

## Current Research

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## CURRENT RESEARCH

Dalhousie University, Halifax, N. S. , by R. A. GEES

Dr. R. A. Gees and Mr. A. K. Lyall of the Department of Geology of Dalhousie University have started a study of the sediment distribution of the shallow shelf around Cape Sable Island, Nova Scotia. An attempt will be made to relate the sediment distribution pattern to the pattern of the oceanic bottom currents. Dyed sands or coloured ground glass will be used as tracers. Work on Cape Sable Island is in progress as well. Beach and dune sands from the Cape are being investigated for grain size distribution and heavy mineral content. The entire island has been mapped.

The project is supported by the National Research Council of Canada.

Bedford Institute of Oceanography, Dartmouth, N. S. , by R. M. McMULLEN

Many studies are being carried out by the marine geological staff at the Bedford Institute of Oceanography in several locations from the Scotian Shelf to the Western Arctic.

In the Arctic, Dr. B. R. Pelletier is continuing his investigations of bottom samples from the western Arctic continental shelf and Hudson Bay; Dr. R. M. McMullen is working on bottom sediments from Hecla and Griper Bay in collaboration with Mr. G. Vilks who is studying the Foraminifera. Also in Hudson Bay, Dr. F. J. E. Wagner is studying the Modern and Pleistocene molluscs and Foraminifera, while Mr. A. C. Grant is investigating over 1,000 miles of continuous seismic profiles. In addition, Grant is involved in a geological-geophysical study of Ungava Bay and Akpatok Island, and a geophysical study of the shelf and slope off northeast Newfoundland. Also off Newfoundland, McMullen is investigating several hundred bottom sediment samples from the Grand Banks; Dr. B. K. Sen Gupta is working on the Foraminifera from these samples. Of particular interest, was the discovery of a piece of a possible Cretaceous reptile bone in one of the surface sediment samples from the Tail of the Bank. Further south and west, Dr. J. I. Marlowe is continuing his study of the continental slope off Nova Scotia, particularly Tertiary material dredged from the Gully; The Gully material is being investigated in collaboration with Dr. G. A. Bartlett who is working on the Foraminifera. Bartlett is also studying Foraminifera from bottom sediments on the Scotian Shelf and in piston cores from the Mid-Atlantic Ridge, and foraminiferal ecology in several near-shore environments around the Atlantic Provinces. Also on the Scotian Shelf, Dr. L. H. King is carrying on his investigations into the sedimentology and organic geochemistry of bottom samples and cores. Miss Kate Kranck is continuing her studies in Northumberland Strait and, in addition, is working on continuous seismic profiles and bottom sediments from George Bay and bottom sediments and cores from the Strait of Belle Isle. McMullen initiated a long-term sedimentological study in the Minas Basin, Bay of Fundy. Vilks completed a foraminiferal study in the Bras d'Or Lakes, Nova Scotia.

New projects commencing this summer include foraminiferal studies in the MacKenzie Delta and estuaries emptying into southwestern Hudson Bay and James Bay, directed by Dr. C. T. Schafer and a sedimentological and foraminiferal study in the Western Arctic under Mr. G. Vilks. Most of the projects mentioned above will be on a continuing basis this year.

Further information about current research within the Geological Survey of

Canada can be obtained from the following publications:

MAHONEY, Leona, R., 1965, Index of Publications of the Geological Survey of Canada, G.S.C. Paper 66-3, Ottawa.

HENDERSON, J. F., Current Research in the Geological Sciences in Canada, G.S.C. 66-53, Ottawa.

GEOLOGICAL SURVEY OF CANADA, 1967, National Advisory Committee on Research in the Geological Sciences, Sixteenth Annual Report 1965-66, Annual Review and Reports of Subcommittees, Chairman, Y. O. FORTIER, Director of Geological Survey of Canada, Ottawa.

Appalachian Section, Geological Survey of Canada, Ottawa, Ont., by W.H. POOLE

The Appalachian Section undertakes geological research within the folded and unfolded rocks of the Appalachian system in Canada, that is, in southern Quebec, New Brunswick, Prince Edward Island, Nova Scotia and Newfoundland (Island). The objectives of this research are the description, interpretation, and synthesis of the stratigraphy and sedimentology, structure, igneous and metamorphic petrology, tectonic history and metallogeny of the region, and to relate all rocks and deposits of economic minerals to one another in space, time and evolution.

During 1966, stratigraphic and structural studies were carried out in the mineral belts of central and southern New Brunswick, while in northern Nova Scotia, similar investigations were continued in pre-Carboniferous strata and associated granites in the Cobequid Mountains and in the Antigonish Highlands. Regional studies of Newfoundland's lower Palaeozoic and older rocks were made in the Red Indian Lake area of central Newfoundland, in the Burlington Peninsula of northern Newfoundland, and in the north end of the Great Northern Peninsula. Summary accounts of these investigations are carried in Geological Survey Paper 67-1A.

Activities in 1966

F. D. Anderson began a detailed stratigraphic and structural study of the Ordovician and Silurian sedimentary and volcanic rocks of the McKendrick Lake area (21 J/16), central New Brunswick. The area adjoins on the north and south previously studied areas in the Province's central mineral belt. The oldest rocks are Cambrian and/or Ordovician phyllite, schist and quartzite, intruded by Ordovician (?) and Devonian granites and overlain on the southeast by folded Ordovician and Silurian volcanic and sedimentary strata. Field tests confirmed the qualitative usefulness of a scintillometer in locating approximately the covered contacts between rock formations which differ principally in gamma radiation intensity ( $K^{40}$ , zircon, etc.).

D. G. Benson (Dartmouth, N. S.) completed the field study of the stratigraphy, structure and tectonics of the pre-Carboniferous sedimentary and volcanic assemblage and associated plutonic rocks of the Antigonish Highlands, northern Nova Scotia. During the 1966 field season, he completed Cape George map-area (11 F/13) and re-examined key-areas in Merigomish (11 E/9), Lochaber (11 E/8) and Hopewell (11 E/7). The pre-Carboniferous rocks are cut by granitic bodies of two ages, the younger of Devonian age and the older probably Ordovician. He continued evaluation of the application of SCUBA diving to geological problems by examination of the offshore extension of mineralized granitic rock near Georgeville and of other

geological features on the west side of George Bay that could possibly be traced into the bay by sparker and/or seismic methods.

J. W. Gillis (Dartmouth, N. S.) continued preparation of final reports and maps.

D. G. Kelley continued detailed investigation of the stratigraphy and structure of the pre-Carboniferous sedimentary and volcanic assemblage and of the granitic rocks in the Cobequid Mountains, northern Nova Scotia. The stratigraphy and structure are complex. Two ages of granitic rocks are present; the older one appears as clasts in a pre-Carboniferous conglomerate and the other, of Devonian age, cuts Silurian strata. G. G. Eisbacher, senior assistant for the past two field seasons, completed the field phase of a detailed structural study of the Cobequid rocks for his Ph. D. thesis submitted to Princeton University.

Dr. Kelley published a paper and roadlog on the stratigraphy of Cape Breton Island in "Guidebook, Geology of Parts of Atlantic Provinces", produced by the Geological Association of Canada, and in September conducted a field trip on the island. With G. H. Eisbacher, he published a short note to Maritime Sediments on tectonic studies in the Cobequid Mountains.

M. J. Kennedy, a National Research Council post-doctorate fellow from Trinity College, Dublin, was attached to the Appalachian Section for the year. He began a detailed structural and metamorphic study of the schists and gneisses of the Fleur de Lys Group in the Fleur de Lys area (12 I/1), northern Burlington Peninsula, Newfoundland. Dr. Kennedy, still in the early stage of his field studies, has identified and begun mapping structures of five episodes of deformation in the Fleur de Lys rocks. He brings to Burlington Peninsula geology experience in structural studies on similar rocks of western Ireland. He will continue his field work this coming summer, and on September 1, 1967, will join the geology department staff of Memorial University of Newfoundland.

E. R. W. Neale spent six weeks in the Burlington Peninsula (12H E/2), northern Newfoundland, to appraise the recent studies by mining company and university geologists and to examine rock exposures produced by new road-cuts, forest fires, and pulpwood operations since he published preliminary maps of the area several years ago. He conducted two informal field trips in the area with participants from Oxford, Cambridge, Yale, and Columbia universities, and several geologists from local exploration companies. His senior assistant, R. K. Stevens, continued for six weeks the regional study of the Palaeozoic klippe rocks on Great Northern Peninsula, begun by J. W. Gillis in 1965.

Dr. Neale served as a half-time executive assistant to Dr. J. M. Harrison, Assistant Deputy Minister (Research) of the Department of Energy, Mines and Resources, from April 1 to November 15, 1966. He was appointed Program Chairman for the Geology Division of the Royal Society of Canada and is arranging a symposium on the state of the earth sciences in Canada for the Centennial Year meetings in Ottawa. He was appointed co-editor, with H. Williams, of a special Geological Association of Canada volume dedicated to the late Professor Hugh Lilly.

W. H. Poole continued to serve as Acting Head of the Section. He supervised a Ph. D. thesis study of A. A. Ruitenbergh in the St. Stephen-Mount Pleasant area, southern New Brunswick, and joined Ruitenbergh in the field for an examination of the stratigraphy and structure.

He edited a guidebook on the geology of parts of the Atlantic Provinces (14 papers, 8 roadlogs, 155 p.) used in conjunction with the field trips conducted by the Geological and Mineralogical Associations of Canada joint annual meeting in Halifax,

September 1966. He read at the plenary session of the meeting a paper on the geology of the Appalachian region of Canada. With H. Williams and others, he published an account in Canadian Journal of Earth Sciences on the Rb/Sr age and geological setting of the Precambrian Holyrood granite of southeast Newfoundland. He edited for the Survey an International Upper Mantle symposium entitled "Continental Margins and Island Arcs" (42 papers, 487 p.).

A. A. Ruitenberg, a graduate student at Leiden University, the Netherlands, completed the field phase of an integrated study of stratigraphy, structure and metallogeny of the St. Stephen-Mount Pleasant area (parts of 21 G/3, 6, 7), southern New Brunswick. The area borders to the southwest on the St. Stephen nickel-bearing ultramafic bodies and extends northeastward to include the Mount Pleasant tin-molybdenum property. Regional structure is controlled by a plunging northeast-trending antiform of Ordovician black slate and quartzite (Charlotte Group, Dark Argillite Division) flanked by Silurian strata of differing facies which apparently intertongue with one another. Several styles of folds were recognized, each differing by orientation and age. A preliminary map and notes on the area has been submitted to the Survey for publication. The results of the study will form the basis of a Ph.D. thesis to be submitted to Leiden University.

H. Williams completed investigations of the Ordovician and Silurian volcanic and sedimentary rocks with associated metamorphic equivalents and plutonic bodies of Red Indian Lake (East Half) area (12 A E/2), central Newfoundland, which includes Buchans lead-zinc-copper mine, and began investigation of the Burgeo (East Half) area (11 P E/2) to the south. These areas are the last to be studied in reconnaissance "4-mile" fashion in central Newfoundland. With F. C. Taylor, he made a brief examination of Lower Cambrian or older red beds and basalt of northern Newfoundland and southeast Labrador.

He published a final account of the geology and the mineral deposits of the Chisel Lake area in west-central Manitoba, and, with W. H. Poole and others, he published an account in Canadian Journal of Earth Sciences on the Rb/Sr age and geological setting of the Precambrian Holyrood granite of southeast Newfoundland. He submitted for publication by the Survey a final map and notes of the Red Indian Lake (East Half) area. He was appointed co-editor with E. R. W. Neale of a special Geological Association of Canada volume dedicated to the Late Professor Hugh Lilly.

#### Selected Recent Publications

- BARSS, M. S. and HACQUEBARD, P. A., 1966, Age and stratigraphy of the Pictou Group in the Maritime Provinces as revealed by fossil spores (abstract): Technical Program, Geol. Assoc. Can., ann. mtg., Halifax, p. 2-3.
- BELL, W. A., 1966, Illustrations of Canadian fossils - Carboniferous plants of eastern Canada: Geol. Surv. Can., Paper 66-11, 76 p.
- BLACKADAR, R. G., ed., 1966, Report of Activities, November 1965 to April 1966: Geol. Surv. Can., Paper 66-2, 73 p.
- BOUCOT, A. J., JOHNSON, J. G., HARPER, C., and WALMSLEY, V. G., 1966, Silurian brachiopods and gastropods of southern New Brunswick: Geol. Surv. Can., Bull. 140, 45 p.
- BRANDON, L. V., 1966, Groundwater hydrology and water supply of Prince Edward Island: Geol. Surv. Can., Paper 64-38, 37 p.

- BRANDON, L. V., comp., 1966, Truro (W 1/2) groundwater probability, Nova Scotia: Geol. Surv. Can., Map 1160A.
- BOYLE, R. W., 1966, Origin of the gold and silver deposits of the Meguma Series, Nova Scotia (abstract): Technical Program, Geol. Assoc. Can., ann. mtg., Halifax, p. 7-8.
- BOYLE, R. W. et al., 1966, Geochemistry of Pb, Zn, Cu, As, Sb, Mo, Sn, W, Ag, Ni, Co, Cr, Ba, and Mn in the waters and stream sediments of the Bathurst-Jacquet River District, New Brunswick: Geol. Surv. Can., Paper 65-42.
- EISBACHER, G. H., 1967, Tectonic analysis in the Cobequid Mountains, Nova Scotia, Canada: Ph.D. thesis, Princeton Univ., Princeton, New Jersey, 108 p.
- \_\_\_\_\_, and KELLEY, D. G., 1966, Tectonic studies in the Cobequid Mountains, Nova Scotia: Maritime Sediments, vol. 2, p. 180-183.
- EWING, G. N. and HOBSON, G. D., 1966, Marine seismic refraction investigation over the Orpheus gravity anomaly off the east coast of Nova Scotia: Geol. Surv. Can., Paper 66-38, 10 p.
- FINDLAY, D. C. and SMITH, C. H., eds., 1966, Drilling for scientific purposes: Report of International Upper Mantle Symposium: Geol. Surv. Can., Paper 66-13, 264 p.
- FRANKEL, L., 1966, Geology of southeastern Prince Edward Island: Geol. Surv. Can., Bull. 145, 70 p.
- HOOD, P., 1966, Geophysical reconnaissance of Hudson Bay: Geol. Surv. Can., Paper 65-32, 42 p.
- \_\_\_\_\_ and BOWER, M., 1966, Aeromagnetic survey of the Scotian Shelf south-east of Halifax, Nova Scotia (abstract): Technical Program, Geol. Assoc. Can., ann. mtg., Halifax, p. 20.
- HOWIE, R. D., 1966, Catalogue of well samples from Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland at the Geological Survey of Canada, Ottawa: Geol. Surv. Can., Paper 65-40, 43 p.
- \_\_\_\_\_ and CUMMING, L. M., 1966, Basement graben beneath Miramichi Bay, New Brunswick (abstract): Technical Program, Geol. Assoc. Can., ann. mtg., Halifax, p. 20-21.
- IRVINE, T. N., ed., 1966, The world rift system: Report of International Upper Mantle Symposium: Geol. Surv. Can., Paper 66-14, 471 p.
- JENNESS, S. E., ed., 1966, Report of Activities, May to October, 1965: Geol. Surv. Can., Paper 66-1, 210 p.
- \_\_\_\_\_, 1966, The anorthosite of northern Cape Breton Island, Nova Scotia, a petrological enigma: Geol. Surv. Can., Paper 66-21, 25 p.
- \_\_\_\_\_, ed., 1967, Report of Activities, Part A: May to October, 1966: Geol. Surv. Can., Paper 67-1A, 221 p.
- KELLEY, D. G., 1966, Stratigraphy of Cape Breton Island, in Guidebook, Geology of Parts of Atlantic Provinces, ed. W. H. POOLE, Geol. Assoc. Can., ann. mtg., Halifax, p. 115-130.

- McCARTNEY, W. D., POOLE, W. H., WANLESS, R. K., WILLIAMS, H., and LOVERIDGE, W. D., 1966, Rb/Sr age and geological setting of the Holyrood granite, southeast Newfoundland: *Can. J. Earth Sci.*, vol. 3, p. 947-957.
- McGREGOR, D. C. and OWENS, B., 1966, Illustrations of Canadian fossils - Devonian spores of Eastern and Northern Canada: *Geol. Surv. Can.*, Paper 66-30, 66 p.
- POOLE, W. H., ed., 1966, Continental margins and island arcs: Report of International Upper Mantle Symposium: *Geol. Surv. Can.*, Paper 66-15, 486 p.
- \_\_\_\_\_, 1966, Geology of the Appalachian region of Canada (abstract): Technical Program, *Geol. Assoc. Can.*, ann. mtg., Halifax, p. 40-42.
- \_\_\_\_\_, ed., 1966, Guidebook, Geology of Parts of Atlantic Provinces: *Geol. Assoc. Can.*, ann. mtg., Halifax, 155 p.
- STOCKWELL, C. H. and TUPPER, W. M., 1966, Geology of the Brunswick No. 6 and No. 12 mining area, Gloucester County, New Brunswick: *Geol. Surv. Can.*, Paper 65-13, 8 p.
- TAYLOR, F. C. and SCHILLER, E. A., 1966, Metamorphism of the Meguma group of Nova Scotia: *Can. J. Earth Sci.*, vol. 3, p. 959-974.

#### Mobil News Release \*

Mobil Oil Canada Ltd. said today it will drill a 15,000 foot well on Sable Island this summer to test a structural anomaly in the underground formations as mapped by seismic methods. The anomaly could contain oil or gas or both.

The well will be drilled on a one-million acre block of permits issued to Mobil by the Federal and Nova Scotia governments in 1959. The block covers Sable Island and surrounding waters, and is part of more than 23 million eastern offshore acres Mobil has under permit. The company spent three summers doing land and marine seismic surveys on the block before deciding to drill.

The well is the deepest ever to be attempted along the eastern continental shelf of North America. Drilling is expected to start about mid-May and take four months to complete. Cost of the venture is estimated at \$1 3/4 million.

Of interest to Mobil scientists is the thickness and nature of sedimentary rock in the area. Information from this test will prove valuable for future exploration. They expect the well to penetrate about 15,000 feet of layered rock before striking the precambrian or "basement" rock. They say, however, that the absence of detailed geological knowledge of the area could place their estimate in substantial error. The well is classified as a "rank wildcat".

Sable Island, a sand bar one mile wide and 20 miles long, is located 190 miles east of Halifax and 100 miles from the nearest mainland.

\* This was released March 21, 1967.