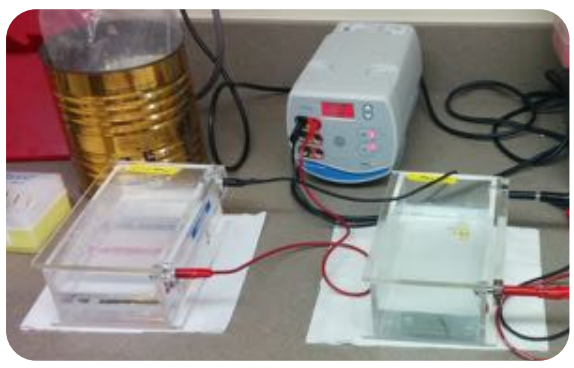
DNA Barcoding of The E.C. Smith Herbarium's G.J. Boland Fungal Collection

Alex Young, Dr. Rodger C. Evans, Ruth Newell, Dr. Allison K. Walker
Department of Biology, Acadia University, Wolfville, Nova Scotia

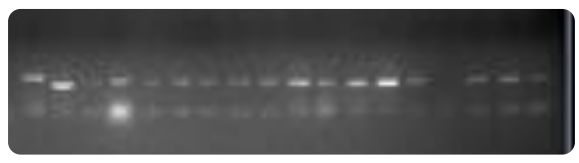
The recent development of a universal DNA barcode for all fungi has provided investigators with the necessary tools to contribute to the GenBank DNA sequence reference database. However, fungi remain underrepresented and the majority do not have a publically accessible barcode sequence. Millions of fungal specimens exist in herbaria around the world, and these specimens provide an untapped wealth of fungal biodiversity information. The Boland collection represents a fungal biodiversity survey conducted by Acadia student Gregory Boland in 1975 in the saltmarshes of the Minas Basin, Nova Scotia.

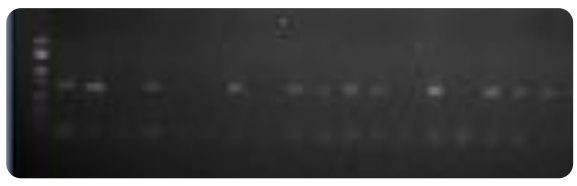
The major goals of this research are: (1) Development of a novel protocol that will provide a base on which Acadia's entire fungal collection (~20,000 specimens) may be sequenced;(2) Expansion of the number of DNA barcode sequences present in GenBank which will allow anyone to much more easily identify fungal samples. (3) Use all sequence data to reconstruct the fungal biodiversity of the Minas Basin as it was in 1975, to allow comparison with current coastal fungal communities.

DNA Extraction
Much of the DNA contained within the specimens may be degraded during the long-term storage preparation process. Development of a reliable protocol is key to extracting the miniscule quantities of DNA which remain.



DNA Amplification
After DNA is successfully extracted, the DNA barcode must be amplified via PCR and visualized on an agarose gel. Developing a protocol for amplifying the DNA region of interest has posed the second major challenge of this project.





Sequence Analysis
After the DNA barcode has been obtained, it can be used to genetically confirm or correct the identities of the specimens.

Future Directions
Improving our knowledge of the Boland collection will provide a more accurate representation of the fungal diversity in the Minas Basin in 1975. This information will complement future biodiversity studies in the Bay of Fundy region and allow us to investigate changes over time in these enigmatic, ecologically relevant saprotrophic communities.

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ACADIA UNIVERSITY

NOVA SCOTIA

E. C. SMITH HERBARIUM
ACADIA UNIVERSITY, WOLFVILLE, NS

For additional information, contact: 109717y@acadiau.ca