Egg morphology update based on new chorionic data of *Potamanthus luteus* (Linnaeus), *Ephemera danica* Müller and *Oligoneuriella rhenana* (Imhoff) (Insecta, Ephemeroptera) obtained by scanning electron microscopy

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Abstract

The chorionic patterns of Ephemeroptera eggs are very diverse and these have often been used for taxonomic and systematic purposes. In a great number of species, including *Potamanthus luteus*, *Ephemera danica* and *Oligoneuriella rhenana,* these egg features have been studied using light microscopy. However, current trends in egg morphology studies use scanning electron microscopy (SEM), so that the eggs of these species need to be re-described in order to establish morphological comparisons. The general chorionic features which have already been described in these three species are confirmed in our SEM study, although a more detailed description of both the architecture and arrangement of these can now be offered. In addition, this study has allowed us to note new morphological data, such as the chorionic reticulation in *P. luteus* and the complex extrachorion-adhesive layer in *E. danica*; classification of the lateral attachment structure in *P. luteus* and *O. rhenana* has been changed; and the variability of the polar cap observed in *P. luteus* underlines the care that must to be taken when selecting chorionic structures for taxonomic purposes.

Key words: Ootaxonomy, egg attachment structures, micropyle, chorionic sculpturing, taxonomy, Potamanthidae, Oligoneuriidae, Ephemeridae

Introduction

The eggshell surface in Ephemeroptera shows a great variability of morphological patterns, which has been used effectively many times to solve taxonomic problems or to establish systematic relationships (Belfiore *et al.* 1999; Degrange 1960; Domínguez & Cuezzo 2002; Gaino *et al.* 1987, 1989, 1993; Mazzini & Gaino 1990; Klonowska-Olejnik 1997; Koss 1968; Koss & Edmunds 1974; Studemann & Landolt 1997; Thomas *et al.* 1999). The different morphological patterns are the result of a particular combination of chorionic structures in each species, especially as regards to shape, arrangement and distribution. Basically, chorionic structures can be categorized into three main classes, micropyles, attachment structures and chorionic sculpturing, which have been established mainly according to their physiological function. These types of chorionic structure, as well as the classification of each one given by Koss and Edmunds (1974), continue to be used as reference for morphological descriptions of Ephemeroptera egg. However, as this classification is based on light microscope observations, the increasing use of SEM as the normal technique for the description of egg morphology, is beginning to throw doubt on some of the old published data for many species and even the type assignation of many structures proposed in the new descriptions of eggs (Gaino & Mazzini 1988; Gaino & Bongiovanni 1992; Klonowska-Olejnik 2004; Mazzini & Gaino 1990; Ubero-Pascal 2004; Ubero-Pascal *et al.* 2005).