

**REDESCRIPTION AND NEW LECTOTYPE DESIGNATION FOR THE
TYPE SPECIES OF *PSEUDOCLOEON*, *P. KRAEPELINI* KLAPÁLEK
(EPHEMEROPTERA: BAETIDAE)¹**

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Abstract.—The type species of *Pseudocloeon* Klapálek is the Javanese species *P. kraepelini* Klapálek, 1905. That species is known only from the adult stage, and knowledge of the actual generic limits of the genus are thus severely limited. Specimens taken subsequent to the type series and reported as *P. kraepelini* were misidentified. The formerly designated lectotype of *P. kraepelini* is invalid since it was from misidentified material taken some 20 years after Klapálek's syntypes were collected. A new lectotype is designated from the syntype series; *P. kraepelini* is redescribed; and *P. kraepelini* is compared with the previously misidentified material.

The enigmatic genus *Pseudocloeon* Klapálek was described without the use of illustrations and was only broadly characterized by comparison with the genus *Cloeon* Leach. Klapálek (1905) recognized that both *Cloeon* and *Pseudocloeon* were two-winged baetids and that the two genera differed in that *Cloeon* possessed single marginal intercalaries in the fore wing and *Pseudocloeon* possessed paired marginal intercalaries. This has remained the primary basis for separating these two genera. Unfortunately, this adult-based generic characterization has led to the assignment of many unrelated species to the genus *Pseudocloeon*.

Recent systematic studies of Baetidae (Day, 1955; Müller-Liebenau, 1970, 1973, 1974; Morihara and McCafferty, 1979a, b; Provonsha and McCafferty, 1982; Edmunds et al., 1976) incorporate considerable larval characterization for defining generic classifications and have led, in part, to a realization of the systematic problems surrounding *Pseudocloeon* (Day, 1955; Edmunds et al., 1976; Morihara and McCafferty, 1979a; and Müller-Liebenau, 1981, 1982c). Larval character states are especially important because related but phylogenetically distinct genera can include species with morphologically distinct larvae and symmorphous adults (Morihara and McCafferty, 1979a). This has led modern workers to designate larvae as the type material even when adults are available (e.g., Provonsha and McCafferty, 1982).

The type species of *Pseudocloeon* was originally designated to be the Javanese species *P. kraepelini* Klapálek, 1905. One of the more interesting problems sur-

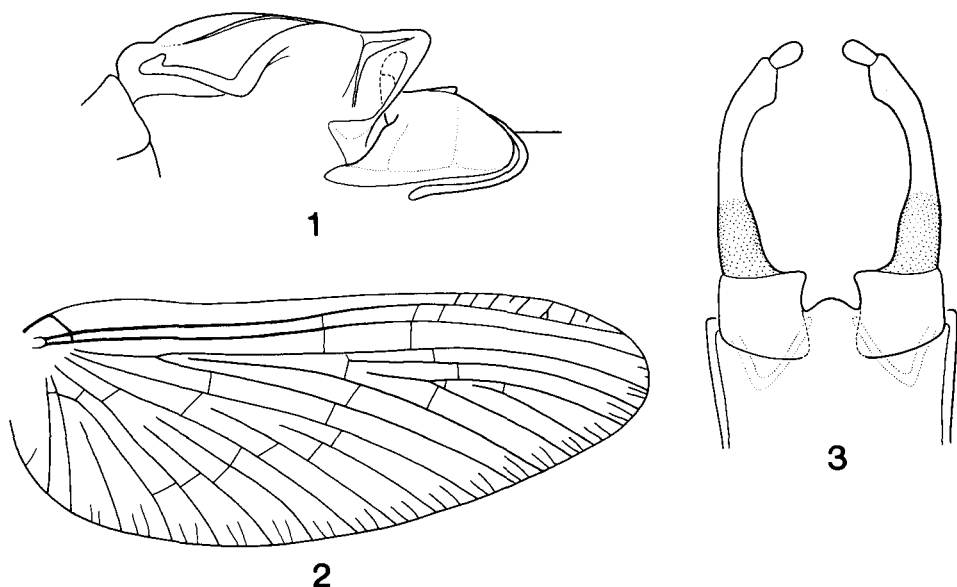
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rounding this species, and consequently the strictest and possibly only applicable concept of the genus *Pseudocloeon*, is that the species is presently known only in the adult stage. At least three other species of baetids, including *Baetis feminalis* Eaton, are also characterized only as adults and share the characteristics of two wings and paired marginal intercalaries (Müller-Liebenau, 1981; Waltz and McCafferty, 1985). Since knowledge of the larval stage is essential to understanding and defining generic limits within Baetidae, the genus *Pseudocloeon* is now of dubious taxonomic application and must remain such until a larval-adult association of the type species is provided. Distinctive larvae known from the Orient have been only provisionally placed in *Pseudocloeon* by Müller-Liebenau (1981, 1982a, c, 1984). In addition, several two-winged baetid larvae from the Orient have been assigned to other genera, including *Baetis* (Müller-Liebenau, 1981), *Centroptella* (Müller-Liebenau, 1983), *Indobaetis* (Müller-Liebenau and Morihara, 1982), *Indocloeon* (Müller-Liebenau, 1982b), and *Symbiocloeon* (Müller-Liebenau and Heard, 1979). Obviously, any one of the above may ultimately prove to be the as yet un-reared larva of *P. kraepelini*.

The inevitable future revision of *Pseudocloeon* and thus the importance of understanding the type concept led us to examine the syntype material of *P. kraepelini* along with specimens that were used by Ulmer (1939) for his redescription of the species and that were also used by Müller-Liebenau (1981) for her review of *Pseudocloeon*. Our study shows that an invalid lectotype designation (Müller-Liebenau, 1981) for *P. kraepelini* was based on a specimen from Ulmer's comparative material rather than Klapálek's original syntypes. Article 74a of the International Code of Zoological Nomenclature renders any designation of a lectotype from non-type material invalid. Even more important, Ulmer's and Müller-Liebenau's comparative material is not conspecific with the syntype material. Müller-Liebenau's invalid lectotype cannot definitely be placed to any genus at this time. A new lectotype for *P. kraepelini* is thus designated below.

***Pseudocloeon kraepelini* Klapálek**

Syntypes.—The three male adults and one male subimago syntypes (specimens #'s 1–4) are all pinned material and deposited in the Zoological Institut and Zoological Museum, University Hamburg. Lectotype male adult (#1): Buitenzorg, Java, K. Kraepelini leg. 24.II-12.III. 1904., ded. 8.VI.1904 (white label); *kraepelini* Klapálek (white label); syntype (pink label); Z.I.M. Hamburg (white label); Lectotype (#1) (white label); *Pseudocloeon kraepelini* Klapálek, 1905, Lectotype, Des. Waltz and McCafferty, 1985 (red label). Condition: adult male with wings tattered but intact, fore legs absent, remainder of body structures intact. Paralectotypes: Paralectotype (#2): same collection label as for lectotype (white label); *Pseudocloeon kraepelini* (handwritten, white label); *kraepelini* Klapálek (white label); syntype (pink label); Z.I.M. Hamburg (white label); Paratype (#2) (white label); wing on slide (white label); *Pseudocloeon kraepelini* Klapálek, 1905, Paralectotype, Des. Waltz and McCafferty, 1985 (yellow label). Condition: adult male with one wing slide mounted (RDW), the remaining wing, legs, and genitalia missing. Paralectotype (#3): same collection label as for lectotype (white label); *kraepelini* Klapálek (white label); Z.I.M. Hamburg (white label); Paratype (#3) (white label); genitalia in vial (white label); *Pseudocloeon kraepelini* Klapálek, 1905, Paralectotype, Des. Waltz and McCafferty, 1985 (yellow label). Condition: adult male



Figs. 1-3. *Pseudocloeon kraepelini* Klapálek. Paralectotype adult male. 1, Lateral view of thorax. 2, Fore wing. 3, Male genitalia (ventral).

with one wing, head, and legs missing, genitalia reconditioned and stored in vial. Paralectotype (#4): same collection label as for lectotype (white label); *kraepelini* Klapálek (white label); Z.I.M. Hamburg (white label); Paratype (#4) (white label); *Pseudocloeon kraepelini* Klapálek, 1905, Paralectotype, Des. Waltz and McCafferty, 1985 (yellow label). Condition: subimago male with head, one wing, and several legs missing.

Description.—Adult Male: Body ca. 5 mm; wing length 5.5 mm. Turbinate eyes dark brown with lighter margins, apically very broad. Thorax (Fig. 1) dorsally and laterally tan; mesonotum very slightly darkened near wing base; metanotum deeply emarginate posteriorly with metanotal process flattened before apex and projecting posteriorly; thorax ventrally pale amber. Fore wings (Fig. 2) clear, without pigmentation; veins faintly tinted tan; stigmatic area with 5-7 slanting veinlets. Hind wings absent. Fore legs straw colored with distinct brown preapical band on femora; fore tibiae ca. $1.5 \times$ length of femora; fore tarsi ca. $0.66 \times$ length of tibiae. Other legs straw colored. Abdomen dorsally with segments 2-6 pale smoky to tan; segments 7-8 darker amber; segments 9-10 pale cream; laterally segments 2-7 each with red-purple oblique dash originating from posterolateral corner near spiracle line; segments 2-10 with distinct red-purple continuous line laterally below spiracle line. Genitalia (Fig. 3) with basal segments separated medially one from another and without median process; second segment smoky brown and with fine granulation; third segment pale cream, elongate and slightly expanded apically, not excavate apically; fourth segment small and ovoid.

Remarks.—The syntype material of *P. kraepelini* differs distinctly in the size and form of male genitalia from Ulmer's incorrectly identified material, which consists of adults and subimagos collected from Malaysia in 1925 and from Java in 1928 and 1929. Differences in the genitalia of the two species may be seen by

comparison of Fig. 3a (Müller-Liebenau, 1981) with Fig. 3 herein. Minor body and structural size differences are also found in the two species. We are, unfortunately, prevented from making a more specific identification of the previously misidentified material because of its generally bleached condition (preserved in alcohol) and lack of associated larvae.

Our examination of the restored genitalia allows us to correct two previously published errors in Klapálek (1905) and Ulmer (1924) regarding *P. kraepelini*. Klapálek (1905) stated that the basal segments of the forceps touched along the midline; however, in our restored genitalia the bases are well separated (Fig. 3). Also segment 3 of the forceps was reported by Klapálek (1905) and illustrated by Ulmer (1924) as being excavate apically and thus extending around the base of segment 4. Segment 3 of our restored genitalia is slightly expanded apically and segment 4 is juxtaposed to segment 3 as in other baetids (Fig. 3). The slight apical swelling of segment 3 in dried material is subject to collapse and can be easily misinterpreted.

The genitalia of *P. kraepelini* are somewhat similar to the Sumatran species *Baetis fulmeki* (Ulmer) (cf. Müller-Liebenau, 1981, Fig. 2g), which is a member of the *Baetis atrebatinus* complex [*molawinensis*-group sensu Müller-Liebenau (1984)]. This similarity may indicate some derivation with the *Baetis atrebatinus* complex or alternatively a convergence. This particular *Baetis* complex (Müller-Liebenau, 1981, 1984), however, interestingly includes both species with reduced hind wings and species completely lacking hind wings. The possible relationship and hence possibly necessary generic reassignment of *P. kraepelini* with *Baetis* further indicates the importance of discovering the larvae of the true *P. kraepelini* Klapálek as described herein.

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