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Mesozoic microfossil assemblages from two wells on Prince  
Patrick Island, Canadian Arctic Archipelago

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Canadian Arctic Archipelago

## ABSTRACT

Jurassic and Triassic microfaunal assemblages, almost exclusively foraminifera, are identified and dated from two wells drilled on Prince Patrick Island: Elf Jameson Bay C-31 to a depth of 8327 ft. (2538m) in 1971 and BP *et al* Panarctic Satellite F-68 to a depth of 12075 ft. (3680m) in 1971-1972. Both wells at the western edge of the Sverdrup Basin were abandoned as dry holes. A correlation chart integrating the microfaunal assemblages with the rock units is provided.

## INTRODUCTION

The Jameson Bay well penetrated the more complete Jurassic section starting in the lower Deer Bay Formation, whereas drilling in the Satellite well commenced in the older Snowpatch Member of the Jameson Bay Formation (Fig. 1). There are gaps in sample coverage of the Satellite well, especially in the Cape Canning Member of the Jameson Bay Formation, where the more critical index species were not retrieved. Discussion of the microfaunal assemblages begins near the top of the succession and proceeds down hole.

## MICROFAUNAL SUCCESSION

Rich assemblages of Oxfordian-Kimmeridgian foraminifera from the Ringnes Formation in the Jameson Bay well compare favourably with those from the equivalent unit in the eastern

Sverdrup Basin, where it was known as the upper shale member of the Savik Formation (Wall 1983, Fig. 11). In addition, Hedinger (1993) has documented the occurrence of a correlative microfauna in the lower member of the Husky Formation in the Beaufort-Mackenzie Basin.

The underlying Hiccles Cove Formation is nearly devoid of microfossils with no trace in the Jameson Bay well of the Callovian *Guttulina tatariensis* assemblage, characteristic of this interval in outcrop sections on Axel Heiberg Island in the central Sverdrup Basin (Embry and Wall, unpublished chart). However, Harrison *et al* (2000, Fig. 4) indicate the formation includes both Callovian and Bathonian strata.

A weak development of *Riyadhella sibirica* is recognized within the McConnell Island Formation in the Jameson Bay well. This foraminifer is, however, much more prominent in outcrops of this formation on Axel Heiberg Island, where it is found in association with index ammonites such as *Arkelloceras*, *Arctocephalites* and *Artioceras* of Bajocian-Bathonian age.

The Sandy Point Formation, yielding sparse foraminifera of no diagnostic value, is underlain by the Snowpatch Member of the Jameson Bay Formation, dominated by the foraminifer *Ammodiscus asper* of Aalenian age. This marker fossil is also present in the Satellite well. *A. asper* has an extensive distribution in the Sverdrup Basin, including its recognition by the author (1981, Fig. 12, p. 257) in Aalenian-dated beds of the Savik Creek outcrop section on eastern Axel Heiberg Island.

The Cape Canning Member of the Jameson Bay Formation in the Jameson Bay well is characterized by a diversified microfauna, including the foraminifera *Lenticulina toarcense* Payard and *Flabellamina* sp. 1, and the ostracode *Procytheridea* sp. aff. *P. magnycourtensis* Apostolescu which strongly indicate a Toarcian age. Faunal recovery from this member in the Satellite well is sparse due to a large gap in sample coverage, but the same ostracod which was collected on the boundary between the Snowpatch and Cape Canning members could also be associated with the latter.

The Intrepid Inlet Member of the Jameson Bay Formation is thought to span the Toarcian-Pliensbachian boundary. This would appear more evident in the Satellite well than in the Jameson Bay well, where the faunal components appear to be longer-ranging.

Both the King Christian and Lougheed Island formations are recognized in the Jameson Bay well, whereas only the latter appears to be present in the Satellite well. The microfauna is considered to be Pliensbachian and not too dissimilar from that of the overlying Intrepid Inlet Member.

The Grosvenor Island Formation is dated Sinemurian with the possibility of its lowest beds being Hettangian. *Ammodiscus siliceus* and *Glomospira perplexa* are prominent components.

The Upper Triassic Barrow and Hoyle Bay formations yielded distinctive foraminiferal assemblages readily distinguished from the overlying Jurassic microfaunas.

## APPENDIX I

Elf Jameson Bay C-31 Well

Location Prince Patrick Island

N76°40'12.041", W116°43'45.397",

Elevations KB 207 ft (63.09m) Ground 191 ft (58.22m)

Spudded 11-3-71. Abandoned 18-5-71

## JURASSIC

Deer Bay Formation 16 - 250 ft (4.88 - 76.20m)

Sampled interval 90 - 250 ft (27.43 - 76.20m)

Foraminifera:

*Saccamina* sp. - one

*Haplophragmoides* spp., dominant, wide size range

*Trochamina* sp. - one

*Lenticulina iatriensis* Dain - one

*L.* spp.

*Glandulina* sp. (pyritic cast) - one

Age: Late Jurassic, Kimmeridgian.

Ringnes Formation 250 - 942 ft (76.20 - 287.12m)

Sampled interval 410 - 500 ft (124.97 - 152.40m)

Foraminifera:

*Saccamina* spp.

*Ammodiscus* sp. cf. *A. orbis* Hedinger – one

*Saturnella brookeae* Hedinger - one

*Evolutinella infirma* Hedinger

*Labrospira goodenoughensis* (Chamney)

*Ammobaculites lunaris* Hedinger

*Grillina praenodulosa* (Dain) - one

*Lenticulina* sp. cf. *L. undosa* Beljaevskaja

*L.* spp.

*Saracenaria* sp. - one

*Globulina* sp. cf. *G. alexandrae* Dain - one

Age. Late Jurassic, Oxfordian - Kimmeridgian.

Sampled interval 660 - 750 ft (201.17 - 228.60m)

Foraminifera:

*Ammodiscus cheradospirus* Loeblich and Tappan

*A. orbis* Lalicker

*A. thomsi* Chamney

*Arenoturrspirillina waltoni* Chamney - one

*Haplophragmoides* spp.

*Evolutinella infirma* Hedinger

*Labrospira goodenoughensis* (Chamney)

*Recurvoides canningensis* (Tappan)

*R. sublustris* Dain

*Ammobaculites* sp. cf. *A. fragmentarius* Cushman

*A. lunaris* Hedinger

*A.* spp.

*Trochammina elevata* Kosyreva subsp. *inflata* Hedinger

*T. kosyreae* Levina

*T.* sp. cf. *T. rostovzevi* Levina

*Dentalina* sp. (pyritic cast) - one

*Grillina praenodulosa* (Dain) - one incomplete

*Lenticulina* spp.

*Pseudonodosaria brandi* (Tappan) - one

*Saracenaria* sp.

*Globulina* sp. cf. *G. alexandrae* Dain

*Conorboides brauni* Hedinger - one

Age: Late Jurassic, Oxfordian.

Sampled interval 900 - 950 ft (274.32 - 289.56m)

Foraminifera:

*Saccammina* sp. *A* of Hedinger - one

*S.* spp.

*Ammodiscus cheradospirus* Loeblich and Tappan

*A. thomsi* Chamney

*Haplophragmoides* spp.

*Evolutinella infirma* Hedinger

*Labrospira goodenoughensis* (Chamney)

*L. miranda* (Dain)

*Recurvoides cunningensis* (Tappan)

*R. sublustris* Dain

*Ammobaculites alaskensis* Tappan subsp. minor Hedinger

*A. lunaris* Hedinger

*Bulbobaculites willowensis* Hedinger - one

*Trochammina elevata* Kosyreva subsp. elevata Hedinger

*T. kosyrevae* Levina

*Grillina praenodulosa* (Dain) - one

Age: Late Jurassic, Oxfordian.

Hiccles Cove Formation 942-1451 ft (287.12-442.26 m)

Microfossils rare and believed to be primarily cavings

Age: Indeterminate from sparse microfauna; assumed to be Late Bathonian to Callovian on basis of stratigraphic position.

McConnell Island Formation 1451-1566 ft (442.26-477.32 m)

Foraminifera:

*Ammodiscus* sp. aff. *A. cheradospirus* Loeblich and Tappan-fragments

*Haplophragmoides* spp., poorly preserved

*Riyadhella sibirica* Myatliuk

Age: Bajocian-Bathonian, based on *R. sibirica*.



Sandy Point Formation 1566-1802 ft (477.32-549.25 m)

Foraminifera (rare):

*Ammodiscus* sp. aff. *A. cheradospirus* Loeblich and Tappan-fragments

*A.* sp. cf. *A. orbis* Lalicker-one

*Haplophragmoides* spp., poorly preserved

Age: Indeterminate from assemblage; assumed to be Aalenian on basis of stratigraphic position.

Jameson Bay Formation 1802-2806 ft (549.25-855.27 m)

Snowpatch Member 1802-2254 ft (549.25-687.02 m)

Foraminifera:

*Ammodiscus asper* Terquem-dominant taxon

Other components (*Saccamina*, *Haplophragmoides* and *Trochammina*) are very rare

Age: Aalenian based on dominance of *A. asper*.

Cape Canning Member 2254-2690 ft (687.02-819.91 m)

Foraminifera:

*Ammodiscus asper* (Terquem)

*Reophax metensis* Franke

*Haplophragmoides barrowensis* Tappan

*Recurvoides canningensis* (Tappan)

*Flabellamina* sp. 1 of Wall 1983

*Triplasia kingakensis* Loeblich and Tappan – one

*Lenticulina excavata* (Terquem) – one or more

*L. toarcense* Payard

Ostracoda:

*Procytheridea* sp. aff. *P. magnycourtensis* Apostolescu

Age: Toarcian.

Intrepid Inlet Member 2690-2806 ft (819.91-855.27 m)

Foraminifera:

*Haplophragmoides barrowensis* Tappan

*Recurvoides canningensis* (Tappan)

*Ammobaculites* sp. cf. *A. cobbani* Loeblich and Tappan

*Nodosaria mitis* (Terquem and Berthelin) – one

Age: Pliensbachian-Toarcian.

King Christian Formation 2806-2938 ft (855.27-895.50 m)

Foraminifera:

*Ammodiscus* sp.

*Haplophragmoides barrowensis* Tappan

*Ammobaculites vetusta* (Terquem and Berthelin)

*Lenticulina* sp. – one

Age: Pliensbachian.

Lougheed Island Formation 2938-3084 ft (895.50-940.00 m)

Foraminifera:

*Ammodiscus asper* (Terquem)

*Haplophragmoides barrowensis* Tappan

*Recurvoides canningensis* (Tappan)

*Ammobaculites vetusta* (Terquem and Berthelin)

Age: Plienbachian.

Grosvenor Island Formation 3084-3255 ft (940.00-992.12 m)

Foraminifera:

*Bathysiphon* sp.

*Ammodiscus siliceus* (Terquem)

*Glomospira perplexa* Franke

*Ammovertella* sp., an attached form – one

*Reophax metensis* Franke

*Haplophragmoides* spp.

*Recurvoides canningensis* (Tappan)

*Ammobaculites* spp.

*Trochammina* sp.

*Astacolus* sp. cf. *A. arietis* (Terquem) – partial specimens

*Citharina* sp. aff. *C. fallax* (Payard) – one

*Dentalina* sp. aff. *D. pseudocommunis* Franke – partial specimens

*Lenticulina* spp.

*Nodosaria* spp. – fragments

Age: Sinemurian, possibly Hettangian in lower beds, based on assemblage.

## TRIASSIC

Barrow Formation 3255-3386 ft (992.12-1032.05 m)

Sparse microfauna from 3255-3300 ft (992.12-1005.84 m) appears to consist mainly of Jurassic cavings.

Sampled interval 3300-3400 ft (1005.84-1036.32 m)

Foraminifera:

*Ammodiscus siliceus* (Terquem)

\*A. sp., minute, very thin, multi-whorled

\**Reophax* spp., small, multi-chambered

\**Evolutinella* sp., pale yellow

\**Astacolus commudatus* Tappan – dominant

\**Sagoplecta* sp. cf. *S. himatiodes* Tappan – one

Age: Late Triassic

\*not observed in overlying Jurassic section.

Hoyle Bay Formation 3386-3740 ft (1032.05-1139.95 m)

Cape Richards Member 3386-3610 ft (1032.05-1100.33 m)

Sampled interval 3400-3610 ft (1036.32-1100.33 m)

Foraminifera:

*Ammodiscus siliceus* (Terquem) – one

A. sp., minute, very thin, multi-whorled – one

*Reophax* spp., small, multi-chambered

*Evolutinella* sp., pale yellow

*Astacolus commudatus* Tappan – dominant

*Nodosaria liratella* Tappan – one

N. sp. cf. *N. shublikensis* Tappan

*Pseudoglandulina simpsonensis* Tappan

*Lingulina alaskensis* Tappan

*L. borealis* Tappan

*Fronicularia* spp.

*Bolivina* sp. – one

*Discorbis* sp. aff. *D. pristina* Tappan – one

Age: Late Triassic.

APPENDIX 2

BP et al. Panarctic Satellite F-68 Well

Location Prince Patrick Island N77°17'27", W116°55'10"

Elevations KB 83 ft (25.30 m), Ground 68 ft (20.73 m)

Spudded 17-9-71. Abandoned 2-5-72

## JURASSIC

Jameson Bay Formation 100-1093 ft (30.48-331.15 m)

Snowpatch Member 100-579 ft (30.48-176.48 m)

Foraminifera: no recovery above 290 ft (88.39 m)

*Saccamina* sp., flask-shaped

*Ammodiscus asper* (Terquem)

*A.* sp. cf. *A. siliceus* (Terquem)

*Reophax* spp.

*Haplophragmoides barrowensis* Tappan

*Ammobaculites* sp. cf. *A. vetusta* (Terquem and Berthelin)

*A.* sp., poorly preserved

*Dentalina* spp., mostly incomplete specimens

*Lenticulina wisniowskii* (Myatliuk) – one

*L.* sp.

Ostracoda:

*Procytheridea* sp. aff. *P. magnycourtensis* Apostolescu

Age: Aalenian.

Cape Canning Member 579-930 ft (176.48-283.46 m)

Foraminifera (poorly preserved):

*Saccamina* sp., flask-shaped

*Haplophragmoides barrowensis* Tappan

*Ammobaculites* sp. cf. *A. vetusta* (Terquem and Berthelin)

*Trochammina* spp., small, indeterminate

Age: Toarcian.

Note: No samples available between 680-870 ft (207.26-265.18 m), those between 870-960 ft (265.18-292.61 m) are basically barren.

Intrepid Inlet Member 930-1093 ft (283.46-331.15 m)

Foraminifera:

*Reophax* sp., thin, finely granular

*Haplophragmoides barrowensis* Tappan

*Recurvoides canningensis* (Tappan)

*Textularia areoplecta* Tappan

*Lenticulina toarcense* Payard

Age: Pliensbachian-Toarcian.

Lougheed Island Formation 1093-1589 ft (331.15-484.33 m)

Foraminifera:

*Bathysiphon* sp., massive, gray, siliceous

*B.* sp., thin, buff

*Ammodiscus siliceus* (Terquem)

*Reophax densa* Tappan

*R.* sp. ex gr. *R. metensis* Franke

*R.* spp., thin

*Haplophragmoides barrowensis* Tappan

*Recurvoides canningensis* (Tappan)

*Ammobaculites alaskensis* Tappan sensu lato

*A. vetusta* (Terquem and Berthelin) – one

*Textularia areoplecta* Tappan

*Trochammina* sp., massive, gray, siliceus

*Frondicularia lustrata* Tappan – one

Age: Pliensbachian.

Grosvenor Island Formation 1589-1975 ft (484.33-601.98 m)

Foraminifera:

*Bathysiphon* sp., massive, gray, siliceus

*Ammodiscus siliceus* (Terquem)

*Glomospira perplexa* Franke

*Reophax densa* Tappan

*R. metensis* Franke

*Haplophragmoides barrowensis* Tappan

*Recurvoides canningensis* (Tappan)

*Ammobaculites alaskensis* Tappan sensu lato

*A. vetusta* (Terquem and Berthelin)

*Gaudryina kelleri* Tappan

*Dorothia*(?) *squamosa* (Terquem and Berthelin)

*Frondicularia terquemi* d'Orbigny

*Marginulina calva* Tappan



*M. thuringica* (Franke)

*Nodosaria phobytica* Tappan

Species of genera *Astacolus*, *Lenticulina* and *Vaginulinopsis* also present

Age: Sinemurian.

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SERIES		ELF JAMESON BAY C-31		B.P. et al. PANARCTIC SATELLITE F-68	
STAGE	ROCK UNIT	MICROFOSSILS	ROCK UNIT	MICROFOSSILS	
Upper Jurassic	TITHONIAN	DEER BAY FM (lower part)	Lenticulina iatrensensis		
	KIMMERIDGIAN	RINGNES FORMATION	Ammodiscus thomasi Evolutinella infirma Labrospira goodenoughensis Recurvoides subulstris Ammobaculites lunaris Trochammmina elevata		
	OXFORDIAN				
Middle Jurassic	CALLOVIAN	HICCLES COVE FORMATION	sparse foraminifera		
	BATHONIAN	McCONNELL ISLAND FORMATION	Riyadhella sibirica		
	BAJOCIAN				
	AALENIAN	SANDY POINT FORMATION	sparse foraminifera		
Lower Jurassic	TOARCIAN	SNOWPATCH MEMBER	Ammodiscus asper	SNOWPATCH MEMBER	Ammodiscus asper Procytheridea sp. aff. P. magnycourtensis
		CAPE CANNING MEMBER	Flabellammima sp. 1 Lenticulina toarcense Procytheridea sp. aff. P. magnycourtensis	CAPE CANNING MEMBER	Haplophragmoides barrowensis (large gap in sample coverage)
		INTREPID INLET MEMBER	{ Haplophragmoides barrowensis Recurvoides canningensis Ammobaculites vetusta }	INTREPID INLET MEMBER	Lenticulina toarcense Textularia areopecta
	PLIENSBACHIAN	KING CHRISTIAN FORMATION		LOUGHEED ISLAND FM	Ammodiscus siliceus Haplophragmoides barrowensis Recurvoides canningensis
		LOUGHEED ISLAND FM			
Upper Triassic	SINEMURIAN HETTANGIAN? (lower beds)	GROSVENOR ISLAND FORMATION	Ammodiscus siliceus Glomospira perplexa	GROSVENOR ISLAND FORMATION	Ammodiscus siliceus Glomospira perplexa Gaudryina kelleri
	LATE TRIASSIC	BARROW FORMATION	Astacolus connudatus Ammodiscus sp. (minute)	BARROW FORMATION	Astacolus connudatus Ammodiscus sp. (minute)
		HOYLE BAY FM (CAPE RICHARDS MBR)	HOYLE BAY FM (CAPE RICHARDS MBR)	Lingulina alaskensis Pseudoglandulina simpsonensis	HOYLE BAY FM (CAPE RICHARDS MBR)

Figure 1. Correlation chart of Jurassic-Triassic strata, subsurface Prince Patrick Island, Canadian Arctic Archipelago