STOWAWAYS - MARINE LEECHES INFECTING OLIVE RIDLEY SEA TURTLES ENTANGLED IN GHOST NETS

OLIVE RIDLEY PROJECT
Registered Charity in the UK #1165905

Stephanie Köhnk[1,2], Claire Petros[1], Claire Lomas[1], Enas Mohamed Riyad[3] and Martin Stelfox[1,4]
[1]Olive Ridley Project, Dane Close, Bramhall, Stockport, Cheshire, SK73LF UK, [2]Center of Natural History, Hamburg, Germany, [3]Environmental Protection Agency, Malé, Republic of Maldives,
[4]Aquatic Research Facility, Environment Sustainability Research Centr, College of Life and Natural Sciences, University of Derby, UK

OLIVE RIDLEY PROJECT
Registered Charity in the UK #1165905

Introduction

Sea turtles are known to host a wide variety of other organisms, including epibionts such as barnacles, and internal and external parasites. One example for external parasites are sangivorous leeches of the genus *Ozobranchus* Quatrefages, 1852. These are mostly found on the softer skin areas of turtles, such as the cloaca, skin folds in joint areas and corners of eyes and mouth. Infection with the parasite can lead to further complications, such as sea turtle leech erosion disease (Bunkley-Williams et al. 2008). Additionally, ozobranchid leeches are a potential candidate for a mechanical vector of the tumour inducing fipropapilloma-associated turtle herpesvirus (Greenblatt et al. 2004).
Even though ozobranchid leeches have been recorded in all major ocean basins, records from the Indian Ocean are still scarce. In this study we present the first record of ozobranchid leeches found in the Maldives and highlight the unusual circumstances of their discovery.

Turtle Patients

Between 2017 and 2020 three olive ridley turtles *Lepidochelys olivacea* (Eschholtz, 1829) treated at the ORP Marine Rescue Centre were found to carry marine leeches. All turtles were found between end of December and beginning of January during the Northeast monsoon season.

Fig. 1: A ghost net found in Lhaviyani Atoll, Maldives. Entangled marine megafauna includes sharks and various olive ridley turtles. Photo: Mohamed Solah, Hurawalhi.

The infected turtles included a male, a female and a juvenile specimen. All three turtles were either found entangled in a ghost net (fig. 1) or floating on the surface with injuries indicating previous ghost net entanglement (Fig. 2).

Olive ridley turtles are not common in the Maldives, but the species is well known from the Indian Ocean. The species is famous for mass synchronized nesting on certain beaches around the world, for example on the eastern coast of India in Odisha in the Bay of Bengal.

Fig. 2: Posterior ventral side of an adult male olive ridley turtle with adult leeches (black arrow heads) as well as egg cocoons (white arrow heads) attached to the plastron, carapace, skin folds and cloaca.

Recorded Sangivorous Parasites

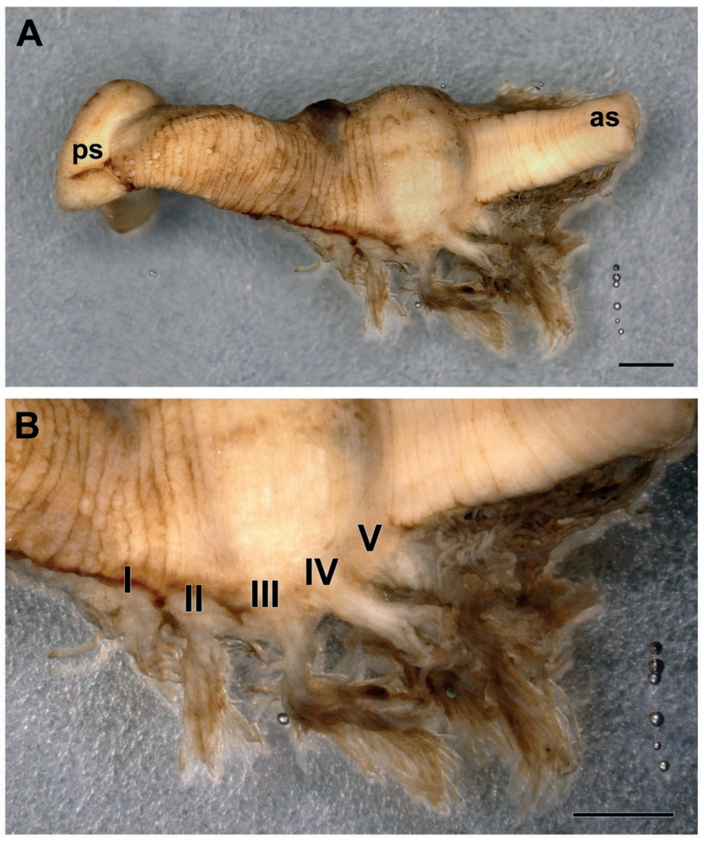

Fig. 3: *Ozobranchus margoi* collected from an olive ridley turtle found in Baa Atoll. (A) Dorsal view of the specimen indicating the anteior (as) and posterior sucker (ps). (B) Detailed view of the gills typical for the species. Paired gills labeled I-V from posterior to anterior on the right side of the body. Scale bar: 1 mm.

The infected turtles carried up to 50 leech specimen predominantely on the posterior part of the body.

Morphologically all complete specimens are clearly identifiable as *Ozobranchus margoi* (Apathy, 1890) through the presence of five pairs of branching gills on the abdomen (Fig. 3). Genetic barcoding with cytochrome c oxidase subunit I confirmed the species (Fig. 4).

Entangled turtles are most likely from Indian or Sri Lankan populations (Stelfox et al., *in prep.*), while turtles native to the Maldives have not been documented to carry the parasites. Here we are showing the possible introduction of new parasites through artifical human-induced relocation of sea turtles.

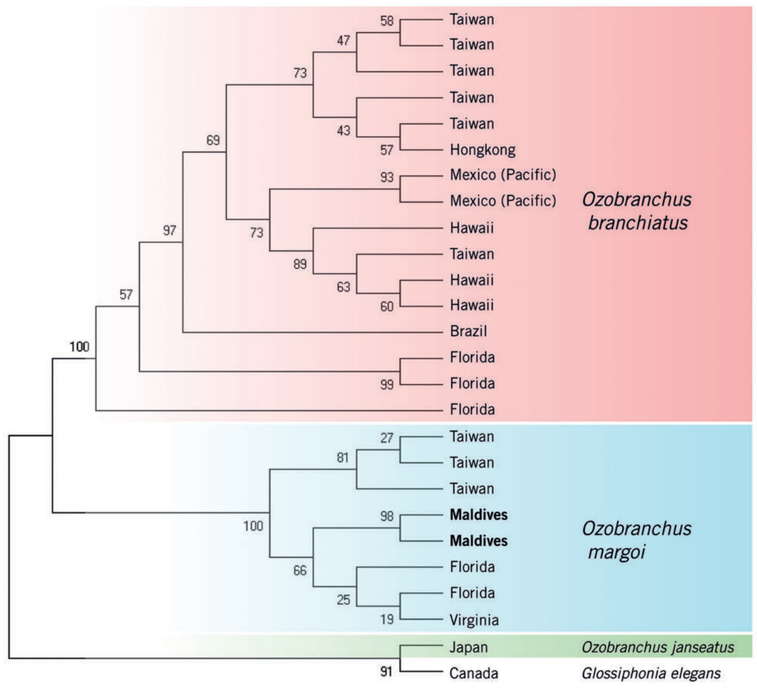

Fig. 4: Maximum-Likelihood tree of CO-I sequences of the genus *Ozobranchus*. Maldivian specimens obtained during this study. *Glossiphonia elegans* is used as an outgroup from another family within the Rhynchobdellida. Bootstrap values shown on the intersections.

For the future we suggest a systematic study of symbionts of various turtle populations in Indian Ocean to create a baseline dataset. This would allow us to a) create a framework for population assignment by proxy and b) better evaluate the influence of artificial relocation.

References:
Bunkley-Williams L, Williams EH, Horrocks JA, Horta HC, Mignucci-Giannoni AA, Poponi AC 2008. New Leeches and Diseases for the Hawksbill Sea Turtle and the West Indies. Comparative Parasitology 75: 263-270.
Greenblatt RJ, Work TM, Balasz GH, Sutton CA, Casey RN, Casey JW 2004. The *Ozobranchus* leech is a candidate mechanical vector for the fibropapilloma-associated turtle herpesvirus found latently infecting skin tumors on Hawaiian green turtles (*Chelonia mydas*). Virology 321: 101-110.

Acknowledgements:
We would like to thank our partners at Coco Palm Dhuni Kolhu for continuing support for the ORP rescue centre. Additional thanks to all rescuers who discovered and helped rescue entangled turtles: CPDK, Finolhu Resort and Soneva Fushi, Baa Atoll. SK would like to thank Prodivers Maldives for continued support especially with logistics.

Corresponding author: Stephanie Köhnk, stephanie@oliveridleyproject.org