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CLEANING SYMBIOSIS BETWEEN TOPSMELT, *ATHERINOPS AFFINIS*, AND GRAY WHALE, *ESCHRICHTIUS ROBUSTUS*, IN LAGUNA SAN IGNACIO, BAJA CALIFORNIA SUR, MEXICO

Many species of marine fishes are known to engage in various forms of cleaning symbiosis (Limbaugh 1961; Hobson 1969, 1971). The cleaners, generally small or juvenile fish, remove ectoparasites and necrotic tissue from larger host fish. This promotes the well-being of the host and provides food for the cleaner. Cleaning symbiosis between topsmelt, *Atherinops affinis*, cleaners and gray whale, *Eschrichtius robustus*, hosts was observed during the author's study of breeding gray whales in Laguna San Ignacio, Baja California Sur, Mexico, supported by the United States Marine Mammal Commission, the National Geographic Society, and the World Wildlife Fund-U.S. (Swartz and Jones[1]). Topsmelt are perennial residents of the lagoon and gray whales occupy the lagoon for 3 to 4 mo each winter. As we photographed gray whales from our skiff, schools of topsmelt were seen accompanying the whales and picking at clusters of parasitic barnacles, *Cryptolepas rhachianecti*, and whale lice, *Cyamus* sp., which incrust these cetaceans (Rice and Wolman 1971).

Topsmelt in association with gray whales were collected during the 1978-79 winter with a "mackerel rig" consisting of 1 m of monofilament line with four No. 6 brass hooks spaced 10 cm apart. The standard length (SL) of each fish was measured and its gut contents examined. A second series of topsmelt were collected during the same winter in the absence of gray whales.

The topsmelt ranged from 17 to 29 cm SL. All 38 specimens collected in association with gray whales contained bits of sloughed gray whale epidermis and whale lice appendages. No barnacle appendages or other material was found in these fish. None of 25 topsmelt collected in the absence of whales contained any gray whale epidermis or whale lice; rather they contained bits of filamentous brown algae, *Ectocarpus* sp., and gammarid amphipods.

Topsmelt are described as opportunistic feeders on marine plants, small crustaceans, bryozoans, and hydroids (Frey 1971). During the breeding season of the gray whale, topsmelt in Laguna San Ignacio supplement their diets by cleaning sloughing epidermal tissue and external parasites from gray whale hosts.

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MORPHOLOGICAL FEATURES OF THE OTOLITHS OF THE SAILFISH, *ISTIOPHORUS PLATYPTERUS*, USEFUL IN AGE DETERMINATION[1]

Because of its spectacular runs and leaps, sailfish, *Istiophorus platypterus*, is highly valued by sport fishermen, and the fishery contributes substantially to the economics of coastal regions (de Sylva 1969). However, information on the biology of sail-

[1]Swartz, S. L., and M. L. Jones. 1978. Gray whales, *Eschrichtius robustus*, during the 1977-1978 and 1978-1979 winter seasons in Laguna San Ignacio, Baja California Sur, Mexico. Available Natl. Tech. Inf. Serv., Springfield, Va., as PB-289 737, 35 p.

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