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First description of winged stages of *Thraulobaetodes* Elouard & Hideux 1991 and reclassification of Rhithroclaeoninae (Ephemeroptera, Baetidae)

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Abstract

Larvae, subimagoes, imagoes of both sexes and eggs of *Thraulobaetodes cumminisorum* Elouard & Hideux 1991 are described based on reared material from north-west of Zambia. Structure and development of genitals testify that *Thraulobaetodes* Elouard & Hideux 1991 belongs to Rhithroclaeoninae Kluge 2012. According to the newly suggested classification, Rhithroclaeoninae are divided into Thraulobaetodini tribus n. and holophyletic taxon Rhithroclaeonini, which includes *Bugilliesia* Lugo-Ortiz & McCafferty 1996, *Mutelocloeon* Gillies & Elouard 1990 and *Rhithroclaeon* Gillies 1985 (including subgenus *Kivuiops* Lugo-Ortiz & McCafferty 2007). Structure of egg chorion of *Bugilliesia*, *Mutelocloeon* and *Rhithroclaeon* is described for the first time. Additional imaginal and subimaginal characters of *Mutelocloeon* are reported.

Key words: mayflies, Ephemeroptera, Baetidae, Rhithroclaeoninae, *Thraulobaetodes*, systematics

Introduction

According to the recent phylogenetic classification of Baetidae, the taxon Turbanoculata Kluge 1997 is divided into plesiomorphon Protopatellata Kluge & Novikova 2011 and holophyletic taxon Anteropatellata Kluge 1997. Within Anteropatellata, there are subsequently subordinated holophyletic taxa with typified names formed from the generic name "*Baetis* Leach 1815" and the following non-typified names: Tetramerotarsata Kluge 1997 > Liberevenata Kluge 1997 > Turbanoculata Kluge 1997 > Anteropatellata Kluge 1997 > Baetovectata Kluge & Novikova 2011 > Baetungulata Kluge & Novikova 2011 > Baetofemorata Kluge & Novikova 2011 (Kluge 1997, 2004, Kluge & Novikova 2011, Kluge 2012).

The genus *Thraulobaetodes* Elouard & Hideux 1991 is known as a single species *Th. cumminisorum* Elouard & Hideux 1991, whose original description was based on four larvae from Guinea. Larva of this species has such unusual characters as branched tergalii (not found in any other Baetidae), ventral position of tergalii (arose independently in a few mayfly taxa), unusual structure of neck articulation, peculiar dorsal projections of thoracic and abdominal terga and other derived characters, which allow separation from all other taxa, but do not shed light on its relationship and systematic position within Baetidae.

Thanks to our recent collecting in Zambia and rearing imagoes from larvae, it becomes possible to reveal such characters of *Thraulobaetodes*, which allow determination of its systematic position. Among African Baetidae, there are representatives of the plesiomorphon Protopatellata (whose fore legs lack patella-tibial suture) and representatives of the holophyletic taxon Anteropatellata (whose fore legs have the same patella-tibial suture as middle and hind legs). Larva of *Thraulobaetodes* has no patella-tibial suture on fore legs; but on its middle and hind legs the patella-tibial suture is modified, smoothed and poorly expressed, so this difference between fore, middle and hind legs can be overlooked. However, examination of the patella-tibial suture of winged stages confirms that *Thraulobaetodes* belongs to Protopatellata. Study of the structure and development of male genitals allows placement of *Thraulobaetodes* in the taxon Rhithroclaeon/fg1, or the subfamily Rhithroclaeoninae Kluge 2012, which belongs the plesiomorphon Protopatellata. At the same time, *Thraulobaetodes* differs from all other Rhithroclaeoninae by a plesiomorphy—retention of the apical segment of the gonostylus. This allows me to

developed eggs can have fine regular structure. Eggs of *Rh. (K.) insuetum* taken from a female imago, have well-developed chorion relief (Figs 65, 66). Eggs of *Rh. (K.) munyagae* were taken from mature female larva; most of them are covered by a coat, but on one egg the coat is partly broken, and poorly developed chorion relief is visible (Figs 67, 68). Eggs of *Rh. (K.) elgonensis* taken from one of female larvae, are all covered by a coat, while eggs from another mature female larva have well-developed chorion relief (Figs 69, 70). It is unclear if this egg characteristic is due to all Rhithroclaeon/fg3, or only to *Kivuiops*, because chorion relief of Rhithroclaeon /fg4 is unknown. Kopelke (1980b) gave description and figures of poorly developed egg of *Rh. permirum* entirely covered by a coat, so that its chorion structure remains to be unknown.

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