Epibionts Associated with Nesting Loggerhead Sea Turtles (*Caretta caretta*) in Georgia, USA

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Loggerhead sea turtles (*Caretta caretta*) are platforms for the colonization of various species of marine flora and fauna (Ernst et al. 1994). Unfortunately, much of the data on commensals and parasites associated with loggerheads is based on small sample sizes, dead turtles, and extremely broad areas of sampling (Dodd 1988). Not until Caine's (1986) research were any data available regarding loggerhead epibionts based on a large sample size of live turtles (N = 138) within the southeastern United States. Caine's (1986) study was conducted only in South Carolina and Florida, leaving a large gap for information on epibionts from *Caretta* along the Georgia coast. To our knowledge, there are only four studies which report epibionts from *Caretta* (Frazier et al. 1985, 1991, 1992; Sawyer et al. 1975). Furthermore, research conducted in Georgia can only include turtles from Camden County (Frazier et al. 1985, 1991, 1992), because Sawyer (1975) did not specify the localities from where his samples were taken.

We initiated a study to provide a comprehensive survey of the epibionts associated with nesting loggerheads in Georgia.We documented a total of 86 epibiotic species (Table 1), 76 of which had never been seen from *Caretta* in Georgia and 52 of which were unknown from loggerheads within the United States. Here, we report our data on loggerhead epibionts from five major nesting beaches in Georgia.

Our study sites were located on Blackbeard Island in McIntosh Co. (31°28.4'N, 81°13.1'W); Jekyll Island, Glynn Co. (31°03.9'N, 81°24.9'W); Little Cumberland Island, Camden Co. (30°57.2'N, 81°25.5'W); Little St. Simons Island, Glynn Co. (31°15.4'N, 81°17.2'W); and Wassaw Island, Chatham Co. (31°53.4'N, 80°58.4'W). All samples were collected during the 1997 nesting season from May to August. No samples were included from dead turtles because epibiont attachment may have occurred post-mortem and may not reflect the true nature of the observed relationship.

Sampling was conducted while the turtle was nesting or covering the nest site. All visible areas of the turtle were examined and sampled where epibiota were most prevalent. Standardization of collection sites on turtles was considered but not adopted as suggested by Caine (1986). Epibionts were collected by using a small putty knife and/or pair of forceps. Once collected, samples were placed in containers of 10% formalin or 70% isopropyl alcohol. Containers were marked with a number previously

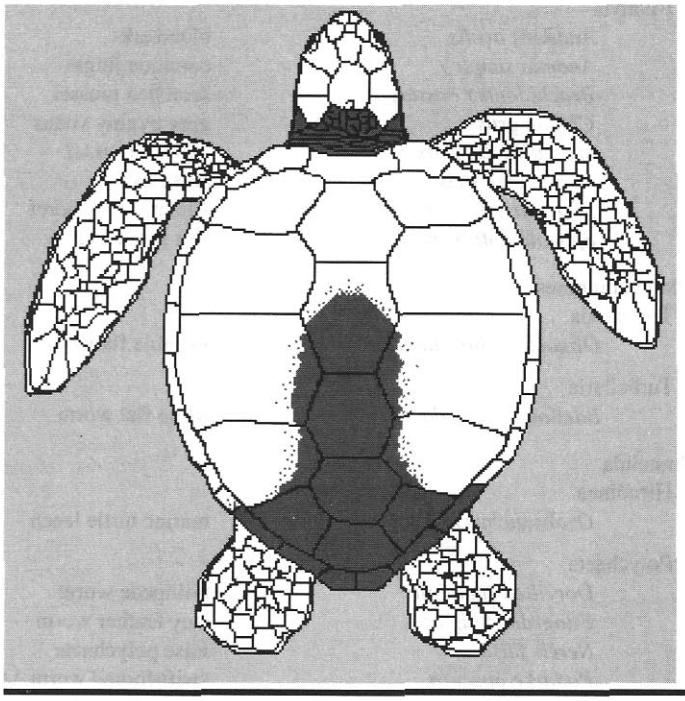

FIG. 1. Prevalent epibiont sites on nesting *Caretta caretta* in Georgia, USA. Shaded neck region represents attachment site for marine leeches, *Ozobranchus margoi*.

TABLE 1. Epibionts collected from *Caretta caretta* in Georgia, USA. Data are the number of turtles upon which the epibiont was found with the percent occurrence in parentheses; sample size (N) = 65 turtles. B = Blackbeard Island, J = Jekyll Island, LC = Little Cumberland Island, LS = Little St. Simons Island, W = Wassaw Island, and A = all localities surveyed.

Species	Common Name	Locality	Percentage
Porifera			
Cliona celata	boring sponge	W, LC, J	31 (47.7%)
Haliclona loosanoffi	eroded sponge	W, J	4 (6.2%)
Microciona prolifera	red beard sponge	J, LC	7 (10.8%)
Mycale americana	flabby sponge	W, LC, J	8 (12.3%)
Cnidaria			
Hydrozoa			
Halocordyle disticha	feather hydroid	W	9 (13.8%)
Hydractinia echinata	snail fur	A	65 (100%)
Obelia dichotoma	brown hydroid	J, LC	19 (29.2%)
Tubularia crocea	wildflower hydroid	A	13 (20%)
Anthozoa			
Aiptasia pallida	brown anemone	LC, W	2 (3.1%)
Anemonia sargassiensis	sargassum anemone	W, J, LC	5 (7.7%)
Bunodosoma cavernata	warty anemone	J	1 (1.5%)
Calliactus tricolor	hermit crab anemone	W, LC	17 (26.1%)
Halliplanella luciae	orange-striped anemone	J, LC	2 (3.1%)
Leptogorgia virgulata	sea whip	W	3 (4.6%)
Mollusca			
Gastropoda			
Chaetopleura apiculata	eastern beaded chiton	W	1 (1.5%)
Cratena pilata	ivory sea slug	A	6 (9.2%)
Crepidula fornicata	Atlantic slipper snail	W, LC	27 (41.5%)
Crepidula plana	white slipper snail	W, J	19 (29.2%)
Diadora cayenensis	cayenne keyhole limpet	J	2 (3.1%)
Doriopsilla pharpa	lemon drop sea slug	W, LC, J	7 (10.8%)
Doris verrucosa	sponge sea slug	W, J, LC	3 (4.6%)
Ischnochiton striolatus	false beaded chiton	LC	1 (1.5%)
Miesea evelina	translucent sea slug	J, LC	2 (3.1%)
Bivalvia			
Anadara ovalis	blood ark	W	12 (18.5%)
Anomia simplex	common jingle	J, LC	14 (22%)
Brachidontes exustus	scorched mussel	W	5 (7.7%)
Chione grus	grey pygmy venus	A	5 (7.7%)
Musculus lateralis	zig-zag mussel	A	10 (15.4%)
Ostrea equestris	horse oyster	J	13 (20%)
Rupellaria typica	Atlantic rock borer	W, LC	2 (3.1%)
Sphenia antillensis	soft shelled clam	LC	2 (3.1%)
Platyhelminthes			
Trematoda			
Oligaclado floridanus	variable flatworm	W	1 (1.5%)
Turbellaria			
Bdelloura candida	white flat worm	W, LC	4 (6.2%)
Annelida			
Hirudinea			
Ozobranchus margoi	marine turtle leech	W, J, LC	58 (89.2%)
Polychaeta			
Dorvillea sociabilis	millipede worm	A	12 (18.5%)
Filograna vulgaris	lacy feather worm	W	1 (1.5%)
Nereis falsa	false polychaete	J	3 (4.6%)
Podarke obscura	swift-footed worm	W, J	5 (7.7%)
Procerea fasciata	red, white and blue worm	W	1 (1.5%)
Sabellaria floridensis	Florida mason worm	W	2 (3.1%)
Sabellaria vulgaris	mason worm	LC	3 (4.6%)
Serpula vermicularis	fan worm	LC	7 (10.8%)

Syllis spongicola	sponge worm	W, J	2 (3.1%)
Arthropoda			
Crustacea			
Decapoda			
Lysmata wurdemanni	peppermint shrimp	W	9 (13.8%)
Cirripedia			
Family Lepadidae			
Lepas anatifera	large goose barnacle	W, J	2 (3.1%)
Lepas pectinata	small goose barnacle	W	1 (1.5%)
Family Balanidae			
Balanus amphitrite	acorn barnacle	A	65 (100%)
Balanus eburneus	ivory barnacle	W, J, B	13 (20%)
Family Corunulidae			
Chelonibia testudinaria	turtle barnacle	A	65 (100%)
Chelonibia caretta	turtle barnacle	A	65 (100%)
Chthamalus fragilis	fragile barnacle	A	42 (64.6%)
Chthamalus stellatus	star barnacle	W, J, LC	21 (32.3%)
Tanaidea			
Zeuxo robustus	robust tanaid	J, LC	6 (9.2%)
Amphipoda			
Ampithoe ramondi	Raymond's amphipod	W, J	2 (3.1%)
Caprella andreae	skeleton shrimp	A	65 (100%)
Caprella equilibria	skeleton shrimp	A	44 (67.7%)
Caprella penantis	skeleton shrimp	W, J, B	19 (29.2%)
Dulichiella appendiculata	bigclaw amphipod	W, J	24 (36.9%)
Elasmopus rapax	no common name	LC	3 (4.6%)
Erichthonius braziliensis	no common name	J	1 (1.5%)
Paracaprella tenuis	skeleton shrimp	W	6 (9.2%)
Podocerus cheloniae	no common name	J, LC	17 (26.2%)
Stenothoe minuta	no common name	J	3 (4.6%)
Isopoda			
Sphaeroma quadridentatum	marine roly-poly	W, J	31 (47.7%)
Cancrion carolinus	entonioscid isopod	W	4 (6.2%)
Brachyura			
Neopanope sayi	mud crab	J, LC	7 (10.8%)
Panopeus herbstii	Atlantic mud crab	W	8 (12.3%)
Planes minuta	gulf-weed crab	W	2 (3.1%)
Bryozoa			
Amathia distans	bushy bryozoan	LC, J	31 (47.7%)
Anguinella palmata	bushy bryozoan	W, LC	29 (44.7%)
Bugula neritina	bushy bryozoan	A	60 (92.3%)
Membranipora tenuis	white crust bryozoan	A	65 (100%)
Chordata			
Urochordata			
Aplidium constellatum	constellation tunicate	W, J	2 (3.1%)
Didemnum duplicatum	paintbrush tunicate	W	7 (10.8%)
Eudistoma carolinese	sandy lobed tunicate	A	42 (64.6%)
Molgula manhattensis	sea grape	W	5 (7.7%)
Perophora viridis	honeysuckle tunicate	W	1 (1.5%)
Algae			
Calothrix sp.	blue-green algae	W	19 (29.2%)
Ceramium sp.	red algae	LC, LS	2 (3.1%)
Cladophora sp.	green algae	W, LC, J	31 (47.7%)
Ectocarpus sp.	brown algae	A	60 (92.3%)
Enteromorpha sp.	green algae	W, J, LC	42 (64.6%)
Noctiluca sp.	dinoflagellate (fire water)	A	65 (100%)
Polysiphonia sp.	red algae	W, J	13 (20%)
unidentified green algae	single celled algae	A	65 (100%)
unidentified diatoms	diatoms	A	65 (100%)

assigned to data sheets which corresponded to each sampling attempt. Samples were only taken from tagged turtles and no turtle was sampled twice. Epibionts were sorted from the samples, counted, and identified.

Other data recorded at the time of sampling included turtle length and width, tag numbers, date, time, county, locations on the turtle where epibiota were most prevalent, and the locations on the turtle where epibionts were collected. Data sheets and samples were compiled in August and September 1997 and recorded into the Caretta Research Project/Wassaw National Wildlife Refuge database at the Savannah Science Museum.

The sites where epibionts were most prevalent corresponded to the posterior one-third of the carapace (Fig. 1). Marine turtle leeches (*Ozobranchus margoi*), however, were more common in the axial region of the turtles (Fig. 1). Also, while leeches preferred the aforementioned area, several turtles (N = 7, Wassaw Island) contained excessive loads of *O. margoi* within their ovipositors. Such obstructions of leeches were ultimately detached during egg deposition.

The relationship between marine turtles and their epibionts remains a poorly studied aspect of sea turtle natural history (Dodd 1988). The occurrence of particular epibiont species may ultimately help to clarify certain questions about sea turtle movements, habitat preference, juvenile and subadult activities, and many other aspects of their life history away from the nesting beaches (Caine 1986).

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