

98. FIRST RECORD OF THE EPIZOIC RED SEAWEED *POLYSIPHONIA CARETTIA* HOLLENBERG IN THE MEDITERRANEAN SEA

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Primera cita del alga roja epizoica Polysiphonia caretta Hollenberg en el mar Mediterráneo

Key words. *Caretta caretta*, epibionts, Mediterranean Sea, *Polysiphonia caretta*.

Palabras claves. *Caretta caretta*, epibiontes, Mar Mediterráneo, *Polysiphonia caretta*.

Pelagic animals, such as cetaceans and sea turtles, are a singular habitat for growth of benthic organisms. The loggerhead turtle, *Caretta caretta* (Linnaeus, 1758), is a species that can sometimes become an "ecosystem" itself because it support a very rich flora (Cribb, 1969; Abel Sentíes *et al.*, 1999) and fauna (Frazier *et al.*, 1985; Caine, 1986; Frick *et al.*, 1998; Frick *et al.*, 2000) occurring as epizoic organisms.

Several studies on epibionts of loggerhead turtles have been carried out from samples collected on female individuals during egg laying events that took place on beaches. Dodd (1988) found 5 genera of seaweeds growing on *C. caretta*, but they were identified in that paper only as green or red algae, without specific designation. Ninety-three species of epibionts (including 7 identified genera of algae as well as other unidentified green algae and diatoms) have been recorded on *C. caretta* from the North American shores of the Atlantic Ocean (Caine, 1986; Frick *et al.*, 1998). Abel Sentíes *et al.* (1999) reported 37 species of seaweeds growing on *C. caretta* from the Caribbean coasts of Mexico. Recently, Frick *et al.* (2000) found 7 new algal species on *C. caretta*, among which an unidentified green alga.

Frazier *et al.* (1985) carried out a revision of the epibiont molluscs of *C. caretta* from the eastern Mediterranean Sea mentioning the

presence of *Sphacelaria tribuloides* Menegh., *Chaetomorpha linum* (O.F. Müller) Kütz., *Cladophora* sp. and *Polysiphonia* sp. As far as we know, this is the only study of epibionts of *C. caretta* carried out in the Mediterranean Sea.

We now report the first record of *Polysiphonia caretta* Hollenberg in the Mediterranean Sea. The samples were obtained from two individuals of loggerhead turtle. Both animals had a shell 39 cm in minimum strength

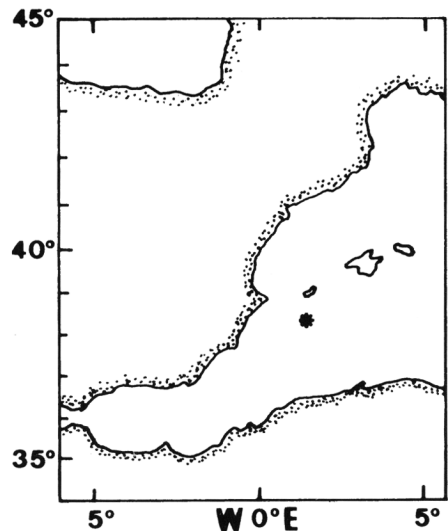


Figure 1. Site of collection of *Polysiphonia caretta* Hollenberg, epizoic on loggerhead turtle, *Caretta caretta* (Linnaeus, 1758).

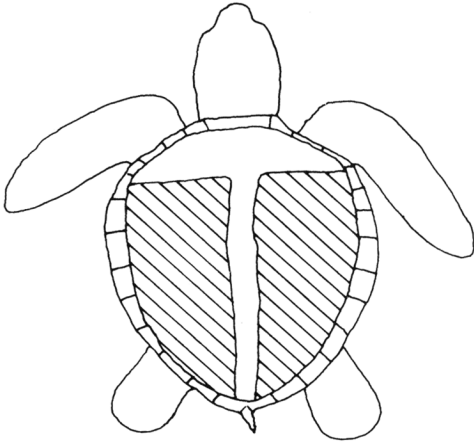


Figure 2. Distribution of *Polysiphonia caretta* Hollenberg on the loggerhead turtle carapace (oblique lines area).

carapace length (MSCL); therefore, they were probably young individuals because the shell of adult individuals usually measures around 74 cm in MSCL (Márquez, 1990). They were captured by a Spanish longline vessel on October 30th 1999, at 38°12'69''N 001°29'62''E (fig. 1). The algae, distributed on the carapace as shown in figure 2, were collected by scraping the shell carapace of the turtles with a diver's knife. The samples were preserved in 4% formalin-seawater. They were deposited at Herbarium of the Department of Plant Biology, University of Málaga (MGC Phyc). They were a cession from the Instituto Español de Oceanografía. The turtles were handled carefully in order to preserve the health of the animals.

Polysiphonia caretta Hollenberg (Ceramiales, Rhodomelaceae), MGC Phyc 3742

This species is characterized by its red-brown, uncorticated thallus of 0.5-4 cm in length, with four pericentral cells surrounding one axial cell, which is smaller in diameter

than the pericentral cells (fig. 3.1). The thallus present creeping axes attached by unicellular rhizoids, which initially are in open connection with pericentral cells (fig. 3.2) and, when fully developed, cut off by a cross wall (fig. 3.3). Erect axes have a sparse, irregular branching pattern in the basal and middle portions, whereas the branching is irregular and dense in the distal part. Erect segments are longer than their width (ratio length/width= 1.3) and bear deciduous trichoblasts. Tetrasporangia are spherical and are disposed in a spiral series in the distal branches (fig. 3.4); they measure over 40-43 μm in diameter. Cystocarps are ovoid-urceolate, with a short peduncle, and measure up to 216 μm in length and 144 μm in diameter. The pericarp is formed by irregularly distributed polygonal cells similar to the cells of the ostiole (fig. 3.5). The carpospores are pyriform and up to 70-80 μm in length and 30-33 μm in diameter. No spermatangial branches were found.

Polysiphonia caretta has been reported on the shells of nesting loggerhead turtles in California (Hollenberg, 1971), Canary Islands (Rojas-González *et al.*, 1994) and the Caribbean Sea (Abel Sentíes *et al.*, 1999). The geographical distribution of *P. caretta* is extended with this study to the Mediterranean Sea.

In the Northern Hemisphere, loggerhead turtles make use of two nesting regions in the north Atlantic Ocean and in the Mediterranean Sea: the one is located on the southeastern shores of the USA and the Gulf of Mexico; the other one in the eastern Mediterranean (Margaritoulis, 1982; Márquez, 1990). It has been proposed that the population from the western Mediterranean Sea contains individuals from both nesting regions, which use this area (and mainly surrounding Balearic Islands) as a feeding area, particularly during spring and summertime (Camiñas, 1997a). Previously this species was recorded only from in the Atlantic Ocean. Although Frazier *et al.* (1985) recorded

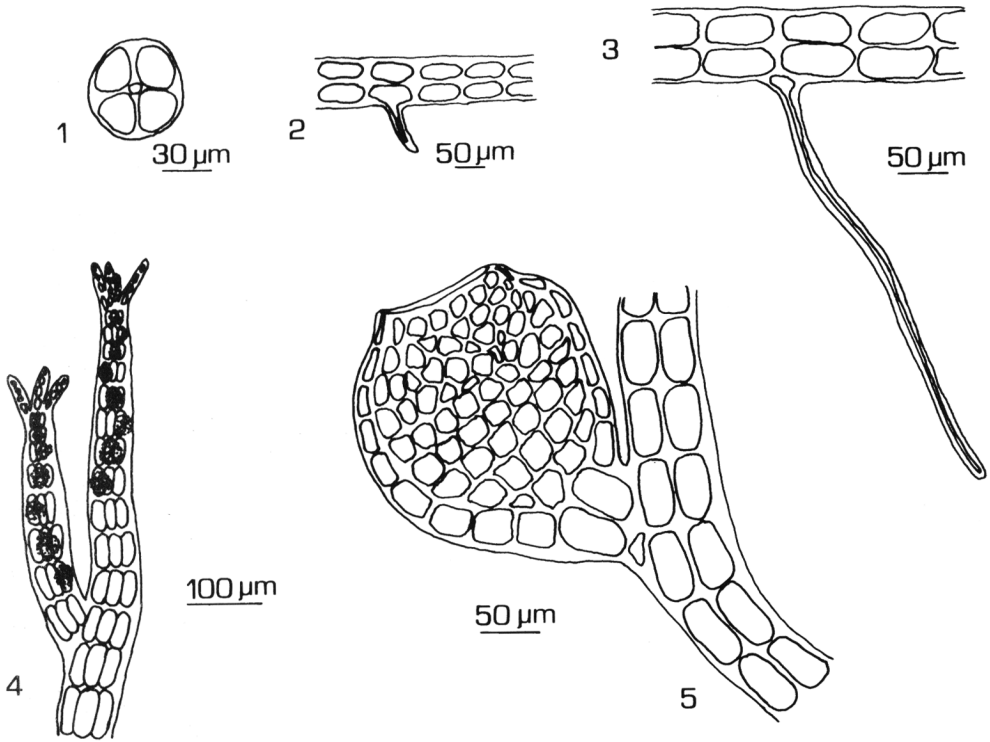


Figure 3. *Polysiphonia carettia* Hollenberg. 1, cross section of axes; 2-3, postrate axes with unicellular rhizoid; 4, tetrasporangial branches; 5, branch with cystocarp.

Polysiphonia sp. growing on *Ostrea edulis* Linnaeus (occurring as an epibiont on *C. caretta* in the eastern Mediterranean Sea), we think that species could not be *P. carettia* because this taxon has always been found on the loggerhead turtle and not on any other substratum (Hollenberg, 1971; Hollenberg and Norris, 1977; Rojas-González *et al.*, 1994; Abel Sentfés *et al.*, 1999). It is known that the populations of loggerhead turtles from the eastern Mediterranean Sea are genetically isolated from the population from the western area (Laurent *et al.*, 1998). Thus, the finding of *P. carettia* growing on young individual of loggerhead turtles in the western Mediterranean Sea could be explained by a migratory

hypothesis, that is, some young turtles found in that area could come from Atlantic populations and have penetrated into the western Mediterranean Sea through the Strait of Gibraltar (Camiñas, 1992, 1995, 1997b; Bolton *et al.*, 1998). By this line of reasoning, it could be interesting to study the epizoic algae growing on loggerhead turtles of the western Mediterranean Sea, in order to distinguish the Atlantic from the eastern Mediterranean populations of loggerhead turtles. Thus, *P. carettia* could be used as a biological marker to distinguish the loggerhead turtles coming from the Atlantic Ocean and found in the western Mediterranean Sea, from those coming from the eastern Mediterranean

Sea. However, it is necessary to study many more samples of algae growing on loggerhead turtles from both the western and eastern Mediterranean Sea in order to test this hypothesis.

The samples of *P. caretta* studied show rhizoids that when fully developed were cut off by a cross wall, in agreement with the observations from Rojas-González *et al.* (1994). In the original description of the taxon, Hollenberg (1971) described rhizoids that were not cut off by a cross wall (as shown in fig. 3.2), but based on these more recent observations we believe that this character in the original description must be revised (see fig. 3.3). On the other hand, our samples are bigger (up to 4 cm in length) than the thalli found in the Canary Islands by Rojas-González (1997) (up to 2 cm in length) and with tetrasporangia of greater diameter.

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