

## Current Research

Volume 4, Number 2, August 1968

URI: [https://id.erudit.org/iderudit/ageo04\\_2res01](https://id.erudit.org/iderudit/ageo04_2res01)

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### Publisher(s)

Maritime Sediments Editorial Board

### ISSN

0843-5561 (print)

1718-7885 (digital)

[Explore this journal](#)

### Cite this document

(1968). Current Research. *Atlantic Geology*, 4(2), 74–77.

## Current Research

### Opportunities for graduate geology studies at Memorial University of Newfoundland, St. John's, Nfld.

The staff of the geology department of Memorial University includes the following ten instructors, four technical and two administrative support personnel. Together they combine many years of teaching experience with a variety of related experience in earth science research with government and industry.

E. R. W. Neale, Ph. D. (Yale) FRSC	Professor and Head
W. D. Brueckner, Dr. Phil. (Basle)	J. P. Howley Professor
M. M. Anderson, B. Sc. (Wales)	Visiting Professor
R. D. Hughes, Ph. D. (Oklahoma)	Associate Professor
V. S. Papezik, Ph. D. (McGill)	Associate Professor
H. Williams, Ph. D. (Toronto)	Associate Professor
C. J. Hughes, D. Phil. (Oxon.)	Assistant Professor
M. J. Kennedy, Ph. D. (Dublin)	Assistant Professor
A. King, Ph. D. (Reading)	Assistant Professor
W. G. Smitheringale, Ph. D. (M. I. T.)	Assistant Professor
(Mrs.) R. Andrews, B. Sc. (McGill)	Science Assistant
P. Browne	Geology Administrative Officer
F. Thornhill	Senior Technician
W. Marsh	Technician
A. Morgan	Technician
(Miss) R. Lake	Departmental secretary

Course work and research leading to the M. Sc. and Ph. D. degrees are offered in the Department.

### Facilities

The Department has a geochemistry laboratory, sample preparation equipment, lapidary room, photographic dark room, X-Ray laboratory, drafting room. Equipment includes Philips X-Ray cameras and diffractometer, X-Ray Spectrograph, Perkin-Elmer 303 Atomic Absorption Spectrophotometer, Fisher Differential Thermal Analysis unit. Computer service is available (IBM 1620 and 360 models) through the University Computer Center.

Newfoundland offers the best 'outdoor laboratory' in Eastern Canada with the most complete cross section through the Appalachian System superbly exposed right at Memorial's doorstep. The Precambrian rocks of the Nain and Grenville Provinces and the iron ores of the Labrador Trough are only a few hours by air from St. John's. It is logical that most earth science research at Memorial should have a basis in field work and with this in mind, the Department is building up its supply of camping equipment, boats, motors and vehicles.

The Department works in close cooperation with the very active and well equipped Geophysics Section of the Physics Department. Joint Geology-Geophysics post graduate programs are encouraged.

### Research

There is a consensus in the Department that most of our research endeavour should be directed towards the major earth science problems of the Atlantic region - particularly those of Newfoundland and Labrador. Although restricted regionally, the great variety of local geology allows wide scope for discipline-oriented research in stratigraphy, sedimentology, paleontology, mineralogy, petrology, structure, Pleistocene geology, geophysics, economic geology, and applied geochemistry. In order to focus studies in these disciplines on important problems of the region, several joint projects have been devised which will use a team approach involving several M. U. N. faculty members and graduate students and possibly people from other universities. For example, Phase 1 of a planned study of The Anatomy of the Appalachian Mobile

Belt will involve closely integrated studies of the structure, volcanic petrology, stratigraphy and mineral deposits of the area between White Bay and Green Bay on the north coast of Newfoundland which will involve at least four faculty members from M. U. N., at least two from another university, and up to six or seven graduate students. Among its many other advantages, this approach will permit adequate direction and close supervision of field research undertaken by graduate students.

#### Support of Graduate Studies

National Research Council and Geological Survey of Canada grants and awards are tenable at M. U. N. From these grants to Faculty members, graduate students may obtain financial support of \$250 per month or they may be eligible to receive National Research Council Post-Graduate Scholarships or Bursaries of \$250 to \$300 per month. In addition, Memorial University Graduate Fellowships up to \$3,000 or more per annum are available. The value of these depends both upon the academic qualifications of the student and also upon the amount of demonstrating or technical work done in the department.

E. R. W. Neale, Head.

#### Marine research facilities at Florida State University, Tallahassee, Florida, U.S.A.

A new laboratory beside the sea and acquisition of the 160-foot research vessel Petrel and the 65-foot Tursiops will assist marine scientists from Florida State University in their research. Dr. James Jones and Dr. Robert Harris will both carry out work in marine geology.

#### Postdoctoral Fellowship in Sedimentology, Department of Geology, McMaster University, Hamilton, Ontario.

Applications are invited for a postdoctoral fellowship in sedimentology, available January, 1969 (or later). Applicants should hold a doctorate degree in geology or engineering and be prepared to carry out research in some aspect of clastic sedimentation, preferably experimental studies on sediment transport, formation of sedimentary structures, or flow of turbidity currents. Other types of field and laboratory studies are, however, not excluded.

The purpose of the fellowship, which is funded by National Research Council of Canada, is to encourage studies on sedimentation in the interdisciplinary area between hydraulics, oceanography and geology. The equipment available includes a 20-foot flume for density and turbidity current studies and a 40-foot recirculating flume for open-channel sedimentation studies.

The stipend will be \$6000-7200 p. a. tax free. Applicants should be less than 35 years of age and should send a brief curriculum vitae to:

Dr. Gerard V. Middleton, Department of Geology, McMaster University, Hamilton, Ontario, Canada.

#### Current marine geology projects at the Atlantic Oceanographic Laboratory, Bedford Institute, Dartmouth, Nova Scotia.

These projects were carried out over the Arctic and Atlantic continental shelves and slopes, the Arctic Archipelago, and the major embayments such as Baffin Bay, Hudson Bay, Gulf of St. Lawrence and Bay of Fundy as well as the inshore and estuarine areas of Hudson Bay and the Atlantic Provinces. Parts of the eastern Caribbean Sea and Mid-Atlantic Ridge were also studied and Tertiary, Mesozoic and Pleistocene collections were obtained from outcrops in western Europe, West Indies, Venezuela and from the continental slope and shelf adjacent to the Atlantic Provinces. To carry out this program a course of basic scientific research, instrument design, and application of conventional principles and techniques was followed. This produced many highlights such as: elucidating certain principles of sedimentation in Arctic waters, defining physiographic and hydro-dynamic environments of sedimentation in Hudson Bay, new relationships of tidal cycles to sedimentological phenomena in Northumberland Strait, the surficial mapping and subbottom seismic profiling of the Scotian Shelf, a stratigraphic description of the important oil-potential Tertiary rocks on the Atlantic continental shelf and slope, defining new northern limits to ancient ocean circulation in the North Atlantic through the study of microfauna,

the discovery of important geological structures on the Labrador Shelf and adjacent northeastern Newfoundland, the potential application of studies in inorganic chemistry to those of chemical pollutants in marine waters, the investigation of structural groups in the organic constituents of marine soils, and the continuing long term comparative study of foraminiferal ecology in various latitudes and marine environments of the North Atlantic ocean.

Special projects involving instrumental and equipment design include the following: an electric remotely controlled, submarine rock-coring drill capable of operating in 1200 feet of water; development of samplers, probes, *in situ* sensors and recorders to assist underwater ecological studies; and construction of a living foraminiferal laboratory to observe the effects of varying ecological factors under controlled conditions. An underwater television system was acquired and adapted for use with certain underwater research tools, and a scanning electron microscope was obtained for aiding studies in micropaleontological work, sand-grain morphology, and clay mineralogy. Recently a series of dives were made at various depths to 1520 feet in the submersible PISCES-I in the Canadian Archipelago to determine the feasibility of this vessel in carrying out underwater geological research, exploration, and surveying. These tests were successful. Following is a resume of the projects by authors and associates.

V. Asthana - coastal geodynamics, Nova Scotia.

G. A. Bartlett - (1) shallow water ecological studies of benthonic Foraminifera in eastern Canada and the United States; (2) microfaunal study of sediments in ponded basins of Mid-Atlantic Ridge; (3) effects of pollution on marine microorganisms; (4) microstructures of microorganisms; (5) circum-Atlantic Tertiary stratigraphy.

G. A. Bartlett and Sandra G. Tapley - foraminiferal ecology in shallow water environments.

G. A. Bartlett, G. Vilks and A. T. S. Ramsay - ecostratigraphy of the North Atlantic.

D. E. Buckley - Clay-inorganic associations in aquatic environments.

C. A. Godden - development of programs with scanning electron microscope.

C. A. Godden and B. R. Pelletier - development of submersible electrical rotary drill for drilling continental shelf.

G. Drapeau - (1) distribution of bottom sediments in Strait of Belle Isle; (2) bottom sediments of southwestern portion of Scotian Shelf.

A. C. Grant - (1) seismic profiler survey of the continental shelf off Labrador; (2) seismic profiler survey of Ungava Bay - Hudson Strait area.

Kate Kranck - (1) subsurface geology of Northumberland Strait; (2) tidal current control of surficial bottom sediments in Northumberland Strait; (3) sediments and bedrock of St. George Bay.

Kate Kranck and D. F. Clark - tidal current transport of suspended sediments.

L. H. King, B. MacLean and I. E. Thurber - studies of bedrock and surficial geology, Scotian Shelf.

L. H. King and M. A. Rashid - organic geochemistry of marine soils, Scotian Shelf.

J. D. Macdougall (Scripps Institute, McMaster University) - mineralogy and geochemistry of Recent sediments in Fitzwilliam Strait and Marie Bay, District of Franklin, Canada.

J. I. Marlowe - (1) structure and stratigraphy of bedrock on the continental slope off Nova Scotia. (2) geological investigations on Aves Ridge and Grenada Trough, eastern Caribbean Sea.

Jill McRoberts (Queen's University, Kingston, Ont.) - planktonic Foraminifera in sediments on Mid-Atlantic Ridge.

B. R. Pelletier and D. J. Swift (Old Dominion College, Virginia) - marine geological studies in the Bay of Fundy.

B. R. Pelletier - (1) sedimentation in Arctic waters; (2) sedimentary environments and models of sediment transport in Hudson Bay; (3) feasibility studies with deep-diving submersibles for geological exploration, research and survey.

C. T. Schafer, R. Vine and C. Mason - development of systems for quantitative sampling of planktonic Foraminifera.

C. T. Schafer - (1) ecology of shallow water benthonic Foraminifera in coastal waters of Prince Edward Island, Nova Scotia and northeastern United States; (2) quantitative survey of depositional rates of foraminiferal tests in coastal waters and continental shelf of Nova Scotia.

C. T. Schafer and B. K. Sen Gupta - ecology and pollution sensitivity of benthonic Foraminifera, St. Lucia, West Indies.

B. K. Sen Gupta - distribution and ecology of Foraminifera on the Grand Banks of Newfoundland.

B. K. Sen Gupta and C. T. Schafer - foraminiferal ecology in leeward bays of St. Lucia, West Indies.

G. Vilks - (1) planktonic Foraminifera in the North Atlantic Ocean and Caribbean Sea; (2) Recent Foraminifera in the Canadian Arctic Archipelago (partly with J. Iqbal of Dalhousie University).

Frances J. E. Wagner - (1) Pleistocene and Recent molluscs of the Canadian Arctic and Sub-Arctic regions; (2) deep-water molluscs of the eastern Caribbean Sea.

D. Walker - living foraminiferal laboratory experiments on ecology and morphology.

B. R. Pelletier

Submersible electric rock-coring drill, A. O. L., Bedford Institute, Dartmouth, N.S.

A new submersible rock-coring drill was put on trial in the Bedford Basin, Dartmouth, on December 13, 1968. This drill was lowered by means of a crane over the side of the sea wall at the Bedford Institute and operated remotely from the bottom with the use of a shore supply of 440-volt power. The drill was lowered into 30 feet of water and penetrated two feet of bottom mud and then 16 inches of bedrock (Goldenville quartzite of the Meguma Series). Full recovery was obtained with an elapsed drilling time of 12 minutes and a rotary speed of 350 R. P. M. An underwater television system provided visual monitoring at the surface while remote monitoring was aided by a tachometer and depth indicator attached to the drill stem, which also provided a visual inspection of the rate of penetration.

The drill was constructed as an electro-mechanical system. It features an automatic-penetration and core-retrieval drive, which senses and delivers suitable thrust pressures dependant on the penetration rate of the material being drilled. This drill comprises a vertical mast assembly mounted into a tripod type of base. A feature on the mast is a pull down and retractable endless chain assembly, powered by a high-torque electro-mechanical drive. The chain assembly carries a self-contained rotary, electro-mechanical drive system. This provides the power for the attached coring barrel. An electric pump supplies the coring head with water under high pressure through the usual type of swivel connector. The next series of test will be from an oceanographic vessel under conditions of moderate swell.

C. A. Godden and B. R. Pelletier

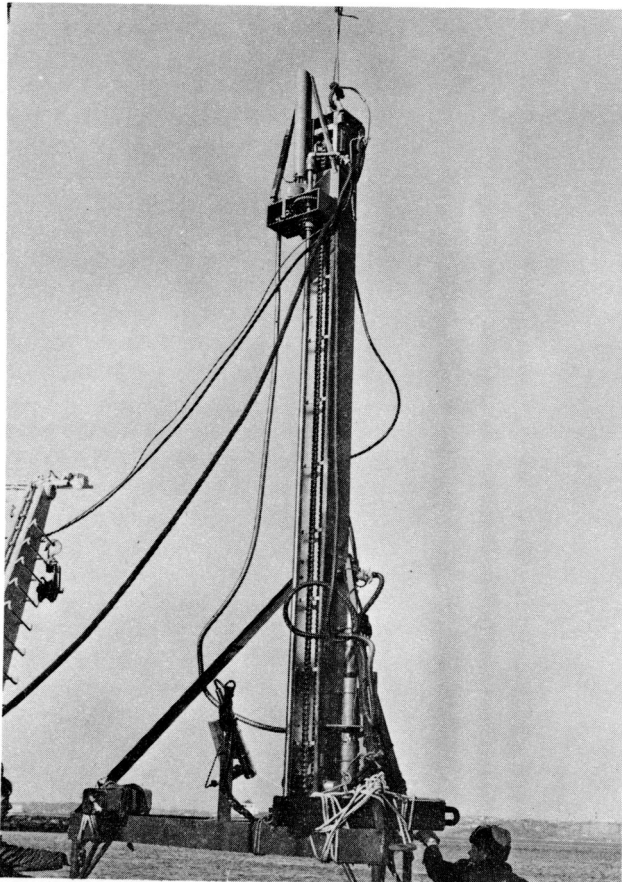


Figure 1 Submersible electric rock-coring drill, Bedford Institute. Test conducted from CSS DAWSON at entrance to Halifax Harbour. Note television camera to left of mast, pump on lower right and drive motor at top.