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Proposal of *Whittingtonocotyle* n. gen. (Dactylogyroidea: Dactylogyridae), with the description of two new species from the gills of *Hoplerythrinus unitaeniatus* (Characiformes: Erythrinidae) in Brazil

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Abstract

Whittingtonocotyle n. gen. is proposed for species with a male copulatory organ sclerotized, spiral, clockwise, non-articulated to the accessory piece; prostatic reservoir separated into two/three zones with one or two terminal areas densely stained; vaginal opening dextrodorsal; anchors without well-defined roots; and dorsal bar with anteromedial protuberance. Two new species of *Whittingtonocotyle* n. gen. are described from the gills of *Hoplerythrinus unitaeniatus* (Agassiz), from two rivers of the State of Pará, Brazil. *Whittingtonocotyle caetei* n. sp. (type species) is characterized by possessing ventral anchor with deep root truncate; prostatic reservoir separated into two zones with one terminal area densely stained; and vaginal canal heavily sclerotized, coiled and dilate distally. *Whittingtonocotyle jeju* n. sp. is distinguished from the previously species mainly by having a male copulatory organ comprising a coil of about 19 rings (29 rings in *Whittingtonocotyle caetei* n. sp.); a prostatic reservoir separated into three zones with two terminal areas densely stained; vaginal canal sclerotized, sigmoid; and dorsal bar with short anteromedial process (elongate in *Whittingtonocotyle caetei* n. sp.).

Key words: Parasites, Monogenoidea, Dactylogyridae, *Whittingtonocotyle* n. gen., Erythrinidae, *Hoplerythrinus unitaeniatus*

Introduction

Erythrinids are endemic to rivers from South America and are composed of 16 species in three genera (Oyakawa 2003; Oyakawa & Mattox 2009). Only one species of this fish family—*Hoplias malabaricus* (Bloch) (trahira)—has been investigated for monogenoidean parasites. Eight species of monogenoids are known from *Hoplias malabaricus* from Brazil, Argentina, and Peru: *Cosmetocleithrum bulbocirrus* Kritsky, Thatcher & Boeger, 1986, *Gyrodactylus trairae* Boeger & Popazoglo, 1995, *Urocleidoides brasiliensis* Rosim, Mendoza-Franco & Luque, 2011, *Urocleidoides cuiabai* Rosim, Mendoza-Franco & Luque, 2011, *Urocleidoides eremitus* Kritsky, Thatcher & Boeger, 1986, *Urocleidoides malabaricus* Rosim, Mendoza-Franco & Luque, 2011, *Urocleidoides naris* Rosim, Mendoza-Franco & Luque, 2011, and *Vanleaveus janauacaensis* Kritsky, Thatcher & Boeger, 1986 (Cohen *et al.* 2013; Graça *et al.* 2013a, b).

During a survey of gill parasites of characiform fishes from the streams of the Northeast Coast of the State of Pará, Brazil, two new species of *Whittingtonocotyle* n. gen. (Dactylogyridae) were encountered on the gills of *Hoplerythrinus unitaeniatus* (Agassiz) (jeju). Descriptions of the new species and the proposal of *Whittingtonocotyle* n. gen. are presented herein.

Material and methods

Three host specimens were collected by trammel net from the Caeté River, municipality of Augusto Corrêa, Pará State, Brazil (1°3'58.21" S 46°40'3.65"W) in October 2013, and Guamá River, municipality of Irituia, Pará State, Brazil (01°51'59.8" S, 47°24'17.2"W) in July 2014. Gill arches were removed and placed in vials containing

Rosim *et al.* (2011) found specimens of an undescribed species of dactylogyrid from the gills of *Hoplias* aff. *malabaricus* from Jaguari-Mirim River (Eastern Atlantic Basin; Paraíba do Sul River sub-basin), Machado River (Paraná Basin; Grande River sub-basin), Cuiabá River (Paraná Basin; Paraguay and São Lourenço Rivers sub-basin) and Rio Paraná (Paraná Basin; Paraná and Paranapanema Rivers sub-basin), Brazil. These authors described the specimens as Dactylogyridae gen. sp. However, they were unable to determine the taxonomic status of the specimens based on the absence of features that fit with the diagnosis of dactylogyrids reported from Neotropical freshwater fishes, as well as, the specimens exhibited some morphological differences among localities, not allowing the proposal of a new genus.

Unidentified specimens of Dactylogyridae were also reported by (Graça *et al.* 2013a, b) from this host, and named as Dactylogyridae gen. 1 sp. and Dactylogyridae gen. 2 sp. Graça *et al.* (2013b) confirmed that specimens of Dactylogyridae gen. 1 sp. fit with the description of Dactylogyridae gen. sp. as presented by Rosim *et al.* (2011). However, these authors (Graça *et al.* 2013a, b) were unable to find diagnostic features for the inclusion of Dactylogyridae gen. 2 sp. in a known genus or proposing a new genus.

The analysis of specimens of Dactylogyridae gen. sp. *sensu* Rosim *et al.* (2011) (CHIOC 37472 a–e, CHIOC 37802 a–b) indicates that they are not congeneric with *Whittingtonocotyle*. Species of *Whittingtonocotyle* **n. gen.** can be easily distinguished from Dactylogyridae gen. sp. *sensu* Rosim *et al.* (2011) by having a male copulatory organ spiral, cork-screw like, with 19–29 rings (male copulatory organ coil with 1–1.5 rings in Dactylogyridae gen. sp.). The ventral and dorsal anchors have inconspicuous roots in *Whittingtonocotyle* **n. gen.**, whereas anchor complexes are well defined with divergent roots in Dactylogyridae gen. sp. The anteromedial process in the dorsal bar is present in *Whittingtonocotyle* **n. gen.**, but it is absent in Dactylogyridae gen. sp.

The study of the only available specimen of Dactylogyridae gen. 2 sp. *sensu* Graça *et al.* (2013a) (CHIOC 37803) indicates that it represents an undescribed species of *Rhinoxenus* Kritsky, Thatcher & Boeger, 1988. It differs from species of *Whittingtonocotyle* **n. gen.** mainly by lacking dorsal bar, presence dorsal anchor modified into a spike-like sclerite, and a copulatory complex comprising a male copulatory organ counterclockwise rings (clockwise rings in *Whittingtonocotyle* **n. gen.**) articulated to accessory piece by a ligament (non-articulated in *Whittingtonocotyle* **n. gen.**). Kritsky *et al.* (1988) suggest that the nasal cavities of the Characiformes are the specific site of infestation for species of *Rhinoxenus*. However, since no specimen of *Rhinoxenus* has been reported from the gills, we propose that its finding in the gills of *H. unitaeniatus* is accidental.

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