

New insights into a brackish Carboniferous ecosystem through the coprolites of the Joggins Formation, Nova Scotia, Canada*

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The cliffs at the UNESCO World Heritage Site in Joggins (Nova Scotia) hold a wealth of fossils, both terrestrial and aquatic, from the Late Carboniferous Period. Fossils from the aquatic realm have historically been understudied and the ecosystem they represent is poorly understood at Joggins. Examination of fish coprolites that are abundant in the limestones of the Joggins Formation has broadened our understanding of the aquatic ecology, specifically the food web. Coprolites preserve undigested material that give us a window into the diets of these fish and provide important information on species interactions within the ecosystem. The coprolites (N = 74) have been studied in thin section and hand sample, as well as cathodoluminescence to determine the contents. We found that specimens could be divided into six categories based on size and shape: cigar/cylindrical shaped; cone shaped; small/equant; spiral; irregular; and massive (samples greater than 5 cm in length). The small coprolites are the most abundant and the massive coprolites are the rarest. They range in size from <1 cm to >10 cm and are 2–3 cm on average. The mineralogy of the coprolites is high calcium phosphate, similar to the composition of bone. This suggests that the fish producing these coprolites were carnivorous and that there is a lack of vertebrate herbivores present, supporting previous findings of possible soft bodied invertebrates as the dominant herbivores. Bone fragments have been found in almost all samples, however specific species identification has thus far been impossible. This research provides both a foundation for further studies on coprolites and similar fossils and a deeper understanding of aquatic ecosystems as fish diversified further into fresh water in the Palaeozoic. Future work will include species specific identification of undigested bone material, strata specific coprolite analysis and possibly dissolution of the coprolites to study the undigested material directly.

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