

## NOTATIONS ON SOUTH AMERICAN BAETIDAE (EPHEMEROPTERA)<sup>1</sup>

W. P. McCafferty<sup>2</sup>

**ABSTRACT:** *Deceptiviosa angolina*, comb. n., is the last of the South American species previously placed in either *Baetis* or *Pseudocloeon* to be recombined. All valid South American Baetidae species historically classified as such are non *Baetis* complex species now residing in 10 different genera. *Americabaetis albinervis*, *A. bruchi*, *Fallceon inops*, and *Moribaetis socius* are newly considered nomina dubia.

A total of 32 currently valid species of South American mayflies were originally described, or subsequently placed in, the *Baetis* complex genera *Baetis* Leach or *Pseudocloeon* Klapálek. All of these species may be considered in the family Baetidae, except for what is now known as *Hexagenia albivitta* (Walker) (family Ephemeridae) and what most assuredly is incorrectly known as *Ecdyonurus guttatus* (Pictet) (family Inquiroidea), both of which were originally described as *Baetis*. Of the 30 valid species of South American Baetidae previously known as *Baetis* or *Pseudocloeon*, all but one have been recombined with non *Baetis* complex genera (see below). Of the 29 previously recombined species, 17 were originally described as *Baetis*, and eight were originally described as *Pseudocloeon*, leaving two that were subsequently recombined with *Baetis*, two that were subsequently recombined with *Pseudocloeon*, and one that had been subsequently recombined with both *Baetis* and *Pseudocloeon* (Table 1). Only *Bernerius incus* Waltz and McCafferty had been known historically by an informal name associated with these genera (*Baetis* sp. B Berner). All other associations involved nominal species.

In addition to the valid species epithets that had been associated with *Baetis* or *Pseudocloeon* (Table 1), *Americabaetis peterseni* and *Fallceon murphyae* include replacement epithets for the following original names for South American Baetidae that proved to be primary junior homonyms: *Cloeon brunneum* Esben-Petersen (subsequently associated with *Pseudocloeon*) and *Baetis melleus* Needham and Murphy, respectively.

In addition to the recombined extractions from *Baetis* and *Pseudocloeon* among South American Baetidae, *B. gloriosus* Navás is now a junior subjective synonym of *Callibaetis fasciatus* (Pictet); *B. opacus* Navás and *B. virellus* Navás are similarly equivalent to *C. zonalis* Navás; *B. weiseri* Navás is equivalent to *Andesiops peruvianus* (Ulmer); and *B. sp. 1* Roback is equivalent to *Mayobaetis ellenae* (Mayo). With respect to *C. zonalis*, I had initially considered it the subordinate synonym of *C. opacus* (Navás) (originally *Baetis*) based on page priority (McCafferty 1996). However, I realized shortly thereafter

<sup>1</sup> Received March 31, 2000. Accepted May 10, 2000.

<sup>2</sup> Department of Entomology, Purdue University, West Lafayette, IN 47907.

that Gillies (1990) may have intended to invoke first revisor's prerogative in considering *C. zonalis* the senior synonym (even though he had not stated such), and therefore now accept that interpretation. With respect to the present review, I have placed *C. zonalis* as a footnoted species in Table 1, because it is the only South American species to be represented previously as a *Baetis* complex genus by a junior synonymy only.

The bases for all of the previous recombinations of South American Baetidae originally or subsequently regarded as *Baetis* or *Pseudocloeon* shown in Table 1 are reviewed as follows: For the species previously placed in *Baetis* that have been recombined with *Americabaetis* Kluge, see Lugo-Ortiz and McCafferty (1999a) (see also Lugo-Ortiz and McCafferty 1996b); for those recombined with *Andesiops* Lugo-Ortiz and McCafferty, see Lugo-Ortiz and McCafferty (1999b); for those recombined with *Bernerius* Waltz and McCafferty, see Waltz and McCafferty (1987a); for those recombined with *Callibaetis* Eaton, see Gillies (1990); for those recombined with *Camelobaetidius* Demoulin, see Lugo-Ortiz and McCafferty (1999a); for those recombined with *Cloeodes* Traver, see Waltz and McCafferty (1987b) and Lugo-Ortiz and McCafferty (1999a); for those recombined with *Fallceon* Waltz and McCafferty, see Lugo-Ortiz and McCafferty (1999a); for those recombined with *Mayobaetis* Waltz and McCafferty, see Waltz and McCafferty (1985) and Lugo-Ortiz and McCafferty (1996a); and for those recombined with *Moribaetis* Waltz and McCafferty, see Lugo-Ortiz and McCafferty (1999a). For the species previously placed in *Pseudocloeon* that have been recombined with *Americabaetis*, see Lugo-Ortiz and McCafferty (1996b, 1999a) and for those recombined with *Cloeodes*, see Waltz and McCafferty (1987b), Waltz (1993), and Lugo-Ortiz and McCafferty (1999a).

Only the Chilean species *Baetis angolinus* Navás, among the South American Baetidae previously associated with a *Baetis* complex genus name, has not been recombined. *Baetis angolinus* clearly does not belong to the genus *Baetis*, or any other genus of the *Baetis* complex, an otherwise widespread baetid lineage that is not represented in South America and is only very poorly represented by boreal-derived species in Central America (e.g., McCafferty 1998, Lugo-Ortiz et al. 1999).

Navás (1933) based *B. angolinus* on a subimago that could generally be deemed nondescript, except for its hindwing shape and venation, and a peculiar reticulate series of crossveins in the distal inter-costal area of the forewings, along with elongate marginal intercalaries in the forewings. For the most part, baetid adults worldwide have not been associated with reticulate forewing venation. Some *Callibaetis* in North and Central America have some inter-costal reticulation, but the inter-costal area itself is relatively narrower than that in *B. angolinus*, and reticulation is not of the same type. In *B. angolinus* there are six crossveins fairly uniformly divided and forming cellules. Also none of the forewings of South American *Callibaetis* illustrated, for example,

by Gillies (1990), demonstrate inter-costal reticulation. More importantly, the small, narrow hindwings of *B. angolinus* lack crossvenation and are clearly not the type of hindwing found in *Callibaetis*.

Another possible genus that has hindwings similar to those of *B. angolinus* and that also has a similar small costal process in the basal third of the hindwing is *Moribaetis*. *Moribaetis* is also one of a very few genera of baetids that has some crossvenation in the distal inter-costal area of the forewings (e.g., McCafferty and Lugo-Ortiz 1998). None of the species of *Moribaetis* presently known as alate stages, however, demonstrate reticulation or inter-costal cellules as does *B. angolinus*.

Lugo-Ortiz and McCafferty (1999b) recently described three related new genera (*Andesiops*, *Deceptiviosa*, and *Nanomis*) indigenous to cool or gradient streams in the Andes and Patagonia (high altitudes or temperate latitudes) of South America. These genera tend to show some remarkable convergence in larval morphology with some unrelated *Baetis* complex genera such as *Acentrella* Bengtsson (Holarctic), *Demoreptus* Lugo-Ortiz and McCafferty (Afrotropics), and *Tanzaniella* Gillies (Afrotropics). *Andesiops*, *Deceptiviosa*, and *Nanomis*, however, may be related to the non *Baetis* complex Australian genus *Edmundsiops* Lugo-Ortiz and McCafferty (Lugo-Ortiz and McCafferty 1999b, 1999c). *Andesiops* and *Deceptiviosa* were described from both larvae and adults, the latter of which were shown to possess the peculiar reticulate crossvenation in the distal inter-costal area of the forewings that is similar to that of *B. angolinus*. Unfortunately, Lugo-Ortiz and McCafferty (1999b) had not been aware of *B. angolinus* at the time *Andesiops* and *Deceptiviosa* were described. It is now clear that *B. angolinus* most probably belongs to one of these genera. Navás (1933) had additionally indicated that the marginal intercalary veins in the forewings of *B. angolinus* were long. Lugo-Ortiz and McCafferty (1999b) had also found this particular additional trait in *Deceptiviosa*, but not *Andesiops*. I therefore am confident in placing Navás's species in *Deceptiviosa* as *D. angolina* (Navás), comb. n.

The new combination should be regarded as provisional (as essentially most South American baetid recombinations are for various reasons) because of the lack of comparative male adult and larval material of *D. angolina*. Nonetheless, the forewings match well as do the general coloration and size given by Navás (1933) and Lugo-Ortiz and McCafferty (1999b). Also, the Chilean locality of *D. angolina* is consistent with the distribution of *Deceptiviosa*.

*Deceptiviosa angolina* can be distinguished from *D. torrens* Lugo-Ortiz and McCafferty, the only other species of *Deceptiviosa* known in alate stages, by the hindwings. Those of *D. angolina* are narrower and lack the first longitudinal vein as well as the short third longitudinal vein. The forked vein and its long unattached intercalary in the hindwings of *D. angolina* are similar to the vein 2 system in *D. torrens*.

Lugo-Ortiz and McCafferty (1999a) indicated that several species of South

American Baetidae are dubious. Gillies (1990) had previously considered *Callibaetis abundans* (Navás) (originally *Baetis*) as a nomen dubium. Because *D. angolina* is based on a single subimago, one might argue that this species should also be considered a nomen dubium. Navás (1933) stated that his single subimago was a female; however Alba-Tercedor and Peters (1985) listed the specimen as a male. Gloria Masso, the curator at the Museo de Zoología del Ayuntamiento (Barcelona, Spain) has confirmed for me that the single specimen is indeed a male, and thus Navás had reported the sex incorrectly. Nonetheless, the wing venation of the combined fore- and hindwings, at least for the present, is enough to distinguish this species among the known South American baetid fauna, and a declaration of nomen dubium is yet uncalled for.

Although their generic assignment can be made with confidence, there indeed remain some South American baetids for which it would be virtually impossible to establish any known morphological criteria for species recognition that may be associated with them. These species are best regarded as nomina dubia based on the study of Lugo-Ortiz and McCafferty (1999a). They include *Americabaetis albinervis* (Navás), *A. bruchi* (Navás), *Fallceon inops* (Navás), and *Moribaetis socius* (Needham and Murphy). As reviewed by Lugo-Ortiz and McCafferty (1999a), in the case of each of the above species, existent descriptions are inconsequential at the species level because they either were incompletely written or were based on subimagos, and either critical body

Table 1. South American species of Baetidae formerly associated with the genera *Baetis* or *Pseudocloeon*. \*Those subsequently associated with *Baetis* or *Pseudocloeon*. \*\*Associated with *Baetis* only via a junior synonym.

#### PREVIOUS BAETIS

- \* *Americabaetis oldendorffi* (Weyenbergh)
- Andesiops peruvianus* (Ulmer)
- Bernerius incus* Waltz & McCafferty
- Callibaetis abundans* (Navás)
- \* *Callibaetis fasciatus* (Pictet)
- \*\* *Callibaetis zonalis* Navás
- Camelobaetidium alcyoneus* (Traver)
- Camelobaetidium coveloae* (Traver)
- Camelobaetidium dryops* (Needham & Murphy)
- Camelobaetidium tantillus* (Needham & Murphy)
- Cloeodes aymara* (Traver)
- Cloeodes nocturnus* (Navás)
- \* *Cloeodes stelzneri* (Weyenbergh)
- Deceptiviosa angolina* (Navás), comb. n.
- Fallceon inops* (Navás)
- Fallceon murphyae* (Hubbard)
- Fallceon yaro* (Traver)
- Mayobaetis ellenae* (Mayo)
- Moribaetis aneto* (Traver)
- Moribaetis comes* (Navás)
- Moribaetis socius* (Needham & Murphy)

#### PREVIOUS PSEUDOCLOEON

- Americabaetis albinervis* (Navás)
- Americabaetis bridarolli* (Navás)
- Americabaetis bruchi* (Navás)
- \* *Americabaetis jorgenseni*  
  (Esben-Petersen)
- \* *Americabaetis oldendorffi* (Weyenbergh)
- \* *Americabaetis peterseni* (Hubbard)
- Americabaetis weiseri* (Navás)
- Cloeodes anduzei* (Traver)
- Cloeodes binocularis*  
  (Needham & Murphy)
- Cloeodes turbinops*  
  (Needham & Murphy)
- Cloeodes venezuelensis* (Traver)

parts are missing (specimens broken or female only) from existent types or the type specimens themselves are no longer available.

Other species among those previously considered in *Baetis* or *Pseudocloeon* that were treated by Lugo-Ortiz and McCafferty (1999a) and whose types have yet to be found include *A. bridarolli* (Navás), *A. jorgenseni* (Esben-Petersen), and *A. oldendorffi* (Weyenbergh). More intensive searching may uncover types of these possible candidates for nomina dubia.

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