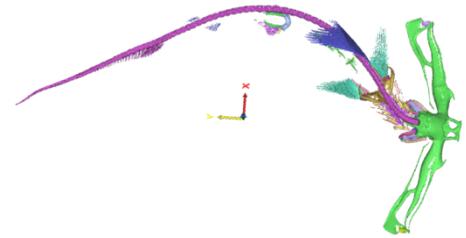


Evolution of Head Size in Hammerhead Sharks

Summer research addresses opposing hypotheses

Two opposing hypotheses exist regarding the evolution of the hammerhead sharks, family *Sphyrnidae*. One hypothesis, based on anatomy, suggests that the head widened over time, indicating advantages to the hammer-like head. The other hypothesis, based on molecular data, suggests that the head dramatically widened early in evolutionary history and has since been decreasing in width. This theory would suggest that the wide head is actually a disadvantage. This study may shed some light on the flaws of the current methods that are used to trace evolutionary history. It is also important from an ecological perspective to know if endangered hammerheads are adapted to play a specific role in the marine environment.



An example of a digital 3-D model segmented by Jasmin Graham.

Species: *Eusphyra blochii*

Jasmin Graham, a student at the College of Charleston has been investigating the evolutionary history of these strange sharks this summer. Graham is involved in the National Science Foundation's (NSF) Research Experience for Undergraduates (REU) program at the College of Charleston. The program is a 10 week internship in which students from across the country are matched with a mentor's lab and conduct research throughout the summer. Graham is the only CofC undergraduate involved in this REU Program, which is one of about 30 sites in the United States that focus on ocean and marine sciences.

Graham's mentor, Dr. Gavin Naylor, professor at the College, is researching shark anatomy through the use of CT scanning and 3-D modeling. "We still don't fully understand how organisms evolve new features. Traditional views hold that most evolutionary change is incremental. There is evidence that some features arise suddenly rather than incrementally," Dr. Naylor explains. The implication that some features can change as dramatically and quickly as the molecular data suggests could change the way scientists understand evolutionary change.

Under the tutelage of Callie Crawford, a graduate student in the Marine Biology program, Graham learned how to segment CT scans of sharks to create a virtual 3-D model by which to compare the anatomy and morphology of hammerheads. By comparing 42 anatomical characteristics Graham hopes to trace the evolutionary history of the family to determine whether or not the wide head is an advantage that the sharks are continuing to evolve or a disadvantage that evolution is selecting against. The team hopes to contribute data to the head size debate by determining whether non-cranial characteristics agree more with one hypothesis or the other.



Graham segmenting CT scans.

Photo credit: Bob Podolsky

About the REU: <https://www.youtube.com/watch?v=9silEToQ5yY> ; <http://reu.cofc.edu/>

About the Naylor lab: <http://prosper.cofc.edu/~sharkevolution/> ; <http://www.sharksrays.org>