Department of Geology Seminar Series
Presents

Dr. Melissa Grey

Curator of Palaeontology
Joggins Fossil Institute

Digesting the Late Carboniferous: using fish coprolites to reconstruct the aquatic paleoecosystem of the Joggins Formation, Nova Scotia, Canada

WEDNESDAY, OCTOBER 2 · 11:30am
Science 411

Everyone is welcome to attend!

SAINT MARY'S UNIVERSITY SINCE 1802 | GEOLOGY
FACULTY OF SCIENCE

Dr. Melissa Grey, Curator of Palaeontology, Joggins Fossil Institute

Title: *Digesting the Late Carboniferous: using fish coprolites to reconstruct the aquatic paleoecosystem of the Joggins Formation, Nova Scotia, Canada*

Abstract

Coprolites (fossilized feces) preserve the diets of the animals that produce them and therefore can provide valuable insights into paleoenvironments and paleoecosystems. Coprolites are abundant in the limestones throughout the Joggins Fossil Cliffs UNESCO World Heritage Site and are used, along with what is already known from body fossils, to reconstruct the Late Carboniferous food web of this estuarine environment. The host rock (limestones), abundance, and content of the coprolites indicate that the majority of the Joggins Formation coprolites originate from fish. Specimens were studied in hand sample and with standard transmitted-light microscopy in order to classify the morphology of the coprolites (e.g., large, spiral, cylindrical, irregular, conical, or small/equant) and determine their contents. This enabled the creation of a hypothetical trophic pyramid with rhizodonts at the apex producing the largest coprolites, and smaller fish species, such as haplolepids, responsible for the small/equant-shaped coprolites at the secondary consumer level. Energy Dispersive X-Ray Spectroscopy (EDS) will be used in conjunction with scanning electron microscopy (SEM) to test our hypothesis that coprolites from different trophic levels will have dissimilar elemental compositions because of dietary differences. Preliminary results on ten samples of various morphotypes/hypothesized trophic levels indicate that there are elemental differences, supporting our hypothesis. Small/equant coprolites exhibit enrichment primarily with respect to barite along with some pyrite and one sample with minor zinc sulphide. Cylindrical, irregular, spiral and conical coprolites tend to contain pyrite and zinc sulphide with minimal barite. The single large coprolite analyzed contained only barite. Further EDS analysis on additional samples (particularly small/equant and large morphotypes) is required to validate whether these elemental discrepancies are indeed the result of different diets and can therefore be related to trophic level.

Biography

Dr. Melissa Grey is a palaeobiologist with a BScH in Biology (Acadia University, 1999), MSc in Zoology (University of Guelph, 2001) and PhD in Geological Sciences (University of British Columbia, 2009). She is the Curator of Palaeontology/Director of Science at the Joggins Fossil Institute, the organization that manages the Joggins Fossil Cliffs UNESCO World Heritage Site. Melissa enjoys travelling, hiking and camping (especially with her husband and dog), biking, soccer, and consuming fabulous food and drink!