Atlantic Geology

Meetings

Volume 9, numéro 2, september 1973

URI : https://id.erudit.org/iderudit/ageo09_2met01

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Éditeur(s)

Maritime Sediments Editorial Board

ISSN

0843-5561 (imprimé)
1718-7885 (numérique)

Découvrir la revue

Citer ce document

(1973). Meetings. *Atlantic Geology*, *9*(2), 66–71.

Meetings

Colloquium on the Geological Evolution of the Eastern Seaboard of Canada, Fredericton, New Brunswick, January 18 and 19, 1974.

This colloquium was held under the auspices of the Atlantic Geoscience Society, and was hosted by the Department of Geology, University of New Brunswick. Abstracts submitted at the meeting are given below.

The Ancient Continental Margin of Eastern North America by Dr. H. Williams, Memorial University of Newfoundland, St. John's, Newfoundland:

The ancient continental margin of eastern North America is represented by a zone of partially deformed and metamorphosed rocks along the western flank of the Appalachian orogen.

The margin was initiated during Late Precambrian time as a rift system with accompanying sedimentation and volcanism along its length. A sequence of shallow-water mature sediments, predominantly carbonates, accumulated on the ancient continental shelf during Cambrian and early Ordovician times.

The mechanism of breakup is not clear but it resulted in the formation of a series of offshore island arcs, the obduction of oceanic crust and mantle across the continental margin onto the shelf, the deformation and metamorphism of sediments bordering the continent, the mass transfer of continental slope sequences westward across the shelf and the flood of clastic sediments from the continental margin which transgressed towards the continental interior.

The Taconic Orogeny records the destruction of the continental margin and Proto-Atlantic Ocean in the northern Appalachians. Further south total destruction did not occur until Permo-Carboniferous time when Africa collided with North America.

Precambrian Development of the Eastern Canadian Appalachians by M.J. Kennedy, Department of Geology, Memorial University of Newfoundland, St. John's, Newfoundland:

Precambrian rocks of three different tectonic regimes are recognizable in the eastern Canadian Appalachians. They are: (1) Helikian or older basement rocks which are generally crystalline and unrelated to the development of the Appalachian orogen; (2) Hadrynian sedimentary and mafic and silicic volcanic sequences with localised Hadrynian folding that are locally underlain by (1); and (3), complexly deformed metasedimentary and metavolcanic sequences of upper greenschist to low amphibolite facies that rest on (1) and represent the products of a late Hadrynian orogenic episode, here referred to as the Ganderian. Several components of a continental margin can be recognized. The Ganderian orogenic episode with its associated plutonic and probable ophiolite involvement provides a basis for reinterpretation of the geologic development of this region. The resulting symmetry within the Canadian Appalachians is briefly discussed.

Stratigraphy and Structure of Late Precambrian Rocks in the Caledonia Highlands, New Brunswick by A.A. Ruitenberg, P.S. Giles and D.V. Venugopal, Department of Natural Resources, Sussex, New Brunswick:

The Caledonia Highlands along the Bay of Fundy coast in southern New Brunswick are mainly underlain by Late Precambrian volcanic and sedimentary rocks.

The southeastern part of this belt is characterized by mafic and felsic flows, tuffs and associated volcanogenic sediments. Two thick horizons composed of arkosic and quartzitic sandstones, occur in the lower exposed part of the sequence in this area. These sediments may have been derived from an older Precambrian (Grenville?) basement. The central and northwestern parts of the belt are mainly composed of felsic flows, breccias and tuffs. Demonstable facies change between volcanic rocks of the central and southeastern parts of the belt, suggests that these rock sequences are contemporaneous.

The late Precambrian rocks in the northwestern part of the Caledonia Highlands, adjacent to the Palaeozoic belt in southern New Brunswick, have been affected by polyphase deformation probably during the Acadian (Middle Devonian) Orogeny. The main phase of this deformation is characterized by upright, close to isoclinal folds produced by northwest to southeast shortening.

Effects of intense cataclastic deformation have been delineated in a broad upwarped zone defined by a penetrative cleavage (S_1) ("Fundy Cataclastic Zone"). This zone extends for 140km along the southern margin of the Caledonia Highlands.

Most rock and mineral fragments in the deformed rocks of this zone have been crushed, flattened, stretched and (or) pulled apart in several directions parallel to S_1. In a few localities, S_1 is roughly parallel to axial surfaces of mesoscopic folds (F_1), but there is no evidence for regional F_1 folds. S_1 surfaces have been folded throughout almost the entire area by a second group of folds (F_2) and a third group of folds (F_3). These structures have, in numerous localities, been truncated by high-angle reverse or normal dip-slip faults and locally by low angle thrusts.

The S_1 fabric probably resulted from upwarping or bending, (under a lithostatic load) which was produced by vertical movements of basement blocks underlying deformed layers. Mesoscopic F_1 folds are believed to have formed along the margins of uplifted blocks. F_2 folds appear to have resulted mainly from gravity sliding along slopes produced by continued up-warping. F_3 folds were produced by slip roughly parallel to S_1.

The cataclastic deformation has affected rocks of both Late Precambrian and Late Devonian (or Early Carboniferous) age. The Hopewell Group (Early Carboniferous) postdates the cataclasis, suggesting an Early Carboniferous (or Late Devonian) age for this deformation.

The Base of the Cambrian in Southern New Brunswick by I.M. Patel, University of New Brunswick, Saint John, New Brunswick:

The stratigraphic position, and the nature of the lower contact of a sequence of dominantly red, unfossiliferous, clastic rocks of the Ratcliffe Brook Formation with the underlying Coldbrook Volcanics of Late Hadrynian age (whole-rock Rb-Sr age of 750 ± 80 my) have been disputed since they were first described by Matthew (1899), and referred to him to the Late Precambrian. Walcott (1900) disagreed with Matthew, correlating the red beds of southern New Brunswick with the Lower Cambrian red beds of eastern and southeastern Massachusetts, which are very similar in lithology but contain Lower Cambrian *Callavia* and related trilobite faunas.

In recent years workers have referred the Ratcliffe Brook Formation to the Lower Cambrian, and suggested that they lie unconformably upon the Coldbrook Volcanic Group. More recently, however, the Ratcliffe Brook Formation has again been reassigned as Late Precambrian on the Geological Survey of Canada Correlation Chart (1970).

The origin of the red beds, their relationship to the underlying and overlying rocks, and their correlation with similar sequences in other parts of the Northern Appalachians will be discussed.

Structural and Magmatic Sequence in the Coldbrook and Greenhead Groups, Southern New Brunswick by R.J. Wardle and B.H. O'Brien, University of New Brunswick, Fredericton, New Brunswick:

A basement of Greenhead Group limestone, quartzite and argillite underlies the predominantly volcanic and sedimentary rocks of the Coldbrook Group. These two groups comprise the Precambrian of the Avalon Platform as it is exposed in southern New Brunswick.

Rocks of the Greenhead Group demonstrate a complex magmatic history which has been, in part, closely linked to their structural development. A sequence of meta gabbros, basic dykes and migmatitic gneisses almost certainly predates formation of the Coldbrook Group. The development of migmatitic gneisses was synchronous with the first deformation within the Greenhead Group. Later magmatic activity included granites and basic dykes. At least one of these granites is believed to be of Hadrynian age. The others may be of Hadrynian or Lower Paleozoic Age.

Within the area discussed the volcanic rocks of the Coldbrook Group are almost totally acidic lavas and pyroclastics. A complicated series of intrusive rocks can be assigned to several characteristic phases although within each phase there may be some overlap in time. Most of the intrusive rocks of this series belong to a consanguinous, petrologic suite. Widespread swarms of strataform sills are older than a suite of granites, diorites, tuffisites and diabase. A Hadrynian age is proposed for both the volcanic and intrusive rocks.

Both Greenhead and Coldbrook Groups have undergone polyphase deformation and metamorphism during the Acadian Orogeny. In the Kennebecasis Bay area a period of high angle, reverse faulting is intimately related to the D_2 phase of Acadian deformation. The faults were reactivated in post-Carboniferous times.

Pre-Carboniferous Structural History of S.E. Cape Breton Island, Nova Scotia by H. Helmstaedt, Department of Geological Sciences, McGill University, Montreal, Quebec:

The Avalonian orogeny in southeastern Cape Breton Island is documented by penetrative deformation and low-grade metamorphism of the Hadrynian George River Group, calc-alkaline volcanism (Coxheath volcanics, Fourchu Group), batholithic intrusions and related thermal metamorphism. Volcanism had subsided at the beginning of the Cambrian. The Boisdale Peninsula (Coxheath volcano) was exposed to erosion, while a Lower Cambrian clastic sequence was deposited in the Mira River area. Erosion had reached the level of the Late Hadrynian intrusive rocks and thermally metamorphosed George River rocks by early Middle Cambrian times when a new period of calc-alkaline volcanism (Bourinot Group) began. Bourinot volcanism was mainly subaerial in the Boisdale area, but almost entirely submarine and accompanied by the formation of exhalites in a basin to the southeast, in the Stirling area. The volcanic islands of the Boisdale area were rapidly eroded, and readily distinguishable volcanic debris is rare in the upper parts of the MacMullin Formation and totally absent in the Upper Cambrian MacNeil and Lower Ordovician McLeod Brook Formations. Upright folding of the Cambrian and Early Ordovician strata cannot be bracketed closely. It must predate the (?) Upper Silurian to Lower Devonian Middle River Group in the Mira area and the Lower to Middle McAdam Lake Formation in the Boisdale area, and thus cannot be assigned to the Acadian orogeny. Convincing evidence of major penetrative Acadian deformation is as yet lacking. Local deformation and tilting of the Middle River Group and McAdam Lake Formations does not significantly differ from deformation effects in Carboniferous strata. A major unconformity between McAdam Lake Formation and the Grantmire Member of the Mississippian Windsor Group does not exist.

Precambrian Evolution of Northeastern Cape Breton Island by Robert A. Wiebe, Department of Geology, Franklin and Marshall College, Lancaster, Pennsylvania:

Two structurally and compositionally distinct metamorphic units occur in northeastern Cape Breton Island. The older unit (correlated with the George River Group) is composed of metamorphosed psammitic and semi-pelitic rocks with some distinctive quartzite and marble layers. The younger unit (correlated with the Fourchu Group) is composed of intermediate to acidic volcanic and volcaniclastic rocks with subordinate sedimentary rocks. Prior to accumulation of the Fourchu Group, George River rocks were folded, metamorphosed and post-tectonically intruded by gabbros and diorites chemically equivalent to high-alumina basalts and andesites. The gabbros were emplaced at depths of at least 5 km, and considerable erosion of the older rocks must have occurred before accumulation of the Fourchu rocks. Many dikes cut the older rocks and may have been feeders to the Fourchu Group. Granitic plutons (similar to those dated by Cormier (1972) at 560 my) intrude the Fourchu Group as well as the George River and older plutons. Their shallow level of emplacement and compositional range suggest that they are cogenetic and contemporaneous with the Fourchu Group.

In Paleozoic (Acadian?) time all of these rocks were deformed, metamorphosed and locally intruded by leucocratic granites. Metamorphism is closely related to these younger granite plutons, and metamorphic assemblages indicate that they were emplaced at depths greater than 10 km. Late Precambrian granites can be distinguished from Acadian (?) granites by a combination of structure, composition and metamorphic effect.

The Variscan Plate Tectonics by N. Rast, Geology Department, The University of New Brunswick, Fredericton, New Brunswick:

The Caledonian Orogeny of Scotland, Ireland, Greenland and Scandinavia closed one arm of the Proto-Atlantic and the early Variscan ocean spread through central Europe to the east coast of North America. It seems likely that the Acadian was a local movement and may have indicated the closure of a limited part of the ocean.

In the southern part of the Bay of Fundy strong tectonic deformation including cleavage, affects Lower and Upper Carboniferous rocks. Similar strong penetrative cleavage (S_1) affects the Pennsylvanian of Rhode Island, and in both cases is refolded by later F_2 and F_3 folds.

These structures can be compared with the Variscan of Europe and signify the closing of the Variscan Ocean.

Petrology of the South Mountain Batholith, Nova Scotia by C.B. McKenzie and D.B. Clarke, Department of Geology,, Dalhousie University, Halifax, Nova Scotia:

Approximately one-third of western Nova Scotia is covered by granitic rocks of the South Mountain batholith which consists largely of a sea of granodiorite enclosing four large adamellitic bodies as well as numerous smaller intrusives and aplitic dykes. The batholith has invaded regionally metamorphosed Cambrian-Lower Devonian sequences late in the Acadian orogenic cycle. On a large scale the batholith parallels the regional structural trends, however locally it cuts across the Acadian fold structures.

Chemical analyses show that the various rock types of the batholith can all be representatives of a single comagmatic suite, most likely related to one another by fractional crystallization. Comparison of the bulk compositions of the granitic rocks with experimentally determined phase relations in the residua system, in conjunction with such considerations as stratigraphy, and structure, all point to lower epizone-upper mesozone emplacement and crystallization of the batholith. In addition, the occurrence of primary andalusite in late-stage rocks suggests that the final P-T conditions of crystallization were 3.3 to 3.5 kb and 650 to 680°C.

In plate-tectonic terms, the Devonian granites of Nova Scotia are at least spatially and perhaps temporally related to a subduction zone which gave rise to the White Rock volcanics in Ordovidian-Silurian times. The rather basic average composition of the batholith and intermediate Sr87/86 ratios both suggest that the parent magma was created from a combination of mantle and crustal rocks.

The Timing of the Acadian Orogeny in the Appalachian Mountains of Eastern Maine and Western New Brunswick by H.V. Donohoe and G.E. Pajari, Jr., Geology Department, University of New Brunswick, Fredericton, New Brunswick:

Contrary to established ideas, the Acadian Orogeny in the Maine-New Brunswick Appalachians is not a static Middle-Devonian event. The Acadian Orogeny began in Pridoli-Gedinnian time in the Passamaquoddy Bay area and became a progressively younger event towards the northwest, reaching Eifelian-Givetian time in the Rimouski-Matapedia River valley. Implicit in this assertion is the correctness of Acadian deformation time along the southern coast of Maine and New Brunswick. The age of deformation here, can be no younger than the age of the batholith and stocks that truncate the Acadian D_1 structure trend. New data from Rb-Sr whole rick isochrons and K-Ar mineral dates demonstrate that the St. George Complex (quartz-monzonite phase) and similar igneous rocks in Maine (e.g. Red Beach Granite) were emplaced into Carado to Pridoli-aged rocks around 400 my before present.

In Maine and New Brunswick, published data suggest that the age of deformation decreases northwestward, from Passamaquoddy Bay (Eastport, Maine) through Mt. Katahdin area, Houghton, and

Presque Isle to the Cabano, Quebec and Rimouski-Matapedia River regions. Approximately 200 km northwest of the Eastport, Maine, a succession of Llandovery to Pridoli-aged rocks, the undeformed Eifelian-aged Trout Valley Formation, overlies the deformed and metamorphosed (chlorite "grade") Gedinnian to Emsian succession of (from oldest) Seboomook Formation, Matagamon Sandstone and Traveler Rhyolite. The same relationship is exposed in the Presque Isle region (approximately 100 km northeast of Katahdin) where the Mapleton Sandstone of Eifelian to Givetian age is gently folded. An angular unconformity separates the Mapleton from the deformed Dockendorf Group (Gedinnian to Sieginian age). Northward, in the Cabano, Quebec region, the youngest deformed rocks are the Temiscouata Formation overlying the Sieginian-aged Touladi Limestone. The very youngest deformed rocks in this part of the Appalachians are the red silts and sands of the Lake Branch Formation (Eifelian to Givetian), which overlies the fossiliferous York River Formation (Emsian to Eifelian) in the Matapedia River valley.

Perhaps an alternative to an Acadian Orogeny progressing through time and space would be two orogenies: the Salinic (Pridoli to Gedinnian) and the Acadian (Eifelian to Frasian). This hypothesis is discounted because no evidence exists for a Salinic penetrative fabric and folding, and because the available literature suggests an orderly decrease in the age of the youngest deformed rocks from Eastport to Matapedia.

Upper Paleozoic in the Gulf of St. Lawrence and the Atlantic Provinces by R.D. Howie and M.S. Barss, Atlantic Geoscience Centre, Bedford Institute, Dartmouth, Nova Scotia:

The Acadian (Devonian) Orogeny stabalized the Appalachian Geosyncline from the northeastern part of the St. Lawrence Platform to the continental shelf. This newly cratonized area initiated a new set of tectonic elements that prevailed into the Permian. Late-stage working of the area affected by the Acadian Orogeny appears to have been mainly confined to a narrow northeast-trending, lens-shaped taphrogeosyncline that accumulated over 30 thousand feet of clastics and evaporites. The configuration of post-Acadian basement and subsequent infilling of sediments have been determined by lithological and palynological studies of exploratory wells, combined with regional seismic, gravity, ship and air magnetometer surveys, and field observations. In the deeper areas of the basin, salt swells, ridges, domes, diapirs and walls of Windsor Group evaporites and shale, estimated to be at least 16 thousand feet thick, may have produced a variety of stratigraphic traps in the overlying sediments suitable for the accumulation of oil and gas.

Sediment Dispersal and Facies Distributions in the Pennsylvanian Pictou Group of New Brunswick by H.W. van de Poll, University of New Brunswick Fredericton, New Brunswick:

The Pictou Group is the most widespread Carboniferous stratigraphic unit in southern New Brunswick and underlies an estimated 27% of the Province.

The Group consists of alternating red and grey fluvial sequences which occur in cyclic order and extends beyond the borders of the province into the Bay of Chaleur, Gulf of St. Lawrence, Prince Edward Island and Nova Scotia. Each cyclic succession may be up to a thousand feet thick and is made up of a grey, relatively coarse-grained, fluvial conglomerate-sandstone facies sequence at the base and a red, finer-grained, fluvial sandstone-siltstone facies sequence at the top.

The mapped distribution of the Pictou subunits indicates a gentle northeasterly dip of a few degrees or less, except in the southwestern part of the Province where the sequence is gently dipping to the north-northwest.

It is believed that the dip directions conform to post-depositional regional tilt of major basement blocks, whereby the present western and southern margin of the basin is either a fault or represents a basal unconformity. Restoration for tile between southwestern New Brunswick and Prince Edward Island reveals that an additional several thousand feet of Upper Pennsylvanian-Stephanian strata covered the present western margin of the basin during late Palaeozoic time.

Sediment dispersal of the Pictou Group shows a centripetal pattern of transport that is asymptotic to an easterly trending transport mean suggesting an easterly trending basin structure with a symmetry axis that was approximately centred on the present site of Miramichi Bay.

Although the western palaeogeographic limits of the basin are not known the cyclic recurrence of facies clearly indicates that the present distribution of Pictou strata represents an erosional remnant of what must have been a much larger basin of deposition during Pennsylvanian-Permian time.

Whether or nor the Maritime Carboniferous basin was ever connected with the main tract of Carboniferous strata in the United States however is a matter of speculation. In this respect, it is worth noting that dispersal and facies patterns in Pennsylvanian strata of the United States show a southwesterly to westerly trend in sedimentary transport, in contrast to the northeasterly to easterly transport directions in strata of similar age in New Brunswick.

This opposing pattern in sedimentary transport suggests that a southeasterly trending structural divide across the New England States separated the two basins during Pennsylvanian time.

Intertidal Sand Bars in Cobequid Bay (Bay of Fundy) by R.W. Dalrymple, R.J. Knight and

G.V. Middleton, Department of Geology, McMaster University, Hamilton, Ontario:

The largest tides in the world, with an average perigee spring range of 15.4 m and a maximum measured range of 16.3 m, occur at Burncoat Head on the south shore of Cobequid Bay. The tides generate currents with speeds of 1 to 1.5 m/sec in the centre of Cobequid Bay. These currents, and waves approaching mainly from the west, have re-worked sand derived from glaciofluvial outwash and cliff erosion of bedrock into a major sand body which occupies the eastern part of the Bay. The sand body is 30 km long and 6 to 25 m thick. Most of it is subtidal, but close to shore and at the east end of the Bay there are several intertidal sand bars, which reach 6 m or more in relief and thickness, and have dimensions up to 4 kms in length. Maximum speeds of tidal currents over the bar surfaces generally range from 0.5 to 1 m/sec: the strength and direction are largely determined by shore and bar topography. In many areas either flood or ebb currents dominate, producing strongly asymmetrical patterns of sand dispersal. Bars are covered by sand waves (with wavelengths of the order of 30 m: these are not found on all bars), megaripples (with wavelengths in the range 1.5 to 5 m) and ripples. Many megaripples can be observed on depth recordings to reverse their orientation during each ebb or flood. On Selmah Bar, sand waves are flood oriented and covered at low tide by ebb oriented megaripples. The sand waves are found only on the south side of the bar in a low area (not affected by wave action) that is strongly dominated by flood currents, and they migrate about 20 cms per tidal cycle.

Geology and Stratigraphy of the Continental Margin of Eastern Canada by L.F. Jansa and J. Wade, Atlantic Geoscience Centre, Bedford Institute, Dartmouth, Nova Scotia:

The Atlantic continental margin can be defined as a miogeocline which can be subdivided into several structural provinces. The eastern part of the Scotian Shelf and southern part of Grand Banks where more than 15,000 m of sediments were accumulated is named the Scotian Basin.

At the southwestern and western side, the basin is underlain by Lower Paleozoic metasedimentary rocks intruded by granites; at the western part by gneisses similar to the Precambrian gneissic rocks of Cape Breton Island. South of Newfoundland the Mesozoic overlies Carboniferous sediments, and on the northeastern side of the Grand Banks is surrounded by and overlies metasedimentary rocks probably of a Lower Paleozoic or older age.

The depositional history of the Scotian Basin started in the Late Triassic where fluviolacustrine sediments accumulated in fault basins. The marine invasion during Lower Jurassic time, led to the deposition of a thick sequence (Argo Salt) and an evaporite-carbonate shale, the Iroquois Formation. The overlying thin Middle Jurassic terrigenous Mohawk Formation indicates a short period of regression east of Nova Scotia.

The second major Jurassic transgression which began in the late Middle Jurassic deposited 2000 m of sediments comprised of shallow to deep water, open-shelf carbonates which grade seaward into shales and laterally into inner-shelf, and deltaic terrigenous sediments.

The Jurassic-Cretaceous boundary was a time of significant change of sediment composition. As a result of an epirogenetic uplifting of the landmass, up to 1200 m of Lower Cretaceous clastics was deposited by a seaward-prograding delta system.

A new major transgression commenced in the Lower Aptian and lasted up to, and including the Tertiary. The Upper Cretaceous transgression culminated in the Senonian, when chalky carbonates of the Wyandot Formation were accumulated in the outer neritic and epibathyal environments of the Scotian Basin. During the subsequent period, the sea slowly regressed to its maximum low stand in the Pleistocene. The stratigraphic hiatus in parts of the basin developed in the Paleocene and Upper Eocene. It was during the slow regression in the Tertiary that the continental shelves off Nova Scotia and Newfoundland were constructed.

The Tertiary System of the Scotian Shelf by I.A. Hardy and D.F. Clark, Atlantic Geoscience Centre, Bedford Institute, Dartmouth, Nova Scotia

Petroleum exploration and drilling on the Scotian Shelf since the initial Mobil Core Hole Program in August, 1965, has provided invaluable stratigraphic information for offshore eastern Canada. Prior to this time, only geophysical and surficial sampling data were available, while to date there have been 47 wells drilled on the Scotian Shelf.

The uppermost portion of the sedimentary sequence on the Scotian Shelf of offshore eastern Canada is mainly Tertiary in age, and towards the edge of the continental shelf may attain a thickness of up to 6,000 feet. Those sediments comprising the Tertiary section cover an area of 35,000 square miles and have a volume of approximately 36,000 cubic miles. Regional northwest to southeast-trending, deep-penetration seismic profiles examined on the Scotian Shelf, demonstrate that the sediments of the Tertiary section reflect simple wedge geometry, from the zero edge of the Tertiary to the continental shelf break. Profiles examined on strike with the coast of Nova Scotia reflect a lenticular configuration.

Detailed examination of ditch-wall cuttings and side-wall cuttings from 11 exploratory wells drilled on the Scotian Shelf has enabled four dominant groups of lithologies to be recognized within the Banquereau Formation (McIver, 1972). The Banquereau Formation is comprised of both Tertiary and Late Cretaceous age units in this area of the shelf.

The oldest of the four dominant groups of lithologies are the Maskonomet beds, which consist primarily of an argillaceous mudstone. These beds appear to be a good marker for determining the base of the Banquereau Formation and are generally found directly overlying the Wyandot (Chalk) Formation. A second dominant group of lithologies comprises the Nashwauk beds. The Nashwauk beds are recognized in the majority of wells studied as a good marker for determining the Tertiary-Cretaceous boundary. These beds are generally described as an argillaceous, glauconitic sandstone facies which is directly overlain by a calcareous, slightly glauconitic (<10%) mudstone facies. A third dominant group recognized within the Tertiary section on the Scotian Shelf are the Manhasset beds consisting of a coarse grained, argillaceous and glauconitic sandstone. The fourth and youngest dominant group recognized, are the Esperanto beds which consist of an unconsolidated quartzose sandstone, which is generally medium to coarse-grained.

Palynological investigations have revealed four principal nannofloral zones in the Banquereau Formation of the Scotian Shelf of offshore eastern Canada.

Biostratigraphic and lithostratigraphic correlation has permitted each of these four zones to be associated with one of the four dominant lithologies to be described.

The zones are the Maskonomet floral group of Campanian age, the Naskwauk floral group of Paleocene/Early Eocene age, the Manhasset floral group of Early Oligocene age, and the youngest and most poorly developed Esperanto floral group of Miocene age.

It is also proposed that the spasmodic pulses of nannoplankton in evidence throughout the Tertiary period may be associated with phases of transgression and regression where water depths oscillated between an inner neritic and outer neritic situation

Biostratigraphy of the Scotian Shelf and Grand Banks by Graham L. Williams and Piero Ascoli, Atlantic Geoscience Centre, Bedford Institute, Dartmouth, Nova Scotia:

Sediments ranging in age from Mississippian to Pleistocene have been encountered in shallow core holes drilled in 1965 on the Grand Banks of Newfoundland. Palynological analysis of 212 samples from 20 core holes has permitted the recognition of 16 diagnostic biostratigraphical divisions within the Late Mesozoic and Cenozoic. The geological history and paleoecology can be reconstructed in part from the palynomorph assemblages.

The established zonation has been utilized in the palynological and micropaleontological analysis of the Amoco IOE Tors Cove and Amoco IOE Grand Falls wells on the Grand Banks, and the Mobil Sable Island C-67, Shell Fox I-22, Shell Oneida O-25, Shell Naskapi N-30 and Shell Mohawk B-93 wells on the Scotian Shelf. The stratigraphic section penetrated by these wells extends from the Middle Jurassic to Plio-Pleistocene. 24 palynomorph zones and 21 foraminiferal zones permit biostratigraphic subdivisions of this section into Middle Jurassic, Oxfordian, Kimmeridgian, Tithonian, Berriasian-Valanginian, Hauterivian, Barremian, Aptian, Albian, Cenomanian, Turonian, Coniacian, Santonian, Campanian, Maastrichtian, Danian, Late Paleocene, Early, Middle and Late Eocene, Oligocene, Early, Middle and Late Miocene and Plio-Pleistocene. In addition, the Mesozoic is characterized by 11 ostracod zones. Paleoecological interpretations have been based on benthonic foraminifera, ostracods and palynomorphs.

Gravity Measurements over Salt Structures in the Canso Strait Area by K. Howells, Nova Scotia Research Foundation, Dartmouth, Nova Scotia:

Gravity surveys have revealed the presence of a number of possible salt structures in Windsor sedimentary basins near the Strait of Canso.

Models of the possible salt structures and the sedimentary basins have been calculated using automatic computer methods. Recent underwater gravity measurements in George Bay strongly suggest the presence of additional salt structures in the offshore extension of the Antigonish Windsor sub-basin.

Interpretation of Seismic Reflection Profiles - Central Grand Banks by Lewis H. King and Brian MacLean, Atlantic Geoscience Centre, Bedford Institute, Dartmouth, Nova Scotia:

Shallow corehole and exploratory well data together with high resolution seismic profiles can be effectively combined to provide detailed shallow stratigraphy on the Grand Banks of Newfoundland. The biostratigraphic and seismic data collectively suggest continuous sedimentation on most of the central Grand Banks from Albian to Early Maestrichtian time, followed by an erosional interval near the end of the Cretaceous Period. This apparently was a shelf-wide event. Erosion was followed by a continuous period of Tertiary sedimentation that extended well into Pliocene time. On some areas of the shelf the seismic evidence indicates a Late Tertiary(?) angular unconformity overlain by up to 120 m of Late Pliocene or Early Pleistocene strata. These uppermost strata are truncated by a channelled surface and the channels are infilled by sediment of Pleistocene age. This Pleistocene unconformity is evident across all of the Grand Banks and apparently has removed most of the evidence for the Late Tertiary unconformity.

DEDICATION

This collection of abstracts is dedicated to David Clark, a contributor, colleague and fellow member of the Atlantic Geoscience Society who, after a short sudden illness, died in the evening of February 7, 1974. We extend our deep sympathy to his wife, his family, and his many close friends.