GEOLOGICAL
SURVEY
OF
CANADA

DEPARTMENT OF ENERGY,
MINES AND RESOURCES

PAPER 67-25

CONTRIBUTIONS TO THE AGE OF THE GASPÉ SANDSTONE AND GASPÉ LIMESTONE

(Report and 3 plates)

A. J. Boucot, L. M. Cumming and H. Jaeger

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ABSTRACT

Restudy of the fauna of the lower part of the Gaspé Sandstone Group shows that at least the lower one-fifth (approximately 2,000 feet of strata) of this group is Lower Devonian. In eastern Gaspé, the York River Formation is of Etymothyris zone age: in western Gaspé, the 'Heppel' Formation is of Etymothyris and Amphigenia zone age. The brachiopod genera Rhenorensselaeria, Prionothyris and Globithyris are present in the Gaspé Sandstone. These genera are known elsewhere only from the upper part of the Lower Devonian. "Spirifer" mucronatus var. posterus Kindle non Hall and Clarke, previously recorded from the 'Heppel' Formation, is redetermined as Howellella aff. H. nictavensis (Dawson), a species present in the Lower Devonian of Nova Scotia and in the Lower Devonian Tomhegan Formation of Maine.

A gastropod from the Gaspé Sandstone, Nylanderina n. genus, occurs in the Lower Devonian Tomhegan Formation, and in the Lower Devonian beds near Highland Mills, New York. The Gaspé Sandstone Group is conformably underlain by the Gaspé Limestone Group. The age of the upper part of the Gaspé Limestone Group (Grande Grève Formation) is also Lower Devonian. The occurrence of Monograptus aequabilis (Přibyl, 1941) in a lower part of the Gaspé Limestone Group (Cape Bon Ami Formation) suggests that the base of the Gaspé Limestone Group lies near the Silurian-Devonian boundary. Monograptus aequabilis indicates the presence of the M. uniformis zone of Early Gedinnian age.

CONTRIBUTIONS TO THE AGE OF THE GASPÉ SANDSTONE AND GASPÉ LIMESTONE, QUEBEC

INTRODUCTION

Sir William Logan (1863) defined the 'Gaspé Sandstone' as a rock unit and stated that it was of Devonian age. Since then, over a score of geologists and palaeontologists have been concerned with the more precise dating of the sandstone. Table I summarizes the different opinions of various workers concerning the age of the Gaspé Sandstone Group as well as for its York River and 'Heppel' Formations (see Table II). This report presents new faunal evidence based on reexamination of collections from the New York State Museum, Albany; the Redpath Museum, Montreal; and the Geological Survey of Canada, Ottawa. This evidence provides additional information about the brachiopods and mollusca from the Gaspé Sandstone Group and about graptolites from the Gaspé Limestone Group.

Dr. G.A. Cooper, of the United States National Museum, Washington, contributed the information regarding the pelecypods and echinoderms. Dr. G. Brooks Knight, of the same institution, provided help in the study of a new gastropod subgenus. Miss Winifred Goldring, formerly of the New York State Museum; Dr. T.H. Clark, of McGill University; and Dr. Côme Carbonneau, formerly of the École Polytechnique, Montreal, have assisted by lending material for study. Boucot, Department of Geology, California Institute Technology, Pasadena, has described the brachiopods and gastropods; Boucot and Cumming have outlined the stratigraphy; and Jaeger, Humboldt Museum, University of Berlin, described the graptolite.

STRATIGRAPHY

Table II is an abbreviated table of formations, showing correlation of Lower Devonian formations of Gaspé with those of eastern New York. In eastern Gaspé, the Gaspé Limestone Group consists of a conformable sequence comprising in ascending order, the St. Alban, Cape Bon Ami and Grande Grève Formations (Ami, 1900; Clarke, 1900). This group is conformably overlain by the Gaspé Sandstone Group consisting, in ascending order, of the York River and Battery Point Formations (McGerrigle, 1950). Two formations in eastern Gaspé, not shown on Table II, are lateral equivalents of parts of the Gaspé Limestone-Gaspé Sandstone Groups. These are the Fortin and York Lake Formations. The former may span part of the interval between the Cape Bon Ami and York River Formations; the latter may be equivalent to part of the York River Formation (Roliff, 1952).

Revised manuscript submitted October 26, 1966.

Table I

Published opinions regarding the age of the York River and 'Heppel' Formations				Published opinions regarding the age of the Gaspé Sandstone Group			
	Devonian				Devonian		
	Lower	Middle	Upper	Lower	Middle	Upper	
Dawson	---			---			1861
Dawson	---			----------			1862
Logan	---			----------			1863
Dawson	---			----------			1871
Ells	---			--------			1884
Schuchert	---			----------			1900
Clarke		---			---		1913
Williams (with Breger)	---			---			1916
Alcock		---			---		1926
Bailey	---						1928
Jones	--------			--------			1931
Parks		---			---		1931
Alcock		---			---		1935
Allan	---				---		1935
Jones		---			---		1936
Kindle		--------			--------		1938
Cooper	---			---			1942
Dorf & Cooper	---			---			1943
Fritz		---			---		1944
McGerrigle		---			---		1946
McGerrigle		---			---		1950
This Report	---			---			1963

Table II

Correlation of Formations from Becraft to Schoharie age.

Terebratuloid Zones		Eastern New York	Western Gaspé		Eastern Gaspé	
LOWER EMSIAN	Amphigenia zone	Schoharie Grit	Lake Branch Formation ?	'Heppel' Formation	BATTERY POINT Formation ?	GASPÉ SANDSTONE GROUP
SIEGENIAN	Etymothyris zone	Esopus Shale	YORK RIVER Formation		YORK RIVER Formation ?	
	Rensselaeria zone	Oriskany Sandstone / Becraft Limestone	GRANDE GRÈVE Formation	'Causapscal' Formation	GRANDE GRÈVE Formation	GASPÉ LIMESTONE GROUP (upper part)

In western Gaspé, the 'Causapscal' and 'Heppel' Formations (terms not yet completely discarded) were originally defined by Alcock (1935). The rocks comprising these formations are now mainly assigned to the Grande Grève, Fortin, York River and Lake Branch Formations (e.g. Béland, 1960, p. 10). In western Gaspé the Lake Branch Formation (McGerrigle, 1954; Carbonneau, 1959) overlies the York River Formation conformably and was part of the original 'Heppel' Formation (Stearn, 1960, p. 7).

A general faunal similarity between the lower part of the Gaspé Sandstone Group and the upper part of the Gaspé Limestone Group has been recorded by Logan (1863, p. 403); Clarke (1908, p. 251) and Cooper et al. (1942, p. 1763). Recently a radiometric age has been determined from fresh sanidine and biotite from a bentonite bed occurring within a highly fossiliferous part of the Grande Grève Formation. The indicated age of this horizon, which occurs 700 feet down from the top of the Grande Grève Formation, is approximately 385 million years (Smith et al., 1961). A conformable sequence of 1,700 feet of strata occurs beneath this radiometrically dated Lower Devonian bentonite horizon. Some graptolites described from this sequence indicate an age and stratigraphic position near to the Silurian-Devonian boundary. The conformable sequence continues downward for another 375 feet to the base of the Gaspé Limestone Group which lies unconformably on the Cambro-Ordovician Quebec Group (Cumming, 1959).

PALAEONTOLOGY

Systematic Descriptions

Phylum BRACHIOPODA

Class ARTICULATA

Family SPIRIFERIDAE King

Genus Howellella Kozlowski, 1946

Howellella aff. H. nictavensis (Dawson)

Plate I, figures 10-13

1860. aff. Spirifer nictavensis Dawson, Oliver and Boyd, footnote p. 62.

1868. aff. Spirifer nictavensis Dawson, Acadian Geology, second edition, Macmillan, p. 499, figs. 176 a, b.

1938. Spirifer pennatus posterus Kindle, non Hall and Clarke 1893 Bull. Am. Pal., vol. 24, No. 82, p. 40.

Exterior. Elliptical in outline, prominent unplicated median fold and sulcus, lateral plications seven or eight, greatest width at hingeline but no great extension of the ears. Median fold rounded in cross-section. Delthyrid type striations are preserved on a few specimens.

Brachial interior. Low myophragm extending anteriorly about two-thirds length of shell, crural plates, a comb-like cardinal process, small dental sockets supported by the crural plates.

Pedicle interior. Dental lamellae subparallel and extend anteriorly about one-third length of shell, median adductor scars elongate and surrounded by elongate but larger diductor scars.

Comparison. Kindle (1938, p. 40) lists "Spirifer pennatus posterus" from the Four Mile Brook beds of western Gaspé. The Gaspé specimens lack the highly mucronate lateral extremities and the lamellose ornament characteristic of Mucrospirifer and Eleutherokomma and are therefore unlike the New York Upper Devonian form Eleutherokomma pennatus var. posterus (Hall and Clarke) (Pl. I, figs. 1-9). The median fold of the New York form is relatively broad and flat, whereas that in the Gaspé material is circular in cross-section. The dental plates of the New York species include an angle approaching ninety degrees, enclosing a somewhat flabellate muscle field, whereas the dental lamellae of the Gaspé species are subparallel and enclose a narrow muscle field that extends forward one-third the distance to the anterior margin. The brachial interior of the Gaspé form has a well-developed myophragm, whereas the specimens from New York do not possess such a structure although they do have a complex pattern of muscle scars not observed in the specimens from Gaspé. Last, and most important of all, is the presence in the Gaspé specimens of the closely spaced, lamellose growth lamellae which characterizes both Mucrospirifer and Eleutherokomma.

Remarks. A similar form occurs in the Tomhegan Formation [Schoharie (Lower Emsian) in age], and in collections from Nictaux, Nova Scotia. The fauna of the Nictaux beds has not been completely described, but is possibly of Lower Emsian age (Boucot, 1960, p. 131).

Occurrence. Lower Devonian in Maine, Nova Scotia and 'Heppel' Formation of Gaspé.

Material. Hypotypes, Geological Survey of Canada, Nos. 16519 to 16522. 'Heppel' Formation, from the lower part of hill where Lacroix Road reaches Four Mile Brook, 5 miles east of Causapscal (see Quebec Dept. Mines map 1262, Stearn 1959).

Family CENTRONELLIDAE

Subfamily EURYTHYRINAE

Genus Prionothyris Cloud, 1942

Prionothyris sp.

Plate II, figure 1

Brachial interior. Cardinalia consists of hinge plate, supported by crural plates, surmounted by mound-like, terminally bifid cardinal process, a low myophragm medially divides the muscle field which is weakly impressed. Posterior face of cardinal process serrate.

Remarks. This brachial valve was collected by Ells (1884, p. 23E) from Miner Brook, from beds now assigned (McGerrigle, 1953) to the York River Formation. This particular specimen is more akin to undescribed material from the Tomhegan Formation (Schoharie in age) and the high Lower Devonian beds at Highland Mills, New York, than to the specimens from beds of Oriskany age in New York and Maryland.

Geologic range. Lower Devonian (Oriskany to Schoharie).

Geographic range. Appalachian region, and Colombia.

Material. Hypotype GSC 16523; Ells' Miner Brook locality as shown on GSC map 3 S.W. 1884; York River Formation, Dunière township, Matane co., Gaspé. On Miner Brook, one mile above the junction with Moose Brook, (see Quebec Dept. Mines map 1000, 1953).

Family RHIPIDOTHYRIDAE Cloud

Subfamily GLOBITHYRINAE Cloud

Genus Rhenorensselaeria Kegel, 1913

Rhenorensselaeria macgerriglei Boucot, n. sp.

Plate II, figures 3-9

Exterior. Outline subcircular, globular, pedicle valve the larger, pedicle beak incurved over brachial valve's beak, costellae about one millimetre in width, anterior margin rectimarginate and crenulate, about fifty costellae on each valve.

Pedicle interior. Short dental plates, muscle field strongly bipartite, that portion included between dental plates separated by low ridge from anterior portion of muscle field. Posterior portion of muscle field is medially divided by low myophragm, whereas anterior portion is medially divided by strongly developed myophragm that has triangular cross-section. Posterior portion of muscle field consists of two pairs of elongate impressions, exterior pair being slightly shorter than interior.

Brachial interior. Cardinal plate composed of medially conjunct hinge plates, supported by crural plates that fuse into small cruralium which is supported by median septum. Two small knobs surmount each half of cardinal plate.

Comparison. R. macgerriglei differs from R. stringiceps (Romer, 1844) in that it is relatively gibbous and globular as contrasted with the elongate outline of the latter. R. macgerriglei differs from R. crassicosta (Koch, 1881) in its finer costellation (Pl. II, fig. 2).

The figured specimens (Pl. II, figs. 2-9) all show the characteristic pedicle musculature of the genus Rhenorensselaeria. This feature distinguishes it readily from Globithyris in the absence of brachial interiors.

Remarks. Rhenorensselaeria macgerriglei is the first known occurrence of the genus in North America. In Belgium the genus is not known above the Siegenian (Mailleux, 1931), but in Rhineland it occurs in strata of Lower Emsian age.

Geologic range. Beds of high Lower Devonian age (Mailleux, 1931) in Europe, and the Gaspé Sandstone (lower part).

Material. Holotype, Redpath Museum No. 2.3564, paratypes, R.M. Nos. 2.3565 to 2.3567. 1,000 feet upstream above mouth of a west-flowing tributary of 6-mile Bogan Brook, 5 miles upstream from the junction of 6-mile Bogan Brook with the Salmon Branch of the Cascapedia River, Richard township, Matane county, Gaspé, Quebec. Collected by Dr. Côme Carbonneau, Quebec Department of Natural Resources.

Genus Globithyris Cloud, 1942

Globithyris sp.

Exterior. Globular shells, subcircular outline, multi-costellate, pedicle beak incurved over brachial valve, anterior margin rectimarginate, crenulate.

Pedicle interior. Short dental plates enclose undivided muscle field, posterior end of muscle field strongly carinate as seen in impressions, lacking myophragms or lateral ridges.

Brachial interior. Cardinal plate comprised of fused hinge plates supported by cruralium formed from crural plates and median septum. No cardinal process.

Comparison. The specimens are costate, resembling G. callida Clarke rather than G. diania Clarke in the character of their ornamentation.

Geologic range. Areas from which Globithyris has been positively identified are: Somerset county, Maine, where it is found in beds of both Oriskany and Schoharie age; Restigouche county, New Brunswick, where G. of G. callida (Clarke) occurs in sandstone (GSC loc. 34184) near the Quebec-New Brunswick boundary about one mile west of longitude 68°00'; and Upper Lake Branch River (Lake Branch Formation), Richard-Gravier area, Gaspé (Carbonneau, 1959, p. 35).

Collecting locality. Inlet River, three and one half miles west of the point where Inlet River takes sharp bend north towards Loon Lake, Dunière township, Matane-Matapedia county line, Gaspé (48°35'00"N, 66°25'30"W), collected by Dr. Côme Carbonneau for the Quebec Department of Natural Resources and deposited in the collections of the Q. D. N. R.

Phylum MOLLUSCA

Class GASTROPODA

Family PROTOWARTHIDAE

Subfamily BUCANELLINAE

Genus Nylanderina Boucot, n. gen.

Type species. Nylanderina goldringae Boucot, n. sp.

Diagnosis. Trilobed, bellerophontid with V-shaped sinus on median lobe, no selenizone, ornamentation consisting of coarse, longitudinal ribs.

Comparison. Nylanderina has longitudinal ornamentation whereas Bucanella (Plectonotus) (Clarke, 1899) which has a similar shape, has growth lines only. Bucanella (Bucanella) Meek, 1871 possesses a very broad, flat, almost smooth median lobe, as opposed to the strongly curved, ornamented median lobe of Nylanderina and the former is almost smooth, lacking the strongly developed revolving ornamentation of the latter.

Geologic range. Lower Devonian to Middle Devonian.

Collecting localities. First dam on Misery Stream above Brassua Lake, Somerset county, Maine (U.S.G.S. Sil.-Dev. No. 2713); Pine Hill (Highland Mills), Orange county, New York; Cayuga Lake, New York (loc. 428 of Herbert H. Smith's notes for 1871); Shurger's Glen, near Norton's Landing Cayuga Lake, halfway up the side of the third fall (going up from the lake), eleven and one half feet below the Tully Limestone (Div. 2, stratum 10 of section); Gaspé Basin, Quebec.

Species Assigned

Bellerophon rotalinea Hall, 1879, Natural History of New York, Paleontology, Vol. V, Part II, p. 115, Plate XXVI, fig. 8; this publication Pl. II, fig. 12.

Nylanderina goldringae Boucot, n. sp. Plate II, figures 10, 11, 13-18. Plate III, figures 1-4.

Description. Bellerophontid gastropods of medium size, trilobed, narrowly phaneromphalous with V-shaped sinus on median lobe; whorl profile trilobed, median lobe with circular profile, somewhat broader than lateral lobes, lateral lobes separated from median lobe by rounded depression; umbilici narrow; outer lip with moderately narrow, V-shaped sinus culminating on crest but not giving rise to a selenizone; ornamentation consisting of coarse, revolving ribs; shell thin, its structure unknown.

Remarks. This species differs from Nylanderina rotalinea (Hall) in possessing less coarse longitudinal ornamentation (see Plate II, figure 12).

Opik's (1935, p. 20, Plate VII, figures 52-54) Kokenospira (Tritonophon) tremetra possesses ornamentation and form very similar to Nylanderina goldringae but Opik (op. cit.) reports the presence of a "short and wide U-shaped slit-notch" as opposed to the V-shaped sinus of N. goldringae. It is possible that Nylanderina is synonymous with Opik's Lower Silurian subgenus Tritonophon, but in the absence of illustrations of the sinus or comparative material of the latter, an element of doubt exists.

Material. Holotype, U.S.N.M. No. 125303; additional figured and unfigured paratype specimens are U.S.N.M. Nos. 125304-125306. All above specimens are from the Tomhegan Formation, Misery Stream, Brassua Lake quadrangle, Somerset county, Maine, U.S.G.S. Sil.-Dev. Locality No. 2713. Additional paratypes from Gaspé and New York are illustrated.

Order GRAPTOLOIDEA

Family MONOGRAPTIDAE Lapworth 1873

Monograptus aequabilis (Pribyl, 1941)

Plate III, figures 5-9

1941 Pristiograptus aequabilis n. sp. - Pribyl; Mitt. tschech. Akad. Wiss., Sl, 8, Pl. 1, figs. 6-8.

1959 Monograptus uncinatus var. micropoma Jaekel; Cumming, 1959, p. 19.

1959 Monograptus aequabilis (Pribyl, 1941); Jaeger 1959, pp. 102-105, pl. 1, fig. 8; pl. 4, fig. 3; pl. 5, figs. 1-5 and text-fig. 17 a-b.

Description. Rhabdosome almost straight, except for a gradual ventral curvature of the dorsal side of the proximal portion embracing th5-10. The characteristic feature of this species is the peculiar biformism of the thecae: th1 has a large well-developed hood of uncinatus type, i.e. an unpaired arched mesial structure, which extends from the dorsal side of the thecal aperture down beyond its ventral margin, and surrounds and encloses the true aperture.

Th2 has a much smaller hood, it attains at the most, 1/3-1/2 the size of that in th1. All succeeding thecae fail to develop a real hood, but instead – after a short transitional interval comprising th3-4(5) – form only well-marked supra-apertural ridges, which project 0.1 mm over the free ventral walls.

The apertures of the hood-less thecae have the appearance of small rounded to triangular excavations. Their margins are thickened, and consequently form a distinct lip ventrally and laterally. The free ventral walls stand vertically, i.e. parallel to the axis of the rhabdosome if seen in precise side view. This character is clearly visible until the distal end even in one of the longest rhabdosomes. Number of thecae in the initial cm: 10-11, in the second cm 8-10. Width: 1±0.1 mm at th 1 including the hood; 0.8-0.9 mm above the hood of th 1; 1.7-1.8 mm in the distal portion (beyond th10-12) of non-tilted rhabdosomes. These figures compare closely to those of flattened European specimens, the maximum width of which attains 1.8-2 mm. Greatest length: 20-30 mm; (some European specimens, with 50 thecae, attain 60 mm).

Occurrence. Cape Rosier Cove, Forillon Peninsula, Gaspé, Quebec. For exact locality see Cumming, 1959, Figs. 1, 2, 4 and Plate III.

GSC loc. 18985 Cape Rosier Cove, 16 feet above the base of the Cape Bon Ami Formation.

Types. Hypotypes, GSC Nos. 11324 a-c.

Age. The stratigraphic position of M. aequabilis in Gaspé lies near the Silurian-Devonian boundary. Beds containing M. aequabilis were previously assigned to the Silurian (Jaeger, 1959, p. 31, Fig. 4). This interpretation was used in Gaspé by Cumming (1959) and Burk (1964). Jaeger (1962, Table I) now assigns these same beds to a post-Skala horizon belonging to the M. uniformis zone and interprets these beds as Gedinnian.

Until recently, M. aequabilis has been known only from the basal Lochkovian (zone of Monograptus uniformis) in Central Bohemia (Czechoslovakia) and the uniformis zone in the Upper Graptolitic Slates in Thuringia (Germany). According to Spasov (1963) it occurs also in the uniformis zone in Bulgaria. In Thuringia, M. aequabilis is restricted to the lower and middle portion of the uniformis zone. As interpreted by Boucot (1960), Boucot and Pankiwskyj (1962), Jaeger (1962), E. and H. Tomczyk (1962), Walliser (1962) and Alberti (1962, 1963) the base of the Lochkovian corresponds closely to the base of the Gedinnian (Lower Devonian) as delimited by R. and E. Richter (1954), i.e. the Huinghauser Schichten in the Rhineland or the Schistes de Mondrepuits in the Ardennes. Following this interpretation, the beds containing M. aequabilis in Gaspé are approximately equated with the basal Lochkovian and with the Lower Gedinnian.

However, in Central Bohemia, the type Lochkovian is usually delimited from the underlying Budnanian by a sharp lithological change, which is accompanied by a corresponding faunal break; M. uniformis makes its first appearance 3-6 feet below this break, i.e. in the uppermost layers of the Budnanian.

Closely associated stratigraphically with M. aequabilis is the crinoid Scyphocrinus. In eastern Gaspé, Scyphocrinus occurs in the Griffon Cove River Formation (Cumming, 1959) which occurs stratigraphically beneath the Cape Bon Ami Formation M. aequabilis horizon.

In Europe, from Poland to North France (Normandy) and in North Africa, Scyphocrinus, where it is associated with graptolites, is restricted to the post-Ludlovian pre-Gedinnian stage (Upper Budnanian) or but inconsiderably ranging into the uniformis zone.

Summary of fauna and flora of Gaspé Sandstone Group

Brachiopoda

Chonostrophids of the Chonostrophia dawsoni type and rhipidomellids of the Dalejina musculosa type, both present in the lower part of the Gaspé Sandstone, are not known elsewhere in North America above Lower Devonian beds.

The presence of the following genera is evidence for the Lower Devonian age of the lower part of the Gaspé Sandstone: Eatonia, Etymothyris, Amphigenia, Prionothyris, Rhenorensselaeria, Globithyris, Eodevonaria, Beachia.

Evidence for dating the Gaspé Sandstone Group is now based upon a morphological sequence of terebratuloid brachiopods. This sequence was established in eastern New York (Boucot, 1959) and consists of the developmental sequence of: Rensselaeria, Etymothyris, and Amphigenia (see Table II). Rensselaeris is restricted to Becraft-Oriskany strata in eastern New York, and in eastern Gaspé has been found in the lower part of the Grande Grève Formation as well as in the medial part of the 'Causapscal' Formation of western Gaspé. Etymothyris is restricted to the lower half of the Esopus Formation in New York; the upper part of the Grande Grève Formation as well as the overlying York River Formation of eastern Gaspé; and the upper part of the 'Causapscal' Formation and the lower part of the 'Heppel' Formation of western Gaspé. These Etymothyris-containing beds make up the zone of Etymothyris. Small species of Amphigenia are restricted to Schoharie strata (Oliver's 1960 "Zone B") and Camden Chert; in New York, and to the Four Mile Brook collecting locality of the 'Heppel' Formation in Gaspé. Eodevonaria arcuata (Hall) is characteristically associated with these Amphigenia occurrences. Brachiopod zones are not recognized from the Battery Point Formation or from the Lake Branch Formation.

Pelecypoda

Restudy of the collections made by Clarke and by Kindle show that the specific identity of most of the pelecypods in the Gaspé Sandstone fauna is difficult to determine owing to their poor state of preservation, and the inadequacy of present day criteria for discriminating pelecypod species. Previous specific identifications are open to question in many cases, and thus the pelecypods do not afford a satisfactory basis for establishing the age of the Gaspé Sandstone.

Dr. G.A. Cooper had contributed the following information about the pelecypod species which Kindle (1938, p. 36) indicated as being either identical with or closely related to Hamilton species:

1. Ledabrevirostris Hall

   The form from the Gaspé Sandstone is specifically distinct from the New York species as shown by the more rotund anterior of the latter, more nasute posterior, and more angular posterior slope.

2. Palaeoneilo maxima (Conrad)

The form from the Gaspé Sandstone is specifically distinct from P. maxima as indicated by the more nasute posterior of the Hamilton species.

3. Nuculites triquetrus (Conrad)

The Gaspé Sandstone species is much less triangular than the New York form, and has a more elongate outline, indicating that it belongs to a distinct species.

4. Schizodus appressus Hall

Its specific identity is questionable because of the generalized nature of the specimen.

5. Sphenotus truncatus (Conrad)

Clarke's (1908) Figures 10 and 12, probably are modiomorphids as they lack the rib on the posterior slope. The specimen represented by his Figure 11 has a more rounded outline than do specimens of the New York species.

6. Phthonia cylindrica Hall

This specimen may not belong to the genus Phthonia because it lacks the characteristic oblique ornamentation of that genus. Furthermore, the Gaspé specimen is not the same as the Hamilton one, differing in its nasute anterior, and broader posterior.

7. Modiella pygmaea (Conrad)

Clarke's Modiella (1908, p. 231, Pl. 23, fig. 7) is suggestive of the Hamilton species but is much less oblique. The Gaspé specimen is such a generalized form that it is doubtful if any specific characters are available.

8. Grammysia canadensis Billings

Grammysia canadensis is much wider than the Hamilton species G. bisulcata (G. hamiltonensis to which Clarke, 1908 made comparison). The cincture is much weaker, and the umbo is less nodose. However, G. canadensis is actually more like G. ovata Sandberger from the Lower Devonian of the Rhineland (Beushausen, 1895) than to the Hamilton species.

9. Actinopteria (Pterinea) fronsacia Clarke

Even Clarke (1908, p. 230) mentions that this form is also similar to a Lower Devonian species from Brazil. It is probably too erect to be properly assigned to Actinoptera, and is certainly not similar to the Hamilton species A. boydi.

Gastropoda

All of the genera recorded from the Gaspé Sandstone are long ranging and by themselves cannot provide information on the precise age of the sandstone. The genus Nylanderina, regarded by Clarke and Kindle as a representative Hamilton form, is now known to range at least as low as the Schoharie equivalent in northern Maine. Callonema bellatulum cited by Kindle (1938, p. 36) as a Hamilton species is now known from strata of Lower Devonian (Onondaga and Schoharie) age (Knight, in Shimer and Shrock, 1942).

Echinodermata

Echinoderms are rare in the Gaspé Sandstone. The only crinoid found is too poorly preserved to be generically identified. Starfish from the Gaspé Sandstone have been described by Ruedemann (1926, p. 79) as a variety of Devonaster eucharis. Inspection of Plate 12, figures 1 and 3 of Schuchert's 1915 monograph of the Palaeozoic stellaroids shows that the abactinal central portion of Spaniaster is covered with large plates whereas the same portion of Devonaster is covered by a mass of very small plates. Also, the three rows of plates on the abactinal side of the arms are much larger in Spaniaster than in Devonaster. The Gaspé Sandstone starfish is more in agreement with Spaniaster than with Devonaster in regard to these characters.

Devonaster is known only from the Middle and Upper Devonian of New York, whereas Spaniaster is reported only from the Lower Devonian of Europe.

Vertebrata

Romer and Grove (1935), Denison (written communications 1951, 1955), and Westoll (oral communication) agree that the vertebrates of the Gaspé Sandstone are of Lower Devonian age. However, L. S. Russell (written communication 1953) indicates that though the Lower Devonian affinities are strongest it may be too early to rule out the Middle Devonian owing to the lack of information regarding the Devonian vertebrate faunas of North America.

Plants

The flora contained in the lower two thirds of the Gaspé Sandstone indicate a Lower Devonian age because of the presence of Drepanophycus (Dorf and Cooper, 1943). François Stockmans, Royal Museum of Natural History, Brussells (oral communication 1955) thought the Psilophyton

remains, described from the Gaspé Sandstone by Dawson, were Lower Devonian forms. Kräusel (1961) also favours a Lower Devonian age for the Psilophyton-bearing beds of the Gaspé Sandstone.

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PLATE I

Eleutherokomma and Howellella

Figures 1-5 Eleutherokomma pennatus var. posterus (Hall and Clarke); figures reproduced from Vol. VIII, Pt. 2, Pl. XXXIV of the "Paleontology of New York". All specimens are from the Chemung of Tompkins County, N.Y.

Figure 1 Brachial internal impression, XI; Hall and Clarke's fig. 30.

Figure 2 Brachial exterior, XI; Hall and Clarke's fig. 27.

Figure 3 Pedicle interior, X2; Hall and Clarke's fig. 31.

Figure 4 Brachial internal impression, XI; Hall and Clarke's fig. 29.

Figure 5 Pedicle internal impression XI; Hall and Clarke's fig. 28.

Figures 6-9 Eleutherokomma pennatus var. posterus (Hall and Clarke): Hypotype U.S.N.M. No. 124124; Ithaca beds at Ithaca, N.Y.

Figure 6 Posterior view of brachial internal impression, X2.

Figure 7 Posterior view of pedicle internal impression, X2.

Figure 8 Posterior view of brachial internal impression, X2.

Figure 9 Brachial and pedicle internal impressions, X2.

Figures 10-13 Howellella aff. H. nictavensis (Dawson); all specimens from Kindle's (1938) Four Mile Brook locality ('Heppel' Formation). Locality shown on map 1262, Quebec Dept. Mines, 1959.

Figure 10 Brachial internal impression X2, Hypotype, G.S.C. No. 16519.

Figure 11 Pedicle internal impression X2, Hypotype, G.S.C. No. 16520.

Figure 12 Brachial internal impression X2, Hypotype, G.S.C. No. 16521.

Figure 13 Brachial external impression X3, Hypotype, G.S.C. No. 16522.

Plate I

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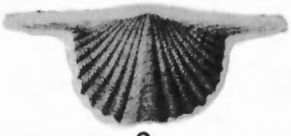

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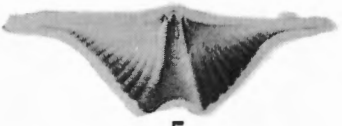

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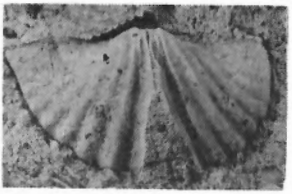

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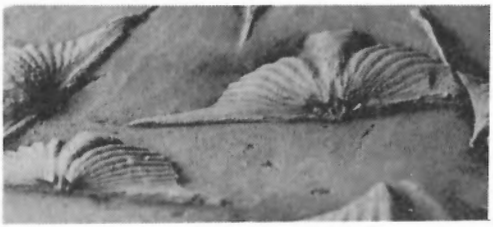

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PLATE II

Prionothyris, Rhenorensselaeria, Nylanderina

Figure 1 — Prionothyris sp. - rubber cast of brachial interior impression XI, fig. spec., GSC No. 16523; York River Formation, Dunière township, Gaspé, Miner Brook, one mile above junction with Moose Brook (see Quebec Dept. Mines map 1000, 1953). Ells' Devonian locality on Miner Brook (see GSC map 3 S.W. Province of Quebec, 1884).

Figure 2 — Rhenorensselaeria crassicosta (Koch, 1881) from the Coblenzian at Silbersand, Germany; specimen deposited in collection of the Museum of Comparative Zoology, Cambridge, Massachusetts, MCZ No. 9F19, posterior view of flattened internal impression, XI.

Figures 3-9 — Rhenorensselaeria macgerriglei Boucot, n. sp., Gaspé Sandstone, Inlet River, Gaspé.

Figures 3, 6 — Side and brachial views XI; paratype, Redpath Museum No. 2.3565.

Figure 4 — Posterior view of internal impression XI; holotype, R.M. No. 2.3564.

Figure 5 — Posterior view of rubber impression XI; holotype, R.M. No. 2.3564.

Figure 8 — Brachial view of internal impression X2; paratype, R.M. No. 2.3567.

Figures 7, 9 — Posterior view of internal impression (flattened) and rubber cast of same XI; paratype, R.M. No. 2.3566.

Figures 10-11, 16-18 — Nylanderina goldringae Boucot, n. sp.; from railroad cut at Highland Mills, Orange co., N.Y. from beds of high Lower Devonian age. This material was figured by Clarke (1909, Plate 32). All material consists of dental wax squeezes.

Figures 10, 17 — Apertural view, X4 (Clarke's fig. 24).

Figure 11 — Side view, X4 (Clarke's fig. 23).

Figure 12 — Nylanderina rotalinea (Hall) - Hamilton group from Cayuga Lake, N.Y.; side view of Holotype, X4, N.Y. State Museum, Albany, New York type No. 12707.

Figure 16 — Anterior view, X4 (Clarke's fig. 25).

Figure 18 — Side view, X4 (Clarke's fig. 26).

Figures 13-15 — Nylanderina goldringae Boucot, n. sp.; from Gaspé Sandstone, Gaspé, P.Q. This material consists of dental wax squeezes figured (Plate 17) by Clarke (1908).

Figure 13 — Side view, X4 (Clarke's fig. 3).

Figure 14 — Side view, X4 (Clarke's fig. 5).

Figure 15 — Side view, X4 (Clarke's fig. 6).

Plate II

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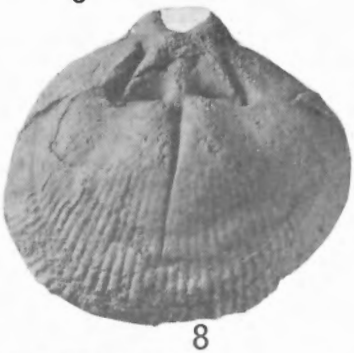

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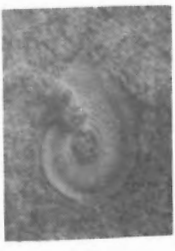

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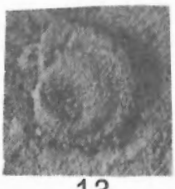

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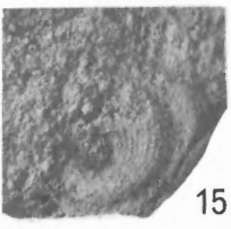

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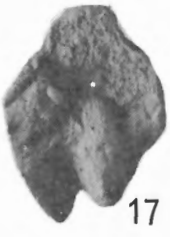

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PLATE III

Figures 1-4 Nylanderina goldringae Boucot, n. sp.; from Tomhegan Formation, Misery Stream, Somerset county, Maine. U.S.G.S. Sil.-Dev. locality No. 2713.

Figure 1 Side view X3, holotype, U.S.N.M. No. 125303.

Figure 2 Anterior view X3, holotype, U.S.N.M. No. 125303.

Figure 3 Side view of external impression X3, paratype, U.S.N.M. No. 125306.

Figure 4 Apertural view X3, holotype, U.S.N.M. No. 125303.

Figures 5-9 Monograptus aequabilis (Přibyl) Cape Bon Ami Formation (Petit Portage member), Cape Rosier Cove, Forillon Peninsula, Gaspé, Quebec.

Figures 5, 6 Complete but tilted rhabdosome consisting of 17 thecae and sicula, showing large hood of th 1 and much smaller hood of th2, ventral walls in the median and distal portion of the rhabdosome appear to be inclined due to tilting (oblique embedding) of the rhabdosome. Distally, a short piece of the virgula can be seen, fig. 5 x 3; fig. 6 x 5; - GSC loc. 18985, Hypotype GSC 11324a.

Figures 7, 8 Rhabdosome distally complete, proximally lacking parts of th1 (and th2?) and sicula, lying almost exactly on the side and showing well the climacograptid type of medial and distal thecae; interthecal septa of the distal thecae also visible, fig. 7 x 3; fig. 8 x 5; GSC loc. 18985, Hypotype GSC 11324b.

Figure 9 Proximal fragment (X5) showing the ventrally directed sicula with virgella, the well-developed large hood of th1, the much smaller hood of th2, the short supra-apertural rim and thickened ventral apertural margin of th4. Apertural region of th3 damaged - GSC loc. 18985, Hypotype GSC 11324c.

Plate III

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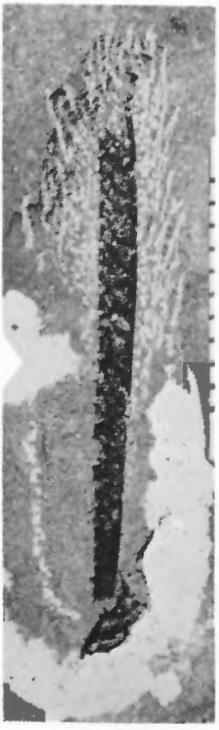

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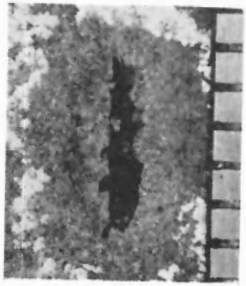

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1867 Centennial of Canadian Confederation 1967
Le Centenaire de la Confédération Canadienne 1967