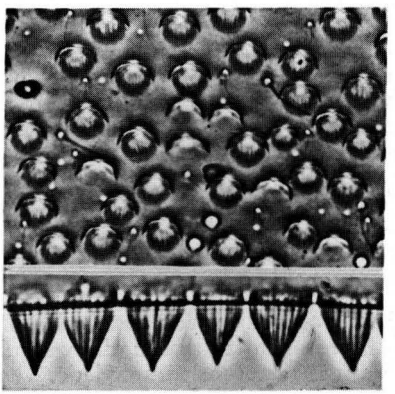

Fig. 6: *Indobaetis starmuehlneri* gen. n. sp. n., nymph: surface and posterior margin of terga

canini fused basically and similar in size, vaulted ventrally; right prostheca slender, pointed. Maxillae (Fig. 2d): apical teeth of galea-lacinia comparatively long, pointed; maxillary palpus about as long as galea-lacinia, only a slight indentation on inner margin near apex. Labium (Fig. 2b): glossa only a little smaller and shorter than paraglossa, with subapical transverse row of ca. 4 fine bristles, labial palpus more stout, 3rd segment nearly of same length as width. Hypoharynx (Fig. 2e): "brush" at apex of middle lobe. Legs (Fig. 2h): slender with strong setae on outer margin of femur and tibia, claws (Fig. 2i) with single long seta submarginal between two apical denticles near tip of claw. Hind wing pads absent (Fig. 2g). Six pairs of abdominal gills (II. — VII. segment). Paraproct (Fig. 2j): tongue-like prolongation at inner posterior edge. Surface of terga (Fig. 6) with rounded scales, more densely arranged than in *I. costai* sp. n.; posterior margin with basically broad, elongate, pointed spines.

Holotype: — Mature nymph; slide preparation. Ceylon, FC 11/b, Ratnapura, Rajanawa-Fall, 19. 11. 1970, leg. STARMÜHLNER.
Paratype: 1 slide preparation.

Holotype is deposited at the Zool. Staatssammlung, München, the Paratype at Florida A & M University, Entomology and structurae Pest Control, Talahassee, Florida, U.S.A.

Remarks

As morphological characters show, *Indobaetis costai* sp. n. and *I. starmuehlneri* sp. n. are closely related. Both species have a number of characters which show a certain similarity with the European *muticus*-group of the genus *Baetis (B. muticus* and *B. navasi,* MÜLLER-LIEBENAU, 1969,1974): head bowed ventrally, head and thorax laterally flattened; a number of bristles on dorsal surface of glossa, which are arranged in a transverse row in *Indobaetis costai* sp. n. and *I. starmuehlneri* sp. n. (Fig. 1b and 2b), while more randomly grouped in *Baetis muticus* and *B. navasi;* a tongue-like prolongation at the inner posterior edge of the paraproct (Fig. 1g and 2j); canini area of mandibles, although they are vaulted ventrally in *Indobaetis costai* sp. n. and *I. starmuehlneri* sp. n.; right prostheca slender and pointed (slender and bifid in *B. muticus* and *B. navasi);* scales with bases which are more or less trapezoid. However, *B. muticus* has 7 pairs of gills developed, *B. navasi* lacks the pair on the first segment as in both newly described species of *Indobaetis* gen. n.

A third species of *Indobaetis* gen. n. from Sri Lanka was determined by BRAASCH (personal information). Also this species has no hind wing pads and only 6 pairs of abdominal gills (segment II—VII). Therefore one can probably take both characters as generic in *Indobaetis* gen. n.

The proposed phylogenetic relationship of *Indobaetis* gen. n. and *Baetis* is based upon the shared, derived, character states as diagrammed in Fig. 7. *Baetis* is therefore paraphyletic. The loss of hind wing pads and first pair of abdominal gills is considered to be convergent.

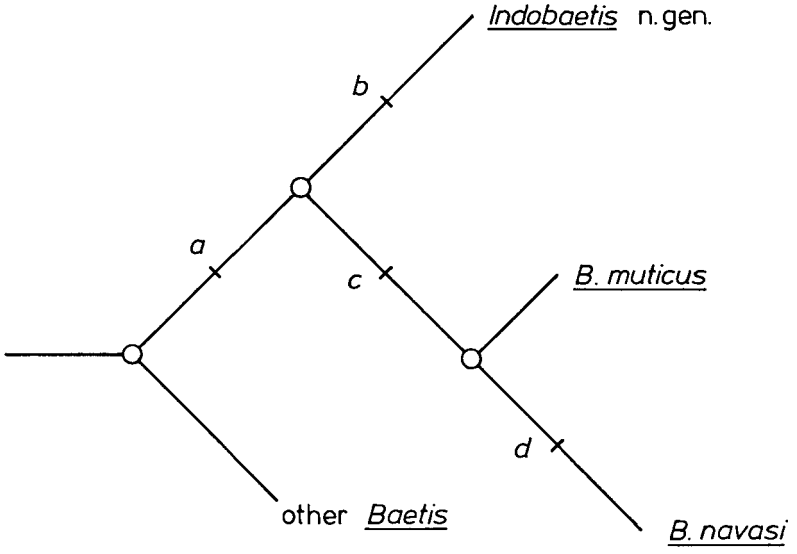

Fig. 7: Phylongenetic relationship of *Baetis* and *Indobaetis* gen. n. Shared, derived, character states: a) prolonged paraproct, laterally flattened head and thorax, and trapezoid scale bases; b) loss of hind wings and first abdominal gills; c) bifid protheca, and d) loss of first abdominal gills.

As mentioned by COSTA & SARMÜHLNER (1972) *Indobaetis costai* sp. n. occurs at altitudes between 2000 m and 650 m above sea level. There the nymphs live under stones in the current and in the cascades (collecting sites 1/c, 3/b, 6/c, 8/7, 9/c, 17/c, 20 b/c, 21/b, 26/b, 35/b, 812).

Indobaetis starmuehlneri sp. n. was collected at two stations at 450 m and 250 m above sea level (collecting sites 10/b and 11/b), where the nymphs were living under stones near the banks.

Acknowledgment

We are very indepted to Prof. Dr. F. STARMÜHLNER, Zool. Inst., University Vienna, Austria, who has kindly provided us with this material for studying.

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