



The ECOSPHERE research group aims to study aquatic and valley ecosystems that are continuously challenged by natural and anthropogenic stressors. The research focuses on acquiring fundamental and applied knowledge at different levels of structural and functional organisation in order to underpin environmental management decisions.

MASTER THESIS SUBJECT 2023

Characterisation of new primers for GLUTs, MCTs, and GRs for blacktip reef sharks (*Carcharhinus melanopterus*)

Research group: ECOSPHERE

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A juvenile blacktip reef shark (Carcharhinus melanopterus), the study species of this MSc project.

- This topic mostly contains literature study, lab work, field work, experimental work, GIS, numerical modelling, other:
- Possession of driver's license B is needed, recommended, not needed
- Possession of certificates needed: FELASA C, other:



Summary

Over the last half century, blacktip reef sharks (*Carcharhinus melanopterus*) have experienced global declines of up to 70% and almost half of the world's coral reefs have now been depleted of this charismatic species. The coastal habitats that these reef sharks inhabit are easily accessible from the land making reef shark populations vulnerable to exploitation by fisheries, activities associated with coastal development result in habitat alterations, degradation or loss, and terrestrial runoff leads to increased pollution and degraded water quality. The many human stressors encountered by reef sharks throughout their lives therefore warrant a detailed investigation into their physiological responses to stress, especially considering that many of these stressors will increase both in frequency and severity over the coming decades. However, directed studies on the physiological stress response in sharks are rare, even though a profound knowledge of the stress response in sharks is pivotal to inform and refine future conservation efforts.

A key research gap that requires particular attention are the effects of long-term, sustained (chronic) stress on the energy balance of sharks. In this master's project, you will design new primers for glucose transporters (GLUT), monocarboxylate transporters (MCT), and glucocorticoid receptors (GR) for blacktip reef sharks. These primers will prove crucial for future research on gene expression and the extent of metabolic costs in relation to glucocorticoid levels, which may lead to a suite of possible biomarkers to be added to the physiological toolbox for shark conservation.

You will first look for evolutionary conserved regions in gene sequences across shark species. Based on these previously published nucleotide sequences, you will run reverse transcription-polymerase chain reactions (RT-PCR) with the selected primers on isolated RNA from white muscle and liver tissue of blacktip reef sharks. Finally, you will separate the PCR products via gel electrophoresis to identify optimal sets of primers for these genes for *C. melanopterus*.

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