

Research Note

New Locality Records for *Dermophthirius carcharhini* (Monogenea: Microbothriidae) and *Dermophthirius maccallumi* and a List of Hosts and Localities for Species of *Dermophthirius*

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ABSTRACT: We report *Dermophthirius carcharhini* (Monogenea: Microbothriidae) from the skin of a dusky shark, *Carcharhinus obscurus* (Carcharhinidae), in the southwest Indian Ocean off Umhlanga Rocks, South Africa, and *Dermophthirius maccallumi* from the skin of 2 bull sharks, *Carcharhinus leucas*, in the northern Gulf of Mexico off Cat Island, Mississippi, U.S.A. No previous report exists of a microbothriid from the western Indian Ocean or from off southern Africa or of *D. maccallumi* from beyond the vicinity of the Lake Nicaragua–San Juan River system. We also provide a list of hosts and localities for members of *Dermophthirius*.

KEY WORDS: *Dermophthirius carcharhini*, *D. maccallumi*, dusky shark, *Carcharhinus obscurus*, bull shark, *C. leucas*, Microbothriidae, Monogenea, skin, ectoparasite, Indian Ocean, Gulf of Mexico, biological tag.

The 5 nominal species of *Dermophthirius* (Microbothriidae) infect the skin of carcharhinids (Carcharhinidae). Although limited observations of *Dermophthirius penneri* suggest that these microbothriids are probably not regular pathogens of free-ranging hosts (Bullard et al., 2000), several congeners have been implicated in the deaths of captive sharks (Cheung et al., 1982, 1988; Cheung and Ruggieri, 1983). Herein, on the basis of new collections, we extend the known geographic range of 2 species of *Dermophthirius*. We also provide a current list of hosts and localities, which may assist aquarists in identifying a species of *Dermophthirius* or predicting which shark species will likely harbor an infection.

A dusky shark, *Carcharhinus obscurus* (Carcharhinidae), 2.2 m in total length, died in a gill net off Umhlanga Rocks, South Africa (29°43'S; 31°50'E),

on 5 November 1998 and was examined for metazoan ectoparasites. Worms from this shark were fixed in 70% ethanol (EtOH). Two bull sharks, *Carcharhinus leucas*, each 1 m in total length, were caught in a gill net off the north shore of Cat Island, Mississippi, U.S.A. (30°15'N; 89°09'W), on 6 and 8 October 2002, maintained alive in a cooler of ambient seawater (10-ppt salinity) for 2–3 hr, and subsequently examined for metazoan ectoparasites. Worms from bull sharks were fixed in 5% neutral buffered formalin. Select worms from each host were hydrated, rinsed in distilled water, stained in Van Cleave's hematoxylin with several additional drops of Ehrlich's hematoxylin, partially dehydrated, alkalized in 70% EtOH with lithium carbonate and butyl-amine, dehydrated, cleared in clove oil, and mounted on glass slides using Canada balsam. Voucher specimens were deposited in the United States National Parasite Collection (USNPC).

Dermophthirius carcharhini

Carcharhinus commersoni

Distribution: Northwestern Atlantic Ocean off Woods Hole, Massachusetts, U.S.A. (MacCallum, 1926).

Remarks: This name was applied to several *Carcharhinus* spp., but this record probably referred to *C. obscurus* because the other known hosts, *Carcharhinus altimus* and *Carcharhinus galapagensis*, do not range off Woods Hole (Compagno, 1984).

Carcharhinus obscurus

Distribution: New York Aquarium, New York, New York, U.S.A., originally collected from northwestern

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Atlantic Ocean, in New York Bight, New York, U.S.A. (Cheung and Ruggieri, 1983). Southwestern Indian Ocean off Umhlanga Rocks, South Africa (present study [USNPC 92850]).

Carcharhinus galapagensis

Distribution: Bermuda Aquarium, originally collected from northwestern Atlantic Ocean off Bermuda (Rand et al., 1986).

Carcharhinus altimus

Distribution: Northwestern Atlantic Ocean off North Carolina, U.S.A. (Benz, 1987).

Dermophthirius maccallumi

Carcharhinus leucas

Distribution: Colorado River, off Colorado Bar, Costa Rica (Watson and Thorson, 1976). San Juan River, off San Carlos, Nicaragua (Watson and Thorson, 1976). Northern Gulf of Mexico off Cat Island, Mississippi, U.S.A. (present study [USNPC 92851]).

Dermophthirius nigrellii

Negaprion brevirostris

Distribution: Steinhart Aquarium, San Francisco, California, U.S.A., original collection locality not reported (Cheung et al., 1982). Sea World, San Diego, California, U.S.A., original collection locality not reported (Cheung et al., 1982). New England Aquarium, Boston, Massachusetts, U.S.A., original collection locality not reported (Cheung et al., 1982). Sea World Shark Institute, Orlando, Florida, U.S.A., original collection locality not reported (Cheung et al., 1982). New York Aquarium, New York, New York, U.S.A., originally collected from eastern Gulf of Mexico off Florida Keys, Florida, U.S.A. (Cheung and Ruggieri, 1983). Captivity (originally collected from eastern Gulf of Mexico, in Florida Bay, Florida, U.S.A.) (Grimes et al., 1985). Eastern Atlantic Ocean off Senegal, reported as *D. carcharhini* (Euzet and Maillard, 1967; see also Cheung and Ruggieri [1983] and Benz [1987]).

Dermophthirius penneri

Carcharhinus limbatus

Distribution: Northwestern Atlantic Ocean off New Jersey, U.S.A. (Benz, 1987). Northern Gulf of Mexico off Mississippi, U.S.A. (Bullard et al., 2000). Northern Gulf of Mexico off Louisiana, U.S.A., reported as *D. carcharhini* (Thatcher, 1959;

see also Benz [1987]). Northern Gulf of Mexico, in Davis Bayou, Mississippi, U.S.A., reported as *D. carcharhini* (see Thatcher [1959]; Benz [1987]).

Carcharhinus brevipinna

Distribution: Eastern Gulf of Mexico off Florida, U.S.A. (Benz, 1987). Eastern Atlantic Ocean off Senegal, reported as *D. carcharhini* (see Euzet and Maillard [1967]; Benz [1987]).

Dermophthirius melanopteri

Carcharhinus melanopterus

Distribution: Captivity, originally collected from eastern Indian Ocean off Christmas Island (Cheung et al., 1988).

Eleven specimens of *D. carcharhini* were collected from an unspecified site on the skin of the dusky shark. This report extends the known range of *D. carcharhini* to the Indian Ocean and provides the first record of a member of *Dermophthirius* from a free-ranging host in that ocean. Cheung and Ruggieri (1983) and Benz (1987) noted that records of *D. carcharhini* from blacktip sharks (*C. limbatus*), spinner sharks (*C. brevipinna*), and lemon sharks (*N. brevirostris*) were probably erroneous. We concur and suspect that specimens of *D. carcharhini* have been collected from only 3 carcharhinid species: dusky shark, bignose shark (*C. altimus*), and Galapagos shark (*C. galapagensis*). In partial support of this, two of us (S.A.B and G.W.B.) have not identified any microbothriid other than *D. penneri* infecting tens of free-ranging blacktip sharks.

Two and 23 specimens of *D. maccallumi* were collected from about the dorsal ridge of the bull sharks caught on 6 and 8 October, respectively. The first shark lacked a gross skin lesion, but the second shark possessed a light gray-colored skin lesion grossly similar to that surrounding specimens of *D. penneri* on the skin of *C. limbatus* (see Bullard et al. [2000]). This is the first report of *D. maccallumi* from the Gulf of Mexico or from a nonriverine or nonlacustrine environment. *Dermophthirius maccallumi* seems somewhat euryhaline: it was originally described from a bull shark in freshwater (Watson and Thorson, 1976), and we report infections on bull sharks in 10 ppt seawater. However, on the basis of the information provided by Watson and Thorson (1976), we suspect that *D. maccallumi* probably cannot thrive in freshwater. Prevalence of infection by *D. maccallumi* was inversely related to host distance from the ocean, suggesting that bull sharks moving upriver were cleared of infections as they

entered into and lingered in freshwater (Watson and Thorson, 1976). If specimens of *D. maccallumi* die after prolonged exposure to freshwater, then an infection by *D. maccallumi* could serve as a useful biological tag for identifying a bull shark that resides in or has recently traveled from an ocean or estuary. Regarding eradication of captive infections, a short-duration freshwater dip, such as those commonly used by some aquarium personnel to kill ectoparasites, is probably ineffective against infection by *D. maccallumi*.

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