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Remoras

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Remora, suckerfish, diskfish, and sucker are some of the names describing eight species of marine fishes in the Family Echeneidae (=Echenedidae) Fischer, 1978; Nelson *et al.*, 2004). Remoras inhabit tropical and subtropical waters worldwide, except for the whitefin sharksucker (=whitefin remora, *Echeneis neucratoides*), which is restricted to the western Atlantic Ocean (Fischer, 1978).

I. Remora Biology

Remoras use a suction disk to attach to sharks, rays, bony fishes, sea turtles, cetaceans, sirenians, and ships and other floating objects (O'Toole, 2002). When attached to these hosts, remoras appear to swim upside down, but the disk is really on top of their head. The oval-shaped disk is a modified dorsal fin that has split and flattened to form a series of transverse, plate-like fin rays (disk lamellae) that resemble slats of a venetian blind (Fig. 1). When these fin rays are lifted, a strong vacuum is created between the remora's disk and its host (Fulcher and Motta, 2006).

The tenacity with which remoras attach to their hosts is best illustrated by the practice of sea turtle fishing by fishermen in the Caribbean and off China and northern Australia (Gudger, 1919), and in Yemen and Kenya, where it continues to this day. A fisherman ties a line around the tail of a remora and throws the fish into the water. The remora tightly attaches itself to a turtle, and the remora and its "catch" are then hauled ashore.

Suspected benefits of a remora's association with their hosts include transportation, protection from predators, increased courtship/reproduction potential, enhanced respiration, and expanded feeding opportunities (Fertl and Landry, 1999; Silva and Sazima, 2003). Remoras opportunistically feed on parasitic copepods (which constitute the bulk of their diet), zooplankton and smaller nekton, food scraps from meals of their hosts, and sloughing epidermal tissue and feces of the host (Cressey and Lachner, 1970; Williams *et al.*, 2003).

II. Marine Mammal Hosts

Adult remoras typically attach to the body of a marine mammal (Figs 2, 3). At least three remora species utilize marine mammals as hosts: whalesucker (*Remora australis* = *Remilegia australis*), sharksucker (*Echeneis naucrates*), and whitefin sharksucker (Fertl and Landry, 1999; Williams *et al.*, 2003). Remoras associate with at least 20 cetacean and 2 sirenian species [dugong (*Dugong dugon*) and

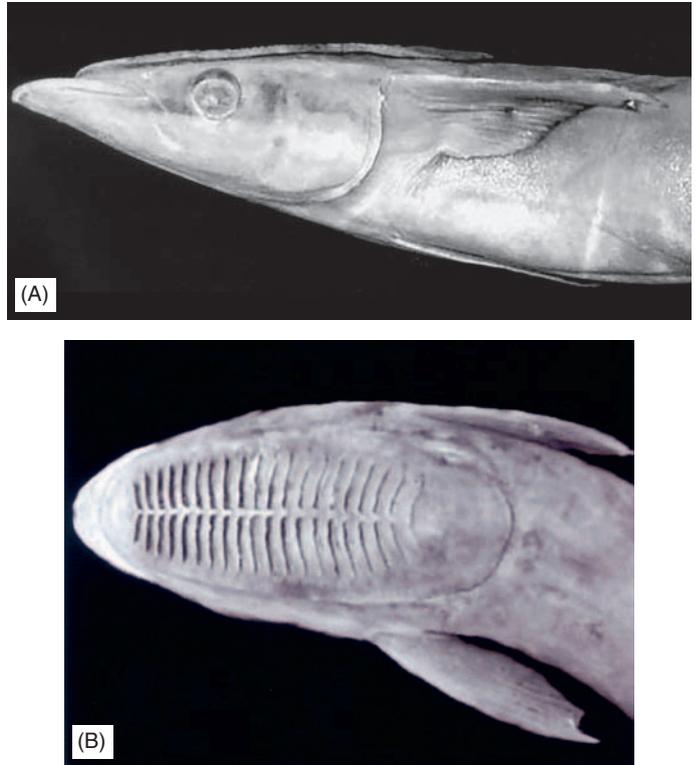


Figure 1 (A) Lateral and (B) dorsal view of the head of a remora, with suction disk visible. Photographs by W.H. Dailey.



Figure 2 Bottlenose dolphin (*Tursiops truncatus*) with remora attached. Photograph by Dagmar C. Fertl.

West Indian manatee (*Trichechus manatus*)]. The whalesucker has most often been collected and identified from cetaceans, hence, its common name (Rice and Caldwell, 1961; Fertl and Landry, 1999). The sharksucker has also been collected from common bottlenose dolphins (*Tursiops truncatus*) (Fertl and Landry, 1999, 2002; Noke, 2004). Two species of remora have been collected from West Indian manatees; these were positively identified as the whitefin sharksucker and the sharksucker (Williams *et al.*, 2003).

The remora's suction mode of attachment does not hurt the host or leave scars, as has been suggested. However, a temporary mark resembling the disk imprint may be seen. Wounds attributed to remoras are most likely caused by cookiecutter sharks (*Isistius brasiliensis*) or Pacific lampreys (*Lampetra tridentate* = *Entosphenus tridentatus*), which actually bite or rasp their prey or host.

To what degree a remora might irritate its host is uncertain. A remora may slide all over its host's body, possibly tickling the animal.



Figure 3 Sharksucker (*Echeneis naucrates*) attached to a West Indian manatee (*Trichechus manatus*) off Aguadilla, Puerto Rico. Photo by Edwin Rivera-Colon, La Casa del Buzo.

Animals observed with remoras sliding over their bodies sometime will jerk and even roll over (Ritter, 2002; Ritter and Brunnschweiler, 2003). Dolphins of various species leap with remoras attached to them, perhaps to dislodge the “hitchhiker” (Fish *et al.*, 2006; Weihs *et al.*, 2006). There are also reports of dolphins dislodging remoras from themselves or their calves and then biting them (Wedekin *et al.*, 2007). Large remoras or multiple remoras on the same host may produce a hydrodynamic drag.

III. Problems with Remora Identifications

The whalesucker’s preference for cetaceans leads many observers to assume that any remora spotted on a cetacean is this species. Most remora–marine mammal associations described in the literature are based on visual or photographic observations of a remote, free-swimming host and its passenger(s) rather than specimens collected from strandings or whaling victims. Host records determined from remote observations should be considered problematic, as the identification of remoras to species is difficult without the actual specimen in hand (Fertl and Landry, 1999; Sazima, 2006).

The whalesucker and other host-specific remoras are typically pelagic forms with a specialized morphology consisting of large disks, short stout bodies, and reduced fin size (when compared to those of inshore counterparts) (Fertl and Landry, 1999). More commonly reported remoras are slender-bodied, inshore forms, such as the sharksucker, that are least particular about their hosts. The possibility that small, slender remoras, as well as more stocky remoras photographed on cetaceans, may represent different life history stages of one species further complicates positive identification from afar.

See Also the Following Articles

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Reproductive Behavior

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I. Introduction

Taking a very broad view, the “function” of marine mammals is to convert prey into offspring. Reproductive behavior is an important part of the process by which this is brought about and must serve to create a situation in which the young can safely be born and nurtured, and one which facilitates mating with suitable