

Age of the Power Glen Formation

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Goal:

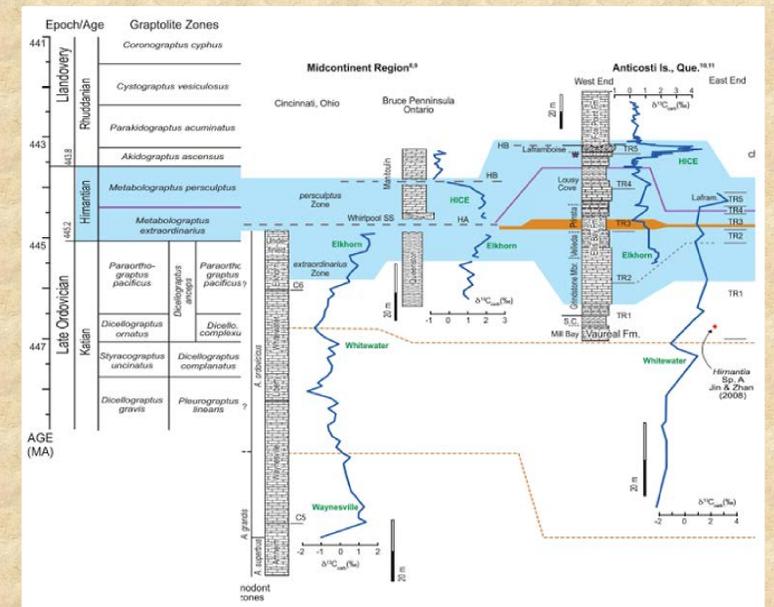
The goal of this project is to use fossils to refine the age of a set of ancient rock layers that are exposed in the Niagara Gorge. I intend to test an alternate age assigned of the Power Glen Formation by Bergström et al. (2011) based on their study of the laterally equivalent Whirlpool Sandstone and the Manitoulin Formation in Ontario.

SYSTEM	CHRONOSTRATIGRAPHICAL UNITS			MANITOULIN ISLAND	BRUCE PENINSULA
	Global	Classic N. Am.	GLOBAL STAGE	LITHOSTRATIGRAPHIC UNITS	
				FOSSIL HILL	FOSSIL HILL
SILURIAN	LLANDOVERY	ALEXANDRIAN	Aeronian	ST. EDMUND	ST. EDMUND
				WINGFIELD	WINGFIELD
				DYER BAY	DYER BAY
				CABOT HEAD	CABOT HEAD
				MANITOULIN	MANITOULIN WHIRLPOOL
ORDOVICIAN	U. ORDOVICIAN	CINCINNATIAN	Kat. Hirnantian	GEORGIAN BAY	QUEENSTON

Ontario succession studied by Bergström et al. 2011

Materials needed to do this:

- Hydrochloric (HC) and hydrofluoric (HF) acid
- 125, 75, & 41 micrometer (μm) sieve material
- 3 inch PCV pipes to support the sieve material
- sample holders
- microscope
- paint brush



Regional correlation of fossil zones and rock strata in the study interval of New York State and Ontario. Blue band is the glacial interval (from Melchin et al. 2013).

What next?

Right now we have found some fossilized chitozoans in certain samples and currently gathering and isolating them into sample holders. Dr. Mitchell and I are planning on heading to the Canadian side with a colleague of his to collect more samples. Achieving permission to use the SEM machine at south campus to collect surface topography and composition of these fossils is also on the to do list.



Works cited:

Bergström, Stig M., Mark Kleffner, Birger Schmitz, Bradley D. Cramer, and George Dix. "Revision of the Position of the Ordovician-Silurian Boundary in Southern Ontario: Regional Chronostratigraphic Implications of 13C Chemostratigraphy of the Manitoulin Formation and Associated Strata." *Canadian Journal of Earth Sciences* 48.11 (2011): 1447-470. Print.

Melchin, Michael J., Charles E. Mitchell, Chris Holmden, and Petr Štorch. "Environmental Changes in the Late Ordovician–Early Silurian: Review and New Insights from Black Shales and Nitrogen Isotopes." *Canadian Journal of Earth Sciences* 48.11 (2013): 1447-470. Print.



Niagara Gorge



chitinozoans

Method:

August of last year Dr. Mitchell, graduate student Richard Frieman and I went to Niagara Gorge to collect nine samples from a ten meter-thick interval in the basal most Power Glenn Formation. We then soak ~ 20 gram samples in HCl to remove most of the carbonate portion of the shales. After sieving with 125 and 75 mm sieves, we bathe the residue in HF, and wash the final residue using a 41 mm sieve to further concentrate the chitozoans. I then use a microscope and paintbrush to separate these fossilized pollen spores and store them for later study by scanning electron microscope (SEM).

Leads:

Bergstrom et al. (2011) suggested that these rock strata to belonged to the Late Ordovician portion of the Earth's history, roughly 445.2 to 443.8 million years ago. That interval included an episode of major glaciation and was also a time of mass extinction (Melchin et al., 2013). Prior to their work, these rocks and their local equivalents (the Whirlpool Sandstone and Power Glen Shale) had long been considered to be somewhat younger, approximately 442 Ma, within the early Silurian (Brett et al., 1995), after the glaciation had ended. I will use minute organic-walled microfossils (chitinozoan) to re-assess the age of the strata.