



## Siphonostomatoid copepods (Crustacea) associated with marine invertebrates and algae in Brazil: a review and future considerations

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### Abstract

In Brazil, knowledge on copepods of the order Siphonostomatoida dates back to the late 1800s, with the earliest record concerning parasitic copepods of fish. In contrast, the first record in Brazil of a copepod associated with an unknown marine invertebrate did not appear until 1988, with further studies on this copepod group occurring only during the last 15 years. The aim of this paper is to summarize the knowledge on the diversity of the siphonostome copepods, focusing on the associates of marine invertebrates, and to add new data on the distribution of known species and on the utilization of host species. Finally, an evaluation is carried out on the results and the effort expended during this period, and some objectives are proposed for improving the knowledge of the siphonostome copepods associated with marine invertebrates in Brazil.

**Key words:** Siphonostomatoida, association, Asterocheridae, Artotrogidae, Entomolepididae

### Introduction

The Siphonostomatoida Thorell, 1859 is a copepod order in which all members live as parasites or associates of other organisms. Siphonostomatoids are characterized by their modified buccal apparatus: the mouth forms a tube or siphon through the overlap, or partial or complete fusion of the labrum and labium around the esophageal opening. The result is an oral cone with a small slit on each side of the base through which the mandibles enter. The mandibles are styliform and may be armed with denticles at the distal end. The maxillae and maxillipeds are subchelate or brachiform and serve as appendages for attachment to the host (Boxshall 1990; Huys & Boxshall 1991). Among some siphonostomes parasitic on fish a frontal filament is used as an organ of attachment for the tethered copepodid larvae called chalimi (see Huys *et al.* 2007).

According to Ah Yong *et al.* (2011), the Siphonostomatoida currently contains 41 families, which can be divided into two groups: the parasites of marine and freshwater fishes, comprising 19 families, 185 genera and 1,747 species or 71% of the total number of siphonostomatoid species; and the associates of marine invertebrate hosts, consisting of 22 families and 712 species in 157 genera or just 29% of the siphonostomatoid species. That means that over 2/3 of the total amount of siphonostomatoid species are fish parasites, despite the similar number of families for each group.

In Brazil, siphonostomatoids parasitic on fishes have been studied since the late 1800s (Burmeister 1835; Dana 1852) while the first siphonostome associated with an unknown marine invertebrate was recorded for the first time in 1988 (Alvarez 1988), followed by the second record