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The sunfish *Mola mola* as an attachment surface for the Lepadid Cirriped *Lepas anatifera* – a previously unreported association

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Abstract
On the 14th September 2004 a stranded sunfish (*Mola mola*) was found in the south coast of Terceira Island, Azores Archipelago (NE Atlantic). Whilst examining its mouth for the possible presence of plastic debris, we discovered a live colony of the cirriped *Lepas anatifera* attached to the anterior portion of the sunfish's esophagus. This previously undescribed association expands the ecological niches exploited by goose barnacles with apparent advantages such as a regular intake of food and protection both from hydrodynamic hazards and from predators.

Zusammenfassung
Am 14. September 2004 wurde ein gestrandeter Mondfisch *Mola mola* an der Südküste der Terceira-Insel im Azoren-Archipel (NO-Atlantik) gefunden. Bei der Untersuchung des Mauls auf etwaige Plastikabfall-Reste entdeckten wir eine lebende Kolonie des Rankenfüßers *Lepas anatifera,* die im vorderen Bereich der Speiseröhre angeheftet war. Die bisher unbeschriebene Verbindung erweitert die bisher bekannten ökologischen Nischen der Entenmuschel; der Vorteil liegt offensichtlich in der regelmäßigen Nahrungszufuhr und dem Schutz sowohl vor hydrodynamischen Risiken als auch vor Beutegreifern.

Résumé
Le 14 septembre 2004, un poisson lune échoué *(Mola mola)* a été trouvé sur la côte sud de l'île Terceira, archipel des Açores (Atlantique du NE). Pendant l'examen de sa bouche en quête de possibles débris plastiques, nous avons découvert une colonie vivante de cirripèdes, *Lepas anatifera,* fixés à la partie antérieure de l'oesophage du poisson lune. Cette association non encore mentionnée étend le nombre de niches écologiques exploitées par les anatifes, avec des avantages apparents comme un apport régulier de nourriture et une protection à la fois contre les effets hydrodynamiques et contre les prédateurs.

Sommario
Il 14 settembre 2004, un pesce luna *(Mola mola)* spiaggiato fu ritrovato sulla costa meridionale dell'Isola Terceira, Arcipelago delle Azorre (Nord-Est Atlantico). Nell'esaminare la sua bocca alla ricerca di eventuali frammenti plastici, si scoprì la presenza di una colonia vitale di cirripedi *Lepas anatifera* adesi alla porzione anteriore dell'esofago del pesce luna. Questa associazione finora sconosciuta espande le nicchie ecologiche dei cirripedi con chiari vantaggi, come il regolare apporto di nutrimento e la protezione da rischi idrodinamici e da predatori.

Introduction

The sunfish, *Mola mola* (Linnaeus, 1758) is a common pelagic ocean-going fish which may be found from the surface down to at least 300 m in warm and temperate zones of all oceans. It is common in Azorean waters but because of its solitary and erratic habits it is not usually seen. Sunfishes feed on small fish, mollusks, zooplankton, crustaceans, brittle stars and jellyfish (Tortonese, 1986; Santos *et al.*, 1997) This last food item may lead them to ingest plastic debris accidentally.

The goose barnacle *Lepas anatifera* Linnaeus, 1758 is also commonly seen in temperate waters of the Atlantic, including the Azorean Islands, normally attached to a wide variety of surfaces that include plastic boxes, ropes, turtle shells, wooden boxes, bottles, boats, trees and many other floating objects (Wirtz, 1995). Minchin (1996) reports the attachment of lepadid cirripeds to tar pellets and plastics – known hazards which may be ingested by sea birds, turtles and cetaceans or may entangle these creatures (see Carr, 1987; Ryan *et al.*, 1988; Debrot *et al.*, 1995; Arnould & Croxall, 1995; Barreiros & Barcelos, 2001).

Materials and Methods

In the 14th September 2004, a 217 cm (TL) *Mola mola* was found stranded in the locality of Porto Judeu, South coast of Terceira Island, the Azores Archipelago, NE Atlantic. The fish was apparently in good shape and its total weight was estimated to be about 500 kg. The dorsal fin was missing, possibly due to a collision

with a motor boat or perhaps an attack by a shark. Since the wound was fully healed, the absence of the fin may not have led to the fish's death.

When searching inside the sunfish's mouth for any extraneous debris (a common cause of death or injury to many jellyfish-eating species), we found a colony of at least 23 goose barnacles *Lepas anatifera* (size range between 2.5 to 4.7cm) attached to the anterior oesophagus (see figures 1 and 2).

Discussion

Whilst this is just a single observation, close examination of the mouth of specimens of *M. mola* is uncommon. Therefore, similar occurrences of live cirripeds may possibly have gone unnoticed in other stranded, captured or live sunfish. Nevertheless, this observation is important as it gives a further insight into pelagic cirriped attachment surfaces and may well lead to more reports of this type of association.

Whilst this association may be advantageous to the cirriped, , it is not clear whether it is neutral to the sunfish or causes feeding problems since the attachment of *Lepas* may obstruct the sunfish's esophagus,

Acknowledgements

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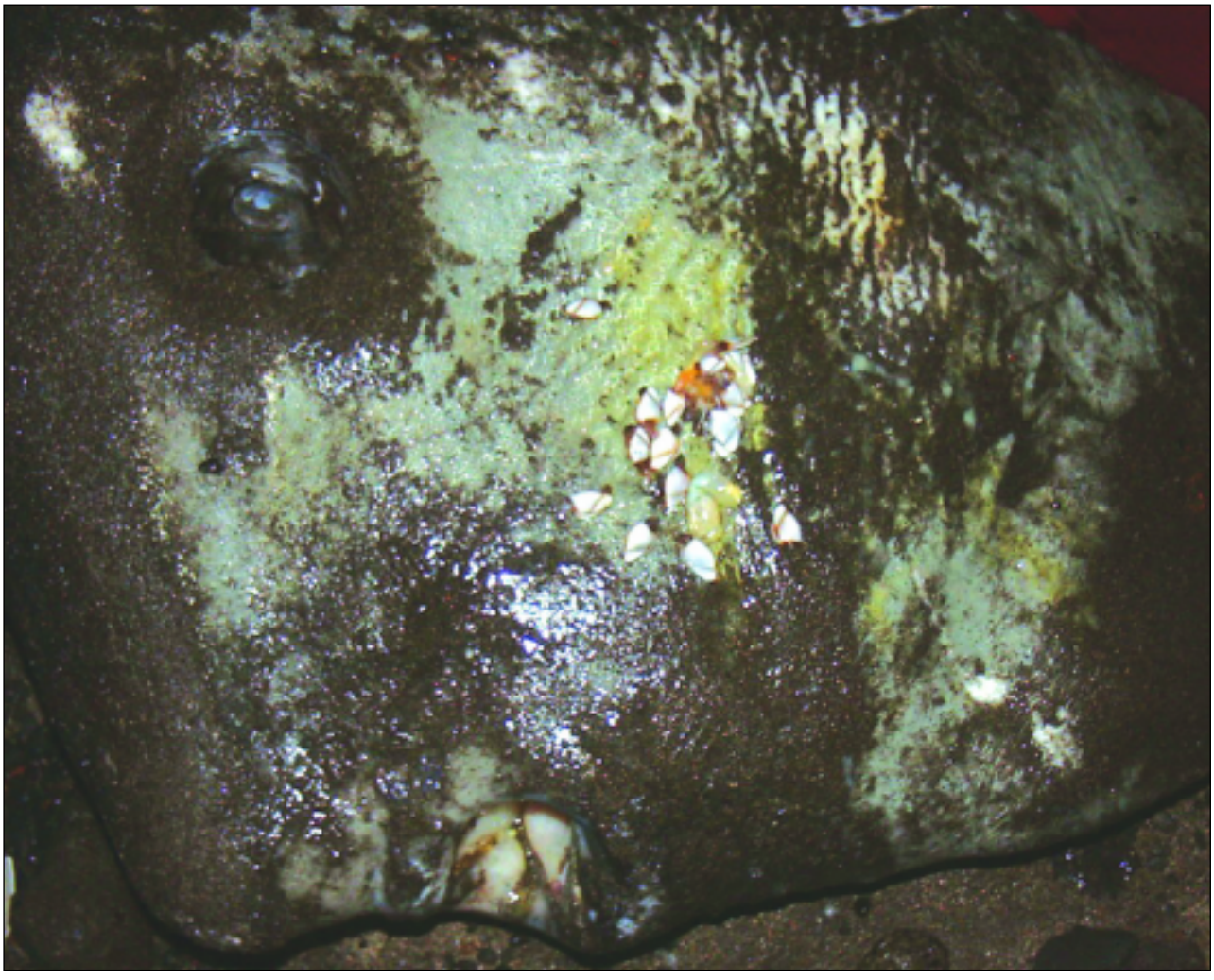

Fig. 1. The stranded *Mola mola* from Porto Judeu (Terceira Island, Azores) showing some of the *Lepas anatifera* specimens after removal from its esophagus. Photo by J. P. Barreiros.

Fig. 2. The mouth of the stranded *Mola mola* showing a *Lepas anatifera* still attached inside. Photo by J. P. Barreiros

The totally harmless sunfish *Mola mola*, one of the most unusual of marine fishes. Photo by Ralf Kiefner taken near the Azores. Courtesy of aqua geõgraphia Vol. 22.

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