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Research in Marine ecology at Bedford Institute of Oceanography

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RECENT SEDIMENT STUDIES

Three reports pertaining to research in marine geology, sedimentology, and related fields are reproduced below.

Research in Marine Geology at Bedford Institute of Oceanography

by B. R. PELLETIER

Introduction

During the year 1964, Marine Geology projects at the BEDFORD INSTITUTE OF OCEANOGRAPHY were undertaken over the Arctic Ocean, adjacent channels of the Arctic Islands, Nares Strait, Baffin Bay, Atlantic Ocean, River and Gulf of St. Lawrence, Northumberland Strait, and numerous bays and inlets of the Atlantic Provinces. These activities involved studies of sediments on the sea floor and the associated fauna, submarine topography, geological formations and structures, and stratigraphy of the unconsolidated sedimentary layers. In the laboratories samples were studied from mechanical, petrographic, spectrochemical, wet chemical, and palaeontological aspects. The total program is designed to lead to knowledge on the origin of our continental shelves, geological processes, evolution and speciation of certain fauna, past oceanic climates and geography, and modern oceanic environmental factors which govern sedimentary deposition and ecological niches.

Study material was collected by means of bottom grabbers, dredges, both gravity and piston corers, and hand-picking by SCUBA divers. These various investigations were augmented with the aid of the following: bottom photographs for observing the nature of the sea bottom; echo sounder records for obtaining depths of water above sea bottom in order to carry out physiographic analyses and geophysical instruments for obtaining the thickness and structure of the unconsolidated sediments above bedrock, the configuration of the bedrock, the structure of the bedrock involving rocks of various ages which may occur a few hundred feet below the sea floor.

Field and Office Activities

Due to the dual nature of the projects, it is difficult to separate field projects from laboratory investigations. Therefore the following activities of Marine Geology are included under a single heading. These activities include those of both the continuing and the seasonal staff. All projects were undertaken with the co-operation of the BEDFORD INSTITUTE OF OCEANOGRAPHY. Publications are listed at the end of this report.

G. A. BARTLETT commenced a field and laboratory study of certain benthic fauna in coastal and nearshore environments of the Atlantic Provinces in order to relate the faunal and sedimentary

facies to certain oceanographic factors. This is primarily a study on foraminiferal ecology. Several field stations are being monitored during winter and early spring. In addition Bartlett is engaged upon, or completing the analyses on the following: 1) faunal collection submitted by J. I. MARLOWE, from the submarine canyon called "The Gully" on the continental slope off Sable Island; 2) faunal collection on material obtained by ERIC SMITH, while under the auspices of the PAN AMERICAN COMPANY on the Grant Banks of Newfoundland; and 3) faunal collections submitted by L. H. KING on material obtained from the outer continental shelf off Halifax.

D. E. BUCKLEY completed a sedimentological study of the beach and offshore area at Belledune Point on Chaleur Bay, New Brunswick, and with A. C. GRANT submitted a manuscript to BIO on this investigation. Buckley also completed his laboratory analyses on a sedimentological study in Malpeque Bay, Prince Edward Island, and has submitted a manuscript which is presently undergoing critical review. Buckley also completed a BIO manuscript on hydraulic settling tubes and their application to sedimentary studies. He also developed a program for electronic computing which has greatly facilitated the handling of data and accelerated the entire laboratory program.

R. CORMIER is processing sediments from the Bay of Fundy collected by the CANADIAN HYDROGRAPHIC SERVICE, and will prepare graphical and cartographic illustrations of the results.

G. A. DUNCAN is processing Bay of Fundy sediments to determine both carbonate and organic carbon content.

L. H. KING undertook a bottom sampling program along the Halifax section of the Scotian Shelf aboard KAPUSKASING, and augmented his study with numerous oceanographic data such as bathymetry, salinity, temperature, and oxygen analyses. He carried his studies into the laboratory where he is examining various aspects of organic geochemistry pertaining to the sediments, as part of an environmental analysis of the study area. He is assisted by DUNCAN in the laboratory, and by L. D. QUICK of the CANADIAN HYDROGRAPHIC SERVICE who is preparing graphical and cartographic illustrations of the study. Mr. Quick is also assisting King in making a detailed interpretation of the bathymetry. King has been engaged in the organization of the organic geochemistry laboratory, and much of his analytical work is of the pilot type in order to establish a working routine in the processing of his samples.

R. J. LESLIE is completing a manuscript on the marine geology of Hudson Bay. He has previously submitted two BIO papers on this subject which are now available in the open literature.

J. I. MARLOWE undertook a bottom sampling program on the continental shelf and slope southeast of Sable Island in The Gully. This work was undertaken aboard the KAPUSKASING. In mid-May he assisted Professor D. SWIFT and his student N. SILVERBERG of DALHOUSIE UNIVERSITY in a similar program in an area adjoining his own. In June Marlowe supervised a marine geology project in the Northumberland Strait. In September and October he joined the CCGS

LABRADOR at Thule, Greenland, to undertake a sampling program in Baffin Bay and Nares Strait. During the year he continued his sedimentological and petrographic analyses on material obtained on oceanographic cruises, and completed a report.

B. R. PELLETIER attended a government management course held at Carleton Place, Ontario, during the month of January. In April and May he continued a bottom sampling program over the Arctic Ocean in collaboration with the POLAR CONTINENTAL SHELF PROJECT. In early June he was Scientist-in-charge of the HUDSON and ACADIA when she paid a courtesy call to Charlottetown, Prince Edward Island, to coincide with the meetings of the Royal Society of Canada held there last year. At this meeting Pelletier and several members of BIO gave papers dealing with marine geology and geophysics of the Canadian Arctic and Eastern Seaboard. During the year Pelletier prepared departmental reports and publications and directed the overall activities of the Marine Geology Unit at the BEDFORD INSTITUTE.

G. VILKS completed his inshore sampling program during late April, May and June in Satellite Bay, District of Franklin. This program deals essentially with benthic Foraminifera, and is in collaboration with the POLAR CONTINENTAL SHELF PROJECT. He participated in a cruise of the ATLANTIC OCEANOGRAPHIC GROUP aboard CNAV SACKVILLE which took place in the Saguenay River, the River and Gulf of St. Lawrence, and Northumberland Strait. Vilks continued his laboratory studies on the Foraminifera, and submitted a report for BIO which is now available in the open literature. He re-wrote the Fortran program for the IBM computer in connection with the processing of sedimentological data.

F.J.E. WAGNER is continuing her palaeontological studies in Ottawa. She is engaged on research involving Arctic Foraminifera as well as fauna from the Champlain Sea deposits of eastern Canada. Miss Wagner is also preparing reports on molluscs occurring in Pleistocene beds and raised marine deposits. She submitted a report to BIO on her Arctic studies.

External Research

KENNETH HOOPER of CARLETON UNIVERSITY commenced a field and laboratory study of the eastern Champlain Sea deposits in an area east of Miss Wagner's study. He also worked on recent sedimentological and palaeontological material from the Gulf of St. Lawrence. He is preparing reports on his earlier investigations in the adjacent waters of the Gaspé area of Quebec and New Brunswick. Hooper recently published on material collected under BIO auspices.

K. M. KRANCK carried out a bottom sampling program in Northumberland Strait in collaboration with the FISHERIES RESEARCH BOARD OF CANADA, aboard the PANDALUS. She has recently completed a manuscript for BIO dealing with her previous sedimentological and petrographic analyses on sediments collected by the CANADIAN HYDROGRAPHIC SERVICE from Exeter Bay, Baffin Island. She is present engaged on detailed petrographic analyses of the material collected from Northumberland Strait.

A. C. GRANT assisted BUCKLEY in the laboratory on a sedimentological analysis of material collected from the beaches and offshore areas of Belledune Point, New Brunswick. He is a co-author with Buckley on a report submitted to BIO, which deals with this investigation. In September and October, he participated in an oceanographic cruise aboard the CCGS LABRADOR which took place in Nares Strait and Baffin Bay. Grant collected sediments along several transects in northern Baffin Bay, and will analyze this material as a requirement for the M.Sc. degree. He returned to the UNIVERSITY OF NEW BRUNSWICK to complete his studies.

Publications and Reports (1964)

BARTLETT, G. A., Preliminary investigation of benthonic Foraminiferal distribution on the Atlantic continental shelf, southeast Nova Scotia: Geol. Survey Canada, Paper 64-5.

BARTLETT, G. A., Benthonic Foraminiferal ecology in St. Margaret's Bay and Mahone Bay, southeast Nova Scotia: Report BIO 64-8. (Submitted to Geological Survey for publication).

BUCKLEY, D. E., Mechanical analysis of macroscopic dispersal systems by-means of a settling tube: Report BIO 64-2.

BUCKLEY, D. E., and GRANT, A. C., Preliminary statement on the sedimentology of the beach and offshore areas at Belledune Point, Bay of Chaleur, New Brunswick: Report BIO 64-12.

KRANCK, K. M., Sediments of Exeter Bay, Baffin Island, District of Franklin: Report BIO 64-15. (Submitted to Geological Survey for publication).

LESLIE, R. J., Sedimentology of Hudson Bay, District of Keewatin: Geol. Survey Canada, Paper 63-48.

MARLOWE, J. I., Marine Geology of western part of Prince Gustaf Adolf Sea, District of Franklin: Report BIO 64-9.

PELLETIER, B. R., Sedimentation in Arctic waters: 1965 S.E.P.M. research symposium. (Abstract).

PELLETIER, B. R., Development of submarine physiography in the Arctic Archipelago and its relation to crustal movements: Report BIO 64-16.

PELLETIER, B. R., Marine Geology in Arctic Canada and Hudson Bay: in Contributions to the Encyclopedia of Earth Sciences: Rhodes Fairbridge, Editor. (In press).

VILKS, G., Foraminiferal study of East Bay, MacKenzie King Island, District of Franklin: Report BIO 64-4, Geol. Survey Canada, Paper 64-55.

WAGNER, F.J.E., Faunal report II, Marine Geology program, Polar Continental Shelf Project, Isachsen, District of Franklin: Report BIO 64-1.