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Epibiotic Associates of Oceanic-Stage Loggerhead Turtles from the Southeastern North Atlantic

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Upon leaving rookery beaches in the southeastern USA, post-hatchling loggerhead turtles (*Caretta caretta*) migrate to oceanic developmental habitats in the waters of the eastern North Atlantic (Bolten *et al.* 1993; 1998; Carr 1986). Because of its proximity to the eastern edge of the North Atlantic Gyre, local sea floor topography and seasonal meteorological events, this area provides rich foraging habitats for juvenile loggerhead turtles and a variety of other oceanic organisms (Bjorndal 1997; Brongersma 1972; Carr 1986; Coston-Clements *et al.* 1991; Davenport 1992; Pouchet & de Guerne 1886; Van Nierop & Den Hartog 1984). Young turtles spend at least 6 years in these oceanic developmental habitats before recruiting to neritic habitats in the western North Atlantic (Bjorndal *et al.* 2000). During the oceanic stage, juvenile loggerheads are exposed to a wide variety of small organisms that rely upon flotsam for survival. As a result, juvenile loggerheads are often colonized by several commensal forms. The first available information on the epibionts of loggerhead sea turtles from the southeastern North Atlantic Ocean is apparently Tuckey's (1818) report of pedunculate barnacles *Lepas anatifera* and *L. membranacea* (= *Conchoderma virgatum*) from sea turtles ('*Testudo caretta*') near the Azores. Here, we

tabulate a list of the epibionts associated with oceanic-stage loggerhead turtles from the southeastern North Atlantic Ocean. We present new records of epibiotic forms from oceanic-stage loggerheads from the Azores.

Turtles were captured in dipnets while floating at the surface in the waters around the Azores from March – November, 1986 -1994 (n = 17). The curved carapace length (CCL) of each turtle was recorded as the distance from the anterior edge of the nuchal notch to the posterior notch between the supracaudals (minimum mid-line CCL range= 14.6 – 62.1 cm; mean= 33.7). Epibionts were removed from turtles and preserved in either 70 % ethyl alcohol or 10 % formalin, depending upon preservative availability. Samples were placed in 500-ml polyethylene wide-mouthed bottles and labeled with the corresponding tag numbers of the host turtle. Specimens were later sorted and identified to the lowest taxon possible. Because sampling efforts for epibionts were not standardized and not all captured turtles were surveyed for epibionts, we are not able to provide information on the frequency of occurrence or density of any particular epibiont species. Nor should our list of epibionts be considered as complete for oceanic-stage loggerheads in the southeastern North Atlantic.

To our knowledge, at least 20 epibiont species or

types are present on oceanic-stage loggerhead turtles in the southeast North Atlantic (Table 1), 9 of which were previously unknown as epibionts from turtles in this region prior to our study. Ours is also the first report of gulf-weed swimming crabs (*Portunus sayi*), sea spiders (*Endeis spinosa*) and pelagic tunicates (*Diplosoma gelatinosum*) as epibionts of loggerhead turtles. The occurrence of *P. sayi* as an epibiont of *Caretta* is interesting because no other portunid crab has ever been reported as an epibiont of sea turtles. However, *P. sayi*, as well as a number of the epibionts listed herein, are commonly associated with floating *Sargassum* weed and it is not surprising that these species can exist as epibiotic associates of oceanic-

stage *Caretta* as well (see Coston-Clements *et al.* 1991). Future studies will undoubtedly yield new records of epibionts associated with oceanic-stage loggerheads. Quantitative studies of the epibiota of oceanic turtles would be particularly valuable. Additionally, epibiont studies are needed from sea turtle developmental areas outside of the southeastern North Atlantic and the epibionts associated with all sea turtle species that have an oceanic life stage need documentation.

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<i>Epibiont Species or Type</i>	<i>Reference</i>
Arthropoda: Cirripedia: <i>Chelonibia caretta</i>	10
Arthropoda: Cirripedia: <i>Chelonibia testudinaria</i>	6
Arthropoda: Cirripedia: <i>Conchoderma virgatum</i>	1, 2, 5 & 11
Arthropoda: Cirripedia: <i>Lepas anatifera</i>	1, 5 & 11
¹ Arthropoda: Cirripedia: <i>Lepas anserifera</i>	11
Arthropoda: Cirripedia: <i>Lepas hilli</i>	2, 5 & 11
Arthropoda: Malacostraca: <i>Caprella andreae</i>	8 & 11
Arthropoda: Malacostraca: <i>Hyale</i> sp.	8
Arthropoda: Malacostraca: <i>Planes minutus</i>	4, 6, 9 & 11
Arthropoda: Malacostraca: <i>Podocerus chelonophilus</i>	3, 6, 8 & 11
² Arthropoda: Malacostraca: <i>Portunus sayi</i>	11
² Arthropoda: Pycnogonida: <i>Endeis spinosa</i>	11
² Chordata: Ascidiacea: <i>Diplosoma gelatinosum</i>	11
¹ Cnidaria: Hydrozoa: Unidentified Hydroid	11
¹ Algae: Bacillariophyceae: Unidentified Diatoms	11
¹ Algae: Chlorophyceae: <i>Chaetomorpha linum</i>	11
¹ Algae: Cyanophyceae: Unidentified Blue-Green Algae	11
¹ Algae: Isogeneratae: Unidentified Brown Algae	11
Algae: Rhodophyceae: <i>Polysiphonia caretta</i>	7 & 11
Algae: Rhodophyceae: <i>Polysiphonia</i> sp.	8

¹ First report as loggerhead epibiont in the region.

² First report as loggerhead epibiont.

Table 1. Epibionts associated with oceanic-stage loggerhead turtles from the southeastern North Atlantic. References: ¹Tuckey (1818) ²Darwin (1852), ³Chevreaux & de Guerne (1888), ⁴Milne-Edwards & Bouvier (1899), ⁵Gravel (1920), ⁶Davenport (1994), ⁷Rojas-Gonzalez *et al.* (1994), ⁸Moore (1995), ⁹Dellinger *et al.* (1997), ¹⁰Southward (1998), ¹¹present study.

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