Epibionts of by-caught Loggerhead Sea Turtles (Caretta caretta): Drini Bay, Albania

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Abstract: This study represents the results of the epibionts found on 157 loggerhead turtles by-caught at Drini bay. We found the presence of the organisms living throughout their lifetime in the host, as well as those who use the turtle for a part of their lifecycle. In total eight taxa of epibionts, including algae, bivalves, annelids and crustaceans were found living on the turtles, of which all except for the leeches (Ozobranchus spp.) represent a commensally relationship with the host. Chelonibia testudinaria was the most frequently observed turtle epibiont and barnacle in this study.

Keywords: Epibionts, loggerhead turtle, Drini bay, Caretta caretta, by-catch

1. Introduction

Sea turtles are used as floating settlement structures by certain marine species of flora and fauna that need areas to settle for part or all of their life cycle (Frazier et al., 1985; Dood, 1988; Báez et al., 2001). This makes the sea turtles a mobile ecosystem in the ocean that due to its movement offer to species like algae an attachment substrate, and species like barnacles and crabs, movement to pelagic and neritic areas optimizing suspension and filter feeding performed by these species (Frick et al., 2004). The presence and characteristics of the epibionts are studied for a better understanding of the ecology and behavior of the turtle that is the host.

The epibiont associations in most cases represent commensally relationships, parasitism is only found in turtles with the presence of leeches (Ozobranchus spp.) which feeds on the blood of the turtle (George, 1997).

The most commonly documented epibionts of sea turtles are the sessile and motile crustaceans. These animals are found in both debilitated and healthy turtles. Mass-colonization of the debilitated turtles is suggested to happen while the turtle is lethargic by other factors (Deem et al., 2009) and do not perform self-grooming (Frick and McFall, 2007) as an epibionts controlling behavior as healthy turtles do.

The structure of the epibiontic community in a sea turtle is affected by the seasonal migration (Reich et al., 2010) symbiotic cleaning associations with other animals (Dellinger et al., 1997; Frick et al., 2004; Frick et al., 2000; Szirmai et al., 2010) and by removing away the epibionts by scraping on hard, submerged structures and substrates (Frick and McFall, 2007).

Sea turtle epibiotic community has been studied for both loggerhead and green turtle in the Mediterranean. This information comes from studies conducted on nesting loggerhead turtles (Gramenz, 1988; Fuller et al., 2010), from stranded turtles (Kitsos et al., 2003; Scaravelli et al., 2003; Kitsos et al., 2005; Karaa et al., 2011; Domènech et al., 2016; Domènech et al., 2015), and by-caught turtles (Casale et al., 2004; Zakhama-Sraieb et al., 2010; Casale et al., 2012). In Albania, the epibiontic community has been studied for the loggerhead turtle and the green turtle from the Adriatic coast (Piroli and Haxhiu, 2013).

The present study examines the occurrence of epibionts on loggerhead turtles frequenting neritic foraging grounds in the Drini bay (Albania).

2. Materials and Methods

The results represented in this study were collected from 157 loggerhead turtles Caretta caretta by-caught at the Drini bay during the period April-October 2015 and with the presence of the epibionts. Each turtle curved carapace length (CCLₜₜ) was measured (Bolten, 1999), the turtle was marked with flipper tags bearing unique serials, was photographed, and then the epibionts were identified, removed and preserved in alcohol 70%. The body surface of the turtle was divided in the carapace, plastron, head, neck, supra-caudal and limbs. Epibionts were detected by the naked eye while in the turtle or by a stereomicroscope for the samples preserved.

3. Results and Discussions

The loggerhead turtles CCLₜₜ ranged 44.00 cm to 87.00 cm (mean CCLₜₜ=67.13cm, sd=7, 95, n=157). The presence of the epibionts was found in 62, 42% of the turtles by-caught during the period covered by this study. We observed 8 taxa of epibionts that included algae, bivalves, annelids, amphipods, and lepadomorph and balanomorph barnacles.

The algae (species not identified) were found in 13.83% of the turtles with epibionts. A preference of the carapace of the turtle was found for their settlement (Tab. 1). A study from the Adriatic coast of Albania found the presence of the macroalgae in the sea turtles (Piroli and Haxhiu, 2013) while another one from the northern Aegean sea found presence on the anterior and the posterior part of the dorsal surface of the carapace and on the marginal plates (Kitsos et al., 2005). This distribution is suggested to be attributed to the light
requirements of these species (Gramentz, 1988). The results of this study support this idea.

Two species of bivalves *Mytilus galloprovincialis* and *Ostrea edulis* were identified by this study as epibions of the by-caught turtles. The frequency of the occurrence of these bivalves was low compared to algae. The frequency of the occurrence of these epibions was low even for other studies from bycaught turtles in Albanian coast (Piroli and Haxhiu, 2013), stranded dead turtles in the northern Aegean sea (Kitsos et al., 2005), while no evidence of these species was reported from Central Mediterranean (D’Addario et al., 2012).

Representatives of Polychaeta and Hirudinea worms were found in 19.10% of the turtles. The polychaeta was found settled in the carapace and the supra-caudal region (the ventral surface of the supra-caudal scutes of the carapace) with a distinguish preference of the carapace. The Hirudinea worms, *Ozobranchus* spp. were found both in egg and adult stage. The eggs were found attached in the hard part of the body of the turtle, posterior plastron and supra-caudal region, while the adults were found in the soft body parts such as tail, limb and neck region. Kitsos et al., (2005) also reported presence of the *Ozobranchus margoi* attached to various fleshy parts of the turtle’s body, while another study from the Albanian coastline reported a higher occurrence of the leeches for almost same sample size (8%, n=164) compared to this study. This occurrence is suggested to the parasitic relationship between the two species (George, 1997).

*Caprella andreae* is the amphipod specie found by this study in 1.91% of the turtles. This specimen was found only on the carapace region and in those turtles with the presence of the macroalgae. Even other studies from the Mediterranean report the amphipods (Kitsos et al., 2005; Casale et al., 2012) as a macroalgal associated fauna that always show the same distributional pattern as their host as they use it for shelter and food (Caine, 1986).

Lepadomorph and balanomorph barnacles were found as epibions of the loggerhead turtle by this study. The balanomorph barnacles resulted the epibions with the highest occurrence on the turtle, same result was reported for another study in the southeast Adriatic (Piroli and Haxhiu, 2013). The presence of the lepadomorph barnacle *Lepas anatifera* and the balanomorph barnacle *Chelonibia testudinaria*, as well as the presence of the mud on the turtles by-caught in the stavniks of Drini bay suggest these turtles frequent benthic habitats of the bay. Higher occurrence of such species is found and associated with turtles assumed to frequent benthic habitats and shallow waters even by other studies in the Mediterranean (Casale et al., 2012; Casale et al., 2004) and Atlantic (Stamper et al., 2005).

**Table 1: Composition of the organism assemblage associated with loggerhead turtle (Caretta caretta)**

<table>
<thead>
<tr>
<th>Epibiont</th>
<th>F (%)</th>
<th>Ca</th>
<th>Pla</th>
<th>SC</th>
<th>T</th>
<th>H</th>
<th>L</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALGAE</td>
<td>13.38</td>
<td>100.00</td>
<td>0.00</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>BIVALVIA</td>
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<tr>
<td><em>Ostrea edulis</em> (Linnaeus, 1758)</td>
<td>1.27</td>
<td>100.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td><em>Mytilus galloprovincialis</em> (Lamarck, 1819)</td>
<td>1.91</td>
<td>100.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<td>ANNELIDA</td>
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<tr>
<td>Polychaeta</td>
<td>15.92</td>
<td>84.62</td>
<td>0.00</td>
<td>15.38</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Hirudinea</td>
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<tr>
<td><em>Ozobranchus</em> spp.</td>
<td>3.18</td>
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<tr>
<td><em>Ozobranchus</em> spp. eggs</td>
<td>0.00</td>
<td>40.00</td>
<td>60.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td><em>Ozobranchus</em> spp. adults</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>60.00</td>
<td>0.00</td>
<td>20.00</td>
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<tr>
<td>CRUSTACEA</td>
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<td>Amphipoda</td>
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<tr>
<td><em>Caprella andreae</em> (Mayer, 1890)</td>
<td>1.91</td>
<td>100.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<td>Cirripedia Thoracica</td>
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<tr>
<td>Balanomorph barnacles</td>
<td>54.78</td>
<td>55.07</td>
<td>34.06</td>
<td>4.35</td>
<td>2.17</td>
<td>3.62</td>
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<tr>
<td>Lepidomorph barnacles</td>
<td>3.18</td>
<td>100.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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</tbody>
</table>

F (%) - frequency of occurrence in the turtles by-caught during the period covered by this study; Ca- Carapace; Pla- plastron; SC- Supra-caudal; T- Tail; H- Head; L- Limbs; N- Neck.

*Chelonibia testudinaria* occurred mainly on the carapace, and it was the only epibiont identified in all parts of the turtle (Tab. 1). This study did not identify a preference of settling on any specific part of the carapace. Different studies (Caine, 1986; Gramentz, 1988; Kitsos et al., 2005; Pfaller et al., 2006; Casale et al., 2012) suggest a non-uniform distribution of epibiont species on the turtle’s body, while some of them reported a preferential settlement location exhibited by the *Chelonibia testudinaria*. Karaa et al. (2012) found *Chelonibia testudinaria* was prevalent in all turtle’s body, mostly on the entire carapace surface, while there were other studies that found it mostly on the marginal scutes (Frick and Slay, 2000; Kitsos et al., 2005), or from the posterior third of the carapace region (Caine, 1986; Frick et al., 1998). This species-specific locations is suggested to not just be an opportunistic settling by the barnacle larvae, but it is the best position for the different needs of barnacle species (Casale et al., 2012), because the positioning of the epibions on the anterior part of the body may influence the suspension feed due to the stronger water flow (Frick et al., 2011).

*Chelonibia testudinaria* was the most frequently observed turtle barnacle in this study. This specimen is reported to be the most frequently observed barnacle even for other studies.
from the Mediterranean (Kitos et al., 2003; Casale et al., 2004; Kitos et al., 2005; Karaa et al., 2011).

*Lepas anatifera* is found by this study in the carapace of the loggerhead turtles, but in a low frequency of the occurrence compared to the other barnacle *Chelonibia testudinaria*. *Lepas anatifera* is reported as an epibiont of loggerheads in different regions of the Mediterranean Sea (Relini, 1980; Gramentz, 1988; Koukouras and Matsa, 1998; Kitos et al., 2003; Kitos et al., 2005; Badillo, 2007; Prazeri et al., 2009; Fuller et al., 2010; Karaa et al., 2011). This study found it in clusters only in the carapace region, while the attachment mainly in the carapace (marginal plates) was found even by other studies (Karaa et al., 2011; Piroli and Haxhiu, 2013) which reported the presence even in the plastron (inframarginal scutes) and in small numbers on the head.

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References


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