

RECENT FOSSIL FINDS IN THE INDIAN ISLANDS GROUP, CENTRAL NEWFOUNDLAND

¹W.D. Boyce, P.Geo. and ²W.L. Dickson, P.Geo.

¹Regional Geology Section

²Mineral Deposits Section

ABSTRACT

During the 2004 and 2005 field seasons a number of fossiliferous exposures of the Indian Islands Group rocks were examined. The results of these fossil surveys are presented here. The occurrence of the bryozoan *Stictopora scalpellum* (Lonsdale, 1839) in many outcrops of the Silurian Indian Islands Group definitively dates these exposures as latest Wenlock (late Homerian). Several richly fossiliferous localities yield faunas indicative of Wenlock, late Wenlock (Homerian), and middle Ludlow (late Gorstian to early Ludfordian) ages.

INTRODUCTION

There is as yet no comprehensive, integrated lithostratigraphic–biostratigraphic scheme for the Silurian shelly faunas of the Indian Islands Group (IIG). Furthermore, apart from this report, the most extensive recent paleontological studies of the area remain those of Boyce *et al.* (1993), Boyce and Ash (1994) and Donovan *et al.* (1997).

In 2004, a total of six days was spent in the field with G.C. Squires and J. Lake, examining old and new fossiliferous exposures of the IIG – including Altius Minerals’ “Fossil Zone” and Jasperoid Showing; also fossiliferous drill core at the Beaver Brook antimony mine was studied (Figure 1). In 2005, three days were spent in the Glenwood area with W.L. Dickson and J. Lake, evaluating new fossiliferous IIG exposures (Figure 1).

AGE DETERMINATIONS

STICTOPORA SCALPELLUM (LONSDALE, 1839) LOCALITIES

The bryozoan *Ptilodictya scalpellum* was originally described by Lonsdale *in* Murchison (1839). It subsequently was re-illustrated by Murchison (1854, page 216; Fossils 36 - *see* Plate 1), who stated: “It is a common species in the Wenlock Limestone.” Most recently, this branching, stick form was described in detail by Snell (2004, pages 22-24; Plate 1, figures 11, 12; Plate 11, figure 4), who assigned it to *Stictopora* Hall, 1847; *Ptilodictya* is an unbranched genus (Snell, 2004, page 24). *Stictopora scalpellum* (Lonsdale, 1839) occurs in the Much Wenlock Limestone Formation of

Dudley, West Midlands, England, of late Homerian (latest Wenlock) age (Snell, 2004, page 6, Text-Figure 4).

Boyce (2004, page 7) identified *Ptilodictya scalpellum* Lonsdale, 1839 from a sawdust-filled quarry near Glenwood (JOD-2003-113 and LD05-0064 - *see* Plates 2 and 3) as well as from drill core at the Beaver Brook antimony mine (2004F016 - *see* Plate 4). During the summers of 2004 and 2005, *Stictopora scalpellum* (Lonsdale, 1839) was also identified from a number of additional IIG outcrops, including:

Altius Minerals’ “Fossil Zone” (GCS-2004-058 - *see* Plate 5).

Altius Minerals’ Jasperoid Showing (2004F031 - *see* Plate 6)

Stop 2-1 of Blackwood (1984, page 11) (LD05-0077 - *see* Plate 7)

“Bryozoan Ridge” (LD05-0360 - *see* Plate 8)

At most localities, *Stictopora scalpellum* (Lonsdale, 1839) either occurs alone or with abundant crinoid columnals. When it occurs in higher diversity assemblages, it tends to be a minor faunal component.

The occurrence of *Stictopora scalpellum* (Lonsdale, 1839) in various IIG outcrops definitively dates these exposures as late Homerian (latest Wenlock) in age.

BRACHIOPOD-RICH LOCALITIES

Glenwood “Overpass” (Williams, 1972)

On the south side of the Trans-Canada Highway, immediately east of the site of the old Glenwood overpass, is an

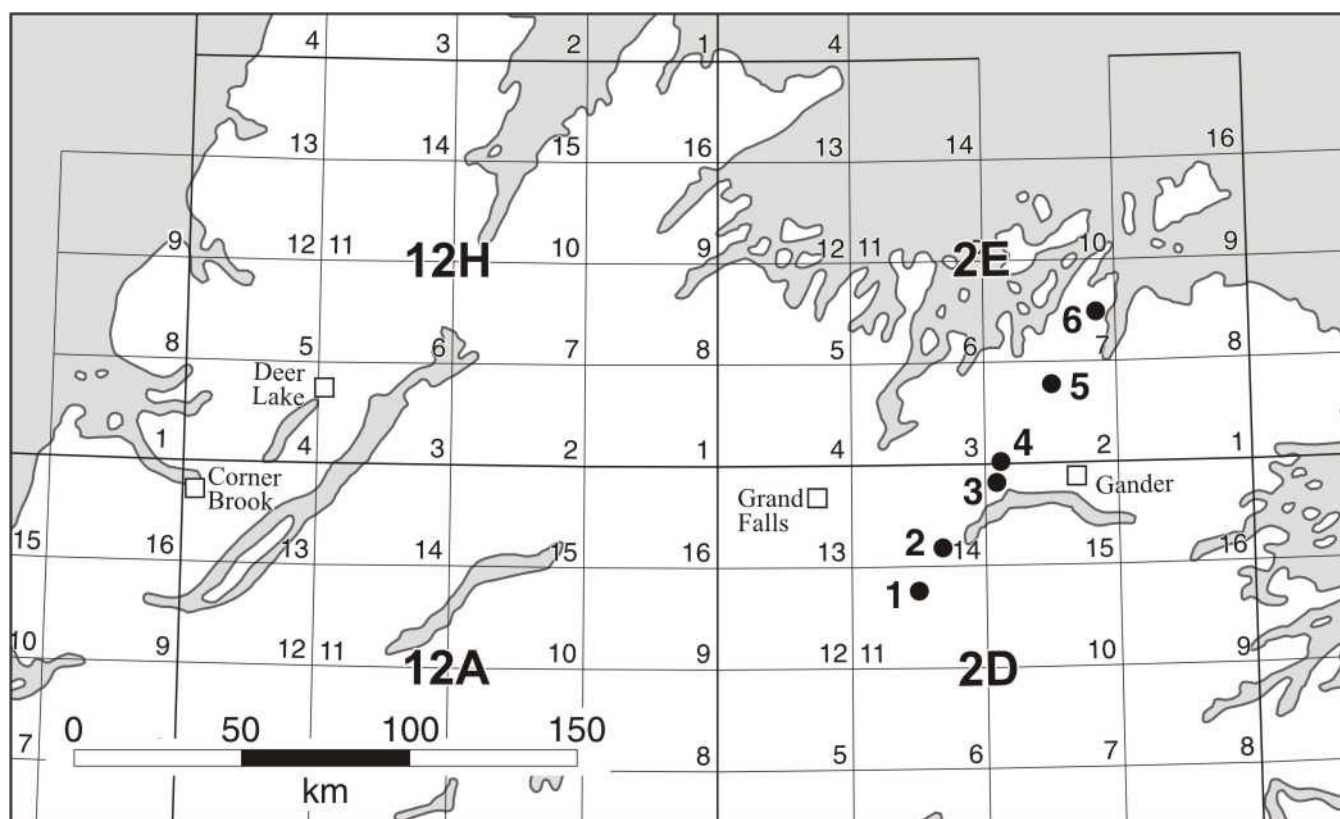


Figure 1. Approximate locations of fossil sites mentioned in this report. 1. Beaver Brook Mine. 2. Altius Minerals "Fossil Zone". 3. Altius Minerals' Jasperoid Showing; loose blocks in gravel pit. 4. Glenwood "overpass"; Blackwood Localities and "sawdust pit". 5. "Bryozoan Ridge". 6. Derek Fancy Localities.

exposure of fine-grained, massive micaceous sandstone that has weathered-out shelly, fossiliferous layers (LD05-0002 - see Plate 9). This is the classic locality of Williams (1972), which was partially destroyed during highway upgrading in the early 1990s. Boucot *in* Williams (1972, page 95) previously identified from this locality the following:

Anthozoa

syringoporoid

Brachiopoda–Articulata

Atrypa reticularis (Linnaeus, 1758)

Howellella sp.

Isorthis sp. aff. *I. orbicularis* Sowerby, 1839

Protochonetes sp.

leptostrophid

sphaerorhynchid

Hyalolitha–Orthothecida

orthotheidid

Mollusca–Gastropoda

snails

Boucot *in* Williams (1972, page 95), assigned the fauna a Wenlock age.

According to Copper (2004, page 34), the genus *Atrypa* Dalman, 1828 ranges from the late Llandovery (Telychian)

through the early Givetian (i.e., late Early Silurian to late Middle Devonian). However, the species *Atrypa reticularis* (Linnaeus, 1758) is restricted to the early Ludlow (Gorstian) of Gotland, Sweden (Copper, 2004, page 7, Figure 2) and the Welsh Borderlands, Great Britain (Copper, 2004, page 8, Figure 3).

Howellella ranges from Llandovery C₂ (latest Aeronian) into the Devonian (Berry and Boucot, 1970; Plate 2). *Isorthis orbicularis* Sowerby, 1839 occurs in both the Gorstian and Ludfordian stages of the Ludlow Series (Lawson and White, 1989, page 78, Figure 53; Watkins, 1979; Molyneux, 2005). In the Arisaig district of Nova Scotia, *Protochonetes* species range up from strata of the upper member of the Ross Brook Formation through the Stonehouse Formation (Harper, 1973, pages 52-55). According to Melchin and MacRae (2005, page 8, Figure 6), the age range represented by these units is Llandovery (late Telychian) to Prídolí.

Boyce has identified *Atrypa sowerbyi* Alexander, 1949? and *Protochonetes novascoticus* (Hall, 1860)? from this site. *Atrypa sowerbyi* Alexander, 1949 is a middle Ludlow species (Copper, 2004). At Arisaig, *Protochonetes novas-*

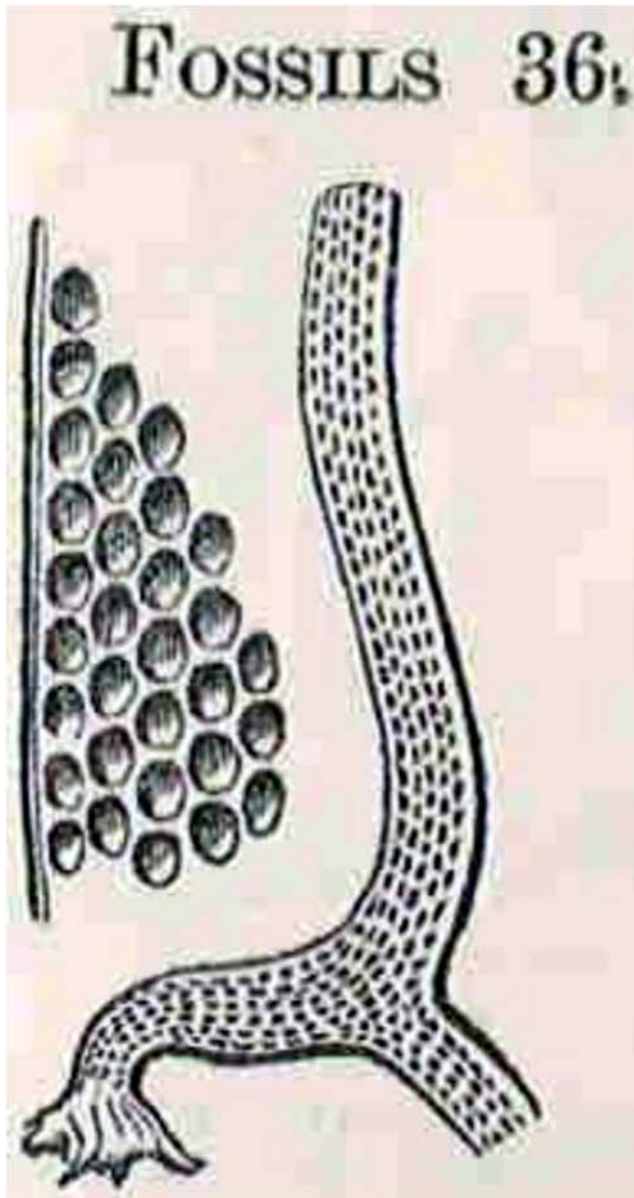


Plate 1. Illustration of *Ptilodictya scalpellum* Lonsdale from Murchison (1854, page 216; *Fossils* 36).

coticus (Hall, 1860) ranges from the French River Formation to the Stonehouse Formation (McLearn, 1924; Harper, 1973), an age range of latest Llandovery to Prídolí (Melchin and MacRae, 2005, page 8, Figure 6). The age of the Williams (1972) locality probably is Ludlow.

Jasperoid Showing (Altius Minerals Corporation)

At Altius Minerals' Jasperoid Showing, *Protochonetes novascoticus* (Hall, 1860)? was recovered from a thin lime-



Plate 2. *Stictopora scalpellum* (Lonsdale, 1839)-bearing outcrop and talus rubble in "sawdust pit" off Salmon Pond Access Road, near Glenwood (JOD-2003-113, LD05-0064). G.C. Squires (left) and J. Lake (right) for scale.

stone layer in sandstone exposed in a trench (2004F034). In addition, a calyx of the crinoid *Gissocrinus* sp. cf. *G. goniodactylus* (Phillips, 1839) was collected from nearby talus rubble (2004F030); *Gissocrinus goniodactylus* (Phillips, 1839) occurs in rocks of the late Wenlock Series (Homerian Stage) – see British Palaeozoic Fossils¹ (1983, page 35; Plate 24, Figure 2). Both sites are in close proximity to the Jasperoid Showing's *Stictopora scalpellum* (Lonsdale, 1839) locality (2004F031). The strata of the Jasperoid Showing are most probably of latest Wenlock (late Homerian) age, although they might extend into the earliest Ludlow (early Gorstian).

Loose blocks in Quarry (LD05-0022)

Abundantly fossiliferous loose blocks of brown-weathering, fine-grained micaceous sandstone in a gravel pit (LD05-0022 - see Plate 10) yielded brachiopods including *Atrypa sowerbyi* Alexander, 1949?, *Microsphaeriodorhynchus nucula* (Sowerby, 1839) and *Protochonetes novascoticus* (Hall, 1860)?, and the cephalopods *Dawsonoceras arisaigense* McLearn, 1924 and *Orthoceras* sp. cf. *O. marklandense* McLearn, 1924. In-place sandstone, 30 m to west, contains the bryozoan *Stictopora scalpellum* (Lonsdale, 1839).

As indicated above, *Atrypa sowerbyi* Alexander, 1949 and *Protochonetes novascoticus* (Hall, 1860) are middle

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Plate 3. *Stictopora scalpellum* (Lonsdale, 1839) from “saw-dust pit”.



Plate 4. Cross-section of branching *Stictopora scalpellum* (Lonsdale, 1839) from VVC Exploration Corporation drill-hole 04-143, ~ 42.66 m depth (2004F016). Scale in cm. Photo courtesy of G.C. Squires.



Plate 5. G.C. Squires (left) and J. Lake (right) at Altius Minerals’ “Fossil Zone” (GCS-2004-058). Specimens of *Stictopora scalpellum* (Lonsdale, 1839) were collected under the trees between J. Lake and the pack-sack to his left.



Plate 6. *Stictopora scalpellum* (Lonsdale, 1839) locality at Altius Minerals’ Jasperoid Showing (2004F031). J. Lake (left) and G.C. Squires (right) for scale. The bryozoan was accompanied by undetermined high-spined gastropods.



Plate 7. J. Lake (left) and G.C. Squires (right) examine steeply dipping reddish sandstone (LD05-0077) at the fossil locality of Blackwood (1982, pages 42, 43; Plate 17). The site now is badly overgrown, and the best fossiliferous layers appear to have been quarried away for roadfill.



Plate 8. *Stictopora scalpellum* (Lonsdale, 1839) covering outcrop at “Bryozoan Ridge” (LD05-0360). The species most commonly occurs alone, or with abundant crinoid debris.

Ludlow and latest Llandovery to Prídolí species, respectively. *Microsphaeridorhynchus nucula* (Sowerby, 1839) occurs in both the Gorstian and Ludfordian stages of the Ludlow Series (Watkins, 1979; Molyneux, 2005). At Arisaig, *Dawsonoceras arisaigense* McLearn, 1924 occurs in the uppermost McAdam Formation (McLearn, 1924, page 157) of



Plate 9. South side of Trans-Canada Highway, immediately east of site of old Glenwood overpass (LD05-0002). This classic locality of Williams (1972) was partially destroyed during highway upgrading in the early 1990s. A. Looking west. B. Looking east. C. Close-up of fine grained, massive micaceous sandstone with weathered-out shelly, calcareous fossiliferous layers.



Plate 10. Brachiopod-rich block of brown-weathering, fine-grained micaceous sandstone in gravel pit (LD05-0022). Note the well preserved valve of *Atrypa sowerbyi* Alexander, 1949? in the lower left corner.



Plate 11. *The Derek Fancey Locality (LD05-0397).* A. G.C. Squires examining coral-rich outcrop. B. Colonial coral *Favosites* sp. - side view. Pen top for scale. C. Colonial coral *Halysites catenularius* (Linnaeus, 1767)? - top view. Pen top for scale. D. *Halysites catenularius* (Linnaeus, 1767)? - oblique side view. E. Colonial coral *Heliolites interstinctus* (Linnaeus, 1767)? Pen (left) for scale. F. Specimens of the solitary coral *Ketophyllum* sp. Pen (bottom) for scale. B, C, E and F courtesy of G.C. Squires.

middle Ludlow (late Gorstian to early Ludfordian) age (*see* Melchin and MacRae, 2005, page 8, Figure 6). *Orthoceras marklandense* McLearn, 1924 occurs in the Stonehouse Formation (McLearn, 1924, page 154) exclusively of Prídolí age (Melchin and MacRae, 2005, page 8, Figure 6).

The loose blocks of this site are assigned a middle Ludlow (late Gorstian to early Ludfordian) age; the fauna appears to correlate with that of the Glenwood site of Williams (1972).

Derek Fancey Locality

This coral-rich locality (LD05-0397 - *see* Plate 11) was discovered by prospector Derek Fancey in 2004, who brought it to the attention of W.D. Boyce and G.C. Squires. The site was visited in 2004 and 2005; the colonial corals *Coenites*, *Favosites*, *Halysites catenularius* (Linnaeus, 1767)?, *Heliolites interstinctus* (Linnaeus, 1767)? were found, as were the solitary coral *Ketophyllum*, the trilobite *Encrinurus* and the snail *Oriostoma*.

Halysites catenularis (Linnaeus, 1767) ranges from the Late Ordovician to the Early Devonian; *Heliolites interstinctus* (Linnaeus, 1767) occurs in strata of Llandovery C₅ (medial Telychian) to Llandovery C₆ (latest Telychian)/earliest Wenlock (earliest Sheinwoodian) age (*see* Boyce *et al.*, 1993, page 189). *Oriostoma*-bearing beds in Back Bay, southwestern New Brunswick are of Llandovery C₄ to C₅ (medial Telychian) age (Boucot *et al.*, 1966); in the type area of the Ludlow Series, *Oriostoma* extends into the basal part of the Ludfordian Series (Watkins, 1979; Molyneux, 2005). Based on present information, a Wenlock age is favoured for the Fancey Locality.

SUMMARY

Coral-rich assemblages within the IIG appear to be of Wenlock age.

Low diversity *Stictopora scalpellum* (Lonsdale, 1839) and crinoid assemblages are indicative of a late Wenlock (Homerian) age.

High diversity brachiopod-rich *Atrypa-Protochonetes* assemblages range from latest Wenlock (Homerian) to middle Ludlow (late Gorstian to early Ludfordian).

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APPENDIX – Indian Islands Group Fossil Localities

Unless otherwise indicated, the datum for the fossil sites is NAD27 and the UTM Zone is 21. “2004F” and “2005F” = W. Douglas Boyce; “GCS” = Gerald C. Squires; “JOD” = Jacqueline O’Driscoll; “LD” = Lawson Dickson.

NTS 02D/11**2004F016**

Beaver Brook Mine, 629837E, 5395493N (UTM coordinates from Squires, 2005, page 231). VVC Exploration Corporation Drill Hole 04-143. 43.02 to 42.66 m depth.

Bryozoa

Stictopora scalpellum (Lonsdale, 1839)

Echinodermata-Crinoidea

Gen. et sp(p). undet.

NTS 02D/14**GCS-2004-058 (2004F038)**

Altius Minerals’ “Fossil Zone”. 640943E, 5407845N.

Bryozoa

Stictopora scalpellum (Lonsdale, 1839)

NTS 02D/15**2004F030**

Altius Minerals’ Jasperoid Showing, Boyce Sample #1B. Talus rubble. 649963E, 5423572N.

Echinodermata-Crinoidea

Gissocrinus sp. cf. *G. goniodactylus* (Phillips, 1839) - calyx (-)

2004F031

Altius Minerals’ Jasperoid Showing, Boyce Sample #2. Outcrop and float. Limestone debris flows. Angular fragments of fossiliferous limestone in laminated green mudstone. 649926E, 5423551N.

Bryozoa

Stictopora scalpellum (Lonsdale, 1839)

Mollusca-Gastropoda

Gen. et sp. undet. - high spired form

2004F034

Altius Minerals’ Jasperoid Showing, Boyce Sample #5. Thin limestone layer within sandstone in trench. 649913E, 5423538N.

Brachiopoda-Articulata

Atrypa sp.

Howellevella sp.

Leangella sp.

Protochonetes novascoticus (Hall, 1860)?

Echinodermata-Crinoidea

Gen. et sp(p). undet. - columnals, fragments

LD05-0002 (1992F006 to 1992F009, 2002F006, 2004F010, 2005F032)

Glenwood, south side of Trans-Canada Highway, immediately east of site of old overpass. Classic locality of Williams (1972). 654092E, 5429025N (NAD83).

Arthropoda-Trilobita

Calymene sp.

Brachiopoda-Articulata

Atrypa sowerbyi Alexander, 1949?

Howellella sp.

Isorthis sp.

Protochonetes novascoticus (Hall, 1860)?

Mollusca-Gastropoda

Gen. et sp. undet.

LD05-0022 (2005F033)

Loose blocks of brown-weathering, fine-grained micaceous sandstone in gravel pit. 649775E, 5425572N.

Annelida

“*Serpulites*” sp.

Anthozoa-Rugosa

Gen. et sp. undet.

Anthozoa-Tabulata

Favosites sp.

Gen. et spp. undet.

Arthropoda-Trilobita

Calymene sp. - pygidium (-)

Brachiopoda-Articulata

Atrypa sowerbyi Alexander, 1949?

“*Camarotoechia*” sp.

Dalmanella sp.

Howellella sp.

Isorthis sp.

Leptostrophia or Mclearnites sp.

Microsphaeridorhyncus nucula (Sowerby, 1839)

Protochonetes novascoticus (Hall, 1860)?

Sphaerirhynchia sp.

Strophomenid gen. et sp. undet.

Bryozoa

Gen. et sp. undet.

Echinodermata-Crinoidea

Gen. et sp(p). - columnals

Mollusca-Cephalopoda

Dawsonoceras arisaigense McLearn, 1924

Orthoceras sp. cf. *O. marklandense* McLearn, 1924

Mollusca-Gastropoda

?*Loxoplocus* sp.

?*Poleumita* sp.

Note: In-place sandstone, 30 m to west, contains the bryozoan *Stictopora scalpellum* (Lonsdale, 1839).

NTS 02E/02

JOD-2003-113 (2004F006)

Salmon Pond Access Road, “sawdust pit”. 654920E, 5430998N.

Bryozoa

Stictopora scalpellum (Lonsdale, 1839)

Echinodermata-Crinoidea

Gen. et sp(p). undet. - columnals (abundant)

Mollusca-Cephalopoda?

Gen. et sp. undet - straight form

LD05-0064 (2004F008 & 2004F009, 2005F038)

Salmon Pond Access Road, "sawdust pit". 654909E, 5431007N.

Bryozoa

Stictopora scalpellum (Lonsdale, 1839)

Echinodermata - Crinoidea

Gen. et sp(p). undet. - columnals (abundant)

LD05-0077 (1985F059, 1992F098, 1993F036, 2004F007, 2004F028, 2005F040)

Salmon Pond Access Road. Fossil locality of Blackwood (1982, pages 42, 43; Plate 17); Stop 2-1 of Blackwood (1984, page 11). 654500E, 5430036N.

Anthozoa-Rugosa

Gen. et sp. undet.

Anthozoa-Tabulata

?*Favosites* sp.

?*Heliolites* sp

Brachiopoda-Articulata

Atrypa sp.

Bryozoa

Stictopora scalpellum (Lonsdale, 1839)

Echinodermata-Crinoidea

Gen. et sp(p). undet.

Mollusca-Gastropoda

Gen. et sp. undet.

LD05-0360 (2005F024 & 2005F025, 2005F068)

"Bryozoan Ridge". 665370E, 5449508N.

Bryozoa

Stictopora scalpellum (Lonsdale, 1839)

NTS 02E/07

LD05-0397 (2004F042, 2005F078)

"Derek Fancey Locality". 679034E, 5473182N.

Anthozoa-Rugosa

Ketophyllum sp.

Anthozoa-Tabulata

Coenites sp.

Favosites sp.

Halysites catenularius (Linnaeus, 1767)?

Heliolites interstinctus (Linnaeus, 1767)?

Arthropoda-Trilobita

Encrinurus sp. - pygidium (+)

Mollusca-Gastropoda

Oriostoma sp. - identification by Dr. D.M. Rohr (personal communication, 2005)