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## *Notobaetis*: A New Genus of Baetidae (Ephemeroptera) from South America

*key words*: Ephemeroptera, Baetidae, Argentina

### Abstract

A new genus and species, *Notobaetis penai*, n. gen., n. sp., of Baetidae (Ephemeroptera), is described based upon reared specimens collected from the Cordoba Province of Argentina. This new genus appears to be phenetically intermediate between *Baetis* LEACH and *Centroptilum* EATON while possessing a unique combination of characters and one autapomorphic character.

The baetid genera of South America are poorly known compared to those of North America and Europe. The taxonomic literature dealing with the neotropical baetid fauna is comprised of numerous short treatments of limited geographic and faunistic scope. The most comprehensive work (NEEDHAM & MURPHY, 1924) is outdated. The larval taxonomy has been particularly inadequate; i. e. an inability to place larvae within nominal genera has existed (TRAVER, 1944, and ROBACK, 1966). Presently, at least 8 genera are known to occur in South America (HUBBARD, 1979).

A species of Baetidae was reared by L. PEÑA from the Cordoba Province of Argentina. This species possesses a combination of adult and larval morphological characters

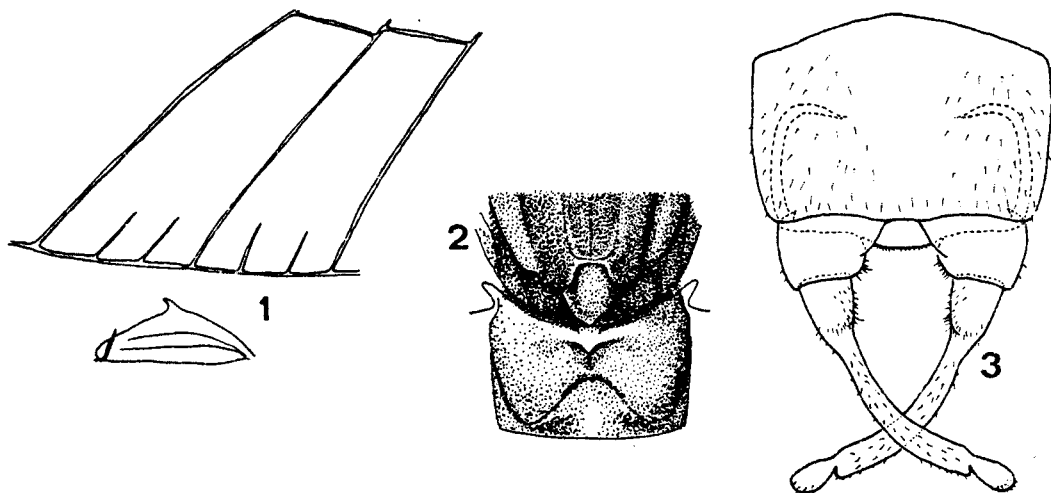


Fig. 1-3. *Notobaetis penai*, n. gen., n. sp. adult ♂: posterior section of forewing & entire hind wing (both to same scale) indicating relative sizes (1), dorsal view of metathorax (2), and venter of genitalia (3).

which does not allow placement within any known genus and a hind wing (Fig. 1) that appears to be uniquely derived within Ephemeroptera. The following descriptions are based on this material.

Genus *Notobaetis*, n. gen.

Adult ♂. — Legs I with tibiae slightly longer than femora; tarsi with 4 segments distally decreasing in length, combined lengths of tarsal segments greater than tibial length. Legs II and III with similar proportions and lengths; tibiae slightly longer than femora, each longer than 3 segmented tarsi; tarsi with subapical, ventral step. Forewings with paired marginal intercalaries (Fig. 1); posterior margin of basal half evenly rounded. Hind wings (Fig. 1) with 2 longitudinal veins and a hook-like, broadly based costal projection arising near midlength of wings. Posterior margin of metanotum deeply emarginate medially (Fig. 2); metascutellar hump acute, not flattened before apex, projecting dorso-posteriorly.

Adult ♀. — Legs I–III subequal in length; I with femora subequal in length to tibiae, tarsi 4 segmented; II and III with tibiae slightly longer than femora. Forewings with paired marginal intercalaries. Hind wings smaller than those of ♂, similar in shape but with costal projection symmetrically acute and smaller; longitudinal veins greatly reduced. Posterior margin of metanotum approximately half as deeply emarginate medially as in ♂. Profile of metascutellar hump as in ♂.

Mature larvae. — Antennae long, but not more than  $\frac{1}{2}$  body length. Right mandible (Fig. 5) with branched, slender protheca; incisors deeply cleft. Left mandible (Fig. 6) with incisors relatively fused; molar regions of both mandibles composed of numerous elongate teeth. Apex of labial palpi asymmetrically rounded (Fig. 7). Maxillary palpi slender, may extend beyond galea-lacinia; apparent apical segment short and acute. Legs (Fig. 8) slender, parallel sided; strong, dorsal setae sparse on femora and absent on tibiae and tarsi; tibia with extremely long, fine setae arising from sockets forming dorsal arc between anterior seam and base; claws (Fig. 9) sharply pointed, equal to or less than  $\frac{1}{3}$  length of tarsus, without denticles. Abdomen with scales (Fig. 11 & 14); sternal surfaces with distinct spiny areas near antero-lateral corners (Fig. 12); tubercles or tufts of setae absent. Abdominal gills flat and simple, present on segments 1–7, held dorso-laterally, longer than broad; tracheae pinnately branched; margins smooth. Cerci with fringe of long, fine setae on inner margin; uniformly shaded. Terminal filament subequal to cerci in length and thickness; long, fine setae arise laterally.

Type-species. — *Notobaetis penai*, n. sp.

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Adult ♂. — Lengths: body 8 mm; forewings 7–8 mm.; hind wings 0.5–0.8 mm. Head with antennal scapes slightly longer than pedicels; flagella longer than length of dorsal surface of turbinate eyes. Viewed dorsally, turbinate eyes oval about 2 times longer than wide; margins narrowly dark.

Thorax dark with pale marks. Forewings hyaline with translucent area near apex of costal and subcostal cells; veins dark; paired marginal intercalaries (Fig. 1) decreasing in length posteriorly. Hind wings (Fig. 1) with 2, simple, longitudinal veins; crossveins absent; 1 hook-like, broadly based costal projection. Leg (I–III) segment ratios (femur: tibia: tarsus) measured dorsally, I = 7 : 9 : 11; II and III = 10 : 13 : 4.

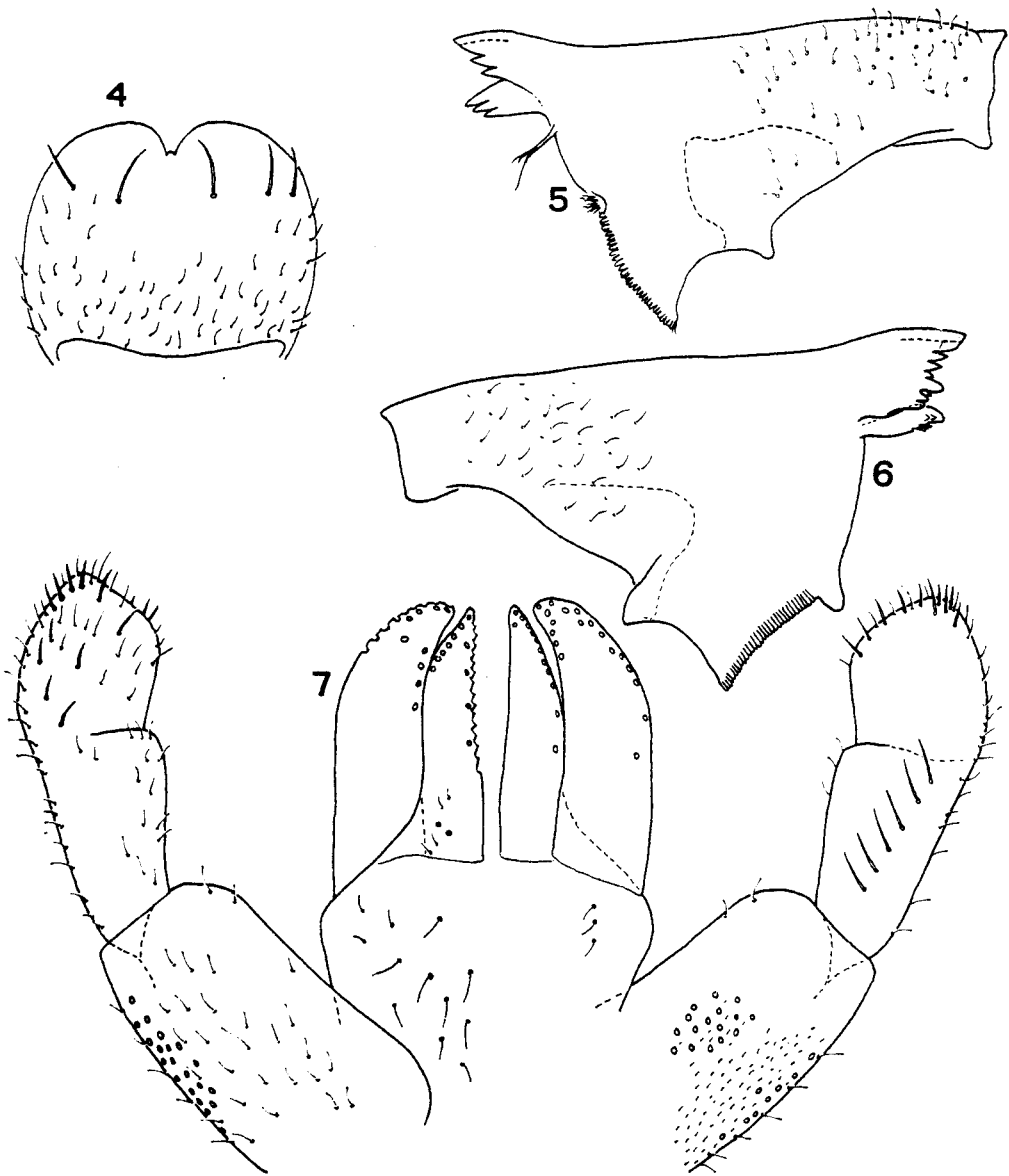


Fig. 4-7. Larval mouthparts of *Notobaetis penai* n. gen., n. sp.: dorsum of labrum (4), right mandible (5), left mandible (6), and labium (left half = venter, right half = dorsum) (7).

Abdomen paler than thorax with distinct brown marks on each segment; ground color of all segments similar. Genitalia as in Fig. 3. Caudal filaments pale with dark joints.

Adult ♀. — Lengths: body 9 mm.; forewings 9 mm.; hind wings 0.25–0.5 mm. Similar to ♂ except for usual sexual dimorphism. Antennal scapes and pedicels subequal in length. Thorax pale with distinct brown marks. Hind wings minute, with symmetrically acute, costal projection; longitudinal veins greatly reduced. Leg segment ratios, I = 3 : 3 : 2, II = 6 : 7 : 2; and III = 3 : 3 : 1.

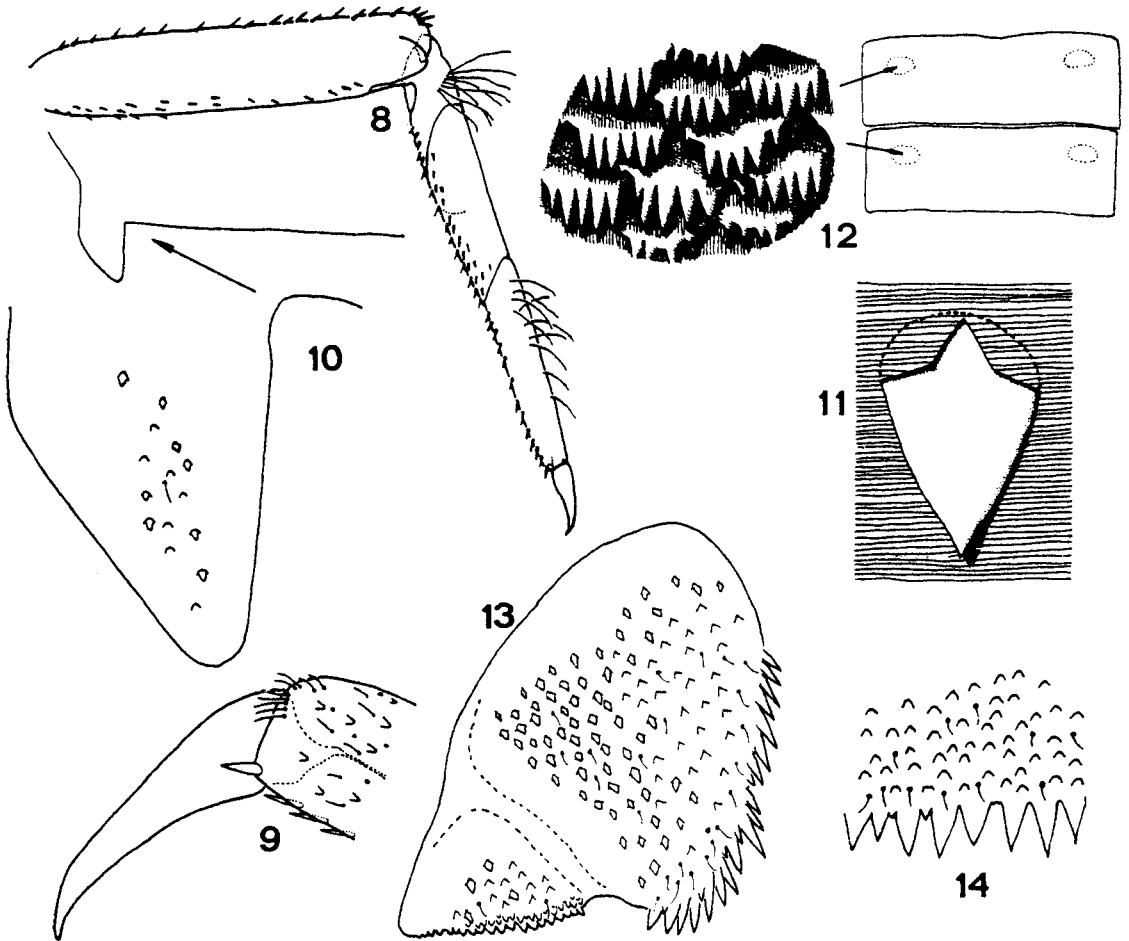


Fig. 8.-14. Larva of *Notobaetis penai* n. gen., n. sp. (cont.):

left metathoracic leg (8), claw (9), postero-lateral margin of metathorax with hind wing pad magnified (10), scale (11), spiny area greatly enlarged (drawn to same scale as Fig. 11) with positions on sterna 6 & 7 (spines, scales and setae omitted from figure) indicated (12), paraproct (13), and postero-medial section of tergum 6 (14).

Mature larvae. — Lengths: body 7–10 mm.; cerci 4–5 mm. Antennal scapes and pedicels with scattered, fine setae; surface of pedicels shagreened with occasional small spines. Labrum (Fig. 4) with 1+1–3 submarginal, dorsal setae; ventral, submarginal, anterior setae deeply bifid, setae nearer lateral margins may be trifid. Prosthema of right mandible 2–5 branched (Fig. 5). Maxillary palpi with 2–4 strong setae on subapical outer side. Labium (Fig. 7) with median lobe of palpi weakly developed, segment 2 with 6–7 strong, dorsal setae; glossae and paraglossae 3–4 times longer than width at base; paraglossae slightly larger than glossae. Cervical membrane brown (continuously with pronotum) at postero-medial margin, otherwise hyaline.

Submedial, pigmented, muscle insertion areas of pronotum nebulous. Anterior legs equal to or slightly longer than posterior legs, otherwise similar (Fig. 8); femora longer than tibiae and tarsi; ventral setae on tibiae and tarsi more numerous and robust than dorsal setae; ventral and dorsal setae similar in size on femora, 2–6 such setae grouped dorso-apically; numerous scales present on all leg segments; extremely

long, fine setae on dorsal half of tibiae and tarsi; claws (Fig. 9) without denticles (some may show traces) or setae, slightly less than  $\frac{1}{3}$  length of tarsi. Hind wing pads (Fig. 10) small, with dorsal scales.

Abdominal terga densely covered with scales (Fig. 11 & 14), fine setae less apparent; posterior margins with long, sharp spines. Anterior sterna without posterior, marginal spines. Gills present on segments 1–7; large, sometimes longer than 2 abdominal segments; broadly acute posteriorly (often appear rounded); postero-apical margins weak and smooth. Paraprocts (Fig. 13) with postero-medial margins consisting of 20–30 long, sharp spines; surfaces densely covered with scales, fine setae less apparent, occasionally with sharp, strong seta(e) near marginal spines. Caudal filaments uniformly pigmented, sometimes slightly darker near apex; median terminal filament about  $\frac{7}{8}$  length of cerci.

Holotype. — Adult ♂ with larval and subimaginal exuviae (reared), Argentina: Cordoba Prov. Copina, (ca. 25 km. WNW Alta Gracia) elev. 1650 m. 11/14 — IV'67. L. PEÑA.

Allotype. — Adult ♀ with larval and subimaginal exuviae (reared), same data.

Paratypes. — 7 reared ♂♂ with exuviae, 18 reared ♀♀ with exuviae, 9 ♂♂ not reared, 2 ♀♀ not reared, 1 reared ♂ subimago with exuvium, 4 reared ♀ subimagines with exuviae and 42 mature larvae.

The Holotype, Allotype and 40 Paratypes are deposited at the University of Utah, Department of Biology. The remaining Paratypes are deposited at Florida A & M University, Laboratory of Aquatic Entomology, Tallahassee, U. S. A., and Limnologisches Institut der Max-Planck-Gesellschaft, Plön, F. R. G.; and Purdue University, West Lafayette, U. S. A.

### Diagnosis and Discussion

Larval characters of *N. penai* n. sp. indicate a very close relationship to *Centroptilum* EATON and can be separated in this stage only by the rounded apical segment of its labial palpi (Fig. 7) and less reliably by its shorter claws (Fig. 8). The adults, however, are most similar to *Baetis* LEACH, i. e. they possess paired marginal intercalaries in the forewings (Fig. 1); similar leg segment proportions, and *Baetis*-like ♂ genitalia (Fig. 3). The ♂ can be discerned only by the position of the costal projection (Fig. 1) of the hind wing (this character is subject to sexual dimorphism, consequently, the ♀ is more difficult to identify). *Notobaetis* n. gen. thus appears to be intermediate between *Baetis* and *Centroptilum*.

It is with reservation that we propose this new genus especially in the absence of several strikingly unique characters (the position of the costal projection of the ♂ hind wing seems to be unique in Baetidae, however, *Baetis garcianus* TRAVER 1938, from Puerto Rico, has a costal projection that approaches this state, also, other adult and larval characters place this species very close to *N. penai* n. sp.). We have examined a larva from Petropolis, Brazil and 2 larvae from the Pampa de Cangallo, Peru, which seem to represent 2 distinct species closely related to *N. penai* n. sp. The species from Peru is similar to EATON's (1883–1888) "nameless ally of *Centroptilum*" collected from Puno, Peru. These 2 larval forms (we withhold formal description due to the inadequate condition of the specimens) are mentioned because they tend to destroy generic character gaps between *Notobaetis* n. gen. and *Centroptilum*. Both these larvae have claw to tarsal ratios which are intermediate or similar to *Centroptilum*, but conversely, labial palpi similar to *N. penai* n. sp.

Finally, the paired marginal intercalaries of the forewings may have to be regarded

as an intragenerically variable character. It is variable in *Callibaetis* EATON (EDMUNDS *et al.*, 1976) and was considered variable in *Centroptilum* by EATON (1883–1888).

We ultimately justify erection of *Notobaetis* n. gen. on the grounds that the unique combination of character states does not allow placement of *N. penai* n. sp. into any existing genus without greatly modifying existing generic characterization. Also the position of the costal projection and overall shape of the hind wing (Fig. 1) is considered to be uniquely derived within Ephemeroptera.

### Acknowledgement

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