



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

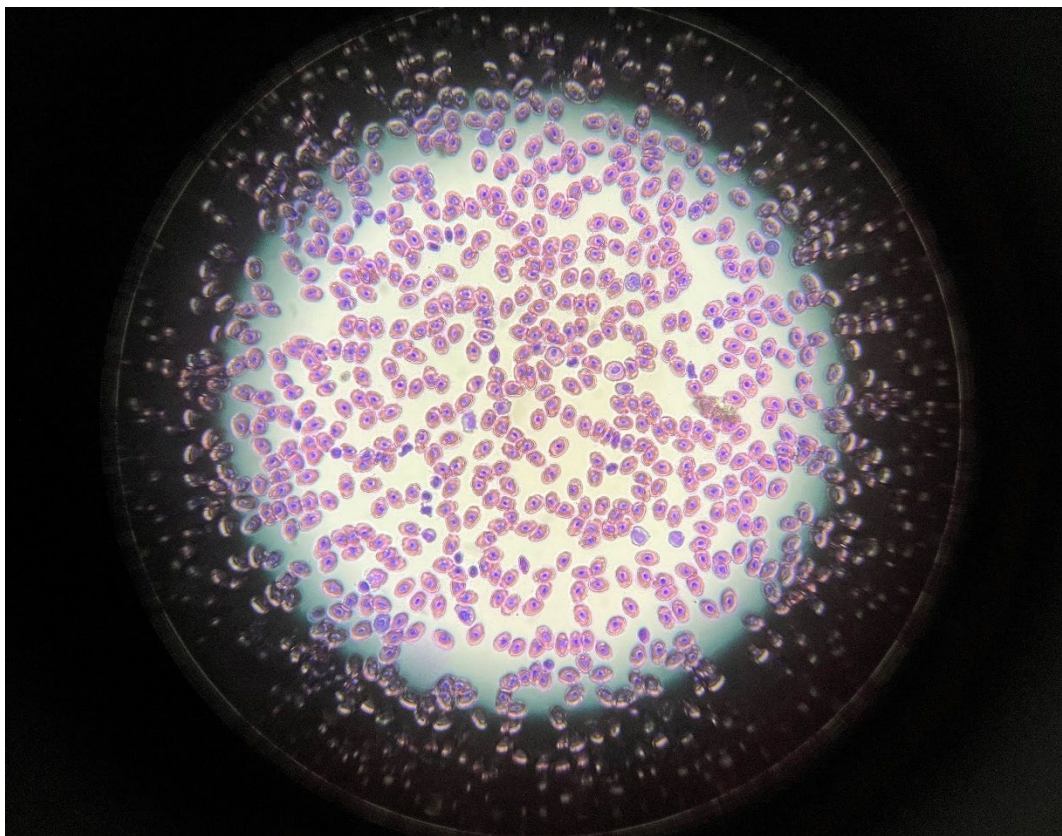
Development of an ImageJ macro tool for differential blood cell counts to assess stress-induced immunosuppression in sharks

Research group: ECOSPHERE

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Stained blood cells of a blacktip reef shark (Carcharhinus melanopterus) in a Giemsa-Wright smear.

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



Summary

More than one-third of all shark species are currently threatened with global extinction due to anthropogenic activities and associated stressors. Because sharks encounter so many anthropogenic and environmental stressors throughout their lives, a detailed investigation into their physiological response to stress is crucial, 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 anthropogenic and environmental stressors on the immune system of sharks. Although poorly studied in elasmobranch fishes, high levels of circulating corticosteroids may modulate the immune response. Indeed, stress can suppress the immune system in teleost fishes as a result of the energetic costs needed to restore homeostasis. However, the tertiary effects of stress have yet to be explored in sharks.

In this master's project, you will develop and validate a macro tool in ImageJ to automatically differentiate leukocytes of blacktip reef sharks (*Carcharhinus melanopterus*) in peripheral blood smears. You will collect images of Giemsa-Wright stained smears through a microscopy camera and make manual leukocyte counts as input for and validation of the macro tool. Finally, you will use leukocyte ratios to assess potentially negative effects of long-term, sustained (chronic) stress on the immune system of the sharks. Most work will be done indoors behind a microscope or behind the computer. Computer work can be done from home if desired. A sense for detail and perseverance is recommended.

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