



Phylogeny and revision of Diplectanidae Monticelli, 1903 (Platyhelminthes: Monogenoidea)

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Abstract

A hypothesis on the phylogenetic relationships of diplectanid genera is proposed based on 36 morphological characters using cladistic methods. The analysis supports two subfamilies, Diplectaninae Monticelli, 1903 and Lamellodiscinae Oliver, 1969, and the proposal of two new subfamilies: Nasobranchitrematinae **n. subfam.**, monotypic, composed by *Nasobranchitrema* Yamaguti, 1965; and Pseudomurraytrematoidinae **n. subfam.** comprising *Pseudomurraytrematoides* **n.gen.** *Murraytrematoides pricei* (Caballero, Bravo-Hollis & Grocott, 1955) is transferred to *Pseudomurraytrematoides* as *P. pricei* comb. n. Lamellodiscinae is supported by two synapomorphies and comprises *Calydiscoides*, *Protolamellodiscus*, *Lamellodiscus*, *Telegamatrix* and *Furnestinia*. The analysis indicates that *Lamellodiscus* is polyphyletic. Diplectaninae comprises *Paradiplectanum* **n. gen.**, *Rhabdosynochus*, *Pseudodiplectanum*, *Monoplectanum*, *Latericaecum*, *Pseudolamellodiscus*, *Acleotrema*, *Diplectanum*, *Lobotrema*, *Murraytrema*, *Lepidotrema*, *Spinomatrix*, *Rhamnocercus*, *Rhamnocercoides*, *Oliveriplectanum* **n. gen.**, *Murraytrematoides*, *Anoplectanum*, *Laticola*, *Pseudorhabdosynochus* and *Echinoplectanum*. Rhabdosynochinae Oliver, 1987; Rhamnocercinae Monaco, Wood & Mizelle, 1954; and Murraytrematoidinae Oliver, 1982 are considered junior synonyms of Diplectaninae. *Diplectanum* is restricted to species that present (1) male copulatory organ with nested tubes; (2) accessory copulatory organ; (3) prostatic reservoir separated into three zones; (4) ventral and dorsal squamodiscs. Based on the analysis, *Cornutohaptor* Mendoza-Franco, Violante-González & Vidal-Martinez, 2006 is a junior synonym of *Rhabdosynochus* Mizelle & Blatz, 1941. *Diplectanum cazauxi* Oliver & Paperna, 1984 is transferred to *Latericaecum* as *L. cazauxi* (Oliver & Paperna, 1984) comb. n. *Diplectanocotyla*, Lamellodiscinae and Diplectaninae are considered *sedis mutabilis*.

Key words: Monogenoidea, Diplectanidae, taxonomy, phylogeny

Introduction

The Diplectanidae Monticelli, 1903 is represented by approximately 250 species occurring primarily on the gills of marine perciforms fishes (Oliver 1987). Five subfamilies are recognized: Diplectaninae Monticelli, 1903, Lamellodiscinae, Oliver, 1969, Murraytrematoidinae Oliver, 1982, Rhabdosynochinae Oliver, 1987 and Rhamnocercinae Monaco, Wood & Mizelle, 1954. This family represents a monophyletic group within Dactylogyrynea (Dactylogyridae (Diplectanidae + Pseudomurraytrematidae) (Kritsky & Boeger 1989, Boeger & Kritsky 1993, 1997, 2001). Diplectanidae is historically diagnosed by the combination of the following characters: (1) accessory adhesive organs (squamodiscs or lamellodiscs); (2) three transversal bars connected to two pairs of anchors (dorsal, ventral); and (3) pretesticular germarium, looping right intestinal caecum.

Despite of its widely accepted monophyly, Diplectanidae has been subject to several taxonomical rearrangements at subfamily and genera levels since it was proposed by Monticelli (1903) (Johnston & Tieggs 1922; Price 1937; Bychowsky 1957; Yamaguti 1963; Oliver 1987). The studies, focusing on the relationships among supraspecific taxa of the family, contain many contradictions (Price 1937; Yamaguti 1953; Yamaguti 1958; Bychowsky 1957; Yamaguti 1963; Yamaguti 1965; Oliver 1968; Young 1968; Bychowsky & Nagibina 1977; Euzet & Dossou 1979; Oliver 1982; Kritsky & Beverley-Burton 1986; Oliver 1987; Rakotofiringa & Oliver 1987; Rakotofiringa *et al.* 1987; Chaves *et al.* 1999; Kritsky *et al.* 2000; Desdevises *et al.* 2001; Kritsky *et al.* 2001; Mendoza-Franco *et al.* 2004; Domingues & Boeger 2006; 2007).

Kritsky *et al.* (2000) suggested that some genera might represent unnatural groups (“catch-all”) by including species with variable features. Yang *et al.* (2006) recognized that one possible solution for the potential unnatural taxa within the Diplectanidae should be synonymy taxa distinguished by apparent secondary char-