Zootaxa 4059 (2): 335–350
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.4059.2.5
http://zoobank.org/urn:lsid:zoobank.org:pub:5D06E0D9-6529-4495-872B-2916A4849F9C

Insights on the identities of sharks of the *Rhizoprionodon acutus* (Elasmobranchii: Carcharhiniformes) species complex based on three new species of *Phoreiobothrium* (Cestoda: Onchoproteocephalidea)

J. N. CAIRA[1] & K. JENSEN[2]

[1]*Department of Ecology and Evolutionary Biology, University of Connecticut, Unit 3043, 75 N. Eagleville Rd., Storrs, Connecticut 06269–3043. E-mail: janine.caira@uconn.edu*

[2]*Department of Ecology and Evolutionary Biology and the Biodiversity Institute, University of Kansas, 1200 Sunnyside Ave., Lawrence, Kansas 66045. E-mail: jensen@ku.edu*

Abstract

Recent molecular work on milk sharks (*Rhizoprionodon acutus* [Rüppell]) suggests that, rather than a single widely distributed species, *R. acutus* represents a complex of four narrowly distributed cryptic species. Examination of the cestodes in three of the four members of that complex globally led to the discovery and description of three new species in the onchoproteocephalidean genus *Phoreiobothrium* Linton, 1889. The host associations and geographic distributions of the new species are fully congruent with the geographic distributions and species boundaries inferred for the sharks from molecular data: *Phoreiobothrium jahki* **n. sp.** parasitizes *Rhizoprionodon* cf. *acutus* 3 off Borneo, *P. nadiae* **n. sp.** parasitizes *R.* cf. *acutus* 1 off Senegal, and *P. swaki* **n. sp.** parasitizes *R.* cf. *acutus* 2 off northern Australia. The new cestodes differ from one another and from their 11 valid congeners in morphological features such as sublocular configuration and number, hook size, and testis number. Given the notoriously oioxenous nature of elasmobranch-hosted onchoproteocephalidean cestodes, these results provide further support for recognition of the milk shark species complex. This work also raises questions about the *Phoreiobothrium* species reported in cursory descriptions from India; further examination of these cestodes is key because they are potentially hosted by the fourth member of the *R. acutus* complex. To encourage future taxonomic work on the morphology of sharks in this complex, comparative photographs of representatives of the four potential host species are provided.

Key words: tapeworms; Australia; Borneo; Senegal; shark species delineation; biological indicators

Introduction

Elasmobranch taxonomy is currently an area of active investigation with over 180 new species described in the last decade alone (White & Last 2012). Molecular data point to the existence of additional novelty in the form of cryptic complexes of species in many genera (Naylor *et al.* 2012b). Informed by such molecular studies, the comparative morphological work required to verify this novelty has ensued. Recognition of some of these elasmobranch species has occurred through the resurrection of existing names (e.g., White 2012); others have been described de novo (e.g., White *et al.* 2013; 2015; Straube *et al.* 2015); the novelty of many remains to be verified. Additional types of data can provide valuable information to help inform species determinations in the cases of cryptic species complexes. The high degree of host specificity exhibited by many groups of elasmobranch tapeworms (Caira & Jensen 2014) makes them an ideal source of such data. In fact, cestodes have been effectively used to inform hypotheses regarding species boundaries in stingrays of the *Aetobatus narinari* (Euphrasen) and *Aetomylaeus nichofii* (Bloch & Schneider) complexes (White *et al.* 2010; Koch *et al.* 2012), sharks of the *Chiloscyllium punctatum* Müller & Henle complex (Desjardins & Caira 2011), wedgefish of the *Rhynchobatus djiddensis* (Forsskål) complex (Fyler & Caira 2010), and skates of the *Raja miraletus* Linnaeus complex (Caira *et al.* 2013).

Our focus here is on cestodes of the highly host-specific (i.e., oioxenous) onchoproteocephalidean genus *Phoreiobothrium* Linton, 1889 found parasitizing the milk shark (*Rhizoprionodon acutus* [Rüppell]), across the

Accepted by N. Dronen: 3 Nov. 2015; published: 22 Dec 2015