

Investigating the effect of fish armor morphology on hydrodynamics and biomechanics of fish.

Background: Armor has evolved many times in fishes and is found in 30 different families today. It is multifunctional, acting as a protective barrier against biotic (e.g. predators) and abiotic (e.g. abrasion) factors, a signal of a quality mate, an agent of camouflage, and even as an energy storage system. The family Agonidae (poachers) includes 46 species of fishes with bony armor covering their bodies. In poachers, armor is morphologically diverse, making them an excellent model family to study the function of different types of armor. Poachers are found in habitats as diverse as their armor, and each environment brings an assortment of predators and locomotory challenges requiring an armor that can serve multiple functions in response to varying demands.



Proposal: We propose to determine whether poacher armor aids in locomotion either through drag reduction hydrodynamics and/or by returning energy stored during bending. We will examine the morphology of poacher armor to (1) describe how it varies across the family and the ecosystems inhabited by each species and (2) quantify the effect of morphology on hydrodynamics during station-holding and locomotion.

Undergraduates: For this project we CT scanned 45 different species of Agonidae, this resulted in a large dataset of micro-CT data that needs to be analyzed. We are looking for undergraduate volunteers interested in learning about CT scanning and the use of CT scans to help process the data. Your job would involve segmenting out armor and quantifying armor morphometrics from CT scans in 3D Slicer. There is an opportunity to evolve your own research project and/or gain credit for your work.