Zoosymposia 8: 97–105 (2012)
www.mapress.com/zoosymposia/

ISSN 1178-9905 (print edition)
ZOOSYMPOSIA
ISSN 1178-9913 (online edition)

urn:lsid:zoobank.org:pub:FF7629BD-2C4D-4EC1-B3CA-F4A6C053CF65

Co-occurrence of the parasitic copepods *Acantholochus zairae* Morales-Serna & Gómez, 2010 (Poecilostomatoida: Bomolochidae) and *Pseudochondracanthus diceraus* C. B. Wilson, 1908 (Poecilostomatoida: Chondracanthidae) on the gills of *Sphoeroides annulatus* (Jenyns) (Pisces: Tetraodontidae)

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Abstract

The spatial distribution of two parasitic copepods, *Acantholochus zairae* Morales-Serna & Gómez, 2010 (Poecilostomatoida: Bomolochidae) and *Pseudochondracanthus diceraus* C. B. Wilson, 1908 (Poecilostomatoida: Chondracanthidae), was analyzed on the gills of the bullseye pufferfish *Sphoeroides annulatus* (Jenyns). A positive association between *A. zairae* and *P. diceraus* was observed; however, species coexistence is facilitated because intraspecific aggregation was stronger than interspecific aggregation. Each copepod species was less frequent on the middle arch regions. *Pseudochondracanthus diceraus* showed a preference for the third gill arch (the innermost), as well as for the dorsal region of the gill arches and the middle zone of the gill filaments. *Acantholochus zairae* was randomly distributed among gill arches, but showed a preference for the ventral region of the gill arches and the middle zone of the gill filaments. In addition, only *A. zairae* appeared to be affected by increasing host length. It is possible that water flowing through the branchial cavities of *S. annulatus* is a major determinant on the distribution of its gill copepods.

Key words: crustaceans, fish parasites, microhabitat selection, Mexico

Introduction

Gill parasites of fishes may exhibit a microhabitat preference (e.g., Geets *et al.* 1997; Lo & Morand 2001; Baker *et al*. 2005; Scott-Holland *et al*. 2006; Rubio-Godoy 2008), even in the absence of potentially competing parasite species and of individuals of the same species (Rohde & Rohde 2005). Some explanations for this are avoidance of competition, predation and hyperparasites, facilitation of mating, reinforcement of reproductive barriers, and adaptations to environmental complexity (Rohde 1994). Although no interspecific competition for attachment space is apparent among gill parasites (e.g., Yang *et al*. 2006; Dippenaar *et al*. 2009), there is evidence indicating that positive, negative and neutral interactions play a role in determining the distribution of species on a particular microhabitat (e.g., Lo & Morand 2000; Baker *et al*. 2005). However, according to Baker *et al*. (2005), those findings are based mainly on monogenean communities, and knowledge of the coexistence of copepod species is poor. Therefore, more evidence regarding parasitic copepods is

Accepted by Danny Tang: 18 Oct. 2012; published: 17 Dec. 2012