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MIDDLE ORDOVICIAN (WHITEROCKIAN) GASTROPODS FROM THE TABLE POINT FORMATION, WESTERN NEWFOUNDLAND

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ABSTRACT

Seven gastropods from a silicified horizon within the Uromystrum validum *trilobite zone and the* Histiodella tableheadensis *conodont zone in the Spring Inlet Member of the Table Point Formation are documented. Gastropods from western Newfoundland comprise part of the Toquima–Table Head fauna, and eleven genera found in Newfoundland also occur in Whiterockian strata of Nevada. Five species of* Raphistomina, Lophospira, Donaldiella, Hormotoma, *and* Straparollina *originally described by E. Billings in 1865 from Middle Ordovician (Whiterockian) strata of Newfoundland are revised. Two species of* Scalites *and* Cataschisma *not previously reported from Newfoundland are also described. The gastropod genera* Hormotoma *and* Lophospira *are long-ranging genera that originated during the Early Ordovician.* Scalites, Raphistomina, Cataschisma *and* Donaldiella *appear to have originated during Whiterock time.*

INTRODUCTION

The Table Point Formation is a thick sequence of peritidal to subtidal carbonate rocks of Whiterockian age that outcrops extensively in the lower Paleozoic shelf sequence of western Newfoundland. The type section of the formation occurs just north of Bellburns, at Table Point on the Great Northern Peninsula, within the Table Point Ecological Reserve (Figure 1). The formation has been extensively studied for a variety of macro- and micro-fossils. Gastropods, originally studied by Billings (1865, pages 222-251) form part of the macrofauna. Most recently, ten macluritoid and euomphaloid species from the Whiterock of western Newfoundland, including material from the section at Table Point, were described, as part of a regional study by Rohr and Measures (2001). This report describes additional species from one of the localities at Table Point.

Richardson *in* Logan *et al.* (1863, pages 287-292; 865-871) provided the first stratigraphic division of the succession at Point Riche and Table Point, following his 1861 and 1862 reconnaissance mapping of western Newfoundland. Divisions K to N (Richardson *in* Logan *et al.*, 1863, page 865) were first referred to as the Table Head Series by Schuchert and Dunbar (1934, pages 16 and 38) who divided it into three parts. The Table Head Formation was proposed by Whittington and Kindle (1963), who recognized Schuchert and Dunbar's tripartite subdivision. Later, the lower member became the Table Point Formation, when the succession was elevated to group status as a result of stratigraphic studies by Klappa *et al.* (1980); *see also* Stenzel *et al.* (1990). The lower part of the Table Point Formation was assigned to the Spring Inlet Member by Ross and James (1987).

The Table Point Formation (Plate 1) consists of thick to massive, bioclastic limestone, algal sponge wackestone to packstone, and algal oncolitic wackestone (Stenzel *et al.*, 1990). The upward-deepening environments of deposition include tidal flat, lagoon, shoal, and sponge bioherms (Klappa *et al.*, 1980). Ross and James (1987) established the Spring Inlet Member for the lower 10 to 40 m of peritidal carbonate rocks of the Table Point Formation; they correlated the brachiopod fauna with that of the *Anomalorthis* zone of the Great Basin. The Table Point Formation contains gastropods throughout the section, but only the silicified specimens are dealt with here. At Table Point, three cherty intervals occur in the Table Point Formation (Stouge, 1984, page 16, Figure 16; Figure 2). Silicified gastropods occur in all three intervals, but they are most common in the lowest interval at locality 1996R003, which lies within unit A2 of Stouge (1984) in the Spring Inlet Member of Ross and James (1987). The gastropods occur in dolomitic wackstone to packstone and are interbedded with laminated and cross-laminated dolomitic mudstone.

[1] Regional Geology Section

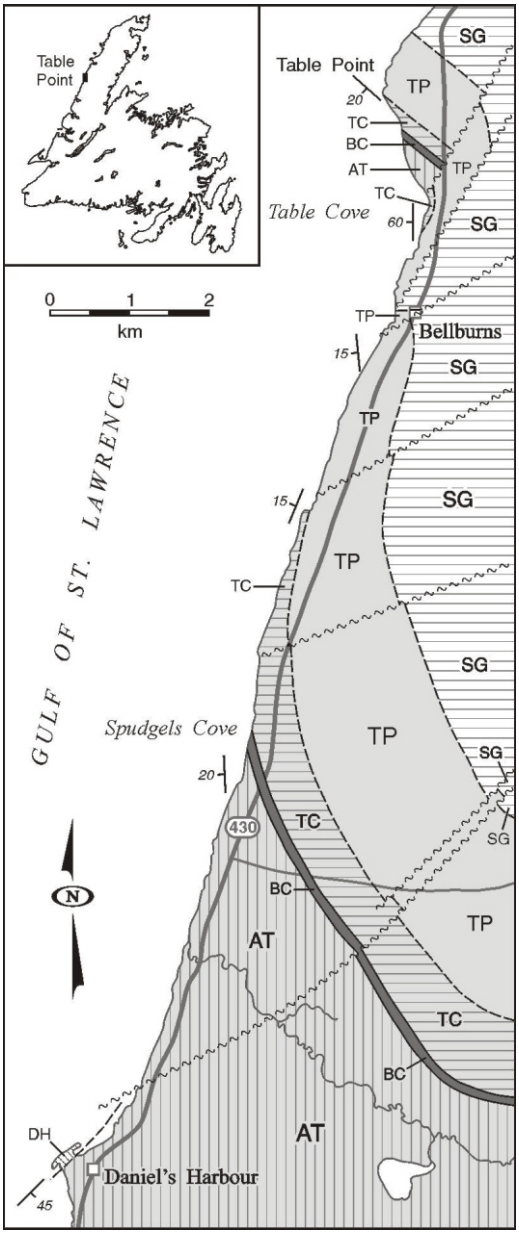

Figure 1. *Geological map of the Table Point Ecological Reserve and environs (from Stenzel* et al.*, 1990). SG - St. George Group; TP - Table Point Formation (Table Head Group); TC - Table Cove Formation (Table Head Group); BC - Black Cove Formation (Goose Tickle Group); AT - American Tickle Formation (Goose Tickle Group); DH - Daniel's Harbour Member, American Tickle Formation (Goose Tickle Group).*

The Table Point locality lies within the *Histiodella tableheadensis* conodont zone (Stouge, 1984), and the *Uromystrum validum* trilobite zone (Boyce, 1997). This interval has been correlated with the *Anomalorthis* brachiopod zone of the Great Basin (Ross and James, 1987).

Plate 1. *Table Point Formation, Table Point Ecological Reserve, looking southwest. Note the gentle syncline.*

BIOGEOGRAPHY

A distinct Whiterockian gastropod fauna (Table 1) exists in North America (Newfoundland, Nevada, British Columbia and Alaska). These Whiterockian gastropods are a part of the Toquima–Table Head Fauna, best known from the Toquima Range, Nevada and the Table Head Group in Newfoundland. The Toquima–Table Head (biogeographic) Province was named by Ross and Ingham (1970) for a carbonate belt that was peripheral to the trans-equatorial Ordovician North American continent (as well as part of Siberia, Kazakhstan, and Scandinavia) and contained characteristic Whiterockian brachiopods and trilobites. Although western Canada and Alaska are included in Table 1, no large collections of gastropods have yet been made from those areas.

Ten genera occur in both Nevada and Newfoundland. The genera *Monitorella*, *Malayaspira*, and *Straparollina*, and the species *Rossospira harrisae* Rohr, 1994 and *Helicotoma gubanovai* Rohr, 1994 are diagnostic of this fauna. The genera *Maclurites*, *Lytospira*, *Lophospira*, and large *Hormotoma* are present, but they are also found in younger Ordovician rocks. *Palliseria* is common in the Whiterockian strata of western North America, but has not been found in Newfoundland.

SYSTEMATIC PALEONTOLOGY

REPOSITORY OF ILLUSTRATED MATERIAL

The specimens illustrated in this report are housed in the Provincial Museum of Newfoundland and Labrador (NFM), St. John's.

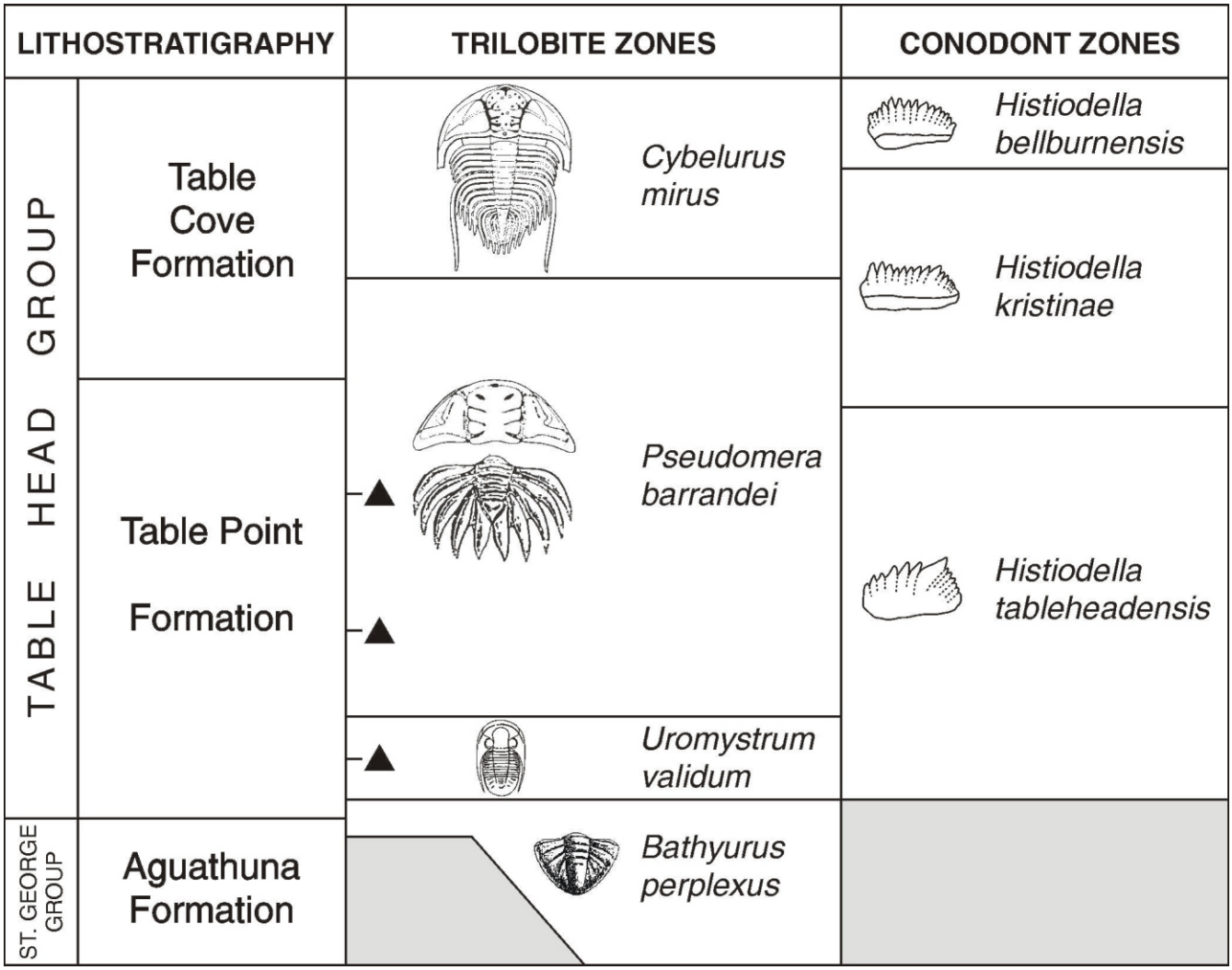

Figure 2. *Lithostratigraphy and trilobite and conodont biostratigraphy of the uppermost St. George Group and the Table Head Group within the Table Point Ecological Reserve. Trilobite and conodont zonations after Boyce (1997) and Stouge (1984). Base of each zone is the FAD (First Appearance Datum) of the nominate species. Black triangles indicate chert horizons. 1996R003 was obtained from the lowest chert horizon, within the Spring Inlet Member of Ross and James (1987).*

SYSTEMATIC DESCRIPTIONS

Superfamily PLEUROTOMAROIDEA Swainson, 1840
Family RAPHISTOMADIDAE Koken, 1896
Genus *Scalites* Hall, 1847

Type species. Scalites angulatus Emmons 1842, from the Chazy Group of Chazy, New York, U.S.A.

Distribution. *Scalites* Emmons, 1842 is only known from three species, of which *S. angulatus* Emmons, 1842 is the most common. Poorly preserved examples of other species are known form the upper Arenig strata of Malaysia (Kobayashi, 1934, 1958), and lower Whiterockian strata of Alaska (Rohr *et al.*, 1992).

Scalites angulatus Emmons, 1842
Plate 2; plate figures 1-4

1842 *Scalites angulatus*, Emmons, page 312; Figure 84.
1847 *Scalites angulatus*, Hall, page 27; Plate 6, Figures 1a-b.
1908 *Scalites angulatus*, Raymond, page 183; Plate 48, Figures 7-10.
1941 *Scalites angulatus*, Knight, page 301; Plate 21, Figures 4a-e.

Discussion. The shell resembles the raphistomatids *Scalites* Emmons, 1842 and *Raphistoma* Hall, 1847. *Scalites* is only known from three species while *Raphistoma* – once assigned as a subgenus of *Scalites* by Salter (1859) – has

Table 1. Occurrence of Whiterockian gastropods in Nevada, (NV) Newfoundland (NL), and western Canada and Alaska (CA)

Genus	NV	NL	CA
Tropidodiscus sp.	X	X	
Groomodiscus rossi	X		
Palliseria robusta	X		X
Monitorella spp.	X	X	
Maclurites spp.	X	X	X
Operculum of *Maclurites* spp.	X	X	X
Rousseauspira sp.	X		
Helicotoma sp.	X		X
Helicotoma gubanovai	X	X	
Walcottoma frydai	X		
Lytospira spp.	X	X	X
Ecculiomphalus sp.	X		
Ecculiomphalus owenanus		X	
Pachystrophia devexa		X	
Barnesella spp.	X		X
Malayaspira spp.	X	X	X
Rossospira harrisae	X	X	
Onychochilid aff. *Laeogyra*	X		
Scalites spp.		X	X
Raphistoma hortensia		X	
Liospira cf. *americana*	X		
Clathrospira spp.	X	X	
Lophospira spp.	X	X	X
Donaldiella cicelia		X	
Trochonemella antelopensis	X		
Cataschisma aff. *C. typica*		X	
Straparollina spp.	X	X	
gen. aff. *Oriostoma*	X		
Murchisonia sp.	X	X	
Raphistomina lapicida	X		
Mimospira aff. *M. cochleata*	X		

over twenty species assigned, including some once included in *Scalites*. Species of *Raphistoma* such as *R. aperta* Salter, 1859, *R. lapicida* Salter, 1859, *R. lenticularis* (Sowerby *in* Murchison, 1839), *R. pelhamensis* Butts, 1926, *R. staminea* Hall, 1847, and *R. striata* Hall, 1847, are wider than high and have flat or nearly flat spires.

The most common species of *Scalites* is *S. angulatus* Emmons, 1842. The basal portion of the Newfoundland specimen is identical, but the apical area is slightly lower in profile (about 120°). Both show a thickening in the columella. *Scalites katoi* (Kobayashi, 1934), and *S. irregulare* Kobayashi, 1934, are based on poorly preserved specimens. Kobayashi (1958, page 87) stated that these species had a lower spire than *S. angularis*. *Scalites? alaskensis* Rohr, Dutro and Blodgett, 1992, is similar in profile but has a narrow umbilicus.

Strong growth lines near the base of the shell show evidence of breakage and repair (Plate 2; plate figure 1).

Occurrence. Locality 1996R003, Spring Inlet Member of the Table Point Formation at Table Point. This genus was not reported from Newfoundland by Billings (1865).

Figured specimen. NFM F-420

Genus *Raphistomina* Ulrich and Scofield, 1897

Type species. Raphistomina lapicida Ulrich and Schofield, 1897, from the Black River Group of Allumette Island, Québec, Canada.

Distribution. The genus *Raphistomina* appears in the Antelope Valley Formation (Whiterockian) of Nevada (Rohr, 1994), and the youngest report is from the Port Clarence Limestone (Ashgill) of Alaska (Rohr, 1988).

Plate 2. (opposite page) *Silicified gastropods (Plate figures 1 to 28) from the lower part of the Table Point Formation, Table Point Ecological Reserve, western Newfoundland. All specimens are from locality 1996R003. Explanation of plate figures. Plate figures 1-4.* Scalites angulatus *Emmons, 1842. Abapertural, basal, apical and apertural views (x 1, specimen NFM F-420). Plate figures 5-7.* Raphistomina hortensia *(Billings, 1865). Apical, apertural and basal views (x 1.5, specimen NFM F-421). Plate figures 8-13.* Lophospira sororcula *(Billings, 1865). Plate figure 8. Side view, (x 3, specimen NFM F-422). Plate figures 9, 10. Basal and abapertual views (x 2, specimen NFM F-423). Plate figures 11-13. Abapertural, apertural, and basal views (x 2, specimen NFM F-424). Plate figures 14-15.* Donaldiella cicelia *(Billings, 1865). Side views (x 4, specimens NFM F-425 and F-426. Plate figures 16-19.* Cataschisma typica *Branson, 1909. Apertural, apical, abapical and basal views (x 3, specimen NFM F-427). Plate figures 20-25.* Straparollina pelagica *Billings, 1865. Plate figures* 20-23. *Apertural, oblique side, abapertural, and basal views (x 1.5, specimen NFM F-428). Plate* figures 24-25. *Apertural and basal views of a larger specimen (x 1.5, specimen NFM F-429). Plate figures 26-28.* Hormotoma augustina *(Billings, 1865). Plate figure* 26. *Side view of fragment of larger specimen showing band and flattened upper whorl surface (x 1, specimen NFM F-430). Plate figures 27, 28. Side views of two smaller specimens showing rounded whorl profile, 27, (x 2, specimen NFM F-431) and 28, (x 1, specimen NFM F-432).*

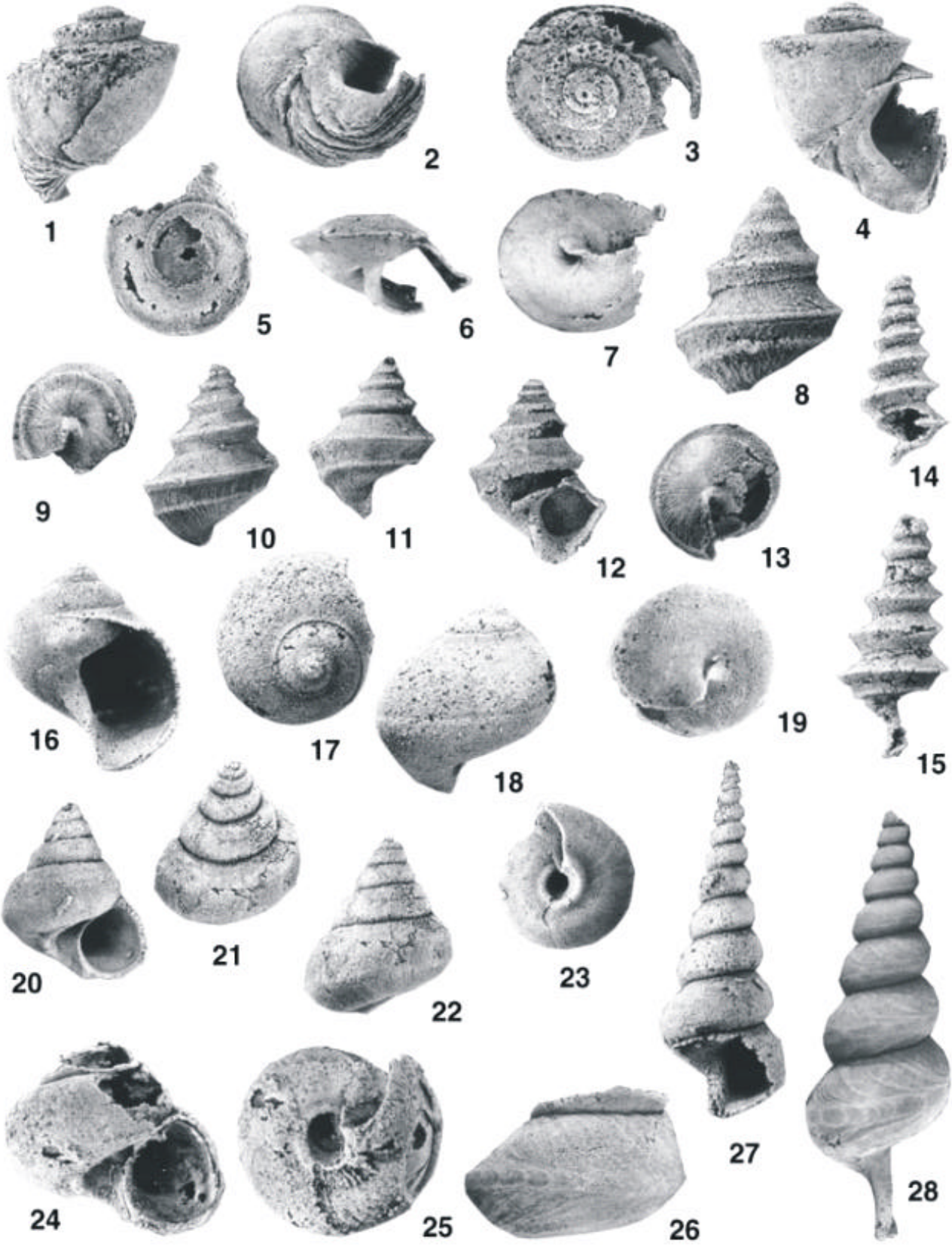

Plate 2

Raphistomina hortensia (Billings, 1865)
Plate 2, plate figures 5-7

1865 *Pleurotomaria hortensia*, Billings, page 227; Figure 211.
1890 *Raphistoma hortensia*, Whitfield, page 32; Plate 1, Figures 15-16.

Discussion. *Raphistomina hortensia* was named by Billings (1865) for specimens from Table Point. This shell is less gradate in profile than *Scalites* and has the characteristic acute margin of *Raphistomina*. There is no type specimen (T.E. Bolton, personal communication, 1997), but Billings' illustration shows the shell slightly higher spired. A late Canadian gastropod assigned to this species by Whitfield (1890) is very similar, but its base is not as extended. Billings (1865) stated the species is close to his *Pleurotomaria harpya*, which is based on one internal mold.

Occurrence. Uncommon at locality 1996R003, Spring Inlet Member of the Table Point Formation at Table Point. Billings (1865) reported the species to occur at Table Point from Division H – equivalent to the Catoche Formation.

Figured specimens. NFM F-421.

Family LOPHOSPIRIDAE Wenz, 1938
Genus *Lophospira* Whitfield, 1886

Type species. Lophospira milleri Miller, 1877, from the Trenton Group of Watertown, New York, U.S.A.

Distribution. *Lophospira* is known to range from Whiterockian through Blackriverian, with some younger occurrences in the Late Ordovician (Tofel and Bretsky, 1987). The Newfoundland occurrence is one of the oldest.

Lophospira sororcula (Billings, 1865)
Plate 2; plate figures 8-13

1865 *Murchisonia sororcula*, Billings, page 233; Figure 220.

Emended description. Moderate size (17 mm high), apical angle 60 to 65°, anomphalous having two whorl angulations: a well-developed carina bearing the selenizone at the periphery and a weaker angulation on the lower whorl surface; suture flush in early whorls and becoming incised in later whorls; whorl surface concave above and below carina, base convex; growth lines prosocyrt, curving back into selenizone.

Discussion. *Lophospira sororcula* is known only from Newfoundland, but it appears to be closely related to *L. perangulata* Hall, 1847, a common North American species in the Middle Ordovician. *Lophospira perangulata* has a narrow umbilicus, and some specimens have a narrow sutural shelf.

Occurrence. Locality 1996R003, Spring Inlet Member of the Table Point Formation at Table Point. Billings (1865) reported the species to occur at Table Point and Point Riche from Divisions H, I, K, L, M, and N – equivalent to the Catoche, Aguathuna, Table Point, and Table Cove formations, according to Ross and James (1987).

Illustrated specimens. NFM F-422, F-423, and F-424

Genus *Donaldiella* Cossman, 1903

Type species. Goniospira filosa Donald, 1902, from the Whitehouse Group of Ayrshire, Scotland, U.K.

Distribution. Poorly preserved specimens of *Donaldiella* are known from the Upper Arenig of Norway (Holtedahl, 1915), the Upper Ordovician of Scotland (Donald, 1902) and China (Grabau, 1922), and the Silurian (lower Ludlow) of Bohemia (Horný, 1952).

Donaldiella cicelia (Billings, 1865)
Plate 2; plate figures 14 and 15.

1865 *Murchisonia cicelia*, Billings, page 231; Figure 219.

Discussion. The high spire and the strongly angular whorls are characteristic of *Donaldiella.* Poorly preserved specimens of *Donaldiella norvegica* (Holtedahl, 1915) of the same small size and shape are known from the Upper Arenig of Norway. Late Ordovician species *Donaldiella filosa* (Donald, 1902) from Scotland, and *D. derwiduii* (Grabau, 1922) from China, have higher whorl profiles. The lower Ludlow species *Donaldiella morinensis* Horný, 1952 is not as angular in profile.

Occurrence. Locality 1996R003, Spring Inlet Member of the Table Point Formation at Table Point; Black Point (Point Riche). Billings (1865) reported the species to occur at Table Point and Point Riche from Division L – equivalent to the Table Point Formation, according to Ross and James (1987).

Illustrated specimens. NFM F-425 and F-426.

Family GOSSELETIDAE Wenz, 1938
Subfamily COELOZONINAE Knight, 1956
Genus *Cataschisma* Branson, 1909

Type species. *Cataschisma typa* Branson, 1909, from the Branson Chert of Branson, Missouri, U.S.A.

Distribution. *Cataschisma typica* Branson, 1909, is previously known only from the Blackriverian of Missouri, (Branson, 1909). The genus (and the included *Globispira* Koken, 1925) occurs in the Ashgill of Alaska (Rohr, 1988) and the Baltic (Koken, 1925), and the Silurian (Wenlock) of Sweden (Lindström, 1884).

Cataschisma typica Branson, 1909
Plate 2; plate figures 16-19

1909 *Cataschisma typica*, Branson, page 43; Plate 7, Figure 15.
1941 *Cataschisma typica*, Knight, page 69; Plate 28, Figure 6.

Description. Small, 14-mm-high, rapidly expanding naticiform shell with adpressed whorls having an apical angle of 75°; weak, convex selenizone below midwhorl, no growth lines preserved; whorl profile uniformly convex except concave next to suture; parietal inductra absent, inner lip curves backward around a very narrow umbilicus.

Discussion. *Cataschisma exquisita* (Lindström, 1884) has a wider umbilicus and is cryptomphalous, and *C. pillula* (Koken, 1896) has spiral ormament. *Globispira nitida* Koken, 1925 and *G. microsoma* Koken 1925 both have the selenizone at midlwhorl. Because of the lack of preserved ornamentation and the limited number of specimens, these specimens are assigned to *Cataschisma typica* Branson, 1909, from the Middle Ordovician of Missouri. The Newfoundland specimens have a slightly higher spire (75°) and a weakly convex selenizone.

Occurrence. Uncommon at locality 1996R003, Spring Inlet Member of the Table Point Formation at Table Point. Billings (1865) did not report this genus from Newfoundland.

Illustrated specimen. NFM F-427.

Superfamily PLATYCERATOIDEA Hall, 1859
Family HOLOPEIDAE Wenz, 1938
Genus *Straparollina* Billings, 1865

Type species. *Straparollina pelagica* Billings, 1865, from the Catoche Formation of Pistolet Bay and Cape Norman, western Newfoundland, Canada.

Distribution. In Newfoundland, *Straparollina pelagica* Billings, 1865, was previously known only from rocks of late Canadian (Cassinian) age. The genus occurs in Middle Ordovician strata of North America with one occurrence on Smøla Island, Norway (Strand, 1932).

Straparollina pelagica Billings, 1865
Plate 2; plate figures 20-25

1865 *Straparollina pelagica*, Billings, page 223; Figure 205.
1941 *Straparollina pelagica*, Knight, page 337; Plate 52, Figures 6a-b.

Emended description. Turbiniform, narrowly phaneromphalous shell, up to 2.5 cm high, apical angle about 60°; rounded angulation at mid-whorl; apertural plane tangential with no re-entrants, smooth shell surface except for weak growth lines, and circumumbilical cord; impressed suture at midpoint of previous whorl.

Discussion. The rounded, turbiniform shell is characteristic of the Holopeidae, and the circular umbilical ridge is found on *Raphispira* Perner, 1903 and *Straparollina* Billings, 1865. *Raphispira plena* Perner, 1903, a rare shell from the Upper Silurian of Bohemia, is more rounded and has a weaker spiral cord. The Newfoundland specimen is similar to *Straparollina martinensis* (Rohr, 1996), from the Middle Ordovician of Nevada, but that species is low-spired, more rounded, has a narrower umbilicus and a distinct, separate funicle, and the spiral cord is farther from the umbilicus. *Straparollina circe* (Billings, 1860) is lower spired and has a much wider umbilicus, while *S. eurydice* (Billings, 1860) has a weak circumumbilical cord and an undulose surface. The spire of *S. holdedahli* Strand, 1932, is lower and has a more rounded profile. Both *S. asperostriata* Billings, 1860 and *S. harpa* Hudson, 1905, have strong growth lines, and *S. obtusa* Whiteaves, 1892, from the Middle Devonian of Manitoba, does not have a circum-umbilical angulation.

Occurrence. Uncommon at 1996R003, Spring Inlet Member of the Table Point Formation at Table Point. Billings (1865) reported the species from Pistolet Bay and Cape Norman in Divisions G and H – equivalent to the Catoche Formation.

Illustrated specimens. NFM F-428 and NFM F-429.

Superfamily MURCHISONOIDEA Koken, 1896
Family HORMOTOMIDAE Wenz, 1938
Genus *Hormotoma* Salter, 1859

Type species. *Murchisonia gracilis* Hall, 1847, from the Trenton Group of Watertown, New York, U.S.A.

Distribution. The oldest known occurrence of *Hormotoma augustina* (Billings) is Early Ordovician (late Canadian) and possibly continues through Middle Ordovician (Ulrich and Scofield, 1897).

Hormotoma augustina (Billings, 1865)
Plate 2; plate figures 26-28.

1865 *Murchisonia augustina*, Billings, page 234; Figure 221.
1897 *Lophospira augustina?*, Ulrich and Scofield, page 987; Plate 71, Figures 1 and 2.

Emended description. Large (up to 10 cm high), high spired (20 to 25°), narrow, convex selenizone at midwhorl; whorl surface uniformly convex between impressed sutures in early whorls (Plate 2; plate figure 26); more angular in later whorls (Plate 2; plate figures 27 and 28), surface broadly convex between selenizone and sutures; outer lip of aperture not preserved; growth lines sweep back sharply and convexly from suture to selenizone; weak lunula on selenizone on larger specimens (Plate 2; plate figure 26); base of lip near columella folded to form a minute umbilicus behind inner lip.

Discussion. This species is the most abundant large shell at locality 1996R003. Smaller specimens are more rounded and resemble *H. simulatrix* Billings, 1865, but that species is not as high-spired. Billings (1865, page 234) observed that casts of *H. augustina* closely resemble *H. bellicincta* (Hall, 1847), a common, but poorly known Ordovician species from eastern North America. Ulrich and Scofield (1897) identified large internal molds as *H. augustina* from the upper Middle Ordovician strata of Minnesota.

Occurrence. Common at 1996R003, Spring Inlet Member and throughout the Table Point Formation at Table Point. The species also occurs in float from the Agathuna Formation at Table Point. Billings (1865) reported the species from Divisions H, I, K, L, M, and N – equivalent to Catoche, Aguathuna, Table Point, and Table Cove Formations, according to Ross and James (1987).

Illustrated specimens. NFM F-430, NFM F-431, and NFM F-432.

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