Joint Department of

BIOMEDICAL ENGINEERING

UNC CHAPEL HILL   NC STATE UNIVERSITY

Coulter Seminar Series Presents

"Molecules in the Rock Record"

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Professor
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Mary Schweitzer holds a BS in Communicative Disorders from Utah State University, as well as a PhD in Biology from Montana State University. Dr. Schweitzer has been a Professor in the Department of Biological Sciences at NC State University since 2015. Prior to this appointment, she has been with the Marine, Earth & Atmospheric Sciences Department at NC State, the NC State Museum of Natural Sciences, and Montana State University.

Dr. Schweitzer's love of paleontology stems from her brother's gifts of *Roy Chapman Andrews and the Dinosaurs of the Flaming Cliffs* and *The Enormous Egg*. She is fascinated by what makes animals survive and thrive in their worlds, and the interplay of inherent—and inherited—biology, with the world they inhabit. All of this is contained in the molecules (the DNA and proteins) of living animals, and the molecules of ancient animals would hold the same information. But after 65 million years, what is left? And how do we decipher it? How are molecules changed from the living state? What survives, and how can we recover it? How do animals transition from being part of a living ecosystem to being part of the rock record? That, and the technologies that allow us to answer those questions are the focus of her research interests.

ABSTRACT

Molecular investigations of extant organisms have transformed our understanding of evolutionary biology. DNA and protein sequence data have been used to test hypotheses of evolutionary relationships, paleobiogeographic trends, rates of molecular change, population mixing, and timing of dispersals. Molecular data have provided insight into population bottlenecks, been used to identify species at risk for extinction, and shed light on species origins, radiations, and extinctions, as well as organismal response to climate change at the molecular level.

There is no doubt that molecular remnants persisting into deep time in exceptionally preserved fossils will expand our understanding of the tree of life, evolutionary processes, and selective forces acting to equip organisms to changing environments. But equally important is the influence preserved molecular information will have on our ability to make predictions about the world we inherit. All predictions about the future must rely on data from the past---data only available in the rock record. However, many factors have constrained our use of molecular data from fossils in deep time. Technological limitations, limits to databases of extant organisms on which paleoproteomics must rely, and untested assumptions about the preservation potential of molecules are just a few of the factors affecting the usability of molecular information retained in fossils. Here, I suggest criteria for acceptance of endogeneity of molecules recovered from fossils, address methodological limits, environmental factors affecting preservation, and finally, present case studies that illustrate the potential of molecular studies using fossil remains of extinct organisms.

Friday, April 13th
12:00 Noon

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& East Carolina University (ECU)