Current Research (2008) Newfoundland and Labrador Department of Natural Resources
Geological Survey, Report 08-1, pages 55-61

THE EDIACARAN FOSSIL *ASPIDELLA TERRANOVICA* BILLINGS, 1872 FROM ST. JOHN'S CONVENTION CENTRE TEST PIT CjAe-33

W.D. Boyce and K. Reynolds[1]
Regional Geology Section

ABSTRACT

Aspidella terranovica *Billings, 1872 – the first described Ediacaran body fossil – characterizes the Fermeuse fossil assemblage of eastern Newfoundland, which is developed in the Fermeuse Formation (St. John's Group). Well-preserved specimens of the* Aspidella-*,* Spriggia- *and* Ediacaria-*morphotypes are illustrated from Test Pit CjAe-33, and the distribution of the species in downtown St. John's is documented.*

INTRODUCTION

In 2004, the Ediacaran Period (Figure 1) was ratified by the International Union of Geological Sciences (IUGS) as an official geological period, the first new one declared for the two-centuries old Geologic Time Scale in 120 years. Dr. Guy Narbonne (personal communication, 2007) likened this to the discovery of a new planet in the solar system. Despite the recent definition of the Ediacaran Period (Knoll *et al.*, 2003), Ediacaran fossils have been known for well over a century.

According to Gehling *et al.* (2000), the first described Ediacaran body fossil is *Aspidella terranovica* Billings, 1872, which was first documented from outcrops of black sandstone and shale along Prescott and Duckworth streets in downtown St. John's (Plate 1). These beds occur at the top of what is now called the Fermeuse Formation, which forms the middle of the St. John's Group (Figure 2). Although Billings (1872) recognized *Aspidella terranovica* as a fossil organism, many subsequent authors viewed it as an inorganic structure (Figure 3). Gehling *et al.* (2000), however, re-emphasized its organic nature and concluded that it probably represented the attachment disc of a frond. They identified three primary morphotypes (Gehling *et al.*, 2000, page 434, Text-figure 5) – see Plate 2:

1) Type Morph (*Aspidella*) – flat to convex with radial grooves and central invagination

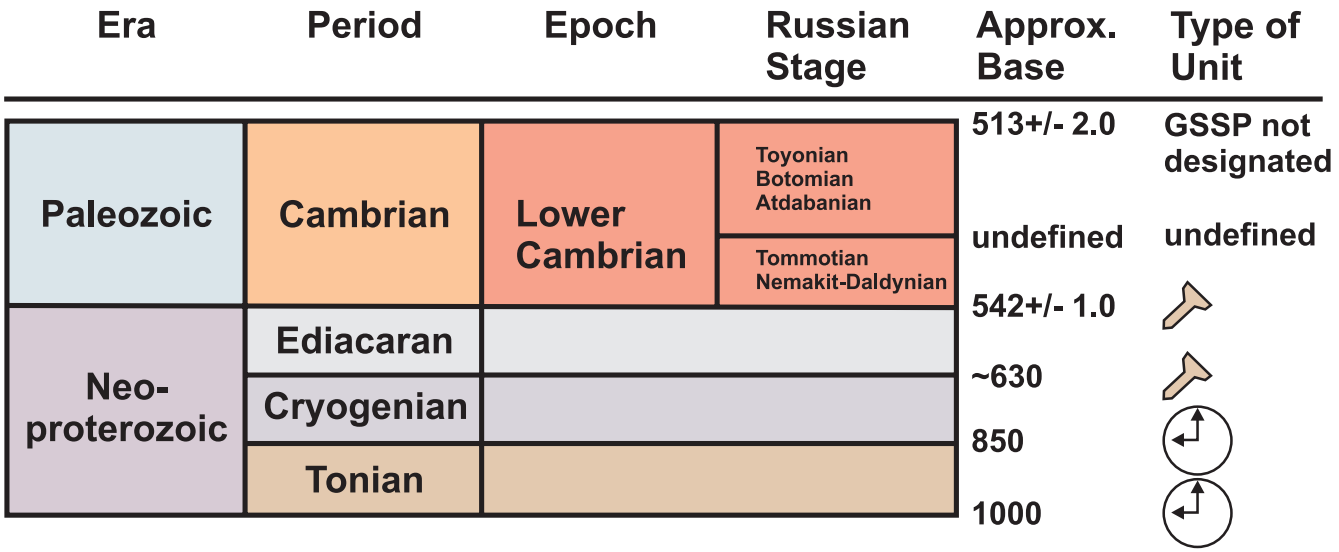

Figure 1. *Stratigraphic position of the Ediacaran Period in the Geologic Time Scale (From http://www.palaeos.com/Proterozoic/Neoproterozoic/Ediacaran/Ediacaran.htm#Current_Chronology). Key: Clock - radiometrically defined. Pin - Global Stratotype Section and Point (GSSP).*

[1]Provincial Archaeology Office

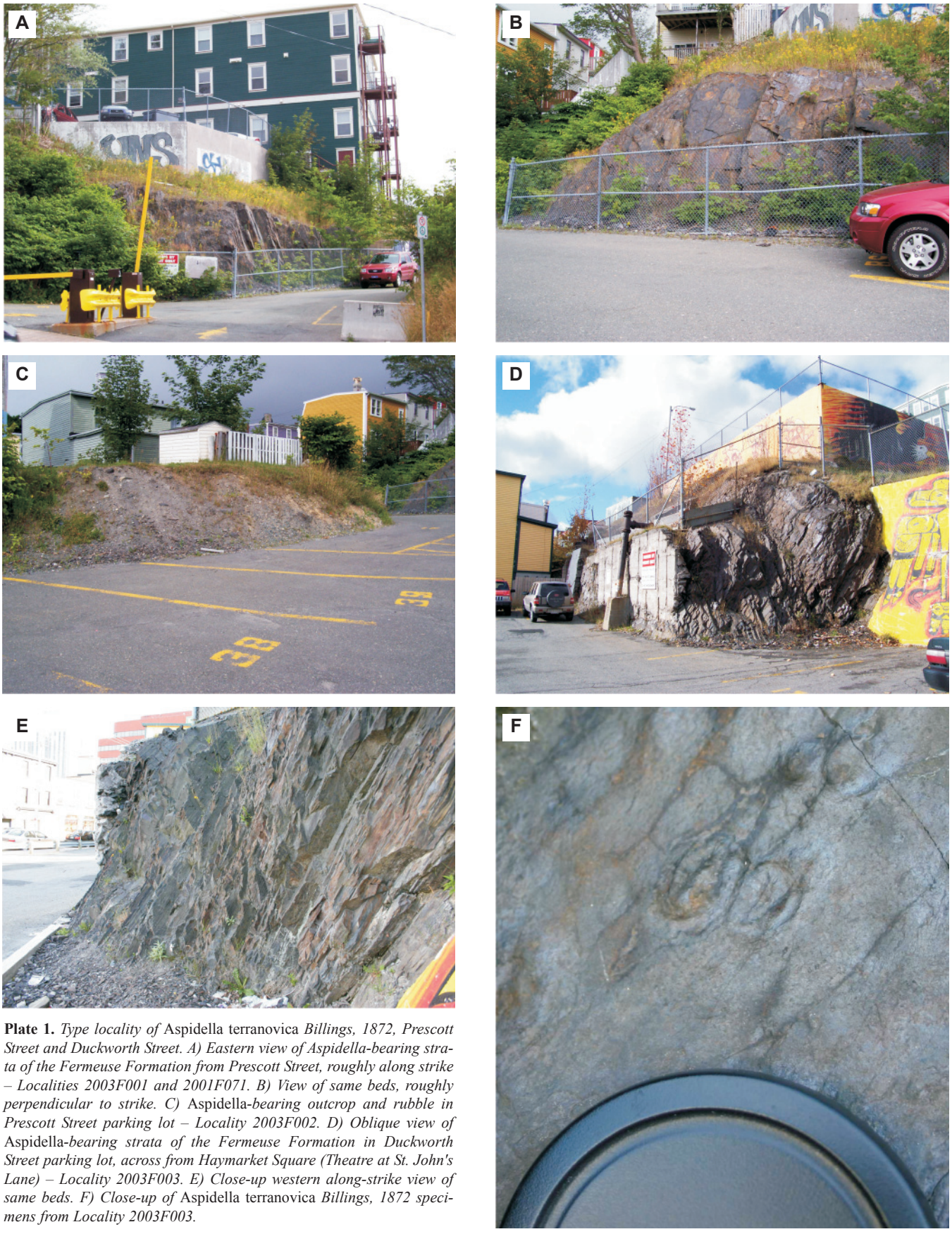

Plate 1. *Type locality of* Aspidella terranovica *Billings, 1872, Prescott Street and Duckworth Street. A) Eastern view of Aspidella-bearing strata of the Fermeuse Formation from Prescott Street, roughly along strike – Localities 2003F001 and 2001F071. B) View of same beds, roughly perpendicular to strike. C)* Aspidella*-bearing outcrop and rubble in Prescott Street parking lot – Locality 2003F002. D) Oblique view of* Aspidella*-bearing strata of the Fermeuse Formation in Duckworth Street parking lot, across from Haymarket Square (Theatre at St. John's Lane) – Locality 2003F003. E) Close-up western along-strike view of same beds. F) Close-up of* Aspidella terranovica *Billings, 1872 specimens from Locality 2003F003.*

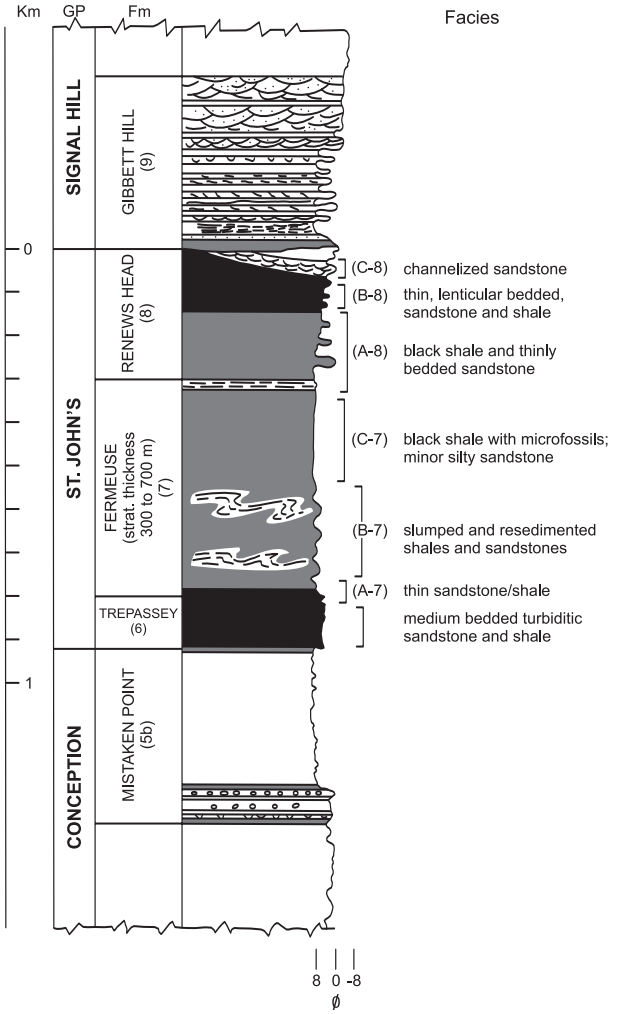

Figure 2. *Composite stratigraphic section of the St. John's Group (from King, 1990, page 45, figure 14).*

2) Flat Morph (*Spriggia*) – raised marginal rim and central boss, and
3) Convex Morph (*Ediacaria*) – prominent central boss, radial and concentric grooves.

Based on their analysis of the three morphological end members and their intermediate forms, Gehling *et al.* (2000, page 448, Table 1) indicated that *Aspidella terranovica* Billings, 1872 likely had priority over at least 24 later named Ediacaran fossil taxa.

PRESENT INVESTIGATION

On March 31, 1999, abundant specimens of *Aspidella terranovica* Billings, 1872 were identified in loose blocks of the Fermeuse Formation recovered by W.D. Boyce and K. Reynolds from Test Pit CjAe-33, dug in the George Street / Waldegrave Street parking lot (Plate 3) – now the site of the St. John's Convention Centre (Plate 4). Examples of each morph were obtained (Plate 5A-E) as well as a possible fossil of unknown affinity (Plate 5F).

PRECAMBRIAN FOSSILS, PSEUDOFOSSILS, AND PROBLEMATICA IN CANADA

Author	Date	Interpretation of Aspidella Billings
Hofmann	present	X Of mechanical origin; focussed surfaces of rupture
Cloud	1968	X Concretion or spall mark
Hantzschel	1965	X Inorganic; pressure cone or gas bubble crater
Glaessner	1962	X Inorganic; cites Walcott 1900 and Schindewolf 1956
Hantzschel	1962	X Inorganic; resembles *Guilielmites* Geinitz
A. E. Wilson	1957	? No opinion; cites interpretation of earlier authors
Schindewolf	1956	X Diagenetic; pressure cones or buckling through escaping gas bubbles
Rose	1952	? No opinion; quotes Walcott's (1900) interpretation
M. E. Wilson	1939	? No opinion; quotes Matthew's (1898) interpretation
M. E. Wilson	1931	? No opinion; quotes Matthew's (1898) interpretation
Metzger	1927	? Of questionable nature; like *Chuaria*, which Walcott considered a brachiopod
Clark	1923	X Sites of vents from which gas escaped
Buddington	1919	O Possible fossil
Van Hise & Leith	1909	O Page 80: organic origin is denied; p. 100: probably organic, but questionable
Sollas	1909	O Plainly organic
Walcott	1901	X Inorganic
Walcott	1900	X Spherulitic concretion
Walcott	1899	O Probably organic, but it may be questioned
Matthew	1898	X Slickensided mud concretion striated by pressure
Packard	1898	O Mollusk
Weston	1898 (1896)	X Probably concretion
Dawson	1897	O Problematic; may be crustacean or mollusk allied to limpets
Murray	1873 (1881)	O Fossil
Billings	1872 (1874, 1882, 1918)	O Fossils; resemble, but are different from *Chiton* or *Patella*
Murray	1868	O Obscure organic remains [resembling "Oldhamia"]

X Inorganic, or probably inorganic. O Organic, or possibly organic.

Figure 3. *Previous interpretations of* Aspidella *(from Hofmann, 1971, page 16, Figure 5).*

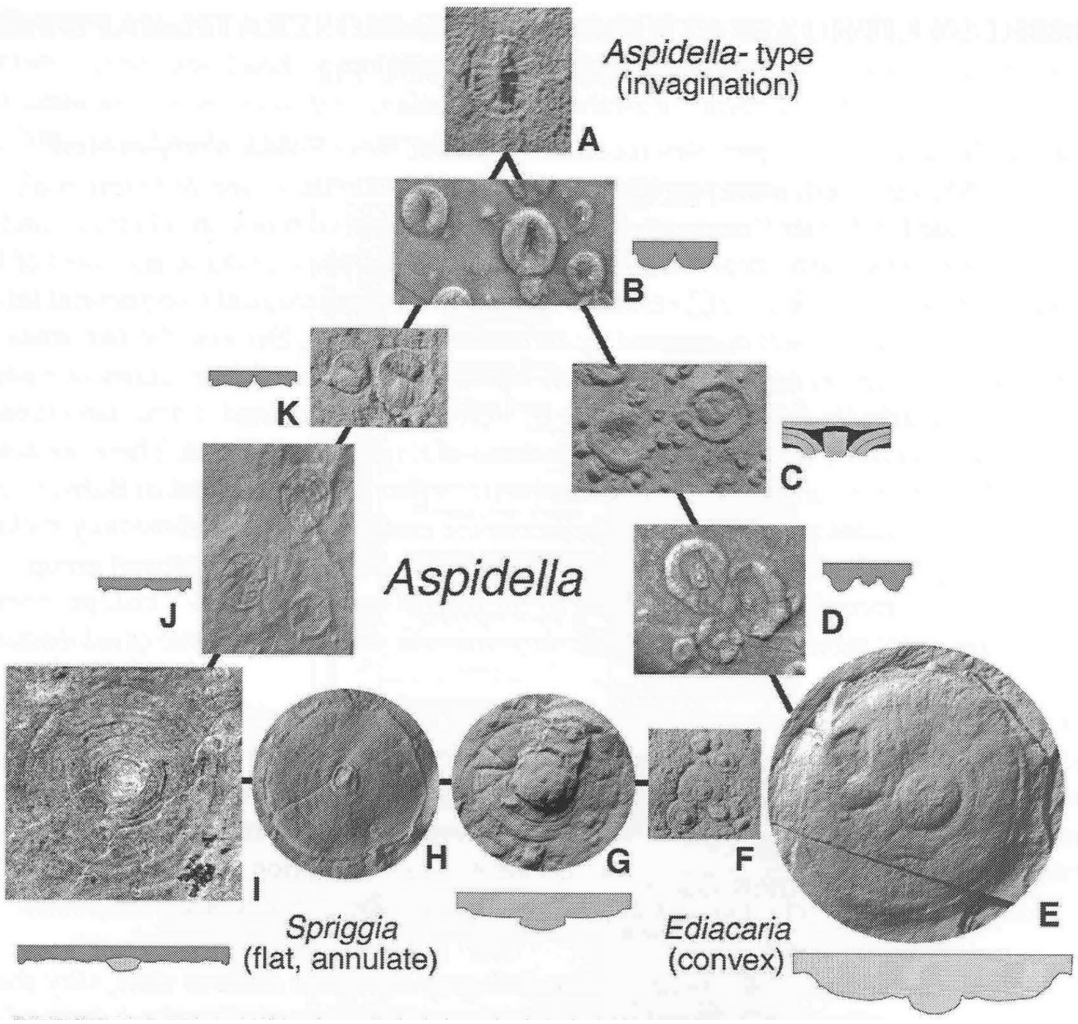

Plate 2. *The three morphotype end members of* Aspidella *with intermediate forms (modified from Narbonne* et al.*, 2005, page 29, plate 2).*

Plate 3. *George Street / Waldegrave Street parking lot on March 31, 1999 – Locality 1999F001. A) Test Pit CjAe-33 after excavation. Ken Reynolds in foreground. B, and C. Close-ups of test pit.*

Plate 4. *View from Waldegrave Street showing the Blue Peter Marine Associates Limited Building to the left of the stairs beside the convention centre. This is the approximate location of Test Pit CjAe-33 - Locality 1999F001.*

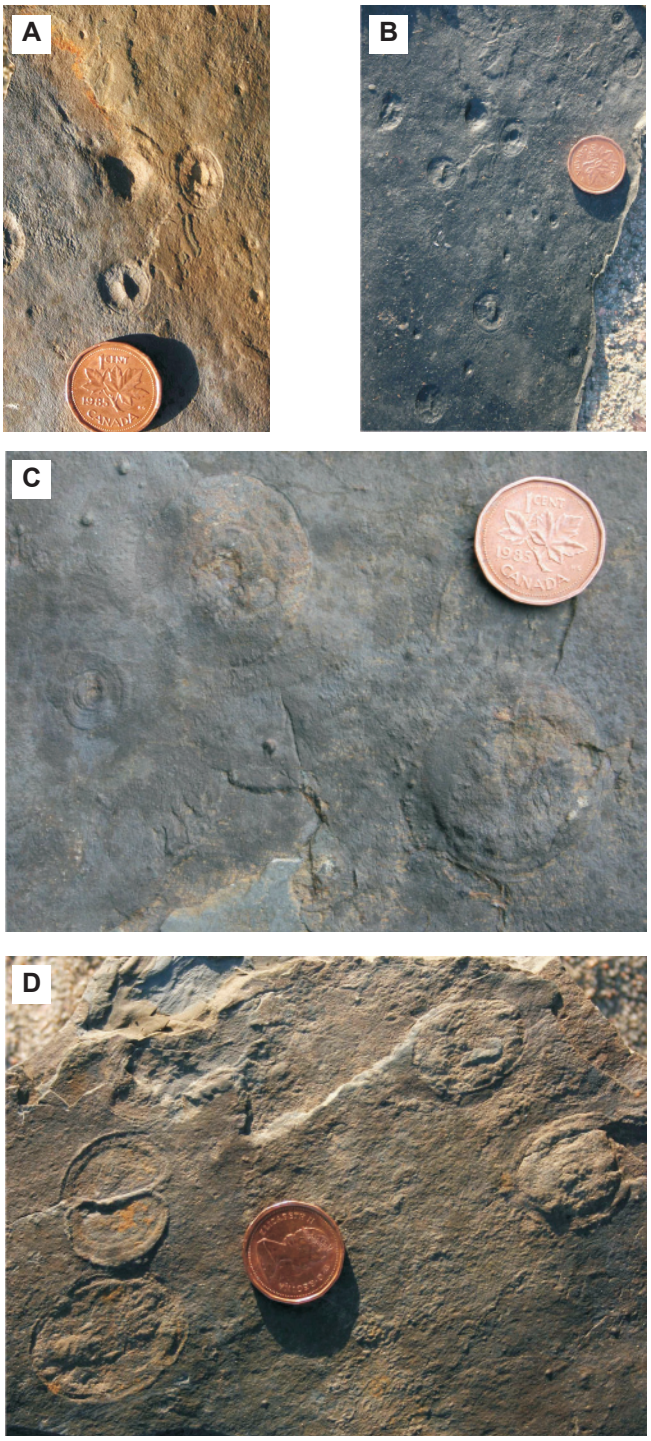

Plate 5. *Fossils from Test Pit CjAe-33 – Locality 1999F001. A) Type (invaginate) morphs (*Aspidella*), NFM F-743. B) Type (invaginate) morphs (*Aspidella*), NFM F-744. Note: This is a latex replica of the counterpart of NFM F-743. C) Flat, annulate morphs (*Spriggia*), NFM F-745. D) Flat, annulate morphs (*Spriggia*), NFM F-746. Note the flat morphs with mutually deformed boundaries. E) Convex morph (*Ediacaria*), NFM F-747. F) Possible fossil, NFM F-748. Pennies are 19 mm in diameter.*

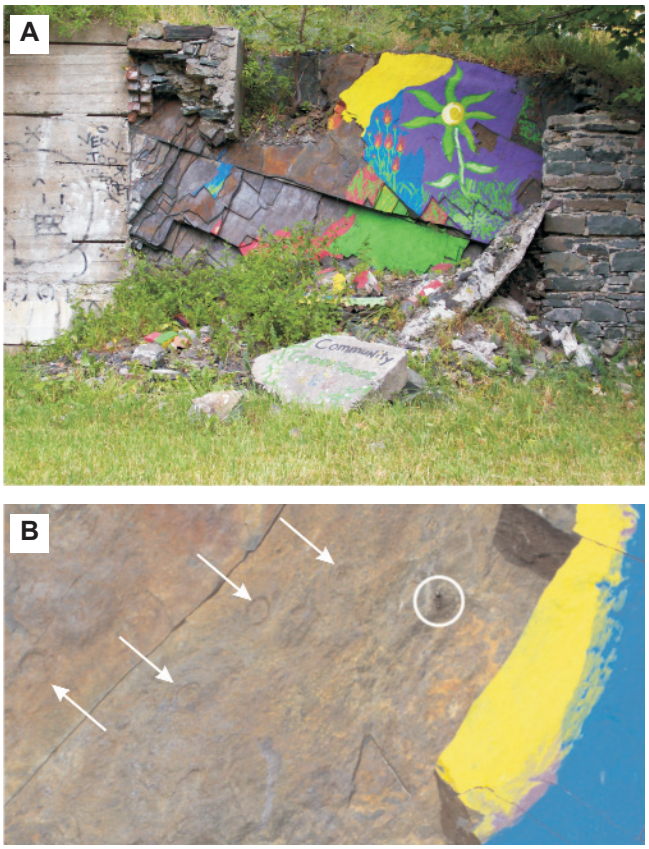

Plate 6. *Outcrop of* Aspidella*-bearing Fermeuse Formation in "Community Green Space" at Bell's Corner – Locality 2006F001. A) Overview of painted exposure. B) Poorly preserved small specimens of* Aspidella terranovica *Billings, 1872 (arrowed); ant (circled) for scale.*

Subsequent investigation of an outcrop of the Fermeuse Formation exposed in the "Community Green Space" at Bell's Corner, resulted in the discovery of small poorly preserved *Aspidella terranovica* Billings, 1872 (Plate 6). These were left in the outcrop.

ACKNOWLEDGMENTS

D. Boyce thanks his co-author, Mr. Ken Reynolds (Provincial Archaeology Office), for the invitation to participate in the dig, and for collecting the first fossil specimens. Drs. Art King (retired, Memorial University of Newfoundland), and Jim Gehling (South Australia Museum) and Guy Narbonne (Queen's University) are thanked for useful discussions. Randy Batten (Provincial Museum of Newfoundland and Labrador at The Rooms) kindly provided specimen numbers.

REFERENCES

Billings, E.
1872: On some fossils from the Primordial rocks of Newfoundland. Naturaliste Canadien, Volume 6, pages 465-479.

Gehling, J.G., Narbonne, G.M. and Anderson, M.M.
2000: The first named Ediacaran body fossil, *Aspidella terranovica*. Palaeontology, Volume 43, pages 427-456.

Hofmann, H.J.
1971: Precambrian fossils, pseudofossils, and problematica in Canada. Geological Survey of Canada, Bulletin 189, 146 pages.

King, A.F.
1990: Geology of the St. John's area., Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 90-2, 88 pages.

Knoll, A.H., Walter, M., Narbonne, G. and Christie-Blick, N.
2003: The Ediacaran Period: A New Addition to the Geologic Time Scale. International Commission on Stratigraphy, Terminal Proterozoic Subcommission, Unpublished Report, 35 pages (including dissenting comments).

Narbonne, G.M., Dalrymple, R.W., LaFlamme, M., Gehling, J.G. and Boyce, W.D. (Compilers)
2005: Life after Snowball: Mistaken Point Biota and the Cambrian of the Avalon. North American Paleontological Convention (NAPC 2005) Field Trip Guidebook, 100 pages.

APPENDIX – *Aspidella terranovica* Billings, 1872 Localities in the Fermeuse Formation (St. John's Group) – NTS map area 01N/10 (St. John's), UTM Zone 22

The datum for the fossil sites is NAD27. Unless otherwise indicated, all samples were collected by W.D. Boyce. All samples are indicative of the Ediacaran Fermeuse assemblage.

1999F001 = Waldegrave Parking Lot/Convention Centre Archeology Test Pit CjAe-33 of Ken Reynolds
George Street / Waldegrave Street parking lot. 371063E, 5268575N. Collected by W.D. Boyce and K. Reynolds.

Note: The UTM coordinates were measured on the sidewalk at the top of the stairs at the northwest corner of the St. John's Convention Centre, approximately where the fossils were originally collected.

2001F070
West side of Prescott Street. 371585E, 5269330N.

2003F001 = 2001F071
Immediately east of Prescott Street, behind chain link fence in Prescott Street parking lot. 371599E, 5269397N.

2003F002
Loose rubble in Prescott Street parking lot. 371608E, 5269379N.

2003F003
Parking lot across from Haymarket Square (Theatre at St. John's Lane). 371654E, 5629383N.

Note: 2003F001 (2001F071) to 2003F003 are all part of the Aspidella terranovica Billings, 1872 type locality (Plate 1).

2006F001
"Community Green Space", Bell's Corner. 371397E, 5269051N