

New Host and Geographical Distribution for the Pearlfish *Carapus mourlani* (Carapidae) with a Discussion on its Biology

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Specimens of the pearlfish *Carapus mourlani* (Carapidae) were observed for the first time in association with the sea cucumber *Isostichopus fuscus* (Holothuroidea: Echinodermata) along the coast of Ecuador. Out of 4345 sea cucumbers collected from various depths between 5 and 60 m, 12 harbored a pearlfish either in the coelomic cavity, the respiratory tree, or the digestive tract, yielding a prevalence of ca. 0.0028. The presence of *C. mourlani* appeared to be detrimental to the holothurian host in some cases. Side effects resulting from coelomic cavity infections included less advanced gonad maturity (reduced gonadal tubule diameter and length, lower ratio of mature oocytes) and a significant proportion of necrotic and shriveled gonadal tubules, devoid of gametes. Aside from discussing this evidence, the present paper briefly describes the biology of the pearlfish, its relationship with the host, and its daily activity cycle.

THE Carapini tribe comprises a group of marine fishes that are distributed worldwide between 40°N and 30°S but display a greater diversity in tropical latitudes (Williams, 1984; Markle and Olney, 1990; Nielsen et al., 1999). The Carapini are currently divided into two genera: *Carapus* and *Encheliophis* (Markle and Olney, 1990; Parmentier et al., 2000a). Among the seven known commensal species of *Carapus*, four are associated with holothurians (*C. acus*, *C. bermudensis*, *C. boraborensis*, and *C. homei*), one is found in sea stars (*C. mourlani*), one is hosted by bivalves (*C. dubius*), and the last one (*C. sluiteri*) by ascidians (Markle and Olney, 1990; Parmentier et al., 2000a; Eeckhaut et al., 2004). The five species that belong to the genus *Encheliophis* are parasites of holothurians (Parmentier et al., 2000a; Parmentier and Das, 2004) although at least two (*E. gracilis* and *E. sagamianus*) were also found in sea stars (Arnold, 1956; Cheney, 1973; Markle and Olney, 1990). Carapidae are known to associate with preferred hosts (Trott and Trott, 1972; Gustato et al., 1979), but they may occur in uncharacteristic hosts as well (Smith, 1964; Trott, 1970). In captivity, some Carapidae were observed to associate with holothurians in which they had never been found before in the wild, although they always selected their customary hosts when given a choice (Trott, 1970, 1981).

While the biology of some Carapidae has received a certain degree of attention, the habits and behavior of *C. mourlani* remain poorly known. *Carapus mourlani* is commonly found in the Indo-Pacific where it is described as a commensal of sea stars such as *Culcita* sp. and *Acanthaster planci* (Meyer-Rochow, 1977, 1979; Trott, 1981). *Carapus mourlani* has been observed

to swim along the ambulacral groove of the sea star *Culcita* before entering the stomach, tail first, through the oral cavity and finally reaching the coelomic cavity (E. Parmentier, pers. obs.). The presence of a pearlfish is usually not believed to be detrimental for hosts (Trott, 1981; Vanden-Spiegel et al., 2000), which display very efficient regeneration capabilities (Mary Bai, 1971; Hamel and Mercier, 2000).

The prevalence of pearlfishes in given hosts seems largely dependent on the host abundance and distribution as well as on the occurrence of pearlfish planktonic eggs and veliger larva (Trott, 1981). The degree of infection varies between 10% and 100% depending on the species and geographical locations (Jangoux, 1987, 1990).

This paper reports the first occurrence of a Carapini off the coast of Ecuador within a new holothurian host. The specific goals of the present study were to identify the species found in Ecuador and describe the main aspects of its biology.

MATERIALS AND METHODS

Collection and observations.—Sea cucumbers (*Isostichopus fuscus*) were routinely collected by SCUBA divers between 5 and 60 m at several sites along the coast of mainland Ecuador, from fall 2000 to fall 2003, for the purpose of aquaculture studies. During this time, a total of 12 pearlfishes were found inside the sea cucumbers, mostly in fall 2001 and exclusively in hosts collected at 20 ± 5 m near the villages of Punta Ayangué ($01^{\circ}59'33''S$ and $80^{\circ}45'23''W$) and Ancocito ($02^{\circ}19'60''S$ and $80^{\circ}52'60''W$) in the Guayas Province. The pearlfishes were either