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EPIZOIC ALGAE OF NESTING SEA TURTLES *CARETTA CARETTA* (L.) AND *CHELONIA MYDAS* (L.) FROM THE MEXICAN CARIBBEAN

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The epizoan and commensal organisms of marine turtles have been documented in several investigations (Ernst and Barbour, 1972; Frazier et al., 1985; Caine, 1986; Dodd, 1988; Monhanty-Hejamdi et al., 1989; Frazier et al., 1991, 1992). In some cases, the epizoic flora have been referred to generally as red algae, green algae, filamentous algae, periphyton or just algae (Cogger and Lindner, 1969; Frazier, 1971; Bustard, 1976; Caine, 1986; Dodd, 1988). A detailed study of algae on sea turtles does not exist for Mexico although Frazier (1983) gave a brief summary of algae on *Lepidochelys olivacea* (Eschscholtz) in Oaxaca, Mexico. The present investigation gives a detailed list of epizoic algae found on nesting loggerhead turtle, *Caretta caretta* (L.), and the green turtle, *Chelonia mydas* (L.).

Materials and Methods

Algae were collected from 33 individuals of *C. caretta* and six individuals of *C. mydas*, nesting on Xcacel, Quintana Roo (20°20′N, 87°21′W), in the Mexican Caribbean. Samples were obtained from 11 May to 12 August 1992, by scrapping the carapaces with a knife. Collected algae were preserved with 4% formalin in seawater, freehand sectioned, and mounted on slides with glycerinated gelatin for examination under stereoscopic and compound microscopes. Specimens were deposited in the Herbarium of El Colegio de la Frontera Sur, Unidad Chetumal (= CIQR).

Results and Discussion

The 37 taxa found in this study (Table 1) almost equal the 38 taxa of epizoic algae for marine turtles that Cribb (1969) reported for hawksbill turtles, *Eretmochelys imbricata* (L.), in Australia. However, hawksbills are thought to be much more sedentary and forage near shallow reef habitats (Magnuson et al., 1990), conditions which expose them for longer periods of time to potential colonizing algae. Cribb's study, as well as this one, were carried out in areas of high algal diversity: the Great Barrier Reef and the Caribbean.

Only three algal species were found on *C. mydas*, whereas 37 taxa were found on *C. caretta*, with the largest number being 12 on a single carapace. Visual observations of hundreds of *C. mydas* individuals by one of us (JCZ) clearly indicate a less colonized carapace than that of *C. caretta*. This difference on the number of epizoic algae is more significant if one considers the feeding and resting behavior of *C. mydas*: it preferentially feeds on seaweeds and/or seagrasses in relatively shallow, protected waters (Magnuson et al., 1990). Furthermore, up to 69 species of algae have been found in their stomach contents (Forbes, 1994). Thus, *C. mydas* maintains a relatively clean carapace, even when exposed to a high number of potential colonizing algae.

Small and filamentous algae were the dominant form found on sea turtles of the Mexican Caribbean and are considered to be primary colonizers (Littler and Littler, 1980) in

Table 1. Algae taxa found on *Caretta caretta* and *Chelonia mydas* nesting on Xcacel, Quintana Roo, Mexico, between 11 May and 12 August 1992.

Taxa	*C. caretta*	*C. mydas*
Cyanophyceae		
Lyngbya sp.	✓[1]	
Microcoleus lyngbyaceus (Kützing) Crouan	✓[2]	✓
Schizothrix mexicana Goumont	✓[1]	
Chlorophyceae		
Acetabularia crenulata Lamouroux	✓[1]	
Anadyomene stellata (Wulfen) C. Agardh	✓[1]	
Chaetomorpha linum (O.F. Müller) Kützing	✓[3]	
Cladophora conferta P. & H. Crouan in Schramm & Mazé	✓[1]	
Cladophora prolifera (Roth) Kützing	✓[1]	
Cladophora sp.	✓[2]	
Rhizoclonium riparium (Roth) Kützing ex Harvey	✓[1]	
Phaeophyceae		
Hincksia mitchelliae (Hamel) P. C. Silva	✓[1]	
Sphacelaria tribuloides Meneghini	✓[3]	
Rhodophyceae		
Audoniella robusta (Børgesen) Garbary	✓[2]	
Bangia atropurpurea (Roth) C. Agardh	✓[1]	
Callithamnion herveyi Howe	✓[1,4]	
Centroceras clavulatum (C. Agardh in Kunth) Montagne	✓[1]	
Ceramium flaccidum (Kützing) Ardissone	✓[1]	
Ceramium leutzelburgii Schmidt	✓[1]	
Ceramium sp.	✓[2]	
Champia parvula (C. Agardh) Harvey	✓[1]	
Chondria cnicophylla (Melvill) De Toni	✓[1]	
Chondria polyrhiza Collins & Hervey	✓[1]	
Erythrotrichia carnea (Dillwyn) J. Agardh	✓[2]	
Erythrotrichia vexiliaris (Montagne) Hamel	✓[1,4]	
Gelidiella trinitatensis W. Taylor	✓[1]	
Herposiphonia secunda f. tenella (C. Agardh) Wynne	✓[1]	
Jania pumila Lamouroux	✓[1]	
Laurencia sp.	✓[1]	
Lophosiphonia cristata Falkenberg	✓[1]	
Polysiphonia atlantica Kapraun & J. Norris	✓[1]	✓
Polysiphonia carettia Hollenberg	✓[3,5]	
Polysiphonia denudata (Dillwyn) Greville	✓[1]	
Polysiphonia ferulacea Surh ex J. Agardh	✓[1]	✓
Polysiphonia sphaerocarpa Børgesen	✓[3]	
Spyridia filamentosa (Wulfen) Harvey in Hooker	✓[1]	
Stylonema elegans (Zanardini) Drew	✓[1,6]	
Wrangelia penicillata (C. Agardh) C. Agardh	✓[1]	

[1] = New records of epizoic algae on sea turtles, [2] = Algal species also found on other sea turtle species, [3] = Species reported before as epizoic of *Caretta caretta* (Parke and Dickinson, 1947; Frazier et al.,1985), [4] = Reported for the first time for Mexico, [5] = Reported for the first time for the western Atlantic, [6] = Reported for the first time for the Mexican Atlantic (from U.S.A.– Mexico border to the Belize-Mexico border).

stressful habitats due to the instability of a mobile substrate such as the sea turtle carapace, which imposes changes in temperature and light. The Ceramiales was the best represented Order among the filamentous algae, with 17 species, five of them of the genus *Polysiphonia*.

In a strict sense, the new records of *Polysiphonia carettia* for the western Atlantic, *Erythrotrichia vexillaris* and *Aglaothamnion herveyi* for Mexico, and *Stylonema elegans* for the Mexican Atlantic (Table 1), cannot be considered permanent elements of the Mexican Caribbean flora until found on stable (permanent) substrates of this coast. *Polysiphonia carettia* has only been recorded on *C. caretta* (Hollenberg, 1971; Hollenberg and Norris, 1977; Rojas-González et al., 1994, this study), which may indicate special relationship.

Excluding *P. carettia*, 30 out of 32 (94%) of the algal species identified in this study had already been reported for the Mexican Atlantic coast and are known in the Caribbean (Taylor, 1960; Earle, 1972; Almodovar and Ballantine, 1983; Lemus-C., 1984; Kemperman and Stegenga, 1986; Huerta-Muzquiz et al., 1987; Vroman and Stegenga, 1988; Mateo-Cid and Mendoza-González, 1991; Aguilar-Rosas et al., 1992; Mendoza-González and Mateo-Cid, 1992). *Erythrotrichia vexillaris* occurs from North Carolina to Venezuela and Trinidad while *Aglaothamnion herveyi* is found from Bermuda to Puerto Rico (Taylor, 1960; Croley and Dawes, 1970; Almodovar and Ballantine, 1983). Thus, the algal species which survive on the carapace of sea turtles are those which are tolerant to the broad range of conditions imposed by the Caribbean Sea. It is thought, then, that the epizoic algae of nesting sea turtles of Xcacel, Quintana Roo, Mexico, are not useful to infer migration paths of sea turtles in the northern part of the Caribbean Sea.

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