

201 • Matthew K. Gaylord¹, Glenn R. Parsons²

Functional Morphology of the Hammerhead Shark Cephalofoil: An Assessment of the Hydrodynamic Lift Hypothesis Using Computational Fluid Dynamics

The hammerhead sharks (Family: Sphyrnidae) are all characterized by head morphologies that are strongly expanded laterally and dorsoventrally flattened. Many theories have been proposed regarding the functional aspects of this structure (termed the cephalofoil). One of these is that it may produce dynamic lift in similar fashion to a cambered wing, aiding them (like the swim bladder of bony fishes) in maintaining vertical station in the water column. Shark specimens were obtained from a variety of sources including fishing tournaments, private fishermen, commercial fishing vessels, and museum collections. Plaster head models were cast of each species. These physical models were digitized using a Faro-Arm laser scanner, and the resulting data were imported using Geomagic Studio 10 software at Mississippi State University (MSU). Unsteady, 2nd-order Navier-Stokes solutions were computed using the U²NCLE unstructured flow solver (a parallel flow simulation code developed at MSU which solves the Unsteady Reynolds-Averaged Navier-Stokes equations) to model the surrounding flow field and associated forces. A family-wide computational fluid dynamic (CFD) analysis was performed from laser-digitized head morphologies to quantify lift and drag forces. Carcharhinid species were included for comparison. The cephalofoil appears to produce substantial lift forces only when at some angle of incidence to the flow. Species with this head morphology, meanwhile, appear to be characterized by greater drag than their carcharhinid counterparts. The ecophysiological implications of our results are integrated with knowledge from previous studies and new hypotheses are formulated from the resulting conclusions.

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202 • Richard Carter

Digitization of the Valdosta State University Herbarium

The Valdosta State University [VSU] Herbarium comprises more than 65,000 dried plant specimens used in research and teaching. It is the second largest herbarium in Georgia and is a rich repository of data emphasizing the flora of the coastal plain region of Georgia and, more generally, the flora of the southeastern United States. The VSU Herbarium has extensive holdings of sedges (Cyperaceae) and other graminoid families and bryophytes. In 2011, the National Science Foundation funded a three-year project to support digitization and general enhancement of the collection. Subsequently, more than 65,000 specimens have been imaged, and label data from more than 60,000 specimens have been digitized. General enhancement has included purchase of additional herbarium cabinets, replacement of worn seals in old cabinets, replacement of old genus folders with geographically color-coded archival folders, and processing of a large backlog of specimens. Much of this effort has been accomplished by undergraduate student assistants, and through this project eleven students have been trained in basic herbarium curation and digitization methods. It is anticipated that this project will be completed by the close of 2014, and current efforts have shifted toward processing of the specimen backlog and georeferencing.

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203 • Michael O. Holt¹, Richard Carter²

The Valdosta State University Virtual Herbarium

Collaboration between the Odum Library and the herbarium of Valdosta State University has produced a web interface to serve herbarium specimen data and images on-line. Source code, generously provided by the R.K. Godfrey Herbarium of Florida State University, was adapted to fit the schema of the Specify 6.5 database used by the VSU Herbarium. The source code is written in php and MySQL, with some Javascript

components. Through the Valdosta State University Virtual Herbarium web interface, users can query to retrieve specimen images and data, distributional maps, and customizable reports. Password protection and redaction of label data on images restrict sensitive locality information for rare, threatened and endangered species to authorized users. The Valdosta State University Virtual Herbarium source code adapted for use with Specify 6.5 is available at no cost to interested parties.

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204 • Phillip D. Lowe, Richard Carter

Two Birds With One Stone: Using Excel and Mail Merge to Create Herbarium Specimen Labels in Word and Populate a Specify Database

We describe a method that uses Microsoft Excel to pivot between Microsoft Word and Specify 6. Field data are digitized from the field notebook into a formatted Excel document, then the Mail Merge feature of Word is used to format the digitized field data to produce customized herbarium specimen labels. Once the labels have been generated, the specimens mounted, and their barcode labels attached, the barcode catalog numbers are scanned into the designated field in the Excel spreadsheet, providing the unique identifier required by the Specify database for each specimen. Subsequently, the data in the Excel spreadsheet are uploaded to the database through the Specify 6 Workbench. This system is flexible, efficient, and easy to use. It allows for customized formatting of herbarium specimen labels and eliminates keystroking of data into the database. This work was made possible through the support of the National Science Foundation (DBI 1054366, J.R. Carter, PI).

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205 • Anna K. Monfils¹, Gil Nelson²

Recruiting and Retaining Small Natural History Collections in the National Digitization Initiative

Small natural history collections constitute a major source of information for understanding North America's biodiversity. Typically regional in scope with strong ecological, taxonomic, and geographic biases, they frequently hold specimens that are unduplicated in larger collections and represent intense samplings of community composition that have the potential to significantly expand our knowledge of landscape-level biogeography. As a result, they are singularly important to the study of regional and continental biodiversity. Digitizing these collections will expand accessibility to their holdings, enhance the impact of the data they generate, and ensure incorporation of these data in ongoing biological and paleobiological research. This session will highlight the work of iDigBio, the North American Network of Small Herbaria (NANSH), the NANSH Working Group, and the newly established Small Collections Network (SCNet). Preliminary results from a recent survey, information about an upcoming Small Collection Symposium at SPNHC 2014 in Cardiff, Wales, and a small herbarium digitization workshop to be held in conjunction with Botany 2014 in Boise, ID will also be included

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206 • Peter Schafran, Joe Keenan, Marcus Jones, Jay Bolin, Lytton Musselman

Germination and Development of Hazel Dodder *Cuscuta coryli* (Convolvulaceae)

Hazel dodder is one of the rarest native *Cuscuta* species in the Southeast and little is known of its floral and germination biology. It is readily distinguished from other dodder species by its 4-merous flowers and papillate surface. The only other species with a papillate surface is *C. indecora*, a species with 5-merous flowers and found chiefly in coastal marshes. Seeds of *C. coryli* were collected in Rowan County, North Carolina from *Solidago* and *Aster* hosts, cleaned, and scarified using sand paper, then germinated on sand in petri plates in the dark at 20.5 degrees Celsius. Over twenty days the scarified seeds germinated at a rate of 23.5%. Dodder germination yields a hook-shaped epicotyl.